MONA OFFSHORE WIND PROJECT

Environmental Statement

Volume 2, Chapter 2: Benthic subtidal and intertidal ecology

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Image of an offshore wind farm

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List of annexes

Volume 6, Annex 2.1: Benthic and subtidal ecology technical report of the Environmental Statement.

Glossary

Term	Meaning
Annelida	A large phylum that comprises the segmented worms, which include earthworms, lugworms, ragworms, and leeches.
Arthropoda	Phylum with a wide diversity of animals with hard exoskeletons and jointed appendages.
Benthic Ecology	Benthic ecology encompasses the study of the organisms living in and on the sea floor, the interactions between them and impacts on the surrounding environment.
Biotope	The combination of physical environment (habitat) and its distinctive assemblage of conspicuous species.
Cumulative Effects	Changes to the environment caused by a combination of present and future projects, plans or activities.
Drop-down Video	A survey method in which imagery of habitat is collected, used predominantly to survey marine environments.
Echinoderm	A marine invertebrate of the phylum Echinodermata, such as a starfish, sea urchin, or sea cucumber.
Epifauna	Organisms living on the surface of the seabed.
Epibenthic	Benthic invertebrates living on the surface of the seabed.
Eulittoral	Applied to the habitat formed on the lower shore of an aquatic ecosystem, below the littoral zone.
Filter Feeder	A sub-group of suspension feeding animals that feed by straining suspended matter and food particles from water, typically by passing the water over a specialized filtering structure.
Habitat	The environment that a plant or animal lives in.
Infauna	The animals living in the sediments of the seabed.
Infralittoral	A subzone of the sublittoral in which upward-facing rocks are dominated by erect algae.
Isle of Man Territorial Sea Committee	A cross-governmental committee which was set up to manage the Isle of Man's interests regarding its territorial sea and the resources within it including hydrocarbon, coal and mineral rights, up to the 12 nautical mile limit.
Intertidal area	The area between Mean High Water Springs (MHWS) and Mean Low Water Springs (MLWS).
Invasive Species	An introduced organism that becomes overpopulated and negatively alters its new environment.
Littoral	Residing within the littoral zone which extends from the high water mark, which is rarely inundated, to shoreline areas that are permanently submerged.
Mollusca	Phylum of invertebrates which have a soft unsegmented body, commonly protected by a calcareous shell.
National Marine Biological Analytical Quality Control Scheme	This scheme provides a source of external quality assurance for laboratories engaged in the production of marine biological data.
Polychaete	A class of segmented worms often known as bristleworms.

Term	Meaning
SACFOR Classification	A measure of abundance which records species in terms of percentage cover or counts and categorises in to superabundant, abundant, common, frequent, occasional and rare.
Special Area of Conservation (SAC)	Special Areas of Conservation (SACs) are areas designated under the European Union (EU) Habitat's Directive to help conserve certain plant and animal species listed in the Directive. Article 3 of the Habitats Directive requires the establishment of a European network of important high-quality conservation sites that will make a significant contribution to conserving the 189 habitat types and 788 species identified in Annexes I and II of the Directive (as amended). The listed habitat types and species are those considered to be most in need of conservation at a European level (excluding birds).
Species	A group of living organisms consisting of similar individuals capable of exchanging genes or interbreeding.
Sublittoral	Area extending seaward of low tide to the edge of the continental shelf.
Subtidal	Area extending from below low tide to the edge of the continental shelf.
Tidal Excursion	The horizontal distance over which a water particle may move during one cycle of flood and ebb.
Trenchless Techniques	A collective term for methods of cable installation which do not involve open cut trenching (e.g. Horizontal Directional Drilling (HDD), Direct Pipe, thrust bore drilling or microtunnelling).

Acronyms

Acronym	Description
AC	Alternating Current
BAP	Biodiversity Action Plan
BNG	Biodiversity Net Gain
CCS	Carbon Capture and Storage
CEA	Cumulative Effects Assessment
Cefas	Centre for Environment, Fisheries and Aquaculture Science
CIEEM	Chartered Institute of Ecology and Environmental Management
CMACS	Centre for Marine and Coastal Studies
CMS	Construction Method Statement
CSIP	Cable Specification and Installation Plan
CSQGs	Canadian Environmental Quality Guidelines
DAERA	Department of Agriculture, Environment and Rural Affairs (Northern Ireland)
DCO	Development Consent Order
DDV	Drop Down Video
Defra	Department for Environment, Food and Rural Affairs
EcIA	Ecological Impact Assessment

Acronym	Description
ECoW	Ecological Clerk of Works
EIA	Environmental Impact Assessment
EMF	Electromagnetic Field
EMP	Environmental Management Plan
EPP	Evidence Plan process
ERL	Effects Range Low
ERM	Effects Range Median
EWG	Expert Working Group
HDD	Horizontal Directional Drilling
HRA	Habitat Regulations Assessment
HVAC	High Voltage Alternating Current
HVDC	High Voltage Direct Current
IEF	Important Ecological Feature
IEMA	Institute of Environmental Management and Assessment
IMO	International Maritime Organisation
INNS	Invasive Non-Native Species
ISAA	Information to Support an Appropriate Assessment
JNCC	Joint Nature Conservation Committee
MarESA	Marine Evidence based Sensitivity Assessment
MARLIN	Marine Life Information Network
MARPOL	The International Convention for the Prevention of Pollution from Ships
MBA	Marine Biological Association
MCA	Maritime and Coastguard Agency
MCZ	Marine Conservation Zone
MDS	Maximum Design Scenario
MHWS	Mean High Water Springs
MLWS	Mean Low Water Springs
MMEA	Manx Marine Environmental Assessment
MMO	Marine Management Organisation
MNCR	Marine Nature Conservation Review
MPA	Marine Protected Area
MPCP	Marine Pollution Contingency Plan
MSFD	Marine Strategy Framework Directive
NBN	National Biodiversity Network
NPS	National Policy Statement

Acronym	Description
NRW	Natural Resources Wales
NSIP	Nationally Significant Infrastructure Project
OESEA	Offshore Energy Strategic Environmental Assessment
OPRED	Offshore Petroleum Regulator for Environment and Decommissioning
OSP	Offshore Substation Platform
OSPAR	The Convention for the Protection of the Marine Environment of the North-East Atlantic
OWES	Offshore Wind Environmental Standards
PAH	Polycyclic Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyls
PD	Project Design
PEIR	Preliminary Environmental Information Report
PEL	Probable Effect Level
PPW	Planning Policy Wales
SAC	Special Area of Conservation
SACFOR	Superabundant, Abundant, Common, Frequent, Occasional and Rare
SNCB	Statutory Nature Conservation Body
SPA	Special Protection Area
SPM	Suspended Particulate Matter
SSC	Suspended Sediment Concentration
TEL	Threshold Effect Level
TSC	Isle of Man Territorial Sea Committee
TWT	The Wildlife Trust
UXO	Unexploded Ordnance
WFD	Water Framework Directive
WTW	Wildlife Trust Wales
ZoI	Zone Of Influence

Units

Unit	Description
%	Percentage
mm	Millimetres
cm	Centimetres
m	Metres
km	Kilometres

Unit	Description
m^2	Square metres
km^2	Square kilometres
m^3	Cubic metres
m^3/d/m	Cubic metres transported per day per metre width of transport path (i.e. perpendicular to direction of transport)
nm	Nautical miles
m/s	Metres per second
m/h	Metres per hour
mg/l	Milligrams per litre
Mt	Metric tonnes
Kv	Kilovolts
MW	Megawatts
GWh	Gigawatt hour
mG	Milligauss
mV/cm	Millivolt per centimetre
µT	Microtesla
^oC	Degrees centigrade
cfu/g	Colony-forming unit per gram

2 Benthic subtidal and intertidal ecology

2.1 Introduction

2.1.1 Overview

2.1.1.1 This chapter of the Environmental Statement presents the assessment of the potential impact of the Mona Offshore Wind Project on benthic subtidal and intertidal ecology. Specifically, this chapter considers the potential impact of the Mona Offshore Wind Project seaward of Mean High Water Springs (MHWS) during the construction, operations and maintenance, and decommissioning phases. Those impacts of the Mona Offshore Wind Project landward of MHWS are addressed in Volume 3, Chapter 3: Onshore ecology of the Environmental Statement.

2.1.1.2 The assessment presented is informed by the following technical chapters:

- Volume 2, Chapter 1: Physical processes of the Environmental Statement.

2.1.1.3 This chapter also draws upon information contained within:

- Volume 6, Annex 1.1: Physical processes technical report of the Environmental Statement
- Volume 6, Annex 2.1: Benthic subtidal and intertidal ecology technical report of the Environmental Statement.

2.1.1.4 In particular, this Environmental Statement chapter:

- Presents the existing environmental baseline established from desk studies, site specific surveys and consultation
- Identifies any assumptions and limitations encountered in compiling the environmental information
- Presents the potential environmental effects on benthic subtidal and intertidal ecology arising from the Mona Offshore Wind Project, based on the information gathered and the analysis and assessments undertaken
- Highlights any necessary monitoring and/or mitigation measures which could prevent, minimise, reduce or offset the possible environmental effects of the Mona Offshore Wind Project on benthic subtidal and intertidal ecology.

2.2 Legislative and policy context

2.2.1 Legislation

2.2.1.1 The full relevant legislative context for the Mona Offshore Wind Project has been detailed in Volume 1, Chapter 2: Policy and legislation context of the Environmental Statement, with the legislation outlined below being the most relevant to benthic subtidal and intertidal ecology.

Marine and Coastal Access Act 2009

2.2.1.2 Parts three and four of the Marine and Coastal Access Act 2009 introduced a new marine planning and licensing system for overseeing the marine environment and a requirement to obtain a marine licence for certain activities and works at sea. Section 149A of the Planning Act 2008 allows applicants for development consent to apply for 'deemed marine licences' as part of the consenting process. This section only applies to works which are outside Welsh inshore waters. For works which are within Welsh inshore waters a separate marine licence is required from Natural Resources Wales (NRW).

2.2.1.3 Part 5 of the Marine and Coastal Access Act 2009 enables the designation of Marine Conservation Zones (MCZs) in England and Wales as well as UK offshore areas. Consideration of MCZs is required for any marine licence application or application for development consent which includes a deemed marine licence. This legislation has been included as the Zone of Influence (ZoI) for the Mona Offshore Wind Project includes English waters where this legislation is applicable.

Habitats Regulations

2.2.1.4 The Conservation of Habitats and Species Regulations 2017 (as amended) and the Conservation of Offshore Marine Habitats and Species Regulations 2017 (as amended) (collectively known as the 'Habitats Regulations') require the assessment of significant effects on internationally important nature conservation sites, including:

- Special Areas of Conservation (SACs) or candidate SACs
- Special Protection Areas (SPAs) or potential SPAs
- Sites of Community Importance.

2.2.1.5 These designated sites have been given full consideration in Volume 6, Annex 2.1: Benthic subtidal and intertidal ecology technical report of the Environmental Statement and are given further consideration within this chapter where the impacts are deemed likely to have an effect. Additionally the impact of the Mona Offshore Wind Project on all habitats, species and sites protected under the Habitats Regulations is assessed in Habitat Regulations Assessment (HRA) Stage 1 Screening Report (Document Reference E1.1) and HRA Stage 2 Information to support the Appropriate Assessment (ISAA) (Document Reference E1.1, E1.2 and E1.3).

Environment Act 2021

2.2.1.6 The Environment Act 2021 sets out targets, plans and policies for environmental protection in England. Schedule 15 of the Environment Act 2021 sets out provisions for Biodiversity Net Gain in respect of nationally significant infrastructure projects (NSIPs) and amends the Planning Act 2008. These provisions are not yet in force. The provisions include the requirement for the production of Biodiversity Net Gain (BNG) statements for applications for development consent under the Planning Act. In response to the recent consultation on the requirements of the Environment Act 2021, the Government has stated that it intends to produce a draft BNG statement and intends to consult with the industry on this (Department for Environment, Food and Rural Affairs (Defra), 2023). The stated intention is for the requirements of the Environment Act 2021 in relation to biodiversity to be implemented no later than 2025, which will temporally overlap with the ongoing development of the Mona Offshore Wind Project. The approach taken for the Mona Offshore Wind Project regarding biodiversity enhancement is outlined in the Biodiversity Benefit and Green Infrastructure Statement (Document Reference J7).

2.2.1.7 The Environment Act 2021 applies to works which are outside Welsh inshore waters. For works which are within Welsh inshore waters a separate marine licence is required from Natural Resources Wales (NRW). This legislation has been included as the ZoI for the Mona Offshore Wind Project includes English waters where this legislation is applicable.

Environment (Wales) Act 2016

2.2.1.8 The Environment (Wales) Act 2016 sets out targets, plans and policies for environmental protection in Wales. Section 6 of the Environment (Wales) Act 2016 requiring all public authorities, when carrying out their functions in Wales, to seek to "maintain and enhance biodiversity" where it is within the proper exercise of their functions. In doing so, public authorities must also seek to "promote the resilience of ecosystems". Welsh Government now requires strategic action to safeguard ecological networks and secure biodiversity enhancement. The approach taken for the Mona Offshore Wind Project regarding biodiversity enhancement is outlined in the Biodiversity Benefit and Green Infrastructure Statement (Document Reference J7).

2.2.2 Planning policy context

2.2.2.1 The Mona Offshore Wind Project will be located wholly within Welsh offshore waters (beyond 12 nautical miles (nm) from the Welsh coast) and Welsh inshore waters, with the onshore infrastructure located wholly within Wales. As set out in Volume 1, Chapter 1: Introduction of the Environmental Statement, as the Mona Offshore Wind Project is an offshore generating station with a capacity of greater than 350 MW located in Welsh waters, it is a NSIP as defined by Section 15(3) of the Planning Act 2008 (as amended) (the 2008 Act). As such, there is a requirement to submit an application for a Development Consent Order (DCO) to the Planning Inspectorate to be decided by the Secretary of State for the Department for Energy Security and Net Zero.

2.2.3 National Policy Statements

2.2.3.1 There are currently six energy National Policy Statements (NPSs), three of which contain policy relevant to offshore wind development and the Mona Offshore Wind Project, specifically:

- Overarching NPS for Energy (NPS EN-1) which sets out the UK Government's policy for the delivery of major energy infrastructure (Department for Energy Security and Net Zero, 2024a)
- NPS for Renewable Energy Infrastructure (NPS EN-3) (Department for Energy Security and Net Zero, 2024b)
- NPS for Electricity Networks Infrastructure (NPS EN-5) (Department for Energy Security and Net Zero, 2024c).

2.2.3.2 NPS EN-1 and NPS EN-3 include guidance on what matters are to be considered in the assessment. These are summarised in Table 2.1. NPS EN-1 and NPS EN-3 also highlight a number of factors relating to the determination of an application and in relation to mitigation. These are summarised in Table 2.2.

Table 2.1: Summary of the NPS EN-1 and NPS EN-3 provisions relevant to benthic subtidal and intertidal ecology.

Summary of NPS EN-1 and EN-3 provision	How and where considered in the Environmental Statement
NPS EN-1	
The applicant must provide information proportionate to the scale of the project, ensuring the information is sufficient to meet the requirements of the Environmental Impact Assessment (EIA) Regulations. (NPS EN-1, paragraph 4.3.10)	The scoping process enables the Mona Offshore Wind Project to deliver environmental information proportionate to the infrastructure. This is demonstrated in this chapter in regard to the justification of the topics scoped out (Table 2.9) as this demonstrates a proportionate approach.
Where the development is subject to EIA the applicant should ensure that the Environmental Statement clearly sets out any effects on internationally, nationally, and locally designated sites of ecological or geological conservation importance (including those outside England), on protected species and on habitats and other species identified as being of principal importance for the conservation of biodiversity, including irreplaceable habitats. (NPS EN-1 paragraph 5.4.17)	The Mona Offshore Wind Project will aim to conserve habitats through a number of measures adopted as part of the Mona Offshore Wind Project to reduce the magnitude of impacts (section 2.8). Furthermore, section 2.5.3 evaluates relevant designated sites in the regional benthic subtidal and intertidal ecology study area and explains why certain ones have been taken forward for assessment in section 2.9. The impact of the Mona Offshore Wind Project on all habitats, species and sites protected under the Habitats Regulations is assessed in HRA Stage 1 Screening Report (Document Reference E1.1) and HRA Stage 2 Information to support the Appropriate Assessment (ISAA) (Document Reference E1.1, E1.2 and E1.3).
The applicant should show how the project has taken advantage of opportunities to conserve and enhance biodiversity and geological conservation interests. (NPS EN-1 paragraph 5.4.19)	The Mona Offshore Wind Project will aim to conserve habitats through a number of measures adopted as part of the Mona Offshore Wind Project to reduce the magnitude of impacts (see section 2.8).
The design process should embed opportunities for nature inclusive design. Energy infrastructure projects have the potential to deliver significant benefits and enhancements beyond Biodiversity Net Gain, which result in wider environmental gains. The scope of potential gains will be dependent on the type, scale, and location of each project. (NPS EN-1 paragraph 5.4.21)	The Biodiversity Benefit and Green Infrastructure Statement outlines the approach of the Mona Offshore Wind Project to biodiversity enhancement (Document Reference J7).
The applicant should be particularly careful to identify any effects of physical changes on the integrity and special features of Marine Protected Areas (MPAs). These could include Marine Conservation Zone (MCZs), habitat sites including Special Areas of Conservation and Special Protection Areas with marine features, Ramsar Sites, Sites of Community Importance, and Sites of Special Scientific Interest (SSSIs) with marine features. (NPS EN-1 paragraph 5.6.13)	MCZs have been taken account of through the identification of designated sites within the Mona benthic subtidal and intertidal study area (sections 2.4.5 and 2.5.3). As a result of this process no MCZs have been considered in this assessment. The impact of the Mona Offshore Wind Project on all habitats, species and sites protected under the Habitats Regulations is assessed in HRA Stage 1 Screening Report (Document Reference E1.1) and HRA Stage 2 Information to support the Appropriate Assessment (ISAA) (Document Reference E1.1, E1.2 and E1.3).
The applicant should demonstrate that: • During construction, they will seek to ensure that activities will be confined to the minimum areas required for the works • The timing of construction has been planned to avoid or limit disturbance	The Maximum Design Scenario (MDS) represents the parameters that make up the realistic worst case scenario. The worst case that could potentially be built out will be selected on a topic-by-topic and impact-by-impact basis and assessed; for benthic subtidal and intertidal ecology it has been presented in section 2.7.1 and Table 2.18. This

Summary of NPS EN-1 and EN-3 provision	How and where considered in the Environmental Statement
• During construction and operation best practice will be followed to ensure that risk of disturbance or damage to species or habitats is minimised, including as a consequence of transport access arrangements • Habitats will, where practicable, be restored after construction works have finished • Opportunities will be taken to enhance existing habitats rather than replace them, and where practicable, create new habitats of value within the site landscaping proposals. Where habitat creation is required as mitigation, compensation, or enhancement, the location and quality will be of key importance. In this regard habitat creation should be focused on areas where the most ecological and ecosystems benefits can be realised • Mitigations required as a result of legal protection of habitats or species will be complied with. (NPS EN-1 paragraph 5.4.35)	approach allows for an assessment of the minimum area required to work for each activity. Best practice during construction and maintenance will be set out in the Offshore Construction Method Statement (CMS) (Document Reference J26.15) and the Offshore Environmental Management Plan (EMP) (Table 2.19). Additionally, the Outline Landfall Construction methods statement demonstrates what methods will be used in the intertidal area (Document Reference J26.14). Following the completion of most activities sedimentary habitats will recover naturally (paragraph 2.9.2.9) and measures have been adopted for the Mona Offshore Wind Project to avoid direct impacts on sensitive habitats where recovery would be limited (section 2.8). The Biodiversity Benefit and Green Infrastructure Statement outlines the approach of the Mona Offshore Wind Project to biodiversity enhancement (Document Reference J7). The Mona Offshore Wind Project will aim to conserve habitats through a number of measures adopted to reduce the impact of the Mona Offshore Wind Project (section 2.8). Mitigation was considered throughout section 2.9 and 2.11 however no additional mitigation has been considered relevant based on the conclusions reached for benthic subtidal and intertidal ecology beyond the measures adopted as part of the Mona Offshore Wind Project in Table 2.19.
The applicant should show how the project has taken advantage of opportunities to conserve and enhance biodiversity and geological conservation interests. (NPS EN-1 paragraph 5.4.19)	The Mona Offshore Wind Project will aim to conserve habitats through a number of measures adopted as part of the Mona Offshore Wind Project to reduce the magnitude of impacts (section 2.8). Additionally, the Biodiversity Benefit and Green Infrastructure Statement outlines the approach of the Mona Offshore Wind Project to biodiversity enhancement (Document Reference J7).
NPS EN-3	
Given the scale of offshore wind deployment required to meet 2030 and 2050 ambitions, applicants will need to give close consideration to impacts on MPAs, either alone or in combination, and employ the mitigation hierarchy, and if necessary provide compensation (both individually and in combination with other plans or projects) which may be needed to approve their projects. It is likely that mitigation may include proactive measures to reduce the impact of deployment e.g., micrositing of offshore transmission routes to avoid vulnerable habitats, alternatives piling or trenching techniques, noise abatement technology, collision avoidance methods or, if necessary, compensation for habitat loss. (NPS EN-3 paragraphs 2.8.52-53)	All designated sites with relevant benthic ecology features which have the potential to be impacted by the Mona Offshore Wind project as well as protected habitats and species within the benthic subtidal and intertidal ecology study area have been identified and considered in the assessment where relevant in sections 2.9 and 2.11. The HRA Stage 1 Screening report (Document Reference E1.4) screening identifies direct or indirect effects on sites which could be affected, and those sites will have been assessed in the Information to Support Appropriate Assessment (ISAA) (Document Reference E1.1, E1.2, E1.3). The ISAA concludes that there will be no adverse effect on integrity of any European site as a result of the Mona Offshore Wind Project. The MCZ screening report (Document Reference E2) considers the potential for the Mona Offshore Wind Project to directly or indirectly affect the interest features of any MCZ. The assessments conclude that there is no significant risk of the Mona Offshore Wind Project hindering the achievement of the conservation objectives stated for any MCZ and therefore a Stage 1 MCZ assessment is not required for any MCZ for the Mona Offshore Wind Project.

Summary of NPS EN-1 and EN-3 provision	How and where considered in the Environmental Statement
As part of the Offshore Wind Environmental Improvement Package set out in the British Energy Security Strategy, government committed to establishing Offshore Wind Environmental Standards (previously referred to as Nature Based Design Standards) to accelerate deployment whilst enhancing the marine environment. Offshore Wind Environmental Standards (OWES) aim to support developers to take a more consistent approach to avoiding, reducing, and mitigating the impacts of an offshore wind farm and/or offshore transmission infrastructure. The measures could apply to the design, construction, operation and decommissioning of offshore wind farms and offshore transmission. Defra will consult on a series of OWES before drafting clear OWES Guidance, which sets out where and how Defra expects each measure to be applied to a development. Once the OWES Guidance is issued, the Secretary of State will expect applicants to have applied the relevant measures to their applications. Applicants should explain how their proposals comply with the guidance or, alternatively, the grounds on which a departure from them is justified. Any reasons for departure from the OWES should be fully detailed within the application documents, with details of any agreements made with statutory consultees. (NPS EN-3 paragraphs 2.8.90-92)	The project is aware of the requirements in NPS EN3 to apply the guidance on Environmental Standards. The project will review the guidance once available and determine how the project complies with the guidance, and where, if relevant, the project departs from them.
Assessments should also include effects such as the scouring that may result from the proposed development and how that might impact sensitive species and habitats (NPS EN-3 Section 2.8, paragraph 2.8.113)	Scour protection as a measure will be adopted as part of the Mona Offshore Wind Project as detailed in Table 2.19 and defined in Volume 1, Chapter 3: Project description of the Environmental Statement. A measure will also be adopted requiring the development and adherence to an Offshore CMS which will include details of scour protection management to be used around offshore structures and foundations to reduce scour. The scour protection measures will be subject to engineering design to ensure they minimise as much as practical the occurrence of scour and therefore any impacts would relate only to residual/secondary scour which would be very localised and of negligible magnitude, as discussed in section 2.9.9. The assessment of the potential impacts of secondary scour on benthic subtidal receptors is presented in section 2.9.9.
Applicant assessment of the effects of installing offshore transmission infrastructure across the intertidal/coastal zone should demonstrate compliance with mitigation measures in any relevant plan-level HRA including those prepared by The Crown Estate as part of its leasing round and include information, where relevant, about: • Any alternative landfall sites that have been considered by the applicant during the design phase and an explanation for the final choice	The MDS for export cable installation at the landfall has been considered throughout the assessment. This ensures that a reasonable assessment of the effects of the various impacts associated with this method are presented. Alternative landfall routes will have been considered during site selection (Volume 1, Chapter 4: Site selection and consideration of alternatives of the Environmental Statement). A description of the activities which could result in habitat disturbance from cable installation and maintenance and increased suspended sediments has been provided in the MDS (Table 2.18). The predicted rates of recovery in the

Summary of NPS EN-1 and EN-3 provision	How and where considered in the Environmental Statement
• Any alternative cable installation methods that have been considered by the applicant during the design phase and an explanation for the final choice • Potential loss of habitat • Disturbance during cable installation, maintenance/repairs and removal (decommissioning) • Increased suspended sediment loads in the intertidal zone during installation and maintenance/repairs • Potential risk from invasive and non-native species • Predicted rates at which the intertidal zone might recover from temporary effects, based on existing monitoring data • Protected sites. (NPS EN-3 paragraph 2.8.119)	intertidal zone from temporary effects has been considered in the sensitivity of the intertidal biotopes and then used to determine the final significance of an impact (section 2.9.2). The impacts of cable installation are much reduced following the commitment to trenchless techniques post-PEIR and reduction in other parameters (including sandwave clearance and cable protection parameters). This update to the project design (PD) was made following stakeholder feedback, and review of further site specific data. Habitat loss and impacts associated with invasive non-native species (INNS) are assessed in sections 2.9.5 and 2.9.7, respectively. Sites of conservation importance which may be directly or indirectly affected by the Mona Offshore Wind Project have been identified in section 2.5.3 and the relevant benthic feature assessed in sections 2.9 and 2.11. The impacts (e.g. from sandwave clearance and placement of cable protection) upon sites of conservation importance which overlap with the Mona Offshore Cable Corridor have been greatly reduced following refinement to the project design post-PEIR. This update to the project design was made following stakeholder feedback, and review of further site specific data.
Applicant assessment of the effects on the subtidal environment should include: • Loss of habitat due to foundation type including associated seabed preparation, predicted scour, scour protection and altered sedimentary processes, (e.g. sandwave/boulder/Unexploded Ordnance (UXO) clearance) • Environmental appraisal of inter-array and other offshore transmission and installation/maintenance methods, including predicted loss of habitat due to predicted scour and scour/cable protection, and sandwave/boulder/UXO clearance • Habitat disturbance from construction and maintenance/repair vessels' extendible legs and anchors • Increased suspended sediment loads during construction and from maintenance/repairs • Predicted rates at which the subtidal zone might recover from temporary effects • Potential impacts from Electromagnetic Fields (EMF) on benthic fauna • Potential impacts upon natural ecosystem functioning • Protected sites • Potential for invasive/non-native species introduction. (NPS EN-3 paragraph 2.8.126)	The impact of suspended sediments, long term habitat loss and temporary habitat disturbance from cable installation and maintenance as well as anchors and vessel legs (i.e. jack-up legs) has been quantified in the MDS (Table 2.18). The effect of these impacts on the habitats within the Mona Array Area and Mona Offshore Cable Corridor and Access Area has then been assessed throughout section 2.9. The predicted rates of recovery in the intertidal zone from temporary effects has been considered in the sensitivity of the intertidal biotopes and then used to determine the final significance of an impact (section 2.9.2). Assessments of the effects of EMF and INNS, including on ecosystem function, have been considered in sections 2.9.10 and 2.9.7 respectively. Relevant protected sites such as MCZs and SACs have been identified in section 2.5.3 and those with benthic features directly or indirectly affected by the Mona Offshore Wind Project have been taken forward for assessment in sections 2.9 and 2.11.
Landfall and cable installation and decommissioning methods should be designed appropriately to	The methods of cable installation and decommissioning and a quantification of the associated impacts on benthic receptors is presented in the MDS in Table 2.18. The Applicant is committed to the development of and adherence to a Landfall

Summary of NPS EN-1 and EN-3 provision	How and where considered in the Environmental Statement
minimise effects on intertidal/coastal habitats, taking into account other constraints. Where applicable, use of horizontal directional drilling techniques (HDD) should be considered as a method to avoid impacts on sensitive habitats and species. (NPS EN-3 paragraph 2.8.227-228)	construction method statement which commits to the installation of Mona export cables via trenchless techniques under the intertidal area from below MLWS, where the exit pits will be located, to onshore. This will minimise the impacts to all benthic intertidal receptors. Additionally, specific measures have been adopted to avoid sensitive features at the landfall such as *Sabellaria alveolata* reef (see Table 2.19).
Where cumulative effects on intertidal habitats are predicted as a result of the cumulative impact of multiple cable routes, applicants of various schemes are encouraged to work together to ensure that the number of cables crossing the intertidal/coastal zone are minimised and installation and decommissioning phases are coordinated to ensure that disturbance is also reasonably minimised. (NPS EN-3 paragraph 2.8.231)	The project alone assessment MDS includes the impact of cable crossings where relevant (Table 2.18). Cumulative effects have been quantified and their significance assessed in section 2.11, including the impact of cables from other projects within the benthic subtidal and intertidal ecology Cumulative Effects Assessment (CEA) study area.
Applicants should design construction, maintenance and decommissioning methods appropriately to minimise effects on subtidal habitats, taking into account other constraints. Mitigation measures which applicants are expected to have considered include: • surveying and micrositing of the turbines, designing array layout or re-routing of the export and inter-array cables to avoid adverse effects on sensitive/protected habitats, biogenic reefs or protected species • reducing as much as possible the amount of infrastructure that will cause habitat loss in sensitive/protected habitats • burying cables at a sufficient depth, taking into account other constraints, to allow the seabed to recover to its natural state • the use of anti-fouling paint could be minimised on subtidal surfaces in certain environments, to encourage species' colonisation on the structures, unless this is within a soft sediment MPA and thus would allow colonisation by species that would not normally be present Where cumulative impacts on subtidal habitats are predicted as a result of multiple cable routes, applicants for various schemes are encouraged to work together to ensure that the number of cables crossing the subtidal zone is minimised and installation/ decommissioning phases are coordinated to ensure that disturbance is reasonably minimised. (NPS EN-3 paragraph 2.8.233-235)	Table 2.19 outlines the measures adopted as part of the Mona Offshore Wind Project to reduce the potential for impacts on benthic subtidal and intertidal ecology. These include measures avoid sensitive habitats (i.e. *S. alveolata reef* and *M. edulis* bed) at the landfall and a commitment to the installation of Mona export cables via trenchless techniques under the intertidal area from below MLWS, where the exit pits will be located, to onshore, which will ensure that direct impacts (e.g. habitat loss or disturbance) to ecologically sensitive and nationally protected intertidal habitats will not occur. Measures have also been implemented to reduce any impacts to the Menai Strait and Conwy Bay SAC including limiting the extent and height of cable protection within the site and ensuring no sandwave clearance within the SAC. A Cable specification and installation plan (CSIP) will also be developed that does not permit the installation of cable protection within Constable Bank and minimises the extent of sandwave clearance activities within Constable Bank. The project alone assessment MDS includes the impact of cable crossings where relevant (see Table 2.18). Cumulative effects have been quantified and their significance assessed in section 2.11 including the impact of cables from other projects within the benthic subtidal and intertidal ecology CEA study area. There are no other cable routes (from other projects) which overlap with the landfall and significant cumulative (or alone) effects are not predicted on intertidal or subtidal receptors.

Table 2.2: Summary of NPS EN-1 and NPS EN-3 policy on decision making relevant to benthic subtidal and intertidal ecology.

Summary of NPS EN-1 and EN-3 provision	How and where considered in the Environmental Statement
NPS EN-1	
The aim is to halt overall biodiversity loss in England by 2030 and then reverse loss by 2042, support healthy well-functioning ecosystems and establish coherent ecological networks, with more and better places for nature for the benefit of wildlife and people. This aim needs to be viewed in the context of the challenge presented by climate change. Healthy, naturally functioning ecosystems and coherent ecological networks will be more resilient and adaptable to climate change effects. Failure to address this challenge will result in significant adverse impact on biodiversity and the ecosystem services it provides. (NPS EN-1 paragraph 5.4.2)	The conservation status of habitats and species is considered throughout this assessment and measures have been adopted to ensure impacts are reduced (section 2.8). The future impact of climate change on the habitats in the east Irish Sea has been considered in section 2.5.5.
As a general principle, and subject to the specific policies below, development should, in line with the mitigation hierarchy, aim to avoid significant harm to biodiversity and geological conservation interests, including through consideration of reasonable alternatives. Where significant harm cannot be avoided, impacts should be mitigated and as a last resort, appropriate compensation measures should be sought. (NPS EN-1 paragraph 5.4.42)	Mitigation would be considered if a significant impact was identified however no impacts were found to have a significant effect in EIA terms (section 2.9) therefore no additional mitigation measures have been considered for the Mona Offshore Wind Project beyond those measures adopted as part of the project; see section 2.8.
In taking decisions, the Secretary of State should ensure that appropriate weight is attached to designated sites of international, national, and local importance; protected species; habitats and other species of principal importance for the conservation of biodiversity; and to biodiversity and geological interests within the wider environment. (NPS EN-1 paragraph 5.4.48)	As part of this chapter the process of identifying designated sites has been undertaken for the Mona benthic subtidal and intertidal study area (sections 2.4.5 and 2.5.3). This was done to ensure all habitats, features and species of conservation importance were considered, where relevant, in this assessment. Species, habitats and sites protected under the Habitats Regulations are also assessed as part of HRA Stage 1 Screening report (Document Reference E1.4) and the HRA Stage 2 Information to Support Appropriate Assessment (Documents References E1.1, E1.2 and E1.3).
If significant harm to biodiversity resulting from a development cannot be avoided (for example through locating on an alternative site with less harmful impacts), adequately mitigated, or, as a last resort, compensated for, then the Secretary of State will give significant weight to any residual harm. (NPS EN-1 paragraph 5.4.43)	An assessment of significance was undertaken in sections 2.9 and 2.11, and no significant effects, in EIA terms, have been identified, therefore no additional mitigation or compensation has been proposed beyond the measures adopted as part of the Mona Offshore Wind Project in Table 2.19.
NPS EN-3	
Landfall and cable installation and decommissioning methods should be designed appropriately to minimise effects on intertidal/coastal habitats, taking into account other constraints. (NPS EN-3 paragraph 2.8.227)	The methods of cable installation and decommissioning and a quantification of the associated impacts is presented in the MDS (Table 2.18). The effect of these impacts on relevant habitats has been considered throughout section 2.9. Additionally, measures have been adopted to avoid sensitive features at the landfall such as *Sabellaria alveolata* (Table 2.19).

Summary of NPS EN-1 and EN-3 provision	How and where considered in the Environmental Statement
The Secretary of State should be satisfied that activities have been designed considering sensitive subtidal environmental aspects, and discussions with the relevant conservation bodies have taken place. (NPS EN-3 paragraph 2.8.317)	The effect of impacts related to the design of the Mona Offshore Wind Project have been assessed in section 2.9. This included the consideration of the sensitivity of the relevant subtidal habitats and the consideration of mitigation where necessary. An evidence plan has been set up with the statutory nature conservation bodies (SNCBs) and other consultees to consult on the project on topics such as sensitive subtidal environmental aspects (see section 2.3). As part of this process an expert working group (EWG) for benthic ecology, physical processes and fish and shellfish ecology was set up to enable this consultation.

2.2.4 Welsh National Marine Plan

2.2.4.1 The benthic subtidal and intertidal ecology impact assessment has been made with consideration to the specific policies set out in the Welsh National Marine Plan (Welsh Government, 2019). Key provisions are set out in Table 2.3 along with details as to how these have been addressed within the assessment.

Table 2.3: Welsh National Marine Plan policies of relevance to benthic subtidal and intertidal ecology.

Policy	Key provisions	How and where considered in the Environmental Statement
• ENV_01, 02, 03, 04, 05, 06, 07 • SOC_06, 09 • GOV_01	The quality and occurrence of habitats and the distribution and abundance of species are in line with prevailing physiographic, geographic and climatic conditions. Commitments to supporting an ecologically coherent network of MPAs.	The extent of each potential impact on the benthic environment, therefore considering the abundance and distribution of species and habitats, is considered throughout the project alone assessment and the cumulative assessment (section 2.9 and 2.10). Consideration of the potential impact of the Mona Offshore Wind Project on designated sites is considered in section 2.5.3 and those which have the potential to be impacted have been considered throughout this assessment.
• ENV_01; 03 • GOV_01	Non-indigenous species introduced by human activities are at levels that do not adversely alter the ecosystems.	The potential impact of non-indigenous species in regard to the Mona Offshore Wind project is assessed in section 2.9.7.
• ENV_01, 02, 03, 04, 05, 06, 07 • GOV_01	All elements of the marine food webs, to the extent that they are known, occur at normal abundance and diversity and levels capable of ensuring the long term abundance of the species and the retention of their full reproductive capacity.	The extent of each potential impact on the benthic environment, therefore considering the abundance and diversity of species and habitats, is considered throughout the project alone assessment and the cumulative assessment (section 2.9 and 2.10).
• ENV_01, 02, 03, 07 • GOV_01 • FIS_01	Sea-floor integrity is at a level that ensures that the structure and functions of the ecosystems are safeguarded and benthic ecosystems, in particular, are not adversely affected.	Sea floor integrity is considered within the temporary habitat disturbance/loss and long term habitat loss impacts (sections 2.9.2 and 2.9.5). These impacts consider pressures such as changes in substrate or seabed type and the

Policy	Key provisions	How and where considered in the Environmental Statement
		sensitivity of the impacted habitats and species in relation to this pressure.
• SOC_09, 10 • ENV_01, 02 • GOV_01	Permanent alteration of hydrographical conditions does not adversely affect marine ecosystems. Plan policies recognise the importance of the physical parameters of seawater (temperature, salinity, depth, currents, waves, turbulence and turbidity) and the need to manage human activities which could impact the dynamics of the ecosystem.	The long term alteration of hydrographical conditions in relation to the placement of Mona Offshore Wind Project infrastructure is considered as part of the changes in physical process impact (section 2.9.9). This section considers the changes in tidal, wave and sediment transport regime and identified no significant effects.
• ENV_06 • SOC_01 • GOV_01	Contaminants are at a level not giving rise to pollution effects.	The effects of contaminants is considered in the remobilisation of sediment-bound contaminants impact (section 2.9.4). This section evaluated the potential impact of historical contaminant on habitats and identified no significant effects.

2.2.5 The Marine Strategy Framework Directive

2.2.5.1 The Marine Strategy Framework Directive (MSFD) aims to protect more effectively the marine environment across Europe.

Table 2.4: Summary of the MSFD's high level descriptors of Good Environmental Status (GES) relevant to benthic subtidal and intertidal ecology and consideration in the Mona Offshore Wind Project.

MSFD Descriptor relevant to benthic subtidal and intertidal ecology	How and where considered in the Environmental Statement
Descriptor 1: Biological diversity: Biological diversity is maintained. The quality and occurrence of habitats and the distribution and abundance of species are in line with prevailing physiographic, geographic and climatic conditions.	The potential effects on biological diversity has been described and considered within the assessment for the Mona Offshore Wind Project both alone (see section 2.9) and in cumulatively with other project(see section 2.11). A detailed baseline assessment which describes the distribution of benthic habitats and species in the study area has been undertaken in Volume 6, Annex 2.1: Benthic subtidal and intertidal ecology technical report of the Environmental Statement, and a summary presented in section 2.5.
Descriptor 2: Non-indigenous species: Non-indigenous species introduced by human activities are at levels that do not adversely alter the ecosystems.	The potential effects of non-indigenous species has been described and considered within the assessment for the Mona Offshore Wind Project both alone (section 2.9.7) and cumulatively with other projects (see section 2.11.6).
Descriptor 4: Elements of marine food webs: All elements of the marine food webs, to the extent that they are known, occur at normal abundance and diversity and levels capable of ensuring the long term abundance of the species and the retention of their full reproductive capacity.	The potential effects on benthic (i.e. prey) species is presented in section 2.9 and implications on the wider marine food webs is assessed accordingly in Volume 2, Chapter 3: Fish and shellfish ecology of the Environmental Statement and Volume 2, Chapter 4: Marine Mammals of the Environmental Statement.
Descriptor 6: Sea floor integrity: Seafloor integrity is at a level that ensures that the structure and functions of	The potential effects of temporary and long term habitat loss/disturbance and introduction of new habitat on benthic ecosystems and associated benthic species have been

MSFD Descriptor relevant to benthic subtidal and intertidal ecology	How and where considered in the Environmental Statement
the ecosystems are safeguarded and benthic ecosystems, in particular, are not adversely affected.	considered within sections 2.9.2 and 2.9.5 respectively. Significant effects in EIA terms are not predicted.
Descriptor 7: Hydrographical conditions: Permanent alteration of hydrographical conditions does not adversely affect marine ecosystems.	The potential effects of the Mona Offshore Wind Project on the hydrographical conditions within the Mona benthic subtidal and intertidal ecology study area has been described and considered within the assessment for the Mona Offshore Wind Project both alone (see section 2.9.9) and cumulatively with other projects (see section 2.11.8).
Descriptor 8: Contaminants: Concentrations of contaminants are at levels not giving rise to pollution effects.	The potential effects of contaminants on benthic subtidal and intertidal ecology receptors from the Mona Offshore Wind Project alone has been assessed in section 2.9.4.
Descriptor 10: Marine litter: Properties and quantities of marine litter do not cause harm to the coastal and marine environment.	An appropriate Offshore EMP will be produced and implemented for the Mona Offshore Wind Project (see Table 2.19). The Offshore EMP will also outline any procedures to be implemented during the operations and maintenance phase. A Decommissioning Plan will be developed and implemented during the decommissioning phase. No offshore works may commence until a written decommissioning programme is approved by the Secretary of State for the Department for Energy Security and Net Zero.

2.2.6 Planning Policy Wales

2.2.6.1 Planning Policy Wales (PPW) (Welsh Government, 2021) sets out the land use planning policies of the Welsh Government. The objective is to ensure the planning system contributes towards sustainable development and improves the social, economic, environmental and cultural wellbeing of Wales. Those sections of particular relevance to benthic subtidal and intertidal ecology are set out in Table 2.5, below.

Table 2.5: Planning Policy Wales policies of relevance to benthic subtidal and intertidal ecology

Policy	Key provisions	How and where considered in the Environmental Statement
Section 6, paragraph 6.4.9	Mechanisms should be in place to minimise further loss and where circumstances allow for species' populations to expand and recolonise their natural range (former range) or adapt to future change.	The majority of the impacts assessed in section 2.9 and 2.11 occur on a temporary basis and will allow for the recovery of habitat between periods of disturbance. Where impacts have a long term effect (e.g. long term habitat loss (section 2.9.5)) and introduction of artificial structures (section 2.9.6), the MDS has been considered which represents the maximum area this effect may cover therefore no further loss is considered in relation to these impacts.
	Mechanisms should be in place to allow for the identification of potential habitat, the maintenance of existing assets and networks and promote the restoration of damaged, modified or potential habitat and the creation of new habitat.	Baseline surveys have been conducted to characterise the habitats within the Mona benthic subtidal and intertidal ecology study area (section 2.5). these habitats will be maintained as much as possible through the application of the MDS which ensures the maximum area of disturbance or loss associated with each impact is assessed so that all habitats beyond these areas are able to be maintained in their original condition. Consideration regarding leaving artificial structures *in situ* along with their new communities has been included in the relevant impacts.
	Ecosystems need to be in a healthy condition to function effectively, to deliver a range of important ecosystem services. Planning decisions should not compromise the condition of ecosystems.	The resilience and recovery of each habitat has been considered as part of the impact assessment methodology (detailed in section 2.6.2) which helps to establish if habitats will still be able to contribute to ecosystem services to the same degree as was possible before the Mona Offshore Wind Project.
	Take opportunities to develop functional habitat and ecological networks within and between ecosystems and across landscapes, building on existing connectivity and quality and encouraging habitat creation, restoration and appropriate management.	The Mona Offshore Wind Project involves infrastructure which is spread over a wide area (451.47 km^2) allowing for large areas which will be largely undisturbed for the majority of the lifetime of the project ensuring there are corridors for ecological connectivity and recovery.
Section 6, paragraph 6.4.11	Planning authorities must have regard to the relative significance of international, national and local designations in considering the weight to be attached to nature conservation interests.	Relevant protected sites such as MCZs, SACs and SSSIs have been identified in section 2.5.3 and those with benthic features directly or indirectly affected by the Mona Offshore Wind Project have been taken forward for assessment in sections 2.9 and 2.11.

Policy	Key provisions	How and where considered in the Environmental Statement
Section 6, paragraph 6.4.20	Although non-statutory designations carry less weight than statutory designations, they can make a vital contribution to delivering an ecological network for biodiversity and resilient ecosystems, and they should be given adequate protection in development plans and the development management process.	The Mona Offshore Wind Project has also considered any non-statutory designated features which it indirectly and directly affects. the relevant non-statutory features have been included in Table 2.13.

2.2.7 North West Inshore and North West Offshore Marine Plans

2.2.7.1 The benthic subtidal and intertidal ecology assessment has also been made with consideration to the specific policies set out in the North West Inshore and North West Offshore Marine Plans (MMO, 2021). These plans have been considered as the ZoI for the Mona Offshore Wind Project extends in to English waters where these plans are applicable. Key provisions are set out in Table 2.6 along with details as to how these have been addressed within the assessment.

Table 2.6: North West Inshore and North West Offshore Marine Plan policies of relevance to benthic subtidal and intertidal ecology.

Policy	Key provisions	How and where considered in the Environmental Statement
NW-SCP-1	Proposals within or relatively close to nationally designated areas should have regard to the specific statutory purposes of the designated area. Great weight should be given to conserving and enhancing landscape and scenic beauty in National Parks and Areas of Outstanding Natural Beauty.	As part of this chapter (as well as Volume 6, Annex 2.1: Benthic subtidal and intertidal ecology technical report of the Environmental Statement), designated sites within the Mona benthic subtidal and intertidal study area have been identified (sections 2.4.5 and 2.5.3). This was done to ensure all habitats, features and species of conservation importance were considered, where relevant, in this assessment.
NW-MPA-1	Proposals that support the objectives of marine protected areas and the ecological coherence of the marine protected area network will be supported.	As part of this chapter, designated sites within the Mona benthic subtidal and intertidal study area have been identified (sections 2.4.5 and 2.5.3). This was done to ensure all habitats, features and species of conservation importance were considered, where relevant, in this assessment.
NW-BIO-1	NW-BIO-1 encourages and supports proposals that enhance the distribution of priority habitats and priority species.	The approach regarding biodiversity enhancement for the Mona Offshore Wind Project is set out in the Biodiversity Benefit and Green Infrastructure Statement (Document Reference J7).
NW-BIO-2	NW-BIO-2 requires proposals to manage negative effects which may significantly adversely impact the functioning of healthy, resilient and adaptable marine ecosystems.	Mitigation is considered where the significance of an impact is moderate or major to reduce the significance of the impact to negligible or minor. This assessment is undertaken for each impact.

Policy	Key provisions	How and where considered in the Environmental Statement
NW-BIO-3	Proposals that conserve, restore or enhance coastal habitats, where important in their own right and/or for ecosystem functioning and provision of ecosystem services, will be supported.	Section 2.9 considers the magnitude, sensitivity and significance of the impacts associated with the Mona Offshore Wind Project on the relevant subtidal and intertidal Important Ecological Features (IEFs). Additionally, mitigation is considered where impacts were found to be significant. As a result, the Mona Offshore Wind Project seeks to conserve the function and services provided by coastal habitats.
NW-INNS-1	NW-INNS-1 aims to avoid or minimise damage to the marine area from the introduction or transport of invasive non-native species.	The implementation of an Offshore EMP as part of the measures adopted by the Mona Offshore Wind Project (section 2.8 and Table 2.19) will manage and reduce the risk of introduction or spread of invasive species.
NW-CE-1	Proposals which may have adverse cumulative effects with other existing, authorised, or reasonably foreseeable proposals must demonstrate that they will avoid, minimise and mitigate.	Cumulative effects have been quantified and their significance assessed in section 2.11. This section includes the consideration of mitigation where the significance is found to be moderate or major.

2.3 Consultation

2.3.1 Overview

2.3.1.1 A summary of the key issues raised during consultation activities undertaken to date specific to benthic subtidal and intertidal ecology is presented in Table 2.7 below, together with how these issues have been considered in the production of this Environmental Statement chapter. Further detail is presented within Volume 6, Annex 2.1: Benthic subtidal and intertidal ecology technical report of the Environmental Statement.

2.3.2 Evidence plan

2.3.2.1 The purpose of the Evidence Plan process (EPP) is to agree the information the Mona Offshore Wind Project needs to supply to the Secretary of State, as part of a DCO application for Mona Offshore Wind Project. The EPP seeks to ensure engagement with the relevant aspects of the HRA and EIA throughout the pre-application phase. The development and monitoring of the EPP and its subsequent progress is being undertaken by the Steering Group. The Steering Group comprises the Planning Inspectorate, the Applicant, Natural Resources Wales (NRW), Natural England, the Joint Nature Conservation Committee (JNCC), the Marine Management Organisation (MMO) and the Isle of Man Government as the key regulatory and SNCBs. To inform the EIA and HRA process during the pre-application stage of the Mona Offshore Wind Project, EWGs were also set up to discuss and agree topic specific issues with the relevant stakeholders.

Table 2.7: Summary of key consultation issues raised during consultation activities undertaken for the Mona Offshore Wind Project relevant to benthic subtidal and intertidal ecology.

Date	Consultee and type of response	Issues raised	Response to issue raised and/or where considered in this chapter
February 2022	Natural England, MMO, JNCC, the Planning Inspectorate, and Environment Agency - consultation meeting	The limits between the onshore and offshore EWG topics remits was queried.	Habitats that can be found from MHWS landwards will be taken forward in the onshore EWGs, while those found from MHWS seawards will be discussed in the offshore EWGs. For example, sand dune habitats are considered under onshore EWGs while intertidal reef habitats are considered under offshore EWGs. Benthic habitats can occur in the intertidal area up to MHWS, therefore would fall under the Benthic Ecology, Fish and Shellfish and Physical Processes EWG. Some intertidal habitats may be covered by both the onshore and offshore permits as onshore planning limits go down to Mean Low Water Springs (MLWS).
	Natural England, MMO, JNCC, the Environment Agency, NRW, Centre of Environment Fisheries and Aquaculture Science (Cefas) and The Northwest Wildlife Trust (TWT) - Benthic Ecology, Fish and Shellfish and Physical Processes EWG meeting 1	NRW requested to be consulted on the export cable corridor. They wanted to know why the route has been chosen and what had been considered within the process to choose the route.	The site selection process of the export cable corridor was presented and discussed with NRW via the Evidence Plan Steering Group. In addition, NRW was consulted later in the EWG process on the Mona Offshore Cable Corridor through the provision of the benthic survey scope of works which outlined the area which would be investigated for the Mona Offshore Cable Corridor. The scope of works also included detail regarding what information would be used to further refine the Mona Offshore Cable Corridor.
		Natural England and JNCC had been working on best practice guidance which had been published on a Natural England SharePoint site to inform external stakeholders (Natural England, 2022). The Applicant should review this guidance.	The draft guidance has been reviewed and it has been considered in the EPP as well as when planning the benthic site specific surveys (the full details regarding the benthic site specific surveys can be found in Volume 6, Annex 2.1: Benthic subtidal and intertidal ecology technical report of the Environmental Statement).

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April 2022	MMO - EWG Meeting Response	The MMO noted that there were several areas relevant to benthic ecology that were not discussed at the meeting (e.g. cumulative impacts, non-native invasive species and survey design and benthic analyses etc.). The MMO was aware this was only the first group meeting but expected these topics to be covered in the future.	These areas of discussion have been addressed in subsequent meetings and where relevant these topics have been assessed in this report (cumulative assessment in section 2.10, non-native invasive species assessed in section 2.9.7, electromagnetic fields have been assessed in section 2.9.10).
May 2022	Isle of Man Department of Infrastructure - Scoping Opinion	The Isle of Man Territorial Sea Committee (TSC) drew the applicant's attention to the Manx Marine Environmental Assessment (MMEA) which provides an overview of the Island's marine environment. Specifically Chapter 3.3 (Subtidal Ecology) contains information that would improve upon the data provided, including in sections 4.1.4.18 (*Sabellaria spinulosa*) and 4.1.4.19 (*Modiolus* reefs).	The Manx Marine Environmental Assessment has been used to provide an overview of the subtidal and intertidal environment around the Isle of Man (Volume 6, Annex 2.1: Benthic subtidal and intertidal ecology technical report of the Environmental Statement). It has also been used to establish notable and vulnerable habitat around the island such as *Sabellaria spinulosa* and *Modiolus* reefs and is now included in Table 2.10 as a key desktop source.
		Commented that, on the Mona regional benthic subtidal and intertidal ecology study area for the generation assets (Figure 4.1), the straight line seemed rather arbitrary from an effects perspective. This appeared to be neither an ecological or jurisdictional- based boundary decision and warrants further clarification.	The western edge of the regional benthic subtidal and intertidal ecology study area has been adjusted to reflect the full extent of the territorial waters of the Isle of Man (Figure 2.1 and Volume 6, Annex 2.1: Benthic subtidal and intertidal ecology technical report of the Environmental Statement).
		They noted that, given the inclusion of a substantial part of the Manx territorial sea, there were no datasets or reports indicated for the area of the Manx territorial sea.	The MMEA has now been added to the key desktop sources table (Table 2.10) and used to characterise the waters around the Isle of Man in Volume 6, Annex 2.1: Benthic subtidal and intertidal ecology technical report of the Environmental Statement.

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	NRW - Scoping Opinion	NRW advised that relevant protected benthic species and habitats should have also included Annex I features outside SACs that might potentially occur within the Mona benthic subtidal and intertidal study area.	Annex I features outside of SACs have been considered in the desktop study as well as the site specific study (e.g. the *Sabellaria alveolata* reef which was identified at the Mona intertidal study area).
		NRW did not agree that the potential impacts from EMF could be scoped out.	Effects of EMF arising from subtidal export cables on subtidal benthic receptors have been assessed in the operations and maintenance phase in section 2.9.10.
		NRW advised that the risk of the introduction and spread of INNS is scoped in during the operations and maintenance phase.	Effects arising from the introduction and spread of INNS is assessed across all phases of the Mona Offshore Wind Project in section 2.9.7.
		NRW advised that habitat alteration is scoped in during the operations and maintenance phase.	Effects associated with the introduction of artificial structures and their colonisation on benthic receptors are assessed in section 2.9.6 and changes in physical processes is assessed in section 2.9.9.
		NRW requested that increases in thermal emissions from cable operation should be scoped in during the operations and maintenance phase.	Effects of thermal emissions from subtidal export cables on subtidal benthic receptors have been assessed in the operations and maintenance phase in section 2.9.11.
		When assessing removal of hard substrate, the applicant should have consider that the introduction of hard substrate in a soft sediment habitat is a change of habitat type.	This effect has been considered in the introduction of artificial structures impact assessment (section 2.9.8).
		NRW advised that Little Orme's Head SSSI also falls within the transmission assets study area and includes benthic features (e.g. Intertidal rocky habitats) as a primary feature in the citation.	Consideration for Little Ormes Head SSSI is presented in section 2.5.3.
		NRW advised that the potential to release bacteria from sediment at landfall should also be scoped into the project assessment.	Sampling for total solids and *Escherichia coli* was undertaken as part of the intertidal survey work conducted in 2023. The results of this sampling found that *E. coli* below the limit of detection of <10 cfu/g. These results are discussed in Volume 6, Annex 2.1: Benthic subtidal and intertidal ecology technical report of

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			the Environmental Statement, and Volume 6, Annex 2.2: Water Framework Directive coastal waters assessment for the Environmental Statement.
June 2022	The Planning Inspectorate - Scoping Opinion	The regional study areas for benthic, subtidal and intertidal ecology and fish and shellfish ecology included a straight-line boundary on the western edge which appears arbitrary from an effects perspective. The study areas should sufficiently encompass the full extent of any receptors likely to be significantly affected.	The western edge of the regional benthic subtidal and intertidal ecology study area has been adjusted to reflect the full extent of the territorial waters of the Isle of Man (section 2.4.3 and Figure 2.1).
November 2022	Natural England, MMO, JNCC, NRW, Cefas and TWT – Benthic Ecology, Fish and Shellfish and Physical Process EWG meeting 2	The meeting presented the result of the baseline characterisation and the preliminary outputs of the impact assessment. NRW provided updated guidance for Wales on when low resemblance rocky reef should be considered as Annex I features.	This updated guidance on low resemblance rocky reefs has been considered in the assessment for stony reefs in Volume 6, Annex 2.1: Benthic subtidal and intertidal ecology technical report of the Environmental Statement and has been reflected in the description of the IEFs in Table 2.13.
		NRW asked if the physical processes modelling supported the decision to not include certain features in the Menai Strait and Conwy Bay SAC.	The results of the modelling regarding increases in suspended sediment concentration and changes in physical processes including tidal, wave and sediment transport regimes were not found to extend to the coast (i.e. submerged and partially submerged sea caves will not be affected) and, therefore, only those designated features of the Menai Strait and Conwy Bay SAC with the potential to be affected have been assessed (sections 2.9.3 and 2.9.9)
		NRW also requested any potential impacts from habitat alteration are assessed in the benthic chapter by drawing from the information presented in the physical processes chapter.	Habitat alteration as a result of changes in physical processes is assessed in section 2.9.9.
		NRW also highlighted that peat and clay exposures with piddocks and blue mussel beds are protected under the Environment (Wales) Act (Section 7 habitat) and should be considered alongside the reef for micrositing around.	As the blue mussel beds are in close proximity to the *S. alveolata* reef the measures outlined in Table 2.19 to avoid the reef will also result in no impact to the protected blue mussel beds. Furthermore, the Mona Offshore Wind Project has committed to trenchless cable installation techniques in the intertidal which will avoid direct impacts to the clay with piddocks IEF.

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		Cefas asked if any of the infrastructure will remain *in situ* after decommissioning.	The assessment for permanent habitat loss (in the decommissioning phase of the long term habitat loss impact, section 2.9.5), considers the MDS which assumes that cable crossings and scour and cable protection would be left on the seabed following decommissioning with all other infrastructure being removed.
March 2023	Natural England, MMO, JNCC, NRW, Cefas, Isle of Man Government and TWT – Benthic Ecology, Fish and Shellfish and Physical Processes EWG meeting 3	Presentation of the baseline characterisation and initial outputs of project alone impact assessment as well as an outline of the CEA methodology. Cefas highlighted that they may later have queries regarding the grab imagery data and eDNA will be shown.	The full site specific survey data is available upon request.
June 2023	Isle of Man Government - Section 42 Response	Clarity was sought as to some statements within the Preliminary Environmental Information Report (PEIR) in respect of dredging activities within the Island's harbours and volumes associated with these activities. The Department of Infrastructure can provide this data should it be requested by the project team.	Information regarding the potential dredge sites at Castletown Bay and Douglas Harbour were requested from the Isle of Man government and any relevant detail received in response has been included in the cumulative assessment (section 2.11).
		For the Isle of Man projects listed; Douglas Harbour, and Castletown Bay – not aware of this as a current operation. It is not clear whether these projects are active, or that the correct quantities or assumptions about waste disposal sites have been made. Recommend clarification with DoI.	Information received from the Isle of Man government has resulted in the removal of Castletown Bay from the CEA and the inclusion of further information regarding dredging at Douglas Harbour (section 2.11).
	JNCC - Section 42 Response	JNCC would have welcomed more clarity on the likelihood of protection material removal at decommissioning to allow clearer assessment of permanent impacts resulting from the Mona project.	The MDS for the long term habitat loss impact in the decommissioning phase (section 2.9.5) is for scour and cable protection around foundations to be left *in situ* following the decommissioning phase as this represents the worst case for this impact pathway. The impact assessment for the removal of hard substrate impact however now considers the removal of all hard substrate, including scour and cable protection, as this represents the worst case scenario for this impact pathway(section 2.9.8).

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			This approach ensures that the appropriate MDS is assessed for each impact pathway.
		JNCC noted that the incorporation of site specific surveys for the Mona Offshore Cable Corridor and the ZoI have not been incorporated.	Noted, this information has now been added to the report and the relevant IEFs (Table 2.13) have been assessed throughout sections 2.9 and 2.11.
		JNCC noted the classification of cable protection as long-term. Given the length of time that these materials will be in place (i.e. at least the project lifetime), JNCC would consider this to result in permanent habitat loss, particularly given the current lack of information on the feasibility of removal.	The MDS is for cable protection to be left *in situ* following decommissioning therefore cable protection has been considered as permanent habitat loss in the decommissioning phase of the long term habitat loss impact in section 2.9.5.
		JNCC strongly recommend that any material from sandwave levelling or dredging be retained within the same sediment system from which it was removed. This could have included, where appropriate, deposition upstream of the operations to allow natural backfill.	Noted, material from sandwave clearance will be deposited in the immediate vicinity of the clearance site. Additionally some of the sediment from the Mona Array Area may be removed from the system to instead be used as ballast for the gravity base foundations. The impacts of sediment deposition and removal are considered in regard to the temporary habitat disturbance/loss and long term habitat loss impacts respectively (sections 2.9.2 and 2.9.5).
		JNCC requested further information regarding the potential impact on Annex I Stony Reef from seabed impacts such as sandwave levelling and deposition of sandwave levelling sediments.	The impacts of sandwave clearance and sediment deposition, including any potential effects on potential reef features, have been considered when assessing the temporary habitat disturbance/loss impacts (sections 2.9.2).
		JNCC recommend that all figures reflecting seabed impacts are broken down and collated into a reference tool (such as a spreadsheet) to ensure full understanding of the impacts from the Mona Offshore Wind Project. It would have also been helpful to have clear distinction between SNCB inshore and offshore remits.	Table 2.18 has been restructured to group impacts which occur within the Mona Array Area, Mona Offshore Cable Corridor and landfall. This new presentation should improve the ability of the SNCBs to determine the figures relevant to their remit. The Applicant considers that this presents the SNCBs with sufficient transparency in how the MDS has been calculated from the range of project parameters provided in Volume 1, Chapter 3: Project description of the Environmental Statement.
		JNCC were keen to understand where the estimated number of repairs and the estimated	The MDS for cable repair and reburial activities (as per Volume 1, Chapter 3: Project description of the Environmental Statement) has been generated based

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		scale of impact from said repairs have been derived from. They also queried whether there is the potential for further remediation requirements which could impact on the seabed, such as additional scour protection.	on experience from previous projects regarding the potential needs of each element of the project. These values are determined by the project engineers who have taken in to consideration a range of geophysical and logistical factors. Additional remediation works beyond that predicted and assessed could be required during the operation and maintenance phase. In such instances, a Marine Licence for the works could be required. Further details on this are provided in the Outline Offshore Operations and Maintenance Plan.
		JNCC noted that quantitative figures have not been provided for all operations, in particular decommissioning, and no explanation has been provided as to why this is the case.	Specific values regarding impacts in the decommissioning phase have not been quantified as the activities in the decommissioning phase will be guided by legislation and guidance which will be available at the time of decommissioning. To produce a precautionary assessment it has therefore been assumed that the magnitude of impacts such as temporary habitat loss in the decommissioning phase will be similar to the construction phase. This is precautionary as activities such as sandwave clearance would not be required.
		JNCC required justification as to why Scenario 2, 68 wind turbines has been used over Scenario 1, 107 wind turbines.	The suction bucket jacket 68 wind turbine scenario has been determined to be the MDS for long term habitat loss based on the parameters included in the MDS table (Table 2.18). The options for a greater number of wind turbines (e.g. 96 suction bucket jacket foundations noting the option for 107 wind turbines) has been removed from the Volume 1, Chapter 3: Project description of the Environmental Statement however these options are associated with a smaller total seabed footprint (i.e. from scour protection and the foundation itself) than the 68 wind turbine option.
		JNCC highlighted that the use of cable and scour protection can, in itself, cause secondary scour which should be included in assessment of significant effects. In addition, there is the potential for indirect impacts on surrounding habitats including the effects from scour and changes in hydrodynamics resulting from the introduction of hard substrate.	There is a commitment to provide scour protection around offshore structures and foundations to reduce scour, as outlined in Table 2.19. The scour protection measures will be subject to engineering design to ensure they minimise as much as practical the occurrence of scour and therefore any impacts would relate only to residual/secondary scour. Secondary scour is assessed for the operations and maintenance and decommissioning phases in section 2.9.9. The effect of infrastructure in the water column and its effect on the tidal, wave and sediment transport regimes of the surrounding area has been considered in the changes in physical processes impact (section 2.9.9).
		JNCC acknowledged that 'colonisation of hard structures' has been scoped in however, JNCC consider 'physical change to another sediment type' to be a pressure for the offshore wind	This impact has been captured in the assessment of the long term habitat loss (section 2.9.5) impact where the pressure of physical change to another seabed type has been considered.

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		operation phase and the introduction of hard substrate into naturally sandy or muddy seabeds has the potential to change or introduce new, alternative, biological communities.	
		JNCC advised the inclusion of the impact to adjacent habitats from the removal and deposition of marine growth from hard substrates which may potentially impact a larger area than the infrastructure footprint.	The potential impacts associated with the removal of marine growth from foundations during the operations and maintenance phase spans several impact pathways. As such this impact has been considered within two impact pathway assessments: 1) increased SSC and sediment deposition (i.e. in relation to the deposition and smothering element; see section 2.9.3) and 2) in the assessment of the introduction of artificial structures and the potential for this to extend the reef effect in the vicinity of foundations (see section 2.9.6).
		It was not always clear which subtidal IEFs are being assessed. JNCC asked that it be highlighted, for each potential effect and each project phase, which IEFs are being considered.	A summary table has been added to display which IEFs have assessed for each impact (Table 2.20).
		Given the presence of burrow abundance categorised as "frequent" on the Superabundant, Abundant, Common, Frequent, Occasional and Rare (SACFOR) scale and that "no attempt was made to determine the species which formed the burrows" JNCC questioned the conclusion that "no evidence of any species associated with 'sea pen and burrowing megafauna communities' habitat".	The assessment has been updated to include the seapens and burrowing megafauna communities as an IEF on a precautionary basis which is now assessed in full in sections 2.9 and 2.11.
		UXO clearance should be considered in the context the seabed impacts. We welcome future engagement on UXO clearance.	Consideration regarding UXO clearance has been added to the temporary habitat loss impact (paragraph 2.9.2.12).
	NRW - Section 42 Response	NRW stated that recovery of benthic habitats within Constable Bank will depend in part on the impacts to the physical processes of the sandbank, which have not been assessed.	Physical processes modelling has been undertaken to understand the impact of cable installation in the Mona Offshore Cable Corridor (Volume 2, Chapter 1: Physical processes of the Environmental Statement). The outputs of this

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			modelling have been considered in the relevant assessments in section 2.9 including in regards to the potential impact on Constable Bank.
		NRW were concerned that the potential impacts from open-cut trenching to intertidal habitats had not been appropriately assessed in the PEIR and would not be temporary. Further information was required regarding methodology.	Since the submission of the PEIR, open cut trenching through the intertidal area has been removed from the project design (Volume 1, Chapter 3: Project description of the Environmental Statement) and all export cables at the landfall will be installed beneath the intertidal area using trenchless techniques. The assessments have been updated accordingly and the only direct impact in the intertidal will be temporary habitat disturbance associated with the movement of equipment, machinery and personnel.
		NRW requested clarification on how far the cable trenches are from the *M. edulis* beds and *S. alveolata* reef and what evidence there is from the physical processes modelling, to support the conclusions that the movement of sediment in the intertidal from the cable trenching installation works will not significantly impact the *M. edulis* beds and the *S. alveolata* reef	Since the submission of the PEIR, open cut trenching through the intertidal area has been removed from the project design (Volume 1, Chapter 3: Project description of the Environmental Statement) and all export cables at the landfall will be installed beneath the intertidal area using trenchless techniques. The assessments have been updated accordingly. The impact of trenchless techniques in the nearshore subtidal area on intertidal habitats is assessed in section 2.9.3 and paragraphs 2.9.3.27.
		NRW advised that the sensitivity of littoral sand and muddy sand supporting infaunal communities IEF to temporary habitat loss/disturbance, should be considered 'medium'.	The sensitivity of littoral sand and muddy sand supporting infaunal communities IEF has been amended to medium in section 2.9 as NRW suggest.
		The clay with piddocks IEF was characterised by specific abiotic and biotic features that would be adversely affected by open cut trenching, resulting in long-term habitat loss (as noted in Section 7.8.1.31). Clarification was therefore sought as to why it was being assessed as temporary habitat disturbance/loss here.	Since the submission of the PEIR, open cut trenching through the intertidal area has been removed from the project design (Volume 1, Chapter 3: Project description of the Environmental Statement) and all export cables at the landfall will be installed beneath the intertidal area using trenchless techniques and so will avoid the clay with piddocks IEF. Furthermore, all construction and operation and maintenance activities at the Mona landfall will be located outside the clay with piddocks IEF. There will therefore be no direct impacts to the clay with piddocks IEF.
		No spatial figures had been presented to understand the extent of the sediment plume	Modelling has been undertaken to understand the impact of cable installation in the Mona Offshore Cable (Volume 2, Chapter 1: Physical processes of the Environmental Statement). The outputs of this modelling have been considered in

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		and potential interactions with Annex I features of the Menai Strait and Conwy Bay SAC.	the relevant assessments in section 2.9 including in regards to the extent of impacts on the Menai Strait and Conwy Bay SAC.
		NRW advised that the sensitivity of the CR.MCR.SfR.Hia to increases in suspended sediment concentrations and associated deposition should be assessed as medium, in line with the information presented in the Marine Evidence based Sensitivity Assessment (MarESA–medium sensitivity to smothering and siltation rate changes (light)).	The sensitivity of the CR.MCR.SfR.Hia biotope has been amended in section 2.9 as NRW suggested.
		NRW disagreed that the magnitude of impact of long term habitat loss in Constable Bank would be low.	Following the publication of the PEIR a measure has been adopted to place no cable protection with Constable Bank (Table 2.19). There will therefore be no long term habitat loss within the Constable Bank.
		NRW disagreed that the magnitude of impact would be low as up to 56% of the piddocks with a sparse associated fauna in clay with piddocks IEF being permanently lost. NRW therefore advised that the magnitude of impact should be considered high.	Since the submission of the PEIR, open cut trenching has been removed from the project description (Volume 1, Chapter 3: Project description of the Environmental Statement) and all export cables at the landfall will be installed via trenchless techniques and so will avoid the clay with piddocks IEF. Furthermore, all construction and operation and maintenance activities at the Mona landfall will be located outside the clay with piddocks IEF. There will therefore be no direct impacts to the clay with piddocks IEF.
		NRW queried whether it would be possible to carry out Horizontal Direction Drilling (HDD) at the landfall in order to avoid long-term habitat loss to peat and clay exposures and/or whether it is possible to avoid the habitat by micro-siting. HDD might also result in the release of bentonite, which could have an impact on sensitive features in the intertidal (for example *S. alveolata* reef).	Since the submission of the PEIR, open cut trenching through the intertidal area has been removed from the project design (Volume 1, Chapter 3: Project description of the Environmental Statement) and all export cables at the landfall will be installed beneath the entire intertidal area using trenchless techniques and so will avoid the clay with piddocks IEF. An assessment of the potential release of bentonite during cable installation via trenchless techniques has, however, been added to the assessment of increased Suspended Sediment Concentration (SSC) and sediment deposition on benthic receptors (see 2.9.3).
		NRW were concerned that the potential for the cable protection to become exposed in the intertidal during the operation of the development has not been assessed. Exposed	Since the submission of the PEIR, open cut trenching through the intertidal area has been removed from the project design (Volume 1, Chapter 3: Project description of the Environmental Statement) and all export cables at the landfall will be installed beneath the entire intertidal area using trenchless techniques.

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		cable could potentially require cable protection, resulting in further long-term habitat loss.	
		NRW disagreed that the magnitude of impact to the Menai Strait and Conwy Bay SAC is low. The magnitude of impact should be considered High and the effects of major adverse significance, which is significant in EIA terms.	The MDS for cable protection in the SAC has reduced from the PEIR which accounted for up to 2,800 m of cable protection (affecting 0.01% of the SAC), to 810 m of cable protection (i.e. 10% of the length of export cables in the Menai Strait and Conwy Bay SAC, affecting 0.003% of the SAC). Additionally based on the site specific surveys (full results described in section 2.9.5 and Volume 6, Annex 2.1: Benthic subtidal and intertidal ecology technical report of the Environmental Statement) none of the designated features of the Menai Strait and Conwy Bay SAC occur in the area of overlap between the Mona Offshore Cable Corridor and the SAC. Therefore long term habitat loss in the SAC has been assessed against the relevant IEFs and found to have a low magnitude of effect (section 2.9.5).
		NRW advised that all options for decommissioning must be considered including complete removal of cable protection.	The decommissioning scenario that results in the greatest potential impact has been assessed, as relevant, for each impact pathway. For example, for long term/permanent habitat loss, introduction of artificial structures and the introduction and spread of INNS post-decommissioning, the MDS is that cable protection will remain *in situ* as this leads to the greatest potential impact. The assessment of removal of hard substrates has however been updated to consider the potential impacts associated with the removal of cable protection during decommissioning.
		NRW advised that a full Biosecurity Risk Assessment and INNS Management Plan are completed in relation to all marine operation activities associated with the current proposal.	Measures regarding minimising the risk of introduction and spread of INNS will be included in the Offshore EMP including a separate Biosecurity Risk Assessment and INNS Management Plan.
		NRW advised that the sensitivity of the CR.MCR.CfaVS.CuSpH biotope in the Menai Strait and Conwy Bay SAC to the introduction of INNS should be considered High in all phases (in line with the approach taken for the low resemblance stony reef IEF).	The subtidal features of the Menai Strait and Conwy Bay SAC (Annex I subtidal reef IEF and Annex I sandbanks IEF) have been assessed for INNS (section 2.9.7) with a sensitivity of high.
		NRW considered there was a lack of assessment carried out on the potential impacts to physical processes from the	Following the publication of the PEIR a measure has been adopted as part of the Mona Offshore Wind Project to not install cable protection within Constable Bank. There will therefore be no long term habitat loss within Constable Bank.

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		placement of cable protection on Constable Bank and the Menai Strait and Conwy Bay SAC. Furthermore, no assessment on secondary scour has been carried out. Impacts to physical processes could have an indirect impact on benthic habitats. NRW were therefore unable to agree with these conclusions while those assessments are still being carried out.	The impact of changes in physical processes within the Menai Strait and Conwy Bay SAC has been assessed along with the rest of the Mona benthic subtidal and intertidal ecology study area in section 2.9.9. There is a commitment to provide scour protection around offshore structures and foundations to reduce scour, as outlined in Table 2.19. The scour protection measures will be subject to engineering design to ensure they minimise as much as practical the occurrence of scour and therefore any impacts would relate only to residual/secondary scour. Secondary scour is assessed for the operations and maintenance and decommissioning phases in section 2.9.9.
		NRW advised that in order for intertidal habitats to recover, there should be at least ca. 0.5 m of the original sediment on top of the cable protection.	Since the submission of the PEIR, open cut trenching through the intertidal area has been removed from the project design (Volume 1, Chapter 3: Project description of the Environmental Statement) and all export cables at the landfall will be installed beneath the entire intertidal area using trenchless techniques. The assessments have been updated accordingly.
		NRW advised that the definitions of terms relating to the 'negligible' magnitude of an impact in are incorporated into the assessment for clarity.	As suggested the terms relating to a magnitude of negligible from Table 2.14 have been added to the magnitude text in sections 2.9.10 and 2.9.11.
		NRW were unable to agree that no future monitoring is required given the key issues raised.	Since PEIR the project description (Volume 1, Chapter 3: Project description of the Environmental Statement) has been refined resulting in a reduced MDS and therefore reduced impacts on key features such as the Menai Strait and Conwy Bay SAC and Constable Bank. There is no spatial overlap with any of the features of the SAC (Figure 2.9) and no significant effects are predicted on the SAC (Table 2.36 and Table 2.37). Therefore no future monitoring has been proposed.
		The HyNet North West Hydrogen Pipeline Project should also be screened into the cumulative effects assessment.	The Hynet project has been included where appropriate in the CEA (section 2.11).
		NRW advised that a full Biosecurity Risk Assessment and INNS Management Plan is completed in relation to all marine operation activities associated with the current proposal.	Measures regarding minimising the risk of introduction and spread of INNS (such as a Biosecurity Risk Assessment and INNS Management Plan) will be appended to the Offshore EMP.
		NRW noted some inconsistencies between the information in the benthic PEIR chapter and Volume 4, Annex 8.1: Benthic subtidal and	The magnitude for section 2.9.4 has been corrected following updates to the sediment contamination results reporting.

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		intertidal ecology technical report of the PEIR regarding the sediment chemistry analysis results.	
June 2023	Wildlife Trust Wales (WTW) – Section 42 Response	The WTW advocated that projects such as the Mona Offshore Wind Project deliver strategic compensation, and strategic marine environment monitoring throughout the life cycle of the offshore wind farm.	Since PEIR the project design (Volume 1, Chapter 3: Project description of the Environmental Statement) has been refined resulting in a reduced MDS (Table 2.18). No significant effects are predicted and therefore no future monitoring or compensation has been proposed.
		WTW understood that the benthic subtidal ecology baseline and assessment of the MDS was not all determined on site specific data collection.	These concerns have been addressed with the inclusion of the 2022 site-specific survey data for the Mona Offshore Cable Corridor. Therefore full assessments regarding the impact on the benthic habitats in the Mona Offshore Cable Corridor have been provided in all the relevant impacts (see section 2.9).
		The Mona Array represented ~450 km^2 area of potential benthic surface change. The introduction of offshore wind farm infrastructure; 68 to 107 monopiles, 4 offshore substations, inter-array cabling, cable protection and scour prevention methods, at this scale into a predominantly soft sediment benthic environment will see a hard substrate created as a consequence of the cumulative impact. This will see a change in benthic community type from infauna to epifauna dominance, which will in-turn see a change in the dominant feeding type. This represents a bottom-up-pressure which will ultimately impact predator-prey relationships.	Post-PEIR the Mona Array Area has been reduced from 450 to 300 km^2. Additionally the maximum number of turbines has been revised with the new maximum number of wind turbines reduced to 96 (Volume 1, Chapter 3: Project description of the Environmental Statement) and monopile foundations have been removed. As a result of these changes the total footprint of hard substrate within the Mona Array Area equates to 0.46% of Mona Array Area. The magnitude of the long term habitat loss impact was therefore concluded to be low (section 2.9.5) and highly unlikely to result in widespread changes to the infaunal and epifaunal communities. The impact of a potential change in community has been considered primarily in section 2.9.6, introduction of artificial structures, where consideration is given to the impact of these new communities on the existing soft sediment environment. The potential impact regarding the impact of long term habitat loss have been considered in Volume 2, Chapter 3: Fish and shellfish ecology of the Environmental Statement and the effects of changes to prey availability is captured in Volume 2, Chapter 4: Marine mammals of the Environmental Statement and Volume 2 Chapter 5: Offshore ornithology of the Environmental Statement.
		The Mona Offshore Cable Corridor will pass through the Menai Strait and Conway Bay SAC and encroaches Constable Bank.	Noted, project alone impact assessment and the cumulative impacts regarding other projects in the region both consider impacts on the Menai Strait and Conwy Bay SAC and Constable Bank where relevant (section 2.9 and 2.11).

Date	Consultee and type of response	Issues raised	Response to issue raised and/or where considered in this chapter
July 2023	Natural England, MMO, JNCC, NRW, Cefas and TWT – Benthic Ecology, Fish and Shellfish and Physical Processes EWG meeting 4	NRW flagged that it would be good to see more information on the methodology for the open cut trenching option.	Since the submission of the PEIR, open cut trenching through the intertidal area has been removed from the project design (Volume 1, Chapter 3: Project description of the Environmental Statement) and all export cables at the landfall will be installed beneath the intertidal area using trenchless techniques. The assessments have been updated accordingly.
October 2023	Email to Benthic Ecology, Fish and Shellfish and Physical Processes EWG	The Mona benthic subtidal and intertidal ecology technical report for the Environmental Statement was submitted to the Benthic Ecology, Fish and Shellfish and Physical Processes EWG together with a summary of the project refinements for the Environmental Statement.	See response below (November 2023) from NRW to this consultation.
October 2023	Natural England, MMO, JNCC, NRW, Cefas and TWT – Benthic Ecology, Fish and Shellfish and Physical Process EWG meeting 5	This meeting presented the updates to the benthic ecology baseline characterisation to address Section 42 responses.	No concerns were raised in this meeting requiring a response.
November 2023	NRW response following Benthic Ecology, Fish and Shellfish and Physical Process EWG meeting 5	NRW provided the following responses after EWG meeting 5 and after reviewing the Mona benthic subtidal and intertidal ecology technical report: • Overall NRW were satisfied with the Mona benthic subtidal and intertidal ecology Technical Report. The report is very detailed and clearly outlines the baseline characterisation survey, the results and assessments that were carried out • NRW agreed that no Annex I features were identified within this section of the export cable corridor • NRW were satisfied that the habitats present within the export cable corridor and the	No concerns were raised requiring a response.

Date	Consultee and type of response	Issues raised	Response to issue raised and/or where considered in this chapter
		landfall have been appropriately identified and that sufficient site-specific and desktop data has been collated to appropriately characterise the baseline benthic subtidal and intertidal ecology environment to inform the EIA.	

2.4 Baseline methodology

2.4.1 Relevant guidance

2.4.1.1 There are a number of guidance documents which have been considered when compiling the baseline for this chapter, and the key documents are described below.

2.4.1.2 The Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR) guidance on Environmental Considerations for Offshore Wind Farm Development has a primary aim to provide scientific guidance to those involved with the gathering, interpretation and presentation of data within an EIA as part of the consents application process in England and Wales (OSPAR, 2008). In this chapter this guidance has informed the sampling strategy and design of the surveys to determine the baseline for the Mona benthic subtidal and intertidal ecology study area, as well as the processing of the collected samples.

2.4.1.3 The identification of sensitive and protected benthic habitats is a key feature of this chapter. One of these habitats is Annex I stony reef; these habitats were specifically targeted in subtidal baseline surveys to determine if they existed within the Mona benthic subtidal and intertidal ecology study area (these assessments can be found in full in Volume 6, Annex 2.1: Benthic subtidal and intertidal ecology technical report of the Environmental Statement). To determine if the habitats surveys meet the criteria to be classified as Annex I stony reef the “Identification of the Main Characteristics of Stony Reef Habitats under the Habitats Directive” (Irving, 2009) and “Refining the criteria for defining areas with a ‘low resemblance’ to Annex I stony reef” (Golding *et al.*, 2020) guidance have been used.

2.4.2 Scope of the assessment

2.4.2.1 The scope of this Environmental Statement has been developed in consultation with relevant statutory and non-statutory consultees as detailed in Table 2.8. The scope of this assessment is to determine if any impacts, whether direct or indirect, could have a significant effect on the habitats which have been identified in the Mona benthic subtidal and intertidal ecology study area. This assessment has taken a precautionary and proportionate approach therefore impacts which are highly unlikely to result in a change to the environment have been scoped out.

2.4.2.2 Taking into account the scoping and consultation process, Table 2.8 summarises the potential impacts considered as part of this assessment.

Table 2.8: Potential impacts scoped into this assessment.

Activity	Potential impacts scoped into the assessment
Construction phase	
Site preparation (e.g. sandwave clearance, boulder clearance, etc.)	Temporary habitat loss/disturbance
Foundation installation	
Jack up events	
Anchor placement	
Cable installation (subtidal and intertidal)	
Cable removal	

Activity	Potential impacts scoped into the assessment
UXO removal	
Site preparation (e.g. sandwave clearance, boulder clearance, etc.)	Increase in SSC and associated deposition
Foundation installation	
Cable installation	
Site preparation (e.g. sandwave clearance, boulder clearance, etc.)	Disturbance/remobilisation of sediment-bound contaminants
Foundation installation	
Cable installation	
Presence of: • Wind turbine and Offshore Substation Platform (OSP) foundations • Wind turbine and OSP scour protection • Cable protection • Cable crossings.	Long term habitat loss/habitat alteration
Presence of: • Wind turbine and OSP foundations • Wind turbine and OSP scour protection • Cable protection • Cable crossings.	Introduction of artificial structures
Vessel Movement	Increased risk of introduction and spread of INNS
Presence of: • Wind turbine and OSP foundations • Wind turbine and OSP scour protection • Cable protection • Cable crossings.	
Operations and maintenance phase	
Wind turbine and OSP maintenance	Temporary habitat loss/disturbance
Cable repair and reburial (subtidal and intertidal)	
Cable repair and reburial	Increase in SSC and associated deposition
Cable repair and reburial	Disturbance/remobilisation of sediment-bound contaminants
Presence of: • Wind turbine and OSP foundations • Wind turbine and OSP scour protection • Cable protection • Cable crossings.	Long term habitat loss/habitat alteration

Activity	Potential impacts scoped into the assessment
Presence of: • Wind turbine and OSP foundations • Wind turbine and OSP scour protection • Cable protection • Cable crossings.	Introduction of artificial structures
Vessel Movement	Increased risk of introduction and spread of INNS
Presence of: • Wind turbine and OSP foundations • Wind turbine and OSP scour protection • Cable protection • Cable crossings.	
Presence of: • Wind turbines • OSPs • Cable protection • Scour protection.	Changes in physical processes
Operational cables	EMF from subsea electrical cables
Operational cables	Heat from subsea electrical cables
Decommissioning	
Cable removal	Temporary habitat loss/disturbance
Anchor placement	
Jack up event	
Cable removal	Increase in SSC and associated deposition
Foundation removal – suction caissons	
Cable removal	Disturbance/remobilisation of sediment-bound contaminants
Foundation removal – suction caissons	
Presence of: • Wind turbine and OSP scour protection • Cable protection.	Long term habitat loss/habitat alteration
Presence of: • Wind turbine and OSP scour protection Cable protection.	Introduction of artificial structures
Vessel Movement	Increased risk of introduction and spread of INNS
Presence of: • Wind turbine and OSP scour protection • Cable protection.	
Presence of: • Cable protection • Scour protection.	Changes in physical processes

Activity	Potential impacts scoped into the assessment
Removal of: • Wind turbines • OSPs • Cable protection • Scour protection.	Removal of hard substrate

2.4.2.3 Effects which are not considered likely to be significant have been scoped out of the assessment. A summary of the effects scoped out, together with justification for scoping them out and whether the approach has been agreed with key stakeholders through either scoping or consultation, is presented in Table 2.9.

Table 2.9: Impacts scoped out of the assessment for benthic subtidal and intertidal ecology.

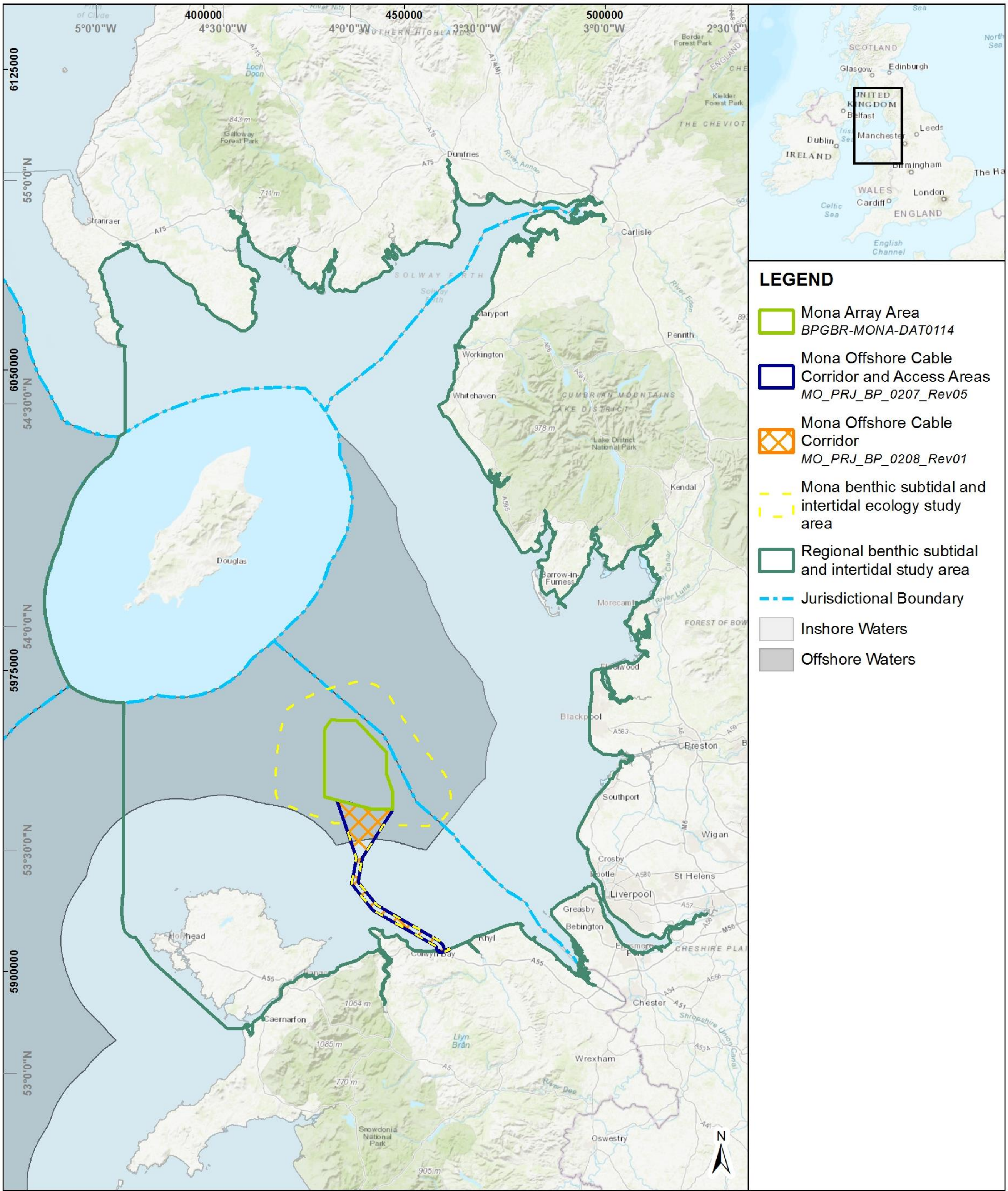
Potential impact	Justification
Accidental pollution in the construction, operations and maintenance, and decommissioning phases.	There is a risk of pollution being accidentally released during the construction, operations and maintenance and decommissioning phases from sources including vessels/vehicles and equipment/machinery. However, the risk of such events is managed by the implementation of measures set out in standard post consent plans (e.g. an Offshore EMP, including a Marine Pollution Contingency Plan (MPCP)). These plans include planning for accidental spills, address all potential contaminant releases and include key emergency contact details. It will also set out industry good practice and OSPAR, International Maritime Organisation (IMO) and MARPOL (International Convention for the Prevention of Pollution from Ships) guidelines for preventing pollution at sea. Therefore, the likelihood of an accidental spill occurring is very low and in the unlikely event that such events did occur, the magnitude of these will be minimised through measures such as a MPCP. As such, this impact was scoped out of further consideration within this chapter. NRW and the Planning Inspectorate agreed through their Scoping responses that the impact of accidental pollution could be scoped out of the assessment.

2.4.3 Study area

2.4.3.1 For the purposes of the benthic subtidal and intertidal ecology assessment, three study areas have been defined:

- The Mona benthic subtidal and intertidal ecology study area has been defined as the area encompassing the Mona Array Area and Offshore Cable Corridor. The Mona benthic subtidal and intertidal study area also includes the area within one tidal excursion around the Mona Array Area known as the ZoI, and associated landfall and intertidal habitats (up to the MHWS mark). These are the areas within which the site specific benthic subtidal and intertidal surveys were undertaken (Figure 2.1). This study area was consulted on throughout the EPP where it was presented to SNCBs, regulators and other stakeholders (e.g. Natural England, NRW, JNCC, MMO and Isle of Man government) who all agreed with the approach.

- The regional benthic subtidal and intertidal ecology study area encompasses the wider east Irish Sea habitats and includes the neighbouring consented offshore wind farms and designated sites (Figure 2.1). It has been characterised by desktop data and provides a wider context to the site specific data collected within the Mona benthic subtidal and intertidal ecology study area.
- The CEA benthic subtidal and intertidal ecology study area has been defined as a 50 km buffer around the Mona Array Area and Offshore Cable Corridor (Figure 2.10). This 50 km buffer is designed to capture all the relevant projects/plans/activities which have the potential to interact with the impact of the Mona Offshore Wind Project. For interactive/synergistic impacts (i.e. increase in SSC and changes in physical processes) the study area was defined by the CEA physical processes study area which is defined as two tidal excursions (see Volume 2, Chapter 1: Physical processes of the Environmental Statement).



Service Layer Credits: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

Data Sources: Client, MMO, MarineScotland

Project Name:
MONA OFFSHORE WIND PROJECT

0 2.5 5 10 15 20 nm
0 5 10 20 30 40 km

Drawing Number:
RPSE-MN-ES-BEN-E010-00

Drawing Title:
MONA BENTHIC SUBTIDAL AND INTERTIDAL ECOLOGY STUDY AREA AND THE REGIONAL BENTHIC SUBTIDAL AND INTERTIDAL ECOLOGY STUDY AREA.

Geodetic Information:
Datum: ETRS 1989
Projection: ETRS 1989 UTM Zone 30N
Scale@160mmx220mm: 1:1,600,000

VER	DATE	DETAILS	BY	CHECK
00	02/10/23	First Issue	MJ	TH

Figure 2.1: Mona benthic subtidal and intertidal ecology study area and regional benthic subtidal and intertidal ecology study area.

2.4.4 Desktop study

2.4.4.1 Information on benthic subtidal and intertidal ecology within the Mona benthic subtidal and intertidal ecology study area was collected through a detailed desktop review of existing studies and datasets. These are summarised in Table 2.10 below.

Table 2.10: Summary of key desktop reports.

Title	Source	Year	Author
Morgan Offshore Wind Project Generation Assets benthic subtidal ecology technical report	Morgan Offshore Wind Ltd.	2023	Morgan Offshore Wind Ltd.
Morecambe Offshore Windfarm benthic characterisation survey report	Morecambe Offshore Windfarm Ltd.	2023	Morecambe Offshore Windfarm Ltd.
Lle Geo – Portal for Wales	Welsh Government	2021	Welsh Government
National Biodiversity Network (NBN) Atlas	NBN Atlas	2019	NBN Atlas
EMODnet broad scale seabed habitat map for Europe (EUSeaMap)	EMODnet – Seabed Habitats	2019	EMODnet – Seabed Habitats
JNCC MPA mapper	JNCC	2019	JNCC
Subtidal Ecology. In: Manx Marine Environmental Assessment (2nd Ed).	The Government of the Isle of Man	2018	Lara Howe
Coastal Ecology. In: Manx Marine Environmental Assessment (2nd Ed).	The Government of the Isle of Man	2018	Lara Howe
Marine Phase 1 Intertidal Habitat Survey	Natural Resources Wales	2016	NRW
Burbo Bank extension benthic and Annex I habitat pre-construction survey	Marine Data Exchange	2015	Centre for Marine and Coastal Studies Ltd (CMACS)
Rhiannon offshore wind project Preliminary Environmental Information Report – benthic Ecology	Marine Data Exchange	2014	Celtic Array Ltd
Walney Year 3 post consent benthic monitoring survey report	Marine Data Exchange	2014	CMACS
Burbo Bank extension environmental statement – benthic ecology	Marine Data Exchange	2013	Dong Energy Ltd.
Walney Extension environmental statement. Chapter 10 benthic ecology	Marine Data Exchange	2013	Dong Energy

Title	Source	Year	Author
Walney Year 2 post-consent benthic monitoring survey report	Marine Data Exchange	2013	CMACS
Ormonde Year 1 post-construction benthic environmental monitoring survey	Marine Data Exchange	2012	CMACS
Burbo Bank Year 3 post construction benthic monitoring survey	Marine Data Exchange	2010	CMACS
Walney pre-construction monitoring report	Marine Data Exchange	2009	CMACS
Gwynt y Môr offshore wind farm baseline characterisation	Marine Data Exchange	2005	CMACS
Burbo Bank pre-construction contaminants investigation	Marine Data Exchange	2005	CMACS
Marine Nature Conservation Review (MNCR) areas summaries-Liverpool Bay and the Solway Firth	JNCC	1998	Covey. R.

2.4.5 Identification of designated sites

2.4.5.1 All designated sites within the Mona benthic subtidal and intertidal ecology study area and qualifying interest features that could be affected by the construction, operational and maintenance, and decommissioning phases of the Mona Offshore Wind Project were identified using the three-step process described below:

- Step 1: All designated sites of international, national and local importance within the regional benthic subtidal and intertidal ecology study area were identified using a number of sources. These sources included the Defra magic map and the JNCC interactive map
- Step 2: Information was compiled on the relevant features of qualifying interests for each of these sites
- Step 3: Using the above information and expert judgement, sites were included for further consideration if:
  - A designated site directly overlaps with the Mona Array Area or Mona Offshore Cable Corridor
  - Sites and associated qualifying interests were located within the potential ZoI for impacts associated with the Mona Offshore Wind Project. The ZoI was determined through project specific outputs from the marine processes assessment (Volume 2, Chapter 1: Physical processes of the Environmental Statement).

2.4.6 Site specific surveys

2.4.6.1 In order to inform the Environmental Statement, site specific surveys were undertaken, as agreed with the JNCC, NRW and Natural England (see Table 2.7 for further details). A summary of the surveys undertaken to inform the benthic subtidal and intertidal ecology impact assessment is outlined in Table 2.11 below.

Table 2.11: Summary of site specific survey data.

Title	Extent of survey	Overview of survey	Survey contractor	Date	Reference to further information
Pre-construction site investigation surveys	Mona Array Area	Geophysical survey to establish bathymetry, seabed sediment and identify seabed features.	Xocean Ltd	June 2021 – March 2022	XOCEAN (2022), Volume 6, Annex 1.1: Physical processes technical report of the Environmental Statement and Volume 6, Annex 2.1: Benthic subtidal and intertidal ecology technical report of the Environmental Statement
		High resolution side scan sonar and multibeam bathymetry.	Gardline Ltd.	June 2021 – September 2021	
Benthic subtidal survey	Mona Array Area	Grab samples and Drop Down Video (DDV) sampling was undertaken at 66 sites, and nine sample sites undertook just DDV sampling. A total of 22 sediment samples from across the Mona Array Area within the benthic subtidal and intertidal ecology study areas were analysed for sediment chemistry.	Gardline Ltd.	8 August 2021 – 20 September 2021	Volume 6, Annex 2.1: Benthic subtidal and intertidal ecology technical report of the Environmental Statement
	Mona Array Area and ZoI and Mona Offshore Cable Corridor (water depth >15 m)	Combined grab and DDV sampling at 58 stations and DDV only sampling at a further two stations. A total of 22 sediment samples from across the Mona Array Area and ZoI and 18 samples from across the Mona Offshore Cable Corridor within the benthic subtidal and intertidal ecology study areas were analysed for sediment chemistry.	Gardline Ltd.	1 April 2022 – 14 August 2022	
	Mona Offshore Cable Corridor (water depth <15 m)			1 April 2022 – 14 August 2022	

Title	Extent of survey	Overview of survey	Survey contractor	Date	Reference to further information
Benthic intertidal survey	Across the intertidal area (i.e. between MHWS and MLWS) at the proposed landfall location in the area within which cables will be installed	Phase I intertidal walkover survey with on-site dig over macrofauna sampling to characterise the benthic environment at the landfall.	RPS Ltd.	16 May 2022 – 20 May 2022	Volume 6, Annex 2.1: Benthic subtidal and intertidal ecology technical report of the Environmental Statement
	Mona Offshore Cable Corridor and Access Areas	Phase 1 intertidal walkover surveys with on-site dig over macrofauna sampling. Re-mapping of *Sabellaria alveolata* reef extent.	RPS Ltd.	8 May 2023 – 9 May 2023	

2.5 Baseline environment

2.5.1 Subtidal baseline

Seabed characterisation (geophysical survey)

2.5.1.1 The site-specific 2021 Gardline geophysical survey showed seabed sediments within the Mona Array Area were generally composed of gravelly shelly sand, cobbles and fine sands. Seabed features included sandwaves and megaripples in the southeast and north of the Mona Array Area where fine sands were more extensive. Whilst geophysical surveys were not specifically targeted at the Mona Array Area ZoI, some surveys did overlap as a result of boundary refinements to the Mona Array Area for the Environmental Statement. The north of the Mona Array Area ZoI also had some poorly defined sandwaves and megaripples which reached up to 6.5 m in height.

2.5.1.2 The site specific 2022 Gardline geophysical survey showed seabed sediments within the north of the Mona Offshore Cable Corridor were generally composed of coarse gravelly sediment. This area was also characterised by relatively flat seabed with two local seabed depressions and area of sand dunes. Sand dunes were also present in the south of the Mona Offshore Cable Corridor. The geophysical data also identified a transition between coarse gravelly seabed and finer sand approaching the coast.

2.5.1.3 The 2022 geophysical survey also identified an area of ripples and megaripples in the vicinity of Constable Bank. Multiple boulders were identified in this area, particularly in the south of the area of Constable Bank which overlaps with the Mona Offshore Cable Corridor. The sediment was determined to be slightly gravelly sand with areas of gravelly sand. Areas of ripples were identified in the north and east of Menai Strait and Conwy Bay SAC which overlaps with the Mona Offshore Cable Corridor. The majority of the overlap area was determined to be slightly gravelly sand with areas of gravelly sand with no features.

Subtidal seabed sediments

Mona Array Area and ZoI

2.5.1.4 Subtidal sediments recorded from infaunal grab samples collected across the Mona Array Area and ZoI during the site specific benthic subtidal surveys ranged from sandy gravel to slightly gravelly muddy sand with most samples classified as gravelly muddy sand (Figure 2.2). A single sample station was classified as slightly gravelly muddy sand, (ENV95) which was located in the southeast section of the Mona Array Area. One station in the Mona Array Area ZoI (ZOI50) was classified as muddy sand, which was located to the east of the Mona Array Area. According to the simplified Folk Classification (Long, 2006), most stations were classified as mixed sediments or coarse sediments, mirroring what was observed in the geophysical surveys. This aligned with the desktop data which indicated coarse sediments, sand and mixed sediments across the Mona benthic subtidal and intertidal ecology study area (EMODnet, 2019).

2.5.1.5 The percentage sediment composition (i.e. mud ≤0.63 mm; sand <2 mm; gravel ≥2 mm) at each grab sample station in the Mona Array Area was also determined. Across all sample stations in the Mona Array Area, the average percentage sediment composition was 17% gravel, 75% sand and 8% mud, with sand making up the highest proportion of the sediment composition in both the Mona Array Area and ZoI. Sediments across the Mona Array Area and ZoI were typically very poorly sorted (71% of samples). Of the samples, 17% were classified as poorly sorted and 10% were classified as moderately sorted.

Mona Offshore Cable Corridor

2.5.1.6 In the Mona Offshore Cable Corridor the majority of sediment samples were classified as either gravelly muddy sand or sand (Figure 2.3). Gravelly muddy sands dominated the north of the Mona Offshore Cable Corridor in the area adjoining the Mona Array Area, and sands were more prevalent in the centre and south. Sample stations in the centre of the Mona Offshore Cable Corridor were typically coarser with areas of sandy gravel, gravelly sand and slightly gravelly sand. The stations closest to the landfall were mostly sand with the shallowest station being slightly gravelly sand.

2.5.1.7 Across all sample stations in the Mona Offshore Cable Corridor, the average percentage sediment composition was 80% sand, 15% gravel and 5% fine sediment. Sediments within the Mona Offshore Cable Corridor were typically very poorly sorted (40% of samples), 23% were classified as poorly sorted and 20% were classified as moderately well sorted. In the centre of the Mona Offshore Cable Corridor four sample stations were well sorted, these sites were almost entirely composed of sand.

Constable Bank

2.5.1.8 The three stations sampled in the part of the Mona Offshore Cable Corridor which overlaps with Constable Bank (OCC065, OCC149 and OCC150) (Figure 2.3) were dominated by sand. These stations were classified as gravelly muddy sand, sand and slightly gravelly sand.

Menai Strait and Conwy Bay SAC

2.5.1.9 Five grab samples were collected in the area of the Mona Offshore Cable Corridor which overlaps with the Menai Strait and Conwy Bay SAC (OCC146, OCC147, OCC151, OCC152 and OCC153) (Figure 2.3). The sediment composition was dominated by sand with a notable quantity of gravel (up to 33% of each sample was gravel). All stations were classified as either sandy gravel or gravelly sand.

Subtidal sediment contamination

2.5.1.10 As part of the subtidal sediment contamination analysis from samples within the Mona benthic subtidal and intertidal ecology study area, levels of heavy metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc), polycyclic aromatic hydrocarbons (PAHs) and polychlorinated biphenyls (PCBs) were identified and compared to Cefas Action Levels 1 and 2 (AL1 and AL2), the Canadian Environmental Quality Guidelines (CSQGs) (i.e. Canadian Probable Effect Level (PEL) and Threshold Effect Level (TEL)). The National Oceanic and Atmospheric Administration's effects range low (ERL) and effects range median (ERM) thresholds were also used for PAHs only.

Mona Array Area and ZoI

2.5.1.11 In summary, no contaminants were found to exceed Cefas AL2, the Canadian PEL, ERL or ERM thresholds. Concentrations of PCBs in all samples were found to be below Cefas AL1 and the CSQGs. Concentrations of PAHs in all samples were found to be below Cefas AL1 and ERL.

2.5.1.12 Levels of arsenic, however, marginally exceeded the Cefas AL1 at two sample stations in the Mona Array Area. The Canadian TEL was exceeded for arsenic at all sample locations in the Mona Array Area and ZoI however all samples were below Cefas AL2 and the Canadian PEL. One sample station in the Mona Array Area also exceeded Cefas AL1 for cadmium but was below the Cefas AL2 threshold as well as below the Canadian PEL and TEL.

Mona Offshore Cable Corridor

2.5.1.13 In summary, no contaminants were found to exceed Cefas AL2, the Canadian PEL, ERL or ERM. Concentrations of PCBs in all samples were found to be below Cefas AL1 and the CSQGs. Concentrations of PAHs in all samples were found to be below Cefas AL1 and the ERL.

2.5.1.14 Levels of arsenic, however, marginally exceeded the Cefas AL1 at three sample stations in the Mona Offshore Cable Corridor. The Canadian TEL was exceeded for arsenic at all but one sample location in the Mona Offshore Cable Corridor however all samples were below Cefas AL2 and Canadian PEL.

Constable Bank

2.5.1.15 Two samples in the area of the Mona Offshore Cable Corridor overlapping with Constable Bank were analysed for sediment chemistry. The levels for both stations were below all the relevant thresholds for all metals with the exception of arsenic which was over Canadian TEL for both stations.

Menai Strait and Conwy Bay SAC

2.5.1.16 Two samples in the area of the Mona Offshore Cable Corridor overlapping with the Menai Strait and Conwy Bay SAC were analysed for sediment chemistry. The levels for both stations were below all the relevant thresholds for all metals with the exception of arsenic which was over Canadian TEL for both stations.

Subtidal biotopes and habitats

Mona Array Area and ZoI

2.5.1.17 Across the Mona Array Area and ZoI, the infaunal communities were generally dominated by annelids and crustaceans. The most abundant individuals generally belonged to Annelida with the polychaete *Scalibregma inflatum* being overall the most abundant species. The biomass data reflected the dominance of annelids with respect to the number of individuals and number of taxa, in 35% of stations annelids contributed the most to biomass. Molluscs and echinoderms contributed the second and third most to biomass (36% and 17% respectively).

2.5.1.18 The epifaunal communities recorded by the seabed imagery varied according to the type of sediment. In general, high numbers of epifaunal species were recorded in association with the coarser sediments. Epifaunal species recorded were dominated by annelids and cnidarians with low numbers of molluscs and chordates. Stations in areas of coarse and mixed sediments were associated with the presence of dead man's fingers *Alcyonium digitatum*, common starfish *Asterias rubens*, brittlestars *Ophiura* sp. and the common hermit crab *Pagurus bernhardus*.

2.5.1.19 A full description of the habitats and biotopes recorded in the site specific benthic surveys in the Mona benthic subtidal and intertidal ecology study area, including full descriptions of the biotope codes discussed in this section and shown in Figure 2.4, are provided in Volume 6, Annex 2.1: Benthic subtidal and intertidal ecology technical report of the Environmental Statement. The distribution of combined infaunal and epifaunal biotopes is presented in Figure 2.4.

2.5.1.20 The benthic communities in the Mona Array Area and ZoI were characterised by the polychaete-rich deep Venus community in offshore mixed sediments (SS.SMx.OMx.PoVen) biotope. Figure 2.4 shows this biotope was recorded across the majority of the Mona Array Area as well as extending in to the north of the Mona Array Area ZoI. This biotope is characterised by a diverse community particularly rich in polychaetes potentially with a significant venerid bivalve component. Species present in this biotope included polychaetes such as *Glycera lapidum*, *Lysidice unicornis*, *Aonides paucibranchiata*, *Syllis* sp. and *Mediomastus fragilis* as well as the echinoderm *Echinocyamus pusillus*. The second most dominant biotope in the Mona Array Area was the circalittoral coarse sediment biotope (SS.SCS.CCS). This biotope was present in the central and south part of the Mona Array Area as well as in the east of the Mona ZoI. The SS.SCS.CCS biotope was characterised by a robust community of infaunal polychaetes, mobile crustaceans and bivalves which included species such as *Scoloplos armiger*, *Spiophanes bombyx*, *Owenia* sp., Nemertea and *Abra* sp.

2.5.1.21 In the southeast of the Mona Array Area ZoI there were small areas of two other biotopes, *Kurtiella bidentata* and *Thyasira* spp. in circalittoral muddy mixed sediment (SS.SMx.CMx.KurThyMx) and circalittoral mixed sediment (SS.SMx.CMx). The SS.SMx.CMx.KurThyMx biotope was present in two small areas in the southeast of the Mona Array Area ZoI. This biotope was characterised by bivalves such as *Kurtiella bidentata*, polychaetes such as *Scoloplos armiger*, and the brittlestar *Amphiura filiformis*. The SS.SMx.CMx biotope was present in the northwest and east of the Mona Array Area. This biotope encompassed a broad array of communities but in the Mona Array Area and ZoI it was characterised by *Glycera lapidum*, Nemertea, *Leptochiton asellus*, *Ophiothrix fragilis*, *Ophiura albida* and *Syllis* sp. In the southeast of the Mona

Array Area ZoI one station was allocated the circalittoral fine sand (SS.SSa.CFiSa) biotope primarily due to the sediment at this station which was almost entirely composed of sand and was characterised by a broad community of echinoderms, polychaetes and bivalves including *O. ophiura, Paguroidea*, *Hesionura elongata, Pisione remota* and *A. paucibranchiata.* Also in the southeast of the Mona Array Area ZoI one station was allocated the circalittoral muddy sand (SS.SSa.CMuSa) biotope also primarily due to its sediment composition (largely sand and fine material) as well as being characterised by a wide variety of polychaetes and bivalves. In the southwest of the Mona Array Area ZoI the two stations which were sampled by DDV only were found to have high numbers of *O. fragilis* (>40 individuals recorded at each station) leading to this area being characterised by the *Ophiothrix fragilis* and/or *Ophiocomina nigra* brittlestar beds on sublittoral mixed sediment (SS.SMx.CMx.OphMx) biotope.

Mona Offshore Cable Corridor

2.5.1.22 Across the Mona Offshore Cable Corridor, the infaunal communities were generally dominated by annelids and crustaceans, closely followed by Molluscs. The most abundant individuals were generally Molluscs with the bivalve *Ensis* being overall the most abundant species with a total of 380 individuals recorded. The biomass data reflected the dominance of annelids with respect to the number of individuals and number of taxa, in 43% of stations annelids contributed the most to biomass. Molluscs and Echinoderms contributed the second and third most to biomass.

2.5.1.23 The epifaunal communities recorded by the seabed imagery varied according to the type of sediment. In general, high numbers of epifaunal species were recorded in association with the coarse and mixed sediments. Epifaunal species recorded were dominated by annelids, cnidarians and echinoderms. The offshore coarse and mixed sample stations had a much greater diversity of species as well as much higher abundance. The sand-based sample stations had sparser epifaunal communities with many stations having no epifauna visible from the DDV. Some of the most prominent species across the Mona Offshore Cable Corridor included *Serpulidae*, *A. digitatum*, *A. rubens*, *Ophiura albida, Corymorpha nutans, Pectinidae* and *Metridium*.

2.5.1.24 The biotope SS.SMx.OMx.PoVen was found in the north of the Mona Offshore Cable Corridor, adjacent to the Mona Array Area (Figure 2.5). These stations were characterised by communities of polychaetes and bivalves such as *A. paucibranchiata, L. unicornis* and *G. lapidum.* South of this section of SS.SMx.OMx.PoVen the sediment becomes more sand dominated, therefore this area was characterised by the SS.SSa.CFiSa biotope which includes polychaetes such as *Nephtys* and *S. bombyx*. Further south the SS.SMx.CMx biotope as well as the *Nephtys cirrosa* and *Bathyporeia* sp. in infralittoral sand (SS.SSa.IFiSa.NcirBat) biotope were present in the centre of the Mona Offshore Cable Corridor. The SS.SSa.IFiSa.NcirBat biotope was characterised by *Nephtys cirrosa* and *Bathyporeia* sp. as well as polychaetes such as *S. armiger* and *S. bombyx*. Also in this central section of the Mona Offshore Cable Corridor there were areas of SS.SCS.CCS and the SS.SMx.CMx.KurThyMx biotope which were characterised by *K. bidentata, Mediomastus fragilis*, *Owenia* and *Scoloplos*. In the section of the Mona Offshore Cable Corridor closest to the landfall there was an area of the *Fabulina fabula* and *Magelona mirabilis* with venerid bivalves and amphipods in infralittoral compacted fine muddy sand (SS.SSa.IMuSa.FfabMag) biotope. The SS.SSa.IMuSa.FfabMag biotope was characterised by *F. fabula, Magelona johnstoni, S. bombyx* and *Nephtys*.

Constable Bank

2.5.1.25 The Constable Bank is also present within the Mona Offshore Cable Corridor and is located approximately 7 km from the landfall and approximately 24 km from the Mona Array Area. Constable Bank is an Annex I sandbank which occurs outside an SAC (Figure 2.9), lying in shallow coastal waters with high wave stress (NRW, 2015). The bank is over 20 km long and up to 2 km at its widest, outside the overlap with the Mona Offshore Cable Corridor, and is up to 10 m high (Kenyon and Cooper, 2005). The main body of the sandbank is located to the east of the Mona Offshore Cable Corridor (see Figure 2.9 and Volume 2, Chapter 1: Physical processes of the Environmental Statement).

2.5.1.26 The SS.SSa.CFiSa biotope extended in to the north of the section of the Mona Offshore Cable Corridor that overlaps with Constable Bank. South of the area of SS.SSa.CFiSa was a section of SS.SMx.CMx. The biotope which occupies the largest area within the overlap between the Mona Offshore Cable Corridor and Constable Bank is SS.SSa.IFiSa.NcirBat which extends from the south of the overlap.

Menai Strait and Conwy Bay SAC

2.5.1.27 The Mona Offshore Cable Corridor overlaps with the Menai Strait and Conwy Bay SAC and is located approximately 30 km from the Mona Array Area.

2.5.1.28 The SS.SSa.IFiSa.NcirBat biotope was recorded in the area extending south of Constable Bank including in to the section of the Mona Offshore Cable Corridor which overlaps with the Menai Strait and Conwy Bay SAC. Also in this section of the Mona Offshore Cable Corridor there were areas of SS.SCS.CCS, which occupied the north of the overlap and the SS.SMx.CMx.KurThyMx biotope, which could be found in the west of the area of overlap.

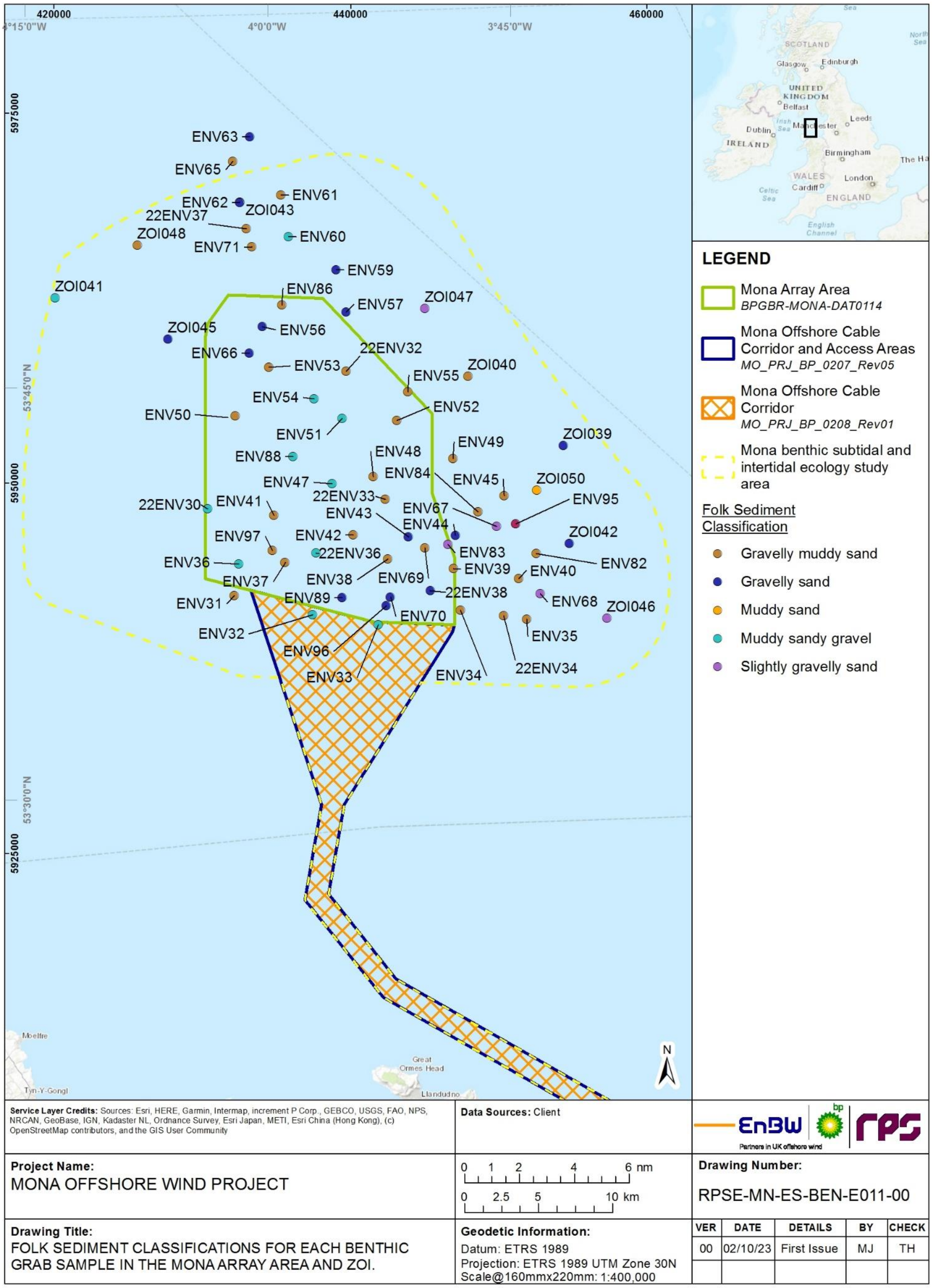
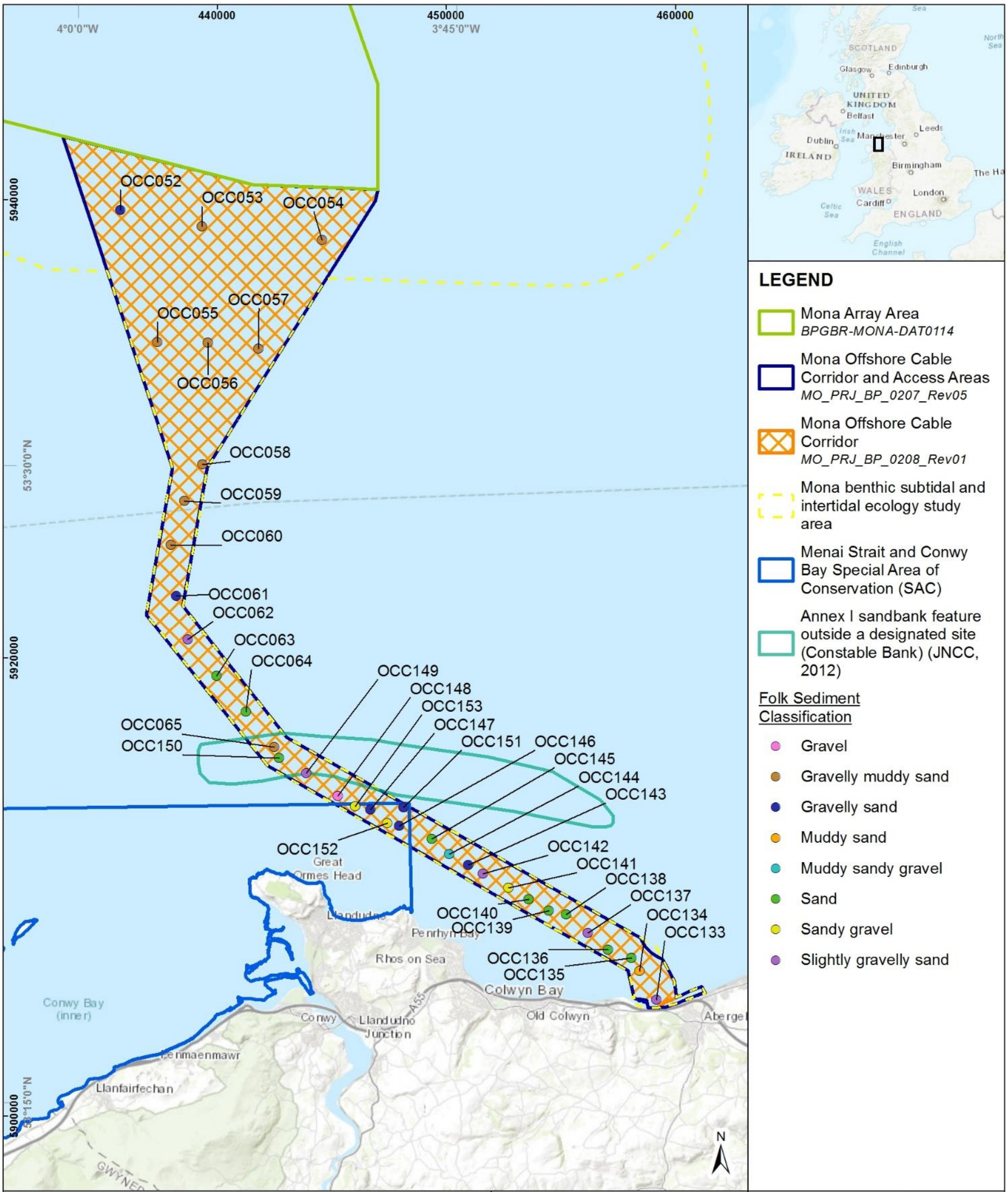


Figure 2.2: Folk sediment classifications for each benthic grab sample in the Mona Array Area and ZoI.



Service Layer Credits: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community	**Data Sources:** Client, Natural Resource Wales, JNCC	EnBW bp Partners in UK offshore wind / rps
Project Name: MONA OFFSHORE WIND PROJECT	0 1 2 4 nm / 0 1 2 4 6 8 km	**Drawing Number:** RPSE-MN-ES-BEN-E012-00
Drawing Title: FOLK SEDIMENT CLASSIFICATIONS FOR EACH BENTHIC GRAB SAMPLE IN THE MONA OFFSHORE CABLE CORRIDOR.	**Geodetic Information:** Datum: ETRS 1989 Projection: ETRS 1989 UTM Zone 30N Scale@160mmx220mm: 1:280,000	

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Figure 2.3: Folk sediment classifications for each benthic grab sample in the Mona Offshore Cable Corridor.

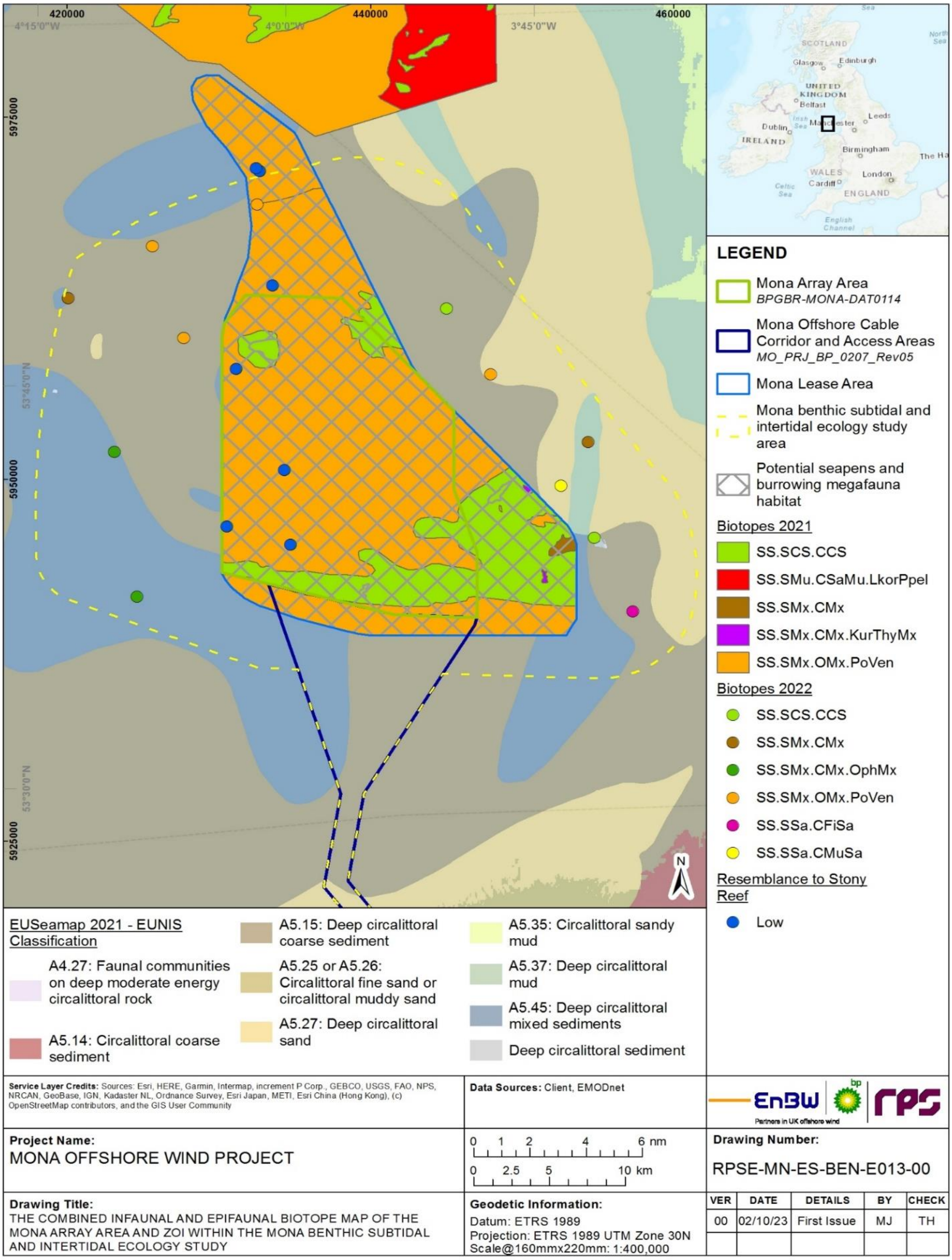
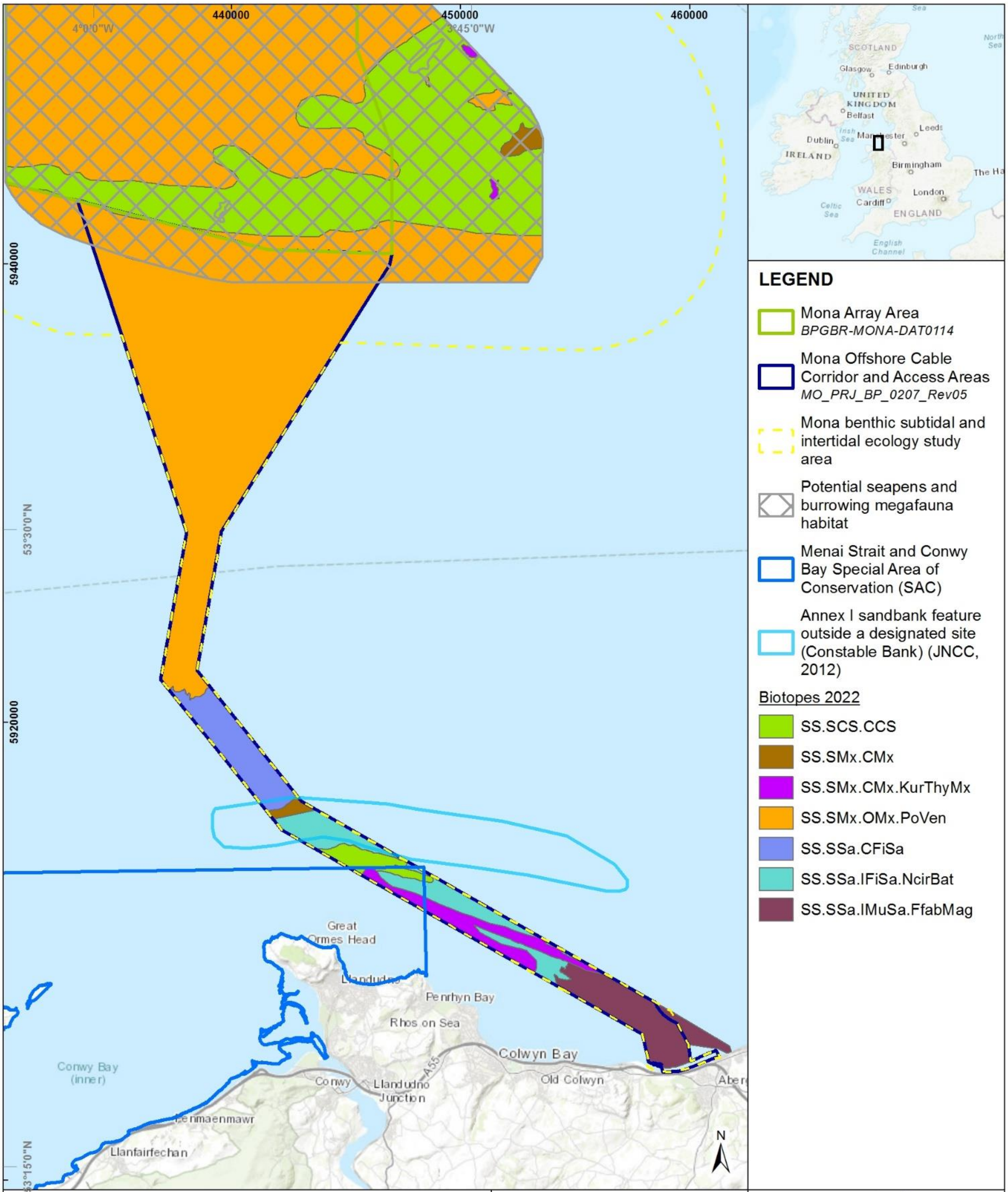


Figure 2.4: The combined infaunal and epifaunal biotope map of the Mona Array Area and ZoI within the Mona benthic subtidal and intertidal ecology study area[1].

[1] The biotope codes used in this figure are defined in full in the text and in Appendix H of Volume 6, Chapter 6.1: Benthic subtidal and intertidal technical report of the Environmental Statement.



Service Layer Credits: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community	**Data Sources:** Client, Natural Resource Wales, JNCC
Project Name: MONA OFFSHORE WIND PROJECT	0 1 2 4 nm; 0 1 2 4 6 8 km
Drawing Title: THE COMBINED INFAUNAL AND EPIFAUNAL BIOTOPE MAP OF THE MONA OFFSHORE CABLE CORRIDOR WITHIN THE MONA BENTHIC SUBTIDAL AND INTERTIDAL ECOLOGY STUDY AREA (ALL BIOTOPE CODES ARE DEFINED IN APPENDIX H)	**Geodetic Information:** Datum: ETRS 1989; Projection: ETRS 1989 UTM Zone 30N; Scale@160mmx220mm: 1:280,000

Drawing Number: RPSE-MN-ES-BEN-E014-00

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Figure 2.5: The combined infaunal and epifaunal biotope map of the Mona Offshore Cable Corridor within the Mona benthic subtidal and intertidal ecology study area[1].

Habitat assessment

2.5.1.29 Several stations within the Mona benthic subtidal and intertidal ecology study area were taken forward for further assessment to determine their potential to align with features of habitats of conservation importance. These included assessments for the presence of the seapens and burrowing megafauna communities, Annex I stony reef and the fragile sponge and anthozoan communities on rocky habitat.

Seapens and burrowing megafauna

Mona Array Area and ZoI

2.5.1.30 Across the Mona Array Area and ZoI small pencil burrows were observed in the site specific surveys. Although no seapens were observed the JNCC (2014a) guidance stipulates that ‘seapens and burrowing megafauna communities’ habitat can occur without seapens. As a result an analysis of this habitat was undertaken by determining the density of burrows and their abundance which was then categorised using the SACFOR abundance scale. Where burrows were identified the density of burrows varied from 0.02 burrows per m2 at one station in the southwest of the Mona Array Area (ENV97; see Figure 2.2) to 5.15 burrows per m2 at one station in the southeast of the Mona ZoI (ENV40; see Figure 2.2). It should be noted that the maximum burrow density is considered to be highly precautionary. This is because total burrows per image were not recorded, rather burrows were assigned a range (i.e. 1 – 5, 6 – 10 etc.) and, to determine the maximum burrow density, the top end of the range bracket was used to obtain the maximum total number of burrows and from that the density then calculated. The majority of burrows were the 0 – 1 cm size range category with 49% of images from the Mona Array Area falling within this range. Burrow abundance was not identified as greater than ‘frequent’ on the SACFOR scale at any station across the Mona Array Area and ZoI. Within the Mona Array Area 63% of stations subject to an analysis of this habitat had an average SACFOR abundance of ‘frequent’, increasing to 66% in the Mona Array Area and ZoI. Very few burrows were observed at stations where soft sediment was dominant. In combination with an absence of associated fauna and gravelly sediment, it was concluded that no sample station had anything other than a negligible resemblance to the ‘seapens and burrowing megafauna communities’ habitat.

2.5.1.31 However, in order to adopt a precautionary approach and on the basis that burrows were observed at an average SACFOR of ‘frequent’ at 36 stations, these stations have, for the purposes of the assessment, been assumed to represent the ‘seapens and burrowing megafauna communities’ habitat. It should be noted however, that during the site specific surveys no seapens were recorded in the Mona benthic subtidal and intertidal ecology study area and the sediment is considered unlikely to be consistent with this habitat (i.e. sediments were predominantly gravelly muddy sand). This approach is therefore deemed to be highly precautionary.

Mona Offshore Cable Corridor

2.5.1.32 No sample stations were identified with burrows or seapens in the Mona Offshore Cable Corridor, therefore no assessment of this habitat was undertaken.

Annex I stony reef

Mona Array Area and ZoI

2.5.1.33 Seabed imagery indicated potential stony reef across the Mona Array Area and ZoI at 13 stations. As a result, an Annex I stony reef assessment was undertaken to determine if there was a resemblance to the protected habitat based on criteria set out by Irving (2009) and Golding *et al*. (2020) considering sediment composition, elevation, extent and ecological communities. All stations were clearly matrix supported, showed little change in relief, and were often composed of patchy areas within larger areas of gravel. When images meeting one or more reef criteria were encountered in a few images or with large areas separating the image station they were overall determined to have no resemblance. Five stations within the Mona Array Area and ZoI were classified as low resemblance to Annex I stony reef (outside an SAC) (as well as two just outside the Mona benthic subtidal and intertidal ecology study area) (Figure 2.6). All other sample stations which were assessed had no resemblance to stony reefs.

2.5.1.34 In conclusion these assessments have concluded that Annex I low resemblance stony reef (outside an SAC) was present at four stations within the Mona Array Area and one station within the Mona ZoI.

Mona Offshore Cable Corridor

2.5.1.35 Seabed imagery indicated potential stony reef (outside an SAC) across the Mona Offshore Cable Corridor at six stations (Figure 2.6). As in the Mona Array Area and ZoI these stations were subject to a full assessment and all stations were clearly matrix supported, showed little change in relief, and were often composed of patchy areas within larger areas of gravel. At all stations where cobbles and boulders were observed, occurrences of images meeting one or more reef criteria were solely in a few images or with wide separation between images therefore stations were classified overall as having no resemblance to stony reef.

2.5.1.36 In conclusion these assessments have concluded that Annex I low resemblance stony reef (outside an SAC) was not present at any stations within the Mona Offshore Cable Corridor.

Menai Strait and Conwy Bay SAC

2.5.1.37 Stations OCC147, OCC147A and OCC153 (Figure 2.6) were within the Menai Strait and Conwy Bay SAC and were assessed for the presence of stony reef. Sample station OCC147A refers to a resurveyed transect at the target station OCC147 as the transect was abandoned on the previous day due to string tides and poor image quality. All of these stations exhibited very few images with stony reef features. Based on the sparse nature of these features and in accordance with the Irving (2009) and Golding *et al*. (2020) guidance, these stations were overall deemed to have no resemblance to stony reef.

Fragile sponge and anthozoan communities on subtidal rocky habitats

Mona Array Area and ZoI

2.5.1.38 Hard substrate Porifera were observed across both the Mona Array Area and ZoI within the Mona benthic subtidal and intertidal ecology study area with 26 stations showing evidence of Porifera. This evidence largely comprised images showing less than 1% of the image occupied by lone sponges such as cf. *Polymastia* sp., cf. *Suberites* sp. and cf. *Tethya* sp. Typical densities observed within the images was a sole individual most often found in coarser substrates. At sample station ENV46 104 still images were analysed and sponge (*Pachymatisma johnstonia*) was only recorded in a single image at a percentage cover of 3% in that one image. This was the greatest percentage of any image occupied by Porifera across all images analysed across the Mona Array Area and ZoI in a single image. Although several of the sponge species present and non-sponge species are listed within the fragile sponge and anthozoan communities on rocky habitats (JNCC, 2008; JNCC, 2014b) they were only recorded at very low abundances and were therefore not considered to represent this habitat. On the basis of the above, the 'fragile sponge and anthozoan communities on rocky habitat' community was not considered to be present anywhere within the Mona Array Area and ZoI.

Mona Offshore Cable Corridor

2.5.1.39 Fragile sponge and anthozoan communities on subtidal rocky habitats were observed across the Mona Offshore Cable Corridor within the Mona benthic subtidal and intertidal ecology study area with seven stations showing evidence of Porifera. This evidence largely comprised images showing less than 1% of the image occupied by lone sponges such as cf. *Polymastia* sp., cf. *Suberites* sp. and cf. *Tethya* sp. At sample station OCC54 a total of 40 still images were analysed and sponge (*Suberites*) was only recorded in a single image at a percentage cover of 1.56%. This was the greatest percentage occupied by Porifera in a single image across the Mona Offshore Cable Corridor. A few species of sponges (*Polymastia* and *Suberites* sp.) and other non-sponge species (*A. digitatum*) were present that are listed within the 'fragile sponge and anthozoan communities on rocky habitats' (JNCC, 2008). They were, however, at very low abundances. On the basis of the above, the 'fragile sponge and anthozoan communities on rocky habitat' community was not considered to be present anywhere within the Mona Offshore Cable Corridor.

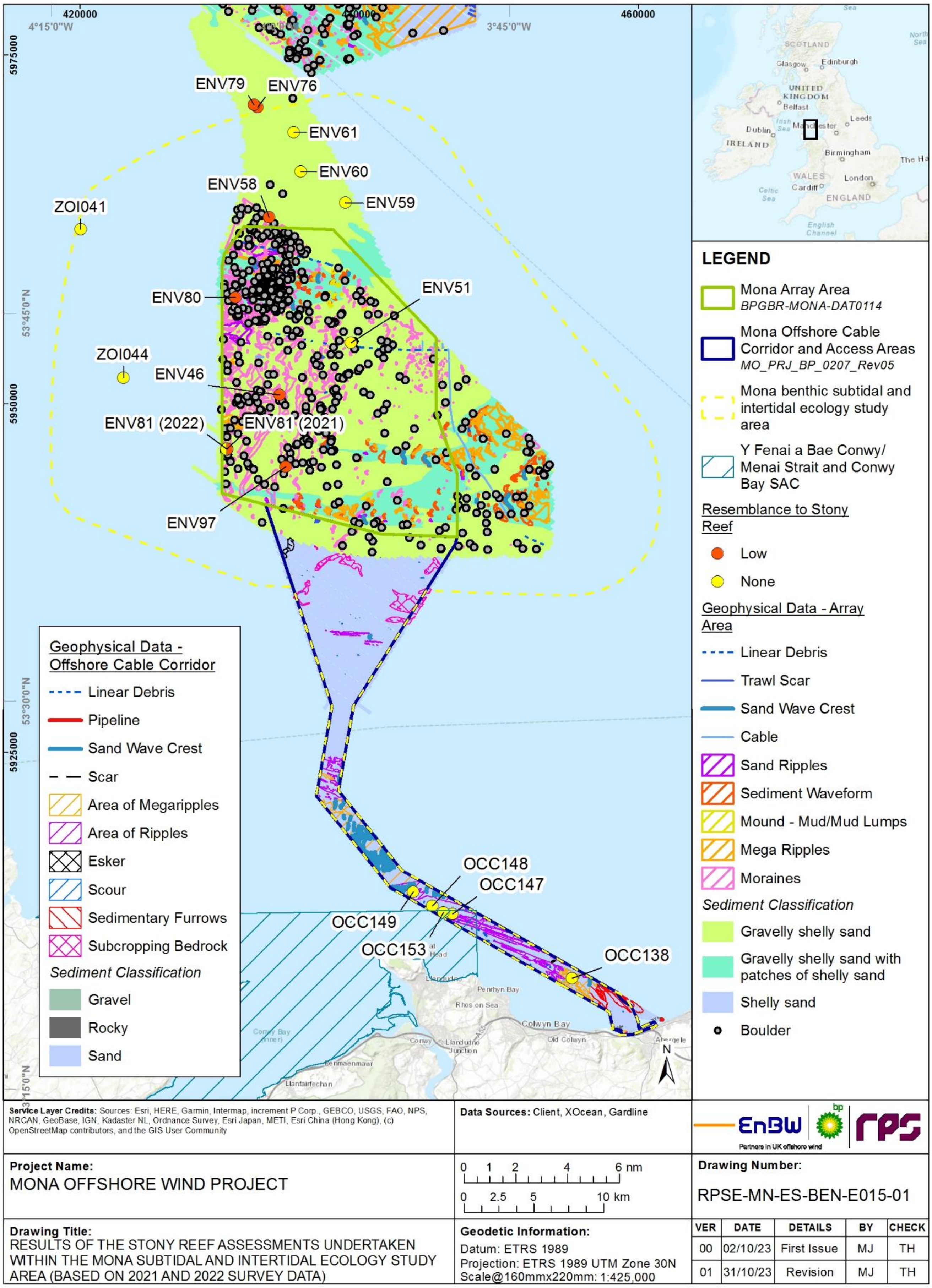


Figure 2.6: Results of the Annex I stony reef assessment undertaken within the Mona benthic subtidal and intertidal ecology study area.

2.5.2 Intertidal baseline

Intertidal sediments

2.5.2.1 The results of the Phase 1 intertidal surveys (conducted in May 2022 and May 2023) are presented in Figure 2.7 and include the intertidal sediments and biotopes mapped in the west of the landfall which is the area within which the export cables will be installed. Figure 2.7 also includes characterisation of the area in the east of the landfall site, which was also surveyed during the May 2022 and 2023 intertidal surveys. This corresponds with the area which will be used for access for construction equipment and vehicles to the landfall.

2.5.2.2 The results of the Phase I intertidal surveys, found the upper shore of the Mona landfall was characterised by a seawall at the east end. This led down to a wide band of shingle dominated by cobbles and pebbles. A large expanse of gently sloping fine to medium grained sand was present across most of the mid and lower shore. An anoxic layer within the sediment was patchily distributed across sandy habitats with more prominence at the lower shore. At the west of the Mona landfall site the upper shore was reinforced with cut-boulders (riprap) beneath which was a band of shingle dominated by cobbles. Mixed mobile sediments dominated by cobbles extended down to MLWS and the proportion of boulders increased significantly from the mid shore seawards.

Intertidal biotopes and habitats

2.5.2.3 The results of the Phase 1 intertidal surveys found the upper shore at the Mona landfall was characterised by a wide band of barren littoral shingle (LS.LCS.Sh.BarSh) leading down from the seawall. This biotope extends across the whole extent of the landfall which has been mapped including in the east. At the west of the site the upper shore had a thin band of *Verrucaria maura* on littoral fringe rock (LR.FLR.Lic.Ver) along with the rip rap (loose stone used as shoreline armour to prevent erosion).

2.5.2.4 The biotope *Semibalanus balanoides* and *Littorina* sp. on exposed to moderately exposed eulittoral boulders and cobbles (LR.HLR.MusB.Sem.LitX) occurred on the middle shore in the west of the survey area (Figure 2.7). This biotope was characterised by a low species diversity with a superabundance of the barnacle *S. balanoides*. The biotope *Porphyra purpurea* and *Ulva* sp. on sand-scoured mid or lower eulittoral rock (LR.FLR.Eph.UlvPor) occurred usually in small, scattered patches (<25m^2) within larger areas of LR.HLR.MusB.Sem.

2.5.2.5 An extensive *S. alveolata* reef (*Sabellaria alveolata* reefs on sand-abraded eulittoral rock (LS.LBR.Sab.Salv)) was recorded during the Mona landfall Phase 1 intertidal survey (the reef is now located outside the Mona Offshore Cable Corridor and Access Areas Red Line Boundary). The reef was located more than 250 m to the west of the intertidal part of the Mona Offshore Cable Corridor and Access Areas Red Line Boundary and approximately 28 m, at the nearest point, from the subtidal part of the Mona Offshore Cable Corridor and Access Areas Red Line Boundary. The *S. alveolata* reef covered an area of 47,473 m^2 of the mid and lower shore in 2022 (Figure 2.7). The *S. Alveolata* reef was revisited in 2023 and the extent was 41,530 m^2, which was a marginal decrease in area since 2022, which was likely to be due to natural fluctuation. In terms of structure the reef was approximately 30 cm high and hummock-shaped, particularly at the outer edges and at the edges of intersecting water channels and pools. The reef was dense with over 80% coverage and occurred in a mosaic with a pool and channel system which accounted for the residual 20%. Reef pools were deep, typically up to 25 cm with some over 40 cm and retained water throughout the tidal cycle. They contained floors composed predominantly of sand (occasionally with overlying mud) and scattered cobbles. Reef pools contained the gastropod mollusc *Littorina littorea* which was superabundant in places where the water was relatively shallow and cobbles were abundant. Other gastropods included *Patella vulgata*, *Nucella lapillus*, *Steromphala umbilicalis*, *Steromphala cineraria* and *Plotosus lineatus*.

2.5.2.6 Also at the landfall, in the area to the west of the Mona Offshore Cable Corridor and Access Areas a *Mytilus edulis* (mussel) bed was identified in close proximity to the *S. alveolata* reef (Figure 2.7) and approximately a 28 m, at the nearest point, from the subtidal part of the Mona Offshore Cable Corridor and Access Areas boundary and more than 250 m from the intertidal part of the Mona Offshore Cable Corridor and Access Area. This mussel bed was small and patchy. One square metre of continuous mussel bed was observed in at least one area meeting the criteria given for biogenic reef in Holt *et al*. (1998), however, the mussel bed was discontinuous. A previous survey by NRW indicates that the main area of *S. alveolata* to the west of the Mona landfall was formerly a *M. edulis* bed.

2.5.2.7 The biotope *Lanice conchilega* in littoral sand (LS.LSa.MuSa.Lan) occurred in strips and patches in sandy habitats across the mid and lower shore. The LS.LSa.MuSa.Lan biotope was also present in muddy sand between and on mixed stony sediments dominated by cobbles. An abundance of the barnacle *S. balanoides* occurred on a bed of cobbles below the *S. alveolata* reef with superabundant *L. conchilega* in small muddy spaces between the stones. *L. conchilega* was dominant at MLWS on mixed mobile sediments ranging from boulders to fine mud. This biotope was present in a mosaic in the central area of the landfall as well as in a small patch in the seaward east corner of the surveyed landfall site. Additionally, at the east boundary of the landfall was a patch of the biotope barren or amphipod-dominated mobile sand shores (LS.LSa.MoSa), which was characterised by a sparse community of isopods, amphipods and a limited range of polychaetes. The under-boulder fauna observed is typically associated with biotopes dominated by seaweeds. However, seaweeds did not appear to be able to establish here possibly due to the presence of fine sediments both in the water column and settled on the substratum. The biotope *Macoma balthica* and *Arenicola marina* in littoral muddy sand (LS.LSa.MuSa.MacAre) was present across large expanses of sand in the central and east of the of the landfall. Across the majority of the mid and lower shore the LS.LSa.MuSa.MacAre and LS.LSa.MuSa.Lan biotopes occurred in a mosaic which extends from the east to the far west of the landfall. An extensive outcrop of clay occurred at the lower shore. This feature was characterised by the biotope piddocks with a sparse associated fauna in sublittoral very soft chalk or clay with piddocks (CR.MCR.SfR.Pid) lacked any associated species. The piddock *Barnea candida* occurred in densities of up to 80 per m^2.

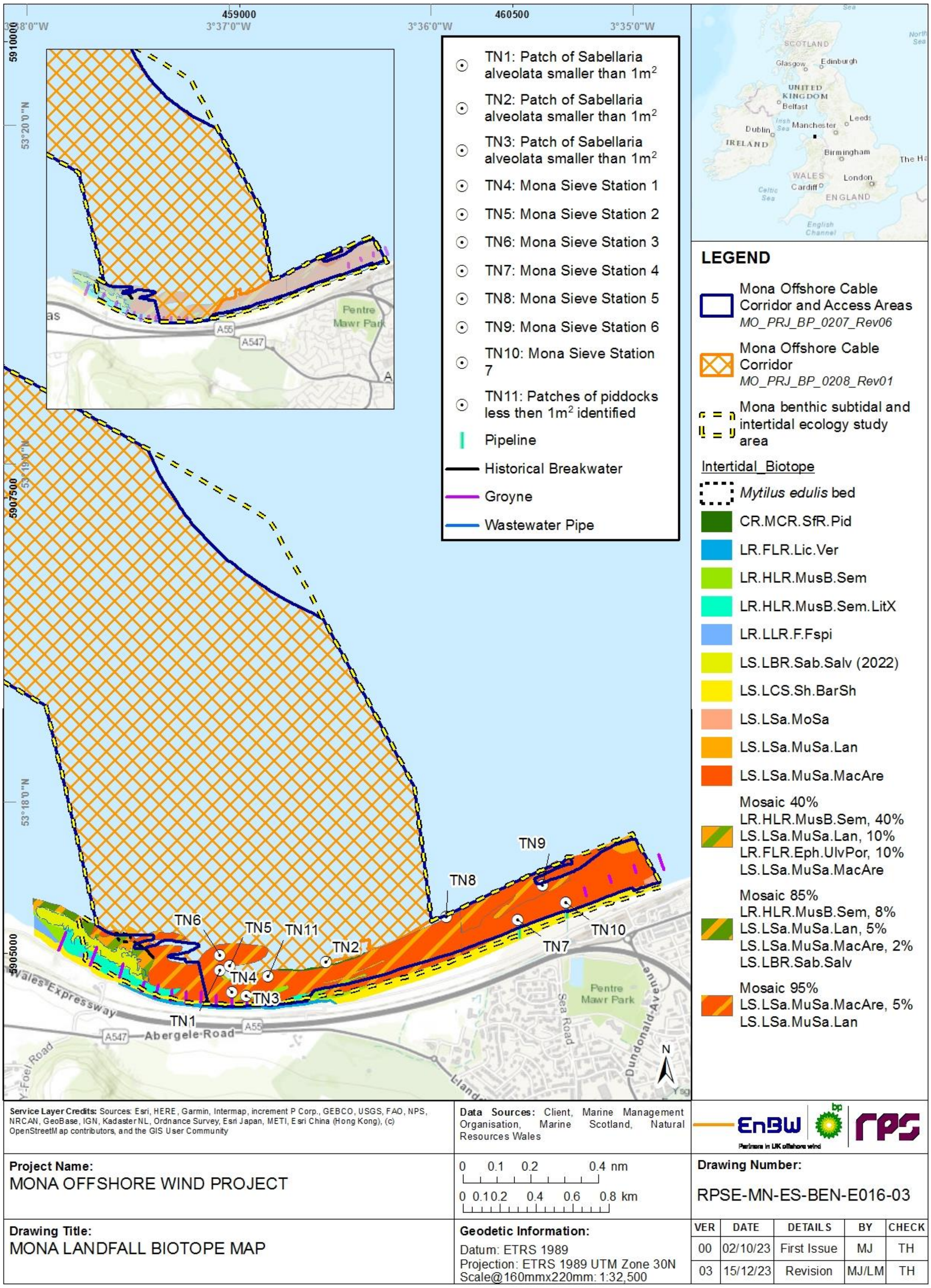


Figure 2.7: Phase I intertidal biotope map of the Mona landfall[2].

[2] The biotope codes used in this figure are defined in full in the text and in Appendix H of Volume 6, Chapter 6.1: Benthic subtidal and intertidal technical report of the Environmental Statement.

2.5.3 Designated sites

2.5.3.1 Designated sites identified for this chapter are described below in Table 2.12. The location of these sites is presented in Figure 2.8. All designated sites including SSSIs, SACs, Ramsar sites, MNRs and MCZs within the regional benthic subtidal and intertidal ecology study area were identified within Volume 6, Annex 2.1: Benthic subtidal and intertidal ecology technical report of the Environmental Statement. The designated sites, and their relevant qualifying benthic features, that could be affected by the construction, operations and maintenance, and decommissioning of the Mona Offshore Wind Project (i.e. that fall within the potential ZoI of the Mona Offshore Wind Project), were identified using the process described below:

- Sites with relevant benthic ecology features which overlap with the Mona Offshore Wind Project and therefore have the potential to be directly affected (e.g. by temporary and/or long term habitat loss/habitat alteration)
- Sites with relevant benthic ecology features with the potential to be indirectly affected by the Mona Offshore Wind Project (i.e. by changes in SSC and/or sediment deposition as determined by the assessment presented in Volume 2, Chapter 1: Physical processes of the Environmental Statement).

2.5.3.2 Of the identified designated sites in Table 2.12, only the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC has been taken forward for assessment within this chapter. Whilst the Great Ormes Head SSSI and Little Ormes Head SSSI both lie within the ZoI of the Mona Offshore Wind Project as determined by the project specific outputs of the physical processes assessment, both sites are located within the boundary of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC. As detailed in section 2.6.3, where nationally and locally designated sites fall within the boundaries of an internationally designated site, such as an SAC, only the international site has been taken forward for assessment. Both of these SSSIs are designated for rocky features (see Table 2.12) which are encompassed by the Annex I reef feature being assessed in relation to the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC, therefore a separate assessment of these SSSI features has not been undertaken. Table 2.13 provides the full list of biotopes and highlights which IEFs address the relevant features of the SSSIs. The consideration of the features of each SAC and SSSI is in line with best practice guidance provided by Natural England and JNCC (2022) regarding the installation of sub-sea cables.

2.5.3.3 With regards to the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC, only the specific features with the potential to be affected by the Mona Offshore Wind Project, as determined by the their location, as well as the project specific outputs of the physical processes modelling, have been taken forward for assessment based on their location within the SAC (Figure 2.9) (NRW, 2016). The Annex I sandbanks and the Annex I subtidal and intertidal reefs features occur near to the overlap between the SAC and the Mona Offshore Cable Corridor and within the ZoI of the Mona Offshore Wind Project (see Figure 2.9). Following the site specific surveys however, none of the features of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC were identified within the overlap with the Mona Offshore Cable Corridor therefore the subtidal features of the SAC (details of the habitats assessments for Annex I stony reef in the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC can be found in section 2.5.1) have only been considered in this assessment in relation to indirect impacts. All other features of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC have been screened out of the assessment in this chapter.

Table 2.12: Designated sites and relevant qualifying interests for the Mona benthic subtidal and intertidal ecology study area chapter.

Designated site	Closest distance to the Mona Array Area (km)	Closest distance to the Mona Offshore Cable Corridor (km)	Relevant qualifying features of interest
Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC	29.82	0	• Sandbanks which are slightly covered by sea water all the time • Reefs.
Great Ormes Head SSSI	29.8	3.2	• Moderately exposed rock • Rockpools • Soft piddock bored substrata • Under boulders.
Little Ormes Head SSSI	31.3	2.3	• Moderately exposed rock • Rockpools • Soft piddock bored substrata • Under boulders.

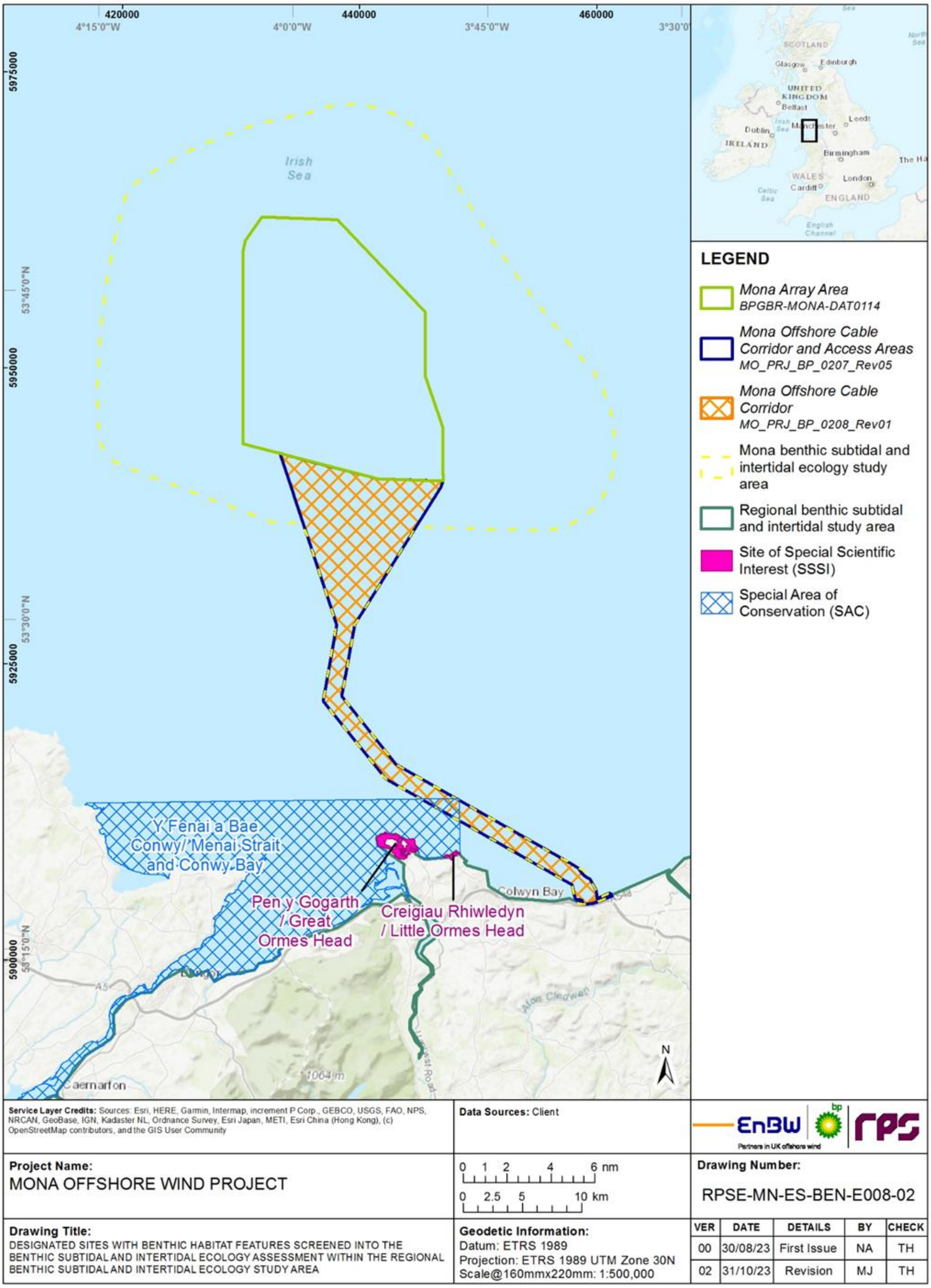
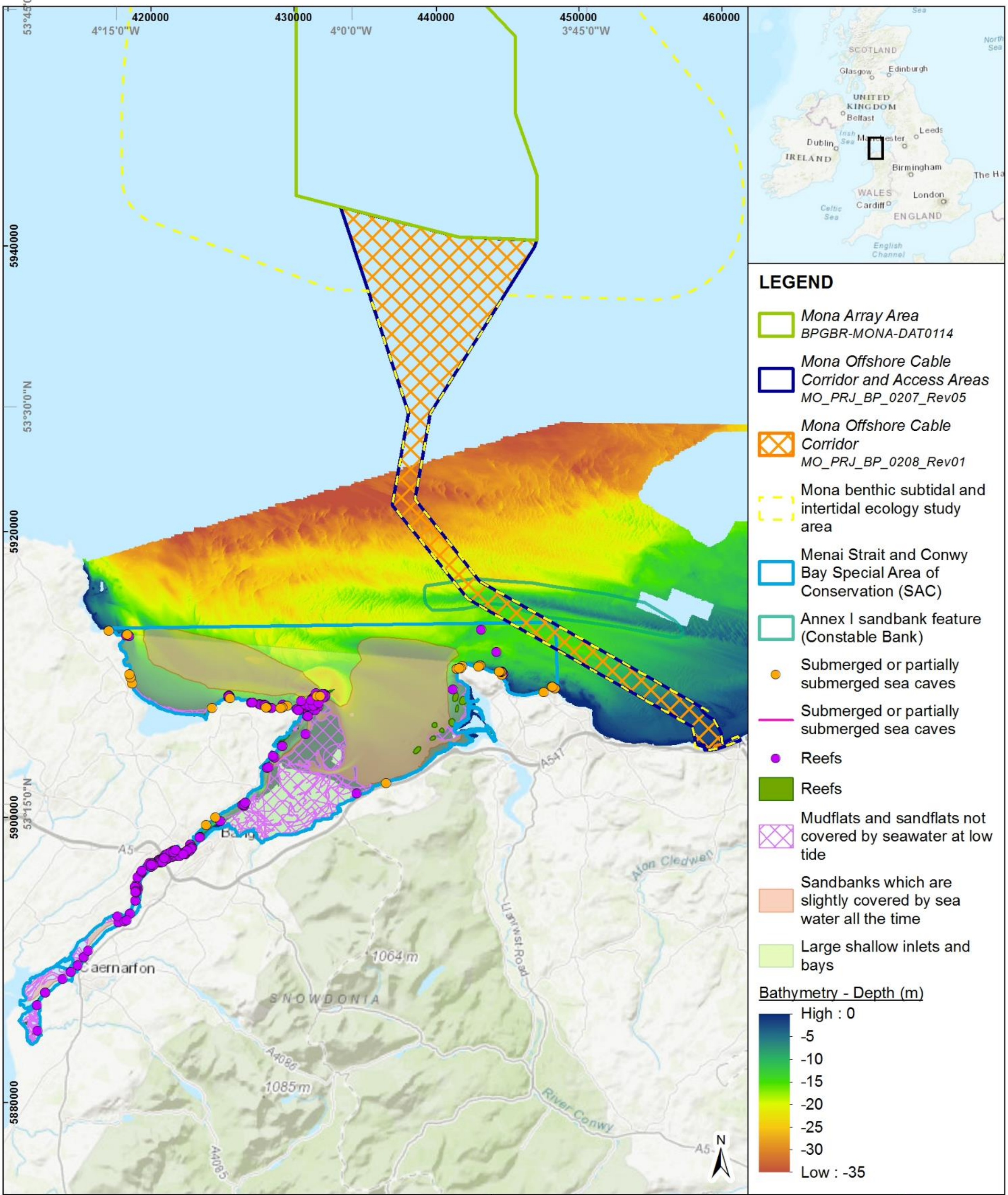


Figure 2.8: Designated sites with benthic habitat features screened into the benthic subtidal and intertidal ecology assessment within the regional benthic subtidal and intertidal ecology study area.



Service Layer Credits: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community	**Data Sources:** Client, Natural Resource Wales, JNCC	
Project Name: MONA OFFSHORE WIND PROJECT	0 1 2 4 6 nm; 0 1 2 4 6 8 10 12 km	**Drawing Number:** RPSE-MN-ES-BEN-E009-02
Drawing Title: DISTRIBUTION OF DESIGNATED FEATURES OF THE Y FENAI A BAE CONWY/MENAI STRAIT AND CONWY BAY SAC AND BATHYMETRY ACROSS THE NORTH WALES COAST AND NEARSHORE.	**Geodetic Information:** Datum: ETRS 1989; Projection: ETRS 1989 UTM Zone 30N; Scale@160mmx220mm: 1:450,000	

VER	DATE	DETAILS	BY	CHECK
00	30/08/23	First Issue	NA	TH
02	31/10/23	Revision	MJ	TH

Figure 2.9: Distribution of designated features of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC and bathymetry across north Wales coast and nearshore.

2.5.4 Important ecological features

2.5.4.1 In accordance with the best practice guidelines for ecological impact assessment (EcIA) in the UK and Ireland (CIEEM, 2019), for the purposes of the benthic subtidal and intertidal ecology EIA, IEFs have been identified. The potential impacts of the Mona Offshore Wind Project which have been scoped into the assessment have been assessed against the IEFs to determine whether or not they are significant. The IEFs assessed are those that are considered to be important and potentially affected by the Mona Offshore Wind Project. Importance may be assigned due to quality or extent of habitats, habitat or species rarity or the extent to which they are threatened (CIEEM, 2019). Species and habitats are considered IEFs if they have a specific biodiversity importance recognised through international or national legislation or through local, regional, or national conservation plans (e.g. Annex I habitats under the Habitats Directive, OSPAR, National Biodiversity Plan or the Marine Strategy Framework Directive).

2.5.4.2 All of the IEFs within the regional subtidal and intertidal ecology study area are listed in Table 2.13. The main habitats identified throughout the Mona benthic subtidal and intertidal ecology study area comprise six broad subtidal IEFs, six broad intertidal IEFs and three IEFs within the Menai Strait and Conwy Bay SAC.

Table 2.13: IEFs within the regional benthic subtidal and intertidal ecology study area.

IEF	Description and representative biotopes	Location	Protection status/ Conservation interest	Importance within the regional benthic subtidal and intertidal ecology study area
Subtidal habitats				
Subtidal coarse and mixed sediments with diverse benthic communities	Subtidal coarse and mixed sediments characterised by polychaetes, bivalves and mobile crustacean. Identified within the Mona Array Area. • SS.SCS.CCS[3] • SS.SMx.CMx • SS.SMx.CMx.KurThyMx • SS.SMx.OMx.PoVen.	Mona Array Area (whole area) and ZoI (north section)	UK Biodiversity Action Plan (BAP) priority habitat Habitat of Principal Importance in England (NERC Act 2006) Habitat of Principal Importance in Wales (Environment (Wales) Act 2016: Section 7)	National
Mixed sediments dominated by brittlestars	Circalittoral sediment dominated by brittlestars (*Ophiothrix fragilis*) forming dense beds, living epifaunally on boulder, gravel or sedimentary substrata.	Mona Array Area ZoI (southeast and southwest)	UK BAP priority habitat Habitat of Principal Importance in Wales	National

[3] This biotope which was recorded withing the Mona benthic subtidal and intertidal ecology study area was not present in the MarESA therefore SS.SCS.CCS.MedLumVen biotope has been used as a proxy for sensitivity.

IEF	Description and representative biotopes	Location	Protection status/ Conservation interest	Importance within the regional benthic subtidal and intertidal ecology study area
	• SS.SMx.CMx.OphMx.		(Environment (Wales) Act 2016: Section 7)	
Sand and muddy sand communities with polychaetes and bivalves	Circalittoral and infralittoral sand and muddy sand characterised by bivalves and polychaetes. • SS.SSa.CFiSa[4] • SS.SSa.IFiSa.NcirBat • SS.SSa.CMuSa[5] • SS.SSa.IMuSa.FfabMag.	Mona Offshore Cable Corridor (central and south sections) and Mona Array Area ZoI (southeast)	UK BAP priority habitat Non-designated habitat present in the Menai Strait and Conwy Bay SAC Habitat of Principal Importance in England (NERC Act 2006) Habitat of Principal Importance in Wales (Environment (Wales) Act 2016: Section 7)	National
Annex I low resemblance stony reef (outside an SAC)	Cobbles and boulders with indicator species such as *A. digitatum*, *Nemertesia* sp. and *Tubularia* sp. Identified within the Mona Array Area. • CR.HCR.XFa.SpNemAdia.	Mona Array Area (west) and ZoI (north)	Annex I habitat outside an SAC	National
Constable Bank (Annex I sandbank outside an SAC)	Sandbank off the north coast of Wales, and north of the Mona landfall. • SS.SSa.IFiSa.NcirBat • SS.SSa.CFiSa.ApriBatPo.	Mona Offshore Cable Corridor (central section)	Annex I habitat outside an SAC UK BAP priority habitat Habitat of Principal Importance in England (NERC Act 2006) Habitat of Principal Importance in Wales (Environment (Wales) Act 2016: Section 7)	National

[4] This biotope which was recorded withing the Mona benthic subtidal and intertidal ecology study area was not present in the MarESA therefore SS.SSa.CFiSa.ApriBatPo biotope has been used as a proxy for sensitivity.

[5] This biotope which was recorded withing the Mona benthic subtidal and intertidal ecology study area was not present in the MarESA therefore SS.SSa.CMuSa.AalbNuc biotope has been used as a proxy for sensitivity.

IEF	Description and representative biotopes	Location	Protection status/ Conservation interest	Importance within the regional benthic subtidal and intertidal ecology study area
Seapens and burrowing megafauna communities	Plains of fine mud at depths greater than about 15 m may be heavily bioturbated by burrowing megafauna. • SS.SMu.CFiMu.SpnMeg.	Mona Array Area and ZoI (east)	UK BAP priority habitat OSPAR habitat Habitat of Principal Importance in England (NERC Act 2006) Habitat of Principal Importance in Wales (Environment (Wales) Act 2016: Section 7)	National
Intertidal habitats				
Littoral shingle with *Verrucaria maura*	Shingle or gravel shore in the littoral fringe which is covered by the black lichen *Verrucaria maura*. Identified within the Mona landfall. • LS.LCS.Sh.BarSh.	Landfall – upper shore	None	Local
Littoral sand and muddy sand supporting infaunal communities	Littoral sand and muddy sand supporting infaunal communities including *Lanice conchilega, Macoma balthica* and *Arenicola marina*. Identified within the Mona landfall. • LS.LSa.MoSa • LS.LSa.MuSa.Lan • LS.LSa.MuSa.MacAre.	Landfall – mid and lower shore	OSPAR habitat Water Framework Directive (WFD) Habitat of Principal Importance in Wales (Environment (Wales) Act 2016: Section 7)	National
Clay with piddocks	Circalittoral soft rocks such as clays with the faunal community dominated by bivalves such as *Pholas dactylus*. Identified within the Mona landfall. • CR.MCR.SfR.Pid.	Landfall – central lower shore	UK BAP priority habitat Habitat of Principal Importance in Wales (Environment (Wales) Act 2016: Section 7) WFD	National

IEF	Description and representative biotopes	Location	Protection status/ Conservation interest	Importance within the regional benthic subtidal and intertidal ecology study area
Littoral and eulittoral rock dominated by epifaunal communities	Littoral and eulittoral rock is typically characterised by a band of the spiral wrack *Fucus spiralis,* black lichen *Verrucaria maura* and the common barnacle *Semibalanus balanoides*. Identified within the Mona landfall. • LR.LLR.F.Fspi • LR.FLR.Lic.Ver • LR.FLR.Eph.UlvPor • LR.HLR.MusB.Sem.LitX • LR.HLR.MusB.Sem.	Landfall – mid and lower shore	None	Local
Sabellaria alveolata reef	Exposed bedrock and boulders characterised by reefs of the polychaete *Sabellaria alveolata* which form large reef-like hummocks. Identified within the Mona landfall. • LS.LBR.Sab.Salv.	Landfall – west mid shore (outside the Mona Offshore Cable Corridor and Access Area)	UK BAP priority habitat Annex I habitat outside an SAC Habitat of Principal Importance in Wales (Environment (Wales) Act 2016: Section 7)	National
Mytilus edulis bed	*Mytilus edulis* bed. Identified within the Mona landfall.	Landfall – west lower shore	UK BAP priority habitat Annex I habitat outside an SAC Habitat of Principal Importance in Wales (Environment (Wales) Act 2016: Section 7) WFD	National
Y Fenai a Bae Conwy/ Menai Strait and Conwy Bay SAC subtidal and intertidal habitats				
Annex I sandbanks[6]	Consist of sandy sediments that are permanently covered by shallow sea water, typically at depths of less than 20 m below chart datum. The habitat comprises distinct banks. • SS.SSa.IFiSa.NcirBat • SS.SSa.CFiSa.ApriBatPo.	In the regional benthic subtidal and intertidal ecology study area but outwith the Mona Array Area and Mona Offshore Cable Corridor	Annex I Habitats Directive Annex I Feature of an SAC Habitat of Principal Importance in Wales (Environment (Wales) Act 2016: Section 7)	International

IEF	Description and representative biotopes	Location	Protection status/ Conservation interest	Importance within the regional benthic subtidal and intertidal ecology study area
Annex I subtidal reefs[6]	Rocky marine habitats or biological concretions that rise from the seabed. They are generally subtidal but may extend as an unbroken transition into the intertidal zone, where they are exposed to the air at low tide. • CR.MCR.SfR.Hia • CR.MCR.CfaVS.CuSpH.		Annex I Habitats Directive Annex I Feature of an SAC Representative of the soft piddock bored substrata feature of the Great Orme's Head SSSI and Little Ormes Head SSSI Habitat of Principal Importance in Wales (Environment (Wales) Act 2016: Section 7)	International
Annex I intertidal reefs	Open rocky surface with dense red seaweed and encrusting coralline algae including *Palmaria palmata, Mastocarpus stellatus* and *Chondrus crispus.* • LR.HLR.FR.Mas • IR.MIR.KT.XKT.	In the regional benthic subtidal and intertidal ecology study area but outwith the Mona Array Area and Mona Offshore Cable Corridor	Annex I Habitats Directive Annex I Feature of an SAC Representative of the moderately exposed rock, rockpools and under boulder features of the Great Orme's Head SSSI and Little Ormes Head SSSI Habitat of Principal Importance in Wales (Environment (Wales) Act 2016: Section 7)	International

[6] No known biotopes have been allocated for this IEF in the literature therefore biotopes have been assigned based on descriptions of the physical environment and the biological communities.

2.5.5 Future baseline scenario

2.5.5.1 The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 require that "an outline of the likely evolution thereof without implementation of the development as far as natural changes from the baseline scenario can be assessed with reasonable effort on the basis of the availability of environmental information and scientific knowledge" is included within the Environmental Statement. In the event that the Mona Offshore Wind Project does not come forward, an assessment of the future baseline conditions has been carried out and is described within this section.

2.5.5.2 Further to potential change associated with existing cycles and processes, it is necessary to take account of potential effects of climate change on the marine environment. Variability and long term changes on physical influences may bring direct and indirect changes to benthic habitats and communities in the mid to long term future (UK Offshore Energy Strategic Environmental Assessment 3 (OESEA3)) (Department of Energy and Climate Change, 2016). A strong base of evidence indicates that long term changes in the benthic ecology may be related to long term changes in the climate or in nutrients (Department of Energy and Climate Change, 2016), with climatic process driving shifts in abundances and species composition of benthic environments. Benthic communities are also currently being influenced by anthropogenic activities including contamination or seabed disturbing activities such as trawling, dredging and development. Studies of benthic ecology over the last three decades have shown that biomass has increased by at least 250% to 400%; opportunistic and short-lived species have increased; and long-living sessile animals have decreased (Krönke, 1995; Krönke, 2011). The Marine Climate Change Impacts Partnership Annual Report Card 2007 – 2008 Scientific Review -Seabed Ecology (MCCIP, 2008) concluded that the available data show that climatic processes, both directly (e.g. winter mortality), and indirectly, via hydrographic conditions, influence the abundance and species composition of sea bed communities. The alteration in the seafloor communities could alter rates and timing of processes such as nutrient cycling, larval supply to the plankton and organic waste assimilation. Defra's recent focus on the risk of climate change to ecosystem services (HM Government, 2022) focuses on invasive non-native species and their likely detriment to native communities and ecosystems, the increased risk to species as their distributions shift of disease from new pathogens, and the impacts on areas of high biodiversity value in the coastal zone from increased storms and erosion. Defra also highlight the risks associated with ocean acidification and higher water temperatures which are linked to climatic changes (HM Government, 2022).

2.5.6 Data limitations

2.5.6.1 The data sources used in this chapter are detailed in Table 2.10. The desktop data used are the most up to date, publicly available information which can be obtained from the applicable data sources as cited. To ensure an up-to-date baseline characterisation, the site specific benthic subtidal ecology survey data have been validated with site specific geophysical surveys undertaken in 2021 and 2022.

2.5.6.2 During the 2021 site specific surveys a number of stations were added based on the need to ensure adequate coverage of the survey area and its features. Further, from reviews of this additional data, additional stations were selected to cover features not already targeted. As a consequence, a further 18 stations, 13 of which are located within the Mona Array Area (ENV80-ENV89 to ENV95-ENV97) were added to the 64 original locations comprising three camera-only stations to target boulder areas and fifteen co-located camera and grab stations to target additional features of interest in the newly reviewed data. In the 2022 survey campaign grab samples could not be collected from two sample stations in the Mona Array Area ZoI, therefore these stations were sampled using DDV only. Additionally failed attempts were reported due to rock or cobbles in the jaw, low retention, sample wash out, delays in grab deployment, the grab triggering in the water column and the vessel being outside of the target range.

2.5.6.3 Although the sampling design and collection process for the site specific benthic subtidal ecology survey data provided robust data on the benthic communities, interpreting these data has limitations. It can be difficult to interpolate data collected from discrete sample locations to cover a wider area and define the precise extents of each biotope. Benthic communities generally show a gradual transition from one biotope to another and therefore boundaries of where one biotope ends and the next begins is an approximation; these boundaries indicate where communities grade into one another. The classification of the community data into biotopes is a best fit allocation, as some communities do not readily fit the available descriptions in the biotope classification system. The biotope map should be used to describe the main habitats which characterised the Mona Array Area and ZoI, Mona Offshore Cable Corridor and landfall site. Due to the limitations described previously, the biotope map shown in Figure 2.3 should not be interpreted as definitive areas. However, this does provide a suitable baseline characterisation which describes the main habitats and communities within the Mona Array Area and ZoI, Mona Offshore Cable Corridor and landfall site for the purposes of the assessment.

2.6 Impact assessment methodology

2.6.1 Overview

2.6.1.1 The benthic subtidal and intertidal ecology impact assessment has followed the methodology set out in Volume 1, Chapter 5: EIA methodology of the Environmental Statement. Specific to the benthic subtidal and intertidal ecology impact assessment, the following guidance documents have also been considered:

- Guidelines for EcIA in the UK and Ireland. Terrestrial, Freshwater and Coastal (CIEEM, 2022)
- Guidance on Environmental Considerations for Offshore Wind Farm Development (OSPAR, 2008)
- Identification of the Main Characteristics of Stony Reef Habitats under the Habitats Directive (Irving, 2009)
- Refining the criteria for defining areas with a 'low resemblance' to Annex I stony reef (Golding *et al.*, 2020)
- Marine Evidence-based Sensitivity Assessment – A Guide (Tyler-Walters *et al.*, 2018)
- Guidelines for data acquisition to support marine environmental assessments of offshore renewable energy projects (Judd, 2012)
- Nature Conservation Considerations and Environmental Best Practice for Subsea Cables for English Inshore and UK Offshore Waters (Natural England and JNCC, 2022).

2.6.1.2 In addition, the benthic subtidal and intertidal ecology impact assessment has considered the legislative framework as defined by:

- The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (relevant to the application for development consent)
- The Planning Act 2008 (as amended) (relevant to the application for development consent)
- The Marine Works (Environmental Impact Assessment Regulations) 2007 (the 2007 EIA Regulations) (relevant to the marine licence application to NRW)
- The Marine and Coastal Access Act 2009 (relevant to the marine licence application to NRW).

2.6.2 Impact assessment criteria

2.6.2.1 The criteria for determining the significance of effects is a two-stage process that involves defining the magnitude of the impacts and the sensitivity of the receptors. This section describes the criteria applied in this chapter to assign values to the magnitude of potential impacts and the sensitivity of the receptors. The terms used to define magnitude and sensitivity are based on those which are described in further detail in Volume 1, Chapter 5: EIA methodology of the Environmental Statement.

2.6.2.2 The criteria for defining magnitude in this chapter are outlined in Table 2.14 below.

Table 2.14: Definition of terms relating to the magnitude of an impact.

Magnitude of impact	Definition
High	Loss of resource and/or quality and integrity of resource; severe damage to key characteristics, features or elements (Adverse)
	Large scale or major improvement or resource quality; extensive restoration or enhancement; major improvement of attribute quality (Beneficial)
Medium	Loss of resource, but not adversely affecting integrity of resource; partial loss of/damage to key characteristics, features or elements (Adverse)
	Benefit to, or addition of, key characteristics, features or elements; improvement of attribute quality (Beneficial)
Low	Some measurable change in attributes, quality or vulnerability, minor loss or, or alteration to, one (maybe more) key characteristics, features or elements (Adverse)
	Minor benefit to, or addition of, one (maybe more) key characteristics, features or elements; some beneficial impact on attribute or a reduced risk of negative impact occurring (Beneficial)
Negligible	Very minor loss or detrimental alteration to one or more characteristics, features or elements (Adverse)
	Very minor benefit to, or positive addition of one or more characteristics, features or elements (Beneficial)
No change	No loss or alteration of characteristics, features or elements; no observable impact either adverse or beneficial.

2.6.2.3 The Marine Evidence based Sensitivity Assessment (MarESA) has been drawn upon to support the assessment of sensitivity of the benthic subtidal and intertidal ecology IEFs within the Mona benthic subtidal and intertidal ecology study area.

2.6.2.4 The MarESA is a database which has been developed through the Marine Life Information Network (MarLIN) of Britain and Ireland and is maintained by the Marine Biological Association (MBA), supported by statutory organisations in the UK (e.g. Department of Agriculture, Environment and Rural Affairs (DAERA), JNCC, Natural England and NatureScot). This database comprises a detailed review of available evidence on the effects of pressures on marine species or habitats, and a subsequent scoring of sensitivity against a standard list of pressures, and their benchmark levels of effect. The evidence base presented in the MarESA is peer reviewed and represents the largest review undertaken to date on the effects of human activities and natural events on marine species and habitats. It is considered to be one of the best available sources of evidence relating to recovery of seabed species and habitats. The benchmarks for the relevant MarESA pressures which have been used to inform each impact assessment have also been referenced under each impact assessment in section 2.9. The process for defining sensitivity in this chapter follows that defined by the MarESA sensitivity assessment, which correlates vulnerability (or resistance) and recoverability (or resilience) to categorise sensitivity, as set out in Table 2.15.

2.6.2.5 The sensitivities of benthic subtidal and intertidal IEFs presented within this benthic subtidal and intertidal ecology chapter of the Environmental Statement have therefore been defined by an assessment of the combined vulnerability (i.e. equivalent to resistance in the MarESA) of the receptor to a given impact and the likely rate of recoverability to pre-impact conditions (i.e. resilience). Here, vulnerability is defined as the susceptibility of a species to disturbance, damage or death, from a specific external factor. Recoverability is the ability of the same species to return to a state close to that which existed before the activity or event which caused change. Recoverability is dependent on a receptor's ability to recover or recruit subject to the extent of disturbance/damage incurred. Information on these aspects of sensitivity of the benthic subtidal and intertidal IEFs to given impacts has been informed by the best available evidence following environmental impact or experimental manipulation in the field and evidence from the offshore wind industry and analogous activities such as those associated with aggregate extraction, electrical cabling, and oil and gas industries.

Table 2.15: Definition of terms relating to the sensitivity of the receptor (applicable to MarESA sensitivity assessment).[7]

Recoverability	Resistance			
	None	**Low**	**Medium**	**High**
Very Low	High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
Low	High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
Medium	Medium sensitivity	Medium sensitivity	Medium sensitivity	Low sensitivity
High	Medium sensitivity	Low sensitivity	Low sensitivity	Not sensitive (Negligible)

[7] In this table the MarESA terms of resistance and resilience have been substituted with recoverability and vulnerability, respectively, to ensure consistency with the terms defined in Table 2.13 and to remain consistent with terminology and approach outlined in Volume 1, Chapter 5: EIA methodology of the Environmental Statement and adopted across the Morgan Generation Assets Environmental Statement.

2.6.2.6 The conclusions of the MarESA assessment have been combined with the importance of the relevant IEFs as presented in Table 2.13 for the benthic subtidal and intertidal IEFs considered in this assessment. The criteria for defining sensitivity in this chapter are outlined in Table 2.16 below. Where an IEF contains multiple biotopes, in the interest of adopting a precautionary approach, the highest sensitivity has been taken forward to determine the significance.

Table 2.16: Definition of terms relating to the sensitivity of the receptor.

Sensitivity	Definition
Very High	Nationally and internationally important receptors with high vulnerability and no ability to recover.
High	Regionally important receptors with high vulnerability and no ability to recover. Nationally and internationally important receptors with high vulnerability and low recoverability.
Medium	Nationally and internationally important receptors with medium vulnerability and medium recoverability. Regionally important receptors with medium to high vulnerability and low recoverability. Locally important receptors with high vulnerability and no ability to recover.
Low	Nationally and internationally important receptors with low vulnerability and high recoverability. Regionally important receptors with low vulnerability and medium to high recoverability. Locally important receptors with medium to high vulnerability and low recoverability.
Negligible	Locally important receptors with low vulnerability and medium to high recoverability. Receptor is not vulnerable to impacts regardless of value/importance.

2.6.2.7 The significance of the effect upon benthic subtidal and intertidal ecology is determined by correlating the magnitude of the impact and the sensitivity of the receptor. The particular method employed for this assessment is presented in Table 2.17. Where a range of significance of effect is presented in Table 2.17, the final assessment for each effect is based upon expert judgement.

2.6.2.8 For the purposes of this assessment, any effects with a significance level of minor or less have been concluded to be not significant in terms of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017.

Table 2.17: Matrix used for the assessment of the significance of the effect.

Sensitivity of Receptor	Magnitude of Impact			
	Negligible	**Low**	**Medium**	**High**
Negligible	Negligible	Negligible or Minor	Negligible or Minor	Minor
Low	Negligible or Minor	Negligible or Minor	Minor	Minor or Moderate
Medium	Negligible or Minor	Minor	Moderate	Moderate or Major
High	Minor	Minor or Moderate	Moderate or Major	Major
Very High	Minor	Moderate or Major	Major	Major

2.6.3 Designated sites

2.6.3.1 Where National Site Network sites (i.e. internationally designated sites) are considered, this chapter summarises the assessments made on the interest features of internationally designated sites as described within section 2.6.3 of this chapter (with the assessment on the site itself deferred to the ISAA (Document Reference E1.1, E1.2 and E1.3). With respect to nationally and locally designated sites, where these sites fall within the boundaries of an internationally designated site (e.g. SSSIs, MCZs and MNRs which have not been assessed within the ISAA), only the international site has been taken forward for assessment. This is because potential effects on the integrity and conservation status of the nationally designated site are assumed to be inherent within the assessment of the internationally designated site (i.e. a separate assessment for the national site is not undertaken).

2.6.3.2 The ISAA has been prepared in accordance with Advice Note Ten: Habitats Regulations Assessment relevant to Nationally Significant Infrastructure Projects (Planning Inspectorate, 2022).

2.7 Key parameters for assessment

2.7.1 Maximum Design Scenario

2.7.1.1 The MDSs identified in Table 2.18 have been selected as those having the potential to result in the greatest effect on an identified receptor or receptor group. These scenarios have been selected from the project design provided in Volume 1, Chapter 3: Project description of the Environmental Statement. Effects of greater adverse significance are not predicted to arise should any other development scenario, based on details within the project description (e.g. different infrastructure layout), to that assessed here be taken forward in the final design scheme.

Table 2.18: MDS considered for the assessment of potential impacts on benthic subtidal and intertidal ecology.

[a] C=construction, O=operational and maintenance, D=decommissioning

Potential impact	Phase[a] C	O	D	Maximum Design Scenario	Justification
Temporary habitat loss/disturbance	✓	✓	✓	**Construction phase** Up to 60,512,833 m² of subtidal habitat loss/disturbance in total across the Mona Array Area and Mona Offshore Cable Corridor. Maximum duration of the offshore construction phase is up to four years. Mona Array Area Up to 48,784,483 m² of temporary habitat loss/disturbance in the Mona Array Area comprising: • Jack-up events: up to 816,000 m² of disturbance from the use of jack-up vessels during foundation installation, with up to four jack-up events at each of 96 wind turbines (two jack-up events for wind turbines and two jack-up events for the foundations) and two jack-up events at each of four OSPs • Sandwave clearance for foundations: up to 923,839 m² of habitat disturbance associated with sandwave clearance comprising: – 826,440 m² of sandwave clearance associated with seabed preparation for wind turbine foundations – 97,399 m² of sandwave clearance associated with seabed preparation for OSP foundations. • Cable installation (including sandwave clearance and pre-lay preparation): up to 19,050,000 m² of disturbance comprising: – Inter-array cables: up to 16,250,000 m² disturbance from installation of up to 325 km of inter-array cables (assumes 50% requires boulder clearance with a 20 m width of disturbance and 50% requires sandwave clearance with an 80 m width of disturbance)	Construction phase: Maximum footprint which would be affected during the construction, operations and maintenance and decommissioning phases. The MDS assumes 100% of all cables are buried. The MDS assumes that the width of disturbance for sandwave and pre-lay preparation (boulder and debris clearance) also includes subsequent burial. The MDS assumes that the area of disturbance associated with each of the four exit pits (15 x 30 m per exit pit) required for the installation of export cables in the intertidal via trenchless techniques will be within the area of disturbance assumed for sandwave clearance for export cables (i.e. a 40 m width of disturbance). The area associated with the exit pits has therefore not been double counted. For the purposes of the MDS, and to avoid double counting of disturbance associated with site preparation activities (i.e. boulder clearance and sandwave clearance), the MDS assumes up to 50% of inter-array, 40% of interconnector, and 80% of export cables will be subject to pre-lay preparation only. The MDS assumes that the remainder of the cables will be subject to sandwave clearance. The area of seabed affected by the placement of sandwave clearance material has been calculated based on the maximum volume of sediment to be placed on the seabed, assuming all this sediment is coarse material (i.e. is not dispersed through tidal currents; see “Increased SSC” impact assessment below). The total footprint of seabed affected has been calculated, for the purposes of the MDS, assuming a mound of uniform thickness of 0.5 m height. The MDS assumes temporary loss of benthic habitat is beneath this.

Potential impact	Phase[a] C	O	D	Maximum Design Scenario	Justification
				– Interconnector cables: up to 2,800,000 m^2 disturbance from installation of up to 50 km of interconnector cables (assumes 40% requires boulder clearance with a 20 m width of disturbance and 60% requires sandwave clearance with an 80 m width of disturbance). • Sandwave clearance material deposition: Up to 26,074,994m^2 of habitat disturbance associated with the deposition of sandwave clearance material comprising: – 16,833,242 m^2 from deposition of 8,416,621 m^3 of sandwave clearance material associated with seabed preparation for wind turbine and OSP foundations – 8,377,752 m^2 from deposition of 4,188,876 m^3 of sandwave clearance material associated with seabed preparation for inter-array cables – 864,000 m^2 from deposition of 432,000 m^3 of sandwave clearance material associated with seabed preparation for interconnector cables • Anchor placements: up to 1,000,000 m^2 of habitat disturbance from two 100 m^2 anchor set placements (five anchors per set) every 500 m per inter-array cable link during installation (325 km) • Cable removal: Up to 920,000 m^2 from the removal of 46,000 m of disused cables • UXO removal: clearance of up to 22 UXOs within the Mona Array Area or Mona Offshore Cable Corridor ranging from 25 kg up to 907 kg with 130 kg the most likely (common) maximum. • Temporary disturbance from anchor chains associated with mooring systems (e.g. gravity based anchors) for: – Up to 30 light buoys and marker buoys (cardinal buoys), although the final number will be determined by Maritime and Coastguard Agency (MCA)/Trinity House requirements	The area of seabed affected by the placement of sandwave clearance material arising from seabed preparation for wind turbine and OSP foundations has been calculated based on the maximum volume of sediment which is associated with suction bucket 4-legged jacket foundations for wind turbines and gravity base foundations for OSPs. Maximum number and maximum size of UXOs encountered in the Mona Array Area and Mona Offshore Cable Corridor. Due to uncertainties in size of UXOs the assessment presents a range, highlighting the most likely size (common) to be encountered. <u>Operations and maintenance phase:</u> The MDS for habitat disturbance associated with export cable maintenance includes repairs/reburial of both subtidal and intertidal cables. <u>Decommissioning phase:</u> Parameters for decommissioning will be significantly lower than for the construction phase as sandwave clearance and pre-lay preparation will not be required in advance of cable removal and cable protection and scour protection may be left *in situ*. The MDS assumes the complete removal of all wind turbine and OSP foundations and cables.

Potential impact	Phase[a] C	O	D	Maximum Design Scenario	Justification
				– Up to three LiDAR buoys – Other buoys including waverider buoys, buoys for potential noise monitoring, wave measurement buoys, and mooring buoys for transportation vessels. Mona Offshore Cable Corridor Up to 11,728,000 m^2 of temporary habitat loss/disturbance in the Mona Offshore Cable Corridor comprising: • Export cable installation (including sandwave clearance and pre-lay preparation) including: – up to 8,640,000 m^2 of disturbance resulting from installation of up to 360 km of export cables (assumes 80% requires boulder clearance with a 20 m width of disturbance and 20% requires sandwave clearance with a 40 m width of disturbance) – up to four exit pits (below MLWS) for installation of export cable in the intertidal via trenchless techniques • Sandwave clearance material deposition: up to 3,008,000 m^2 of habitat disturbance from deposition of 1,504,000 m^3 of sandwave clearance material associated with sandwave clearance for export cables • Anchor placements: up to 80,000 m^2 of habitat disturbance from a 100 m^2 anchor placement event every 500 m during offshore export cable installation within the nearshore area (10 km for each of the four export cables) • UXO removal: clearance of up to 22 UXOs within the Mona Array Area or Mona Offshore Cable Corridor ranging from 25 kg up to 907 kg with 130 kg the most likely (common) maximum. Intertidal Mona Offshore Cable Corridor and Access Area Temporary intertidal habitat disturbance may occur due to: • Activities associated with offshore export cable installation at the landfall via trenchless techniques as follows:	

Potential impact	Phase[a] C	O	D	Maximum Design Scenario	Justification
				– Movement of equipment, machinery and personnel. **Operations and maintenance phase** Up to 17,402,800 m² of temporary subtidal habitat disturbance in total across the Mona Array Area and Mona Offshore Cable Corridor. Operational phase up to 35 years. <u>Mona Array Area</u> Up to 10,822,800 m² of temporary habitat disturbance in the Mona Array Area comprising: • Up to 1,822,800 m² of temporary habitat disturbance due to jack-ups at wind turbines and OSPs over the lifetime of the Mona Offshore Wind Project for the following: – Up to 840 major component replacements (one every four years for each location) for wind turbines – 12 major component replacements (three over the lifetime per OSP) for OSPs – Four access ladder replacements and four modifications to/replacement of J-tubes for wind turbines – Four access ladder replacements and four modifications to/replacement of J-tubes for OSPs • Up to 5,200,000 m² of temporary habitat disturbance due to inter-array cable maintenance associated with: – 2,800,000 m² from seven reburial events (one every five years) affecting up to 20,000 m² per reburial event – 2,400,000 m² from 12 repair events (one every three years) affecting up to 10,000 m per cable repair events – Assuming 20 m width seabed disturbance for repair and remedial burial • Up to 3,800,000 m² of temporary habitat disturbance due to interconnector cable maintenance:	

Potential impact	Phase[a] C	O	D	Maximum Design Scenario	Justification
				– 280,000 m^2 from seven reburial events (one every five years) affecting up to 2,000 m per reburial event – 3,520,000 m^2 from 11 repair events (three every 10 years) affecting up to 16,000 m of cable per repair event – Assuming 20 m width seabed disturbance for repair and remedial burial. Mona Offshore Cable Corridor Up to 6,580,000 m^2 of temporary habitat disturbance in the Mona Offshore Cable Corridor comprising: • Subtidal export cable maintenance: – 4,480,000 m^2 from 14 repair events (two repairs every five years) for each of the four export cables (i.e. 56 repair events in total) affecting up to 4 km per cable per repair event (i.e. 16 km for all four cables) – 2,100,000 m^2 from seven reburial events (one event every five years) s affecting up to 15 km of cable per reburial event – Assuming 20 m width seabed disturbance for repair and remedial burial. **Decommissioning phase** Temporary subtidal habitat loss/disturbance due to: • Cable removal: disturbance from the removal of 325 km of inter-array cables, 50 km of interconnector cables and 360 km of offshore export cables • Anchor placements: habitat disturbance from anchor placements during cable removal • Jack-up events: disturbance from the use of jack-up vessels during foundation removal. Temporary intertidal habitat disturbance due to:	

Potential impact	Phase[a] C	O	D	Maximum Design Scenario	Justification
				• Activities associated with the removal of offshore export cables up to the exit pits (below MHWS) for cables installed under the intertidal area as follows: – Movement of equipment, machinery and personnel.	
Increased SSC and associated deposition	✓	✓	✓	**Construction phase** Site preparation: Sandwave clearance: • Sandwave clearance activities undertaken over an approximate 12 month duration within the wider four year construction programme • Wind turbines and OSP foundations: sandwave clearance has been calculated on the basis of wind turbine generator foundations and with site investigations indicating clearance may be required at up to 50% of locations. Spoil volume per location has been calculated on the basis of 34 locations supporting the largest suction bucket four legged jacket foundation with an associated base diameter of 205 m to an average depth of 7.5 m. This equates to a total spoil volume of 8,416,621 m^3 and a volume of 247,548 m^3 per location • Inter-array cables: sandwave clearance along 163 km of cable length, with a width of 80 m, to an average depth of 3.0 m. Total spoil volume of 4,188,876 m^3 • Interconnector cables: sandwave clearance along 30 km of cable length, with a width of 80 m, to an average depth of 5.1 m. Total spoil volume of 432,000 m^3 • Offshore export cables: sandwave clearance along 72 km of export cable, with a width of 40 m, to an average depth of 5.1 m. Total spoil volume of 1,504,000 m^3 • Removal of up to 46 km of disused cables. Foundation installation: • Undertaken over an approximate 12 month duration	**Construction phase** Site preparation: • The volume of material to be cleared from individual sandwaves will vary according to the local dimensions of the sandwave (height, length, and shape) and the level to which the sandwave must be reduced. These details are not fully known at this stage, however based on the available data, it is anticipated that the sandwaves requiring clearance in the array area are likely to be in the range up to 15 m in height. This will be confirmed pre-construction. In all cases the material cleared from the sandwave will be sidecast (i.e. placed in close proximity to the breach) in order that the sediment is readily available for supply for sandwave recovery. The exception to this will be if the material is used for ballast within the foundation structure (see foundation installation below). • Site clearance activities may be undertaken using a range of techniques, the suction hopper dredger will result in the greatest increase in suspended sediment and largest plume extent as material is released near the water surface during the relocation of material. In reality plough dredging may be implemented however the volume of material brought into suspension would be reduced as material is ploughed along the bed • Boulder clearance activities will result in minimal increases in suspended sediment concentrations and have therefore not been considered in the assessment. Foundation installation: • The dredging and site preparation associated with conical gravity base foundations may involve the use of up to

Potential impact	Phase[a] C	O	D	Maximum Design Scenario	Justification
				• Wind turbines – installation of up to 45 three legged jacket piles of 5.5 m diameter, drilled to a depth of 75 m at a rate of up to 1.78 m/h, with maximum spoil volume of 2,107 m^3 per pile and – installation of 23 conical gravity base foundations with a caisson diameter of 37 m and a sea surface diameter 15 m. Installation requires dredging of a maximum area of 32,761 m^2 to a maximum depth of 10 m. • OSPs: installation of one OSP with six legs with three piles per leg, each 5.5 m drilled to a depth of 75 m at a rate of up to 1.78 m/h, with maximum spoil volume of 2,107 m^3 per pile. • Two drilled piles installed concurrently at adjacent sites. <u>Cable installation:</u> • Inter-array cables: Installation via trenching of up to 325 km of cable, with a trench width of up to 3 m and a depth of up to 6 m. Total maximum spoil volume of 2,925,000 m^3. Installed over a period of approximately 12 months • Interconnector cables: installation via trenching of up to 50 km of cable, with a trench width of up to 3 m and a depth of up to 3 m. Total spoil volume of 225,000 m^3. Installed over a period of approximately four months • Offshore export cables: installation via trenching of up to 360 km of cable, with a trench width of up to 3 m and a depth of up to 3 m. Total spoil volume of 1,620,000 m^3. Installed over a period of 15 months • Intertidal export cable: installation via trenchless techniques with punch out location offshore of MLWS. Bentonite release for the trenchless techniques limited to punch out on four occasions, one per drill shot, and over a	7,000 m^3 of this material as ballast within the structure. The remaining material will be sidecast in close proximity to be available within the sediment cell for transport and sandwave regeneration • Installation of foundations via augured (drilled) operations results in the release of the largest volume of sediment unrestrained through the water column. The greatest volume of sediment disturbance by drilling at individual locations is associated with the largest diameter pile for wind turbines. It is noted that it is unlikely that drilling would be required to the full depth and the most likely scenario is that piles would be driven, with no drilling required. This would give rise to minimal increases in SSC, however the most arduous scenario has been assessed as the MDS • The maximum number of three legged jacket pile foundations to be installed for the largest wind turbine generators is 45 out of an array of 68 wind turbine generators. Therefore, for the holistic approach of SSC assessment the remaining 23 foundations are conical gravity based foundations with associated dredging activities. • The selected OSP scenario represents the greatest volume of sediment to be released for a drilling event • The greatest drilling rate associated with the largest pile diameter represents the maximum level of increase in suspended sediment concentration • The volume of bentonite release for the cable installation using trenchless techniques punch out will be controlled and will be limited depending on the method adopted for conduit insertion. On the basis of previous experience, these quantities will be limited. This controlled bentonite release will occur during the punch out for each drill shot, so this is limited to four occasions, one per drill shot, and over a short duration with an indicative period of up to 12 hours per location. Discharge quantities will, however, vary through the

Potential impact	Phase[a] C	O	D	Maximum Design Scenario	Justification
				short duration with an indicative period of up to 12 hours per location. **Operational and maintenance phase** Project lifetime of 35 years • Inter-array cables: repair of up 10 km of cable in one event every three years. Reburial of up to 20 km of cable in one event every five years • Interconnector cables: repair of up to 16 km of cable in each of three events every 10 years. Reburial of up to 2 km of cable in one event every five years • Offshore export cables: repair of up to 32 km of cable in eight events every five years. Reburial of up to 15 km of cable in one event every five years **Decommissioning phase** • Scour and cable protection will remain *in situ*. If suction caissons are removed using the overpressure to release them then suspended sediment concentration will be temporarily increased • Inter-array and interconnector cables will be removed and disposed of onshore • Offshore export cables will be removed up to the cable installation exit pits and disposed of onshore.	period, with the bulk of the material lost on the initial punch out. <u>Cable installation</u>: • Cable routes inevitably include a variety of seabed material and in some areas 3 m depth may not be achieved or may be of a coarser nature which settles in the vicinity of the cable route. The maximum burial depth of 6 m for inter-array cables would only be required at locations where significant seabed/sandwave mobility is identified. The assessment therefore considers the upper bound in terms of suspended sediment and dispersion potential • Cables may be buried by ploughing, trenching or jetting with trenching or jetting mobilising the greatest volume of material to increase suspended sediment concentrations. • The volume of bentonite release for the trenchless technique punch out will be controlled and will be limited depending on the method adopted for conduit insertion. On the basis of previous experience, these quantities will be limited. This controlled bentonite release will occur during the punch out for each drill shot, so this is limited to four occasions, one per drill shot, and over a short duration with an indicative period of up to 12 hours per location. Discharge quantities will, however, vary through the period, with the bulk of the material lost on the initial punch out. **Operation and maintenance phase** • The greatest foreseeable number of cable reburial and repair events is considered to the MDS for sediment dispersion. **Decommissioning phase** • The removal of cables may be undertaken using similar techniques to those employed during installation, therefore the potential increases in SSC and deposition would be in-line with the construction phase.

Potential impact	Phase[a] C	O	D	Maximum Design Scenario	Justification
					• The MDS assumes the complete removal of all wind turbine and OSP foundations and cables; piles will be cut below the seabed.
Disturbance/remobilisation of sediment-bound contaminants	✓	×	✓	**Construction phase** The MDS as described above for increased SSC and associated deposition during the construction phase. **Decommissioning phase** The MDS as described above for increased SSC and associated deposition during the decommissioning phase.	The justification for the disturbance/remobilisation of sediment-bound contaminants MDS is the same as for the increased SSC and associated deposition impact above, as this MDS results in the release of the largest volume of sediment and associated contaminants.
Long term habitat loss/habitat alteration	✓	✓	✓	**Construction and operations and maintenance phase** Up to 2,192,412 m^2 of long term habitat loss/habitat alteration in total across the Mona Array Area and Mona Offshore Cable Corridor over the lifetime of the Mona Offshore Wind Project. Operational phase up to 35 years. <u>Mona Array Area</u> Up to 1,388,412 m^2 of long term habitat loss/habitat alteration in the Mona Array Area comprising: • Presence of foundations and scour protection: up to 760,452 m^2 of habitat loss comprising: – Wind turbines: up to 735,488 m^2 from the presence of up to 68 wind turbine foundations on suction bucket 4-legged jacket foundations with associated scour protection – OSPs: up to 24,964 m^2 from four OSPs on suction bucket jacket foundations with associated scour protection • Presence of cable protection for inter-array and interconnector cables: up to 425,000 m^2 of habitat loss comprising:	Largest wind turbine and OSP foundation type and associated scour protection, maximum length of cables and cable protection resulting in greatest extent of habitat loss. The MDS for decommissioning (and permanent habitat loss following decommissioning) assumes removal of the foundations, if any additional infrastructure is decommissioned, this will result in a reduced area of permanent habitat loss. Greatest amount of cable and scour protection resulting in the largest area of infrastructure to be left *in situ* after decommissioning.

Potential impact	Phase[a] C	O	D	Maximum Design Scenario	Justification
				– Inter-array cable protection: 325,000 m² associated with up to 10% of 325 km of inter-array cables requiring cable protection (10 m width of cable protection) – Interconnector cable protection: 100,000 m² for up to 20% of 50 km of interconnector cables requiring cable protection (10 m width of cable protection) • Presence of cable crossing protection: up to 202,960m² of habitat loss comprising: – Cable protection for cable crossings for inter-array cables: 192,960 m² from 67 cable crossings (each up to 80 m in length and 36 m in width) – Cable protection for cable crossings for interconnector cables: 10,000² from 10 cable crossings (each up to 50 m in length and 20 m in width). • Presence of mooring systems (e.g. gravity based anchors) for: – Up to 30 light buoys and marker buoys (cardinal buoys), although the final number will be determined by MCA/Trinity House requirements – Up to three LiDAR buoys – Other buoys including waverider buoys, buoys for potential noise monitoring, wave measurement buoys, and mooring buoys for transportation vessels. <u>Mona Offshore Cable Corridor</u> Up to 804,000 m² of long term habitat loss/habitat alteration in the Mona Offshore Cable Corridor comprising: • Presence of export cable protection: up to 720,000 m² of habitat loss associated with cable protection for up to 20% of 360 km of offshore export cables requiring cable protection (10 m width of cable protection) • Presence of cable crossing protection: up to 84,000 m² of habitat loss associated with cable crossing protection for	

Potential impact	Phase[a] C	O	D	Maximum Design Scenario	Justification
				14 crossings (each up to 50 m in length and 30 m in width). **Decommissioning phase** Up to 2,135,276 m^2 of permanent subtidal habitat loss due to scour and cable protection left *in situ* post decommissioning.	
Introduction of artificial structures	✓	✓	✓	**Construction and operations and maintenance phase** Introduction of up to 2,685,616 m^2 of artificial structures across the Mona Array Area and Mona Offshore Cable Corridor over the lifetime of the Mona Offshore Wind Project. Operational phase up to 35 years. <u>Mona Array Area</u> Introduction of up to 1,881,616 m^2 of artificial structures in the Mona Array Area comprising: • Wind turbines and OSPs: Presence of up to 68 wind turbines and four OSPs on suction bucket jacket foundations • Scour protection: Presence of scour protection for wind turbine foundations and OSP foundations • Cable protection: Presence of cable protection associated with up to 10% of 325 km of inter-array cables and 20% of the 50 km of interconnector cables • Cable crossing protection: Presence of cable protection for cable crossings, 67 cable crossings for inter-array cables (each up to 80 m in length and 36 m in width) and 10 cable crossings for interconnector cables (each up to 50 m in length and 20 m in width). Maintenance activities including the removal of marine growth from foundations or access ladders.	Maximum number of wind turbine and OSP foundations and associated scour protection, maximum length of cables and cable protection resulting in greatest surface area for colonisation. The estimate of area associated with the introduction of artificial structures from the presence of foundations has been calculated as if the foundations were a solid structure. This is, therefore, likely to be a conservative estimate of the introduction of artificial structures on the basis that the jacket foundations will have a lattice design rather than a solid surface. The MDS for decommissioning assumes removal of the foundations but that cable and scour protection could be left *in situ* after decommissioning.

Potential impact	Phase[a] C	O	D	Maximum Design Scenario	Justification
				<u>Mona Offshore Cable Corridor</u> Introduction of up to 804,000 m^2 of artificial structures in the Mona Offshore Cable Corridor comprising: • Export cable protection: Presence of cable protection associated with up to 20% of the 360 km of offshore export cables • Export cable crossing protection: Presence of cable protection for cable crossings, 14 cable crossings for each of the four offshore export cables (each up to 50 m in length and 30 m in width). **Decommissioning phase** Up to 2,135,276 m^2 of artificial structures remaining post-decommissioning due to scour and cable protection being left *in situ*.	
Increased risk of introduction and spread of invasive non-native species (INNS)	✓	✓	✓	**Construction phase** Increased risk of INNS due to: • Long term introduction of artificial structures: up to 2,685,616 m^2 as set out in the colonisation of hard structures impact above • Vessel movement: vessels associated with site preparation, wind turbine installation, OSP installation, inter-array cables, export cables, and landfall works, with up to 2,215 vessel round trips in total over the construction phase • Maximum duration of the offshore construction phase is up to four years. **Operations and maintenance phase** Increased risk of INNS due to: • Long term introduction of artificial structures: up to 2,685,616 m^2 as set out in the colonisation of hard structures impact above	Maximum surface area created by offshore infrastructure and maximum number of vessel movements during construction, operations and maintenance and decommissioning phases.

Potential impact	Phase[a] C	O	D	Maximum Design Scenario	Justification
				• Vessel return trips: Up to 849 vessel return trips per year during the operations and maintenance phase • Removal of marine growth from foundations or access ladders • Operational phase up to 35 years. **Decommissioning phase** Increased risk of INNS due to: • Presence of artificial structures: up to 2,135,276 m^2 due to scour and cable protection left *in situ* post decommissioning • Vessel return trips: Up to 2,215 decommissioning vessel return trips during the decommissioning phase • Maximum duration of the offshore decommissioning phase is up to four years.	
Removal of hard substrates	×	×	✓	**Decommissioning phase** Removal of up to 2, 685,616 m^2 of hard substrates in total across the Mona Array Area and Mona Offshore Cable Corridor. Mona Array Area Removal of up to 1,881,616 m^2 of artificial structures in the Mona Array Area comprising: • Wind turbines and OSPs (including scour protection): Removal of up to 68 suction bucket 4-legged jacket foundations for wind turbines and up to four suction bucket jacket foundations for OSPs including all scour protection • Inter-array and interconnector cable protection: Removal of cable protection associated with up to 10% of 325 km of inter-array cables and 20% of the 50 km of interconnector cables • Cable crossing protection: Removal of cable protection for 67 cable crossings for inter-array cables (each up to 80 m	The project description (Volume 1, Chapter 3: Project description of the Environmental Statement) states that it is likely that cable and scour protection will likely be left *in situ* following decommissioing however the MDS for benthic receptors is that all hard substrate could be removed.

Potential impact	Phase[a] C	O	D	Maximum Design Scenario	Justification
				in length and 36 m in width) and 10 cable crossings for interconnector cables (each up to 50 m in length and 20 m in width). Mona Offshore Cable Corridor Removal of up to 804,000m^2 of artificial structures in the Mona Offshore Cable Corridor comprising: • Export cable protection: Removal of cable protection associated with up to 20% of the 360 km of offshore export cables • Export cable crossing protection: Removal of cable protection for 14 cable crossings for each of the four offshore export cables (each up to 50 m in length and 30 m in width).	
Changes in physical processes	✕	✓	✕	**Operation and maintenance phase** Holistic MDS for tides, waves and sediment transport • Wind turbines: 68 installations with four-legged suction bucket foundations, each jacket leg with a diameter of 5 m, spaced 48 m apart, and each bucket with a diameter of 16 m. Scour protection to a height of 2.5 m and extending 20 m from the bucket. Total footprint of 10,816 m^2 per wind turbine • OSPs: one installation with a rectangular gravity base foundation, with an 80 m by 60 m dimension at the surface, a slab base dimension of 100 m by 80 m and with scour protection to a height of 2.6 m extending 25 m from the base. Total footprint of 19,500 m^2 • Inter-array cables: cable protection along 32.5 km of the cable. Up to 67 cable crossings, each crossing has a height of up to 4 m, a width of up to 36 m and a length of up to 80 m • Interconnector cables: cable protection along 10 km of the cable, with a height of up to 3 m and up to 10 m width. Up	The greatest surface blockage to influence wave climate is from the wind turbines with the largest four-legged suction bucket foundations. The four legs provide a slightly smaller obstruction to tidal flows at each wind turbine site than gravity base foundations however the gravity base obstruction is concentrated towards to the lower section of the water column where tidal currents are weaker and influence of conveyance is therefore reduced. Additionally, placement of gravel to accommodate pad foundations for gravity base structures would occur within a dredged area and not impact on tidal flow. Suction bucket foundations have the largest footprint at each wind turbine in terms of scour protection and provide the greatest influence on bathymetry. The devices also have a greater footprint over the site as a whole rather than the more numerous smaller design options. Sensitivity testing was undertaken on a single unit of each of these foundation types, as presented in Volume 6, Annex 1.1: Physical processes technical report of the Environmental Statement. It was seen that although there were differences in influences in the immediate vicinity of each unit, they would not give rise to a different magnitude of impact. The greatest overall in-water column blockage to influence tidal flow and wave climate from the OSPs is the maximum number

Potential impact	Phase[a] C	O	D	Maximum Design Scenario	Justification
				to ten cable crossings, each crossing has a height of up to 3 m, a width of up to 20 m and a length of up to 50 m • Export cables: cable protection along 72 km of the cable, with a height of up to 3 m and up to 10 m width. Up to 14 cable crossings, each crossing has a height of up to 3 m, a width of up to 30 m and a length of up to 50 m. Cable protection height will cause no more than a 5% reduction in water depth (referenced Chart Datum) at any point along the Mona Offshore Cable Corridor without prior written approval from the Licensing Authority in consultation with the MCA. Sediment budget • The dredging and site preparation associated with conical gravity base foundations may involve the use of up to a total of 490,000 m^3 of this material as ballast in structures at up to 96 locations. Up to 7,000 m^3 of this material may be harvested from site preparation activities at any given site. **Decommissioning phase** • During the decommissioning phase the potential changes to the receptor pathway would gradually decrease from the operational MDS as structures are removed and cut below the seabed • Scour and cable protection will remain *in situ* and continue to influence tidal regime.	of OSPs (four) with gravity base foundations. These parameters also present the largest overall footprints to affect changes in bathymetry and sediment transport pathways. However, the greatest single site influence in terms of OSP structures is the rectangular gravity base structure, which is larger than other foundation options. This was demonstrated in modelling of this single foundation under sensitivity testing presented in Volume 6, Annex 1.1: Physical processes technical report of the Environmental Statement. The volume of material which may be harvested from site preparation activities for ballast in gravity based foundations is up to 7,000 m^3 for each location, up to a total of 490,000 m^3. Therefore the MDS differs from the holistic assessment applied to tides, waves and sediment transport when sediment budget and the potential impact on sediment transport is considered.
EMF from subsea electrical cabling	×	✓	×	**Operations and maintenance phase** Presence of inter-array, interconnector and offshore export cables. Operations and maintenance phase of up to 35 years. <u>Mona Array Area</u> • Inter-array cables: up to 325 km of inter-array cables of 66 kv	Maximum length of cables across the Mona Array Area and Offshore Cable Corridor and minimum burial depth (the greater the burial depth, the more the EMF is attenuated).

Potential impact	Phase[a] C	O	D	Maximum Design Scenario	Justification
				• Interconnector cables: up to 50 km of 275 kv High Voltage Alternating Current (HVAC) cables • Minimum burial depth 0.5 m • The MDS assumes up to 10% of inter-array cables and 20% of interconnector cables may require cable protection • Cable protection: cables will also require cable protection at asset crossings (up to 67 crossings for inter-array cables and 10 crossings for interconnector cables). Mona Offshore Cable Corridor • Offshore export cables: up to 360 km of 220 kv HVAC cables • Minimum burial depth 0.5 m • The MDS assumes up to 20% of export cables may require cable protection • Cable protection: cables will also require cable protection at asset crossings (up to 14 crossings for offshore export cables).	
Heat from subsea electrical cables	×	✓	×	**Operations and maintenance phase** Presence of inter-array, interconnector and offshore export cables. Operations and maintenance phase of up to 35 years. Mona Array Area • Inter-array cables: up to 325 km of inter-array cables of 66 kv • Interconnector cables: up to 50 km of 275 kv HVAC cables • Minimum burial depth 0.5 m • The MDS assumes up to 10% of inter-array cables and 20% of interconnector cables may require cable protection	Maximum length of cables across the Mona Array Area and Offshore Cable Corridor and minimum burial depth (the greater the burial depth, the more the heat is attenuated).

Potential impact	Phase[a] C	O	D	Maximum Design Scenario	Justification
				• Cable protection: cables will also require cable protection at asset crossings (up to 67 crossings for inter-array cables and 10 crossings for interconnector cables). Mona Offshore Cable Corridor • Offshore export cables: up to 360 km of 220 kv HVAC cables • Minimum burial depth 0.5 m • The MDS assumes up to 20% of export cables may require cable protection • Cable protection: cables will also require cable protection at asset crossings (up to 14 crossings for offshore export cables).	

2.8 Measures adopted as part of the Mona Offshore Wind Project

2.8.1.1 For the purposes of the EIA process, the term 'measures adopted as part of the project' is used to include the following measures (adapted from Institute of Environmental Management and Assessment (IEMA), 2016):

- Measures included as part of the project design. These include modifications to the location or design envelope of the Mona Offshore Wind Project which are integrated into the application for consent. These measures are secured through the consent itself through the description of the development and the parameters secured in the DCO and/or marine licence(s) (referred to as primary mitigation in IEMA, 2016)
- Measures required to meet legislative requirements, or actions that are generally standard practice used to manage commonly occurring environmental effects and are secured through the DCO requirements and/or the conditions of the marine licence(s) (referred to as tertiary mitigation in IEMA, 2016).

2.8.1.2 A number of measures (primary and tertiary) have been adopted as part of the Mona Offshore Wind Project to reduce the potential for impacts on benthic subtidal and intertidal ecology. These are outlined in Table 2.19. As there is a secured commitment to implementing these measures, they are considered inherently part of the design of the Mona Offshore Wind Project and have therefore been considered in the assessment presented in section 2.9 below (i.e. the determination of magnitude and therefore significance assumes implementation of these measures).

Table 2.19: Measures adopted as part of the Mona Offshore Wind Project.

Measures adopted as part of the Mona Offshore Wind Project	Justification	How the measure will be secured
Primary measures: Measures included as part of the project design		
A 50 m exclusion buffer will be in place to avoid the *Sabellaria alveolata* reef and *Mytilus edulis* bed at the landfall.	The *Sabellaria alveolata* reef is located outside the Mona Offshore Cable Corridor and Access Areas Red Line Boundary. Whilst the reef is located more than 250 m to the west of the intertidal part of the Mona Offshore Cable Corridor and Access Areas Red Line Boundary, it is approximately 28 m, at the nearest point, from the subtidal part of the Mona Offshore Cable Corridor and Access Areas Red Line Boundary. Therefore, this primary measure has been included on a precautionary basis to ensure that direct impacts (e.g. habitat loss or disturbance) to the ecologically sensitive and nationally protected *Sabellaria alveolata* reef will be avoided, as will direct impacts to the *Mytilus edulis* bed.	Included in the Landfall construction method statement which is expected to be secured within the standalone NRW marine licence.
Development and adherence to an Landfall construction method statement (in accordance with the Outline Landfall construction method statement (Document Reference J26.14)) which commits to the installation of Mona export cables via trenchless techniques under	This primary measure will ensure that direct impacts (e.g. habitat loss or disturbance) to the ecologically sensitive and nationally protected clay with piddocks IEF as well as other intertidal habitats (as listed in Table 2.13) will not occur.	Included in the Landfall construction method statement which is expected to be secured within the standalone NRW marine licence.

Measures adopted as part of the Mona Offshore Wind Project	Justification	How the measure will be secured
the intertidal area from below MLWS, where the exit pits will be located, to onshore.		
All construction and operations and maintenance activities at the Mona landfall (i.e. trenchless techniques working areas and movement of machinery, equipment and personnel) will be located outside the clay with piddocks IEF.	This primary measure will ensure that direct impacts (e.g. habitat loss or disturbance) to the ecologically sensitive and nationally protected clay with piddocks IEF will not occur.	Expected to be secured the standalone NRW marine licence.
Development and adherence to an Offshore CMS which includes a CSIP that does not permit the percentage of export cable requiring cable protection to exceed 10% of the total length of the export cable within the Menai Strait and Conwy Bay SAC.	This commitment will minimise the impacts to the SAC whilst noting that there is no overlap between the Mona Offshore Cable Corridor and any designated features of the Menai Strait and Conwy Bay SAC.	The Offshore CMS is secured within the deemed marine licence in Schedule 14 of the draft DCO and expected to be secured within the standalone NRW marine licence.
Development and adherence to an Offshore CMS which includes a CSIP that does not permit cable protection higher than 70 cm to be installed within in the Menai Strait and Conwy Bay SAC.	To minimise impacts on physical processes, particularly sediment transport regimes in the Menai Strait and Conwy Bay SAC. If and where cable protection is required within the Menai Strait and Conwy Bay SAC the cable protection measure used will be with sufficiently low profile to cause minimal changes to wave, tide and sediment transport.	The Offshore CMS is secured within the deemed marine licence in Schedule 14 of the draft DCO and expected to be secured within the standalone NRW marine licence.
No more than 5% reduction in water depth (referenced to Chart Datum) will occur at any point along the Mona Offshore Cable Corridor without prior written approval from the Licensing Authority in consultation with the MCA.	This will ensure any cable protection is sufficiently low profile to cause minimal changes to wave, tide and sediment transport.	Secured within the deemed marine licence in Schedule 14 of the draft DCO and expected to be secured within the standalone NRW marine licence.
Development and adherence to an Offshore CMS which includes a CSIP that does not permit the installation of cable protection within Constable Bank.	This primary measure will avoid any long term habitat loss in Constable Bank (an Annex I habitat outside an SAC).	The Offshore CMS is secured within the deemed marine licence in Schedule 14 of the draft DCO and expected to be secured within the standalone NRW marine licence.
Development and adherence to an Offshore CMS which includes a CSIP that will only permit sandwave clearance on the Constable Bank within the swept path area (20 m) of the cable burial tool.	To minimise potential impacts on Constable Bank (an Annex I habitat outside an SAC).	The Offshore CMS is secured within the deemed marine licence in Schedule 14 of the draft DCO and expected to be secured within the standalone NRW marine licence.
Development and adherence to an Offshore CMS which includes a CSIP that does not	To minimise potential impacts on the Menai Strait and Conwy Bay SAC.	The Offshore CMS is secured within the deemed marine licence in Schedule 14 of the draft DCO

Measures adopted as part of the Mona Offshore Wind Project	Justification	How the measure will be secured
permit sandwave clearance within the Menai Strait and Conwy Bay SAC.		and expected to be secured within the standalone NRW marine licence.
Development and adherence to an Offshore CMS which includes a CSIP which requires material arising from drilling and/or sandwave clearance to be deposited in close proximity to the works.	To retain material within the sediment cell and maintain sediment transport regimes.	The Offshore CMS is secured within the deemed marine licence in Schedule 14 of the draft DCO and expected to be secured within the standalone NRW marine licence.
Development and adherence to an Offshore CMS, which will include details of scour protection management, to be used around offshore structures and foundations to reduce scour as much as is practical.	There is the potential for scouring of seabed sediments to occur due to interactions between the metocean regime (waves and currents) and foundations or other seabed structures. This scouring can develop into depressions around the structure. The use of scour protection around offshore structures and foundations will be employed, as described in detail in Volume 1, Chapter 3: Project description of the Environmental Statement.	The Offshore CMS is secured within the deemed marine licence in Schedule 14 of the draft DCO and expected to be secured within the standalone NRW marine licence.
Development and adherence to an Offshore CMS including a CSIP which will include cable burial where possible and cable protection.	To minimise potential impact from the cables and removal of cables a commitment to bury cables where possible has been made in accordance with the specific policies set out in the Welsh Marine Plan (Welsh Government, 2019) and additionally the North West Inshore and North West Offshore Coast Marine Plans (MMO, 2021). This primary measure will help to reduce the amount of EMF which benthic organisms are exposed to during the operations and maintenance phase by increasing the distance between the seabed surface and the surface of the cables. It will also reduce the extent of long-term habitat loss associated with cable protection. The Applicant recognises that the best form of cable protection is achieved through cable burial to the required depths, according to the results of a Cable Burial Risk Assessment and Burial Assessment Study, which will be included within the CSIP. The burial methodology should select the appropriate tools to endeavour to achieve burial to the required depth of lowering in a single pass, seeking to avoid burial methods that require multiple passes with a burial tool in order to achieve lowering of the cable.	The Offshore CMS is secured within the deemed marine licence in Schedule 14 of the draft DCO and expected to be secured within the standalone NRW marine licence.
Tertiary measures: Measures required to meet legislative requirements, or adopted standard industry practice		
Development of, and adherence to, an Offshore EMP. This will include a Biosecurity Risk Assessment	The plan will outline measures to ensure vessels comply with the IMO ballast water management guidelines, it will consider the origin of vessels and contain standard housekeeping measures for	The Offshore EMP is secured within the deemed marine licence in Schedule 14 of the draft DCO and expected to be secured

Measures adopted as part of the Mona Offshore Wind Project	Justification	How the measure will be secured
and an INNS Management Plan, including actions to minimise INNS.	such vessels as well as specific measures to be adopted in the event that a high alert species is recorded (e.g. carpet sea squirt *Didemnum vexillum*).	within the standalone NRW marine licence.
Development and adherence to an Offshore EMP that will include a MPCP which will include planning for accidental spills, address all potential contaminant releases and include key emergency details.	This will ensure that the potential for release of pollutants from construction, operations and maintenance and decommissioning activities is reduced so far as reasonably practicable.	The Offshore EMP is secured within the deemed marine licence in Schedule 14 of the draft DCO and expected to be secured within the standalone NRW marine licence.
An Ecological Clerk of Works (ECoW) will supervise any planned construction works in the intertidal zone.	This tertiary measure will ensure that direct impacts (e.g. habitat loss or disturbance) to ecologically sensitive and nationally protected clay with piddocks IEF will be avoided. It will also ensure that there will be no direct impacts to the *Sabellaria alveolata* reef IEF and the *Mytilus edulis* bed IEF.	Included in the Landfall construction method statement which is expected to be secured within the standalone NRW marine licence.

2.8.1.3 Where significant effects have been identified, further mitigation measures (referred to as secondary mitigation in IEMA, 2016) have been identified to reduce the significance of effect to acceptable levels following the initial assessment. These are measures that could further prevent, reduce and, where possible, offset any adverse effects on the environment. These measures are set out, where relevant, in section 2.9 below.

2.9 Assessment of significant effects

2.9.1 Overview

2.9.1.1 The impacts of the construction, operations and maintenance, and decommissioning phases of the Mona Offshore Wind Project have been assessed on benthic subtidal and intertidal ecology. The potential impacts are listed in Table 2.18 and Table 2.20, along with the MDS against which each potential impact has been assessed.

2.9.1.2 Descriptions of the potential impact pathways which may result in effects on benthic subtidal and intertidal ecology receptors are given below.

Table 2.20: Summary of IEFs assessed for each potential impact pathway for the Mona Offshore Wind Project alone assessment.

IEF	Temporary habitat loss/disturbance	Increase in suspended sediment concentrations and associated deposition	Disturbance/remobilisation of sediment-bound contaminants	Long term habitat loss/habitat alteration	Introduction of artificial structures	Increased risk of introduction and spread of invasive non-native species	Removal of hard substrates	Changes in physical processes	Electromagnetic fields from subsea electrical cables	Heat from subsea electrical cables
Subtidal habitat IEFs										
Subtidal coarse and mixed sediments with diverse benthic communities IEF	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Sand and muddy sand communities with polychaetes and bivalves IEF	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Annex I low resemblance stony reef (outside an SAC) IEF	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

IEF	Temporary habitat loss/disturbance	Increase in suspended sediment concentrations and associated deposition	Disturbance/remobilisation of sediment-bound contaminants	Long term habitat loss/habitat alteration	Introduction of artificial structures	Increased risk of introduction and spread of invasive non-native species	Removal of hard substrates	Changes in physical processes	Electromagnetic fields from subsea electrical cables	Heat from subsea electrical cables
Constable Bank (Annex I sandbank outside an SAC) IEF	✓	✓	✓	×	×	✓	×	✓	✓	✓
Seapens and burrowing megafauna communities IEF	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Mixed sediments dominated by brittlestars IEF	×	✓	×	×	×	×	×	✓	×	×
Intertidal habitat IEFs										
Littoral shingle with *Verrucaria maura* IEF	✓	✓	×	×	×	×	×	✓	×	×

IEF	Temporary habitat loss/disturbance	Increase in suspended sediment concentrations and associated deposition	Disturbance/remobilisation of sediment-bound contaminants	Long term habitat loss/habitat alteration	Introduction of artificial structures	Increased risk of introduction and spread of invasive non-native species	Removal of hard substrates	Changes in physical processes	Electromagnetic fields from subsea electrical cables	Heat from subsea electrical cables
Littoral sand and muddy sand supporting infaunal communities IEF	✓	✓	×	×	×	×	×	✓	×	×
Clay with piddocks IEF	×	✓	×	×	×	×	×	✓	×	×
Littoral and eulittoral rock dominated by epifaunal communities IEF	✓	✓	×	×	×	×	×	✓	×	×
Sabellaria alveolata reef IEF	×	✓	×	×	×	×	×	✓	×	×
Mytilus edulis bed IEF	×	✓	×	×	×	×	×	✓	×	×

IEF	Temporary habitat loss/disturbance	Increase in suspended sediment concentrations and associated deposition	Disturbance/remobilisation of sediment-bound contaminants	Long term habitat loss/habitat alteration	Introduction of artificial structures	Increased risk of introduction and spread of invasive non-native species	Removal of hard substrates	Changes in physical processes	Electromagnetic fields from subsea electrical cables	Heat from subsea electrical cables
Y Fenai a Bae Conwy/ Menai Strait and Conwy Bay SAC IEFs										
Annex I sandbanks IEF	×	✓	×	×	×	✓	×	✓	×	×
Annex I subtidal reefs IEF	×	✓	×	×	×	✓	×	✓	×	×
Annex I intertidal reefs IEF	×	✓	×	×	×	✓	×	✓	×	×

2.9.2 Temporary habitat loss/disturbance

2.9.2.1 Temporary habitat loss/disturbance of subtidal and intertidal habitats within the Mona benthic ecology subtidal and intertidal study area will occur during the construction, operations and maintenance and decommissioning phases. Temporary habitat loss/disturbance may result from activities including the use of jack-up vessels during the installation of foundations for wind turbines and OSPs, sandwave clearance, pre-lay preparation (e.g. boulder and debris clearance), UXO clearance, cable installation and repair as well as anchor placements associated with these activities. There may also be some temporary habitat disturbance associated with the deployment and operation of various buoys within the Mona Array Area (including light buoys, marker buoys, LiDAR buoys, waverider buoys, noise monitoring buoys, wave measurement buoys, and mooring buoys). Temporary habitat disturbance may also arise as a result of the removal of disused/out of service cables. The MDS for temporary habitat loss/disturbance is summarised in Table 2.18.

2.9.2.2 The relevant MarESA pressures and their benchmarks which have used to inform this impact assessment are described here:

- Habitat structure changes - removal of substratum (extraction): the benchmark for which is the extraction of substratum to 30 cm. This pressure is considered to be analogous to the impacts associated with sandwave clearance and pre-lay preparation (e.g. boulder and debris clearance), and the installation of cables in the intertidal with trenchless techniques.
- Abrasion/disturbance at the surface of the substratum or seabed: the benchmark for which is damage to surface features (e.g. species and physical structures within the habitat). This pressure corresponds to the impacts associated with jack-up vessel operations, anchor placements and the installation/operation of buoys.
- Penetration and/or disturbance of the substratum subsurface: the benchmark for which is damage to sub-surface features (e.g. species and physical structures within the habitat). This pressure corresponds to the impacts associated with cable installation and jack-up vessel operations.
- Smothering and siltation rate changes (heavy): the benchmark for which is heavy deposition of up to 30 cm of fine material added to the habitat in a single discrete event. This pressure corresponds to impacts associated with the deposition of sandwave material dredged prior to foundation installation and cable installation.

2.9.2.3 The subtidal IEFs that have the potential to be affected by temporary habitat loss/disturbance across all phases of the Mona Offshore Wind Project are those present within the Mona Array Area and Mona Offshore Cable Corridor (i.e. subtidal coarse and mixed sediments with diverse benthic communities IEF, sand and muddy sand communities with polychaetes and bivalves IEF, Constable Bank (Annex I sandbank outside an SAC) IEF, Annex I low resemblance stony reef (outside an SAC) IEF and seapens and burrowing megafauna communities IEF (see Table 2.20).

2.9.2.4 The Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC overlaps with the Mona Offshore Cable Corridor for the Mona Offshore Wind Project and therefore some temporary habitat loss/disturbance may occur within the SAC. As outlined in paragraph 2.5.3.3, no designated features of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC were recorded during the site specific surveys in the area of overlap with the Mona Offshore Cable Corridor. This supports NRW's mapped distribution of designated features within the SAC (NRW, 2016), as shown in Figure 2.9. Therefore none of the designated features of the SAC will be affected by temporary habitat loss/disturbance and have not been assessed in relation to this impact. However the magnitude of the impact of temporary habitat loss/disturbance on the subtidal habitat IEFs identified in the area of overlap with the SAC (i.e. subtidal coarse and mixed sediments with diverse benthic communities IEF and the sand and muddy sand communities with polychaetes and bivalves IEF) is assessed across all phases of the Mona Offshore Wind Project.

2.9.2.5 The intertidal IEFs that have the potential to be affected by temporary habitat loss/disturbance are the littoral shingle with *Verrucaria maura* IEF, littoral sand and muddy sand supporting infaunal communities IEF and the littoral and eulittoral rock dominated by epifaunal communities IEF. Since the publication of the PEIR, the boundary of the Mona Offshore Cable Corridor and Access Areas has been adjusted so that the *S. alveolata* reef and *M. edulis* bed are no longer inside the boundary, additionally a measure has been adopted to maintain a 50 m buffer around the *S. alveolata* reef and *M. edulis* bed at the landfall to ensure no direct impacts to these features (Table 2.19). Furthermore, all construction and operation and maintenance activities at the Mona landfall (i.e. trenchless techniques working areas and movement of machinery, equipment and personnel) will be located outside the clay with piddocks IEF. An ECoW will also supervise any planned construction works in the intertidal zone Table 2.19). There will, therefore, be no temporary habitat loss/disturbance to the *Sabellaria alveolata* reef IEF, the *Mytilus edulis* bed IEF or the clay with piddocks IEF and so no further assessment is required for temporary habitat disturbance/loss for these IEFs.

Construction phase

Magnitude of impact

Subtidal habitat IEFs

2.9.2.6 The installation of the Mona Offshore Wind Project infrastructure within the Mona benthic subtidal and intertidal ecology study area may lead to up to 60,512,833 m^2 of temporary habitat loss/disturbance during the construction phase (Table 2.18). This equates to approximately 4.72% of the Mona benthic subtidal and intertidal ecology study area.

2.9.2.7 Temporary habitat disturbance in the construction phase is likely to result from pre-lay preparations (sandwave and boulder and debris clearance and associated deposition), UXO clearance, jack up events, cable installation (subtidal and intertidal, including exit pits for trenchless techniques) and cable removal. Additionally the deployment of buoys may result in temporary habitat disturbance. Long term habitat loss associated with the footprint of the wind turbine foundations and associated scour protection is considered as a separate impact in section 2.9.5.

2.9.2.8 The amount of temporary habitat disturbance/loss has been decreased following post-PEIR refinements made to the MDS primarily as a result of a reduction in the width of the area affected by sandwave clearance, from 104 m to 40 – 80 m. This has led to a decrease in temporary habitat disturbance/loss associated with this activity. For example, the area affected by the deposition of sandwave clearance material from both the Mona Array Area and Offshore Cable Corridor has decreased from 66,144,392 m^2 to 29,082,994 m^2 post-PEIR).

2.9.2.9 It should be noted that when undertaking sandwave clearance the material will be sidecast to a location adjacent to the sandwave clearance to allow this material to be available for migration and sandwave recovery. A recent study reviewed the effects of cable installation on subtidal sediments and habitats, drawing on monitoring reports from over 20 UK offshore wind farms (RPS, 2019). This review showed that sandy sediments recover quickly following cable installation, with little or no evidence of disturbance in the years following cable installation. It also presented evidence that remnant cable trenches in coarse and mixed sediments were conspicuous for several years after installation. However, these shallow depressions were of limited depth (i.e. tens of centimetres) relative to the surrounding seabed, over a horizontal distance of several metres and therefore did not represent a large shift from the baseline environment (RPS, 2019). Remnant trenches (and anchor drag marks) were observed years following cable installation within areas of muddy sand sediments, although these were relatively shallow features (i.e. a few tens of centimetres).

2.9.2.10 The majority of sandwave clearance and cable installation will take place within the subtidal coarse and mixed sediments with diverse benthic communities IEF and sand and muddy sand communities with polychaetes and bivalves IEF. As detailed in paragraphs 2.9.2.9 and 2.9.2.9 this IEF is likely to recover from activities of this nature. Any mounds of cleared material will erode over time and displaced material will re-join the natural sedimentary environment, gradually reducing the size of the mounds. As the sediment type deposited on the seabed will be similar to that of the surrounding areas, benthic assemblages would be expected to recolonise these areas (see paragraphs 2.9.2.22 and 2.9.2.25 below).

2.9.2.11 There is the potential that 19.72 km of export cable (i.e. four cables up to 4.93 km in length) may be installed within Constable Bank (Annex I sandbank outside an SAC). A measure has been adopted as part of the Mona Offshore Wind Project that only permits sandwave clearance on the Constable Bank within the swept path area (20 m) of the cable burial tool (Table 2.19). Regarding any sandwave clearance in the areas surrounding Constable Bank, as noted in paragraph 2.9.2.9, as a measure has been adopted to ensure that the material arising from sandwave clearance to be deposited in close proximity to the works it will naturally be brought back in to the sediment transport system. Furthermore the Mona Offshore Cable Corridor does not pass through the main body of Constable Bank, it crosses the ‘tail’ of the bank feature to the west (see Figure 2.9). This may result in up to 0.39 km^2 of temporary habitat disturbance within Constable Bank which would equate to 1.13% of the feature.

2.9.2.12 The MDS also includes for the clearance of up to 22 UXOs within the Mona Array Area and Mona Offshore Cable Corridor with a 130 kg UXO considered the most likely (common) maximum. Studies undertaken for the Norfolk Vanguard offshore wind farm (Ordtek, 2018) considered the likely crater sizes for a range of UXOs. For the smallest UXO considered (55 kg which is greater than the minimum considered for the Mona Offshore Wind Project) the likely diameter of the crater was estimated at 8.91 m and a likely depth of 1.3 m. For a 150 kg UXO (the option most similar to the most likely maximum for the Mona Offshore Wind Project) the likely diameter of the crater was estimated at 12.61 m and a likely depth of 1.8 – 2.8 m. The project is committed to applying low order/low yield techniques where safe and logistically viable to do so and therefore UXO clearance will most likely be within the 20 m width of disturbance assumed for cable burial (including boulder clearance) and also the 80 m width of disturbance assumed for sandwave clearance for inter-array and interconnector cables and the 40 m width for sandwave clearance for offshore export cables. Any craters created during detonation are expected to backfill by natural processes, the speed of which would depend on the sediment transport regimes in the area.

2.9.2.13 The maximum duration of the offshore construction phase for the Mona Offshore Wind Project is up to four years. Within the four year construction phase, construction activities are anticipated to occur intermittently with only a small proportion of the MDS footprint being affected at any one time.

2.9.2.14 The impact on subtidal coarse and mixed sediments with diverse benthic communities IEF, the sand and muddy sand communities with polychaetes and bivalves IEF, seapens and burrowing megafauna communities IEF and Constable Bank (Annex I sandbank outside an SAC) IEF is predicted to be of local spatial extent, short to medium term duration, intermittent and high reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore considered to be **low**.

Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC

2.9.2.15 As outlined in paragraph 2.5.3.3, no designated features of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC were recorded during the site specific surveys in the area of overlap with the Mona Offshore Cable Corridor. None of the designated features of the SAC will be affected by temporary habitat loss/disturbance and they have not been assessed in relation to this potential impact. However the magnitude of the potential impact on the subtidal habitat IEFs identified in the area of overlap with the SAC (i.e. subtidal coarse and mixed sediments with diverse benthic communities IEF and the sand and muddy sand communities with polychaetes and bivalves IEF) is assessed.

2.9.2.16 The total area of the SAC is 264.83 km^2 (CCW, 2012) and the MDS assumes that up to 8.1 km of export cables may be installed within the SAC. As outlined in Table 2.19 a measure has been adopted as part of the Mona Offshore Wind Project which does not permit seabed preparation activities (sandwave clearance or boulder clearance) within the area of overlap between the Mona Offshore Cable Corridor and the SAC. As a result only cable burial to a width of 20 m will be undertaken in the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC which may result in up to 0.162 km^2 of temporary habitat loss/disturbance within the SAC equating to 0.06% of the total area of the SAC.

2.9.2.17 The impact on subtidal coarse and mixed sediments with diverse benthic communities IEF (within the SAC) and the sand and muddy sand communities with polychaetes and bivalves IEF (within the SAC) is predicted to be of local spatial extent, short to medium term duration, intermittent and high reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore considered to be **low**.

Intertidal habitat IEFs

2.9.2.18 As outlined in Table 2.18, the installation of up to four export cables under the intertidal area at the landfall, via trenchless techniques, may result temporary habitat loss/disturbance associated with the movement of equipment, machinery and personnel in the intertidal.

2.9.2.19 These activities are likely to result in surface level abrasion and disturbance or compaction of sediments. The intertidal habitats present in the part of the landfall which is to be used for access were fully mapped during the site specific surveys undertaken in spring 2023. This survey found the littoral shingle with *Verrucaria maura* IEF and the littoral sand and muddy sand supporting infaunal communities IEF continued throughout this access area.

2.9.2.20 The impact on all intertidal habitat IEFs (littoral shingle with *Verrucaria maura* IEF, littoral sand and muddy sand supporting infaunal communities IEF and littoral and eulittoral rock dominated by epifaunal communities IEF) is predicted to be of local spatial extent, short to medium term duration, intermittent and high reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be **low**.

Sensitivity of the receptor

Subtidal habitat IEFs

2.9.2.21 Subtidal IEFs which are expected to be affected by temporary subtidal habitat loss/disturbance are listed in paragraph 2.9.2.3 and Table 2.13. The sensitivity of the IEFs to temporary subtidal habitat loss/disturbance are presented in Table 2.21. These sensitivities are based on assessments made by the MarESA.

2.9.2.22 The subtidal coarse and mixed sediments with diverse benthic communities IEF, which dominates the Mona Array Area, has an overall medium sensitivity to temporary habitat loss/disturbance (Table 2.21). The biotopes within this IEF generally have a low sensitivity to abrasion and penetration related disturbance because these habitats are largely characterised by infauna and although abrasion or penetration may result in damage or mortality to some epifaunal organisms' resilience is thought to be high (De-Bastos *et al*., 2023; Tillin and Watson, 2023a; Tillin and Watson, 2023b). Sensitivity to habitat structure change is generally considered to be medium. Sedimentary communities are likely to be intolerant of substratum removal, which will lead to partial or complete defaunation (Dernie *et al*., 2003). Recovery of the sedimentary habitat would occur via infilling, although some recovery of the biological assemblage may take place before the original topography is restored, if the exposed, underlying sediments are similar to those that were removed. Recovery of sediments will be site specific following activities such as sandwave clearance and will be influenced by currents, wave action and sediment availability (Desprez, 2000). The sensitivity of this IEF to heavy smothering, such as that which might result from the deposition of sandwave clearance material, is considered to be low to medium as many of the bivalves and polychaete species in this IEF are able to migrate through depositions of sediment greater than the benchmark (30 cm of fine material added to the seabed in a single discrete event) (Bijkerk, 1988; Powilleit *et al*., 2009; Maurer *et al*., 1982).

2.9.2.23 The sand and muddy sand communities with polychaetes and bivalves IEF has an overall medium sensitivity to temporary habitat loss/disturbance (Table 2.21). The biotopes within this IEF have a medium sensitivity to the removal of substratum as most of the animals that occur in these biotope are shallowly buried and extraction of the sediment will remove the biological assemblage (Tillin, 2022; Tillin *et al*., 2023a; Tillin and Rayment, 2023). Abrasive activities such as sandwave clearance are likely to damage a proportion of the characterising species of these biotopes however opportunistic species are likely to recruit rapidly in to these damaged areas allowing recovery (Tillin, 2022; Tillin *et al*., 2023a; Tillin and Rayment, 2023). The species in these biotopes are considered to be relatively tolerant of penetration and disturbance of sediment based on evidence collated from trawling studies however they also showed larger fragile species were more likely to be damaged and therefore occurred more sparsely in areas of frequent disturbance. For example Capasso *et al.* (2010) compared benthic survey datasets from 1895 and 2007 in the English Channel. The datasets showed that large, fragile urchin species and larger bivalves decreased in abundance which was primarily thought to be due to disturbance from bottom trawling. Small, mobile species such as amphipods and small errant and predatory polychaetes

(*Nephtys, Glycera, Lumbrineris*) increased (Capasso *et al*., 2010). In regard to smothering by up to 30 cm of sediment Bijkerk (1988) indicated that the maximal overburden through which small bivalves could migrate was 20– 50 cm in sand and approximately 40 cm for the species studied (*Donax* and *Tellina*). Individuals are more likely to escape from a covering similar to the sediments in which the species is found than a different type (Tillin and Watson, 2023b). As sediment arising from construction activities will be deposited close to its original location it is likely that it will be similar to the seabed sediment increasing the potential for survival and recolonisation making resilience high.

2.9.2.24 The Annex I low resemblance stony reef (outside an SAC) IEF has a medium sensitivity to habitat structure change, abrasion and penetration because damage or removal of substratum is likely to result in the removal or damage of habitat and the characterising epifaunal community attached to it. Given the sessile, erect nature of the sponges, hydroids and bryozoans, damage and mortality following a physical disturbance are likely to be adverse (Readman *et al*., 2023a). Damage from high levels of abrasion may also prevent succession and therefore habitat recovery. Freese *et al*. (1999) studied the effects of trawling on seafloor communities in the Gulf of Alaska and found recovery following this type of activity was likely to take many years due to the slow growth rates of sponges. Heavy smothering of this IEF would bury almost all characterising species resulting in mortality (Readman *et al*., 2023a). This biotope is however found in areas of moderate water movement which would eventually redistribute the sediment, improving the likelihood of recovery for this IEF. Additionally, research on the installation of cables through cobble reef habitats has been found to have a very limited spatial footprint (10 to 20 m wide) with no effect on adjacent communities (<50 m from the installed cable) (RPS, 2019).

2.9.2.25 The Constable Bank (Annex I sandbank outside an SAC) IEF has an overall medium sensitivity to temporary habitat loss/disturbance (Table 2.21). This IEF shares a biotope (SS.SSa.IFiSa.NcirBat) with the sand and muddy sand communities with polychaetes and bivalves IEF therefore also refer to paragraph 2.9.2.23 for relevant evidence regarding the sensitivity of this IEF. This IEF is sensitive to habitat structure change because most of the species that live in this habitat are shallowly buried in the sandy substrate. The removal of the top 30 cm of sediment (e.g. during sandwave clearance) is likely to remove the characterising biological assemblages of the representative biotopes. The biotopes associated with this IEF were present in mobile sands, the associated species are generally present in low abundances and adapted to frequent disturbance suggesting that resistance to surface abrasion would be high and species would be able to re-burrow following disturbance (Tillin and Garrard, 2019). Despite a lack of resistance to these pressures the resilience of these communities is assessed as high as sediment recovery will be enhanced by wave action and mobility of sand and the characterising species are likely to recover through transport of adults in the water column or migration from adjacent patches. The effects of smothering have been found to depend upon the volume and type of sediment involved however the mortality of some characterising amphipods and isopods is likely.

2.9.2.26 There are examples of activities such as aggregate dredging being consented within some designated sites based on the high resilience and recovery rates of some benthic communities. For example, Goodwin Sands MCZ is designated for its subtidal sand and coarse sediments as well as *Mytilus edulis bed* and *Sabellaria spinulosa* beds (MMO, 2016). It was determined that, for the type of species found in the Goodwin Sands study area (some of which are similar to those likely to be found at Constable Bank), recoverability is classified as high (MMO, 2016), previous research on similar features suggested “full recovery will occur but will take many months (or more likely years) but should be complete within about five years" (Hiscock *et al*., 1999). This study states there is high confidence that the ecosystem function can recover following the intensity of dredging, and that recovery was apparent after approximately five years. Aggregate dredging was consented within the Goodwins Sands MCZ as any changes to the subtidal sand feature were unlikely to be significant due to the temporal and spatially limited nature of the activity, the dynamic nature of the sandbank and the proposed measures to promote recovery of the site (MMO, 2018).

2.9.2.27 The seapens and burrowing megafauna communities IEF has an overall medium sensitivity to temporary habitat loss/disturbance (Table 2.21). In the MarESA the sensitivity to the removal of substratum is high as well as to penetration of the seabed as seapen burrows can be up to 25 - 40 cm deep therefore the extraction of the top 30 cm of sediment (the benchmark for this pressure) would result in the removal of any seapens present (Hill *et al.*, 2023). Seapens can avoid the effects of abrasive activities by retreating in to their burrows but frequent disturbance will reduce feeding time. Some species of seapen (*Funiculina quadrangularis*) cannot withdraw in to burrows and would therefore be damaged by abrasive activities. The evidence of the effect of abrasion on *Halipteris willemoesi* in Alaskan waters suggests that seapens can recover from physical abrasion but that specimens that are dislodged or fractured are likely to die, especially in the presence of predators (Malecha and Stone, 2009). Due to their burrowing lifestyle seapens are unlikely to be sensitive to the effects of smothering and have been found to recover within 72 - 96 hours after experimental smothering by pots or creels for 24 hours (Kinnear *et al*., 1996), however smothering by fine sediment could clog feeding apparatus and exclude oxygen (Hill *et al.*, 2023). Within the Mona benthic subtidal and intertidal ecology study area no seapens were observed as part of the site-specific survey, however they are not necessary to the allocation of this habitat (section 2.5.1 and Volume 2, Annex 2.1: Benthic subtidal and intertidal ecology technical report of the Environmental Statement). Given that seapens are understood to be absent from the study area (section 2.5.1), and whilst acknowledging that other burrowing megafauna may still be affected, it is considered that, in this instance, a sensitivity of medium would be appropriate (as opposed to the high sensitivity allocated to the biotope by the MarESA).

2.9.2.28 The subtidal coarse and mixed sediments with diverse benthic communities IEF is deemed to be of high to low vulnerability and high to medium recoverability and, based on assessments made by the MarESA, is of overall low to medium sensitivity to the MarESA pressures associated with temporary habitat loss/disturbance (Table 2.21). The subtidal coarse and mixed sediments with diverse benthic communities IEF is of national value and therefore a precautionary approach has been adopted to assigning the overall level of sensitivity according to Table 2.21. The sensitivity of the receptor is considered to be **medium**.

2.9.2.29 The sand and muddy sand communities with polychaetes and bivalves IEF is deemed to be of high to low vulnerability and high to medium recoverability and, based on assessments made by the MarESA, is of overall low to medium sensitivity to the MarESA pressures associated with temporary habitat loss/disturbance (Table 2.21). The sand and muddy sand communities with polychaetes and bivalves IEF is of national value and therefore a precautionary approach has been adopted to assigning the overall level of sensitivity according to Table 2.21. The sensitivity of the receptor is considered to be **medium**.

2.9.2.30 The Annex I low resemblance stony reef (outside an SAC) IEF is deemed to be of high to no vulnerability and high to low recoverability and, based on assessments made by the MarESA, is of overall medium sensitivity to not sensitive to the MarESA pressures associated with temporary habitat loss/disturbance (Table 2.21). The Annex I low resemblance stony reef (outside an SAC) IEF is of national value and therefore a precautionary approach has been adopted to assigning the overall level of sensitivity according to Table 2.21. The sensitivity of the receptor is considered to be **medium**.

2.9.2.31 The Constable Bank (Annex I sandbank outside an SAC) IEF is deemed to be of high to low vulnerability and high to medium recoverability and, based on assessments made by the MarESA, is of overall low to medium sensitivity to the MarESA pressures associated with temporary habitat loss/disturbance (Table 2.21). The Constable Bank (Annex I sandbank outside an SAC) IEF is of national value and therefore a precautionary approach has been adopted to assigning the overall level of sensitivity according to Table 2.21. The sensitivity of the receptor is considered to be **medium**.

2.9.2.32 The seapens and burrowing megafauna communities IEF is deemed to be of high to low vulnerability and high to low recoverability and, based on assessments made by the MarESA, is of overall high sensitivity to the MarESA pressures associated with temporary habitat loss/disturbance (Table 2.21). The seapens and burrowing megafauna communities IEF is of national value and therefore a precautionary approach has been adopted to assigning the overall level of sensitivity according to Table 2.21. The sensitivity of the receptor is considered to be **high** (and reduced to **medium** in the absence of seapens).

Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC

2.9.2.33 As noted in paragraph 2.9.2.15, only the habitats identified by the site specific surveys in the Mona Offshore Cable Corridor which overlaps with the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC will be affected by temporary subtidal habitat loss/disturbance associated with export cable burial. The habitats identified in the site specific survey which occur within the overlap of the Mona Offshore Cable Corridor and the SAC are the subtidal coarse and mixed sediments with diverse benthic communities IEF and the sand and muddy sand communities with polychaetes and bivalves IEF. The sensitivity of these IEFs to temporary subtidal habitat loss/disturbance is presented in Table 2.21 and discussed in paragraphs 2.9.2.21 to 2.9.2.23.

2.9.2.34 The subtidal coarse and mixed sediments with diverse benthic 2.9.2.32communities IEF (within the SAC) is deemed to be of high to low vulnerability and high to medium recoverability and, based on assessments made by the MarESA, is of overall low to medium sensitivity to the MarESA pressures associated with temporary habitat loss/disturbance (Table 2.21). The subtidal coarse and mixed sediments with diverse benthic communities IEF is of national value and therefore a precautionary approach has been adopted to assigning the overall level of sensitivity according to Table 2.21. The sensitivity of the receptor is considered to be **medium**.

2.9.2.35 The sand and muddy sand communities with polychaetes and bivalves IEF (within the SAC) is deemed to be of high to low vulnerability and high to medium recoverability and, based on assessments made by the MarESA, is of overall low to medium sensitivity to the MarESA pressures associated with temporary habitat loss/disturbance (Table 2.21). The sand and muddy sand communities with polychaetes and bivalves IEF is of national value and therefore a precautionary approach has been adopted to assigning the overall level of sensitivity according to Table 2.21. The sensitivity of the receptor is considered to be **medium**.

Intertidal habitat IEFs

2.9.2.36 The intertidal IEFs which are expected to be affected by temporary subtidal habitat disturbance are listed in paragraph 2.9.2.5 and Table 2.13. The sensitivity of the IEFs to temporary subtidal habitat loss are presented in Table 2.21.

2.9.2.37 The littoral shingle with *Verrucaria maura* IEF has an overall negligible sensitivity to temporary habitat loss/disturbance (Table 2.21). The littoral shingle with *Verrucaria maura* IEF is considered to be insensitive to effects from abrasion, penetration and smothering because this biotope is characterised by the absence of species through sediment mobility, rather than the presence of typical species. Therefore, the activities resulting in these impacts will not alter the biotopes character. *V. maur*a is crustose and closely connected to the rock so may resist abrasion and only be removed where the abrasion destroys the shingle (Tyler-Walters, 2016). As the shingle is mobile, where small areas are impacted infilling of any localised depressions is likely to be rapid following sediment redistribution by wave action (Tillin, Budd and Tyler-Walters, 2019).

2.9.2.38 The littoral sand and muddy sand supporting infaunal communities IEF has an overall high sensitivity to temporary habitat loss/disturbance (Table 2.21). The littoral sand and muddy sand supporting infaunal communities IEF has a medium sensitivity to habitat structure change as sedimentary communities are likely to be intolerant of substratum removal which may lead to defaunation. Resilience is medium if the impact is less than three times a year, as recovery is expected in 2 – 10 years based on the life cycle traits of the characterizing species (Ashley *et al.*, 2023). As noted in paragraph 2.9.2.22, recovery can occur via infilling, which will done as part of the cable installation process. This biotope is not sensitive to abrasion or penetration because the characterizing species of this biotope (e.g. *L. conchilega*) have robust, flexible tubes and may retract below the surface. They are also able to rapidly rebuild or repair tubes (Nickolaidou, 2003). These characteristics reduce exposure to this pressure and enhance recovery (McQuillan *et al*., 2023). Smothering is likely to provide different impacts for the different species characterising the biotope. *A. marina* may experience reduced abundance, whereas *M. balthica* and the polychaete *P. elegans* are likely to be able to exploit the increased nutrient input and rapidly colonize the deposited sediment. Smothering may block the siphons of some of the species which characterise this biotope resulting in mortality although some individuals may survive and sediment may be rapidly removed by tide, resulting in a lower sensitivity to this effect. Where this IEF is characterised by an absence of a biological community the sensitivity is greatly reduced as pressures such as abrasion, penetration and smothering will not affect the physical environment.

2.9.2.39 The littoral and eulittoral rock dominated by epifaunal communities IEF has an overall medium sensitivity to temporary habitat loss/disturbance (Table 2.21). The species associated with the littoral and eulittoral rock dominated by epifaunal communities IEF are epifaunal and are therefore affected by surface level abrasion. The effect varies between species for example Araujo *et al*. (2009) found that trampling negatively affected *Fucus vesiculosus* abundance however it is able to generate vegetative regrowth in response to wounding. *V. maur*a is crustose and closely connected to the rock so may resist abrasion and only be removed where the abrasion destroys the rock surface (Tyler-Walters, 2016). Whereas abrasion may directly crush and remove *S. balanoides* and *P. vulgata* (Tillin, and Hill, 2016). The effect of smothering is similarly variable, the most vulnerable biotopes were those with fucoid and *S. balanoides* and *P. vulgata* especially in sheltered conditions. Smothering would result in an inability to feed or photosynthesise which may eventually result in mortality, depending on what speed wave and tidal action can clear the sediment due to these species lacking the necessary mobility to unbury themselves.

2.9.2.40 The littoral shingle with *Verrucaria maura* IEF is deemed to be of high to low vulnerability and high recoverability and, based on assessments made by the MarESA, is of overall negligible sensitivity to the MarESA pressures associated with temporary habitat loss/disturbance (Table 2.21). The littoral shingle with *Verrucaria maura* IEF is of local value and therefore a precautionary approach has been adopted to assigning the overall level of sensitivity according to Table 2.21. The sensitivity of the receptor is considered to be **negligible**.

2.9.2.41 The littoral sand and muddy sand supporting infaunal communities IEF is deemed to be of high vulnerability and low recoverability and, based on assessments made by the MarESA, is of overall high sensitivity to the MarESA pressures associated with temporary habitat loss/disturbance (Table 2.21). The littoral sand and muddy sand supporting infaunal communities IEF is of national value and therefore a precautionary approach has been adopted to assigning the overall level of sensitivity according to Table 2.21. The sensitivity of the receptor is considered to be **high**.

2.9.2.42 The littoral and eulittoral rock dominated by epifaunal communities IEF is deemed to be of medium vulnerability and medium recoverability and, based on assessments made by the MarESA, is of overall medium sensitivity to the MarESA pressures associated with temporary habitat loss/disturbance (Table 2.21). The littoral and eulittoral rock dominated by epifaunal communities IEF is of national value and therefore a precautionary approach has been adopted to assigning the overall level of sensitivity according to Table 2.21. The sensitivity of the receptor is considered to be **medium**.

Table 2.21: Sensitivity of the benthic IEFs to temporary habitat loss/disturbance.

IEF	Representative Biotope	Sensitivity to defined MarESA pressure				Overall sensitivity (based on Table 2.16)
		Habitat structure changes – removal of substratum	Abrasion/disturbance of the surface of the substratum or seabed	Penetration or disturbance of the substratum subsurface	Smothering and siltation rate changes (heavy)	
Subtidal IEFs						
Subtidal coarse and mixed sediments with diverse benthic communities	SS.SCS.CCS	Medium	Low	Low	Medium	Medium
	SS.SMx.CMx SS.SMx.CMx.KurThyMx	Medium	Low	Low	Low	
	SS.SMx.OMx.PoVen	Medium	Low	Low	Medium	
Sand and muddy sand communities with polychaetes and bivalves	SS.SSa.CFiSa	Medium	Low	Low	Medium	Medium
	SS.SSa.IFiSa.NcirBat	Medium	Low	Low	Low	
	SS.SSa.CMuSa	Medium	Low	Low	Medium	
	SS.SSa.IMuSa.FfabMag	Medium	Low	Low	Medium	
Annex I low resemblance stony reef (outside an SAC)	CR.HCR.XFa.SpNemAdia	Medium	Medium	Medium	Low	Medium
Constable Bank (Annex I sandbank outside an SAC)	SS.SSa.IFiSa.NcirBat	Medium	Low	Low	Low	Medium
	SS.SSa.CFiSa.ApriBatPo	Medium	Low	Low	Medium	
Seapens and burrowing megafauna	SS.SMu.CFiMu.SpnMeg	High	Medium	High	Not sensitive	High (although in the absence of seapens sensitivity is considered to be Medium)

IEF	Representative Biotope	Sensitivity to defined MarESA pressure				Overall sensitivity (based on Table 2.16)
		Habitat structure changes – removal of substratum	Abrasion/disturbance of the surface of the substratum or seabed	Penetration or disturbance of the substratum subsurface	Smothering and siltation rate changes (heavy)	
Intertidal IEFs						
Littoral shingle with *Verrucaria maura*	LS.LCS.Sh.BarSh.	Medium	Not sensitive	Not sensitive	Not sensitive	Negligible
Littoral sand and muddy sand supporting infaunal communities	LS.LSa.MoSa LS.LSa.MuSa.Lan	Medium	Not sensitive	Not sensitive	Low	High
	LS.LSa.MuSa.MacAre	Medium	Medium	High	Medium	
Littoral and eulittoral rock dominated by epifaunal communities	LR.LLR.F.Fspi	Not relevant	Medium	Not relevant	Medium	Medium
	LR.FLR.Lic.Ver	Not relevant	Medium	Not relevant	Not relevant	
	LR.FLR.Eph.UlvPor	Not relevant	Low	Not relevant	Low	
	LR.HLR.MusB.Sem.LitX LR.HLR.MusB.Sem	Not relevant	Low	Not relevant	Medium	

Significance of the effect

Subtidal habitat IEFs

2.9.2.43 Overall, for the subtidal coarse and mixed sediments with diverse benthic communities IEF, sand and muddy sand communities with polychaetes and bivalves IEF, Annex I low resemblance stony reef (outside an SAC) IEF and Constable Bank (Annex I sandbank outside an SAC) IEF the magnitude of the temporary habitat disturbance/loss impact in the construction phase is deemed to be low and the sensitivity of the receptor is considered to be medium. The effect will, therefore, be of **minor** adverse significance, which is not significant in EIA terms.

2.9.2.44 Overall, for the seapens and burrowing megafauna communities IEF the magnitude of the temporary habitat disturbance/loss impact in the construction phase is deemed to be low and the sensitivity of the receptor is considered to be high (and reduced to medium in the absence of seapens). The effect will, therefore, be of **minor** adverse significance, which is not significant in EIA terms.

Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC

2.9.2.45 Overall, for the subtidal coarse and mixed sediments with diverse benthic communities IEF (within the SAC) and sand and muddy sand communities with polychaetes and bivalves IEF (within the SAC) the magnitude of the temporary habitat disturbance/loss impact in the construction phase is deemed to be low and the sensitivity of the receptor is considered to be medium. The effect will, therefore, be of **minor** adverse significance, which is not significant in EIA terms.

Intertidal habitat IEFs

2.9.2.46 Overall, for the littoral shingle with *Verrucaria maura* IEF the magnitude of the temporary habitat disturbance/loss impact in the construction phase is deemed to be low and the sensitivity of the receptor is considered to be negligible. The effect will, therefore, be of **minor** adverse significance, which is not significant in EIA terms. This conclusion has been made based on the medium-term duration of the impact and the high likelihood of recovery of this community and the small scale of the works within the intertidal zone.

2.9.2.47 Overall, for the littoral sand and muddy sand supporting infaunal communities IEF the magnitude of the temporary habitat disturbance/loss impact in the construction phase is deemed to be low and the sensitivity of the receptor is considered to be high. The effect will, therefore, be of **minor** adverse significance, which is not significant in EIA terms. This conclusion has been reached based on the small scale of the works within the intertidal zone.

2.9.2.48 Overall, for the littoral and eulittoral rock dominated by epifaunal communities IEF the magnitude of the temporary habitat disturbance/loss impact in the construction phase is deemed to be low and the sensitivity of the receptor is considered to be medium. The effect will, therefore, be of **minor** adverse significance, which is not significant in EIA terms.

Operations and maintenance phase

Magnitude of impact

Subtidal habitat IEFs

2.9.2.49 Maintenance activities within the Mona Array Area and Mona Offshore Cable Corridor (i.e. jack-ups associated with maintenance at wind turbines and OSPs and cable repair/reburial events) will result in temporary habitat disturbance. There may also be disturbance associated with the movement of anchor chains associated with buoys that may be deployed within the Mona Array Area.

2.9.2.50 The MDS accounts for up to 17,402,800 m^2 of temporary habitat disturbance within this phase (Table 2.18). This equates to a small proportion (1.36%) of the Mona benthic subtidal and intertidal ecology study area. It should also be noted that only a small proportion of the total temporary habitat loss/disturbance is likely to occur at any one time over the 35 year operational lifetime.

2.9.2.51 The potential impacts of jack-up vessel activities will be similar to those identified for the construction phase and will be spatially restricted to the immediate area around the foundations, where the spud cans are placed on the seabed, with recovery occurring following removal of spud cans. The spatial extent of this potential impact is small in relation to the total Mona benthic subtidal and intertidal ecology study area, although there is the potential for repeat disturbance to the habitats in the immediate vicinity of the foundations because of these activities. Repeat disturbance may also result from the movement of anchor chains for buoys on the seabed as they are likely to be present throughout the operations and maintenance phase, however this will only affect a small area in the immediate vicinity of a limited number of buoys. The repair and reburial of inter-array, OSP interconnector and export cables will also affect benthic habitats in the immediate vicinity of these operations, with potential effects on seabed habitats and associated benthic communities expected to be similar to the construction phase.

2.9.2.52 Cable repair and reburial may also be required for the offshore export cables which are installed within Constable Bank. As the length of cable expected to occur within Constable Bank (19.72 km) is greater than the total length of offshore export cables assumed by the MDS to require repair and reburial per year the MDS for impacts to Constable Bank, therefore, assumes that the full amount of temporary habitat disturbance, per repair/reburial event, which may occur along the Mona Offshore Cable Corridor as a result of offshore export cable maintenance could occur within Constable Bank (Table 2.18). The MDS assumes the repair of up to 16 km (i.e. four cables each with a length of 4 km) of subtidal export cable in each repair event and the reburial of up to 15 km of subtidal export cable in each reburial event, with a disturbance width of 20 m. This could result in up to 320,00 m^2 of temporary habitat disturbance within the Constable Bank per repair event (0.92% of the total area of Constable Bank) and up to 300,000 m^2 of temporary habitat disturbance per reburial event (0.86% of the total area of Constable Bank). Over the 35 year operational lifetime of the Mona Offshore Wind Project there may be repeat habitat disturbance up to twice every five years for repair events and once every five years for reburial events, although it is anticipated that the communities will recover between these maintenance events. This approach is considered highly precautionary as repair and reburial could occur at any location along the 360 km of the export cable, and it is highly unlikely all of this will occur within Constable Bank.

2.9.2.53 The impact is predicted to be of local spatial extent, short term duration (i.e. individual maintenance activities would likely occur over a period of days to weeks, over the lifetime of the Mona Offshore Wind Project), intermittent and high reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be **negligible.**

Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC

2.9.2.54 As outlined in paragraph 2.5.3.3, no designated features of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC were recorded during the site specific surveys in the area of overlap with the Mona Offshore Cable Corridor. None of the designated features of the SAC will be affected by temporary habitat loss/disturbance and they have not been assessed in relation to this potential impact. However the magnitude of the potential impact on the subtidal habitat IEFs identified in the area of overlap with the SAC (i.e. subtidal coarse and mixed sediments with diverse benthic communities IEF and the sand and muddy sand communities with polychaetes and bivalves IEF) is assessed.

2.9.2.55 The Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC overlaps with the Mona Offshore Cable Corridor and therefore some temporary habitat disturbance may occur within the SAC during the operations and maintenance phase (although not within any designated feature of the SAC). The overall figures for the spatial overlap are outlined in paragraph 2.9.2.15. In the operations and maintenance phase, the MDS assumes the repair and/or reburial of up to 8.1 km of subtidal export cable per repair/reburial event (assuming all four cables are repair/reburied), with a disturbance width of 20 m. This may result in the temporary habitat disturbance of up to 0.162 km^2 per repair/reburial event (each event equating to 0.06% of the SAC). Over the 35 year operational lifetime of the Mona Offshore Wind Project there may be repeat habitat disturbance twice every five years per export cable for repair events and once every five years for reburial events. It is, however, anticipated that the communities will recover between these maintenance events. This approach is considered highly precautionary as only 16 km of the total 360 km of offshore export cables are expected to require repair every five years and only 15 km of all offshore export cables will require reburial every five years therefore the actual extent of repair/reburial in the SAC is likely to be much less than assessed, if any is required at all.

2.9.2.56 The impact on subtidal coarse and mixed sediments with diverse benthic communities IEF (within the SAC) and the sand and muddy sand communities with polychaetes and bivalves IEF (within the SAC) is predicted to be of local spatial extent, short term duration (i.e. individual maintenance activities would likely occur over a period of days to weeks, over the lifetime of the Mona Offshore Wind Project), intermittent and high reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be **negligible**.

Intertidal habitat IEFs

2.9.2.57 No maintenance works will be undertaken in the intertidal zone during the operations and maintenance phase of the Mona Offshore Wind Project therefore no assessment regarding temporary habitat disturbance/loss of the intertidal IEFs is required.

Sensitivity of receptor

Subtidal habitat IEFs

2.9.2.58 The sensitivity of the IEFs is as described previously for the construction phase assessment in paragraph 2.9.2.21 to 2.9.2.32 and above in Table 2.21.

2.9.2.59 The subtidal coarse and mixed sediments with diverse benthic communities IEF, sand and muddy sand communities with polychaetes and bivalves IEF and Constable Bank (Annex I sandbank outside an SAC) IEF are deemed to be of medium vulnerability, medium recoverability and national value. The sensitivity of the receptor is therefore, considered to be **medium**.

2.9.2.60 The seapens and burrowing megafauna habitat IEF are deemed to be of medium vulnerability, medium recoverability and national value. The sensitivity of the receptor is therefore, considered to be **high** (and reduced to **medium** in the absence of seapens).

Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC

2.9.2.61 As noted in paragraph 2.9.2.15, only the habitats identified by the site specific surveys in the Mona Offshore Cable Corridor which overlaps with the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC will be affected by temporary subtidal habitat loss/disturbance associated with export cable burial. The habitats identified in the site specific survey which occur within the overlap of the Mona Offshore Cable Corridor and the SAC are the subtidal coarse and mixed sediments with diverse benthic communities IEF and the sand and muddy sand communities with polychaetes and bivalves IEF. The sensitivity of these IEFs to temporary subtidal habitat loss/disturbance is presented in paragraphs 2.9.2.22 to 2.9.2.23 and above in Table 2.21.

2.9.2.62 The subtidal coarse and mixed sediments with diverse benthic communities IEF (within the SAC) and sand and muddy sand communities with polychaetes and bivalves IEF (within the SAC) are deemed to be of medium vulnerability, medium recoverability and national value. The sensitivity of the receptor is therefore, considered to be **medium**.

Significance of effect

Subtidal habitat IEFs

2.9.2.63 Overall, for the subtidal coarse and mixed sediments with diverse benthic communities IEF, sand and muddy sand communities with polychaetes and bivalves IEF and Constable Bank (Annex I sandbank outside an SAC) IEF the magnitude of the temporary habitat disturbance impact in the operations and maintenance phase is deemed to be negligible and the sensitivity of the receptor is considered to be medium. The effect will, therefore, be of **minor** adverse significance, which is not significant in EIA terms. This conclusion has been concluded based on the small scale of the activities in this phase and high likelihood of recovery.

2.9.2.64 Overall, for the seapens and burrowing megafauna communities IEF the magnitude of the temporary habitat disturbance impact in the operations and maintenance phase is deemed to be negligible and the sensitivity of the receptor is considered to be high (and reduced to medium in the absence of seapens). The effect will, therefore, be of **minor** adverse significance, which is not significant in EIA terms. This conclusion has been concluded based on the small scale of the activities in this phase and high likelihood of recovery.

Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC

2.9.2.65 Overall, for the subtidal coarse and mixed sediments with diverse benthic communities IEF (within the SAC) and sand and muddy sand communities with polychaetes and bivalves IEF (within the SAC) the magnitude of the temporary habitat disturbance impact in the operations and maintenance phase is deemed to be negligible and the sensitivity of the receptor is considered to be medium. The effect will, therefore, be of **minor** adverse significance, which is not significant in EIA terms. This conclusion has been concluded based on the small scale of the activities in this phase and high likelihood of recovery.

Decommissioning phase

Magnitude of impact

2.9.2.66 The MDS for the decommissioning phase assumes that all foundations and cables will be removed and that the decommissioning sequence will generally be a reverse of the construction sequence.

Subtidal habitat IEFs

2.9.2.67 The extent of temporary habitat disturbance to subtidal habitat IEFs that may occur as a result of decommissioning activities is predicted to be in line with that described for the construction phase in paragraph 2.9.2.6 to 2.9.2.13 (i.e. up to 60,512,833 m^2). On the basis that there will be no requirement for sandwave clearance or pre-lay preparation during decommissioning, the magnitude of the impact is, however, likely to be lower than during construction.

2.9.2.68 The impact on subtidal coarse and mixed sediments with diverse benthic communities IEF and the sand and muddy sand communities with polychaetes and bivalves IEF, Annex I low resemblance stony reef (outside an SAC) IEF, Constable Bank (Annex I sandbank outside an SAC) IEF and seapens and burrowing megafauna communities IEF is predicted to be of local spatial extent, short to medium term duration, intermittent and high reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore considered to be **low**.

Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC

2.9.2.69 As outlined in paragraph 2.5.3.3, none of the designated features of the SAC will be affected by temporary habitat loss/disturbance and have not been assessed in relation to this potential impact. However the magnitude of the potential impact on the subtidal habitat IEFs identified in the area of overlap with the SAC (i.e. subtidal coarse and mixed sediments with diverse benthic communities IEF and the sand and muddy sand communities with polychaetes and bivalves IEF) is assessed. In the decommissioning phase only cable removal will be undertaken in the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC which may result in up to 0.162 km^2 of temporary habitat loss/disturbance within the SAC equating to 0.06% of the total area of the SAC.

2.9.2.70 The extent of temporary habitat disturbance to subtidal habitat IEFs within the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC that may occur as a result of decommissioning activities is predicted to be in line with that described for the construction phase.

2.9.2.71 The impact on subtidal coarse and mixed sediments with diverse benthic communities IEF (within the SAC) and the sand and muddy sand communities with polychaetes and bivalves IEF (within the SAC) is predicted to be of local spatial extent, short to medium term duration, intermittent and high reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore considered to be **low**.

Intertidal habitat IEFs

2.9.2.72 As outlined in Table 2.18, the MDS assumes that offshore export cables would be removed up to the exit pits (below MHWS) for cables installed under the intertidal via trenchless techniques. As such, some equipment, machinery and personnel movements may be required at the Mona landfall which may result in similar levels of temporary habitat disturbance as during the construction phase.

2.9.2.73 The impact on all intertidal habitat IEFs (littoral shingle with *Verrucaria maura* IEF, littoral sand and muddy sand supporting infaunal communities IEF and littoral and eulittoral rock dominated by epifaunal communities IEF) is predicted to be of local spatial extent, short to medium term duration, intermittent and high reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be **low**.

Sensitivity of receptor

Subtidal habitat IEFs

2.9.2.74 The sensitivity of the subtidal habitat IEFs is as described previously for the construction phase assessment in paragraph 2.9.2.21 to 2.9.2.32 and above in Table 2.21.

2.9.2.75 The subtidal coarse and mixed sediments with diverse benthic communities IEF, sand and muddy sand communities with polychaetes and bivalves IEF, Annex I low resemblance stony reef (outside an SAC) IEF and Constable Bank (Annex I sandbank outside an SAC) IEF is deemed to be of medium vulnerability, medium recoverability and national value. The sensitivity of the receptor is therefore, considered to be **medium**.

2.9.2.76 The seapens and burrowing megafauna communities IEF is deemed to be of medium vulnerability, medium recoverability and national value. The sensitivity of the receptor is therefore, considered to be **high** (and reduced to **medium** in the absence of seapens).

Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC

2.9.2.77 The sensitivity of the relevant IEFs (subtidal coarse and mixed sediments with diverse benthic communities IEF and the sand and muddy sand communities with polychaetes and bivalves IEF) is as described previously for the construction phase assessment in paragraphs 2.9.2.22 to 2.9.2.23 and above in Table 2.21.

2.9.2.78 The subtidal coarse and mixed sediments with diverse benthic communities IEF (within the SAC) and sand and muddy sand communities with polychaetes and bivalves IEF (within the SAC) is deemed to be of medium vulnerability, medium recoverability and national value. The sensitivity of the receptor is therefore, considered to be **medium**.

Intertidal habitat IEFs

2.9.2.79 The sensitivity of the intertidal IEFs is as described previously for the construction phase assessment in paragraph 2.9.2.36 to 2.9.2.39 and above in Table 2.21.

2.9.2.80 The littoral shingle with *Verrucaria maura* IEF is deemed to be of low vulnerability, medium recoverability and local value. The sensitivity of the receptor is therefore, considered to be **negligible**.

2.9.2.81 The Littoral sand and muddy sand supporting infaunal communities IEF is deemed to be of high vulnerability, low recoverability and national value. The sensitivity of the receptor is therefore, considered to be **high**.

2.9.2.82 The littoral and eulittoral rock dominated by epifaunal communities IEF are deemed to be of medium vulnerability, medium recoverability and national value. The sensitivity of the receptor is therefore, considered to be **medium**.

Significance of effect

Subtidal habitat IEFs

2.9.2.83 Overall, for the subtidal coarse and mixed sediments with diverse benthic communities IEF, the sand and muddy sand communities with polychaetes and bivalves IEF, Annex I low resemblance stony reef (outside an SAC) IEF and Constable Bank (Annex I sandbank outside an SAC) IEF the magnitude of the temporary habitat disturbance/loss impact in the decommissioning phase is deemed to be low and the sensitivity of the receptor is considered to be medium. The effect will, therefore, be of **minor** adverse significance, which is not significant in EIA terms.

2.9.2.84 Overall, for the seapens and burrowing megafauna communities IEF the magnitude of the temporary habitat disturbance/loss impact in the decommissioning phase is deemed to be low and the sensitivity of the receptor is considered to be high (and reduced to medium in the absence of seapens). The effect will, therefore, be of **minor** adverse significance, which is not significant in EIA terms.

Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC

2.9.2.85 Overall, for the subtidal coarse and mixed sediments with diverse benthic communities IEF (within the SAC) and the sand and muddy sand communities with polychaetes and bivalves IEF (within the SAC) the magnitude of the temporary habitat disturbance/loss impact in the decommissioning phase is deemed to be low and the sensitivity of the receptor is considered to be medium. The effect will, therefore, be of **minor** adverse significance, which is not significant in EIA terms.

Intertidal habitat IEFs

2.9.2.86 Overall, for the littoral shingle with *Verrucaria maura* IEF the magnitude of the impact is deemed to be low and the sensitivity of the receptor is considered to be negligible. The effect will, therefore, be of **minor** adverse significance, which is not significant in EIA terms. This conclusion has been made based on the medium-term duration of the impact and the high likelihood of recovery of this community.

2.9.2.87 Overall, for the littoral sand and muddy sand supporting infaunal communities IEF the magnitude of the temporary habitat disturbance/loss impact in the construction phase is deemed to be low and the sensitivity of the receptor is considered to be high. The effect will, therefore, be of **minor** adverse significance, which is not significant in EIA terms. This conclusion has been made based on the medium-term duration of the impact and the high likelihood of recovery of this community.

2.9.2.88 Overall, for the littoral and eulittoral rock dominated by epifaunal communities IEF the magnitude of the impact is deemed to be low and the sensitivity of the receptor is considered to be medium. The effect will, therefore, be of **minor** adverse significance, which is not significant in EIA terms.

2.9.3 Increase in suspended sediment concentrations and associated deposition

2.9.3.1 Increases of SSC and associated deposition are predicted to occur during the construction and decommissioning phases as a result of the installation/removal of foundations, sandwave clearance activities and the installation of inter-array, interconnector, and export cables. Increases in suspended sediments and associated sediment deposition are also predicted to occur during the operations and maintenance phase due to inter-array, OSP interconnector, and export cable repair and reburial events. Volume 6, Annex 1.1: Physical processes technical report of the Environmental Statement provides a full description of the physical assessment, including numerical modelling used to inform the predictions made with respect to increases in suspended sediment and subsequent deposition.

2.9.3.2 The benchmarks for the relevant MarESA pressures which have been used to inform this impact assessment are described here.

- Changes in suspended solids (water clarity): the benchmark for which is a change in one rank on the WFD scale (e.g. from clear to intermediate for one year, caused by activities disturbing sediment or organic particulate material and mobilising it into the water column such as dredging, disposal at sea, cable and pipeline burial)
- Smothering and siltation rate changes (light): the benchmark for light deposition is up to 5 cm of fine material added to the habitat in a single discrete event.

2.9.3.3 These pressures correspond to the impacts associated with sandwave clearance, the installation of foundations for wind turbines and OSPs via drilling and the installation of cables (export, inter-array and interconnector) by trenching.

2.9.3.4 With regards to background SSC, the Cefas Climatology Report 2016 (Cefas, 2016) and associated dataset provides the spatial distribution of average non-algal Suspended Particulate Matter (SPM) for the majority of the UK Continental Shelf. Between 1998 and 2005, the greatest plumes are associated with large rivers such as those that discharge into the Thames Estuary, The Wash and Liverpool Bay, which show mean values of SPM above 30 mg/l. Based on the data provided within this study, the SPM associated with the Mona Offshore Wind Project has been estimated as approximately 0.9 mg/l – 3 mg/l over 1998 – 005.

2.9.3.5 Seabed preparation activities (e.g. sandwave and boulder, debris clearance and out of service cable removal) will occur in advance of installation of the offshore cables. Pre-lay ploughed material will be disposed of within the Mona Array Area and Mona Offshore Cable Corridor, whilst any debris will be taken ashore for disposal.

2.9.3.6 The subtidal IEFs that have the potential to be affected by increases in SSC and associated deposition across all phases of the Mona Offshore Wind Project are those present within the Mona Array Area and Mona Offshore Cable Corridor (i.e. subtidal coarse and mixed sediments with diverse benthic communities IEF, mixed sediments dominated by brittlestars IEF, sand and muddy sand communities with polychaetes and bivalves IEF, Annex I low resemblance stony reef (outside an SAC) IEF, Constable Bank (Annex I sandbank outside an SAC) IEF and seapens and burrowing megafauna communities IEF) (see Table 2.20).

2.9.3.7 The Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC overlaps with the Mona Offshore Cable Corridor for the Mona Offshore Wind Project and therefore some increases in SSC and associated deposition may occur within the SAC. This includes the potential impact on the designated features of the SAC which all lie outside the overlap with the Mona Offshore Cable Corridor (i.e. Annex I sandbank IEF, Annex I subtidal reefs IEF and Annex I intertidal reefs IEF of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC), as outlined in paragraph 2.5.3.3 and illustrated in Figure 2.9. The magnitude of the potential impact of increases in SSC and associated deposition on the subtidal habitat IEFs identified in the area of overlap with the SAC (i.e. subtidal coarse and mixed sediments with diverse benthic communities IEF and the sand and muddy sand communities with polychaetes and bivalves IEF) is assessed across all phases of the Mona Offshore Wind Project.

2.9.3.8 The intertidal IEFs that have the potential to be affected by increases in SSC and associated deposition are those present at the landfall (i.e. littoral shingle with *Verrucaria maura* IEF, littoral sand and muddy sand supporting infaunal communities IEF, clay with piddocks IEF and littoral and eulittoral rock dominated by epifaunal communities IEF, *Sabellaria alveolata* reef IEF and the *Mytilus edulis bed* IEF) (see Table 2.20).

Construction phase

Magnitude of impact

Subtidal habitat IEFs

2.9.3.9 Full details of the modelling undertaken to inform this assessment including relevant figures are presented in Volume 6, Annex 1.1: Physical processes technical report of the Environmental Statement, including the individual scenarios considered and assumptions within these and full modelling outputs for suspended sediments and associated sediment deposition. For the purposes of this assessment, the following activities have been considered (see Table 2.18):

- Seabed preparation (sandwave, boulder and debris clearance)
- Drilling for foundation installation
- Installation of inter-array, interconnector, and export cables
- Cable installation (using trenchless techniques) breakout and release of bentonite.

2.9.3.10 Sandwave clearance may be required at up to 50% of the potential locations for suction bucket foundations and both sandwave clearance and dredging may be required for the installation of gravity base foundations. For the largest conical gravity bases the maximum dredging area per foundation may be 32,761 m^2 whilst the average area is 14,641 m^2, similarly the maximum dredging depth may be 10 m with an average depth of 3 m. It is proposed that a small proportion of the dredged material from site preparation, 7,000 m^3 per foundation, is to be sequestered as ballast within the gravity base foundation with a maximum total volume of 490,000 m^3. Within the Mona Array Area the seabed sediment is comprised largely of medium to coarse sand and is therefore suited to augment with rock infill to provide ballast. This material typically represents a depth of *circa* 95 cm below the slab foundation and scour protection extent and <8% of the seabed preparation volume. At the site of each of the largest wind turbine gravity base foundation an average of 41,337 m^3 of gravel may be placed to underlie the installation. Therefore, although this material will be removed from the sediment budget, the sediment in question represents a smaller volume than that occupied by the gravity base foundation within the seabed and the installation processes will not result in a void which could potentially interrupt transport processes by intercepting sediment.

2.9.3.11 For cable installation, sandwaves will be reduced in height in order to allow passage of the burial tool to enable cable burial to a sufficient target depth. As outlined in Table 2.18, site clearance activities may be undertaken using a range of techniques. The MDS for sandwave clearance was along 163 km length of the inter array cables and width of 80 m, to an average depth of 3 m. Similarly, sandwave clearance at the same depth and width was determined along the interconnector cables (30 km). For the export cables the clearance length was 72 km with a 40 m width of clearance. Sandwave clearance on Constable Bank will be minimised by restricting any sandwave clearance to within the swept path width (20 m) of the cable burial tool. The use of a suction hopper dredger will result in the greatest increase in suspended sediment and largest plume extent as material is released near the water surface during the disposal of material. A plough dredger would mobilise a much smaller amount of sediment into suspension at the seabed and have a reduced sediment plume concentrations and extents compared to other types of dredgers. The modelling simulated the use of a suction hopper dredger with a phasing representative of the scale of the sandwaves; dredging, and then depositing material within the Mona Offshore Cable Corridor as it progressed along the route, resulting in higher quantification of sedimentation compared to the plough dredging. It should be noted that when undertaking sandwave clearance the material will be sidecast to a location adjacent to the sandwave clearance to allow this material to be available for migration and sandwave recovery. At the site of gravity base foundations a proportion of the dredged volume removed to place the foundation will be used as ballast. This volume is less than the volume of the bed occupied by the installed foundation.

2.9.3.12 The dredging phase plumes (<50 mg/l) are predicted to be smaller than the plumes generated during the dumping phase (1,000 mg/l). The plume however is expected to be most extensive when the deposited material is redistributed on the successive tides with average levels of <500 mg/l in the Mona Array Area. Sedimentation of deposited material in the Mona Offshore Cable Corridor is focussed within 100 m of the site of release with a maximum depth of 0.5-1 m, whilst the finer sediment fractions are distributed in the vicinity at much smaller depths of 5-10 mm. The dispersion of the released material is predicted to continue on successive tides. The average sedimentation depth in the Mona Array Area is similar in form to that of the Mona Offshore Cable Corridor works. Sedimentation one day following the cessation of the clearance operation results in deposited material at the site of release with depth 1 m whilst in the locality lower depths, typically <30 mm, are present at 100 m distance from the release with the formation of sandwaves being visible. At the site of gravity base foundations a proportion of the dredged volume removed to place the foundation will be used as ballast. This volume is less than the volume of the bed occupied by the installed foundation but will marginally reduce the release of material during the disposal phase of the operation.

2.9.3.13 The modelled scenarios for foundation installation examined a range of locations within and in close proximity to the Mona Array Area, with two concurrent drilling operations at adjacent locations. The modelled scenarios examined drilling of larger 16 m diameter piles at a similar drilling rate. Modelling of suspended sediments associated with foundation installation (showed in Volume 2, Chapter 1: Physical processes of the Environmental Statement) in the northeast of the Mona Array Area found an average concentration of <10 mg/l at the modelled site with concentration reducing rapidly with distance from the two discharge locations. Where the plumes converge concentrations of suspended sediment are <1 mg/l above background levels. In the southeast of the site the stronger currents and finer material means that a greater proportion of the material will be suspended. The peak concentrations for the installation and up to three days later in the southeast of the Mona Array Area are approximately 50 mg/l and average values are typically less than one fifth of this magnitude. In the central north of the site average sediment concentrations are <50 mg/l where the plumes coalesce. This is similar to the unmerged values as the plumes are travelling in concert with the tide (and not towards one another) and at the point that the plume reaches the adjacent discharge it is highly dispersed. During drilling for foundation installation the sediment plumes in the northeast of the site are predicted to extend to a distance of approximately 14 km (east to west) with the SSC of the majority of the plume between 30 mg/l and 1 mg/l. In the southeast this extends to approximately 22 km (east to west) with the SSC of the majority of the plume between 50 mg/l and 10 mg/l and approximately 21 km (east to west) in the central north of the site where currents with the SSC of the majority of the plume between 50 mg/l and 1 mg/l.

2.9.3.14 Within the northeast of the Mona Array Area, following foundation installation, sediment was expected to be deposited on the slack tide and then subsequently re-suspended in to the water column. The plume concentration associated with this resuspension was <10 mg/l and reduces with the distance from the site as the sediment is dispersed. In the southeast of the Mona Array Area material is also predicted to settle out on the slack tide and be re-suspended with increasing current speed. In the central north of the Mona Array Area three days after the cessation of installation sediment concentrations are reduced with decreased current speeds on slack tides and mobilise settled material as speed increase through the tidal cycle, settled material is mobilised and concentration increase once again. Under these circumstances peak concentrations are <30 mg/l and average values are typically one tenth of this value, with the peaks centred on areas of remobilised material.

2.9.3.15 In the northeast of the Mona Array Area it is evident that the greatest sedimentation depths occur at the drilling site itself with very localised values circa 300 mm. This corresponds with the immediate settlement of coarser material fractions, the lower neap current speed and also for the portion of work undertaken on slack tide. The coarser material is predicted to remain at the drill site whilst the finer sand fraction will migrate to the east on the residual current albeit with deposition depths <1mm due to the limited volume of material released. The highly dispersive nature of spring tidal currents coupled with the finer material in the southeast of the Mona Array Area results in the material being dispersed to the east further following the end of the operation. The resulting sedimentation depths are typically <0.1 mm from the two drilling operations and demonstrates that this settlement would be imperceptible from the background sediment transport activity. As with the northeast of the Mona Array Area, the coarser material in the central north of the Mona Array Area is retained at the site of the operation with a similar maximum sedimentation depth of 300 mm. However, the material carried to the east on the residual current is circa twice the depth of northeast location at 3 mm. Once again, the formulation of sand ripples is evident. As noted previously, this is native material from the sediment cells and would be entrained into the baseline sediment transport patterns. The distribution of sedimentation one day following cessation of installation in the northeast covered approximately 23 km the majority of which was predicted to be <1 mm. The area impacted by sedimentation extended to approximately 30 km in the central north the majority of which is predicted to experience sedimentation of <5 mm. Whereas in the southeast the distribution of sedimentation was spread over a distance of 16 km but was very patchy which is probably the result of the quick redistribution of sediment by currents the majority of which was predicted to experience <0.1 mm of sedimentation which would be imperceptible from the background sediment transport activity.

2.9.3.16 For the inter-array cable installation, peak plume concentrations are highest at around 500 mg/l (at the release site) with the sediment settling during slack water becoming resuspended in the form of an amalgamated plume. Sedimentation of 30 mm occurs at the trench site, with sediment thickness reducing moving away from the trench but remaining in the sediment cell and retained in the sediment transport system. The greatest area of increased SSC, extending a tidal excursion circa 20 km from the site, is associated with re-mobilisation of the deposited material on subsequent tides. SSC associated with this event range between 1,000 mg/l – 0.3 mg/l.

2.9.3.17 Following the completion of the works for the installation of inter-array cables the turbidity levels return to baseline within a couple of tidal cycles. It would however be anticipated that spring tides following the works may mobilise and redistribute unconsolidated seabed material deposited at the end of the construction phase; this material will therefore be incorporated into the existing transport regime. Following installation, the native seabed material settles close to where it is mobilised and remains in-situ. This would be expected as the baseline modelling indicated that sediment transport potential is limited across the offshore wind farm area. The sedimentation is concentrated along the installation route as material effectively returns to the site from where it was disturbed. Sedimentation thickness of <30 mm arise beyond the immediate vicinity of the trench the day after drilling cessation and therefore would be indiscernible from the existing seabed sediment.

2.9.3.18 For the installation of offshore export cables, the SSC along the route range between 50 and 1,000 mg/l where the greatest levels are located at the source of the sediment release in the shallowest water. The modelling outputs predicted average SSC of <300 mg/l are predicted along the cable path, with the level dropping to background levels on the slack tide. Tidal patterns indicate that although the released material migrates both east and west by settling and being re-suspended on successive tides, the sedimentation level is small typically <0.5 mm and the greatest levels of deposition occur along the trenching route as coarser material settles. The modelling of offshore cable installation from the Mona Array Area to the nearshore region was undertaken with tidal forcing. In nearshore regions the tidal flows are oriented parallel to the coastline and the plume did not encroach on the shoreline. This would therefore also be the case for any seabed preparation activities. Under the additional influence of wind and wave driven currents the plume may be driven towards the shoreline when installation is taking place inshore of the Constable Bank and during ebb tides. Winds from this sector typically have a 6% occurrence and waves are fetch limited. Additionally, the influence of wind and wave action perpendicular to tidal flow will also increase dispersion and reduce SSC and any related deposition to levels indiscernible from background levels. The suspended sediment plume envelope for the export cable installation has a width of circa 20 km which corresponds with the tidal excursion. The maximum SSC during the dredging phase of the export cable installation was predicted to be 30 mg/l.

2.9.3.19 The application of trenchless techniques for the landfall installation of export cables under the intertidal area from below MLWS, where the exit pits will be located, to onshore means that open-cut trenching activities will not take place within the intertidal region. There is however the potential for the release of bentonite from trenchless techniques in the nearshore. Bentonite is an inert water-based drilling mud which will only be released if a long drill is used and the volume of bentonite release from trenchless techniques punch out will be controlled and will be limited depending on the method adopted for conduit insertion. On the basis of previous experience, these quantities will be limited. This controlled bentonite release will occur during the punch out for each drill shot, so this is limited to four occasions, one per drill shot, and over a short duration with an indicative period of up to 12 hours per location. Discharge quantities will, however, vary through the period, with the bulk of the material lost on the initial punch out. Uncontrolled release may occur in the form of a frac out, where bentonite may blead through fissures within the bedrock/overburden during the installation of cables via trenchless techniques. The risk of this happening is managed and controlled and is considered as part of the trenchless techniques design. The Outline Landfall construction method statement (Document Reference J26.14) will define the details and appropriate remedial measures as per the selected methodology. As such, control measures will be in place to limit the risk and volume of bentonite released via frac outs.

2.9.3.20 The modelled trenching for the nearshore assumed silt fractions of at least 10% so the plume sizes discussed in detail in paragraph 2.9.3.27 are, therefore, also applicable for predicting the likely dispersion of bentonite.

2.9.3.21 The impact is predicted to be of local spatial extent, medium term duration (i.e. construction phase of up to four years, although at any one time only a small proportion of activities resulting in this impact will occur), intermittent and medium reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore considered to be **low**.

Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC

2.9.3.22 As outlined in paragraph 2.5.3.3, no designated features of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC were recorded during the site specific surveys in the area of overlap with the Mona Offshore Cable Corridor. However as the sediment plumes can migrate beyond the Mona Offshore Cable Corridor the designated features of the SAC have been assessed in relation to this potential impact. The magnitude of the change in environmental condition due to the potential impact of increased SSC and associated sediment deposition is the same as described for the sandwave clearance and cable installation for the Mona Offshore Cable Corridor outside the SAC. Detail on the magnitude of this potential impact from these activities is detailed in paragraphs 2.9.3.10 and 2.9.3.18. As outlined in Table 2.19, a measure has been adopted as part of the Mona Offshore Wind Project that does not permit sandwave clearance within the Menai Strait and Conwy Bay SAC.

2.9.3.23 The modelling of export cable installation from the Mona Array Area to the nearshore region was undertaken with tidal forcing. In nearshore regions the tidal flows are oriented parallel to the coastline and the plume is not predicted to encroach on the shoreline and the Menai Strait and Conwy Bay SAC features. This would therefore also be the case for any seabed preparation activities. Under the additional influence of wind and wave driven currents the plume may be driven towards the shoreline when installation is taking place both inshore of the Constable Bank and during ebb tides. However, it is noted that in the case of the Menai Strait and Conwy Bay SAC features the principal wind direction would need to be from the northeast. Winds from this sector typically have a 6% occurrence and waves are fetch limited. Additionally, the influence of wind and wave action perpendicular to tidal flow will also increase dispersion and reduce SSC and any related deposition to levels indiscernible from background levels.

2.9.3.24 The impact within the intertidal zone of the SAC is likely to be reduced compared to the subtidal zone as it is further from the Mona Offshore Cable Corridor (based on Figure 2.9 the nearest subtidal feature is ~1.4 km away from the Mona Offshore Cable Corridor and the nearest intertidal feature is ~2.4 km away). Volume 2, Chapter 1: Physical processes of the Environmental Statement details that due to the nature of the tidal flow mobilised sediment is carried offshore and does not accumulate along the coastline.

2.9.3.25 The impact on the subtidal habitats and designated features of the SAC (i.e. Annex I sandbanks and Annex I subtidal reef). Is predicted to be of local spatial extent, short to medium term duration (i.e. construction phase of up to four years, although at any one time only a small proportion of activities resulting in this impact will occur), intermittent and medium reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore considered to be **low**.

2.9.3.26 The impact on the intertidal designated features of the SAC (i.e. Annex I intertidal reef) is predicted to be of local spatial extent, short to medium term duration (i.e. construction phase of up to four years, although at any one time only a small proportion of activities resulting in this impact will occur), intermittent and high reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore considered to be **negligible**.

Intertidal habitat IEFs

2.9.3.27 Modelling related to the installation of offshore export cables in the intertidal zone was also undertaken (Volume 2, Chapter 1: Physical processes of the Environmental Statement). The application of trenchless techniques for the landfall installation of export cables under the intertidal area from below MLWS, where the exit pits will be located, to onshore means that open-cut trenching activities will not take place within the intertidal region. Bentonite will only be released if a long drill is used and the volume of bentonite release from trenchless techniques punch out will be controlled and will be limited depending on the method adopted for conduit insertion. On the basis of previous experience, these quantities will be limited. This controlled bentonite release will occur during the punch out for each drill shot, so this is limited to four occasions, one per drill shot, and over a short duration with an indicative period of up to 12 hours per location. Discharge quantities will, however, vary through the period, with the bulk of the material lost on the initial punch out. Uncontrolled release may occur in the form of a frac out, where bentonite may blead through fissures within the bedrock/overburden during the installation of cables via trenchless techniques. The risk of this happening is managed and controlled and is considered as part of the trenchless techniques design. Control measures will be in place to limit the risk and volume of bentonite released via frac outs. The sediment plume and subsequent deposition arising from the installation of cables in the nearshore via trenchless techniques is strongly dependant on the prevailing tidal and meteorological conditions at the time of sediment release. Onshore winds may increase shoreline deposition although the plume would undergo greater dispersion and conversely offshore winds, such as those from the south west which are much more common, would reduce any potential shoreline deposition. Modelling of intertidal trenching undertaken for PEIR and presented in Volume 6, Annex 1.1: Physical processes technical report of the Environmental Statement included release of sediment with very fine silt fractions, akin to bentonite. So, although the intertidal trenching no longer forms part of the project design the plume extents can be used to inform the assessment of cable breakout. Initially deposition along the coastline is seen to extend 100 m to 200 m and over successive tides this extends to *circa* 2 km. It should be noted that the volumes released would be much smaller than those modelled and the release location would be further offshore providing greater dispersion prior to deposition on the shoreline.

2.9.3.28 The impact is predicted to be of local spatial extent, short term duration (i.e. intertidal export cable will be installed over a period of approximately nine months), intermittent and medium reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore considered to be **low**.

Sensitivity of receptor

Subtidal habitat IEFs

2.9.3.29 The subtidal coarse and mixed sediments with diverse benthic communities IEF and the Constable Bank (Annex I sandbank outside an SAC) IEF have a sensitivity of low or less for the change to suspended solids pressure. Subtidal IEFs overall have a low sensitivity to smothering and siltation rate change but a number of the associated biotopes have been assessed as not sensitive to this pressure (Table 2.22).

2.9.3.30 The subtidal coarse and mixed sediments with diverse benthic communities IEF has an overall low sensitivity to increases in SSC and associated deposition (Table 2.22). The subtidal coarse and mixed sediments with diverse benthic communities IEF is representative of biotopes which are characterised by their sedimentary substrate. The characteristic communities associated with the sedimentary habitats are largely adapted for burrowing, for example Powilleit *et al*., (2009) studied the response of the polychaete *Nephtys hombergii* to smothering. This species successfully migrated to the surface of 32 – 41 cm deposited sediment layer of till or sand/till mixture and restored contact with the overlying water. In general bivalves and polychaetes in these habitats are likely to be able to survive short periods under sediments and to reposition (Tillin and Watson, 2023b), especially with the aid of strong currents to rapidly re-distribute sediment. An increase in suspended sediment may have a deleterious effect on the suspension feeding community. It is likely to clog their feeding apparatus to some degree resulting in a decrease in growth rate (Jackson, 2004). An increase in suspended solids may have a negative effect on growth and fecundity by reducing filter feeding efficiency but the characterising species of these biotopes are likely to be tolerant to short-term increases in turbidity following sediment mobilization by storms and other events (Tillin and Watson, 2023b).

2.9.3.31 All of the biotopes associated with the sand and muddy sand communities with polychaetes and bivalves IEF has an overall low sensitivity to increases in SSC and associated deposition (Table 2.22). The component bivalves are tolerant of short-term increases in turbidity following sediment mobilisation such as by storms. An increase in SSC, may have negative impacts on growth and fecundity by reducing filter feeding efficiency and the extra energy needed to clear any extra sediment (Tillin, 2022; Tillin *et al*., 2023a; Tillin and Rayment, 2023). Bivalves and polychaetes and other species are likely to be able to survive short periods under sediments and to reposition, examples of the ability of some species to reposition themselves are detailed in paragraph 2.9.3.30.

2.9.3.32 The low resemblance stony reef (outside an SAC) IEF has an overall negligible sensitivity to increased SSC and associated deposition (Table 2.22). Whilst increases in SSC may result in extra energetic expenditure in cleaning, it is unlikely to increase mortality (Readman *et al*., 2023a). Deposition of 5 cm may bury some of the characterising species, however the biotope experiences moderate water flow and sediment is likely to be removed rapidly. Additionally, this biotope is sand scoured and occasional disposition events are likely to occur which the biotic community is likely to be adapted for.

2.9.3.33 The Constable Bank (Annex I sandbank outside an SAC) IEF has an overall low sensitivity to increases in SSC and associated deposition (Table 2.22). The Constable Bank (Annex I sandbank outside an SAC) IEF is also characterised by a sedimentary substrate. The likely characterising species which live within the sandbank, including potentially *Nephtys cirrosa, Bathyporeia elegans* and *Abra prismatica*, are unlikely to be directly affected by an increased concentration of suspended sediments. Within the mobile sands habitat storm events or spring tides may re-suspend or transport large amounts of material and therefore species are considered to be adapted to varying levels of suspended solids. Some species may experience short term effects from this impact, for example *Bathyporeia* spp. feed on diatoms within the sand grains (Nicolaisen and Kanneworff, 1969), an increase in suspended solids that reduced light penetration could alter food supply. Other characterising species such as the polychaete *Nephtys cirrosa* and amphipods are likely to be able to burrow through a 5 cm layer of fine sediments, reducing the likelihood of mortality from light smothering for short periods (Tillin and Garrard, 2019).

2.9.3.34 The seapens and burrowing megafauna communities IEF has an overall negligible sensitivity to increases in SSC and associated deposition (Table 2.22). Seapen species often live in sheltered areas, in fine sediments, subject to high suspended sediment loads. The potential effect of increased deposition of fine silt is uncertain but it is possible that feeding structures may become clogged. When tested, the seapen *Virgularia mirabilis* quickly seized and rejected inert particles (Hoare and Wilson, 1977). Once siltation levels return to normal, feeding will be resumed therefore recovery will be immediate. However seapens were not identified in the site specific surveys for the Mona benthic subtidal and intertidal ecology study area (section 2.5.1). Similarly, burrowing megafauna are unlikely to be affected adversely by changes in suspended sediment in the water column. *P. phosphorea* and *F. quadrangularis* were found to recover within 72 to 96 hours after experimental smothering by pots or creels for 24 hours (Kinnear *et al*., 1996). Where present, the characteristic burrowing megafauna (such as mud-shrimp and Nephrops) are unlikely to be affected adversely as they are active burrowers.

2.9.3.35 The mixed sediments dominated by brittlestars IEF has an overall medium sensitivity to increases in SSC and associated deposition (Table 2.22). The mixed sediments dominated by brittlestars IEF is not sensitive to changes in water clarity as brittlestars are passive suspension feeders and a significant supply of suspended organic material is needed to meet the energetic costs of the great numbers of individuals in a brittlestar bed (De-Bastos *et al.*, 2023b). An increase in SSC rich in organic material would therefore be beneficial to brittlestars however an increase in SSC involving primarily non-organic particles may interfere with the feeding of brittlestars (Aronson, 1992). Brittlestar beds occur in a variety of conditions and are likely to be tolerant to a variety of SSCs (De-Bastos *et al.*, 2023b). Regarding light smothering the potential effects can include abrasion and clogging of gills, impaired respiration, clogging of filter mechanisms, and reduced feeding and pumping rates (De-Bastos *et al.*, 2023b), these effects will abate following the re-distribution of material. Furthermore, dense beds of brittlestars tend not to persist in areas of excessive sedimentation, because high levels of sediment foul the brittlestars feeding apparatus and ultimately suffocates them (Aronson, 1992).

2.9.3.36 The subtidal coarse and mixed sediments with diverse benthic communities IEF, the sand and muddy sand communities with polychaetes and bivalves IEF and Constable

Bank (Annex I sandbank outside an SAC) IEF are deemed to be of low vulnerability, medium recoverability and national value. The sensitivity of the receptor is therefore, considered to be **low**.

2.9.3.37 The Annex I low resemblance stony reef (outside an SAC) IEF and seapens and burrowing megafauna communities IEF is deemed to be of low vulnerability, high recoverability and national value. The sensitivity of the receptor is therefore, considered to be **negligible**.

2.9.3.38 The mixed sediments dominated by brittlestars IEF is deemed to be of medium vulnerability, medium recoverability and national value. The sensitivity of the receptor is therefore, considered to be **medium**.

Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC

2.9.3.39 The MarESA determines the Annex I sandbanks IEF, the Annex I intertidal reefs IEF and the Annex I subtidal reefs IEF which occurs within the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC have a medium sensitivity to the pressures associated with increased SSC and associated sediment deposition (Table 2.22).

2.9.3.40 The Annex I sandbanks IEF of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC has an overall low sensitivity to increases in SSC and associated deposition (Table 2.22). As the Constable Bank (Annex I sandbank outside an SAC) and Annex I sandbanks IEFs of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC are associated with the same biotopes the potential effect of this impact on both IEFs will be similar. Therefore, for detail in relation to this IEF see paragraph 2.9.3.33.

2.9.3.41 The Annex I subtidal reef IEF of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC has an overall medium sensitivity to increases in SSC and associated deposition (Table 2.22). The Annex I subtidal reef IEF of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC is likely to be sensitive to increased SSC which can decrease light penetration which may either increase food supply or decrease feeding efficiency for suspension feeders. *H. arctica,* a characteristic species is a filter feeding bivalve, and many other species of this type have efficient mechanisms to remove inorganic particles via pseudofaeces (Tillin, 2016d). Increases in SSC are generally considered to have a negative impact on suspension feeders (Gerrodette and Flechsig, 1979), however many encrusting sponges appear to be able to survive in highly sedimented conditions, and in fact, many species prefer such habitats (Schönberg, 2015). Long term increase in turbidity may affect primary production in the water column and, therefore, reduce the availability of diatom food, both for suspension feeders and deposit feeders (Readman *et al*., 2023b). The activities associated with the construction of Mona offshore Wind Project however are unlikely to result in long term high turbidity levels due to their intermittent nature. Exposure to siltation pressures will be mediated by site specific topography and hydrodynamics as silts may not accumulate on smooth surfaces, although some deposits may be trapped by epifauna and epiflora (where these occur) (Tillin, 2016d). As *H. arctica* are essentially sedentary with relatively short siphons, siltation from fine sediments rather than sands, even at low levels for short periods may increase mortality. Siltation by fine sediments would also prevent larval settlement for species which require hard substratum (Berghahn and Offermann, 1999). Hydroids have been found to be sensitive to silting (Gili and Hughes, 1995). Hughes (1977) found that maturing hydroids which had been smothered with silt lost most of their fine structure. After one month, the hydroids were seen to have recovered but although neither the growth rate nor the reproductive potential appeared to have been affected, the viability of the planulae may have been affected.

2.9.3.42 The Annex I subtidal reef IEF has an overall medium sensitivity to increases in SSC and associated deposition (Table 2.22). The representative biotope of the Annex I intertidal reefs IEF of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC is assessed by the MarESA as being not sensitive to the effects of water quality change because this habitat is only submerged at high tide and therefore has limited exposure to this pressure (Tillin, 2016e). Furthermore, the characteristic red algal turf of this biotope is likely to be resistant to decreased light due to the regular shading which occurs during tidal submersion. An increase in suspended solids may lead to some sub-lethal abrasion of fronds but this will be balanced by the high growth rates exhibited by the characterizing species (Tillin, 2016e). *Laminaria* sp. exhibit a decrease of 50% photosynthetic activity when turbidity increases by a light attenuation coefficient of 0.1 m (Staehr and Wernberg, 2009), the effect will be sublethal at the levels predicted for this site, especially at the coast. Siltation at this pressure benchmark may lower survival and germination of spores also causing mortality for algae in early life stages as well as reducing photosynthesis in adults (Tillin, 2016e). These species however have been found to rapidly regrow from their holdfasts following damage (Tillin, 2016e). Smothering by 5 cm of sediment is likely to impact hydroids, ascidian and sponge species. However, it is likely that enough of the population would survive to recover quite rapidly should the thin layer of sediment be removed (Readman *et al*., 2023a).

2.9.3.43 The Annex I sandbanks IEF of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC is deemed to be of low vulnerability, medium recoverability and international value. The sensitivity of the receptor is therefore, considered to be **low**.

2.9.3.44 The Annex I subtidal reef IEF of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC is deemed to be of medium vulnerability, medium recoverability and international value. The sensitivity of the receptor is therefore, considered to be **medium**.

2.9.3.45 The Annex I intertidal reef IEF of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC is deemed to be of medium vulnerability, medium recoverability and international value. The sensitivity of the receptor is therefore, considered to be **medium**.

Intertidal habitat IEFs

2.9.3.46 All the intertidal IEFs are expected to be affected by increase in SSC and associated deposition. The sensitivity of the IEFs to this impact are presented in Table 2.22. These sensitivities are based on assessments made by the MarESA. Intertidal IEFs have a sensitivity of not sensitive or medium to the MarESA pressures associated with increase in SSC and associated deposition.

2.9.3.47 The littoral shingle with *Verrucaria maura* IEF, and littoral sand and muddy sand supporting infaunal communities IEF have an overall negligible sensitivity to increases in SSC and associated deposition (Table 2.22). Littoral shingle is characterised by its scoured habitat and an absence of species which are expected to be altered by these pressures. The littoral sand and muddy sand supporting infaunal communities IEF is characterised by infaunal species which would experience short term effects from these pressures. For example, an increase in suspended inorganic particles may result in higher energetic costs as feeding becomes less efficient, in turn reducing growth rates and reproductive success (McQuillan *et al*., 2023). Fatalities are unlikely given that *L. conchilega* and *Cerastoderma edule* and other similar associated species are often found in high turbidity environments. Similarly based on the ability of *L. conchilega* to burrow to the surface when deposition has increased, it is likely that they are also resistance to the deposition of 5 cm of sediment which is greater than the magnitude of sediment deposition predicted to affect this biotope in the construction phase of the Mona Offshore Wind Project. Filter feeders will be disturbed on a short term basis, and they are resistant to smothering due to adaptation to their natural habitat on intertidal flats (Ashley *et al.*, 2023). Where this IEF is characterised by the absence of a biological community the pressures of smothering and changes in water clarity will have no impact as they do not change the abiotic characteristics of the environment.

2.9.3.48 The clay with piddocks IEF has an overall medium sensitivity to increases in SSC and associated deposition (Table 2.22). This is due to the short term nature of this pressure. An increase in suspended sediments is likely to result in reduce feeding efficiency for filter feeders however a combination of the hydrodynamic regime and physiological adaptations means this can be resolved quickly. Piddocks are sedentary with short siphons so siltation could be lethal however the hydrodynamic regime is likely to clear this sediment quickly.

2.9.3.49 The littoral and eulittoral rock dominated by epifaunal communities IEF has an overall medium sensitivity to increases in SSC and associated deposition (Table 2.22). Decreased water clarity and light smothering are likely to inhibit photosynthesis for species such as *Fucus spiralis* and *Ulva* sp. and decrease feeding efficiency for species such as *S. balanoides.* The highest sensitivity biotopes are those characterised by sedentary organisms such as *S. balanoides* which has no ability to escape from silty sediments which would bury individuals and prevent feeding and respiration. The level of exposure however may be reduced by wave action or water flows so that vulnerability will be lower where sediments do not accumulate or where sediment is removed.

2.9.3.50 The *S. alveolata* reefs IEF has an overall medium sensitivity to increases in SSC and associated deposition (Table 2.22). *S. alveolata* reefs are not sensitive to light smothering events as they have been shown to survive short-term burial for days and even weeks as a result of deposition by storms (Earll and Erwin, 1983). An increase in siltation may also aid tube building however it may also clog feeding apparatus as *S. alveolata* are filter feeders (Jackson, 2008). Changes in water clarity would also affect *S. alveolata* indirectly by reducing filter feeding efficiency, declining at around 45 mg/l and thereafter remained relatively stable (Dubois *et al.*, 2009). Therefore although *S. alveolata* are likely to experience some effects from these pressures they are unlikely to result in long term damage or fatality.

2.9.3.51 The *M. edulis* beds IEF has an overall medium sensitivity to increases in SSC and associated deposition (Table 2.22). *M. edulis* beds are assessed to not be sensitive to changes in water clarity as wave action in the intertidal zone will act to reduce acclimation. The inability of *M. edulis* to emerge from sediment deeper than 2 cm (Last *et al*., 2011; Essink, 1999; Daly and Matthieson, 1977) and the increased mussel mortality with depth and reduced particle size observed by Last *et al.* (2011) suggest that there may be some mortality from light smothering.

2.9.3.52 The littoral shingle with *Verrucaria maura* IEF and littoral sand and muddy sand supporting infaunal communities IEF are deemed to be of low vulnerability, high recoverability and local value. The sensitivity of the receptor is therefore, considered to be **negligible**.

2.9.3.53 The *Sabellaria alveolata* reef IEF is deemed to be of low vulnerability, medium recoverability and national value. The sensitivity of the receptor is therefore, considered to be **medium**.

2.9.3.54 The clay with piddocks IEF and *Mytilus edulis bed* IEF are deemed to be of medium vulnerability, high recoverability and national value. The sensitivity of the receptor is therefore, considered to be **medium**.

2.9.3.55 The littoral and eulittoral rock dominated by epifaunal communities IEF is deemed to be of medium vulnerability, high recoverability and local value. The sensitivity of the receptor is therefore, considered to be **medium**.

Table 2.22: Sensitivity of all of the relevant IEFs to increased SSC and associated sediment deposition.

IEF	Description and representative biotopes	Sensitivity to defined MarESA		Overall sensitivity (based on Table 2.16)
		Changes in suspended solids (water clarity)	Smothering and siltation rate changes (light)	
Subtidal habitats				
Subtidal coarse and mixed sediments with diverse benthic communities.	SS.SCS.CCS	Low	Low	Low
	SS.SMx.CMx SS.SMx.CMx.KurThyMx	Not sensitive	Not sensitive	
	SS.SMx.OMx.PoVen	Low	Low	
Mixed sediments dominated by brittlestars	SS.SMx.CMx.OphMx	Not sensitive	Medium	Medium
Sand and muddy sand communities with polychaetes and bivalves	SS.SSa.CFiSa	Low	Low	Low
	SS.SSa.IFiSa.NcirBat	Low	Not sensitive	
	SS.SSa.CMuSa	Low	Low	
	SS.SSa.IMuSa.FfabMag	Low	Low	
Annex I low resemblance stony reef (outside an SAC)	CR.HCR.XFa.SpNemAdia.	Not sensitive	Not sensitive	Negligible
Constable Bank (Annex I sandbank outside an SAC)	SS.SSa.IFiSa.NcirBat	Low	Not sensitive	Low
	SS.SSa.CFiSa.ApriBatPo	Low	Low	
Seapens and burrowing megafauna	SS.SMu.CFiMu.SpnMeg	Not sensitive	Not sensitive	Negligible
Intertidal habitats				
Littoral shingle with *Verrucaria maura*	LS.LCS.Sh.BarSh.	Not sensitive	Not sensitive	Negligible

IEF	Description and representative biotopes	Sensitivity to defined MarESA		Overall sensitivity (based on Table 2.16)
		Changes in suspended solids (water clarity)	Smothering and siltation rate changes (light)	
Littoral sand and muddy sand supporting infaunal communities	LS.LSa.MoSa LS.LSa.MuSa.Lan	Not sensitive	Not sensitive	Negligible
	LS.LSa.MuSa.MacAre	Not sensitive	Not sensitive	
Clay with piddocks	CR.MCR.SfR.Pid	Not sensitive	Medium	Medium
Littoral and eulittoral rock dominated by epifaunal communities	LR.LLR.F.Fspi	Not sensitive	Low	Medium
	LR.FLR.Lic.Ver	Medium	Not relevant	
	LR.FLR.Eph.UlvPor	Not sensitive	Low	
	LR.HLR.MusB.Sem.LitX LR.HLR.MusB.Sem	Low	Medium	
Sabellaria alveolata reef	LS.LBR.Sab.Salv	Medium	Not sensitive	Medium
Mytilus edulis bed	*Mytilus edulis bed*	Not sensitive	Medium	Medium
Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC				
Annex I sandbank	SS.SSa.IFiSa.NcirBat	Low	Not sensitive	Low
	SS.SSa.CFiSa.ApriBatPo	Low	Low	
Annex I subtidal reefs	CR.MCR.SfR.Hia	Low	Medium	Medium
	CR.MCR.CFaVS.CuSpH	Not sensitive	Low	
Annex I intertidal reefs	LR.HLR.FR.Mas	Not sensitive	Low	Medium
	IR.MIR.KT.XKT	Medium	Low	

Significance of effect

Subtidal habitat IEFs

2.9.3.56 Overall, for the subtidal coarse and mixed sediments with diverse benthic communities IEF, sand and muddy sand communities with polychaetes and bivalves IEF and Constable Bank (Annex I sandbank outside an SAC) IEF the magnitude of the impact of increases in SSC and associated deposition during the construction phase is deemed to be low and the sensitivity of the receptor is considered to be low. The effect will, therefore, be of **negligible** significance, which is not significant in EIA terms. This conclusion is due to the impact being small in magnitude and short term in nature as well as the biotopes being highly resistant to these specific pressures.

2.9.3.57 Overall, for the Annex I low resemblance stony reef (outside an SAC) IEF and the seapens and burrowing megafauna communities IEF the magnitude of the impact of increases in SSC and associated deposition during the construction phase is deemed to be low and the sensitivity of the receptor is considered to be negligible. The effect will, therefore, be of **negligible** significance, which is not significant in EIA terms. This conclusion is due to the impact being small in magnitude and short term in nature as well as the biotope being highly resistant to these specific pressures.

2.9.3.58 Overall, for the mixed sediments dominated by brittlestars IEF the magnitude of the impact of increases in SSC and associated deposition during the construction phase is deemed to be low and the sensitivity of the receptor is considered to be medium. The effect will, therefore, be of **minor** adverse significance, which is not significant in EIA terms.

Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC

2.9.3.59 Overall, for the Annex I sandbanks IEF of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC the magnitude of the impact of increases in SSC and associated deposition during the construction phase is deemed to be low and the sensitivity of the receptor is considered to be low. The effect will, therefore, be of **negligible** significance, which is not significant in EIA terms. This conclusion is due to the impact being small in magnitude and short term in nature of this impact as well as the biotope being resistant to these specific pressures.

2.9.3.60 Overall, for the Annex I subtidal reefs IEF of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC the magnitude of the impact of increases in SSC and associated deposition during the construction phase is deemed to be low, and the sensitivity of the receptor is considered to be medium. The effect will, therefore, be of **minor** adverse significance, which is not significant in EIA terms.

2.9.3.61 Overall, for the Annex I intertidal reefs IEF of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC the magnitude of the impact of increases in SSC and associated deposition during the construction phase is deemed to be negligible, and the sensitivity of the receptor is considered to be medium. The effect will, therefore, be of **minor** adverse significance, which is not significant in EIA terms. This conclusion is due to the impact being small in magnitude and short term in nature of this impact as well as the biotope being resistant to these specific pressures.

Intertidal habitat IEFs

2.9.3.62 Overall, for the littoral shingle with *Verrucaria maura* IEF, and littoral sand and muddy sand supporting infaunal communities IEF the magnitude of the impact of increases in

SSC and associated deposition during the construction phase is deemed to be low, and the sensitivity of the receptor is considered to be negligible. The effect will, therefore, be of **negligible** significance, which is not significant in EIA terms. This conclusion is due to the impact being small in magnitude and short term in nature of this impact.

2.9.3.63 Overall, for the littoral and eulittoral rock dominated by epifaunal communities IEF, clay with piddocks IEF, *Sabellaria alveolata* reef IEF and *Mytilus edulis bed* IEF the magnitude of the impact of increase in SSC and associated deposition during the construction phase is deemed to be low and the sensitivity of the receptor is considered to be medium. The effect will, therefore, be of **minor** adverse significance, which is not significant in EIA terms.

Operations and maintenance phase

Magnitude of impact

2.9.3.64 Maintenance activities within the Mona benthic subtidal and intertidal ecology study area may lead to increases in SSC and associated sediment deposition over the operational lifetime of the Mona Offshore Wind Project. The MDS includes the repair of 10 km of inter-array cable in one event every three years, 16 km of interconnector cable in three events every 10 years, and 32 km of export cable every five years. The MDS is also for the reburial of 20 km of inter-array cable in one event every five years, 2 km of interconnector cable in one event every five years and 15 km of export cable in one event every five years, over the 35 year operational lifetime of the project (Table 2.18). Cable reburial will be undertaken using similar methods as those for cable installation activities (i.e. trenching/jetting, with trench width up to 3 m and trench depth up to 3 m).

2.9.3.65 In each case the length of the repair or reburial activity may be up to 32 km; therefore, the magnitude of the impacts would be a fraction of those for the construction phase (Volume 2, Chapter 1: Physical processes of the Environmental Statement). In the case of the export cable the total length of works would be approximately 60% of the length of the construction phase with events being undertaken over the duration of the 35 year operational lifetime. The sediment plumes and sedimentation footprints would be dependent on which section of the cable is being repaired however the entire length has been quantified under the construction phase scenario.

2.9.3.66 The removal of encrusted growth from offshore structures may also occur during the operations and maintenance phase however no quantitative assessment can be made as the volume of encrusting material that may be removed is not known. An investigation conducted at the research platform Forschungsplattformen in Nord- und Ostsee 1 FINO 1 in the southwest German Bight in the North Sea reported that yearly, 878,000 single shell halves from *M. edulis* sink onto the seabed from the FINO 1 platform, thereby greatly extending the reef effects created by the construction of the offshore platform structure (Krone *et al*., 2013). Although recent monitoring from Beatrice offshore wind farm found no *M. edulis* colonised its structures reducing the amount of debris reaching the seabed (APEM, 2022).

2.9.3.67 Removal of marine growth from the wind turbine foundations may cause debris to fall within the vicinity of the wind turbine foundation and smother benthic communities within the impact zone. It is likely that seaweed/algal material would disperse into the water column, with heavier material (e.g. mussels) being deposited within 10 m to 15 m of the foundation (Vattenfall Wind Power Ltd, 2018). The discharge of the fine material generated as a result of the use of high- pressure jet washing to remove the encrusting fauna into the marine environment may result in a short-term increase in suspended organic material in the water column. This material would be expected to be rapidly dispersed on the following tides and under the prevailing hydrodynamic conditions. The study by Mavraki *et al*. (2020) of gravity-based foundations in the Belgian part of the North Sea found that higher food web complexity was associated with zones where high accumulation of organic material such as soft substrate or scour protection which begins to describe the potential reef effect that can be found at these hard structures. The potential impact associated with the introduction of artificial structures is assessed in section 2.9.6.

2.9.3.68 The impact is predicted to be of local spatial extent, short term duration, intermittent and of high reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore considered to be **negligible**.

Intertidal habitat IEF

2.9.3.69 No maintenance works will be undertaken in the intertidal zone during the operations and maintenance phase of the Mona Offshore Wind Project therefore no assessment regarding increases in SSC and associated deposition on the intertidal IEFs is required.

Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC

2.9.3.70 The magnitude of the change in environmental condition due to the impact of increased SSC and associated sediment deposition is the same across the Mona Offshore Cable Corridor including in areas which overlap with Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC (see paragraphs 2.9.3.64 to 2.9.3.67).

2.9.3.71 The impact within the intertidal zone of the SAC is likely to be reduced compared to the subtidal zone due to the increased distance from the site of the activity.

2.9.3.72 The impact is predicted to be of local spatial extent, short term duration, intermittent and medium reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore considered to be **negligible**.

Sensitivity of receptor

Subtidal habitat IEFs

2.9.3.73 The sensitivity of the subtidal habitat IEFs is as described previously for the construction phase assessment in paragraph 2.9.3.29 to 2.9.3.35 and above in Table 2.22.

2.9.3.74 The subtidal coarse and mixed sediments with diverse benthic communities IEF is deemed to be of low vulnerability, medium recoverability and national value. The sensitivity of the receptor is therefore, considered to be **low**.

2.9.3.75 The sand and muddy sand communities with polychaetes and bivalves IEF is deemed to be of low vulnerability, medium recoverability and national value. The sensitivity of the receptor is therefore, considered to be **low**.

2.9.3.76 The Annex I low resemblance stony reef (outside an SAC) IEF is deemed to be of low vulnerability, high recoverability and national value. The sensitivity of the receptor is therefore, considered to be **negligible.**

2.9.3.77 The Constable Bank (Annex I sandbank outside an SAC) IEF is deemed to be of low vulnerability, medium recoverability and national value. The sensitivity of the receptor is therefore, considered to be **low**.

2.9.3.78 The seapens and burrowing megafauna communities IEF is deemed to be of low vulnerability, high recoverability and national value. The sensitivity of the receptor is therefore, considered to be **negligible.**

2.9.3.79 The mixed sediments dominated by brittlestars IEF is deemed to be of medium vulnerability, medium recoverability and national value. The sensitivity of the receptor is therefore, considered to be **medium**.

Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC

2.9.3.80 The sensitivity of the subtidal and intertidal IEF features of the SAC are as described previously for the construction phase assessment in paragraph 2.9.3.39 to 2.9.3.45 and above in Table 2.22.

2.9.3.81 The Annex I sandbanks IEF of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC is deemed to be of low vulnerability, medium recoverability and international value. The sensitivity of the receptor is therefore, considered to be **low**.

2.9.3.82 The Annex I subtidal reef IEF of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC is deemed to be of medium vulnerability, medium recoverability and international value. The sensitivity of the receptor is therefore, considered to be **medium**.

2.9.3.83 The Annex I intertidal reef IEF of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC is deemed to be of medium vulnerability, medium recoverability and international value. The sensitivity of the receptor is therefore, considered to be **medium**.

Significance of effect

Subtidal habitat IEFs

2.9.3.84 Overall, for the subtidal coarse and mixed sediments with diverse benthic communities IEF, the sand and muddy sand communities with polychaetes and bivalves IEF and the Constable Bank (Annex I sandbank outside an SAC) IEF the magnitude of the impact of increases in SSC and associated deposition during the operations and maintenance phase is deemed to be negligible, and the sensitivity of the receptor is considered to be low. The effect will, therefore, be of **negligible** significance, which is not significant in EIA terms. This is due to the small magnitude and short term nature of this impact in this phase of the Mona Offshore Wind Project.

2.9.3.85 Overall, for the low resemblance stony reef (outside an SAC) IEF and the seapens and burrowing megafauna communities IEF the magnitude of the impact of increases in SSC and associated deposition during the operations and maintenance phase is deemed to be negligible and the sensitivity of the receptor is considered to be negligible. The effect will, therefore, be of **negligible** significance, which is not significant in EIA terms.

2.9.3.86 Overall, for the mixed sediments dominated by brittlestars IEF the magnitude of the impact of increases in SSC and associated deposition during the operations and maintenance phase is deemed to be negligible, and the sensitivity of the receptor is considered to be medium. The effect will, therefore, be of **negligible** significance, which is not significant in EIA terms. This is due to the small magnitude and short term nature of this impact in this phase of the Mona Offshore Wind Project.

Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC subtidal

2.9.3.87 Overall, for the Annex I sandbanks IEF of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC the magnitude of the impact of increases in SSC and associated deposition during the operations and maintenance phase is deemed to be negligible and the sensitivity of the receptor is considered to be low. The effect will, therefore, be of **negligible** significance, which is not significant in EIA terms. This is due to the small magnitude and short term nature of this impact in this phase of the Mona Offshore Wind Project.

2.9.3.88 Overall, for the Annex I intertidal reefs IEF and Annex I subtidal reefs IEF of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC the magnitude of the impact of increases in SSC and associated deposition during the operations and maintenance phase is deemed to be negligible and the sensitivity of the receptor is considered to be medium. The effect will, therefore, be of **negligible** significance, which is not significant in EIA terms. This is due to the small magnitude and short term nature of this impact in this phase of the Mona Offshore Wind Project.

Decommissioning phase

Magnitude of impact

Subtidal habitat IEF

2.9.3.89 Decommissioning of the Mona Offshore Wind Project infrastructure may lead to increases in SSC and associated sediment deposition. The MDS assumes that if cables and the suction bucket jacket foundations were to be removed this would result in an increase is SSC.

2.9.3.90 During decommissioning, increases in suspended sediments and potential impacts would be of lesser magnitude than both the construction phase and the operations and maintenance phase with scour and cable protection remaining *in situ*. As per the MDS (Table 2.18), SSC would increase temporarily if suction bucket jacket foundations were removed using overpressure to release. In the case of piled foundations, there is no significant disturbance of the seabed during decommissioning as piles are cut off. Decommissioning of gravity bases would involve the removal of ballast, including sand sequestered during construction. This material, which may also include rock, will be disposed of off-site, however a small proportion of sediment may be released during the removal process, noting the ballast material derived from offsite sources would be tested for contamination prior to use. Increases in SSC 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. The increase in suspended sediments and the potential impacts on benthic features may persist during decommissioning, however they are temporary and localised in nature.

2.9.3.91 The impact is predicted to be of local spatial extent, short term duration, intermittent and medium reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore considered to be **negligible**.

Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC

2.9.3.92 As outlined in paragraph 2.5.3.3, no designated features of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC were recorded during the site specific surveys in the area of overlap with the Mona Offshore Cable Corridor. However as the sediment plumes can migrate beyond the Mona Offshore Cable Corridor the designated features of the SAC have been assessed in relation to this potential impact. The magnitude of the change in environmental condition due to the potential impact of increased SSC and associated sediment deposition is the same as described for the sandwave clearance and cable installation for the Mona Offshore Cable Corridor outside the SAC. Detail on the magnitude of this potential impact from these activities is detailed in paragraphs 2.9.3.10 and 2.9.3.18.

2.9.3.93 The impact of cable and cable protection removal as part of the decommissioning phase, as noted in paragraph 2.9.3.90, is not expected to be greater than the construction phase of the Mona Offshore Wind Project. In actuality the release of sediment in the decommissioning phase will be lower than the construction phase as it doesn’t include activities such as seabed preparation.

2.9.3.94 The impact within the intertidal zone of the SAC is likely to be reduced compared to the subtidal zone due to the increased distance from the site of the activity.

2.9.3.95 The impact is predicted to be of local spatial extent, short term duration, intermittent and of high reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore considered to be **negligible**.

Intertidal habitat IEF

2.9.3.96 The MDS assumes that export cables at the landfall may be fully removed, therefore the impact to intertidal habitats is likely to be of a similar magnitude to that defined for the construction phase in paragraphs 2.9.3.27 to 2.9.3.28.

2.9.3.97 The impact is predicted to be of local spatial extent, short term duration, intermittent and medium reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore considered to be **negligible**.

Sensitivity of receptor

Subtidal habitat IEFs

2.9.3.98 The sensitivity of the subtidal habitat IEFs is as described previously for the construction phase assessment in paragraph 2.9.3.29 to 2.9.3.35 and above in Table 2.22.

2.9.3.99 The subtidal coarse and mixed sediments with diverse benthic communities IEF is deemed to be of low vulnerability, medium recoverability and national value. The sensitivity of the receptor is therefore, considered to be **low**.

2.9.3.100 The sand and muddy sand communities with polychaetes and bivalves IEF is deemed to be of low vulnerability, medium recoverability and national value. The sensitivity of the receptor is therefore, considered to be **low**.

2.9.3.101 The Annex I low resemblance stony reef (outside an SAC) IEF is deemed to be of low vulnerability, high recoverability and national value. The sensitivity of the receptor is therefore, considered to be **negligible.**

2.9.3.102 The Constable Bank (Annex I sandbank outside an SAC) IEF is deemed to be of low vulnerability, medium recoverability and national value. The sensitivity of the receptor is therefore, considered to be **low**.

2.9.3.103 The seapens and burrowing megafauna communities IEF is deemed to be of low vulnerability, high recoverability and national value. The sensitivity of the receptor is therefore, considered to be **negligible.**

2.9.3.104 The mixed sediments dominated by brittlestars IEF is deemed to be of medium vulnerability, medium recoverability and national value. The sensitivity of the receptor is therefore, considered to be **medium**.

Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC

2.9.3.105 The sensitivity of the subtidal and intertidal IEF features of the SAC are as described previously for the construction phase assessment in paragraph 2.9.3.39 to 2.9.3.45 and above in Table 2.22.

2.9.3.106 The Annex I sandbanks IEF of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC is deemed to be of low vulnerability, medium recoverability and international value. The sensitivity of the receptor is therefore, considered to be **low**.

2.9.3.107 The Annex I subtidal reef IEF of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC is deemed to be of medium vulnerability, medium recoverability and international value. The sensitivity of the receptor is therefore, considered to be **medium**.

2.9.3.108 The Annex I intertidal reef IEF of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC is deemed to be of medium vulnerability, medium recoverability and international value. The sensitivity of the receptor is therefore, considered to be **medium**.

Intertidal habitat IEFs

2.9.3.109 The sensitivity of the intertidal habitat IEFs is as described previously for the construction phase assessment in paragraph 2.9.3.46 to 2.9.3.55 and above in Table 2.22.

2.9.3.110 The littoral shingle with *Verrucaria maura* IEF and littoral sand and muddy sand supporting infaunal communities IEF are deemed to be of low vulnerability, high recoverability and local value. The sensitivity of the receptor is therefore, considered to be **negligible**.

2.9.3.111 The *Sabellaria alveolata* reef IEF is deemed to be of low vulnerability, high recoverability and national value. The sensitivity of the receptor is therefore, considered to be **medium.**

2.9.3.112 The clay with piddocks IEF and *Mytilus edulis bed* IEF are deemed to be of medium vulnerability, high recoverability and national value. The sensitivity of the receptor is therefore, considered to be **medium**.

2.9.3.113 The littoral and eulittoral rock dominated by epifaunal communities IEF is deemed to be of medium vulnerability, high recoverability and local value. The sensitivity of the receptor is therefore, considered to be **medium**.

Significance of effect

Subtidal habitat IEFs

2.9.3.114 Overall, for the subtidal coarse and mixed sediments with diverse benthic communities IEF, the sand and muddy sand communities with polychaetes and bivalves IEF and Constable Bank (Annex I sandbank outside an SAC) IEF the magnitude of the impact of increases in SSC and associated deposition during the decommissioning phase is deemed to be negligible and the sensitivity of the receptor is considered to be low. The effect will, therefore, be of **negligible** significance, which is not significant in EIA terms. This conclusion has been reached based on the highly localised nature of this impact.

2.9.3.115 Overall, for the Annex I low resemblance stony reef (outside an SAC) IEF and seapens and burrowing megafauna communities IEF the magnitude of the impact of increases in SSC and associated deposition during the decommissioning phase is deemed to be negligible and the sensitivity of the receptor is considered to be negligible. The effect will, therefore, be of **negligible** significance, which is not significant in EIA terms. This conclusion has been reached based on the highly localised nature of this impact.

2.9.3.116 Overall, for the mixed sediments dominated by brittlestars IEF the magnitude of the impact of increases in SSC and associated deposition during the decommissioning phase is deemed to be negligible and the sensitivity of the receptor is considered to be medium. The effect will, therefore, be of **minor** adverse significance, which is not significant in EIA terms. This conclusion has been reached based on the highly localised nature of this impact.

Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC

2.9.3.117 Overall, for the Annex I sandbanks IEF of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC the magnitude of the impact of increases in SSC and associated deposition during the decommissioning phase is deemed to be negligible and the sensitivity of the receptor is considered to be low. The effect will, therefore, be of **negligible** significance, which is not significant in EIA terms. This conclusion has been reached based on the highly localised nature of this impact.

2.9.3.118 Overall, for the Annex I intertidal reefs IEF and Annex I subtidal reefs IEF of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC the magnitude of the impact of increases in SSC and associated deposition during the decommissioning phase is deemed to be negligible and the sensitivity of the receptor is considered to be medium. The effect will, therefore, be of **negligible** significance, which is not significant in EIA terms. This conclusion has been reached based on the highly localised nature of this impact.

Intertidal habitat IEFs

2.9.3.119 Overall, for the *Sabellaria alveolata* reef IEF the magnitude of the impact of increases in SSC and associated deposition during the decommissioning phase is deemed to be negligible and the sensitivity of the receptor is considered to be medium. The effect will, therefore, be of **minor** adverse significance, which is not significant in EIA terms. This conclusion is due to the impact being small in magnitude and short term in nature as well as the biotope being resistant to these specific pressures.

2.9.3.120 Overall, for the littoral shingle with *Verrucaria maura,* and littoral sand and muddy sand supporting infaunal communities IEF the magnitude of the impact of increases in SSC and associated deposition during the decommissioning phase is deemed to be negligible, and the sensitivity of the receptor is considered to be negligible. The effect will, therefore, be of **negligible** significance, which is not significant in EIA terms.

2.9.3.121 Overall, for increase in SSC and associated deposition the littoral and eulittoral rock dominated by epifaunal communities IEF, clay with piddocks IEF and *Mytilus edulis bed* IEF the magnitude of the impact of increases in SSC and associated deposition during the decommissioning phase is deemed to be negligible and the sensitivity of the receptor is considered to be medium. The effect will, therefore, be of **minor** adverse significance, which is not significant in EIA terms. As although they are not sensitive there are likely to be some short term indirect effects to the communities associated with these IEFs.

2.9.4 Disturbance/remobilisation of sediment-bound contaminants

2.9.4.1 During activities such as sandwave clearance and cable and foundation installation/removal there is potential for sediment-bound contaminants such as metals, hydrocarbons and organic pollutants, to be remobilised into the water column and lead to adverse effects on benthic receptors.

2.9.4.2 The relevant MarESA pressures and benchmarks used to inform this impact assessment are described here.

- Transitional elements and organometal contamination: Exposure of marine species or habitat to one or more relevant contaminants via uncontrolled releases or incidental spills. The increase in transition elements levels compared with background concentrations due to their input from land/riverine sources, by air or directly at sea.
- Hydrocarbon and PAH contamination: Exposure of marine species or habitat to one or more relevant contaminants via uncontrolled releases or incidental spills. Increases in the levels of these compounds compared with background concentrations.
- Synthetic compound contamination: Exposure of marine species or habitat to one or more relevant contaminants via uncontrolled releases or incidental spills. Increases in the levels of these compounds compared with background concentrations.

2.9.4.3 These pressures are relevant to the installation of foundations via drilling, cable installation and seabed preparation activities.

2.9.4.4 The subtidal IEFs that have the potential to be affected by disturbance/remobilisation of sediment-bound contaminants across all phases of the Mona Offshore Wind Project are those present within the Mona Array Area and Mona Offshore Cable Corridor (i.e. subtidal coarse and mixed sediments with diverse benthic communities IEF, sand and muddy sand communities with polychaetes and bivalves IEF, Annex I low resemblance stony reef (outside an SAC) IEF, Constable Bank (Annex I sandbank outside an SAC) IEF and seapens and burrowing megafauna communities IEF) (see Table 2.20).

2.9.4.5 The Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC overlaps with the Mona Offshore Cable Corridor for the Mona Offshore Wind Project and therefore some disturbance/remobilisation of sediment-bound contaminants may occur within the SAC. This includes the potential impact on the designated features of the SAC which all lie outside the overlap with the Mona Offshore Cable Corridor (i.e. Annex I sandbank IEF, Annex I subtidal reefs IEF and Annex I intertidal reefs IEF of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC), as outlined in paragraph 2.5.3.3 and illustrated in Figure 2.9. The magnitude of the potential impact of increase in SSC and associated deposition on the subtidal habitat IEFs identified in the area of overlap with the SAC (i.e. subtidal coarse and mixed sediments with diverse benthic communities IEF and the sand and muddy sand communities with polychaetes and bivalves IEF) is assessed across all phases of the Mona Offshore Wind Project.

2.9.4.6 The impact of the disturbance/remobilisation of sediment-bound contaminants will only occur in the immediate area surrounding the disturbance. As the export cables will be installed at the Mona landfall via trenchless techniques (i.e. no open cut trenching) none of the intertidal IEFs will be affected therefore no assessment of the intertidal IEFs has been undertaken for this impact.

Construction phase

Magnitude of impact

Subtidal habitat IEFs

2.9.4.7 Samples from the Mona Array Area were analysed for contaminants including heavy metals, PCBs and PAHs (section 2.5.1). The full results of this sediment chemistry analysis are detailed in Volume 6, Annex 2.1: Benthic subtidal and intertidal ecology technical report of the Environmental Statement. The concentrations of the heavy metals, PAHs and PCBs was compared to the corresponding Cefas AL1 and AL2 and the Canadian TEL and PEL. The National Oceanic and Atmospheric Administration's ERL and ERM thresholds were also used for PAHs only. In summary, no contaminants were found to exceed Cefas AL2, the Canadian PEL, ERL or ERM. One sample station within the Mona Array Area and three sample stations within the Mona Offshore Cable Corridor, exceeded the Cefas AL1 threshold for arsenic (Figure 2.2). The Canadian TEL was exceeded for arsenic at all but one sample location in the Mona Array Area and Offshore Cable Corridor however all samples were below Cefas AL2 and Canadian PEL. One sample station in the Mona Array Area also exceeded Cefas AL1 for cadmium but was below Cefas AL2 as well as Canadian PEL and TEL. Concentrations of PCBs in all samples in the Mona Array Area and Mona Offshore Cable Corridor were found to be below AL1 and the CSQGs. Concentrations of PAHs in all samples were found to be below AL1 and ERL. The total area that is likely to be disturbed by construction activities, and therefore the potential volume of material disturbed, resulting in the potential release of sediment bound contaminants is small and localised in extent as well as occurring gradually over the construction phase. The MDS is for 13,037,497 m^3 of spoil from sandwave clearance within the Mona Array Area and 1,504,000 m^3 of spoil from sandwave clearance within the Mona Offshore Cable Corridor (over a period of 15 months), all for the export cables. The MDS assumes 8,416,621 m^3 of spoil for installation of OSP and wind turbine foundations.

2.9.4.8 Following disturbance as a result of construction activities, the majority of re-suspended sediments are expected to be deposited in the immediate vicinity of the works (for further detail on deposition see section 2.9.3). The release of contaminants from the small proportion of fine sediments is likely to be rapidly dispersed with the tide and/or currents and therefore increased bioavailability resulting in adverse eco-toxicological effects are not expected.

2.9.4.9 The impact is predicted to be of local spatial extent, short term duration, intermittent and of high reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be **negligible**.

Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC

2.9.4.10 As outlined in paragraph 2.5.3.3, no designated features of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC were recorded during the site specific surveys in the area of overlap with the Mona Offshore Cable Corridor. However as the sediment plumes can migrate beyond the Mona Offshore Cable Corridor the designated features of the SAC have been assessed in relation to this potential impact. The magnitude of the change in environmental condition due to the potential impact from disturbance/remobilisation of sediment bound contaminants is the same as described for the Mona Offshore Cable Corridor outside the SAC as described in paragraphs 2.9.4.7 to 2.9.4.8.

2.9.4.11 The impact within the intertidal zone of the SAC is likely to be reduced compared to the subtidal zone due to the increased distance from the site of the activities which may remobilise contaminants.

2.9.4.12 The impact is predicted to be of local spatial extent, short term duration, intermittent and of high reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be **negligible**.

Sensitivity of receptor

Subtidal habitat IEFs

2.9.4.13 The disturbance/remobilisation of sediment-bound contaminants has the potential to affect all the subtidal IEFs and the sensitivity has overall been assessed to be low. Whilst the representative biotopes for the subtidal habitat IEFs are not assessed by the MarESA, in general, tolerance to heavy metals varies depending on species and tolerance tends to be low for most groups of benthic species in these IEFs. For example, the capacity of bivalves to accumulate heavy metals in their tissues, far in excess of environmental levels, is well known, resulting in sub-lethal effects (Aberkali and Trueman, 1985). Echinoderms are also regarded as being intolerant of heavy metals while polychaetes are generally tolerant (Bryan, 1984). Gounin *et al*. (1995) studied the transfer of heavy metals (iron, manganese, lead, copper and cadmium) through *Ophiothrix* beds. They concluded that heavy metals ingested or absorbed by the animals transited rapidly through the body and were expelled in the faeces and did not appear to accumulate in their tissues. The only heavy metal of concern within the subtidal area of the Mona Offshore Wind Project is arsenic. The benthic communities in this area have likely developed in an environment of existing contamination, so any release of contaminants from construction activities is not likely to significantly increase bioavailability.

2.9.4.14 The seapens and burrowing megafauna communities IEF is assessed to have a low sensitivity to the disturbance/remobilisation of sediment-bound contaminants impact. The seapens and burrowing megafauna communities IEF has a high sensitivity to transition metals, hydrocarbons (PCBs) and PAHs however this is primarily based on evidence which focusses on Actinaria and corals rather than seapens directly. For example Reichelt-Brushett and Michalek-Wagner (2005) reported a decrease in fertilisation success in the octocoral *Lobophytum compactum* following exposure to copper exposure. Furthermore, evidence of the effects of the Deep Water Horizon spill on octocorals suggests that seapens, even at depth could be affected by an oil spill (Hill *et al*., 2023). The site specific surveys however did not identify seapens at any of the stations sampled within the Mona benthic subtidal and intertidal ecology study area, therefore the sensitivity of this habitat to re-mobilised contaminants will be greatly reduced.

2.9.4.15 The subtidal coarse and mixed sediments with diverse benthic communities IEF, Annex I low resemblance stony reef (outside an SAC) IEF, Constable Bank (Annex I sandbank outside an SAC) IEF and the seapens and burrowing megafauna IEF are deemed to be of low vulnerability, high recoverability and national value. The sensitivity of the receptors is therefore, considered to be **low**.

Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC

2.9.4.16 The disturbance/remobilisation of sediment-bound contaminants has the potential to affect the Annex I sandbanks IEF, Annex I intertidal reefs IEF and Annex I subtidal reefs IEF of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC.

2.9.4.17 The Annex I sandbank IEF is assessed to have a low sensitivity to the disturbance/remobilisation of sediment-bound contaminants impact. The effect of this impact on the Annex I sandbanks IEF of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC will be the same as those described for the Constable Bank (Annex I sandbank outside an SAC) IEF, paragraphs 2.9.4.13 and 2.9.4.13, as they both represent similar features.

2.9.4.18 The Annex I subtidal reef IEF is assessed to have a low sensitivity to the disturbance/remobilisation of sediment-bound contaminants impact. The Annex I subtidal reef IEF is representative biotopes was not specifically assessed for the relevant pressures however aspects of the biotope were. Although no information on the effects of heavy metals on the assessed hydroids was found, evidence suggests that hydroids may suffer at least sub-lethal effects and possibly morphological changes and reduced growth due to heavy metal contamination. The arsenic levels have been consistent in the Irish sea ensuring communities are well adapted to these conditions making adverse impacts unlikely.

2.9.4.19 The Annex I intertidal reef IEF of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC is assessed to have a low sensitivity to the disturbance/remobilisation of sediment-bound contaminants impact. The Annex I intertidal reefs IEF may be negatively affected by the introduction of heavy metals however at most naturally occurring levels algae are able to metabolise and store arsenic without experiencing damage or mortality (Neff, 2009). Furthermore, the benthic communities have developed in an environment of existing contamination, so any release of contaminants (if present in sediments) from construction activities is not likely to significantly increase bioavailability.

2.9.4.20 The Annex I sandbanks IEF, Annex I intertidal reefs IEF and Annex I subtidal reefs IEF of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC are deemed to be of low vulnerability, high recoverability and international value. The sensitivity of the receptors is therefore, considered to be **low**.

Significance of effect

Subtidal habitat IEFs

2.9.4.21 Overall, for the subtidal coarse and mixed sediments with diverse benthic communities IEF, mixed sediments dominated by brittlestars IEF, sand and muddy sand communities with polychaetes and bivalves IEF, Annex I low resemblance stony reef (outside an SAC) IEF, Constable Bank (Annex I sandbank outside an SAC) IEF and seapens and burrowing megafauna communities IEF the magnitude of the impact of re-mobilisation of sediment bound contaminants in the construction phase is deemed to be negligible, and the sensitivity of the receptor is considered to be low. The effect will, therefore, be of **negligible** significance, which is not significant in EIA terms. This conclusion has been reached based on the low levels of sediment bound contamination across the Mona benthic subtidal and intertidal benthic ecology as well as the relevant benthic communities likely being resistant to contamination of this nature as they have developed alongside the contaminants in this environment.

Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC

2.9.4.22 Overall, for the, Annex I intertidal reefs IEF, Annex I subtidal reefs IEF and Annex I sandbanks IEF of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC the magnitude of the impact of re-mobilisation of sediment bound contaminants in the construction phase is deemed to be negligible, and the sensitivity of the receptor is considered to be low. The effect will, therefore, be of **negligible** significance, which is not significant in EIA terms. This conclusion has been reached based on the temporary nature if this impact as well as the relevant benthic communities likely being resistant to contamination of this nature as they have developed alongside the contaminants in this environment.

Decommissioning phase

Magnitude of impact

Subtidal habitat IEFs

2.9.4.23 In the decommissioning phase of the Mona Offshore Wind Project there is potential for the remobilisation of sediment bound contaminants due to sediment disturbance arising from the removal of cables, scour/cable protection and suction caissons if they are removed using the overpressure to release. During these activities, SSC may be temporarily increased.

2.9.4.24 It is reasonable to assume that the metals, PCBs and PAHs identified in the baseline characterisation survey would continue to be present in the sediments of the Mona Array Area and Mona Offshore Cable Corridor in the decommissioning phase. Therefore the magnitude of this potential impact will be similar to the construction phase aspresented in paragraphs 2.9.4.7 and 2.9.4.8.

2.9.4.25 As in the construction phase, the majority of sediments resuspended during decommissioning activities are expected to be deposited in the immediate vicinity of the works (for further detail on deposition see section 2.9.3). The release of contaminants from the small proportion of fine sediments is likely to be rapidly dispersed with the tide and/or currents and therefore increased bioavailability resulting in adverse eco-toxicological effects are not expected.

2.9.4.26 The impact is predicted to be of local spatial extent, short term duration, intermittent and of high reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be **negligible**.

Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC

2.9.4.27 As outlined in paragraph 2.5.3.3, none of the designated features of the SAC will be affected by disturbance/remobilisation of sediment-bound contaminants and have not been assessed in relation to this potential impact. However as the sediment plumes can migrate beyond the Mona Offshore Cable Corridor the designated features of the

SAC have been assessed in relation to this potential impact. The magnitude of the change in environmental condition due to the potential impact from disturbance/remobilisation of sediment bound contaminants is the same as described for the Mona Offshore Cable Corridor outside the SAC as described in paragraph 2.9.4.25.

2.9.4.28 The impact within the intertidal zone of the SAC is likely to be reduced compared to the subtidal zone due to the increased distance from the site of the activities which may remobilise contaminants.

2.9.4.29 The impact is predicted to be of local spatial extent, short term duration, intermittent and of high reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be **negligible**.

Sensitivity of receptor

Subtidal habitat IEFs

2.9.4.30 The sensitivity of the IEFs is as described previously for the construction phase assessment in paragraph 2.9.4.13 to 2.9.4.15.

2.9.4.31 The subtidal coarse and mixed sediments with diverse benthic communities IEF, mixed sediments dominated by brittlestars IEF, sand and muddy sand communities with polychaetes and bivalves IEF, Annex I low resemblance stony reef (outside an SAC) IEF, Constable Bank (Annex I sandbank outside an SAC) IEF and seapens and burrowing megafauna communities IEF are deemed to be of low vulnerability, high recoverability and national value. The sensitivity of the receptors is therefore, considered to be **low**.

Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC

2.9.4.32 The sensitivity of the IEFs is as described previously for the construction phase assessment in paragraph 2.9.4.16 to 2.9.4.19.

2.9.4.33 The Annex I sandbanks IEF, Annex I intertidal reefs IEF and Annex I subtidal reefs IEF of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC are deemed to be of low vulnerability, high recoverability and international value. The sensitivity of the receptors is therefore, considered to be **low**.

Significance of effect

Subtidal habitat IEFs

2.9.4.34 Overall, for the subtidal coarse and mixed sediments with diverse benthic communities IEF, mixed sediments dominated by brittlestars IEF, sand and muddy sand communities with polychaetes and bivalves IEF, Annex I low resemblance stony reef (outside an SAC) IEF, Constable Bank (Annex I sandbank outside an SAC) IEF and seapens and burrowing megafauna communities IEF the magnitude of the impact of re-mobilisation of sediment bound contaminants in the decommissioning phase is deemed to be negligible, and the sensitivity of the receptor is considered to be low. The effect will, therefore, be of **negligible** significance, which is not significant in EIA terms.

Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC

2.9.4.35 Overall, for the Annex I subtidal reefs IEF, Annex I intertidal reefs IEF and Annex I sandbanks IEFs of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC the magnitude of the impact of the re-mobilisation of sediment bound contaminants in the decommissioning phase is deemed to be negligible, and the sensitivity of the receptor is considered to be low. The effect will, therefore, be of **negligible** significance, which is not significant in EIA terms.

2.9.5 Long term habitat loss/habitat alteration

2.9.5.1 Long term subtidal habitat loss/habitat alteration within the Mona benthic subtidal and intertidal ecology study area will begin during the construction phase as infrastructure is gradually installed and will continue during the operations and maintenance phase when infrastructure is operational (Table 2.18). Long term habitat loss will occur directly under all wind turbine and OSP foundation structures (suction bucket jacket foundations for all structures). The installation of scour protection and cable protection (including at cable crossings), where this is required, will also lead to habitat alteration and a physical change to another seabed type under the scour/cable protection material. There may also be some small and localised long term habitat loss associated with the mooring systems (e.g. gravity based anchors) associated with the buoys which may be deployed within the Mona Array Area (including light buoys, marker buoys, LiDAR buoys, waverider buoys, noise monitoring buoys, wave measurement buoys and mooring buoys). Magnitude has been considered for both phases combined as the structures will be placed during construction and remain throughout operations and maintenance phase. The potential impact of habitat loss occurring during the decommissioning phase has also been considered as the MDS assumes that scour and cable protection will be left *in situ* following decommissioning.

2.9.5.2 The relevant MarESA pressures and their benchmarks which have used to inform this impact assessment are described here.

- Physical change (to another seabed type): the benchmark for which is change in sediment type by one Folk class (based on UK SeaMap simplified classification (Long, 2006)) and change from sedimentary or soft rock substrata to hard rock or artificial substrata or vice-versa.

2.9.5.3 These pressures are relevant to the installation of wind turbine and OSP foundations, the associated scour protection and the cable protection which will replace the sedimentary seabed with hard structures for the duration of the operations and maintenance phase (35 year operational lifetime).

2.9.5.4 The subtidal IEFs that have the potential to be affected by long term habitat loss/habitat alteration across all phases of the Mona Offshore Wind Project are those present within the Mona Array Area and Mona Offshore Cable Corridor (i.e. subtidal coarse and mixed sediments with diverse benthic communities IEF, sand and muddy sand communities with polychaetes and bivalves IEF, Annex I low resemblance stony reef (outside an SAC) IEF and seapens and burrowing megafauna communities IEF). There will not be any cable protection installed in the Constable Bank (Annex I sandbank outside an SAC) IEF. Therefore no assessment for the impact of long term habitat loss is required for this IEF.

2.9.5.5 The Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC overlaps with the Mona Offshore Cable Corridor for the Mona Offshore Wind Project and therefore some long term habitat loss may occur within the SAC. As outlined in paragraph 2.5.3.3, no designated features of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC were recorded during the site specific surveys in the area of overlap with the Mona Offshore Cable Corridor. This supports NRW's mapped distribution of designated features within the SAC (NRW, 2016), as shown in Figure 2.9. Therefore none of the designated features of the SAC will be affected by long term habitat loss and they have not been assessed in relation to this potential impact. However the magnitude of the impact of long term habitat loss on the subtidal habitat IEFs identified in the area of overlap with the SAC (i.e. subtidal coarse and mixed sediments with diverse benthic communities IEF and the sand and muddy sand communities with polychaetes and bivalves IEF) is assessed across all phases of the Mona Offshore Wind Project.

2.9.5.6 There will be no surface infrastructure installed in the intertidal landfall area. Additionally as part of the measures adopted as part of the Mona Offshore Wind Project (Table 2.19) there is a commitment to install the export cables at the Mona landfall via trenchless techniques to below MLWS. There is also a commitment to ensure that all construction and operation and maintenance activities at the Mona landfall (i.e. trenchless techniques working areas and movement of machinery, equipment and personnel) will be located outside the clay with piddocks IEF. An ECoW will also supervise any planned construction works in the intertidal zone. These measures will ensure there is no direct impact to the clay with piddocks IEF which could result in long term habitat loss or any impact to the *S. alveolata* reef IEF and the *M. edulis* bed IEF. As a result of the measures adopted as part of the Mona Offshore Wind Project no intertidal IEFs will be affected by this impact and no further assessment has been undertaken.

Construction and operations and maintenance phases

Magnitude of impact

Subtidal habitat IEFs

2.9.5.7 The presence of the Mona Offshore Wind Project infrastructure within the Mona benthic subtidal and intertidal ecology study area will result in long term habitat loss/habitat alteration. The MDS is for up to 2,192,412 m^2 of long term habitat loss/habitat alteration due to the installation of suction bucket jacket foundations and associated scour protection and cable protection associated with inter-array, interconnector and export cables (Table 2.18). This represents 0.17% of the Mona benthic subtidal and intertidal ecology study area.

2.9.5.8 Foundations and associated scour protection may account for up to 703,316 m^2 of the total long term habitat loss/habitat alteration in the Mona Array Area. Cable protection may account for up to 1,145,000 m^2 of long term habitat loss/habitat alteration. The MDS accounts for 10% of the inter-array cables, 20% of the interconnector cables and 20% of the export cables having cable protection with a width of 10 m. Additionally cable crossing protection may result in 286,960 m^2 of long term habitat loss/habitat alteration. Cable protection may be required for 67 crossings for the inter-array cable, 10 crossings for the interconnector cable and 14 crossings for the export cable.

2.9.5.9 Long term subtidal habitat loss/habitat alteration will commence during the construction phase and will continue through the 35 year operational lifetime.

2.9.5.10 The impact is predicted to be of local spatial extent, long term duration, continuous and low reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore considered to be **low**.

Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC

2.9.5.11 As outlined in paragraph 2.5.3.3, no designated features of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC were recorded during the site specific surveys in the area of overlap with the Mona Offshore Cable Corridor. None of the designated features of the SAC will be affected by long term habitat loss/habitat alteration and have not been assessed in relation to this potential impact. However the magnitude of the potential impact on the subtidal habitat IEFs identified in the area of overlap with the SAC (i.e. subtidal coarse and mixed sediments with diverse benthic communities IEF and the sand and muddy sand communities with polychaetes and bivalves IEF) is assessed.

2.9.5.12 As the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC overlaps spatially with the Mona Offshore Cable Corridor there may be long term habitat loss/habitat alteration within the SAC should cable protection be required in this area. The MDS within the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC is for cable protection for up to 10% (810 m) of export cables within the SAC and a width of 10 m. This may result in long term habitat loss/habitat alteration of 8,100 m^2, which represents 0.003% of the total area of the SAC.

2.9.5.13 The impact is predicted to be of local spatial extent, long term duration, continuous and low reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore considered to be **low**.

Sensitivity of receptor

Subtidal habitat IEFs

2.9.5.14 Long term habitat loss/habitat alteration will affect subtidal IEFs, including the subtidal coarse and mixed sediments with diverse benthic communities IEF, the sand and muddy sand communities with polychaetes and bivalves IEF, the Annex I low resemblance stony reef (outside an SAC) IEF and the seapens and burrowing megafauna communities IEF.

2.9.5.15 All subtidal IEFs have high sensitivity to long term habitat loss/habitat alteration where a change in seabed type would cause a fundamental change in habitat type (Table 2.23). As outlined previously, this habitat alteration represents a small proportion of the Mona benthic subtidal and intertidal ecology study area.

2.9.5.16 The subtidal coarse and mixed sediments with diverse benthic communities IEF, sand and muddy sand communities with polychaetes and bivalves IEF and seapens and burrowing megafauna communities IEF are characterised by their sedimentary composition. To change the seabed to rock or artificial substratum would lead to a loss of the abiotic and biotic features of the biotopes in this IEF and result in a reclassification (De-Bastos *et al*., 2023a; Perry, 2018; Tillin and Watson, 2023a; Tillin and Watson, 2023b; Tillin *et al*., 2023a; Tillin *et al.*, 2023b; Tillin, 2022Tillin and Rayment, 2023; Hill *et al.*, 2023). The low resemblance stony reef (outside an SAC) IEF is characterised by its cobbles and boulders substratum which the epifaunal community are firmly attached to (Connor *et al*., 2004). It is likely that infrastructure such as cable protection will largely occur on sedimentary habitats, and this introduced hard substrate could be colonised by similar communities which have been identified as part of low resemblance stony reefs (further detail on the colonisation of hard structures can be found in section 2.9.6).

2.9.5.17 The subtidal coarse and mixed sediments with diverse benthic communities IEF, sand and muddy sand communities with polychaetes and bivalves IEF, Annex I low resemblance stony reef (outside an SAC) IEF and seapens and burrowing megafauna communities IEF are deemed to be of high vulnerability, low recoverability and national value. The sensitivity of the receptors is therefore considered to be **high**.

Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC

2.9.5.18 As noted in paragraph 2.9.5.11, only the habitats identified by the site specific surveys in the Mona Offshore Cable Corridor which overlaps with the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC will be affected by long term habitat loss/habitat alteration associated with export cable burial. The habitats identified in the site specific survey which occur within the overlap of the Mona Offshore Cable Corridor and the SAC are the subtidal coarse and mixed sediments with diverse benthic communities IEF and the sand and muddy sand communities with polychaetes and bivalves IEF. The sensitivity of these IEFs to long term habitat loss/habitat alteration is presented in Table 2.23 and discussed in paragraphs 2.9.5.14 to 2.9.5.16.

2.9.5.19 The subtidal coarse and mixed sediments with diverse benthic communities IEF and sand and muddy sand communities with polychaetes and bivalves IEF are deemed to be of high vulnerability, low recoverability and national value. The sensitivity of the receptors is therefore considered to be **high**.

Table 2.23: Sensitivity of the benthic IEFs to long term subtidal habitat loss/habitat alteration.

IEF	Representative biotope	Sensitivity to defined MarESA Physical change (to another seabed type)	Overall sensitivity (based on Table 2.16)
Subtidal biotopes			
Subtidal coarse and mixed sediments with diverse benthic communities.	SS.SCS.CCS	High	High
	SS.SMx.CMx SS.SMx.CMx.KurThyMx	High	
	SS.SMx.OMx.PoVen	High	
Sand and muddy sand communities with polychaetes and bivalves	SS.SSa.CFiSa	High	High
	SS.SSa.IFiSa.NcirBat	High	
	SS.SSa.CMuSa	High	
	SS.SSa.IMuSa.FfabMag	High	
Annex I low resemblance stony reef (outside an SAC)	CR.HCR.XFa.SpNemAdia	High	High
Seapens and burrowing megafauna	SS.SMu.CFiMu.SpnMeg	High	High

Significance of effect

Subtidal habitat IEFs

2.9.5.20 Overall, for the subtidal coarse and mixed sediments with diverse benthic communities IEF, sand and muddy sand communities with polychaetes and bivalves IEF, Annex I low resemblance stony reef (outside an SAC) IEF and seapens and burrowing megafauna communities IEF the magnitude of the impact of long term habitat loss/habitat alteration in the construction and operations and maintenance phases is deemed to be low and the sensitivity of the receptor is considered to be high. The effect will, therefore, be of **minor** adverse significance, which is not significant in EIA terms. The long term habitat loss/habitat alteration will only affect a small proportion of the Mona benthic subtidal and intertidal ecology study area which these IEFs occupy which is unlikely to compromise the integrity of these habitat such that they wouldn't be able to support their characterising communities or perform their ecosystem function.

Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC

2.9.5.21 Overall, for the subtidal coarse and mixed sediments with diverse benthic communities IEF (within the SAC) and sand and muddy sand communities with polychaetes and bivalves IEF (within the SAC) the magnitude of the impact of long term habitat loss/habitat alteration in the construction and operations and maintenance phases is deemed to be low and the sensitivity of the receptor is considered to be high. The effect will, therefore, be of **minor** adverse significance, which is not significant in EIA terms. The long term habitat loss/habitat alteration will only affect a small proportion of the Mona benthic subtidal and intertidal ecology study area which these IEFs occupy which is unlikely to compromise the integrity of these habitat such that they wouldn't be able to support their characterising communities or perform their ecosystem function.

Decommissioning phase

Magnitude of impact

Subtidal habitat IEFs

2.9.5.22 The presence of any Mona Offshore Wind Project infrastructure within the Mona benthic subtidal and intertidal ecology study area which is left *in situ* post-decommissioning will result in permanent loss/habitat alteration. The MDS is for up to 2,135,276 m^2 of permanent habitat loss/habitat alteration due to scour protection and cable protection associated with cables and cable crossings being left *in situ* after decommissioning (i.e. only the foundations being removed). This equates to a very small proportion (1.67%) of the Mona benthic subtidal and intertidal ecology study area. In areas of previously soft sediments where the cables and scour protection are left *in situ* on the seabed, the substrate will not return to soft sediments and therefore there is no potential for recovery of sedimentary communities. Throughout the operations and maintenance phase however it is likely that the cable and scour protection will be colonised by hard structure adapted communities similar to those which occur on the natural hard substrates. The potential impact associated with the colonisation of hard structures is presented separately in section 2.9.6). As a result of this it may be more accurate to refer to the permanent presence of cable and scour protection as permanent habitat alteration rather than permanent habitat loss, as used for the other phases, as these artificial structures will provide a basis for benthic communities although they are likely to be different from those originally found at these sites.

2.9.5.23 The impact is predicted to be of local spatial extent, long term duration, continuous and irreversible. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be **low**.

Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC

2.9.5.24 As outlined in paragraph 2.5.3.3, no designated features of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC were recorded during the site specific surveys in the area of overlap with the Mona Offshore Cable Corridor. None of the designated features of the SAC will be affected by permanent habitat loss/habitat alteration and have not been assessed in relation to this potential impact. However the magnitude of the impact on the subtidal habitat IEFs identified in the area of overlap with the SAC (i.e. subtidal coarse and mixed sediments with diverse benthic communities IEF and the sand and muddy sand communities with polychaetes and bivalves IEF) is assessed.

2.9.5.25 The MDS states that cables and cable protection may remain *in situ* following decommissioning. The MDS assumes that any cable protection installed within the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC will remain there in perpetuity contributing to permanent habitat loss/alteration. Paragraph 2.9.5.11 provides an explanation of the assumptions used to determine the MDS for cable protection within the SAC. There may be up to 8,100 m^2 of permanent habitat loss/alteration, which represents 0.003% of the total area of the SAC.

2.9.5.26 The impact is predicted to be of local spatial extent, long term duration, continuous and low reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be **low**.

Sensitivity of receptor

Subtidal habitat IEFs

2.9.5.27 The sensitivity of the subtidal coarse and mixed sediments with diverse benthic communities IEF, sand and muddy sand communities with polychaetes and bivalves IEF and seapens and burrowing megafauna communities IEF are as described previously for the construction phase assessment in paragraph 2.9.5.14 to 2.9.5.17 and above in Table 2.23.

2.9.5.28 The subtidal coarse and mixed sediments with diverse benthic communities IEF, sand and muddy sand communities with polychaetes and bivalves IEF, Annex I low resemblance stony reef (outside an SAC) IEF and seapens and burrowing megafauna communities IEF are deemed to be of high vulnerability, low recoverability and national value. The sensitivity of the receptor is therefore considered to be **high**.

Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC

2.9.5.29 The sensitivity of the subtidal coarse and mixed sediments with diverse benthic communities IEF and sand and muddy sand communities with polychaetes and bivalves IEF are as described previously for the construction phase assessment in paragraph 2.9.5.18 and above in Table 2.23.

2.9.5.30 The subtidal coarse and mixed sediments with diverse benthic communities IEF and sand and muddy sand communities with polychaetes and bivalves IEF are deemed to be of high vulnerability, low recoverability and national value. The sensitivity of the receptor is therefore considered to be **high**.

Significance of effect

Subtidal habitat IEFs

2.9.5.31 Overall, for the subtidal coarse and mixed sediments with diverse benthic communities IEF, sand and muddy sand communities with polychaetes and bivalves IEF, Annex I low resemblance stony reef (outside an SAC) IEF and seapens and burrowing megafauna communities IEF the magnitude of the permanent habitat loss/habitat alteration impact in the decommissioning phase is deemed to be low and the sensitivity of the receptor is considered to be high. The effect will, therefore, be of **minor** adverse significance, which is not significant in EIA terms. The long term habitat loss/habitat alteration will only affect a very small proportion of the Mona benthic subtidal and intertidal ecology study area which these IEFs occupy which is unlikely to compromise the integrity of these habitat such that they wouldn't be able to support their characterising communities or perform their ecosystem function.

Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC

2.9.5.32 Overall, for the subtidal coarse and mixed sediments with diverse benthic communities IEF (within the SAC) and sand and muddy sand communities with polychaetes and bivalves IEF (within the SAC) the magnitude of the permanent habitat loss/habitat alteration impact in the decommissioning phase is deemed to be low and the sensitivity of the receptor is considered to be high. The effect will, therefore, be of **minor** adverse significance, which is not significant in EIA terms. The long term habitat loss/habitat alteration will only affect a very small proportion of the Mona benthic subtidal and intertidal ecology study area which these IEFs occupy which is unlikely to compromise the integrity of these habitat such that they wouldn't be able to support their characterising communities or perform their ecosystem function.

2.9.6 Introduction of artificial structures

2.9.6.1 The introduction of artificial structures within the Mona benthic subtidal and intertidal ecology study area may result in the colonisation of foundations, scour protection and cable protection by new communities. As outlined in Table 2.18, the MDS also includes for the removal of marine growth from foundations and the impacts associated with the deposition of this material on the seabed. This potential impact considers the effects of these new communities on the existing IEFs as well as the physical environment such as the sediment composition of the Mona benthic subtidal and intertidal ecology study area.

2.9.6.2 The environmental pressures associated with this potential impact are the same as those associated with long term subtidal habitat loss/habitat alteration because the physical change (to another substratum type) pressure involves the permanent loss of one marine habitat type but has an equal creation of a different marine habitat type component such as the installation of wind turbine foundations and cable protection (Tillin and Tyler-Walters, 2015b; 2014a,b). The pressure is described for the MarESA in paragraph 2.9.5.2.

2.9.6.3 The subtidal IEFs that have the potential to be affected by the introduction of artificial structures across all phases of the Mona Offshore Wind Project are those present within the Mona Array Area and Mona Offshore Cable Corridor (i.e. subtidal coarse and mixed sediments with diverse benthic communities, sand and muddy sand communities with polychaetes and bivalves and seapens, Annex I low resemblance stony reef (outside an SAC) IEF and burrowing megafauna communities) (see Table 2.20).

2.9.6.4 The Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC overlaps with the Mona Offshore Cable Corridor for the Mona Offshore Wind Project and therefore the introduction of artificial structures may potentially impact the SAC. As outlined in paragraph 2.5.3.3, no designated features of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC were recorded during the site specific surveys in the area of overlap with the Mona Offshore Cable Corridor. This supports NRW's mapped distribution of designated features within the SAC (NRW, 2016), as shown in Figure 2.9. Therefore none of the designated features of the SAC will be affected by the introduction of artificial structures and have not been assessed in relation to this potential impact. However the magnitude of the potential impact of the introduction of artificial structures on the subtidal habitat IEFs identified in the area of overlap with the SAC (i.e. subtidal coarse and mixed sediments with diverse benthic communities IEF and the sand and muddy sand communities with polychaetes and bivalves IEF) is assessed across all phases of the Mona Offshore Wind Project.

2.9.6.5 There will be no surface infrastructure installed at the Mona landfall therefore no intertidal IEFs will be affected by this impact and no further assessment has been undertaken.

Construction and operations and maintenance phases

Magnitude of impact

Subtidal habitat IEFs

2.9.6.6 The MDS is for up to 2,685,616 m^2 of area associated with the introduction of artificial structures due to the installation of suction bucket jacket foundations, associated scour protection and cable protection associated with inter-array cables, interconnector and export cables as well as their associated crossings (Table 2.18). This equates to 0.21% of the Mona benthic subtidal and intertidal ecology study area. This value however is likely an over estimation of area of artificial structures introduced as it has been calculated assuming the foundations were a solid structure. In reality the suction caisson jacket foundations will have a lattice design rather than a solid surface, which would result in a smaller surface area than has been assumed for the MDS. It is expected that the foundations and scour and cable protection will be colonised by epifaunal species already occurring in the Mona benthic subtidal and intertidal ecology study area (e.g. tunicates, bryozoans, mussels and barnacles which are typical of temperate seas).

2.9.6.7 The introduction of new artificial structures will represent a shift in the baseline conditions from soft substrate areas (i.e. muds, sands and gravels) to hard substrate in the areas where infrastructure is present. This may produce some potentially beneficial effects, for example the likely increase in biodiversity and individual abundance of reef species and total number of species over time, as has been observed at the monopile foundations installed at Lysekil research site (a test site for offshore wind-based research, north of Gothenburg, Sweden) (Bender *et al.*, 2020).

This is supported by recent research by Lefaible *et al.* (2023) which found that species richness and abundance were both elevated in the immediate vicinity of foundations (37 m from the foundations), but the effect was absent at a distance (350 – 500 m from the foundations).

2.9.6.8 Additionally, the structural complexity of the substrate may provide refuge as well as increasing feeding opportunities for larger and more mobile species. The presence of mobile benthic organisms is thought to be dependent on sufficient food sources, cover of epibenthic communities and appropriate habitat with shelter opportunities to hide from predators (Langhamer, and Wilhelmsson, 2009). This effect can also be applied to jacket foundations, a study by Lefaible *et al*. (2019) identified that jacket foundations had higher densities and diversity (species richness) of species in closer vicinity of the wind turbines compared to a control and a monopile foundation. Mavraki *et al.* (2020), study of gravity-based foundations in the Belgian part of the North Sea found that higher food web complexity was associated with zones where high accumulation of organic material such as soft substrate or scour protection, suggesting potential reef effect benefits from the presence of the hard structures.

2.9.6.9 The project description (Volume 1, Chapter 3: Project description of the Environmental Statement) and MDS (Table 2.18) includes for the removal of marine growth from foundations and access ladders. As this material may become deposited on the seabed, the reef effect may be enhanced, potentially extending out from the foundation itself. An investigation conducted at the research platform Forschungsplattformen in Nord- und Ostsee 1 FINO 1 in the southwest German Bight in the North Sea reported that yearly, 878,000 single shell halves from *Mytilus edulis* sink onto the seabed from the FINO 1 platform, thereby greatly extending the reef effects created by the construction of the offshore platform structure (Krone *et al*., 2013). Removal of marine growth from the wind turbine foundations may also cause debris to fall within the vicinity of the wind turbine foundation. It is likely that seaweed/algal material would disperse into the water column, with heavier material (e.g. mussels) being deposited within 10 m to 15 m of the foundation. This material has the potential to change the prevailing sediment type in the immediate vicinity of the wind turbines, and therefore extending the reef effect. The impact associated with the potential for the removal of marine growth to release invasive species is assessed in section 2.9.7.

2.9.6.10 Studies have shown that the installation and operation of offshore wind farms have no significant impact on the wider soft sediment environments beyond the immediate impact of the loss of habitat. De Backer *et al*. (2020) found that, eight to nine years after the installation of C-power and Belwind offshore wind farms (offshore Belgium), the soft sediment epibenthos experienced no significant changes and the species originally inhabiting the sandy sediments were still present and remained dominant in both wind farms. The most recent benthic post-construction monitoring data of wind turbine foundations from Beatrice offshore wind farm (APEM, 2021) found foundation colonisation of wind turbines had little influence on the sedimentary habitat below. Furthermore a study by Li *et al*. (2023) concluded there are no net adverse impacts during offshore wind farm operation phase (assuming 25-year operation) on benthic communities inhabiting the baseline sandy environment within many offshore wind farms.

2.9.6.11 The increased biodiversity, species richness and species abundance which has been noted as a result of colonisation of feature of artificial structures such as the jacket foundations of wind turbines, will also provide greater foraging opportunities for some fish species (this has been assessed in Volume 2, Chapter 3: Fish and shellfish ecology of the Environmental Statement). This is supported by monitoring from

Beatrice offshore wind farm (APEM, 2022) which noted fish and shellfish at the base of foundations although no biological material was recorded on the seabed. Material may be rapidly consumed by organisms or relocated due to tidal currents and further monitoring will be required to clarify if biological material builds up over time (APEM, 2022). Any additionally effects up the food chain are considered in relation to marine mammals (Volume 2, Chapter 4: Marine mammals of the Environmental Statement) and ornithology (Volume 2, Chapter 5: Offshore ornithology of the Environmental Statement) in their individual chapters.

2.9.6.12 A review by Degraer *et al.* (2020) explained the process by which wind turbine foundations are colonised and the vertical zonation of species that can occur. In general biofouling communities on offshore installations are dominated by mussels, macroalgae, and barnacles near the water surface, essentially creating a new intertidal zone; filter feeding arthropods at intermediate depths; and anemones in deeper locations (De Mesel *et al*., 2015). Colonisation by these species will likely represent an increase in biodiversity and a change compared to the situation if no hard substrates were present (Lindeboom *et al*., 2011).

2.9.6.13 The impact is predicted to be of local spatial extent, long term duration, continuous and irreversible during the lifetime of the Mona Offshore Wind Project. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be **low**.

Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC

2.9.6.14 As outlined in paragraph 2.5.3.3, no designated features of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC were recorded during the site specific surveys in the area of overlap with the Mona Offshore Cable Corridor. None of the designated features of the SAC will be affected by the introduction of artificial structures and have not been assessed in relation to this potential impact. However the magnitude of the potential impact on the subtidal habitat IEFs identified in the area of overlap with the SAC (i.e. subtidal coarse and mixed sediments with diverse benthic communities IEF and the sand and muddy sand communities with polychaetes and bivalves IEF) is assessed.

2.9.6.15 Within the overlap of the Mona Offshore Cable Corridor and the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC cable protection may be required which would result in the introduction of artificial structures. The MDS for the SAC accounts for cable protection for up to 10% (810 m) of export cables within the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC with a width of 10 m. This results in up to 8,100 m^2 of cable protection available for colonisation within the SAC, which represents 0.003% of the total area of the SAC.

2.9.6.16 The potential effects of the installation of the cable protection within the predominantly sedimentary habitat of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC are the same as those described in paragraphs 2.9.6.7 to 2.9.6.12 for the subtidal habitat IEFs.

2.9.6.17 The impact is predicted to be of local spatial extent, long term duration, continuous and irreversible during the lifetime of the Mona Offshore Wind Project. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be **low**.

Sensitivity of receptor

Subtidal habitat IEFs

2.9.6.18 The sensitivity of the IEFs to physical change (to another substratum) is as described previously for the long term subtidal habitat loss/habitat alteration assessment and above in 2.9.5.2. The sensitivity for all IEFs to introduction of artificial structures is high.

2.9.6.19 Within the Mona benthic subtidal and intertidal ecology study area sediments are dominated by gravelly sand. Furthermore, Annex I low resemblance stony reef (outside an SAC) have also been identified in the Mona benthic subtidal and intertidal ecology study area. As such, the introduction of artificial structures due to installation of foundation structures, associated scour protection, and any cable protection, will represent a shift in community type and will have a direct effect on benthic ecology IEFs through the colonisation of these hard substrates.

2.9.6.20 Colonisation of the foundations, associated scour protection and cable protection may have indirect adverse effects on the baseline communities and habitats due to increased predation on and competition with the existing soft sediment species. These effects are difficult to predict, especially as monitoring to date has focused on the colonisation and aggregation of species close to the foundations rather than broad scale studies.

2.9.6.21 Placing the hard structures on the seabed not only creates new habitat but also modifies or removes existing habitat. Often it replaces an essentially two-dimensional sedimentary seabed, such as subtidal sandbanks, with a complex 3-D structure, thereby increasing surface area, surface complexity and number of niches (e.g. Dannheim *et al*., 2019). The development of such surfaces and their role in connectivity of populations depends on the right type of surface being created but also in the right location and distances from source populations (Marine Pollution Bulletin, 2022). The surface may only be suitable for colonisation after being suitably weathered, through the loss of any surface contaminants, the production of biofilms and the sequence of development of the community after settlement (Marine Pollution Bulletin, 2022).

2.9.6.22 Some studies have also shown that the installation and operation of offshore wind farms have no significant impact on the soft sediment environments. De Backer et al. (2020) found that eight to nine years after the installation of C-power and Belwind offshore wind farms (offshore Belgium) the soft sediment epibenthos underwent no drastic changes; and the species originally inhabiting the sandy bottom were still present and remained dominant in both wind farms. Additionally, a review of monitoring from Block Island wind farm in the United States showed no strong gradients of change in sediment grain size, enrichment, or benthic macrofauna within 30 - 90 m distance bands of the wind turbines (Hutchison *et al.,* 2020).

2.9.6.23 The deployment of scour and cable protection may facilitate the colonisation of rock protection by epifaunal species typical of coarse sediment which are found within the southeast of the Mona Array Area. Previous studies have shown that for artificial hard substrate to be colonised by a benthic community similar to that of the baseline, its structure should resemble that of the baseline habitat as far as possible (Coolen, 2017). The addition of smaller grained material to scour/cable protection may therefore be of some benefit to the native epifaunal communities (Van Duren *et al*., 2017; Lengkeek *et al*., 2017).

2.9.6.24 The most recent monitoring data at the time of writing this chapter to come from an operational wind farm has come from Beatrice Offshore Wind farm Post-Construction

Monitoring (APEM, 2022). This monitoring was undertaken in October 2020 and used DDV, remotely operated vehicles and grab samples to gather qualitative data on the biofouling community composition on wind turbines (four wind turbines with jacketed foundations in four different locations within the wind farm, assessed to a depth of 45 m) and the surrounding seabed. The results found extensive biofouling on all the wind turbines with signs of zonation and successional development. The zonation was dependent on depth and the dominance of a few key species. Across all wind turbines Metridium senile plumose anemones and *Spirobranchus triqueter* keel worms were the most abundant species, with the highest biomass found at mid depths of 40 m with lower biomass above and below. The splash zone and top 5 m of the foundations was dominated by algal turf and kelp, this gave way to cnidarian dominated community at around 5 - 10 m and this transitioned to a keel worm dominated zone between 25 m and 4 m depth. At the base in the immediate vicinity of the wind turbines the Pagurus bernhardus hermit crabs, flatfish and Echinus esculentus common sea urchin were found with decreasing abundance further from the foundation indicating a source of food although no biological matter could be seen. Gadoid fish could also be seen but not identified to species level. The zonation pattern is likely to remain constant except for small scale changes. The zonation pattern may change if the communities are disturbed by the introduction of a new species such as the M. edulis which is notably absent as it commonly found in other wind farms.

2.9.6.25 The introduction of this hard substrate may also have potential impacts on the distribution of species as this kind of artificial infrastructure can influence larval dispersion. Research in this area comes from the oil and gas sector which examines the potential impact of infrastructure regarding the interception and production of larvae (McLean *et al*., 2022). The larvae can be triggered to settle on infrastructure by sound, chemical cues, light and vibrations. Where platforms exist in offshore waters far from natural reef features, their influence on larval dispersal and settlement may be comparatively high, relative to platforms in more naturally connected environments, therefore influencing geographic and population connectivity (McLean *et al*., 2022). As species become established on oil and gas structures, they can start producing larvae (e.g. Henry *et al*., 2018). On such example of this in the North Sea found interannual variability in the North Atlantic Oscillation results in larvae of the protected cold-water coral species, *Lophelia pertusa* being dispersed from oil and gas structures across distances of ~300 km (Fox *et al*., 2016) and into marine protected areas (Henry *et al*., 2018). The influence of oceanographic features in species dispersal and distribution however emphasizes the importance in characterising the hydrodynamics underpinning potential connectivity (Boschetti *et al*., 2020). Potential barriers to settlement, growth, reproduction and survival of larvae on offshore energy infrastructure also exist, including cleaning regimes, surface coatings (e.g. antifoulant) and operational discharges.

2.9.6.26 All of the subtidal IEFs (subtidal coarse and mixed sediments with diverse benthic communities IEF, sand and muddy sand communities with polychaetes and bivalves IEF, Annex I low resemblance stony reef (outside an SAC) IEF and seapens and burrowing megafauna communities IEF) are deemed to be of high vulnerability, low recoverability, and national value. The sensitivity of the IEFs is therefore, considered to be **high**.

Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC

2.9.6.27 The sensitivity of the subtidal habitats IEFs within the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC (i.e. subtidal coarse and mixed sediments with diverse benthic communities IEF and sand and muddy sand communities with polychaetes and bivalves IEF) to physical change (to another substratum) are as described previously for the long term subtidal habitat loss/habitat alteration assessment and in Table 2.23.

2.9.6.28 The sensitivity for all IEFs to introduction of artificial structures is high. The discussion regarding the potential adverse and beneficial potential impact of the introduction of artificial structures into soft sediment environments is presented in paragraphs 2.9.6.22 to 2.9.6.25.

2.9.6.29 The subtidal coarse and mixed sediments with diverse benthic communities IEF and sand and muddy sand communities with polychaetes and bivalves IEF are deemed to be of high vulnerability, low recoverability, and national value. The sensitivity of the IEFs is therefore, considered to be **high**.

Significance of effect

Subtidal habitat IEFs

2.9.6.30 Overall, for the subtidal coarse and mixed sediments with diverse benthic communities IEF, sand and muddy sand communities with polychaetes and bivalves IEF, Annex I low resemblance stony reef (outside an SAC) IEF and seapens and burrowing megafauna communities IEF the magnitude of the introduction of artificial structures impact in the construction and operations and maintenance phases is deemed to be low and the sensitivity of the receptor is considered to be high. The effect will, therefore, be of **minor** adverse significance, which is not significant in EIA terms. This conclusion has been reached based on the localised nature of this impact which is focussed on wind turbine and OSP foundations, and the immediate surrounding area, as well as cable and scour protection.

Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC

2.9.6.31 Overall, for the subtidal coarse and mixed sediments with diverse benthic communities IEF (within the SAC) and sand and muddy sand communities with polychaetes and bivalves IEF (within the SAC) the magnitude of the introduction of artificial structures impact in the construction and operations and maintenance phases is deemed to be low and the sensitivity of the receptor is considered to be high. The effect will, therefore, be of **minor** adverse significance, which is not significant in EIA terms. This conclusion has been reached based on the localised nature of the impact of cable protection.

Decommissioning phase

Magnitude of impact

Subtidal habitat IEFs

2.9.6.32 The presence of any Mona Offshore Wind Project infrastructure within the Mona benthic subtidal and intertidal ecology study area which is left *in situ* post-decommissioning will result in permanent presence of artificial structures. The MDS is for up to 2,135,276 m^2 of permanent artificial structures due to scour protection and cable protection associated with cables and cable crossings potentially being left *in situ* after decommissioning (i.e. only the wind turbine and OSP foundations being removed). This equates to a very small proportion (1.67%) of the Mona benthic subtidal and intertidal ecology study area. In areas of previously soft sediments where the cables and scour protection are left *in situ* on the seabed, the substrate will not return to soft sediments and will be permanently altered by the presence of cable and scour protection, as these artificial structures will provide a substrate for benthic communities although they are likely to be different from those originally found at these sites.

2.9.6.33 The impact is predicted to be of local spatial extent, long term duration, continuous and irreversible. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be **low**.

Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC

2.9.6.34 As outlined in paragraph 2.5.3.3, no designated features of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC were recorded during the site specific surveys in the area of overlap with the Mona Offshore Cable Corridor. None of the designated features of the SAC will be affected by the introduction of artificial structures and have not been assessed in relation to this potential impact. However the magnitude of the potential impact on the subtidal habitat IEFs identified in the area of overlap with the SAC (i.e. subtidal coarse and mixed sediments with diverse benthic communities IEF and the sand and muddy sand communities with polychaetes and bivalves IEF) is assessed.

2.9.6.35 The MDS assumes that any cable protection installed within the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC may remain there in perpetuity contributing to permanent habitat alteration. Paragraph 2.9.5.11 provides an explanation of the assumptions used to determine the MDS for cable protection within the SAC. There may be up to 8,100 m^2 of permanent artificial habitat available for colonisation, which represents 0.003% of the total area of the SAC.

2.9.6.36 The impact is predicted to be of local spatial extent, long term duration, continuous and low reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be **low**.

Sensitivity of receptor

Subtidal habitat IEFs

2.9.6.37 The sensitivity of the subtidal coarse and mixed sediments with diverse benthic communities IEF, sand and muddy sand communities with polychaetes and bivalves IEF, Annex I low resemblance stony reef (outside an SAC) IEF and seapens and burrowing megafauna communities IEF are as described previously for the construction phase assessment in paragraph 2.9.6.18 to 2.9.6.25.

2.9.6.38 The subtidal coarse and mixed sediments with diverse benthic communities IEF, sand and muddy sand communities with polychaetes and bivalves IEF, Annex I low resemblance stony reef (outside an SAC) IEF and seapens and burrowing megafauna communities IEF are deemed to be of high vulnerability, low recoverability and national value. The sensitivity of the receptor is therefore considered to be **high**.

Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC

2.9.6.39 The sensitivity of the subtidal coarse and mixed sediments with diverse benthic communities IEF and sand and muddy sand communities with polychaetes and bivalves IEF are as described previously for the construction phase assessment in paragraph 2.9.6.27 and 2.9.6.28.

2.9.6.40 The subtidal coarse and mixed sediments with diverse benthic communities IEF and sand and muddy sand communities with polychaetes and bivalves IEF are deemed to be of high vulnerability, low recoverability and national value. The sensitivity of the receptor is therefore considered to be **high**.

Significance of effect

Subtidal habitat IEFs

2.9.6.41 Overall, for the subtidal coarse and mixed sediments with diverse benthic communities IEF, sand and muddy sand communities with polychaetes and bivalves IEF, Annex I low resemblance stony reef (outside an SAC) IEF and seapens and burrowing megafauna communities IEF the magnitude of the introduction of artificial structures impact in the decommissioning phase is deemed to be low and the sensitivity of the receptor is considered to be high. The effect will, therefore, be of **minor** adverse significance, which is not significant in EIA terms. This conclusion has been reached based on the localised nature of this impact which is focussed on the immediate area surrounding area the cable and scour protection.

Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC

2.9.6.42 Overall, for the subtidal coarse and mixed sediments with diverse benthic communities IEF (within the SAC) and sand and muddy sand communities with polychaetes and bivalves IEF (within the SAC) the magnitude of the introduction of artificial structures impact in the decommissioning phase is deemed to be low and the sensitivity of the receptor is considered to be high. The effect will, therefore, be of **minor** adverse significance, which is not significant in EIA terms. This conclusion has been reached based on the localised nature of the impact of cable protection.

2.9.7 Increased risk of introduction and spread of invasive non-native species

2.9.7.1 The installation/presence of artificial structure and the movements of construction vessels may lead to an increased risk of introduction and spread of INNS across all phases of the Mona Offshore Wind Project.

2.9.7.2 The benchmark for the relevant MarESA pressure which has been used to inform this impact assessment is described here.

- Introduction or spread of INNS: The benchmark for which is the introduction of one or more INNS.

2.9.7.3 This pressure is relevant to the introduction of new substrates into an established community.

2.9.7.4 The subtidal IEFs that have the potential to be affected by the increased risk of introduction and spread of INNS across all phases of the Mona Offshore Wind Project are those present within the Mona Array Area and Mona Offshore Cable Corridor (i.e. subtidal coarse and mixed sediments with diverse benthic communities, sand and muddy sand communities with polychaetes and bivalves, Annex I low resemblance stony reef (outside an SAC) IEF, Constable Bank (Annex I sandbank outside an SAC) and seapens and burrowing megafauna communities) (see Table 2.20).

2.9.7.5 The Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC overlaps with the Mona Offshore Cable Corridor for the Mona Offshore Wind Project and therefore some increased risk of introduction and spread of INNS may occur within the SAC. As outlined in paragraph 2.5.3.3, no designated features of the Y Fenai a Bae

Conwy/Menai Strait and Conwy Bay SAC were recorded during the site specific surveys in the area of overlap with the Mona Offshore Cable Corridor. This supports NRW's mapped distribution of designated features within the SAC (NRW, 2016), as shown in Figure 2.9. Therefore whilst none of the designated features of the SAC will be directly affected by increased risk of introduction and spread of INNS there is the potential for a stepping stone effect and these features to be impacted. Therefore the Annex I sandbanks IEF and Annex I subtidal reef IEF of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC have been fully assessed in relation to this impact.

2.9.7.6 There will be no surface level infrastructure installed in the intertidal zone for the Mona Offshore Wind Project therefore no further assessment of the intertidal IEFs has been undertaken.

Construction phase

Magnitude of impact

Subtidal habitat IEFs

2.9.7.7 The MDS during the construction phase is for the gradual introduction of up to 2,685,616 m^2 of artificial structures and for up to 2,215 vessel round trips over a maximum duration of up to four years (Table 2.18).

2.9.7.8 There are however a number of existing vessel movements occurring within the Mona benthic subtidal and intertidal ecology study area. Ferries represent a large proportion of the vessel traffic in this region. These ferries primarily move between the mainland UK and Ireland or Northern Ireland. Shipping is also a major contributor with busy ports such as Liverpool operating out of the region. There is also an active fishing industry in this region, with fishing ports such as Amlwch, Conwy, Holyhead and Fleetwood being the most active. During the offshore geophysical, environmental and geotechnical surveys in 2021 and 2022, 124 and 18 fishing vessels were identified for each respective year in the Mona Array Area or in the vicinity (within 10 nm). Approximately 771 – 857 vessels in total pass through the Mona Array Area per year, a rate of 55 – 61 per day (Volume 2, Chapter 7: Shipping and navigation of the Environmental Statement). The addition of Mona Offshore Wind Project construction traffic to this region, over a short period (i.e. up to four years) does not represent a level of vessel activity uncommon to this area, therefore it does not represent a large increase in risk as many of these vessels will be travelling further afield than the construction vessels potentially exposing themselves to INNS.

2.9.7.9 There are multiple marine INNS that are now widespread and well established in this region of Wales and England. The NBN Atlas Wales (2018) has records of five invasive species along the north Wales coast and in the waters to the north. The most common INNS found on the north Wales coast is the modest barnacle (*Austrominius modestus*) which is native to New Zealand. Offshore the Chinese diatom (*Odontella sinensis*) is an INNS of interest to Wales as of August 2020 and can be found offshore all along the Welsh coast. A DEFRA and Marine Strategy Framework Directive database also had a record of the Atlantic Jack-knife clam *Ensis leei* on the north Wales coast; however there has been only one record of this species (to the east of the Mona landfall site). The three other INNS (*Antithamnionella spirographidis, Asterocarpa humilis* and *Bonnemaisonia hamifera*) can be found on the west coast of Anglesey around Holyhead port. This distance from any construction activity makes them unlikely to be spread as a result of the Mona Offshore Wind Project.

2.9.7.10 Furthermore, the colonial ascidian *Didemnum vexillum* has also been identified in the Holyhead region. It tends to colonise artificial structures, rocks, boulders and even tide pools. It is usually found in low energy environments where water motion is limited (Gibson-Hall and Bilewitch, 2018). In 2009 an experimental attempt to remove the *D. vexillum* from Holyhead harbour by isolating, smothering and killing the sea squirt using physical (plastic wrapping) and chemical (calcium hypochlorite) methods was documented by Holt and Cordingley (2011). These methods were largely successful following an eight-month treatment period however five months following cessation of removal activities survey work revealed large numbers of very small colonies of *D. vexillum* and rapidly growing larger colonies over a much larger proportion of the marina (Holt and Cordingley, 2011). Further efforts to remove the *D. vexillum* were not pursued. This study highlights the pervasive nature of this species once it is introduced. The slipper limpet *Crepidula fornicata* has also been identified in the north of Cardigan Bay, in the Menai Strait and off the north and west coast of Anglesey. They are typically found attached to shells and stones on sedimentary substrata around the low water mark and the shallow sublittoral (Rayment, 2008). The American piddock *Petricolaria pholadiformis* has also been identified along the north Wales coast. This species is a mechanical borer into hard clay, chalk, solid mud, peat-moss and limestone from the mid-tide level to low water (Budd, 2005).

2.9.7.11 There are several other INNS which can be found along the English coast to the west of the Mona Offshore Wind Project including species such as Wakame *Undaria pinnatifida* and leathery sea squirt *Styela clava* which have been recorded around Liverpool port.

2.9.7.12 Many of the vessels use during the construction phase are likely to be from the region therefore the introduction of species form outside the region is unlikely, some of the species already in the region however are known to spread as fouling on ships hulls which could introduce them to the Mona Array Area and Mona Offshore Cable Corridor.

2.9.7.13 As set out in Table 2.19, an Offshore EMP will be implemented, which will aim to manage and reduce the risk of potential introduction and spread of INNS so far as reasonably practicable. Included in the Offshore EMP will be a Biosecurity Risk Assessment as well as an INNS Management Plan which will detail the measures to ensure vessels comply with the IMO ballast water management guidelines. It will consider the origin of vessels and contain standard housekeeping measures for such vessels as well as specific measures to be adopted in the event that a high alert species is recorded. This will ensure that the risk of potential introduction and spread of INNS will be minimised.

2.9.7.14 The impact is predicted to be of local spatial extent, long term duration, intermittent and low reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be **low**.

Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC

2.9.7.15 As outlined in paragraph 2.9.6.14, the MDS for the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC accounts for cable protection for up to 10% (810 m) of export cables within the SAC with a width of 10 m. This results in the gradual introduction of up to 8,100 m^2 of cable protection available for colonisation, and potential introduction of INNS, within the SAC (0.003% of the total area of the SAC). Vessel movements will also occur within the SAC during the construction phase, and although it is not possible to quantify the amount of activity specifically in the SAC, the number will be much less than the total 2,215 vessel round trips during the construction phase associated with the whole Mona Offshore Wind Project (i.e. up to 40 cable lay installation and support vessel movements may be required in total and some of those will occur within the SAC). There is the potential that any INNS which colonise the cable protection in the area of the Mona Offshore Cable Corridor which overlaps with the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC, may use this as a stepping stone to spread further in to the SAC and potentially affect the designated features of the site.

2.9.7.16 The impact is predicted to be of local spatial extent, long term duration, intermittent and low reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be **low**.

Sensitivity of receptor

Subtidal habitat IEFs

2.9.7.17 The sensitivities of the benthic subtidal IEFs to this impact are presented in Table 2.24 and based on the information available to inform the MarESA, there is a range in sensitivity of the IEFs present to the increased risk of introduction and spread of INNS.

2.9.7.18 The subtidal coarse and mixed sediments with diverse benthic communities IEF and sand and muddy sand communities with polychaetes and bivalves IEF have been assessed by the MarESA as having a high sensitivity to the increased risk of introduction and spread of INNS. Few non-indigenous species are able to colonise mobile sands due to the high level of disturbance (Tillin and Watson, 2023a). The assessment however highlights two specific species of concern, the slipper limpet *C. fornicata* which can settle on stones and other hard substrate such as bivalve shells to form dense carpets which smother the underlying bivalves (Tillin and Watson, 2023a). Ultimately this may result in a change to the overall substrate type which may make it unsuitable for the settlement of native larvae. The colonial ascidian *D. vexillum* is present in the UK but appears to be restricted to artificial surfaces, this species may, however, have the potential to colonise and smother offshore gravel habitats (Tillin and Watson, 2023a). Additionally, although not currently established in UK waters, the whelk *Rapana venosa* may spread to UK habitats from Europe (Tillin and Watson, 2023b). Both *C. fornicata* and *D. vexillum* have been identified on the north Wales coast and therefore have the potential to extend into this biotope. For the majority of the subtidal biotopes the sediments characterising these IEFs are likely to be too mobile or otherwise unsuitable for most of the recorded INNS currently recorded in the UK (Tillin and Rayment, 2023; Tillin *et al.*, 2023b; Tillin and Watson, 2023a Tillin and Watson, 2023b) however the greatest risk is associated with *C. fornicata*. *C. fornicata* was not recorded in any of the site specific surveys for the Mona benthic subtidal and intertidal ecology study area.

2.9.7.19 Due to the challenging habitat that the Annex I low resemblance stony reef (outside an SAC) IEF occupies, with high levels of scour, it is unlikely invasive species will enter this biotope (Readman *et al*., 2023a). Currently however there is no direct evidence regarding the reaction of this biotope to INNS. Despite this lack of evidence as a hard substrate it is likely that this habitat is at risk from INNS.

2.9.7.20 The Constable Bank (Annex I sandbank outside an SAC) IEF has been assessed by the MarESA as having a high sensitivity to the increased risk of introduction and spread of INNS. The Constable Bank (Annex I sandbank outside an SAC) IEF is considered by the MarESA to be sensitive to the same INNS which could impact upon the subtidal coarse and mixed sediments with diverse benthic communities IEF. Therefore see paragraph 2.9.7.18 for details on the potential effect of INNS on this IEF.

2.9.7.21 The seapens and burrowing megafauna communities IEF has been assessed as having a high sensitivity to the increased risk of introduction and spread of INNS. The MarESA doesn't provide an assessment for the seapens and burrowing megafauna communities IEF however it does provide some research. For example, *Sternapsis scutata* is a non-native polychaete that has extended its range in inshore muddy sediments in the southwest of the UK (Shelley *et al*., 2008). In a mesocosm experiment, little effect on biological functioning was detected after the introduction of the polychaete and a doubling of its biomass (Shelley *et al*., 2008). Additionally as noted in paragraphs 2.9.7.9 and 2.9.7.11, many of the INNS found in this region are found on coarse sediments or artificial structures such as ports and are not adapted to the sandy and muddy sediments that this IEF is found in.

2.9.7.22 The subtidal coarse and mixed sediments with diverse benthic communities IEF, sand and muddy sand communities with polychaetes and bivalves IEF, Annex I low resemblance stony reef (outside an SAC) IEF, Constable Bank (Annex I sandbank outside an SAC) IEF and seapens and burrowing megafauna communities IEF are deemed to be of high vulnerability, low recoverability, and national value. The sensitivity of the IEFs is therefore considered to be **high**.

Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC

2.9.7.23 The Annex I sandbanks IEF of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC contains the same biotopes as the Constable Bank (Annex I sandbank outside an SAC) IEF which was found to have the same sensitivity to INNS as the subtidal coarse and mixed sediments with diverse benthic communities IEF. Therefore see paragraph 2.9.7.20 for details on the potential effect of INNS on this IEF.

2.9.7.24 There is no evidence regarding the sensitivity of the Annex I subtidal reefs IEF of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC therefore this assessment has adopted a precautionary approach in concluding a high sensitivity (as per advice from NRW (Table 2.7)). This habitat is likely to experience high turbidity, reducing light penetration, further reducing the suitability of this habitat to potential INNS. The American piddock has been identified in this region of the UK and it has the appropriate adaptations to colonise this IEF. Displacement however is considered to be unlikely because *H. arctica*, the native piddock, in this biotope occurs subtidally and on harder substrata and the American piddock is found intertidally. Additionally *D. vexillum* is an invasive colonial sea squirt native to Asia. *D. vexillum* can also grow over and smother the resident biological community including hydroids and sponges. Surveys within Holyhead Marina, North Wales have found *D. vexillum* growing on and smothering native tunicate communities (Holt and Cordingley, 2011).

2.9.7.25 The Annex I sandbanks IEF and Annex I subtidal reef IEF of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC are deemed to be of high vulnerability, low recoverability, and international value. The sensitivity of the IEFs is therefore considered to be **high**.

Table 2.24: Sensitivity of the relevant benthic IEFs to introduction or spread of INNS

IEF	Representative biotopes	Sensitivity to defined MarESA pressure Introduction or spread of INNS	Overall sensitivity (based on Table 2.16)
Subtidal biotopes			
Subtidal coarse and mixed sediments with diverse benthic communities.	SS.SCS.CCS	High	High
	SS.SMx.CMx SS.SMx.CMx.KurThyMx	High	
	SS.SMx.OMx.PoVen	High	
Sand and muddy sand communities with polychaetes and bivalves	SS.SSa.CFiSa	High	High
	SS.SSa.IFiSa.NcirBat	Not sensitive	
	SS.SSa.CMuSa	Medium	
	SS.SSa.IMuSa.FfabMag	No evidence	
Annex I low resemblance stony reef (outside an SAC)	CR.HCR.XFa.SpNemAdia	No evidence	High
Constable Bank (Annex I sandbank outside an SAC)	SS.SSa.IFiSa.NcirBat	Not sensitive	High
	SS.SSa.CFiSa.ApriBatPo	High	
Seapens and burrowing megafauna	SS.SMu.CFiMu.SpnMeg	No evidence	High
Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC			
Annex I sandbank	SS.SSa.IFiSa.NcirBat	Not sensitive	High
	SS.SSa.CFiSa.ApriBatPo	High	
Annex I subtidal reef	CR.MCR.SfR.Hia	No evidence	High
	CR.MCR.CFaVS.CuSpH	No evidence	

Significance of effect

Subtidal habitat IEFs

2.9.7.26 Overall, for the subtidal coarse and mixed sediments with diverse benthic communities IEF, sand and muddy sand communities with polychaetes and bivalves IEF, Annex I low resemblance stony reef (outside an SAC) IEF, Constable Bank (Annex I sandbank outside an SAC) IEF and seapens and burrowing megafauna communities IEF the magnitude of the increased risk of introduction and spread of INNS impact in the construction phase is deemed to be low and the sensitivity of the receptor is considered to be high. The effect will, therefore, be of **minor** adverse significance, which is not significant in EIA terms. This is due to the small proportion of the Mona benthic subtidal and intertidal ecology study area that may be colonised. Furthermore measures will be adopted to minimise the effects from introduction or spread of INNS.

Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC

2.9.7.27 Overall, for the Annex I sandbank IEF and Annex I subtidal reef IEF the magnitude of the increased risk of introduction and spread of INNS impact in the construction phase is deemed to be low and the sensitivity of the receptor is considered to be high. The effect will, therefore, be of **minor** adverse significance, which is not significant in EIA terms. This is due to the small proportion of the Mona benthic subtidal and intertidal ecology study area that may be colonised. Furthermore measures will be adopted to minimise the effects from introduction or spread of INNS.

Operations and maintenance phase

Magnitude of impact

Subtidal habitat IEFs

2.9.7.28 The installation of artificial structures and the presence of operations and maintenance vessels may lead to an increased risk of introduction and spread of INNS. The MDS is represented by up to 29,715 vessels return trips during the 35 year operational lifetime or 849 vessel return trips per year (Table 2.18). Furthermore, the long term introduction of 2,745,616 m^2 of artificial structures, in the form of suction bucket jacket foundations, associated scour protection and cable protection/crossings, has the potential to contribute to the introduction and spread of INNS. As outlined in paragraph 2.9.6.6 the estimate for the surface area of artificial structures introduced is considered to be conservative as the lattice nature of jacket foundations will result in a smaller area of habitat created than has been assumed for a foundation with solid sides in the MDS.

2.9.7.29 Details of INNS of concern in these regions of Wales and England are as outlined previously in paragraphs 2.9.7.9 and 2.9.7.11.

2.9.7.30 The removal of encrusted growth may also occur during the operations and maintenance phase, however, no quantitative assessment can be made as the volume of encrusting is not known. Removal of marine growth has the potential to release invasive species if the materials and equipment used in the process have not been properly cleaned after use at a previous location that may have had invasive species present. To control this however an Offshore EMP will be implemented to reduce the transmission of species through actions involved in the various phases of the Mona Offshore Wind Project (Table 2.19). Included in the Offshore EMP will be a Biosecurity Risk Assessment as well as an INNS Management Plan which will detail the measures to ensure vessels comply with the IMO ballast water management guidelines. It will consider the origin of vessels and contain standard housekeeping measures for such vessels as well as specific measures to be adopted in the event that a high alert species is recorded. This will ensure that the risk of potential introduction and spread of INNS will be minimised.

2.9.7.31 The impact is predicted to be of local spatial extent, long term duration, intermittent and low reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be **low**.

Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC

As outlined in paragraph 2.9.6.14, 8,100 m^2 of cable protection will be available for colonisation, and potential introduction of INNS, within the SAC (0.003% of the total area of the SAC) during the operations and maintenance phase. Vessel movements will also occur within the SAC during the operations and maintenance phase, and although it is not possible to quantify the amount of activity specifically in the SAC, the number will be much less than the total 29,715 vessels return trips during the 35 year operational lifetime or 849 vessel return trips per year (Table 2.18) needed for the whole Mona Offshore Wind Project. There is the potential that any INNS which colonise the cable protection in the area of the Mona Offshore Cable Corridor which overlaps with the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC, may use this as a stepping stone to spread further in to the SAC and potentially affect the designated features of the site.

2.9.7.32 The impact is predicted to be of local spatial extent, long term duration, intermittent and low reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be **low**.

Sensitivity of receptor

Subtidal habitat IEFs

2.9.7.33 The sensitivity of the subtidal IEFs (i.e. subtidal coarse and mixed sediments with diverse benthic communities IEF, sand and muddy sand communities with polychaetes and bivalves IEF, Annex I low resemblance stony reef (outside an SAC) IEF, Constable Bank (Annex I sandbank outside an SAC) IEF and seapens and burrowing megafauna communities IEF) is as described previously for the construction phase assessment in paragraph 2.9.7.17 to 2.9.7.22 and above in Table 2.24.

2.9.7.34 The subtidal coarse and mixed sediments with diverse benthic communities IEF, sand and muddy sand communities with polychaetes and bivalves IEF, Annex I low resemblance stony reef (outside an SAC) IEF, Constable Bank (Annex I sandbank outside an SAC) IEF and seapens and burrowing megafauna communities IEF are deemed to be of high vulnerability, low recoverability, and national value. The sensitivity of the IEFs is therefore considered to be **high**.

Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC

2.9.7.35 The sensitivity of the subtidal Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC IEFs (i.e. Annex I sandbank IEF and Annex I subtidal reef IEF) is as described previously for the construction phase assessment in paragraph 2.9.7.23 to 2.9.7.26 and above in Table 2.24.

2.9.7.36 The Annex I sandbank IEF and Annex I subtidal reef IEF are deemed to be of high vulnerability, low recoverability, and international value. The sensitivity of the IEFs is therefore considered to be **high**.

Significance of effect

Subtidal habitat IEFs

2.9.7.37 Overall, for the subtidal coarse and mixed sediments with diverse benthic communities IEF, sand and muddy sand communities with polychaetes and bivalves IEF, Annex I low resemblance stony reef (outside an SAC) IEF, Constable Bank (Annex I sandbank outside an SAC) IEF and seapens and burrowing megafauna communities IEF the magnitude of the increased risk of introduction and spread of INNS impact in the operations and maintenance phase is deemed to be low and the sensitivity of the receptor is considered to be high. The effect will, therefore, be of **minor** adverse significance, which is not significant in EIA terms. This is due to the small proportion of the Mona benthic subtidal and intertidal ecology study area that may be colonised. Furthermore measures have been adopted to minimise the effects from introduction or spread of INNS.

Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC

2.9.7.38 Overall, for the Annex I sandbank IEF and Annex I subtidal reef IEF the magnitude of the increased risk of introduction and spread of INNS impact in the operations and maintenance phase is deemed to be low and the sensitivity of the receptor is considered to be high. The effect will, therefore, be of **minor** adverse significance, which is not significant in EIA terms. This is due to the small proportion of the Mona benthic subtidal and intertidal ecology study area that may be colonised. Furthermore measures have been adopted to minimise the effects from introduction or spread of INNS.

Decommissioning phase

Magnitude of impact

2.9.7.39 The MDS for the decommissioning phase is for up to 2,215 vessel return trips over up to four years (Table 2.18). The MDS regarding artificial structures in this potential impact is for all infrastructure to remain *in situ*, resulting in up to 2,135,276 m^2 of artificial habitat (0.17% of the Mona benthic subtidal and intertidal ecology study area) which could continue to increase the risk of introduction and spread INNS which have developed on these structures on to natural habitats.

2.9.7.40 As set out in Table 2.19, an Offshore EMP will be implemented as part of the Mona Offshore Wind Project, which will aim to manage and reduce the risk of potential introduction and spread of INNS so far as reasonably practicable. Included in the Offshore EMP will be a Biosecurity Risk Assessment as well as an INNS Management Plan which will detail the measures to ensure vessels comply with the IMO ballast water management guidelines, it will consider the origin of vessels and contain standard housekeeping measures for such vessels as well as specific measures to be adopted in the event that a high alert species is recorded. This will ensure that the risk of potential introduction and spread of INNS will be minimised.

2.9.7.41 The impact is predicted to be of local spatial extent, long term duration, intermittent and low reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore considered to be **low**.

Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC

2.9.7.42 The Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC overlaps with the site boundary for the Mona Offshore Cable Corridor and therefore there is the potential for the introduction of infrastructure within the SAC to result in the introduction and spread of INNS. In the decommissioning phase of the Mona Offshore Wind Project there is potential for 8,100 m^2 of cable protection to be removed. It is not possible to determine how many vessel journeys will take place in the SAC however it is likely there will be some traffic associated with the removal of cables and cable protection in and around the SAC.

2.9.7.43 As set out in Table 2.19, an Offshore EMP will be implemented as part of the Mona Offshore Wind Project (see Table 2.19), which will include measures such as ensuring any new infrastructure coming from another marine environment are cleaned and checked prior to installation. The plan will outline measures to ensure vessels comply with the IMO ballast water management guidelines, it will consider the origin of vessels and contain standard housekeeping measures for such vessels as well as specific measures to be adopted in the event that a high alert species is recorded. This will ensure that the risk of potential introduction and spread of INNS will be minimised.

2.9.7.44 The impact is predicted to be of local spatial extent, long term duration, continuous and low reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore considered to be **low**.

Sensitivity of receptor

Subtidal habitat IEFs

2.9.7.45 The sensitivity of the subtidal IEFs (i.e. subtidal coarse and mixed sediments with diverse benthic communities IEF, sand and muddy sand communities with polychaetes and bivalves IEF, Annex I low resemblance stony reef (outside an SAC) IEF, Constable Bank (Annex I sandbank outside an SAC) IEF and seapens and burrowing megafauna communities IEF) is as described previously for the construction phase assessment in paragraph 2.9.7.17 to 2.9.7.22 and above in Table 2.24.

2.9.7.46 The subtidal coarse and mixed sediments with diverse benthic communities IEF, sand and muddy sand communities with polychaetes and bivalves IEF, Annex I low resemblance stony reef (outside an SAC) IEF, Constable Bank (Annex I sandbank outside an SAC) IEF and seapens and burrowing megafauna communities IEF are deemed to be of high vulnerability, low recoverability, and national value. The sensitivity of the receptors is therefore considered to be **high**.

Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC

2.9.7.47 The sensitivity of the subtidal Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC IEFs (i.e. Annex I sandbank IEF and Annex I subtidal reef IEF) is as described previously for the construction phase assessment in paragraph 2.9.7.23 to 2.9.7.26 and above in Table 2.24.

2.9.7.48 The Annex I sandbank IEF and Annex I subtidal reef IEF are deemed to be of high vulnerability, low recoverability, and international value. The sensitivity of the receptors is therefore considered to be **high**.

Significance of effect

Subtidal habitat IEFs

2.9.7.49 Overall, for the subtidal coarse and mixed sediments with diverse benthic communities IEF, sand and muddy sand communities with polychaetes and bivalves IEF, Annex I low resemblance stony reef (outside an SAC) IEF, Constable Bank (Annex I sandbank outside an SAC) IEF and seapens and burrowing megafauna communities IEF the magnitude of the increased risk of introduction and spread of INNS impact in the decommissioning phase is deemed to be low and the sensitivity of the receptor is considered to be high. The effect will, therefore, be of **minor** adverse significance, which is not significant in EIA terms. This is due to the small proportion of the Mona benthic subtidal and intertidal ecology study area that may be colonised. Furthermore, measures have been adopted to minimise the effects from introduction or spread of INNS.

Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC

2.9.7.50 Overall, for the Annex I sandbank IEF and Annex I subtidal reef IEF the magnitude of the increased risk of introduction and spread of INNS impact in the decommissioning phase is deemed to be low and the sensitivity of the receptor is considered to be high. The effect will, therefore, be of **minor** adverse significance, which is not significant in EIA terms. This is due to the small proportion of the Mona benthic subtidal and intertidal ecology study area that may be colonised. Furthermore, measures have been adopted to minimise the effects from introduction or spread of INNS.

2.9.8 Removal of hard substrates

2.9.8.1 The removal of hard substrates associated with the decommissioning of foundations during the decommissioning phase will have a direct effect on benthic subtidal IEFs, with the seabed returning to the predominantly coarse and mixed sediments following removal of structures.

2.9.8.2 The relevant MarESA pressures and their benchmarks which have used to inform this impact assessment are described below.

- Physical change (to another substratum type): change in sediment type by one Folk class (Long, 2006) (based on UK SeaMap simplified classification) and change from sedimentary or soft rock substrata to hard rock or artificial substrata or vice-versa.

2.9.8.3 These pressures relate to the removal of seabed infrastructure such as wind turbine and OSP foundations.

2.9.8.4 The subtidal IEFs that have the potential to be affected by the removal of hard substrate across all phases of the Mona Offshore Wind Project are those present within the Mona Array Area and Mona Offshore Cable Corridor (i.e. subtidal coarse and mixed sediments with diverse benthic communities IEF, sand and muddy sand communities with polychaetes and bivalves IEF, Annex I low resemblance stony reef (outside an SAC) IEF and seapens and burrowing megafauna communities IEF). There will not be any cable protection installed in the Constable Bank (Annex I sandbank outside an SAC) IEF, Therefore no assessment for the potential impact of hard substrate removal is required.

2.9.8.5 The Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC overlaps with the Mona Offshore Cable Corridor for the Mona Offshore Wind Project and therefore the removal of hard substrate may occur within the SAC. As outlined in paragraph 2.5.3.3, no designated features of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC were recorded during the site specific surveys in the area of overlap with the Mona Offshore Cable Corridor. This supports NRW's mapped distribution of designated features within the SAC (NRW, 2016), as shown in Figure 2.9. Therefore none of the designated features of the SAC will be affected by the removal of hard substrate and have not been assessed in relation to this potential impact. However the magnitude of the impact of the removal of hard substrate on the subtidal habitat IEFs identified in the area of overlap with the SAC (i.e. subtidal coarse and mixed sediments with diverse benthic communities IEF and the sand and muddy sand communities with polychaetes and bivalves IEF) is assessed across all phases of the Mona Offshore Wind Project.

2.9.8.6 There will be no above surface cable protection installed in the intertidal zone and so no artificial structures to remove during decommissioning. No further assessment of this impact is, therefore, required for intertidal habitats.

Decommissioning phase

Magnitude of impact

Subtidal habitat IEFs

2.9.8.7 The decommissioning of Mona Offshore Wind Project infrastructure may result in the removal of up to 2,685,616 m^2 of hard substrate associated with the wind turbine and OSP foundations and associated scour protection as well as cable protection/protection for cable crossings (see Table 2.18), resulting in the loss of the associated colonising communities. This equates to 0.21% of the Mona benthic subtidal and intertidal ecology study area.

2.9.8.8 The impact is predicted to be of local spatial extent, long term duration, continuous and irreversible. It is predicted that the impact will affect the receptors directly. The magnitude is therefore considered to be **low**.

Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC

2.9.8.9 The MDS for removal of hard substrate is that all cable protection installed in the SAC during the construction phase will be removed. The MDS is for the removal of 8,100 m^2 of cable protection from the SAC.

2.9.8.10 The impact is predicted to be of local spatial extent, short term duration and no reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be **low**.

Sensitivity of receptor

Subtidal habitat IEFs

2.9.8.11 The removal of wind turbine and OSP foundations, cable protection, scour protection and cable crossings during decommissioning would result in localised declines in biodiversity. However, areas of seabed where Mona Offshore Wind Project infrastructure was not present prior to decommissioning would be expected to recover, with benthic communities in these areas recolonising habitats previously lost beneath offshore structures. In time, these communities are predicted to revert to their pre-construction state. Recovery of the IEFs affected is likely to be high as a result of the recovery of their natural habitat (recovery will be similar to the temporary habitat disturbance impact which is described in paragraphs 2.9.2.22 and 2.9.2.25). A review undertaken by RPS (2019) found communities in coarse and mixed sediments are likely to recover within five years of disturbance (Desprez, 2000; Newell *et al*., 1998; Pearce *et al*., 2007), but in some cases, recovery has been reported as taking up to nine years following cessation of dredging (Foden *et al*., 2009). Sandy sediments also recover quickly following cable installation, with little or no evidence of disturbance in the years following cable installation (RPS, 2019).

2.9.8.12 The subtidal coarse and mixed sediments with diverse benthic communities IEF and sand and muddy sand communities with polychaetes and bivalves IEF, Annex I low resemblance stony reef (outside an SAC) IEF and seapens and burrowing megafauna communities IEF are deemed to be of high vulnerability, high recoverability, and national value. The sensitivity of the IEFs is therefore considered to be **low**.

Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC

2.9.8.13 The sensitivity of the IEFs of the Menai Strait and Conwy Bay SAC is as described previously for the subtidal habitat IEFs in paragraph 2.9.8.11. Over the operations and maintenance phase, any cable protection installed within the SAC during the construction phase may develop a reef like community as a result of its proximity to the subtidal reef communities already present in the SAC leading to larval settlement. Therefore the approach regarding the removal of cable protection within the SAC (if required) will be discussed with the relevant SNCBs prior to the decommissioning phase to ensure the appropriate approach is taken depending on the nature of the habitats present at the time.

2.9.8.14 Additionally subtidal reef features may form on the infrastructure places in the Menai Strait and Conwy Bay SAC and be subsequently designated as an Annex I subtidal reef feature of the SAC. The sensitivity of this feature to removal of hard substrate is high, as if rock such as cable protection were replaced with sediment, this would represent a fundamental change to the physical character of the biotope and the species would be unlikely to recover (Readman *et al*., 2023b; Tillin, Lloyd and Watson, 2023).

2.9.8.15 The subtidal coarse and mixed sediments with diverse benthic communities IEF and sand and muddy sand communities with polychaetes and bivalves IEF are deemed to be of high vulnerability, high recoverability, and national value. The sensitivity of the IEFs is therefore considered to be **low**.

2.9.8.16 The Annex I subtidal reef IEF is deemed to be of high vulnerability, low recoverability, and international value. The sensitivity of the IEFs is therefore considered to be **high**.

Significance of effect

Subtidal habitat IEFs

2.9.8.17 Overall, for the subtidal coarse and mixed sediments with diverse benthic communities IEF, sand and muddy sand communities with polychaetes and bivalves IEF and seapens and burrowing megafauna communities IEF the magnitude of the removal of hard structures impact in the decommissioning phase is deemed to be low and the sensitivity of the receptor is considered to be low. The effect will, therefore, be of **minor** adverse significance, which is not significant in EIA terms. This conclusion is based on the ability of these habitat to recover following these activities and the small scale of the change in relation to the wider Mona benthic subtidal and intertidal ecology study area.

Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC

2.9.8.18 Overall, for the subtidal coarse and mixed sediments with diverse benthic communities IEF (within the SAC) and sand and muddy sand communities with polychaetes and bivalves (within the SAC) IEF the magnitude of the removal of hard structures impact in the decommissioning phase is deemed to be low and the sensitivity of the receptor is considered to be low. The effect will, therefore, be of **minor** adverse significance, which is not significant in EIA terms. This conclusion is based on the ability of these habitat to recover following these activities and the small scale of the change in relation to the wider Mona benthic subtidal and intertidal ecology study area.

2.9.8.19 Overall, for the Annex I subtidal reef IEF the magnitude of the removal of hard structures impact in the decommissioning phase is deemed to be low and the sensitivity of the receptor is considered to be high. The effect will, therefore, be of **minor** adverse significance, which is not significant in EIA terms. This conclusion is based on the small scale of the change in relation to the wider Menai Strait and Conwy Bay SAC.

2.9.9 Changes in physical processes

2.9.9.1 Changes in physical processes may arise from the installation of infrastructure into the water column, including scour effects and changes in the sediment transport and wave regimes resulting in potential effects on benthic receptors. Volume 6, Annex 1.1: Physical processes technical report of the Environmental Statement provides a full description of the modelling used to inform this assessment.

2.9.9.2 The relevant MarESA pressures and benchmarks used to inform this impact assessment are described here:

- Changes in local water flow (tidal current): change in peak mean spring bed flow velocity between 0.1 m/s to 0.2 m/s for more than one year. The pressure is associated with activities that have the potential to modify hydrological energy flows. This pressure corresponds to the impacts associated with the presence of wind turbine and OSP foundations, cable protection and secondary scour
- Local wave exposure changes: change in nearshore significant wave height >3% but <5% for one year. This pressure corresponds to the impacts associated with the presence of wind turbine and OSP foundations and scour protection.

2.9.9.3 These pressures are relevant to the installation of wind turbines and OSPs into the water column potentially changing the predominant wave and tidal regime on a small scale.

2.9.9.4 The subtidal IEFs that have the potential to be affected by changes in physical process across the operations and maintenance of the Mona Offshore Wind Project are those present within the Mona Array Area and Mona Offshore Cable Corridor (i.e. subtidal coarse and mixed sediments with diverse benthic communities, mixed sediments dominated by brittlestars, sand and muddy sand communities with polychaetes and bivalves, Annex I low resemblance stony reef (outside an SAC), Constable Bank (Annex I sandbank outside an SAC) and seapens and burrowing megafauna communities) (see Table 2.20).

2.9.9.5 The Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC overlaps with the Mona Offshore Cable Corridor for the Mona Offshore Wind Project and therefore some changes in physical process may occur within the SAC. This includes a potential impact on the designated features of the SAC which all lie outside the overlap with the Mona Offshore Cable Corridor (i.e. Annex I sandbank IEF, Annex I subtidal reefs IEF and Annex I intertidal reefs IEF of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC), as outlined in paragraph 2.5.3.3 and illustrated in Figure 2.9.

2.9.9.6 The intertidal IEFs that have the potential to be affected by changes in physical process are those present at the landfall (i.e. littoral shingle with *Verrucaria maura* IEF, littoral sand and muddy sand supporting infaunal communities IEF, clay with piddocks IEF, littoral, eulittoral rock dominated by epifaunal communities IEF, *Sabellaria alveolata* reef IEF and *Mytilus edulis bed* IEF).

Operations and maintenance phase

Magnitude of impact

Subtidal habitat IEFs

2.9.9.7 The presence of Mona Offshore Wind Project infrastructure may obstruct tidal flow and lead to changes in the wave regime and sediment transport and sediment transport pathways. Associated potential impacts may also occur along adjacent shorelines during the operations and maintenance phase of the Mona Offshore Wind Project. As outlined in Table 2.18, the MDS in terms of hydrographic impacts is for up to 68 wind turbines with 4-legged suction bucket foundations for each jacket leg at 5 m diameter and scour protection covering a total footprint of 10,816 m^2. Additionally, the MDS includes one OSP, with a rectangular gravity base foundation each with an 80 m by 60 m dimension at the surface and a slab base dimension of 100 m by 80 m. Associated scour protection extends from the slab base by 25 m at a height of 2.6 m giving rise to 19,500 m^2 footprint per unit.

2.9.9.8 The results of the modelling presented in Volume 6, Annex 1.1: Physical processes technical report of the Environmental Statement indicated that peak tidal flows are redirected in the immediate proximity of foundations by a maximum variation of 5 cm/s which constitutes less than 5% of the peak flow and reduces significantly with distance from the structures. These changes are also limited to the immediate Mona Array Area where they may have a direct impact on the hydrodynamic regime and persist for the entire lifecycle of the Mona Offshore Wind Project. However, they would be imperceptible beyond the immediate vicinity of the Mona Array Area and would be reversible on decommissioning. The limited nature of these changes would not influence the tidal regime which underpins sediment transport. Cable protection will only be used where sufficient trenching depths cannot be achieved. Project commitments, presented in Table 2.19, outline that no cable protection will be installed within Constable Bank. The cable protection measures used will be with sufficiently low profile to cause minimal changes to tidal flow.

2.9.9.9 Examination of a 1 in 1 year storm from the west (of greatest influence of approaching storms) shows the deflection of waves by the structures is predicted to result in a reduction in the lee and increases where the waves are deflected either side of each structure. Changes in the wave height at the larger wind turbine structures are modelled to be in the order of 3 cm equating to <1% of the baseline significant wave height. For a 1 in 20 year storm event, the pattern is similar however the change in wave height at the foundations is 3 – 4.5 cm and due to the larger baseline associated with the return period the overall impact on the wave climate is less obvious. Cable protection will only be used where sufficient trenching depths cannot be achieved. Project commitments, presented in Table 2.19, outline that no cable protection will be installed within Constable Bank. The cable protection measures used will be with sufficiently low profile to cause minimal changes to wave climate.

2.9.9.10 With the introduction of infrastructure during the operations and maintenance phase changes may occur in the sediment transport and sediment transport pathways in the Mona Offshore Wind Project area and potential impacts along adjacent shorelines. One of the measures to be adopted as part of the project design, detailed in Table 2.19, is the provision of scour protection. An Offshore CMS will be developed which will include a CSIP and details of scour protection management to be used around offshore structures and foundations to reduce scour. The scour protection measures will be subject to engineering design to ensure they minimise as much as practical the occurrence of scour. Therefore any impacts would relate only to residual/secondary scour which would be very localised and of negligible magnitude; typically confined to within a few meters of the direct footprint of that scour protection material.

2.9.9.11 To minimise the potential impact from the cables and removal of cables there is a commitment to bury cables where possible. Where burial cannot be achieved to the required depth cable protection may be required. A Cable Burial Risk Assessment and Burial Assessment Study, which will be included within the CSIP, will establish these parameters. The detail of design and construction will be outlined within the CSIP and would also determine the likely extent of any potential scour and would aim to mitigate this through site specific detailed design of scour protection measures, as far as is practical. It is therefore likely that any secondary scour effects associated with cable protection would be confined to within a few meters of the direct footprint of that scour protection material. During the operations and maintenance phase of the project routine annual inspections will be made of cable and scour protection in line with the Offshore in-principle monitoring plan (Document Reference J15). If secondary scour is identified remedial works may be undertaken to both mitigate environmental impacts and also provide asset security.

2.9.9.12 Sediment transport is driven by a combination of tidal currents and wave conditions, the magnitude of these has been individually quantified as described above. For a 1 in 1 year storm from the north, during the flood tide the wave climate is in concert with tidal flow reducing the tidal flow on the lee side of the wind turbine and OSP foundation structures further. However, during the ebb flow, the wave climate and tidal flow are in opposition reducing the magnitude of the littoral current. With the presence of infrastructure, wave climate causes a small reduction in the magnitude of flow whilst there is little difference between the magnitude of littoral current flow and the tidal flows. Changes in magnitude compared to baseline current flow are ±5% which would not be sufficient to disrupt beach and offshore bank morphological processes or destabilise coastal features.

2.9.9.13 Residual currents are effectively the driver of sediment transport and therefore any changes to residual currents would have a direct impact on sediment transport which would persist for the lifecycle of the Mona Offshore Wind Project. However, if the presence of the foundation structures does not have a significant influence on either tide or wave conditions they cannot therefore have a significant effect on the sediment transport regime. For completeness, the residual current and sediment transport was simulated with the foundations in place (Volume 6, Annex 1.1: Physical processes technical report of the Environmental Statement). The maximum change in residual current and sediment transport is circa ±10% which is largely sited within close proximity to the wind turbine foundation structures (i.e. as a result of the scour protection). Changes in the residual current and sediment transport reduce with increasing distance from the wind turbines towards baseline levels.

2.9.9.14 The use of a single rectangular gravity base OSP forms a greater obstruction to sediment transport than the suction bucket foundations considered for the wind turbine structures. The footprint of the foundation is 19,500 m^2, therefore, the orientation of the unit and the detail of the scour protection design will determine the impact of sediment transport pathways. The influence of an OSP on wave and tides, the driving force of sediment transport, diminishes rapidly with distance from the unit. The OSP within the Mona Array Area therefore would not induce changes to sediment transport beyond the immediate vicinity or extend to adjacent shorelines.

2.9.9.15 It is anticipated that trenching to the required depth in areas of sandwaves and in the vicinity of sandbanks should be achievable due to the nature of the sediment, with the reduced need for placement of material on the bed in these areas which may potentially reduce transport until pathways are re-established. It is recognised that the best form of cable protection is achieved through cable burial to the required depths, according to the results of a Cable Burial Risk Assessment and Burial Assessment Study, which will be included within the CSIP. Geophysical surveys have been carried out within the Mona Offshore Cable Corridor and Access Areas, and this additional data will be used to determine cable protection requirements and inform detailed design parameters. Noting that as previously outlined (Table 2.19), no cable protection will be installed within Constable Bank.

2.9.9.16 Sandwave clearance may be required at the site of turbine locations, particularly in the case of gravity based structures to accommodate a slab base. For the largest gravity base foundation proposed, the slab base has a diameter of 43 m with scour protection extending 22 m from the slab base. Dredging and sandwave clearance may be required up to a diameter of 173 m to accommodate seabed profiling; therefore, there may be localised disruption to sandwave features.

2.9.9.17 Within the Mona Array Area, particularly to the north and east, there are areas with sandwave features including megaripples and barchan dunes. These sandwaves will be reduced in height in order to allow passage of the burial tool to enable cable burial to a sufficient target depth. Significant reductions in sandwave clearance volumes have been identified, from those identified within the PEIR, by detailed analysis of survey data and refining the clearance parameters. Sandwave features are predominately aligned perpendicular to the net sediment transport which is to the east. These features are generally circa 1 km in length, however some barchan dunes are greater than 2 km in length, (ABPmer, 2023).

2.9.9.18 Up to 50% of the Mona Array Area and thus inter-array cable routes may be affected by areas of sandwave features, with fewer and smaller sandwave features within the Mona Offshore Cable Corridor. This corresponds to circa 50 sandwave crossings across an area of 150 km^2, representing circa 1% of this region (or 0.5% on the Mona Array Area as a whole). The material which is cleared from the sandwaves to allow passage of the burial tool will not be removed from the site, it will be relocated in close proximity to the sandwave such that it is readily available for sandwave recharge. The magnitude, extent and proposed methodology is therefore unlikely to affect the sandwave system as a whole.

2.9.9.19 The rate of reformation of sandwaves is dependent on a range of factors including the size, location and alignment of any breach with respect to the sediment transport pathways and available recharge material. It has been shown that the region has active sediment transport systems with net sediment transport rates of circa 1 m^3/d/m within Mona Array Area and rates more than double this at sandwave crests. Indeed the use of prelay trenches is not recommended due to rapid infilling. Increases in littoral currents during storm events would also significantly increase transport rates. The sandwave features themselves are also mobile, typically moving 1 to 4 m in an easterly direction each year (ABPmer, 2023). Therefore, although it is not possible to quantify the reformation rate of sandwave breaches with certainty, given the number of variables and dependencies, in an active sediment transport with rechange material available it is anticipated that in the months following installation infilling would become evident. Post installation surveys that will be undertaken for engineering purposes during the operations and maintenance phase may be utilised to monitor these processes.

2.9.9.20 It is proposed to sequester 7,000 m^3 of the dredged material to provide ballast, however the majority (92.8%) of the dredged material will be placed in the immediate vicinity of the seabed preparation activities. This material will be available for sediment transport under the revised transport pathways, which are altered by typically 10% in the immediate vicinity of the structures as flow and transport are redirected around the infrastructure. Within the Mona Array Area the seabed sediment is comprised largely of coarse gravelly sand and is therefore suited to provide ballast. This, coupled with the diminutive volume, means the removal of coarser fractions would not alter either the local or regional sediment characteristics.

2.9.9.21 The coarse sand which is proposed for use as ballast in gravity base foundations would be drawn from site preparation at each foundation location. Depending on each location, the area affected may vary given the requirement for sandwave clearance or dredging to prepare for the slab base. Typically the area affected corresponds with dredging an area 120 m by 120 m with the material harvested equivalent to 0.5 m in depth. Each of these discrete 120 by 120 m areas are located a minimum of 1.4 km from each other and in total typically represent 0.33% of the Mona Array Area. In terms of sediment budget, 490,000 m^3 of the maximum 6,746,105 m^3 seabed preparation volume (which equates to 7.2%) may be removed across the Mona Array Area during the 12 month installation period. This will also equate to an average sediment ballast requirement of 5,104 m^3 per foundation location when 96 gravity base foundations are considered. Typical net sediment transport, under tides alone, through the Mona Array Area is circa 20,000 m^3 per day; the harvested material therefore represents a one-off 6.7% reduction in sediment budget during the construction phase and would therefore not significantly influence sediment transport across the Mona Array Area.

2.9.9.22 As outlined in Table 2.19, a measure has been adopted as part of the Mona Offshore Wind Project to ensure that no cable protection will be installed within Constable Bank.

2.9.9.23 The hydrodynamic regime is highly variable through tidal cycles and due to meteorological conditions, with the scale of the predicted impacts being well within the natural variation. The changes to tidal currents, wave climate, littoral currents, and sediment transport are insignificant in terms of the hydrodynamic regime and would not alter beach, sandbanks or reefs. Any potential effects on tidal current and wave climate would be reversible on decommissioning (i.e. following removal of the wind turbine structures).

2.9.9.24 The impact is predicted to be of local spatial extent, long term duration, continuous and irreversible during the lifetime of the project. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be **low**.

Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC

2.9.9.25 As outlined in Table 2.19, the percentage of export cable requiring cable protection will not exceed 10% of the total length of the export cable within the Menai Strait and Conwy Bay SAC. It is predicted that the potential impact on tide, wave and sediment transport regimes will affect the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC indirectly. As outlined in Table 2.19, there is a committment to ensure that no cable protection higher than 70 cm will be installed within the Menai Strait and Conwy Bay SAC. There will also be no more than a 5% reduction in water depth (referenced to Chart Datum) at any point along the Mona Offshore Cable Corridor without prior written approval from the Licensing Authority in consultation with the MCA. These measures will minimise impacts on physical processes, particularly sediment transport regimes in the Menai Strait and Conwy Bay SAC. If and where cable protection is required within the Menai Strait and Conwy Bay SAC the cable protection measure used will be with sufficiently low profile to cause minimal changes to wave, tide and sediment transport. The magnitude of change in wave and tidal currents as well as sediment transport is consistent throughout the Mona Export Cable Corridor where there is cable protection. It is predicted that this potential impact will affect Menai Strait and Conwy Bay SAC indirectly whilst also indirectly affecting other receptors to a much lesser degree. As discussed in paragraph 2.9.9.11, it is likely that any secondary scour effects associated with cable protection would be confined to within a few meters of the direct footprint of that scour protection material. During the operations and maintenance phase of the project routine annual inspections will be made of cable and scour protection in line with the Offshore in-principle monitoring plan (Document Reference J15). If secondary scour is identified remedial works may be undertaken to both mitigate environmental impacts and also provide asset security.

2.9.9.26 The impact is predicted to be of local spatial extent, long term duration, continuous and irreversible during the lifetime of the project. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be **negligible**.

Intertidal habitat IEFs

2.9.9.27 The MDS for cable installation in the intertidal region is via trenchless techniques. This will be undertaken such that no additional material will be placed above the surface in this region which could potentially interfere with sediment transport pathways. In line with best practice cable burial depths are such that beach levels are maintained as detailed in Volume 1, Chapter 3: Project description of the Environmental Statement.

2.9.9.28 The activities in the intertidal zone will not result in permanent structures above the sediment level resulting in no change to tidal or residual currents and in the subtidal environment the potential impact on tidal and residual currents is expected to be minimal and highly localised. Therefore changes to the tidal regime or residual currents are highly unlikely to result in notable change in the intertidal zone. Furthermore changes in the magnitude compared to baseline sediment transport current flow are ±5% which would not be sufficient to disrupt beach and offshore bank morphological processes or destabilise coastal features.

2.9.9.29 The impact is predicted to be of local spatial extent, long term duration, continuous and irreversible during the lifetime of the project. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be **negligible**.

Sensitivity of receptor

Subtidal habitat IEFs

2.9.9.30 The sensitivity of the subtidal IEFs (i.e. subtidal coarse and mixed sediments with diverse benthic communities, mixed sediments dominated by brittlestars, sand and muddy sand communities with polychaetes and bivalves, Annex I low resemblance stony reef (outside an SAC), Constable Bank (Annex I sandbank outside an SAC) and seapens and burrowing megafauna communities) to the pressures associated with changes in physical processes are presented in Table 2.25. These sensitivities are based on assessments made by the MarESA. All IEFs are found to be not sensitive to the magnitude of changes predicted in physical processes associated with the presence of the Mona Offshore Wind Project.

2.9.9.31 The representative biotopes of the subtidal coarse and mixed sediments with diverse benthic communities IEF has an overall negligible sensitivity to changes in physical processes (Table 2.25). The minimal level of predicted change associated with these impacts makes it highly unlikely these biotopes will be challenged physiologically by these conditions even where specific environmental conditions are required for a biotope. Changes in water flow at the pressure benchmark of between 0.1 m/s to 0.2 m/s may alter sediment transport patterns and habitat topography as well as potentially cause some shifts in abundance (Tillin and Watson, 2023a) resulting in a spatial and demographic shift (e.g. population loss). The magnitude of change predicted to result from infrastructure in the Mona Array Area and Offshore Cable Corridor is unlikely to lead to any notable changes in these biotopes as a whole. Regarding changes to wave regimes in the Mona Array Area this IEF occurs in the subtidal and therefore will not be exposed to any change in wave exposure.

2.9.9.32 The sand and muddy sand communities with polychaetes and bivalves IEF has an overall negligible sensitivity to changes in physical processes (Table 2.25). The component biotopes are recorded in areas where tidal flow varies between moderately strong (0.5 – 1.5 m/s) and weak (>0.5 m/s) (JNCC, 2022). Changes in water flow may alter sediment transport patterns and the topography of the habitat as well as potentially causing some shifts in abundance. However, a change at the magnitude predicted to occur as a result of the infrastructure in the Mona Offshore Cable Corridor is unlikely to result in the alteration of the biotopes associated with this IEF. As these biotopes occur in sublittoral habitats, they are not directly exposed to the action of breaking waves, therefore changes in the wave regime are unlikely to have an effect on these biotopes (Tillin and Rayment, 2023).

2.9.9.33 The Constable Bank (Annex I sandbank outside an SAC) IEF has an overall negligible sensitivity to changes in physical processes (Table 2.25). The mobile sands that characterise this biotope range from medium to fine, a change at the pressure benchmark may lead to some changes in sediment transport patterns. This is unlikely to result in damage to this biotope instead demographic or spatial shifts may occur however would not be detrimental to this biotope especially with the minimal level of change expected in the Mona Array Area. Additionally in the Mona Array Area this IEF occurs in the subtidal and therefore will not be exposed to any change in wave exposure.

2.9.9.34 The seapens and burrowing megafauna IEF has a high sensitivity to changes in tidal currents as a long term increase in flow would result in behavioural changes in seapens which would lead to a loss of population. A change in the topography of the habitat is likely due to the cohesive nature of muds and the low magnitude of change predicted as a result of infrastructure in the Mona Array Area. Hiscock (1983) examined the effects of water flow on *Virgularia mirabilis*, and documented changes in their behaviour which included shifting to face away from high speed currents and eventually resulted in retreating in to their burrows when flow exceeded 0.5 m/s, which is a much higher flow than is predicted to arise as a result of the presence of infrastructure within the Mona Array Area. A long term retreat would lead to a loss of population as they would not be able to feed. It should be noted that no seapens were recorded within the Mona benthic subtidal and intertidal ecology study area however similar behaviour could be exhibited by other kinds of burrowing megafauna. Regarding burrowing megafauna such as *Nephrops norvegicus* (noting this species has not been identified in the Mona benthic subtidal and intertidal ecology study area), they are likely to be tolerant of changes in water flow rates due to their burrow dwelling lifestyle however increases in water flow may inhibit larvae settlement (Hill and Sabatini, 2008).

2.9.9.35 The Annex I low resemblance stony reef (outside an SAC) IEF has an overall negligible sensitivity to changes in physical processes (Table 2.25). This is because only a substantial decrease in water flow would result in the decline in this biotope. This may only occur in the immediate vicinity of the wind turbine foundations. As a hard substrate habitat this IEF is highly unlikely to experience changes in topography (e.g. secondary scour) resulting from changes in sediment transport. The characteristic fauna of this biotope are predominantly passive filter feeders which require a strong enough current to carry food into their range. They are therefore adapted to moderate tidal streams but maladapted to low level currents. The minimal level of change associated with this potential impact however makes it unlikely conditions detrimental to this biotope will be produced. Additionally in the Mona Array Area this IEF occurs in the subtidal and therefore will not be exposed to any change in wave exposure.

2.9.9.36 The mixed sediments dominated by brittlestars IEF has an overall negligible sensitivity to changes in physical processes (Table 2.25). This is because brittlestars are found in a range of tidal levels from the restricted flow of lochs to the high energy environment of open coastlines (Connor *et al.*, 2004) as well as their ability to adapt to water flow changes. For example, if the velocity exceeded 0.3 m/s the animals ceased feeding, flattening themselves against the substratum and linking arms, increasing their collective stability in the current (De-Bastos *et al.*, 2023b). This also applies to wave exposure where brittlestar beds have been found to occupy moderately exposed and sheltered areas (Connor *et al.*, 2004). Increased flow rates, increases suspension and transport of organic particles can enhance feeding rates. If the flow is too strong, brittlestars may flatten, link arms, or withdraw arms into the sediment (De-Bastos *et al.*, 2023b).

2.9.9.37 The subtidal coarse and mixed sediments with diverse benthic communities IEF, mixed sediments dominated by brittlestars IEF, sand and muddy sand communities with polychaetes and bivalves IEF, Annex I low resemblance stony reef (outside an SAC) IEF and Constable Bank (Annex I sandbank outside an SAC) IEF are deemed to be of low vulnerability, high recoverability and national value. The sensitivity of the receptor is therefore considered to be **negligible**.

2.9.9.38 The seapens and burrowing megafauna communities IEF are deemed to be of high vulnerability, low recoverability and national value. The sensitivity of the receptor is therefore considered to be **high** (reduced to **medium** in absence of seapens).

Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC

2.9.9.39 Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC subtidal and intertidal habitat IEFs which are expected to be affected by changes in physical processes are listed in Table 2.25. The sensitivity of the IEFs to physical processes are presented in Table 2.25. These sensitivities are based on assessments made by the MarESA.

2.9.9.40 The Annex I sandbank IEF has an overall negligible sensitivity to changes in physical processes (Table 2.25). The effect of these impacts on the Annex I sandbanks IEF of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC will be the same as those described for the Constable Bank (Annex I sandbank outside an SAC) IEF, paragraph 2.9.9.33, as they both represent similar features.

2.9.9.41 The Annex I subtidal reefs IEF of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC has an overall negligible sensitivity to changes in physical processes (Table 2.25). As a habitat found on hard substrate this IEF is unlikely to be affected by changes in the sediment transport regime as a result of the presence of infrastructure as the substrate is not mobile. The key characterizing species, *H. arctica* are protected from water flows within burrows, although they and other associated species may be indirectly affected by changes in water movement where it impacts the supply of food or larvae or other processes. There is little evidence regarding sponges and water flow changes, the important characterizing hydroids are typically found in places of low to moderate water movement. Hydroids can bend passively with water flow to reduce drag forces to prevent detachment and enhance feeding (Gili and Hughes, 1995), making them resilient to increases in flow. Overall the range of flow rates experienced by the biotope is considered to indicate, by proxy, that the biotope would have high resistance and by high resilience to a change in water flow at the pressure benchmark (Tillin, 2016d). Decreases in wave exposure are unlikely to have any effect whereas increases in wave exposure can result in physical damage to erect sponges whereas encrusting sponges dominate in wave exposed environments. The scale of change associated with the Mona Offshore Wind Project infrastructure, <1% of the baseline significant wave height, makes the likelihood of physically damaging conditions unlikely.

2.9.9.42 The Annex I intertidal reefs IEF of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC has an overall negligible sensitivity to changes in physical processes (Table 2.25). As a habitat found on hard substrate this IEF is unlikely to be affected by changes in the sediment transport regime as a result of the presence of infrastructure as the substrate is not mobile. As water velocity increases *Mastocarpus stellatus* and *Chondrus crispus* can flex and reconfigure to align with the direction of flow, this minimises drag and reduce risk of dislodgement (Boller and Carrington, 2007). In terms of wave exposure this habitat is found in a range of wave conditions and strong wave action is likely to damage fronds of characterising species. Changes of the magnitude predicted for the Mona Offshore Wind Project however are highly unlikely to lead to a major shift in conditions ensuring the continues presence of this habitat within the SAC.

2.9.9.43 The Annex I sandbanks IEF, Annex I subtidal reefs IEF and Annex I intertidal reefs IEF of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC are deemed to be of low vulnerability, high recoverability and international value. The sensitivity of the receptor is therefore considered to be **negligible**.

Intertidal habitat IEFs

2.9.9.44 The intertidal IEFs which are expected to be affected by changes in physical processes are listed in Table 2.25. The sensitivity of the IEFs to changes in physical processes are presented in Table 2.25. These sensitivities are based on assessments made by the MarESA. Generally the intertidal IEFs are not considered to be sensitive to the relevant pressures at their benchmarks with a few exceptions.

2.9.9.45 The littoral shingle with *Verrucaria maura* IEF has an overall negligible sensitivity to changes in physical processes (Table 2.25). This is because changes in water flow are considered unlikely to change the mobility of sediment which prevents the establishment of species rich biotopes. Furthermore this habitat is exposed to a range of wave conditions and is therefore considered to be resistant to biotope alteration by this method. The littoral sand and muddy sand supporting infaunal communities IEF is found in a range of tidal streams from negligible to very strong (JNCC, 2022), therefore a change in water flow rate at the pressure benchmark level of 0.1 – 0.2 m/s is considered to fall within the range of flow speeds experienced by the biotope. For example changes in water flow can result in changes in sediment transport which could impact species such as *A. marina*. In high currents *A. marina* castes and burrows can be eroded and slow flow can result in accretion of fine sediment changing the overall substrate. These effects however are unlikely based on the magnitude of change expected at the Mona landfall (paragraph 2.9.9.28). The same is true for wave exposure as this biotope occurs in moderately exposed to extremely sheltered beaches (Connor *et al*., 2004), therefore this minimal change is likely to fall within the normal range. Where this IEF is characterised by spares communities (i.e. for the LS.LSa.MoSa biotope), the MarESA determines that the physical environment will not be affected by the pressures associated with this potential impact.

2.9.9.46 The clay with piddocks IEF has an overall negligible sensitivity to changes in physical processes (Table 2.25). The clay with piddocks IEF is considered to be potentially vulnerable to these pressures as high tidal currents or wave exposure could lead to changes in the sediment transport regime and result in the erosion of the chalk or clay that is the foundation of this biotope, exposing the piddocks. The MarESA benchmarks for these pressures however are not considered to result in erosion and these conditions fall within the piddocks natural environmental variation. The magnitude of change resulting from the Mona Offshore Wind Project is smaller than the MarESA benchmark making damage to this IEF highly unlikely as a result in changes to the wave and tidal regimes.

2.9.9.47 The littoral and eulittoral rock dominated by epifaunal communities IEF has an overall low sensitivity to changes in physical processes (Table 2.25). The biotopes which represent the littoral and eulittoral rock dominated by epifaunal communities IEF are largely assessed as being not sensitive to this potential impact. As detailed for previous IEFs this is because the benchmark for tidal and wave exposure changes is within the range of conditions they are adapted for. The *Porphyra purpurea* and *Ulva* sp. on sand-scoured mid or lower eulittoral rock biotope (LR.FLR.Eph.UlvPor) however has a low sensitivity to the changes in water flow from tidal currents because increased water flow rates may detach and remove biomass of the *Porphyra* sp. and *Ulva* sp. that characterise this biotope. Experiments suggest that the pressure benchmark is biologically relevant (i.e. increases at the pressure benchmark could result in biomass loss and detachment) (Flindt *et al*., 2007). The rapid growth of *P. purpurea* and *Ulva* sp. May mitigate the loss of tissue during the growing season. Additionally changes in tidal currents may result in changes to the sediment transport pattern, with an increase in current velocity leading to the erosion of this habitat (Ashley *et al.*, 2023). The actual pressure which will be experienced by this biotope as a result of the presence of infrastructure such as cable protection is however less than half the pressure benchmark used by the MarESA making the likelihood damage from these changes unlikely.

2.9.9.48 The *Sabellaria alveolata* reef IEF has an overall negligible sensitivity to changes in physical processes (Table 2.25). The *Sabellaria alveolata* reef IEF may be affected by a reduction in flow reducing the supply of tube-building materials and food (Tillin, Jackson and Garrard, 2023). Alternatively the worms may retract into tubes to withstand periods of high flows at spring tides and some non-lethal reduction in feeding efficiency and growth rate may occur at the edge of the optimal range (Tillin, Jackson and Garrard, 2023). Given the range of reported tolerances a change at the pressure benchmark, is not considered to result in mortality and the actual change is likely to be less than half the benchmark. Additionally *S. alveolata* are considered to be able to mechanically withstand an increase in wave exposure and to be unaffected by a decrease due to the properties of the worms tubes which are able to dissipate the energy of the waves and bind the base sediment together (Tillin, Jackson and Garrard, 2023).

2.9.9.49 The *Mytilus edulis bed* IEF has an overall medium sensitivity to changes in physical processes (Table 2.25). *M. edulis* are active suspension feeders which can generate their own small current to feed from however tidal currents can enhance food supply. Therefore, a decrease in water flow could result in changes to growth as well as larval settlement. An increase in flow rate, however, could result in the detachment of mussels as well as reduced feeding. These effects however are unlikely based on the magnitude of change expected at the Mona landfall. For this IEF the benchmark pressure for wave exposure is within the habitable range for their biotopes.

2.9.9.50 The littoral shingle with *Verrucaria maura* IEF is deemed to be of low vulnerability, high recoverability and local value. The sensitivity of the receptor is therefore considered to be **negligible**.

2.9.9.51 The clay with piddocks IEF and *Sabellaria alveolata* reef IEF are deemed to be of low vulnerability, high recoverability and national value. The sensitivity of the receptor is therefore considered to be **negligible**.

2.9.9.52 The littoral and eulittoral rock dominated by epifaunal communities IEF is deemed to be of medium vulnerability, high recoverability and local value. The sensitivity of the receptor is therefore considered to be **low**.

2.9.9.53 The littoral sand and muddy sand supporting infaunal communities IEF and *Mytilus edulis bed* IEF are deemed to be of medium vulnerability, medium recoverability and national value. The sensitivity of the receptor is therefore considered to be **medium**.

Table 2.25: Sensitivity of all of the relevant IEFs to changes in physical processes.

IEF	Representative biotope	Sensitivity to defined MarESA pressure		
		Water flow (tidal current) changes (local)	Wave exposure changes (local)	Overall sensitivity (based on Table 2.16)
Subtidal biotopes				
Subtidal coarse and mixed sediments with diverse benthic communities	SS.SCS.CCS	Not sensitive	Not sensitive	Negligible
	SS.SMx.CMx SS.SMx.CMx.KurThyMx	Not sensitive	Not sensitive	
	SS.SMx.OMx.PoVen	Not sensitive	Not sensitive	
Mixed sediments dominated by brittlestars	SS.SMx.CMx.OphMx	Not sensitive	Not sensitive	Negligible
Sand and muddy sand communities with polychaetes and bivalves	SS.SSa.CFiSa	Not sensitive	Not sensitive	Negligible
	SS.SSa.IFiSa.NcirBat	Not sensitive	Not sensitive	
	SS.SSa.CMuSa	Not sensitive	Not sensitive	
	SS.SSa.IMuSa.FfabMag	Not sensitive	Not sensitive	
Annex I low resemblance stony reef (outside an SAC)	CR.HCR.XFa.SpNemAdia	Not sensitive	Not sensitive	Negligible
Constable Bank (Annex I sandbank outside an SAC)	SS.SSa.IFiSa.NcirBat	Not sensitive	Not sensitive	Negligible
	SS.SSa.CFiSa.ApriBatPo	Not sensitive	Not sensitive	
Seapens and burrowing megafauna	SS.SMu.CFiMu.SpnMeg	High	Not sensitive	High

IEF	Representative biotope	Sensitivity to defined MarESA pressure		
		Water flow (tidal current) changes (local)	Wave exposure changes (local)	Overall sensitivity (based on Table 2.16)
Intertidal biotopes				
Littoral shingle with *Verrucaria maura*	LS.LCS.Sh.BarSh	Not sensitive	Not sensitive	Negligible
Littoral sand and muddy sand supporting infaunal communities	LS.LSa.MoSa LS.LSa.MuSa.Lan	Not sensitive	Not sensitive	Medium
	LS.LSa.MuSa.MacAre	Medium	Not sensitive	
Clay with piddocks	CR.MCR.SfR.Pid	Not sensitive	Not sensitive	Negligible
Littoral and eulittoral rock dominated by epifaunal communities	LR.LLR.F.Fspi	Not sensitive	Not sensitive	Low
	LR.FLR.Lic.Ver	Not relevant	Not sensitive	
	LR.FLR.Eph.UlvPor	Low	Not sensitive	
	LR.HLR.MusB.Sem.LitX LR.HLR.MusB.Sem	Not sensitive	Not sensitive	
Sabellaria alveolata reef	LS.LBR.Sab.Salv.	Not sensitive	Not sensitive	Negligible
Mytilus edulis bed	*Mytilus edulis bed*	Medium	Medium	Medium
Y Fenai a Bae Conwy/ Menai Strait and Conwy Bay SAC				
Annex I sandbank	SS.SSa.IFiSa.NcirBat	Not sensitive	Not sensitive	Negligible
	SS.SSa.CFiSa.ApriBatPo	Not sensitive	Not sensitive	
	CR.MCR.SfR.Hia	Not sensitive	Not sensitive	Negligible

IEF	Representative biotope	Sensitivity to defined MarESA pressure		
		Water flow (tidal current) changes (local)	Wave exposure changes (local)	Overall sensitivity (based on Table 2.16)
Annex I subtidal reefs	CR.MCR.CFaVS.CuSpH	Not sensitive	Not sensitive	
Annex I intertidal reefs	LR.HLR.FR.Mas	Not sensitive	Not sensitive	Negligible
	IR.MIR.KT.XKT	Not sensitive	Not sensitive	

Significance of effect

Subtidal habitat IEFs

2.9.9.54 Overall, for the subtidal coarse and mixed sediments with diverse benthic communities IEF, mixed sediments dominated by brittlestars IEF, sand and muddy sand communities with polychaetes and bivalves IEF, Annex I low resemblance stony reef (outside an SAC) IEF and Constable Bank (Annex I sandbank outside an SAC) IEF the magnitude of the changes in physical processes impact in the operations and maintenance phase is deemed to be low and the sensitivity of the receptor is considered to be negligible. The effect will, therefore, be of **negligible** significance, which is not significant in EIA terms. This significance has been assigned due to the minimal change to the physical environment which is unlikely to result in a change in conditions beyond the natural variation that these IEFs are adapted for.

2.9.9.55 Overall, for the seapens and burrowing megafauna communities IEF the magnitude of the changes in physical processes impact in the operations and maintenance phase is deemed to be low and the sensitivity of the receptor is considered to be high (reducing to medium in the absence of seapens). The effect will, therefore, be of **minor** adverse significance, which is not significant in EIA terms.

Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC

2.9.9.56 Overall, for the Annex I sandbanks IEF, Annex I subtidal reefs IEF and Annex I intertidal reefs IEF of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC the magnitude of the changes in physical processes impact in the operations and maintenance phase is deemed to be low and the sensitivity of the receptor is considered to be negligible. The effect will, therefore, be of **negligible** significance, which is not significant in EIA terms. This significance has been assigned due to the minimal change to the physical environment which is unlikely to result in a change in conditions beyond the natural variation that these IEFs are adapted for.

Intertidal habitat IEFs

2.9.9.57 Overall, for the littoral shingle with *Verrucaria maura* IEF, clay with piddocks IEF and *Sabellaria alveolata* reef IEF the magnitude of the changes in physical processes impact in the operations and maintenance phase is deemed to be negligible and the sensitivity of the receptor is considered to be negligible. The effect will, therefore, be of **negligible** significance, which is not significant in EIA terms.

2.9.9.58 Overall, for the littoral and eulittoral rock dominated by epifaunal communities IEF, the magnitude of the changes in physical processes impact in the operations and maintenance phase is deemed to be negligible and the sensitivity of the receptor is considered to be low. The effect will, therefore, be of **negligible** significance, which is not significant in EIA terms. This significance has been assigned due to the minimal change to the physical environment which is unlikely to result in a change in conditions beyond the natural variation that these IEFs are adapted for.

2.9.9.59 Overall, for the littoral sand and muddy sand supporting infaunal communities IEF and *Mytilus edulis* bed IEF the magnitude of the changes in physical processes impact in the operations and maintenance phase is deemed to be negligible and the sensitivity of the receptor is considered to be medium. The effect will, therefore, be of **negligible** significance, which is not significant in EIA terms. This significance has been assigned due to the minimal change to the physical environment which is unlikely to result in a change in conditions beyond the natural variation that these IEFs are adapted for.

Decommissioning phase

Magnitude of impact

Subtidal habitat IEFs

2.9.9.60 Following decommissioning, changes to tidal regime would be of a lesser magnitude than the operations and maintenance phase, as no structures would remain in the water column to influence tidal currents, waves or the littoral currents above bed level, with only the colonised scour and cable protection remaining *in situ*. As outlined in Table 2.19, no cable protection will be placed within Constable Bank.

2.9.9.61 The impact is predicted to be of local spatial extent, long term duration, continuous and irreversible. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be **negligible**.

Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC

2.9.9.62 Within the Menai Strait and Conwy Bay SAC, following decommissioning, there will be no change to the tidal regime, waves or the littoral currents above bed level compared to the operations and maintenance phase, as cable protection will be retained, noting that the Mona Offshore Cable Corridor does not intersect with the Menai Strait and Conwy Bay SAC designated features.

2.9.9.63 The impact is predicted to be of local spatial extent, long term duration, continuous and irreversible. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be **low**.

Intertidal habitat IEFs

2.9.9.64 As noted in the operation and maintenance phase, there will be permanent structures above the sediment level resulting in no change to tidal or residual currents and in the subtidal environment the potential impact on tidal and residual currents is expected to be minimal and highly localised. Therefore changes to the tidal regime or residual currents are highly unlikely to result in notable change in the intertidal zone.

2.9.9.65 The impact is predicted to be of local spatial extent, long term duration, continuous and irreversible. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be **negligible**.

Sensitivity of receptor

Subtidal habitat IEFs

2.9.9.66 The sensitivity of the subtidal IEFs (i.e. subtidal coarse and mixed sediments with diverse benthic communities, mixed sediments dominated by brittlestars, sand and muddy sand communities with polychaetes and bivalves, Annex I low resemblance stony reef (outside an SAC), Constable Bank (Annex I sandbank outside an SAC) and seapens and burrowing megafauna communities) is as described previously for the construction phase assessment in paragraph 2.9.9.30 to 2.9.9.36 and above in Table 2.25.

2.9.9.67 The subtidal coarse and mixed sediments with diverse benthic communities IEF, mixed sediments dominated by brittlestars IEF, sand and muddy sand communities with polychaetes and bivalves IEF, Annex I low resemblance stony reef (outside an SAC) IEF and Constable Bank (Annex I sandbank outside an SAC) IEF are deemed to be of low vulnerability, high recoverability and national value. The sensitivity of the receptor is therefore considered to be **negligible**.

2.9.9.68 The seapens and burrowing megafauna communities IEF are deemed to be of high vulnerability, low recoverability and national value. The sensitivity of the receptor is therefore considered to be **high** (reduced to **medium** in absence of seapens).

Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC

2.9.9.69 The sensitivity of the Menai Strait and Conwy Bay SAC IEFs (i.e. Annex I sandbank IEF, Annex I subtidal reefs IEF and Annex I intertidal reefs IEF) is as described previously for the construction phase assessment in paragraph 2.9.7.23 to 2.9.7.26 and above in Table 2.24.

2.9.9.70 The Annex I sandbanks IEF, Annex I subtidal reefs IEF and Annex I intertidal reefs IEF of the Menai Strait and Conwy Bay SAC are deemed to be of low vulnerability, high recoverability and international value. The sensitivity of the receptor is therefore considered to be **negligible**.

Intertidal habitat IEFs

2.9.9.71 The sensitivity of the intertidal habitat IEFs is as described previously for the construction phase assessment in paragraph 2.9.9.44 to 2.9.9.49and above in Table 2.25.

2.9.9.72 The littoral shingle with *Verrucaria ma*ura IEF is deemed to be of low vulnerability, high recoverability and local value. The sensitivity of the receptor is therefore considered to be **negligible**.

2.9.9.73 The clay with piddocks IEF and *Sabellaria alveolata* reef IEF are deemed to be of low vulnerability, high recoverability and national value. The sensitivity of the receptor is therefore considered to be **negligible**.

2.9.9.74 The littoral and eulittoral rock dominated by epifaunal communities IEF is deemed to be of medium vulnerability, high recoverability and local value. The sensitivity of the receptor is therefore considered to be **low**.

2.9.9.75 The littoral sand and muddy sand supporting infaunal communities IEF and *Mytilus edulis* bed IEF are deemed to be of medium vulnerability, medium recoverability and national value. The sensitivity of the receptor is therefore considered to be **medium**.

Significance of effect

Subtidal habitat IEFs

2.9.9.76 Overall, for the subtidal coarse and mixed sediments with diverse benthic communities IEF, mixed sediments dominated by brittlestars IEF, sand and muddy sand communities with polychaetes and bivalves IEF, Annex I low resemblance stony reef (outside an SAC) IEF and Constable Bank (Annex I sandbank outside an SAC) IEF the magnitude of the changes in physical processes impact in the decommissioning phase is deemed to be negligible and the sensitivity of the receptor is considered to be negligible. The effect will, therefore, be of **negligible** significance, which is not significant in EIA terms.

2.9.9.77 Overall, for the seapens and burrowing megafauna communities IEF the magnitude of the changes in physical processes impact in the decommissioning phase is deemed to be negligible and the sensitivity of the receptor is considered to be high (reducing to medium in the absence of seapens). The effect will, therefore, be of **minor adverse** significance, which is not significant in EIA terms. This significance has been assigned due to the minimal change to the physical environment which is unlikely to result in a change in conditions beyond the natural variation that these IEFs are adapted for.

Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC

2.9.9.78 Overall, for the Annex I sandbanks IEF, Annex I subtidal reefs IEF and Annex I intertidal reefs IEF of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC the magnitude of the changes in physical processes impact in the decommissioning phase is deemed to be low and the sensitivity of the receptor is considered to be negligible. The effect will, therefore, be of **negligible** significance, which is not significant in EIA terms. This significance has been assigned due to the minimal change to the physical environment which is unlikely to result in a change in conditions beyond the natural variation that these IEFs are adapted for.

Intertidal habitat IEFs

2.9.9.79 Overall, for the littoral shingle with *Verrucaria maura* IEF, clay with piddocks IEF and *Sabellaria alveolata* reef IEF the magnitude of the changes in physical processes impact in the decommissioning phase is deemed to be negligible and the sensitivity of the receptor is considered to be negligible. The effect will, therefore, be of **negligible** significance, which is not significant in EIA terms.

2.9.9.80 Overall, for the littoral and eulittoral rock dominated by epifaunal communities IEF, the magnitude of the changes in physical processes impact in the decommissioning phase is deemed to be negligible and the sensitivity of the receptor is considered to be low. The effect will, therefore, be of **negligible** significance, which is not significant in EIA terms. This significance has been assigned due to the minimal change to the physical environment which is unlikely to result in a change in conditions beyond the natural variation that these IEFs are adapted for.

2.9.9.81 Overall, for the littoral sand and muddy sand supporting infaunal communities IEF and *Mytilus edulis* bed IEF the magnitude of the changes in physical processes impact in the operations and maintenance phase is deemed to be negligible and the sensitivity of the receptor is considered to be medium. The effect will, therefore, be of **negligible** significance, which is not significant in EIA terms. This significance has been assigned due to the minimal change to the physical environment which is unlikely to result in a change in conditions beyond the natural variation that these IEFs are adapted for.

2.9.10 Electromagnetic fields from subsea electrical cables

2.9.10.1 The presence and operation of inter-array, interconnector and export cables within the Mona Array Area and Mona Offshore Cable Corridor may lead to localised EMF affecting benthic subtidal receptors.

2.9.10.2 The subtidal IEFs that have the potential to be affected by EMF from subsea electrical cables across all phases of the Mona Offshore Wind Project are those present within the Mona Array Area and Mona Offshore Cable Corridor (i.e. subtidal coarse and mixed sediments with diverse benthic communities IEF, sand and muddy sand communities with polychaetes and bivalves IEF, Annex I low resemblance stony reef (outside an SAC) IEF, Constable Bank (Annex I sandbank outside an SAC IEF) and seapens and burrowing megafauna communities IEF) (see Table 2.20).

2.9.10.3 The Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC overlaps with the Mona Offshore Cable Corridor for the Mona Offshore Wind Project and therefore some EMF from subsea electrical cables may occur within the SAC. As outlined in paragraph 2.5.3.3, no designated features of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC were recorded during the site specific surveys in the area of overlap with the Mona Offshore Cable Corridor. This supports NRW's mapped distribution of designated features within the SAC (NRW, 2016), as shown in Figure 2.9. Therefore none of the designated features of the SAC will be affected by EMF from subsea electrical cables and have not been assessed in relation to this potential impact. However the magnitude of the potential impact of EMF from subsea electrical cables on the subtidal habitat IEFs identified in the area of overlap with the SAC (i.e. subtidal coarse and mixed sediments with diverse benthic communities IEF and the sand and muddy sand communities with polychaetes and bivalves IEF) is assessed across all phases of the Mona Offshore Wind Project.

2.9.10.4 Due to the greater depth of burial associated with the intertidal compared to the subtidal, there will be no impact associated with EMF from subsea electrical cables on intertidal IEFs therefore no further assessment has been undertaken.

Operations and maintenance phase

Magnitude of impact

Subtidal habitat IEFs

2.9.10.5 EMF comprise both the electrical fields, measured in volts per metre (V/m), and the magnetic fields, measured in microtesla (μT) or milligauss (mG). Background measurements of the magnetic field are approximately 50 μT for example in Ireland (Eirgrid, 2015). It is common practice to block the direct electrical field using conductive sheathing, meaning that the only EMFs that are emitted into the marine environment are the magnetic field and the resultant induced electrical field. It is generally considered impractical to assume that cables can be buried at depths that will reduce the magnitude of the magnetic field, and hence the sediment-sea water interface induced electrical field, to below that at which these fields could be detected by certain marine organisms on or close to the seabed (Gill *et al*., 2005; Gill *et al*., 2009). By burying a cable, the magnetic field at the seabed is reduced due to the distance between the cable and the seabed surface as a result of field decay with distance from the cable (CSA, 2019). The magnetic field is about 10 μT/m with a cable that is buried 1.5 m down in the sea floor (Hutchison *et al*., 2021).

2.9.10.6 A variety of design and installation factors affect EMF levels in the vicinity of the cables. These include current flow, distance between cables, cable insulation, number of conductors, configuration of cable and burial depth. The flow of electricity associated with an alternating current (AC) cable (proposed for the Proposed Development) changes direction (as per the frequency of the AC transmission) and creates a constantly varying electric field in the surrounding marine environment (Huang, 2005).

2.9.10.7 The strength of the magnetic field (and consequently, induced electrical fields) decreases rapidly horizontally and vertically with distance from source. A recent study conducted by CSA (2019) found that inter-array and export cables buried between depths of 1 m to 2 m reduces the magnetic field at the seabed surface four-fold. For cables that are unburied and instead protected by thick concrete mattresses or rock berms, the field levels were found to be similar to buried cables.

2.9.10.8 CSA (2019) investigated the relationship between voltage, current, and burial depth, the results of which are presented in Table 2.26 which shows the magnetic and induced electric field levels expected directly over the undersea power cables and at distance from the cable for inter-array and export cables. Directly above the cable, EMF levels decrease with increasing distance from the seafloor to 1 m above the cable, while as you move laterally away from the cable, at distances greater than 3 m the magnetic fields at the seafloor and at 1 m above the seafloor are comparable.

Table 2.26: Typical EMF levels over AC undersea power cables from offshore wind energy projects (CSA, 2019).

Power Cable Type	Magnetic Field Levels (mT)			
	Directly Above Cable		3 to 7.5 m laterally away from cable	
	1 m above seafloor	At seafloor	1 m above seafloor	At seafloor
Inter-array	0.0005 to 0.0015	0.002 to 0.0065	<0.00001 to 0.0007	<0.00001 to 0.0010
Export Cable	0.001 to 0.004	0.002 to 0.0165	<0.00001 to 0.0012	0.0001 to 0.0015
Power Cable Type	Induced Field Levels (mG)			
	Directly Above Cable		3 to 7.5 m laterally away from cable	
	1 m above seafloor	At seafloor	1 m above seafloor	At seafloor
Inter-Array	0.00001 to 0.00012	0.0001 to 0.00017	0.000001 to 0.00009	0.000001 to 0.00011
Export Cable	0.00002 to 0.0002	0.00019 to 0.00037	0.000002 to 1.1	0.000004 to 0.00013

2.9.10.9 During the operational phase of the Mona Offshore Wind Project there will be up to 325 km of 66 kv to 132 kv HVAC inter-array cables, up to 50 km of 275 kv HVAC interconnector cables and up to 360 km of 275 kv HVAC export cables (Table 2.18). The minimum burial depth for cables will be 0.5 m.

2.9.10.10 The impact is predicted to be of local spatial extent, long term duration, continuous and high reversibility (when the cables cease transmitting electricity post-decommissioning). It is predicted that the impact will affect the receptor directly. The magnitude is therefore considered to be **negligible**.

Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC

2.9.10.11 The magnitude of the potential impact on benthic invertebrates due to EMF is consistent across the Mona Offshore Wind Project including in the sections of the Mona Offshore Cable Corridor which overlap with the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC and is therefore as outlined in paragraphs 2.9.10.5 and 2.9.10.8. Furthermore, based on the proportion of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC which overlaps with the Mona Offshore Cable Corridor, the MDS assumes that there may be up to 8.1 km of HVAC export cables installed within the SAC.

2.9.10.12 On the basis of NRW's mapped distribution of designated features within the SAC (NRW, 2016), as shown in Figure 2.9, the Mona Offshore Cable Corridor does not spatially overlap with any protected features. This was supported by the site specific surveys which did not find any of the designated features within the overlap between the SAC and the Mona Offshore Cable Corridor.

2.9.10.13 The impact is predicted to be of local spatial extent, long term duration, continuous and high reversibility (when the cables cease transmitting electricity post-decommissioning). It is predicted that the impact will affect the receptor directly. The magnitude is therefore considered to be **negligible**.

Sensitivity of receptor

Subtidal habitat IEFs

2.9.10.14 Gill and Desender (2020) summarised current research on the impact of EMF emissions on organisms and acknowledged that relatively little is known about the potential effects of EMF on invertebrates such as those common in benthic communities. This is supported by a recent evaluation of knowledge of the impacts of EMF on invertebrates which concluded, globally, no direct impact on survival has been identified in the literature (Hervé, 2021). Furthermore, the methods to assess benthic invertebrates are variable therefore creating the same variability in results, as well as, in some cases, contradiction (Hutchinson *et al*., 2020). Some studies found that benthic communities which grow along cable routes were generally similar to those in the nearby area (Gill and Desender, 2020). These communities however are not exposed to the maximum EMF emissions due to cable burial creating a physical distance between the cable and the seabed surface. The EMF which reaches the surface however is measurable at biologically relevant scales at the seabed and in the water column (Hutchinson *et al*., 2020). Although whether these levels are detectable by benthic species is a topic of research.

2.9.10.15 Experimental evidence has demonstrated that exposure to EMF did not change the distribution of the ragworm *H. diversicolor* (Jakubowska *et al*., 2019). Experimental evidence has however demonstrated magnetoreception in marine molluscs and arthropods and biogenic magnetite has been known to occur in marine molluscs for over five decades (Normandeau, 2011). Magneto-receptive and electro-receptive species have evolved to respond to small changes in the Earth's geomagnetic fields and bioelectric fields making the presence of an EMF more perceivable to receptive species (Hutchinson *et al*., 2020). Reported sensitivities to electric fields for invertebrates range from around 3 mV/cm to 20 mV/cm (Steullet *et al*., 2007). Research conducted on the edible crab *Cancer pagurus* by Scott *et al.* (2021) found that EMF strength of 250 µT were found to have limited physiological and behavioural impacts, far above levels expected to be generated from cables from the Mona Offshore Wind Project. Exposure to 500 µT and 1,000 µT were found to disrupt internal stress response and crabs showed a clear attraction to EMF exposed (500 µT and 1000 µT) shelters with a significant reduction in time spent roaming (Scott *et al.*, 2021). Further research by Harsanyi *et al.* (2022) examined the effect of EMF on crab (*Cancer pagurus*) and lobster (*Homarus gammarus*) early development. Chronic exposure to 2.8 mT EMF throughout embryonic development resulted in significant differences in stage-specific egg volume and resulted in stage I lobster and zoea I crab larvae exhibiting decreased carapace height, total length, and maximum eye diameter. These traits may ultimately affect larval mortality, recruitment and dispersal. The levels of EMF exposure which is simulated by Harsanyi *et al.* (2022) is likely to only be found directly above and a few meters either side of the cable reducing the area this impact could occur over. Normandeau (2011) summarised that, despite these sensitivities, no direct evidence of impacts to invertebrates from undersea cable EMFs exists. What is known about invertebrate sensitivities to EMF does provides some guidance for considering likely significant effects. Likely significant effects would depend on the sensory capabilities of a species, the life functions that it's magnetic or electric sensory systems support, and the natural history characteristics of the species. Life functions supported by the electric and magnetic sense indicate that species capable of detecting magnetic fields face likely significant effects different from those that detect electric fields.

2.9.10.16 The conclusion that the potential impact of EMF is negligible is popular amongst the international community. For example in Germany The Federal Maritime and Hydrographic Agency stated in its guidance on the design of offshore wind turbines that the expected magnetic field produced by a submarine power cable will be well below the geomagnetic field on the surface, and the effect therefore assumed to be negligible (Olsson *et al*., 2010). Similar conclusions have been drawn in Sweden and Norway (Olsson *et al*., 2010).

2.9.10.17 Shellfish which also inhabit the sea floor, are anticipated to be more sensitive to EMF. Scott *et al*. (2021), investigated the effects of different strength EMF exposure on the commercially important edible crab *Cancer pagurus*. This investigation measured stress related parameters as well as behavioural and response parameters over a 24-hour period. The results of this investigation indicated that exposure to 500 µT and 1,000 µT were found to attract crabs, limiting their time spent roaming as well as disrupt some stress related parameters leading to increased physiological stress when exposed to EMF of 500 µT or above. These results however are not directly applicable to the cables used in the Mona Offshore Wind Project as the magnetic field levels tested are an order of magnitude higher than what you would expect for a buried cable such as those at the Mona Offshore Wind Project. Effects of EMF on shellfish receptors are fully considered in Volume 2, Chapter 3: Fish and shellfish ecology of the Environmental Statement.

2.9.10.18 Research regarding the potential impact of EMF on invertebrates still has a number of knowledge gaps which hinder the ability to fully understand the effects. Hervé (2021) identifies that establishing the impact on groups such as molluscs is highly underdeveloped, the impact on species relative to the strength of the EMF as well as the impact of different types of cable are key knowledge gaps.

2.9.10.19 In summary, the current literature suggests that EMF influenced behavioural and physiological effects in benthic invertebrates, if any are observed, will be closely related to the proximity of the individual to the source. Despite this, and due to the low confidence in the assessment of sensitivity due to a lack of data, a precautionary approach has been taken to the conclusion of sensitivity below.

2.9.10.20 EMF may result in very minor loss or detrimental alteration to one or more characteristics, features or elements of the subtidal IEFs.

2.9.10.21 The subtidal coarse and mixed sediments with diverse benthic communities IEF, sand and muddy sand communities with polychaetes and bivalves IEF, Annex I low resemblance stony reef (outside an SAC) IEF, Constable Bank (Annex I sandbank outside an SAC) IEF and seapens and burrowing megafauna communities IEF are deemed to be of low vulnerability (recoverability is not applicable to this impact) and national value. The sensitivity of the IEFs is therefore, considered to be **low**.

Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC

2.9.10.22 The sensitivity of the IEFs is as described previously for the subtidal habitat IEF assessment in paragraph 2.9.10.14 to 2.9.10.20.

2.9.10.23 The subtidal coarse and mixed sediments with diverse benthic communities IEF and sand and muddy sand communities with polychaetes and bivalves IEF are deemed to be of low vulnerability (recoverability is not applicable to this impact) and national value. The sensitivity of the IEFs is therefore, considered to be **low**.

Significance of effect

Subtidal habitat IEFs

2.9.10.24 Overall, for all the subtidal IEFs (subtidal coarse and mixed sediments with diverse benthic communities IEF, sand and muddy sand communities with polychaetes and bivalves IEF, Annex I low resemblance stony reef (outside an SAC) IEF, Constable Bank (Annex I sandbank outside an SAC) IEF and seapens and burrowing megafauna communities IEF) the magnitude of EMF from subsea electrical cables impact in the operations and maintenance phase is deemed to be low and the sensitivity of the receptor is considered to be low. The effect will, therefore, be of **negligible** significance, which is not significant in EIA terms. This conclusion has been reached due to the limited effects associated with EMF which have been described only affecting a small group of organisms as well as the small area over which potentially influential EMF will be present.

Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC

2.9.10.25 Overall, for all the subtidal coarse and mixed sediments with diverse benthic communities IEF (within the SAC) and sand and muddy sand communities with polychaetes and bivalves IEF (within the SAC) the magnitude of EMF from subsea electrical cables impact in the operations and maintenance phase is deemed to be low and the sensitivity of the receptor is considered to be low. The effect will, therefore, be of **negligible** significance, which is not significant in EIA terms. This conclusion has been reached due to the limited effects associated with EMF which have been described only affecting a small group of organisms as well as the small area over which potentially influential EMF will be present.

2.9.11 Heat from subsea electrical cables

2.9.11.1 The presence and operation of inter-array, interconnector and export cables within the Mona Array Area and Mona Offshore Cable Corridor may lead to localised heating of seabed affecting benthic subtidal receptors.

2.9.11.2 The benchmark for the relevant MarESA pressure which has been used to inform this impact assessment is described here.

- Temperature increase (local): An increase of 5°C for one month, or 2°C for one year.

2.9.11.3 The subtidal IEFs that have the potential to be affected by heat from subsea electrical cables across all phases of the Mona Offshore Wind Project are those present within the Mona Array Area and Mona Offshore Cable Corridor (i.e. subtidal coarse and mixed sediments with diverse benthic communities, sand and muddy sand communities with polychaetes and bivalves, Annex I low resemblance stony reef (outside an SAC) IEF, Constable Bank (Annex I sandbank outside an SAC) and seapens and burrowing megafauna communities) (see Table 2.20).

2.9.11.4 The Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC overlaps with the Mona Offshore Cable Corridor for the Mona Offshore Wind Project and therefore some heat from subsea electrical cables may occur within the SAC. As outlined in paragraph 2.5.3.3, no designated features of the Y Fenai a Bae Conwy/Menai Strait and Conwy

Bay SAC were recorded during the site specific surveys in the area of overlap with the Mona Offshore Cable Corridor. This supports NRW's mapped distribution of designated features within the SAC (NRW, 2016), as shown in Figure 2.9Figure 2.9. Therefore none of the designated features of the SAC will be affected by heat from subsea electrical cables and have not been assessed in relation to this potential impact. However the magnitude of the potential impact of heat from subsea electrical cables on the subtidal habitat IEFs identified in the area of overlap with the SAC (i.e. subtidal coarse and mixed sediments with diverse benthic communities IEF and the sand and muddy sand communities with polychaetes and bivalves IEF) is assessed across all phases of the Mona Offshore Wind Project.

2.9.11.5 Due to the greater depth of burial associated with the intertidal compared to the subtidal, there will be no impact associated with heat from subsea electrical cables on intertidal IEFs therefore no further assessment has been undertaken.

Operations and maintenance phase

Magnitude of impact

Subtidal habitat IEFs

2.9.11.6 Submarine power cables such as those to be installed for the Mona Offshore Wind Project generate heat through resistive heating. It is caused by energy loss as electrical currents flow and leads to the heating of the cable surface and the warming of the surrounding environment. High voltage cables are used to minimise the amount of energy lost as heat which in turn minimises the environmental warming effect.

2.9.11.7 Where submarine power cables are buried, the surrounding sediment may be heated. The cables, however, have negligible capability to heat the overlying water column because of the very high heat capacity of water (the amount of energy needed to result in a temperature change). There is little research on the heat dissipation effect resulting from subsea cables in the field as well as its effect on benthic receptors. Meißner *et al*. (2007) conducted a field study at Nysted Offshore Windfarm in Denmark. This study tested the difference in sediment temperature between a control site and a site 25 cm away from the cable. Results showed a 2^{o}C maximum difference between sites with a mean difference of 1^{o}C, with similar results for a HVAC 33 kv cable and HVAC 132 kv cable (low and high voltage cables respectively).

2.9.11.8 Additionally the potential impact of seabed temperature rise as a result of buried cables has been considered during a project to bury a submarine High Voltage Direct Current (HVDC) cable between New England and Long Island, New York. The project estimated that the rise in temperature at the seabed immediately above the buried cable to be just 0.19^{o}C (BERR, 2008). The seasonal temperature range in the Irish Sea is 11^{o}C – 5^{o}C (Howarth, 2004), therefore any change similar to those observed by the previously described studies would fall within the natural seasonal variation of this region. Furthermore, the effects of climate change are likely to result in higher average temperatures being the norm.

2.9.11.9 A number of environmental factors have been identified which change the way that heat from subsea cables will dissipate. One of them being the nature of sediment that the cable is buried in. A lab-based study by Emeana *et al.* (2016) investigated the thermal regime around high voltage submarine cables using a heat source in a large tank to simulate seafloor conditions. The research identified that when the heat source was buried in fine clay/silt sediments it had a conductive heat transfer mode, only raising temperatures in the immediate radius of the cable. When the heat source was buried in fine permeable sands they observed convective heat transfer when the heat sources surface temperature reached over 20ºC above the ambient temperature resulting in temperature change up to 1 m above the heat sources surface (when the heat source was buried at 1 m). In coarse sands convection occurred at a lower temperature (>9ºC) and increases in fluid temp were detectable over 1m above the heat sources surface. This study however was conducted in a laboratory without the influence of water flow which, in an offshore environment, would quickly dissipate the effects of heat emissions (Worzyk, 2009).

2.9.11.10 During the operational phase of the Mona Offshore Wind Project there will be up to 325 km of 66 kv to 132 kv HVAC inter-array cables, up to 50 km of 275 kv HVAC interconnector cables and up to 360 km of 275 kv HVAC export cables (Table 2.18). The minimum burial depth for cables will be 0.5 m.

2.9.11.11 A small increase in temperature may result in very minor loss or detrimental alteration to one or more characteristics, features or elements of the subtidal IEFs.

2.9.11.12 The impact is predicted to be of local spatial extent, long term duration, continuous and high reversibility (when the cables cease transmitting electricity post-decommissioning). It is predicted that the impact will affect the receptor directly. The magnitude is therefore considered to be **negligible**.

Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC

2.9.11.13 The magnitude of the impact on benthic invertebrates due to heat from subsea cables is consistent across the Mona Offshore Wind Project including in the sections of the Mona Offshore Cable Corridor which overlap with the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC and is, therefore, as outlined in paragraphs 2.9.11.6 and 2.9.11.12. Furthermore, based on the proportion of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC which overlaps with the Mona Offshore Cable Corridor, the MDS assumes that there may be up to 8.1 km of HVAC export cables installed within the SAC. A small increase in temperature may result in very minor loss or detrimental alteration to one or more characteristics, features or elements of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC.

2.9.11.14 On the basis of NRW's mapped distribution of designated features within the SAC (NRW, 2016), as shown in Figure 2.9, the Mona Offshore Cable Corridor does not spatially overlap with any protected features. This was supported by the site specific surveys which did not find any of the designated features within the overlap between the SAC and the Mona Offshore Cable Corridor.

2.9.11.15 The impact is predicted to be of local spatial extent, long term duration, continuous and high reversibility (when the cables cease transmitting electricity post-decommissioning). It is predicted that the impact will affect the receptor directly. The magnitude is therefore considered to be **negligible**.

Sensitivity of receptor

Subtidal habitat IEFs

2.9.11.16 The sensitivities of the benthic subtidal IEFs to this impact are presented in Table 2.27 and based on the information available to inform the MarESA. Subtidal IEFs are predicted to range from being not sensitive to having low sensitivity to sediment temperature increase.

2.9.11.17 The sensitivity of the subtidal coarse and mixed sediments with diverse benthic communities IEF representative biotopes is based on the thermal limits of their characteristic benthic species. For example the characterising bivalve *Timoclea ovata* has a wide distribution from north Norway and Iceland south to west Africa. It is also recorded from the Canary Islands, the Azores and the Mediterranean and Black Sea (Morton, 2009) adapting to the temperature regime at each location as well as local seasonal variations. Temperature cues influence the timing of gametogenesis and spawning in several species present in the biotope. Many polychaete species including *Mediomastus fragilis, Owenia fusiformis* and *Protodorvillea kefersteini* recruit in spring/early summer recruitment (Sardá *et al*., 1999). As the sediment temperature change expected in relation to the presence of cables is anticipated to be minimal and within the thermal range of species residing in UK waters it is unlikely that there will be any notable effects on the characteristic species and therefore the biotopes as a whole.

2.9.11.18 The assemblages in the sand and muddy sand communities with polychaetes and bivalves IEF contain many characterising species that also occur in the Mediterranean (Sardá *et al*., 1999; Sardá *et al*., 2000), where temperatures are higher than experienced in the UK. It is considered likely, therefore, that a chronic change in temperature at such a low level would be tolerated by species with a wide distribution or they would be resistant of such changes. Very few laboratory studies have been carried out on the characterising species and the assessment relies on information on larvae in the plankton or monitoring of settlement and records of species distribution. Studies on *Bathyporeia,* a characterising species of the SS.SSa.IFiSa.NcirBat, found a chronic increase in temperature throughout the year of 2ºC may fall within the normal temperature variation and an acute increase in water temperatures from 19 to 24ºC for a month may be tolerated by the characterising species supported by deeper burrowing and/or migration (Preece, 1971).

2.9.11.19 The low resemblance stony reef (outside an SAC) IEF is assessed by the MarESA as being not sensitive to temperature change as the characteristic species have a wide range throughout most of Europe. For example *Dysidea fragilis* is found from the Arctic to the Mediterranean (Mustapha *et al*., 2004). Berman *et al*. (2013) monitored sponge communities off Skomer Island, UK (southwest Wales|) over three years noting seawater temperature, turbidity, photosynthetically active radiation and wind speed were all recorded during the study. It was concluded that, despite changes in species composition, primarily driven by the non-characterising species, no significant difference in sponge density was recorded in all sites studied.

2.9.11.20 The Constable Bank (Annex I sandbank outside an SAC) IEF is considered to have an overall low sensitivity to temperature change. Studies have shown that the characteristic communities of the representative biotopes can adapt to a wide range of temperatures (an example for this adaptation is detailed in paragraph 2.9.11.18). The upper lethal temperatures (the temperature at which 50% of individuals died) were 37.5°C and 39.4°C, respectively, well above the temperatures that may occur in the sediment above cables. Emery *et al*. (1957) reported that *Nephtys* spp. could withstand summer temperatures of 30 – 35°C. Kröncke *et al*. (1998) examined long term changes in the macrofauna in the subtidal zone off Norderney, Germany. The analysis suggested that hot summers have no impact on the benthos therefore the slight elevation resulting from cables is unlikely to result in an adverse impact. Long-term analysis of the North Sea pelagic system has identified yearly variations in larval abundance of Echinodermata, Arthropoda, and Mollusca larvae that correlate with sea surface temperatures. Larvae of benthic echinoderms and decapod crustaceans increased after the mid-1980s, coincident with a rise in sea surface temperature in the North Sea, whereas bivalve larvae underwent a reduction (Kirby *et al*., 2008). An increase in temperature may alter larval supply and in the long term, and over large spatial scales, may result in changes in community composition. The temperature change associated with cables has not been found to extend into the water column due to the high heat capacity of water therefore it is highly unlikely that processes such as larval production or dispersal will be impacted by this cable heat transfer. Furthermore, the minimal increase in temperature expected in the top layers of sediment and on the seabed are expected to be within the seasonal temperature ranges of these species therefore other function such as gametogenesis and spawning are also unlikely to be affected.

2.9.11.21 The seapens and burrowing megafauna communities IEF has a medium sensitivity to local temperature increase primarily due to the slow recovery rate of the habitat. Some species of seapen as well as the accompanying burrowing megafauna are buffered from temperature increases typically due to their burrowing lifestyle (Hill *et al.*, 2023). *Virgularia mirabilis* are recorded across very different environmental conditions, including western Europe, the Mediterranean, Norway, Iceland, north Africa, and the Gulf of Mexico (OBIS, 2016). The distribution of seapens suggests that they are probably resistant to a 2°C change in temperature (which is much greater than the temperature change which may be caused by buried subsea cables associated with the Mona Offshore Wind Project), however, may be less resistant of a short-term increase of 5°C (Hill *et al*., 2023).

2.9.11.22 The subtidal coarse and mixed sediments with diverse benthic communities IEF, sand and muddy sand communities with polychaetes and bivalves IEF and Constable Bank (Annex I sandbank outside an SAC) IEF are deemed to be of low vulnerability, high recoverability, and national value. The sensitivity of the IEFs is therefore considered to be **low**.

2.9.11.23 The seapens and burrowing megafauna communities IEF are deemed to be of medium vulnerability, medium recoverability, and national value. The sensitivity of the IEFs is therefore considered to be **medium**.

2.9.11.24 The low resemblance stony reef (outside an SAC) IEF is deemed to not be sensitive to this pressure and is of national value. The sensitivity of the IEFs is therefore considered to be **negligible**.

Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC

2.9.11.25 The sensitivity of the IEFs is as described previously for the subtidal habitat IEF assessment in paragraph 2.9.11.16 to 2.9.11.20.

2.9.11.26 The subtidal coarse and mixed sediments with diverse benthic communities IEF and sand and muddy sand communities with polychaetes and bivalves IEF are deemed to be of low vulnerability, high recoverability, and national value. The sensitivity of the IEFs is therefore considered to be **low**.

Table 2.27: Sensitivity of the relevant benthic IEFs to heat from cables.

IEF	Representative biotopes	Sensitivity to defined MarESA pressure Temperature increase (local)	Overall sensitivity (based on Table 2.16)
Subtidal biotopes			
Subtidal coarse and mixed sediments with diverse benthic communities.	SS.SCS.CCS	Low	Low
	SS.SMx.CMx SS.SMx.CMx.KurThyMx	Low	
	SS.SMx.OMx.PoVen	Low	
Sand and muddy sand communities with polychaetes and bivalves	SS.SSa.CFiSa	Low	Low
	SS.SSa.IFiSa.NcirBat	Not sensitive	
	SS.SSa.CMuSa	Low	
	SS.SSa.IMuSa.FfabMag	Low	
Annex I low resemblance stony reef (outside an SAC)	CR.HCR.XFa.SpNemAdia	Not sensitive	Negligible
Constable Bank (Annex I sandbank outside an SAC)	SS.SSa.IFiSa.NcirBat	Not sensitive	Low
	SS.SSa.CFiSa.ApriBatPo	Low	
Seapens and burrowing megafauna	SS.SMu.CFiMu.SpnMeg	Medium	Medium

Significance of effect

Subtidal habitat IEFs

2.9.11.27 Overall, for the subtidal coarse and mixed sediments with diverse benthic communities IEF, sand and muddy sand communities with polychaetes and bivalves IEF and Constable Bank (Annex I sandbank outside an SAC) IEF the magnitude of the heat from subsea electrical cables impact in the operations and maintenance phase is deemed to be negligible and the sensitivity of the receptor is considered to be low. The effect will, therefore, be of **negligible** significance, which is not significant in EIA terms. This significance has been determined due to the very low levels of heat which are expected from the cables, creating conditions well within the natural variability experienced by the characteristic communities of these IEFs.

2.9.11.28 Overall, for the seapens and burrowing megafauna communities IEF the magnitude of the heat from subsea electrical cables impact in the operations and maintenance phase is deemed to be negligible and the sensitivity of the receptor is considered to be medium. The effect will, therefore, be of **negligible** significance, which is not significant in EIA terms. This significance has been concluded due to the very low levels of heat which are expected from the cables, creating conditions well within the natural variability experienced by the characteristic communities of this IEF.

2.9.11.29 Overall, for the low resemblance stony reef (outside an SAC) IEF the magnitude of the heat from subsea electrical cables impact in the operations and maintenance phase is deemed to be negligible and the sensitivity of the receptor is considered to be negligible. The effect will, therefore, be of **negligible** significance, which is not significant in EIA terms.

Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC

2.9.11.30 Overall, for the subtidal coarse and mixed sediments with diverse benthic communities IEF (within the SAC) and sand and muddy sand communities with polychaetes and bivalves IEF (within the SAC) the magnitude of the heat from subsea electrical cables impact in the operations and maintenance phase is deemed to be negligible and the sensitivity of the receptor is considered to be low. The effect will, therefore, be of **negligible** significance, which is not significant in EIA terms. This significance has been determined due to the very low levels of heat which are expected from the cables, creating conditions well within the natural variability experienced by the characteristic communities of these IEFs.

2.9.12 Future monitoring

2.9.12.1 No benthic subtidal and intertidal ecology monitoring to test the predictions made within the impact assessment is considered necessary.

2.10 Cumulative effect assessment methodology

2.10.1 Adjusted an Methodology

2.10.1.1 The CEA takes into account the potential impact associated with the Mona Offshore Wind Project together with other projects and plans. The projects and plans selected as relevant to the CEA presented within this chapter are based upon the results of a screening exercise (see Volume 5, Annex 5.1: Cumulative effects screening matrix of the Environmental Statement). Each project has been considered on a case by case basis for screening in or out of this chapter's assessment based upon data confidence, effect-receptor pathways and the spatial/temporal scales involved.

2.10.1.2 The benthic subtidal and intertidal ecology CEA methodology has followed the methodology set out in Volume 1, Chapter 5: EIA methodology of the Environmental Statement. As part of the assessment, all projects and plans considered alongside the Mona Offshore Wind Project have been allocated into 'tiers' reflecting their current stage within the planning and development process, these are listed below.

2.10.1.3 A tiered approach to the assessment has been adopted, as follows:

- Tier 1
  - Under construction
  - Permitted application
  - Submitted application
  - Those currently operational that were not operational when baseline data were collected, and/or those that are operational but have an on-going impact
- Tier 2
  - Scoping report has been submitted and is in the public domain
- Tier 3
  - Scoping report has not been submitted and is not in the public domain
  - Identified in the relevant Development Plan
  - Identified in other plans and programmes.

2.10.1.4 This tiered approach is adopted to provide a clear assessment of the Mona Offshore Wind Project alongside other projects, plans and activities.

2.10.1.5 The specific projects, plans and activities scoped into the CEA, are outlined in Table 2.28 and shown in Figure 2.10.

2.10.1.6 A number of the impacts considered for the Mona Offshore Wind Project alone, as outlined in Table 2.18 and section 2.9, have not been considered within the CEA due to the localised and temporally restricted nature of these impacts. These impacts include:

- Disturbance/remobilisation of sediment-bound contaminants
- EMF from subsea electrical cabling
- Heat from subsea electrical cables.

Table 2.28: List of other projects, plans and activities considered within the CEA.

Project/Plan	Status	Distance from the Mona Array Area (km)	Distance from the Mona Offshore/Onshore Cable Corridor (km)	Description of project/plan	Dates of construction (if applicable)	Dates of operation (if applicable)	Overlap with the Mona Offshore Wind Project
Mona Offshore Wind Project	**-**	**-**	**-**	**-**	**Q1 2026 to Q4 2029**	**Q1 2030 to Q4 2065**	**-**
Tier 1							
Offshore renewables							
Awel y Môr Offshore Wind Farm	Permitted but not yet implemented	13.52	3.60	Up to 50 wind turbines.	2026 to 2030	2030 to 2055	The construction, operations and maintenance and decommissioning phases of this project will overlap with the construction and operations and maintenance of the Mona Offshore Wind Project.
Rhyl Flats Offshore Wind Farm	Operational (with ongoing activities)	25.6	3.80	30 wind turbines	2004	2004 to 2024	The decommissioning phase of this project overlaps with the construction phase of the Mona Offshore Wind Project.
Rhyl Flats Offshore Wind Farm Operational Marine Licence - operations and maintenance activities	Operational	24.8	3.80	Operations and maintenance activities at Rhyl Flats Offshore Wind Farm (no further information)	n/a	2015 to 2034	The operations and maintenance activities associated with this project will overlap with the construction and operations and maintenance phases of the Mona Offshore Wind Project.

Project/Plan	Status	Distance from the Mona Array Area (km)	Distance from the Mona Offshore/Onshore Cable Corridor (km)	Description of project/plan	Dates of construction (if applicable)	Dates of operation (if applicable)	Overlap with the Mona Offshore Wind Project
Gwynt y Môr Offshore Wind Farm	Operational (with ongoing activities)	17.8	9.92	150 to 250 wind turbines	2008 to 2011	2011 to 2033	The operations and maintenance and decommissioning phases of this project will overlap with the construction and operations and maintenance phases of the Mona Offshore Wind Project.
North Hoyle Offshore Wind Farm	Operational (with ongoing activities)	29.6	13.57	30 wind turbines	2002 to 2003	2003 to 2034	The operations and maintenance and decommissioning phases of this project will overlap with the construction and operation and maintenance phases of the Mona Offshore Wind Project.
North Hoyle Offshore Wind Farm Operational Marine Licence - operations and maintenance activities	Operational	29.6	13.57	Operations and maintenance activities at North Hoyle Offshore Wind Farm (no further information)	n/a	2015 to 2029	The operations and maintenance activities associated with this project will overlap with the construction phase of the Mona Offshore Wind Project.
Burbo Bank Extension Offshore Wind Farm	Operational (with ongoing activities)	30.6	26.07	32 wind turbines	2016 to 2017	2017 to 2042	The operations and maintenance and decommissioning phases of this project will overlap with the construction and operations and maintenance phases of the

Project/Plan	Status	Distance from the Mona Array Area (km)	Distance from the Mona Offshore/Onshore Cable Corridor (km)	Description of project/plan	Dates of construction (if applicable)	Dates of operation (if applicable)	Overlap with the Mona Offshore Wind Project
							Mona Offshore Wind Project.
Burbo Bank Extension Operational Marine Licence - array cable repair and remediation activities (MLA/2017/00164)	Operational	30.6	26.07	Up to 10 discrete array cable repair or remediation events over the lifetime of the wind farm (25 years).	n/a	2018 to 2042	Cable repair/remediation activities associated with this project overlaps with the construction and operations and maintenance phases of the Mona Offshore Wind Project.
Burbo Bank Extension Operational Marine Licence - export cable repair and remediation activities (MLA/2017/00166/1)	Operational	34.6	20.81	Up to 4 discrete export cable repair or remediation events over the lifetime of the wind farm (25 years).	n/a	2017 to 2042	Cable repair/remediation activities associated with this project overlaps with the construction and operations and maintenance phases of the Mona Offshore Wind Project.
Walney Extension Offshore Wind Farm	Operational (with ongoing activities)	30.7	47.76	87 wind turbines	2015 to 2018	2018 to 3038	The operations and maintenance and decommissioning phases of this project will overlap with the construction and operations and maintenance phases of the Mona Offshore Wind Project.
West of Duddon Sands Offshore Wind Farm	Operational (with ongoing activities)	31.9	43.94	108 wind turbines	2012 to 2014	2014 to 2034	The operations and maintenance and decommissioning phases of this project will overlap with the construction and

Project/Plan	Status	Distance from the Mona Array Area (km)	Distance from the Mona Offshore/Onshore Cable Corridor (km)	Description of project/plan	Dates of construction (if applicable)	Dates of operation (if applicable)	Overlap with the Mona Offshore Wind Project
							operations and maintenance phases of the Mona Offshore Wind Project.
West of Duddon Sands Offshore Wind Farm Operational Marine Licence operations and maintenance activities (MLA/2016/00150/3)	Operational	31.9	43.94	Covers licensable O&M activities to be carried out as and when required over the lifetime of the wind farm	n/a	2016 to 2037	The operations and maintenance activities associated with this project will overlap with the construction and operations and maintenance phases of the Mona Offshore Wind Project.
Walney 2 Offshore Wind Farm	Operational (with ongoing activities)	34.1	51.49	51 wind turbines	2010 to 2012	2012 to 2032	The operations and maintenance and decommissioning phases of this project will overlap with the construction and operations and maintenance phases of the Mona Offshore Wind Project.
Walney 2 Offshore Wind Farm Operational Marine Licence - composite operations and maintenance activities (MLA/2017/00429/1)	Operational	38.6	52.54	Operations and maintenance events including removal of marine growth and/ or guano from substation, export cable repair events, with associated anchoring/jacking-up/vessel beaching, remediation events (via	n/a	2018 to 2038	The operations and maintenance activities associated with this project will overlap with the construction and operations and maintenance phases of the Mona Offshore Wind Project.

Project/Plan	Status	Distance from the Mona Array Area (km)	Distance from the Mona Offshore/Onshore Cable Corridor (km)	Description of project/plan	Dates of construction (if applicable)	Dates of operation (if applicable)	Overlap with the Mona Offshore Wind Project
				jetting and/or mass flow excavator) of up to 7 km length per event, potential jacking-up to and removal and/or replacement of cable/scour protection and deployment of additional cable protection adjacent to existing cable protection to resolve secondary scour issues.			
Walney 1 Offshore Wind Farm	Operational (with ongoing activities)	35.4	49.63	51 wind turbines	2010 to 2011	2011 to 2031	The operations and maintenance and decommissioning phases of this project will overlap with the construction and operations and maintenance phases of the Mona Offshore Wind Project.
Walney Offshore Wind Farm Operational Marine Licence - phase 1 export cable (MLA/2014/00028/5)	Operational	39.0	53.58	Emergency export cable repairs over the operational life time of the Walney Offshore Wind Farm export cables (2) to ensure adequate contingency plans are in place to react to a major breakage/fault in a	n/a	2014 to 2027	Cable repair/remediation activities associated with this project overlaps with the construction phase of the Mona Offshore Wind Project.

Project/Plan	Status	Distance from the Mona Array Area (km)	Distance from the Mona Offshore/Onshore Cable Corridor (km)	Description of project/plan	Dates of construction (if applicable)	Dates of operation (if applicable)	Overlap with the Mona Offshore Wind Project
				reasonable period of time.			
Walney Offshore Wind Farm Operational Marine Licence - composite operations and maintenance activities (MLA/2017/00081/2)	Operational	39.0	53.58	For future cable repair/remediation/protection works on the Walney 1 export cable and also for potential repair works on the Walney 1 Offshore Substation Platform.	n/a	2017 to 2037	The operations and maintenance activities associated with this project will overlap with the construction and operations and maintenance phases of the Mona Offshore Wind Project.
Walney Offshore Wind Farm Operational Marine Licence - phase 2 export cable (MLA/2014/00027/7)	Operational	38.6	52.54	Emergency export cable repairs over the operational life time of the Walney Offshore Wind Farm export cables (2) to ensure adequate contingency plans are in place to react to a major breakage/fault within a reasonable period of time.	n/a	2014 to 2027	Cable repair/remediation activities associated with this project overlaps with the construction and operations and maintenance phases of the Mona Offshore Wind Project.
Walney Offshore Wind Farm Operational Marine Licence - inter array cable repair (MLA/2013/00426/2)	Operational	35.4	49.63	Emergency inter array cable repairs over the operational life time of the Walney Offshore Wind Farm (1 & 2). To ensure adequate contingency plans are in place to react to a	n/a	2018 to 2032	Cable repair/remediation activities associated with this project overlaps with the construction and operations and maintenance phases of the Mona Offshore Wind Project.

Project/Plan	Status	Distance from the Mona Array Area (km)	Distance from the Mona Offshore/Onshore Cable Corridor (km)	Description of project/plan	Dates of construction (if applicable)	Dates of operation (if applicable)	Overlap with the Mona Offshore Wind Project
				major breakage/fault in an inter array cable.			
Walney 1 and 2 Offshore Wind Farms Operational Marine Licence - operations and maintenance activities (MLA/2016/00151/3)	Operational	32.8	49.6	Covers licensable O&M activities to be carried out as and when required over the lifetime of the wind farms.	n/a	2016 to 2032	The operations and maintenance activities associated with this project will overlap with the construction and operations and maintenance phases of the Mona Offshore Wind Project.
Burbo Bank Offshore Wind Farm	Operational (with ongoing activities)	40.3	32.75	25 wind turbines	2004 to 2005	2007 to 2032	The operations and maintenance and decommissioning phases of this project will overlap with the construction and operations and maintenance phases of the Mona Offshore Wind Project.
Burbo Bank Offshore Wind Farm Operational Marine Licence - cable repair and remediation (MLA/2014/00336/1)	Operational	34.1	9.45	Burbo Bank cable repair and remediation works (no further information)	n/a	2018 to 2043	Cable repair/remediation activities associated with this project overlap with the construction and operations and maintenance phases of the Mona Offshore Wind Project.
Burbo Bank Offshore Wind Farm Operational Marine Licence - export cable	Operational	40.3	32.75	Up to four discrete export cable repair/remediation events over the	n/a	2018 to 2032	Cable repair/remediation activities associated with this project overlap with the construction and

Project/Plan	Status	Distance from the Mona Array Area (km)	Distance from the Mona Offshore/Onshore Cable Corridor (km)	Description of project/plan	Dates of construction (if applicable)	Dates of operation (if applicable)	Overlap with the Mona Offshore Wind Project
repair/remediation activities (MLA/2016/00406)				remaining lifetime of the wind farm (15 years).			operations and maintenance phases of the Mona Offshore Wind Project.
Burbo Bank Offshore Wind Farm Operational Marine Licence - inter-array cable repair (MLA/2014/00336/1)	Operational	40.3	32.75	For works which would be undertaken should any inter array cables at Burbo Bank Offshore Wind Farm fail. This is a pre-emptive application which is designed to limit downtime in any such situation where the cables fail.	n/a	2014 to 2032	Cable repair/remediation activities associated with this project overlaps with the construction and operations and maintenance phases of the Mona Offshore Wind Project.
Ormonde Offshore Wind Farm	Operational (with ongoing activities)	44.0	57.95	30 wind turbines	2009 to 2010	2011 to 2036	The operations and maintenance and decommissioning phases of this project will overlap with the construction and operations and maintenance phases of the Mona Offshore Wind Project.
Ormonde Offshore Wind Farm Operational Marine Licence - export cable repair and remediation (MLA/2015/00086/2)	Operational	45.7	56.86	5 x cable repair events, with associated jacking-up; and 10 x cable remediation events (via jetting).	n/a	2015 to 2030	Cable repair/remediation activities associated with this project overlaps with the construction and operations and maintenance phases of the Mona Offshore Wind Project.

Project/Plan	Status	Distance from the Mona Array Area (km)	Distance from the Mona Offshore/Onshore Cable Corridor (km)	Description of project/plan	Dates of construction (if applicable)	Dates of operation (if applicable)	Overlap with the Mona Offshore Wind Project
Ormonde Offshore Wind Farm Operational Marine Licence - operations and maintenance activities (MLA/2016/00224/2)	Operational	44.0	57.95	Operations and maintenance activities to be carried out as and when required over the lifetime of the wind farm.	n/a	2017 to 2037	The operations and maintenance activities associated with this project will overlap with the construction and operations and maintenance phases of the Mona Offshore Wind Project.
Barrow Offshore Wind Farm	Operational (with ongoing activities)	43.3	53.88	30 wind turbines	2004 to 2006	2006 to 2026	The operations and maintenance and decommissioning phases of this project will overlap with the construction phase of the Mona Offshore Wind Project.
Barrow Offshore Wind Farm Operational Marine Licence - export cable repair and remediation (MLA/2015/00077)[8]	Operational	46.3	56.22	5 x cable repair events, with associated jacking-up; and 10 x cable remediation events (via jetting).	n/a	2015 to 2030	Cable repair/remediation activities associated with this project overlaps with the construction and operations and maintenance phases of the Mona Offshore Wind Project.
Barrow Offshore Wind Farm Operational Marine Licence - operations and	Operational	43.3	53.88	This licence permits a number of operations and maintenance activities including	n/a	2016 to 2026	The operations and maintenance activities associated with this project will overlap with the

[8] MMO marine licence case reference

Project/Plan	Status	Distance from the Mona Array Area (km)	Distance from the Mona Offshore/Onshore Cable Corridor (km)	Description of project/plan	Dates of construction (if applicable)	Dates of operation (if applicable)	Overlap with the Mona Offshore Wind Project
maintenance (MLA/2016/00149/3)				- Removal of marine growth and/or guano - Replacement of access ladders			construction and operations and maintenance phases of the Mona Offshore Wind Project.
Routine operations and maintenance activities at five OSPs (Barrow, Ormonde, Lincs, Westermost Rough, and Gunfleet Sands) (MLA/2017/00100/1)	Operational	45.36	53.28	Repainting of offshore structures, removal of algal growth/bird guano and removal of growth around J Tubes.	n/a	2017 to 2038	The operations and maintenance activities associated with this project will overlap with the construction and operations and maintenance phases of the Mona Offshore Wind Project.
Oil and Gas							
Isle of Man Crogga Licence (112/25)	Permitted	33.92	61.60	Licence for exploratory geotechnical and geophysical surveys as well as exploratory drilling,	n/a	2017 to 2048	The permitted activities associated with this project will overlap with the construction and operations and maintenance phases of the Mona Offshore Wind Project.
Dredging activities and dredge disposal sites							
Conwy River	Operational (with ongoing activities)	35.2	7.70	Dredging, no further information given.	n/a	2022 to 2037	Dredging and disposal activities associated with this project will overlap with the construction and

Project/Plan	Status	Distance from the Mona Array Area (km)	Distance from the Mona Offshore/Onshore Cable Corridor (km)	Description of project/plan	Dates of construction (if applicable)	Dates of operation (if applicable)	Overlap with the Mona Offshore Wind Project
							operations and maintenance phases of the Mona Offshore Wind Project.
Liverpool 2 and River Mersey approach channel dredging (MLA/2018/00536/8)	Operational (with ongoing activities)	22.1	22.44	Capital dredging in front of the proposed terminal to create a berth pocket.	n/a	2019 to 2028	Dredging and disposal activities associated with this project will overlap with the construction phase of the Mona Offshore Wind Project.
Mersey channel and river maintenance dredge disposal renewal (MLA/2021/00202)	Operational (with ongoing activities)	22.1	22.53	The Mersey Docks and Harbour Company Ltd, as the Harbour Authority for the Port of Liverpool has an obligation to dredge the approaches to Liverpool in order to maintain navigation into the Mersey Estuary for all river users.	n/a	2021 to 2031	Dredging and disposal activities associated with this project will overlap with the construction and operations and maintenance phases of the Mona Offshore Wind Project.
RNLI North Division - Regional Licence for Low Impact Maintenance Works	Operational (with ongoing activities)	48.7	40.35	Various low impact maintenance activities at RNLIW stations including minor beach reprofiling, navigational dredging and pontoon maintenance	n/a	2017 to 2027	Dredging and disposal activities associated with this project will overlap with the construction phase of the Mona Offshore Wind Project.
Dee River	Operational (with ongoing activities)	51.3	26.71	Dredging, no further information given.	n/a	2022 to 2037	Dredging and disposal activities associated with this project will overlap with the construction and

Project/Plan	Status	Distance from the Mona Array Area (km)	Distance from the Mona Offshore/Onshore Cable Corridor (km)	Description of project/plan	Dates of construction (if applicable)	Dates of operation (if applicable)	Overlap with the Mona Offshore Wind Project
							operations and maintenance phases of the Mona Offshore Wind Project.
RNLI Regional Maintenance (MLA/2015/00016)	Operational (with ongoing activities)	59.9	31.76	Low impact maintenance works to RNLI operated lifeboat stations and associated slipways, berths and other infrastructure.	n/a	2019 to 2029	Dredging and disposal activities associated with this project will overlap with the construction phase of the Mona Offshore Wind Project.
Liverpool Marina Maintenance Dredging - sustainable relocation of dredged material to the River Mersey (MLA/2020/00492)	Operational (with ongoing activities)	59.5	41.98	Annual campaigns of maintenance dredging over the next ten years using small hydraulic dredger.	n/a	2021 to 2030	Dredging and disposal activities associated with this project will overlap with the construction and operations and maintenance phase of the Mona Offshore Wind Project.
Douglas Harbour, Isle of Man	Operational (with ongoing activities)	43.1	67.0	Douglas outer harbour, basin and fairway are plough dredged annually, normally in January/February. The inner harbour/marina is also dredged annually, and silt is deposited at a licensed site off Douglas Head.	n/a	2016 to 2031	Dredging and disposal activities associated with this project will overlap with the construction and operations and maintenance phases of the Mona Offshore Wind Project.
Walney Extension pontoon/jetty dredging	Operational (with ongoing activities)	46.0	55.28	Twice yearly dredging campaigns over the next 10 years at each of	n/a	2019 to 2029	Dredging and disposal activities associated with this project overlaps with the construction phase of

Project/Plan	Status	Distance from the Mona Array Area (km)	Distance from the Mona Offshore/Onshore Cable Corridor (km)	Description of project/plan	Dates of construction (if applicable)	Dates of operation (if applicable)	Overlap with the Mona Offshore Wind Project
and disposal (MLA/2018/00403)				the two dredge locations.			the Mona Offshore Wind Project.
Port of Barrow maintenance dredging disposal licence (MLA/2015/00458/1)	Operational (with ongoing activities)	48.1	58.07	Dredging is required to maintain the Port of Barrow and its approach channel at its advertised navigational depth for all vessels entering and leaving the port.	n/a	2016 to 2026	Dredging and disposal activities associated with this project will overlap with the construction phase of the Mona Offshore Wind Project.
Deposit and removals							
Hilbre Swash (392/393)[9]	Operational (with ongoing activities)	22.4	17.20	Licence to extract up to 12 million tonnes of aggregate (mainly sand) over 15 years.	n/a	2015 to 2029	Aggregate extraction activities associated with this project will overlap with the construction phase of the Mona Offshore Wind Project.
Liverpool Bay (457)	Application Submitted	20.2	20.10	Proposed extraction of 18 million tonnes of aggregate (mainly sand and fine sediment) over 15 years.	n/a	Unknown	Aggregate extraction activities associated with this project will overlap with the construction and operations and maintenance phases of the Mona Offshore Wind Project.

[9] Marine aggregate extraction area number (NRW)

Project/Plan	Status	Distance from the Mona Array Area (km)	Distance from the Mona Offshore/Onshore Cable Corridor (km)	Description of project/plan	Dates of construction (if applicable)	Dates of operation (if applicable)	Overlap with the Mona Offshore Wind Project
Remedial works							
Isle of Man to UK Interconnector Cable - maintenance and repair (MLA/2016/00211)	Operational	21.5	36.96	This licence is for depositing additional armouring or protection whilst carrying out contingency repair and maintenance works on the IOM interconnector.	n/a	2018 to 2033	Maintenance activities associated with this project will overlap with the construction and operations and maintenance phases of the Mona Offshore Wind Project.
Isle of Man to UK Interconnector Cable - cable protection remedial works (MLA/2014/00201/2)	Operational	23.5	40.12	The licence is to remove displaced concrete mattresses and install flexible filter units in the original positions.	n/a	2014 to 2065	Maintenance activities associated with this project will overlap with the construction and operations and maintenance phases of the Mona Offshore Wind Project.
Tier 2							
Offshore Renewables Projects							
Morgan Offshore Wind Project: Generation Assets (hereafter referred to as the Morgan Generation Assets)	Pre-application	5.52	32.93	Up to 107 wind turbines	2028 to 2029	2030 to 2065	The construction, operations and maintenance and decommissioning phases of this project will overlap with the construction, operations and maintenance and decommissioning phases of the Mona Offshore Wind Project.

Project/Plan	Status	Distance from the Mona Array Area (km)	Distance from the Mona Offshore/Onshore Cable Corridor (km)	Description of project/plan	Dates of construction (if applicable)	Dates of operation (if applicable)	Overlap with the Mona Offshore Wind Project
Morecambe Offshore Windfarm Generation Assets (hereafter referred to as the Morecambe Generation Assets)	Pre-application	8.9	21.53	Up to 40 wind turbines	2026 to 2028	2029 to 2089	The construction, operations and maintenance and decommissioning phases of this project will overlap with the construction, operations and maintenance and decommissioning phases of the Mona Offshore Wind Project.
Morgan and Morecambe Offshore Windfarms Transmission Assets (hereafter referred to as the Morgan and Morecambe Offshore Windfarms Transmission Assets) (scoping search area)	Pre-application	8.92	21.53	Morgan Transmission Assets	2028 to 2029	2030 to 2065	Project construction phase overlaps with Mona Offshore Wind Project construction phase.
Eni Hynet Carbon Capture and Storage (CCS)	Pre-application	12.1	9.52	CCS project in the east Irish Sea. Works will include installation of a new cable, a new Douglas CCS platform and work on the existing Hamilton, Hamilton North and Lennox wellhead platforms.	Unknown	Unknown	This project will overlap with the construction and operations and maintenance phases of the Mona Offshore Wind Project.

Project/Plan	Status	Distance from the Mona Array Area (km)	Distance from the Mona Offshore/Onshore Cable Corridor (km)	Description of project/plan	Dates of construction (if applicable)	Dates of operation (if applicable)	Overlap with the Mona Offshore Wind Project
Mooir Vannin Offshore Windfarm	Pre-application	34.5	59.90	Orsted have signed an agreement for lease to develop a 700 MW (annual output 3,000 GWh) wind farm on the east coast and have undertaken initial surveys since 2016.	2030 to 2032	Aiming for the start of the operations and maintenance phase in 2032. End of this phase unknown.	This project will overlap with the construction and operations and maintenance phases of the Mona Offshore Wind Project.
Tier 3							
Cables and pipelines							
MaresConnect – Wales-Ireland Interconnector Cable	Pre-application	16.4	0.00	A proposed subsea and underground electricity interconnector system linking the existing electricity grids in Ireland and Great Britain.	2025	2027 – 2037	This project will overlap with the construction and operations and maintenance phases of the Mona Offshore Wind Project.

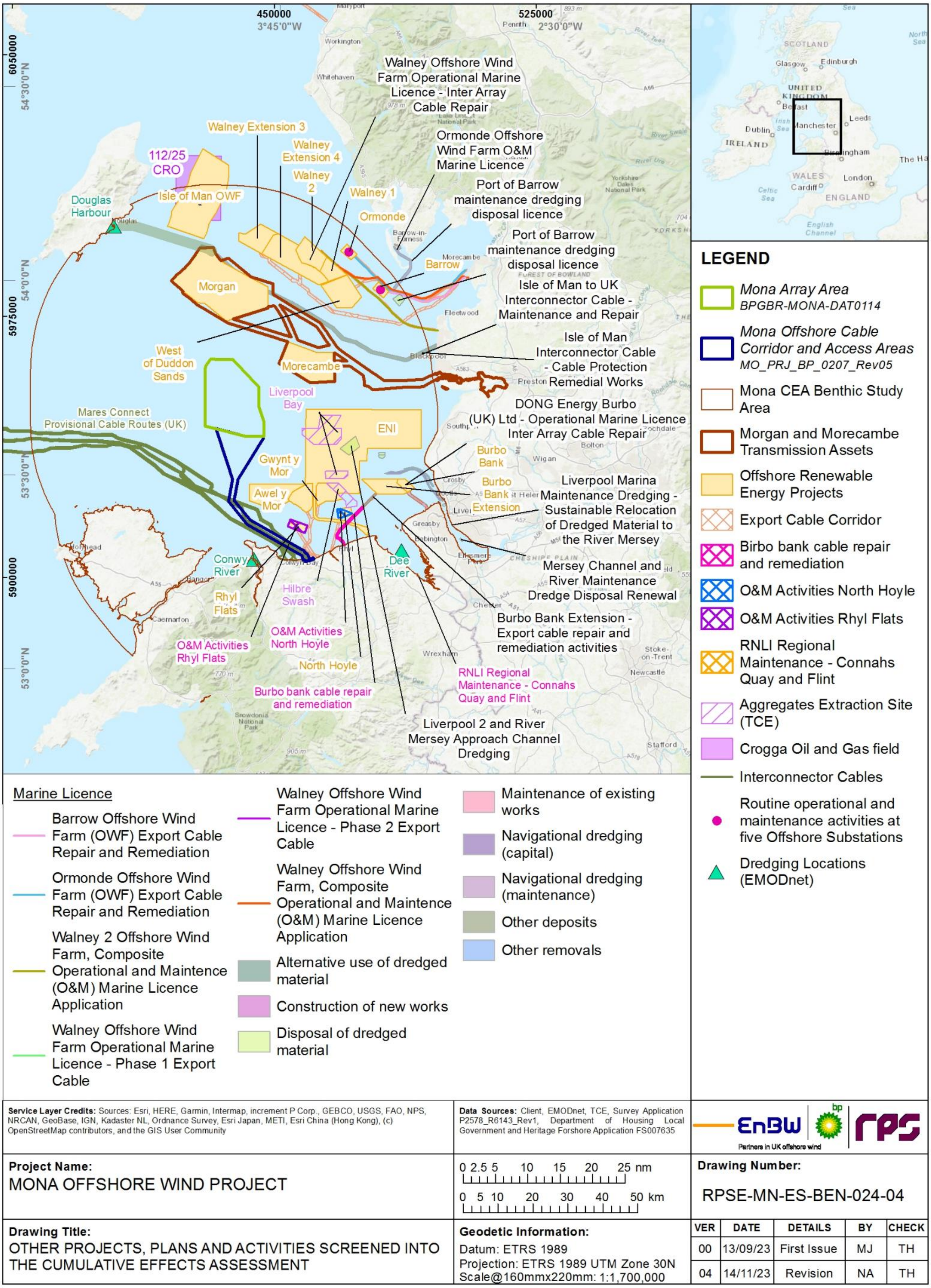


Figure 2.10: Other projects, plans and activities screened into the cumulative effects assessment.

2.10.2 Maximum design scenario

2.10.2.1 The MDSs identified in Table 2.29 have been selected as those having the potential to result in the greatest effect on an identified receptor or receptor group. The cumulative effects presented and assessed in this section have been selected from the Project Design Envelope provided in Volume 1, Chapter 3: Project description, of the Environmental Statement as well as the information available on other projects and plans, in order to inform an MDS. Effects of greater adverse significance are not predicted to arise should any other development scenario, based on details within the Project Design Envelope (e.g. different wind turbine layout), to that assessed here, be taken forward in the final design scheme.

Table 2.29: Maximum design scenario considered for the assessment of potential cumulative effects on benthic subtidal and intertidal ecology.

[a] C=construction, O=operational and maintenance, D=decommissioning

Potential cumulative effect	Phase[a]			Maximum Design Scenario	Justification
	C	O	D		
Temporary habitat loss/disturbance	✓	×	×	The MDS as described for the Mona Offshore Wind Project (Table 2.18) assessed cumulatively with the following other projects/plans: **Tier 1** • Offshore windfarm projects: – Awel y Môr Offshore Wind Farm construction and operations and maintenance phase – Rhyl Flats Offshore Wind Farm – operations and maintenance marine licences and decommissioning phase – Gwynt y Môr Offshore Wind Farm operations and maintenance – North Hoyle Offshore Wind Farm - operations and maintenance marine licences – Burbo Bank Extension Offshore Wind Farm - operations and maintenance marine licences (MLA/2017/00164 and MLA/2017/00166/1) – Walney Extension Offshore Wind Farm operations and maintenance phase – West of Duddon Sands Offshore Wind Farm operations and maintenance marine licence (MLA/2016/00150/3) – Walney 2 Offshore Wind farm – operations and maintenance marine licences (MLA/2017/00429/1) – Walney 1 Offshore Wind farm – operations and maintenance marine licences (MLA/2014/00028/5, MLA/2017/00081/2, MLA/2014/00027/7, MLA/2013/00426/2 and MLA/2016/00151/3) – Burbo Bank Offshore Wind Farm -– operations and maintenance marine licences (MLA/2014/00336/1, MLA/2016/00406 and MLA/2014/00336/1) – Ormonde Offshore Wind farm – operations and maintenance marine licences (MLA/2015/00086/2 and MLA/2016/00224/2)	These projects all involve activities which will result in temporary habitat disturbance/loss which may contribute to the impact upon a habitat that the Mona Offshore Wind Project will also affect.

Potential cumulative effect	Phase[a]			Maximum Design Scenario	Justification
	C	O	D		
				– Barrow Offshore Wind Farm – operations and maintenance marine licences (MLA/2015/00077 and MLA/2016/00149/3) and decommissioning phase – Routine operations and maintenance activities at five Offshore Substations (Barrow, Ormonde, Lincs, Westermost Rough, and Gunfleet Sands). • Oil and Gas projects: – Isle of Man Crogga Licence • Dredging projects: – Conwy River – Liverpool 2 and River Mersey approach channel dredging (MLA/2018/00536/8) – Mersey channel and river maintenance dredge disposal renewal (MLA/2021/00202) – RNLI North Division - Regional Licence for Low Impact Maintenance Works – Dee River – RNLI Regional Maintenance (MLA/2015/00016) – Liverpool Marina Maintenance Dredging - sustainable relocation of dredged material to the River Mersey (MLA/2020/00492) – Douglas Harbour, Isle of Man – Walney Extension pontoon/jetty dredging and disposal (MLA/2018/00403) – Port of Barrow maintenance dredging disposal licence (MLA/2015/00458/1) • Aggregate extraction activities – Hilbre Swash (area 392/393) aggregate extraction. • Inter-connector cables – Isle of Man to UK Interconnector Cable - maintenance and repair/ cable protection remedial works.	

Potential cumulative effect	Phase[a] C	O	D	Maximum Design Scenario	Justification
				Tier 2 • Tier 1 projects • Offshore windfarm projects: – Morgan and Morecambe Offshore Windfarms Transmission Assets Morecambe Generation Assets construction and operations and maintenance phases – Morgan Generation Assets construction phase – ENI Hynet CCS. • Aggregate extraction activities – Liverpool Bay (area 457) aggregate extraction. **Tier 3** • Tier 1 and 2 projects • Cables/pipelines: – MaresConnect.	
	×	✓	×	The MDS as described for the Mona Offshore Wind Project (Table 2.18) assessed cumulatively with the following other projects/plans: **Tier 1** • Offshore windfarm projects: – Awel y Môr Offshore Wind Farm operations and maintenance and decommissioning phases – Gwynt y Môr Offshore Wind Farm operations and maintenance and decommissioning phases – North Hoyle Offshore Wind Farm - operations and maintenance marine licences and decommissioning phase – Burbo Bank Extension Offshore Wind Farm - operations and maintenance marine licences (MLA/2017/00164 and MLA/2017/00166/1) and decommissioning phase	These projects all involve activities which will result in temporary habitat disturbance/loss which may contribute to the impact upon a habitat that the Mona Offshore Wind Project will also affect.

Potential cumulative effect	Phase[a] C	O	D	Maximum Design Scenario	Justification
				– Walney Extension Offshore Wind Farm operations and maintenance and decommissioning phases – West of Duddon Sands Offshore Wind Farm operations and maintenance marine licence (MLA/2016/00150/3) and decommissioning phase – Walney 2 Offshore Wind farm – operations and maintenance marine licences (MLA/2017/00429/1) and decommissioning phase – Walney 1 Offshore Wind farm – operations and maintenance marine licences (MLA/2014/00028/5, MLA/2017/00081/2, MLA/2014/00027/7, MLA/2013/00426/2 and MLA/2016/00151/3) and decommissioning phase – Burbo Bank Offshore Wind Farm -– operations and maintenance marine licences (MLA/2014/00336/1, MLA/2016/00406 and MLA/2014/00336/1) and decommissioning phase – Ormonde Offshore Wind farm – operations and maintenance marine licences (MLA/2015/00086/2 and MLA/2016/00224/2) and decommissioning phase – Routine operations and maintenance activities at five Offshore Substations (Barrow, Ormonde, Lincs, Westermost Rough, and Gunfleet Sands). • Oil and Gas projects: – Isle of Man Crogga Licence • Dredging projects: – Conwy River – Mersey channel and river maintenance dredge disposal renewal – Dee River – Liverpool Marina Maintenance Dredging - sustainable relocation of dredged material to the River Mersey – Douglas Harbour, Isle of Man • Cables/pipelines: – Isle of Man to UK Interconnector Cable - maintenance and repair.	

<table>
<tr><th rowspan="2">Potential cumulative effect</th><th colspan="3">Phase[a]</th><th rowspan="2">Maximum Design Scenario</th><th rowspan="2">Justification</th></tr>
<tr><th>C</th><th>O</th><th>D</th></tr>
<tr><td></td><td></td><td></td><td></td><td>Tier 2
• Tier 1 projects
• Offshore windfarm projects:
– Mooir Vannin Offshore Windfarm
– Morgan and Morecambe Offshore Windfarms Transmission Assets Morecambe Offshore Windfarm Generation Assets operations and maintenance phase
– Morgan Offshore Wind Project Generation Assets operations and maintenance phase
– ENI Hynet CCS.
• Aggregate extraction activities
– Liverpool Bay (area 457) aggregate extraction.
Tier 3
• Tier 1 and 2 projects
• Cables/pipelines:
– MaresConnect.</td><td></td></tr>
<tr><td></td><td>×</td><td>×</td><td>✓</td><td>The MDS as described for the Mona Offshore Wind Project (Table 2.18) assessed cumulatively with the following other projects/plans:
Tier 1
No tier 1 projects are predicted to overlap with the decommissioning phase of the Mona Offshore Wind Project.
Tier 2
• Offshore windfarm projects:
– Mooir Vannin Offshore Windfarm
– Morgan and Morecambe Offshore Windfarms Transmission Assets
– Morgan Offshore Wind Project Generation Assets decommissioning phase</td><td>These projects all involve activities which will result in temporary habitat disturbance/loss which may contribute to the impact upon a habitat that the Mona Offshore Wind Project will also affect.</td></tr>
</table>

Potential cumulative effect	Phase[a]			Maximum Design Scenario	Justification
	C	O	D		
				– Morecambe Offshore Windfarm Generation Assets operations and maintenance phase – Morgan and Morecambe Offshore Windfarms Transmission Assets – ENI Hynet CCS. **Tier 3** • Tier 1 and 2 projects • Cables/pipelines: – MaresConnect.	
Increased SSC and associated deposition	✓	×	×	The MDS as described for the Mona Offshore Wind Project (Table 2.18) assessed cumulatively with the following other projects/plans: **Tier 1** • Offshore windfarm projects: – Proposed development of Awel y Môr Offshore Wind Farm – Maintenance of Rhyl Flats Wind Farm – Maintenance of Gwynt y Môr Offshore Wind Farm – Maintenance and decommissioning of North Hoyle Wind Farm. • Aggregate extraction activities: – Operation of Hilbre Swash (area 392/393) extraction. • Dredge projects: – Conwy River. **Tier 2** • Tier 1 projects • Offshore renewables projects: – Construction of Morgan Offshore Wind Project Generation Assets – Construction of Morgan and Morecambe Offshore Windfarms Transmission Assets	Outcome of the CEA will be greatest when the greatest number of other schemes are considered in combination. Including schemes and developments within the CEA study area to capture the potential overlap of impacts during the construction, operations and maintenance and decommissioning phases. Activities from schemes that potentially impact the tidal/ wave regime and sediment transport during the temporal overlap with the Mona Offshore Wind Project phases have been included as these may create a cumulative impact on physical features/ receptors.

Potential cumulative effect	Phase[a] C	O	D	Maximum Design Scenario	Justification
				– Construction of Morecambe Offshore Windfarm Generation Assets – Construction of Eni Hynet CCS. • Aggregate extraction activities – Operation of Liverpool Bay (area 457) aggregate extraction. **Tier 3** • Tier 1 and 2 projects • Cables and pipelines: – Construction of MaresConnect cable.	
	×	✓	×	The MDS as described for the Mona Offshore Wind Project (Table 2.18) assessed cumulatively with the following other projects/plans: **Tier 1** • Offshore windfarm projects: – Maintenance and decommissioning of Awel y Môr Offshore Wind Farm – Maintenance and decommissioning of Rhyl Flats Wind Farm – Maintenance and decommissioning of Gwynt y Môr Offshore Wind Farm. • Dredge projects: – Conwy River. **Tier 2** • Tier 1 projects • Offshore windfarm projects: – Operational and maintenance of Morecambe Offshore Windfarm Generation Assets – Operational and maintenance of Morgan Offshore Wind Project Generation Assets – Operational and maintenance of Morgan and Morecambe Offshore Windfarms Transmission Assets. • Aggregate extraction activities	Outcome of the CEA will be greatest when the greatest number of other schemes are considered in combination. Including schemes and developments within the CEA study area to capture the potential overlap of impacts during the construction, operations and maintenance and decommissioning phases. Activities from schemes that potentially impact the tidal/ wave regime and sediment transport during the temporal overlap with the Mona Offshore Wind Project phases have been included as these may create a cumulative impact on physical features/ receptors.

Potential cumulative effect	Phase[a] C	O	D	Maximum Design Scenario	Justification
				– Operation of Liverpool Bay (area 457) aggregate extraction.	
	×	×	✓	The MDS as described for the Mona Offshore Wind Project (Table 2.18) assessed cumulatively with the following other projects/plans: There are no Tier 1 projects in decommissioning phase **Tier 2** • Tier 1 projects • Offshore windfarm projects: – Morecambe Offshore Windfarm Generation Assets decommissioning structures – Morgan Offshore Wind Project Generation Assets decommissioning structures – Morgan and Morecambe Offshore Windfarms Transmission Assets decommissioning structures.	Outcome of the CEA will be greatest when the greatest number of other schemes are considered in combination. Including schemes and developments within the CEA study area to capture the potential overlap of impacts during the construction, operations and maintenance and decommissioning phases. Activities from schemes that potentially impact the tidal/ wave regime and sediment transport during the temporal overlap with the Mona Offshore Wind Project phases have been included as these may create a cumulative impact on physical features/ receptors.
Long term habitat loss/habitat alteration	✓	✓	×	The MDS as described for the Mona Offshore Wind Project (Table 2.18) assessed cumulatively with the following other projects/plans: **Tier 1** • Offshore windfarm projects: – Awel y Môr Offshore Wind Farm. **Tier 2** • Tier 1 projects • Offshore windfarm projects: – Mooir Vannin Offshore Windfarm – Morgan and Morecambe Offshore Windfarms Transmission Assets Morgan Offshore Wind Project Generation Assets – Morecambe Offshore Windfarm Generation Assets – Eni Hynet CCS.	These projects will all result in the installation of hard structures on the seabed which will lead to long term habitat loss/habitat alteration within the CEA benthic subtidal and intertidal ecology study area meaning they may also affect habitats that the Mona Offshore Wind Project will also affect. All other projects which are currently operational are considered to be part of the baseline.

Potential cumulative effect	Phase[a] C	O	D	Maximum Design Scenario	Justification
				• Oil and Gas projects: – Isle of Man Crogga Licence. **Tier 3** • Tier 1 and 2 projects • Cables/pipelines: – MaresConnect.	
	×	×	✓	The MDS as described for the Mona Offshore Wind Project (Table 2.18) assessed cumulatively with the following other projects/plans: **Tier 1** No tier 1 projects are predicted to overlap with the decommissioning phase of the Mona Offshore Wind Project. **Tier 2** • Offshore windfarm projects: – Mooir Vannin Offshore Windfarm – Morecambe Offshore Windfarm Generation Assets – Morgan Offshore Wind Project Generation Assets – Morgan and Morecambe Offshore Windfarms Transmission Assets.	These projects will all result in the installation of hard structures on the seabed which will lead to long term habitat loss/habitat alteration within the CEA benthic subtidal and intertidal ecology study area meaning they may also affect habitats that the Mona Offshore Wind Project will also affect.
Introduction of artificial structures	✓	✓	×	The MDS as described for the Mona Offshore Wind Project (Table 2.18) assessed cumulatively with the following other projects/plans: **Tier 1** • Offshore windfarm projects: – Awel y Môr Offshore Wind Farm. • Oil and Gas projects: – Isle of Man Crogga Licence.	These projects will all result in the installation of hard structures on the seabed which could be colonised by new communities within the CEA benthic subtidal and intertidal ecology study area meaning they may also affect habitats that the Mona Offshore Wind Project will also affect.

Potential cumulative effect	Phase[a] C	O	D	Maximum Design Scenario	Justification
				Tier 2 • Tier 1 projects • Offshore windfarm projects: – Mooir Vannin Offshore Windfarm – Morgan and Morecambe Offshore Windfarms Transmission Assets Morgan Offshore Wind Project Generation Assets – Morecambe Offshore Windfarm Generation Assets – Eni Hynet CCS. **Tier 3** • Tier 1 and 2 projects • Cables/pipelines: – MaresConnect.	
	×	×	✓	The MDS as described for the Mona Offshore Wind Project (Table 2.18) assessed cumulatively with the following other projects/plans: **Tier 1** • Offshore wind farm projects: – Awel y Môr Offshore Wind Farm. **Tier 2** • Tier 1 projects • Offshore windfarm projects: – Mooir Vannin Offshore Windfarm – Morgan and Morecambe Offshore Windfarms Transmission Assets – Morgan Offshore Wind Project Generation Assets – Morecambe Offshore Windfarm Generation Assets	These projects will all result in the installation of hard structures on the seabed which could be colonised by new communities within the CEA benthic subtidal and intertidal ecology study area meaning they may also affect habitats that the Mona Offshore Wind Project will also affect.
Increased risk of introduction and spread of INNS)	✓	×	×	The MDS as described for the Mona Offshore Wind Project (Table 2.18) assessed cumulatively with the following other projects/plans:	These projects will all result in the installation of hard structures on the seabed which could be colonised by

Potential cumulative effect	Phase[a] C	O	D	Maximum Design Scenario	Justification
				Tier 1 • Offshore windfarm projects: – Awel y Môr Offshore Wind Farm construction phase. • Oil and Gas projects: – Isle of Man Crogga Licence **Tier 2** • Tier 1 projects • Offshore windfarm projects: – Morgan and Morecambe Offshore Windfarms Transmission Assets – Morgan Offshore Wind Project Generation Assets construction phase – Morecambe Offshore Windfarm Generation Assets construction and operations and maintenance phase – Eni Hynet CCS. **Tier 3** • Tier 1 and 2 projects • Cables/pipelines: – MaresConnect.	new communities composed of INNS within the CEA benthic subtidal and intertidal ecology study area meaning they may also affect habitats that the Mona Offshore Wind Project will also affect.
	×	✓	×	The MDS as described for the Mona Offshore Wind Project (Table 2.18) assessed cumulatively with the following other projects/plans: **Tier 1** • Offshore windfarm projects: – Awel y Môr Offshore Wind Farm operations and maintenance and decommissioning phases. • Oil and Gas projects: – Isle of Man Crogga Licence.	These projects will all result in the installation of hard structures on the seabed which could be colonised by new communities composed of INNS within the CEA benthic subtidal and intertidal ecology study area meaning they may also affect habitats that the Mona Offshore Wind Project will also affect.

<table>
<tr><th rowspan="2">Potential cumulative effect</th><th colspan="3">Phase[a]</th><th rowspan="2">Maximum Design Scenario</th><th rowspan="2">Justification</th></tr>
<tr><th>C</th><th>O</th><th>D</th></tr>
<tr><td></td><td></td><td></td><td></td><td>Tier 2
• Offshore windfarm projects:
– Mooir Vannin Offshore Windfarm
– Morgan and Morecambe Offshore Windfarms Transmission Assets Morecambe Offshore Windfarm Generation Assets operations and maintenance phase
– Morgan Offshore Wind Project Generation Assets operations and maintenance phase
– Eni Hynet CCS.
Tier 3
• Tier 1 projects
• Cables/pipelines:
– MaresConnect.</td><td></td></tr>
<tr><td></td><td>×</td><td>×</td><td>✓</td><td>The MDS as described for the Mona Offshore Wind Project (Table 2.18) assessed cumulatively with the following other projects/plans:
Tier 1
No tier 1 projects are predicted to overlap with the decommissioning phase of the Mona Offshore Wind Project.
Tier 2
• Tier 1 projects
• Offshore windfarm projects:
– Mooir Vannin Offshore Windfarm
– Morgan and Morecambe Offshore Windfarms Transmission Assets Morgan Offshore Wind Project Generation Assets decommissioning phase
– Morecambe Offshore Windfarm Generation Assets operations and maintenance phase
– Eni Hynet CCS.</td><td>These projects will all result in the installation of hard structures on the seabed which could be colonised by new communities composed of INNS within the CEA benthic subtidal and intertidal ecology study area meaning they may also affect habitats that the Mona Offshore Wind Project will also affect.</td></tr>
</table>

Potential cumulative effect	Phase[a] C	O	D	Maximum Design Scenario	Justification
				Tier 3 • Tier 1 and 2 projects • Cables/pipelines: – MaresConnect.	
Changes in physical processes.	×	✓	×	The MDS as described for the Mona Offshore Wind Project (Table 2.18) assessed cumulatively with the following other projects/plans: **Tier 1** • Offshore windfarm projects: – Proposed development of Awel y Môr Offshore Wind Farm. **Tier 2** • Tier 1 projects • Offshore windfarm projects: – Operations and maintenance of Morgan and Morecambe Offshore Windfarms Transmission Assets – Operations and maintenance of Morecambe Offshore Windfarm Generation Assets – Operations and maintenance of Morgan Offshore Wind Project Generation Assets.	Outcome of the CEA will be greatest when the greatest number of other schemes are considered in combination. Including schemes and developments within the CEA study area to capture the potential overlap of impacts during the operations and maintenance phase. Activities from schemes that potentially impact the tidal/ wave regime and sediment transport during the temporal overlap with the Mona Offshore Wind Project phases have been included as these may create a cumulative impact on physical features/ receptors.
	×	×	✓	The MDS as described for the Mona Offshore Wind Project (Table 2.18) assessed cumulatively with the following other projects/plans: **Tier 1** • Offshore windfarm projects: – Awel y Môr Offshore Wind Farm residual structures. **Tier 2** • Tier 1 Projects • Offshore windfarm projects:	Outcome of the CEA will be greatest when the greatest number of other schemes are considered in combination. Including schemes and developments within the CEA study area to capture the potential overlap of impacts during the operations and maintenance phase. Activities from schemes that potentially impact the tidal/ wave regime and sediment transport during the temporal overlap with the Mona Offshore Wind Project

Potential cumulative effect	Phase[a] C	O	D	Maximum Design Scenario	Justification
				– Residual structures of Morgan Generation Assets – Residual structures of Morgan and Morecambe Offshore Wind Farms: Transmission Assets – Residual structures of Morecambe Generation Assets.	phases have been included as these may create a cumulative impact on physical features/ receptors.
Removal of hard substrate	×	×	✓	The MDS as described for the Mona Offshore Wind Project (Table 2.18) assessed cumulatively with the following other projects/plans: **Tier 1** No tier 1 projects are predicted to overlap with the decommissioning phase of the Mona Offshore Wind Project. **Tier 2** • Offshore windfarm projects: – Mooir Vannin Offshore Windfarm – Morgan Offshore Wind Project Generation Assets decommissioning phase.	This project will also undergo the removal of hard substrate within the period of decommissioning for the Mona Offshore Wind Project.

2.11 Cumulative effects assessment

2.11.1 Overview

2.11.1.1 A description of the significance of cumulative effects upon benthic subtidal and intertidal ecology receptors arising from each identified impact is given below.

2.11.2 Temporary habitat loss/disturbance

2.11.2.1 There is the potential for cumulative temporary habitat loss as a result of construction activities associated with the Mona Offshore Wind Project and other offshore wind farms (i.e. from cable burial, jack-up activities, anchor placements and seabed preparation), dredging activities, aggregate extraction activities, cables and pipelines and remedial work (see Table 2.29). For the purposes of this Environmental Statement, this additive impact has been assessed within the CEA benthic subtidal and intertidal ecology study area, defined as the area within a 50 km buffer of the Mona Offshore Wind Project, using the tiered approach outlined above in paragraph 2.10.1.3. The 50 km buffer area captures a fair representation of benthic habitats within the Mona CEA benthic subtidal and intertidal ecology study area in proximity to the Mona Offshore Wind Project.

2.11.2.2 All plans/projects/activities screened into the assessment for cumulative effects from temporary habitat loss/disturbance are either on-going activities (i.e. maintenance licences and licensed aggregate extraction areas) or projects with sufficient information in the public domain. Tier 1 includes 26 projects, as well as some of their accompanying operations and maintenance licences, which are consented, submitted, under construction or operational. Six tier two projects (Morgan Generation Assets, Morecambe Generation Assets, Morgan and Morecambe Offshore Windfarms Transmission Assets, Mooir Vannin Offshore Windfarm, ENI Hynet Carbon Capture and Storage (CCS) and Liverpool Bay aggregate extraction area 457) and one tier three project (MaresConnect) have been identified within the CEA benthic subtidal and intertidal ecology study area.

<u>Tier 1</u>

<u>Construction phase</u>

Magnitude of impact

Subtidal habitat IEFs

2.11.2.3 Predicted cumulative temporary habitat loss/disturbance from each of the tier 1 plans/projects/activities during the construction phase of the Mona Offshore Wind Project are presented in Table 2.30 together with a breakdown of the sources of this data from the relevant Environmental Statements and any assumptions made where necessary information was not presented in these Environmental Statements. Table 2.30 shows that for all projects/plans/activities during the construction phase of the Mona Offshore Wind Project in the tier 1 assessment, the cumulative temporary habitat loss/disturbance is estimated at 77.93 km^2 (including the Mona Offshore Wind Project).

2.11.2.4 The maximum total temporary habitat loss/disturbance associated with all offshore wind farms (Awel y Môr construction, North Hoyle, Barrow and Rhyl Flats operations and maintenance and decommissioning phases and the operations and maintenance phases for the other wind farm projects listed in Table 2.30) within the CEA benthic subtidal and intertidal ecology study area is 12.11 km^2. The values of temporary habitat loss for Mona Offshore Wind Project are comparably larger than for many of the other offshore wind farms presented in Table 2.30, as the Mona Offshore Wind Project assessment includes habitat affected as a result of seabed preparation and all of the construction activities while most of the tier 1 projects will be in their operations and maintenance phases during the Mona Offshore Wind Project’s construction phase. Three of the operations and maintenance licences do not have environmental information available (i.e. Burbo Bank cable repair and remediation, operations and maintenance activities at North Hoyle Offshore Wind Farm and operations and maintenance activities at Rhyl Flats Offshore Wind Farm). These licences are likely to include activities such as offshore cable repair and reburial, removing biofouling and component replacement. Based on the scale of these activities it is highly likely that the extent of temporary habitat disturbance/loss impact associated with these projects will be similar to the other offshore wind farm operations and maintenance licences, which are much smaller than area of temporary habitat disturbance/loss associated with the Mona Offshore Wind Project.

2.11.2.5 There is one exploratory oil and gas permit approved within the Mona CEA benthic subtidal and intertidal ecology study area, the Isle of Man Crogga licence. There is however limited information regarding the potential impacts associated with this project, it does however include geophysical and geotechnical studies as well as exploratory drilling which may disturb the seabed (Isle of Man Government, 2021).

2.11.2.6 For licensed aggregate deposits and removal the maximum total temporary habitat loss/disturbance is estimated at approximately 1.09 km^2 (Table 2.30). This figure is associated with aggregate extraction at the Hilbre Swash site, which is for the next 15 years. The overall licenced area for this site is 21.79 km^2 however the Crown Estate reports that, in 2021, only 3.97% of the total area of seabed licenced to be dredged in the North West region was actively dredged (The Crown Estate and MPA Marine Aggregates, 2021). For the purposes of this assessment, the MDS assumes that a precautionary 5% of the total licensed area of Hilbre Swash will be actively dredged during this period. It is unlikely that the whole site will be active at once therefore the impact associated with aggregate extraction at this site will be spread over the full length of the licence therefore resulting in longer-term low-level disturbance.

2.11.2.7 Temporary habitat loss/disturbance from tier 1 dredge and disposal activities is likely to result in intermittent disturbance throughout the licenced period resulting in the disturbance of approximately 4.22 km^2 of seabed over the construction phase and potentially beyond (Table 2.30). There are also a number of dredge licences without readily available environmental information (i.e. Douglas Harbour, Isle of Man, Conwy River, RNLI North Regional Maintenance, Dee River and RNLI Regional Maintenance (Figure 2.9). The dredging is however of a small scale and likely to be short term and intermittent throughout the Mona Offshore Wind Project construction phase affecting relatively small areas in comparison with the Mona Offshore Wind Project. One such example is Douglas Harbour on the Isle of Man which is plough dredged in both the inner and outer harbour annually with the silt deposited in a licences site off Douglas Head.

2.11.2.8 There are a number of cables and pipelines in the CEA benthic subtidal and intertidal ecology study area, some of which will require maintenance during the construction phase of the Mona Offshore Wind Project. The Isle of Man Interconnector projects scoped into this tier 1 assessment will involve maintenance or remedial work on cables. This project doesn’t quantify the area affected by these activities (i.e. cable maintenance) however it is likely to be similar to those associated with the operations and maintenance activities at offshore wind farms resulting in low level intermittent disturbance throughout their licence period.

Table 2.30: Cumulative temporary habitat loss for the Mona Offshore Wind Project construction phase and other tier 1 plans/projects/activities in the CEA benthic subtidal and intertidal ecology study area.

Project	Predicted temporary habitat disturbance/loss (km^2)	Component parts of temporary habitat disturbance/loss	Source
Mona Offshore Wind Project	60.51	See Table 2.18	See Table 2.18
Awel y Môr Offshore Wind Farm	Construction: 10.02	Temporary habitat disturbance/loss may result from: • Jack up events • Anchoring • Intertidal HDD.	REW (2022)
	Operational and maintenance: 0.258	Temporary habitat disturbance/loss may result from: • Cable repair/reburial.	
Rhyl Flats Offshore Wind Farm	Operational and maintenance: No quantification provided	Temporary habitat disturbance/loss in the operations and maintenance phase has not been considered in this licence.	Celtic Offshore Wind Ltd (2002)
	Decommissioning: No quantification provided	Temporary habitat disturbance/loss may result from: • Infrastructure removal.	
Gwynt y Môr Offshore Wind Farm	Operations and maintenance: No quantification provided	Temporary habitat disturbance/loss may result from: • Component repairs and replacement • Biofouling removal.	CMACS (2005)
North Hoyle Offshore Wind Farm	Operational and maintenance: No quantification provided	No significant impacts on benthic communities would arise from operation of the North Hoyle Offshore Wind Farm.	North Hoyle (2002)

Project	Predicted temporary habitat disturbance/loss (km²)	Component parts of temporary habitat disturbance/loss	Source
Burbo Bank Extension Offshore Wind Farm	Operational and maintenance: No quantification provided	Temporary habitat disturbance/loss in the operations and maintenance phase has not been considered in this licence.	Dong Energy (2013a)
Burbo Bank Extension Offshore Wind Farm – operations and maintenance marine licences (MLA/2017/00164 and MLA/2017/00166/1)	0.03	Temporary habitat disturbance/loss may result from: • Cable repair/remediation.	Dong Energy (2017b) Dong Energy (2017c)
Walney Extension Offshore Wind Farm	Operations and maintenance: 0.24	Temporary habitat disturbance/loss may result from: • Jack-up events.	Dong Energy (2013b)
Walney Extension pontoon/jetty dredging and disposal	0.01	Temporary habitat disturbance/loss may result from: • Material deposition.	Orsted (2018)
West of Duddon Sands Offshore Wind Farm	Operational and maintenance: No quantification provided	Temporary habitat disturbance/loss in the operations and maintenance phase has not been considered in this licence.	RSKENSR Ltd (2006)
West of Duddon Sands Offshore Wind Farm operations and maintenance marine licence (MLA/2016/00150/3)	0.001	Temporary habitat disturbance/loss may result from: • Jack-up events.	Dong Energy (2016c)
Walney 2 Offshore Wind Farm	Operational and maintenance: No quantification provided	Temporary habitat disturbance/loss in the operations and maintenance phase has not been considered in this licence.	Dong Energy (2006)
Walney 2 Offshore Wind farm – operations and maintenance marine licences (MLA/2017/00429/1)	0.24	Temporary habitat disturbance/loss may result from: • Jack-up events.	Dong Energy (2013b)
Walney 1 Offshore Wind Farm	Operational and maintenance: No quantification provided	Temporary habitat disturbance/loss in the operations and maintenance phase has not been considered in this licence.	Dong Energy (2006)

Project	Predicted temporary habitat disturbance/loss (km^2)	Component parts of temporary habitat disturbance/loss	Source
Walney 1 Offshore Wind farm – operations and maintenance marine licences (MLA/2014/00028/5, MLA/2017/00081/2, MLA/2014/00027/7, MLA/2013/00426/2 and MLA/2016/00151/3)	1.13	Temporary habitat disturbance/loss may result from: • Cable repair/remediation • Jetting for cable repair and/or remediation works • Jack-up/moored vessels.	Dong Energy (2014b) Marine Space (2017a) Dong Energy (2013c) Dong Energy (2016b)
Walney Offshore Wind Farm Operational Marine Licence – phase 2 export cable	0.01	Temporary habitat disturbance/loss may result from: • Cable repair/remediation.	Dong Energy (2014b)
Burbo Bank Offshore Wind Farm	Operational and maintenance: No quantification provided	Temporary habitat disturbance/loss in the operations and maintenance phase has not been considered in this licence.	Seascape Energy (2002)
Burbo Bank Offshore Wind Farm – operations and maintenance marine licences (MLA/2014/00336/1, MLA/2016/00406 and MLA/2014/00336/1)	0.01	Temporary habitat disturbance/loss may result from: • Cable repair/remediation.	Dong Energy (2017a) Dong Energy (2014)
Ormonde Offshore Wind Farm	Operational and maintenance: No quantification provided	Temporary habitat disturbance/loss in the operations and maintenance phase has not been considered in this licence.	Eclipse Energy Company Ltd (2005)
Ormonde Offshore Wind farm – operations and maintenance marine licences (MLA/2015/00086/2 and MLA/2016/00224/2)	0.07	Temporary habitat disturbance/loss may result from: • Jetting for cable repair and/or remediation works • Jack-up events.	Marine Space (2015b) Vattenfall Wind Power Ltd (2016)
Barrow Offshore Wind Farm	Operational and maintenance: No quantification provided	Temporary habitat disturbance/loss in the operations and maintenance phase has not been considered in this licence.	Warwick Energy (2005)

Project	Predicted temporary habitat disturbance/loss (km^2)	Component parts of temporary habitat disturbance/loss	Source
	Decommissioning: No quantification provided	Potential total removal of wind turbines, scour protection and subsea cables.	
Barrow Offshore Wind Farm – operations and maintenance marine licences (MLA/2015/00077 and MLA/2016/00149/3)	0.07	Temporary habitat disturbance/loss may result from: • Jetting for cable repair and/or remediation works • Jack-up/moored vessels.	Marine Space (2015a) Dong Energy (2016a)
Routine operations and maintenance activities at five Offshore Substations (Barrow, Ormonde, Lincs, Westermost Rough, and Gunfleet Sands)	No quantification provided.	Temporary habitat disturbance/loss may result from: • Removal of algal growth.	Transmission Capital Partners Ltd (2017)
Oil and Gas			
Isle of Man Crogga licence	No quantification provided.	Temporary habitat disturbance/loss may result from: • Geophysical and geotechnical studies • Exploratory drilling.	Isle of Man Government (2021)
Dredging activities and dredge disposal sites			
Liverpool 2 and River Mersey approach channel dredging	3.71	Temporary habitat disturbance/loss may result from: • Dredging of silt. The values provided for this project represent the area of the project as not temporary habitat disturbance/loss values were provided	Royal Haskoning (2012)

Project	Predicted temporary habitat disturbance/loss (km²)	Component parts of temporary habitat disturbance/loss	Source
Mersey channel and river maintenance dredge disposal renewal	0.5	Temporary habitat disturbance/loss may result from: • Dredging of silt and sand.	Royal Haskoning (2018)
Liverpool Marina Maintenance Dredging – sustainable relocation of dredged material to the River Mersey	No quantification provided.	Temporary habitat disturbance/loss may result from: • Dredging.	Anthony D Bates Partnership LLP (2020)
Port of Barrow maintenance dredging disposal licence.	0.01	Temporary habitat disturbance/loss may result from: • Dredging of silt, sand and gravel. The values provided for this project represent the area of the project as not temporary habitat disturbance/loss values were provided	Associated British Ports (2016)
Deposit and removals			
Hilbre Swash	1.09	Temporary habitat disturbance/loss may result from: • Aggregate extraction (mainly sand). The values provided for this project represent the area of the project as not temporary habitat disturbance/loss values were provided	NRW (2013)
Remedial works			
Isle of Man Interconnector Cable – cable protection remedial works	No quantification provided.	Temporary habitat disturbance/loss may result from: • Anchoring • Concrete mattress installation.	Intertek (2014)
Isle of Man to UK Interconnector Cable – maintenance and repair	No quantification provided.	Temporary habitat disturbance/loss may result from: • Cable repair/reburial.	Intertek (2016)
Total	77.93		

2.11.2.9 The cumulative impact on the subtidal coarse and mixed sediments with diverse benthic communities IEF, sand and muddy sand communities with polychaetes and bivalves IEF and Annex I low resemblance stony reef (outside an SAC) IEF is predicted to be of regional spatial extent, medium term duration, intermittent and high reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore considered to be **low**.

2.11.2.10 The impact on seapens and burrowing megafauna communities IEF is predicted to be of local spatial extent, short term duration, intermittent and high reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore considered to be **low.**

2.11.2.11 No other tier 1 projects in the CEA for temporary habitat loss/disturbance overlap with the Constable Bank (Annex I sandbank outside an SAC) IEF, so this IEF is not considered further in this assessment.

Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC

2.11.2.12 The river Conwy dredge site lies is located within the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC, however there is no readily available information on this project. The dredging in the river Conwy is likely to result in small scale temporary habitat disturbance/loss in the form of sediment removal. Therefore these projects are unlikely to contribute in any meaningful way to cumulative effects regarding cable installation in the SAC for the Mona Offshore Wind Project.

2.11.2.13 The cumulative effect is predicted to be of regional spatial extent, medium term duration (i.e. the construction phase for the Mona Offshore Wind Project is up to three years), intermittent and high reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be **low**.

Intertidal habitat IEFs

2.11.2.14 The tier 1 projects will not cumulatively interact with temporary habitat disturbance in the intertidal zone of the Mona Offshore Wind Project due to their distance from the Mona landfall site. As a result, the intertidal habitat IEFs have not been considered further in this tier 1 assessment of the cumulative temporary habitat disturbance/loss.

Sensitivity of the receptor

Subtidal habitat IEFs

2.11.2.15 The sensitivity of the subtidal IEFs is as described previously for the construction phase assessment for the Mona Offshore Wind Project alone in paragraph 2.9.2.21 to 2.9.2.27 and Table 2.21.

2.11.2.16 The subtidal coarse and mixed sediments with diverse benthic communities IEF, sand and muddy sand communities with polychaetes and bivalves IEF and Annex I low resemblance stony reef (outside an SAC) IEF is deemed to be of medium vulnerability, medium recoverability and national value. The sensitivity of the receptor is therefore, considered to be **medium**.

2.11.2.17 The seapens and burrowing megafauna habitat IEF are deemed to be of medium vulnerability, medium recoverability and national value. The sensitivity of the receptor is therefore, considered to be **high** (and reduced to **medium** in the absence of seapens).

Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC

2.11.2.18 The sensitivity of the relevant IEFs (subtidal coarse and mixed sediments with diverse benthic communities IEF and the sand and muddy sand communities with polychaetes and bivalves IEF) is as described previously for the construction phase assessment in paragraphs 2.9.2.22 to 2.9.2.23 and above in Table 2.21.

2.11.2.19 The subtidal coarse and mixed sediments with diverse benthic communities IEF and sand and muddy sand communities with polychaetes and bivalves IEF is deemed to be of medium vulnerability, medium recoverability and national value. The sensitivity of the receptor is therefore, considered to be **medium**.

Significance of effect

Subtidal habitat IEFs

2.11.2.20 Overall for the subtidal coarse and mixed sediments with diverse benthic communities IEF, sand and muddy sand communities with polychaetes and bivalves IEF and Annex I low resemblance stony reef (outside an SAC) IEF, the magnitude of the cumulative temporary habitat disturbance/loss impact during the construction phase is deemed to be low and the sensitivity of the receptor is considered to be low. The cumulative effect will, therefore, be of **minor** adverse significance, which is significant in EIA terms. This conclusion has been reached based on the amount of temporary habitat disturbance/loss from the tier 1 projects over the construction phase which will be temporally intermittent and spatially distributed over the CEA benthic subtidal and intertidal ecology study area.

2.11.2.21 Overall, for the seapens and burrowing megafauna communities IEF the magnitude of the temporary habitat disturbance/loss impact in the construction phase is deemed to be low and the sensitivity of the receptor is considered to be high (and reduced to medium in the absence of seapens). The effect will, therefore, be of **minor** adverse significance, which is not significant in EIA terms.

Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC

2.11.2.22 Overall for the subtidal coarse and mixed sediments with diverse benthic communities IEF (within the SAC) and sand and muddy sand communities with polychaetes and bivalves IEF (within the SAC), the magnitude of the cumulative temporary habitat disturbance/loss impact during the construction phase is deemed to be low and the sensitivity of the receptor is considered to be low. The cumulative effect will, therefore, be of **minor** adverse significance, which is significant in EIA terms. This conclusion has been reached based on the amount of temporary habitat disturbance/loss from the tier 1 projects over the construction phase which will be temporally intermittent and spatially distributed over the CEA benthic subtidal and intertidal ecology study area.

Operations and maintenance phase

Magnitude of impact

2.11.2.23 Predicted cumulative temporary habitat loss/disturbance from each of the tier 1 plans/projects/activities is presented in Table 2.31 together with a breakdown of the sources of this data from the relevant Environmental Statements and any assumptions made where necessary information was not presented in these Environmental Statements. Table 2.31 shows that for all projects/plans/activities in the tier 1 assessment, the cumulative temporary habitat loss/disturbance during the operations and maintenance phase of the Mona Offshore Wind Project is estimated at 36.86 km^2 (including the Mona Offshore Wind Project).

2.11.2.24 The maximum total temporary habitat loss/disturbance associated with all offshore wind farms, which are in their operations and maintenance and/or decommissioning phases, within the tier 1 assessment is 17.87 km^2. The values of temporary habitat loss for Mona Offshore Wind Project are comparably larger than for many of the other offshore wind farms presented in Table 2.30, as many do not quantify the temporary habitat disturbance in the operations and maintenance phase or break it down in to a number of different licences which are active over different periods of the wind farms lifetime. Three of the operations and maintenance licences do not have environmental information available (i.e. Burbo Bank cable repair and remediation, operations and maintenance activities at North Hoyle Offshore Wind Farm and operations and maintenance activities at Rhyl Flats Offshore Wind Farm). These licences are likely to include activities such as offshore cable repair and reburial, removing biofouling and component replacement. Based on the scale of these activities it is highly likely that the extent of temporary habitat disturbance/loss impact associated with these projects will be similar to the other offshore wind farm operations and maintenance licences, which are much smaller than area of temporary habitat disturbance/loss associated with the Mona Offshore Wind Project.

2.11.2.25 There is one exploratory oil and gas permit approved within the Mona CEA benthic subtidal and intertidal ecology study area, the Isle of Man Crogga licence. There is however limited information regarding the potential impacts associated with this project, it does however include geophysical and geotechnical studies as well as exploratory drilling which may disturb the seabed (Isle of Man Government, 2021).

2.11.2.26 Temporary habitat loss/disturbance from tier 1 dredge and disposal activities will result in intermittent disturbance throughout the licenced period resulting in disturbance of approximately 0.5 km^2 of seabed spread over the overlap with the operations and maintenance phase of Mona Offshore Wind Project (this value is the sum of all the offshore wind farm values in Table 2.31). There are also a number of dredge licences without readily available environmental information (i.e. Douglas Harbour, Isle of Man, Conwy River and Dee River). The dredging associated with these projects is however of a small scale and is likely to occur intermittently throughout the Mona Offshore Wind Project construction phase affecting relatively small areas. One such example is Douglas Harbour on the Isle of Man which is plough dredged in both the inner and outer harbour annually with the silt deposited in a licences site off Douglas Head.

2.11.2.27 There are a number of cables and pipeline in the CEA benthic subtidal and intertidal ecology study area, some of which will require maintenance during the construction phase of the Mona Offshore Wind Project. The one projects scoped into this tier 1 assessment will involve maintenance or remedial work on cables. Neither of these projects quantify the area affected by these activities however they are likely to be similar to those associated with maintenance activities for cables at offshore wind farms resulting in low level intermittent disturbance throughout their licence period.

Table 2.31: Cumulative temporary habitat disturbance for the Mona Offshore Wind Project operations and maintenance phase and other tier 1 plans/projects/activities in the CEA benthic subtidal and intertidal ecology study area.

Project	Predicted temporary habitat disturbance/loss (km^2)	Component parts of temporary habitat disturbance/loss	Source
Mona Offshore Wind Project	17.40	See Table 2.18	See Table 2.18
Offshore renewables			
Awel y Môr Offshore Wind Farm	Operational and maintenance: 0.258	Temporary habitat disturbance/loss may result from: • Cable repair/reburial.	RWE (2022)
	Decommissioning: 10.02	Temporary habitat disturbance/loss may result from: • Jack up events • Anchoring.	
Rhyl Flats Offshore Wind Farm	Operational and maintenance: No quantification provided	Temporary habitat disturbance/loss in the operations and maintenance phase has not been considered in this licence.	Celtic Offshore Wind Ltd (2002)
	Decommissioning phase not assessed.	Temporary habitat disturbance/loss in the decommissioning phase has not been considered in this licence.	
Gwynt y Môr Offshore Wind farm	Operations and maintenance: No quantification provided	Temporary habitat disturbance/loss may result from: • Component repairs and replacement • Biofouling removal.	CMACS (2005)
	Decommissioning: No quantification provided	Temporary habitat disturbance/loss may result from: • Jack up events.	
North Hoyle Offshore Wind Farm	Operational and maintenance: No quantification provided	No significant impacts on benthic communities would arise from operation of the North Hoyle Offshore Wind Farm.	North Hoyle (2002)
	Decommissioning: No quantification provided	Potential total removal of wind turbines and scour protection.	
Burbo Bank Extension Offshore Wind Farm	Operational and Maintenance: No quantification provided	Temporary habitat disturbance/loss in the operations and maintenance	Dong Energy (2013a)

Project	Predicted temporary habitat disturbance/loss (km^2)	Component parts of temporary habitat disturbance/loss	Source
		phase has not been considered in this licence.	
	Decommissioning: No quantification provided	Temporary habitat disturbance/loss may result from: • Jack-up events.	
Burbo Bank Extension Offshore Wind Farm - operations and maintenance marine licences (MLA/2017/00164 and MLA/2017/00166/1)	0.03	Temporary habitat disturbance/loss may result from: • Cable repair/remediation.	Dong Energy (2017b) Dong Energy (2017c)
Walney Extension Offshore Wind Farm	Operations and maintenance: 0.24	Temporary habitat disturbance/loss may result from: • Jack-up events.	Dong Energy (2013b)
	Decommissioning: No quantification provided	Temporary habitat disturbance/loss may result from: • Jack-up events.	
Walney Extension pontoon/jetty dredging and disposal	0.01	Temporary habitat disturbance/loss may result from: • Material deposition.	Orsted (2018)
West of Duddon Sands Offshore Wind Farm	Operational and maintenance: No quantification provided	Temporary habitat disturbance/loss in the operations and maintenance phase has not been considered in this licence.	RSKENSR Ltd (2006)
	Decommissioning: 0.68	Temporary habitat disturbance/loss may result from: • Jack up events.	
West of Duddon Sands Offshore Wind Farm operations and maintenance marine licence (MLA/2016/00150/3)	0.001	Temporary habitat disturbance/loss may result from: • Jack-up events.	Dong Energy (2016c)
Walney 2 Offshore Wind Farm	Operational and maintenance: No quantification provided	Temporary habitat disturbance/loss in the operations and maintenance phase has not been considered in this licence.	Dong Energy (2006)
	Decommissioning: 0.09	Temporary habitat disturbance/loss may result from:	

Project	Predicted temporary habitat disturbance/loss (km²)	Component parts of temporary habitat disturbance/loss	Source
		• Jack-up events • Foundation removal • Scour protection removal.	
Walney 2 Offshore Wind farm – operations and maintenance marine licences (MLA/2017/00429/1)	0.01	Temporary habitat disturbance/loss may result from: • Cable repair/remediation.	Dong Energy (2014b)
Walney 1 Offshore Wind Farm	Operational and maintenance: No quantification provided	Temporary habitat disturbance/loss in the operations and maintenance phase has not been considered in this licence.	Dong Energy (2006)
	Decommissioning: 0.05	Temporary habitat disturbance/loss may result from: • Jack-up events • Foundation removal • Scour protection removal.	
Walney 1 Offshore Wind farm – operations and maintenance marine licences (MLA/2014/00028/5, MLA/2017/00081/2, MLA/2014/00027/7, MLA/2013/00426/2 and MLA/2016/00151/3	1.13	Temporary habitat disturbance/loss may result from: • Cable repair/remediation • Jetting for cable repair and/or remediation works • Jack-up/moored vessels.	Dong Energy (2014b) Marine Space (2017a) Dong Energy (2013c) Dong Energy (2016b)
Burbo Bank Offshore Wind Farm	Decommissioning: 0.02	Temporary habitat disturbance/loss may result from: • Wind turbine and scour protection removal.	Seascape Energy (2002)
Burbo Bank Offshore Wind Farm –- operations and maintenance marine licences (MLA/2014/00336/1, MLA/2016/00406 and MLA/2014/00336/1)	0.010	Temporary habitat disturbance/loss may result from: • Cable repair/remediation.	Dong Energy (2017a) Dong Energy (2014a)
Ormonde Offshore Wind Farm	Operational and maintenance: No quantification provided	Temporary habitat disturbance/loss in the operations and maintenance	Eclipse Energy Company Ltd (2005)

Project	Predicted temporary habitat disturbance/loss (km²)	Component parts of temporary habitat disturbance/loss	Source
		phase has not been considered in this licence.	
	Decommissioning: 5.25	Temporary habitat disturbance/loss may result from: • Removal of wind turbines • Removal of scour protection.	
Ormonde Offshore Wind farm – operations and maintenance marine licences (MLA/2015/00086/2 and MLA/2016/00224/2)	0.07	Temporary habitat disturbance/loss may result from: • Jetting for cable repair and/or remediation works • Jack-up events.	Marine Space (2015b) Vattenfall Wind Power Ltd (2016)
Routine operations and maintenance activities at five Offshore Substations (Barrow, Ormonde, Lincs, Westermost Rough, and Gunfleet Sands)	No quantification provided.	Temporary habitat disturbance/loss may result from: • Removal of algal growth.	Transmission Capital Partners Ltd (2017)
Oil and Gas			
Isle of Man Crogga licence	No quantification provided.	Temporary habitat disturbance/loss may result from: • Geophysical and geotechnical studies • Exploratory drilling.	Isle of Man Government (2021)
Dredging activities and dredge disposal sites			
Mersey channel and river maintenance dredge disposal renewal	0.5	Temporary habitat disturbance/loss may result from: • Dredging of silt and sand.	Royal Haskoning (2018)
Liverpool Marina Maintenance Dredging - sustainable relocation of dredged material to the River Mersey	No quantification provided.	Temporary habitat disturbance/loss may result from: • Dredging.	Anthony D Bates Partnership LLP (2020)
Remedial works			
Isle of Man Interconnector Cable - cable protection remedial works	No quantification provided.	Temporary habitat disturbance/loss may result from: • Anchoring • Concrete mattress installation.	Intertek (2014)

Project	Predicted temporary habitat disturbance/loss (km^2)	Component parts of temporary habitat disturbance/loss	Source
Isle of Man to UK Interconnector Cable - maintenance and repair	No quantification provided.	Temporary habitat disturbance/loss may result from: • Cable repair/reburial.	Intertek (2016)
Total	36.86		

2.11.2.28 The cumulative effect for all the relevant subtidal IEFs is predicted to be of regional spatial extent, medium term duration (some of the decommissioning works may take a few years however most of the maintenance activities are likely occur over a period of days to weeks, over the lifetime of the projects), intermittent and high reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be **low**.

2.11.2.29 No other tier 1 projects in the CEA for temporary habitat loss/disturbance overlap with the Constable Bank (Annex I sandbank outside an SAC) IEF, so this IEF is not considered further in this assessment.

Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC

2.11.2.30 The river Conwy dredge site lies is located within the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC, however there is no readily available information on this project. The dredging in the river Conwy is likely to result in small scale temporary habitat disturbance/loss in the form of sediment removal. Therefore these projects are unlikely to contribute in any meaningful way to cumulative effects regarding cable installation in the SAC for the Mona Offshore Wind Project.

2.11.2.31 The cumulative effect is predicted to be of regional spatial extent, medium term duration, intermittent and high reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be **negligible**.

Intertidal habitat IEFs

2.11.2.32 The tier 1 projects will not cumulatively interact with temporary habitat disturbance/loss in the intertidal zone of the Mona Offshore Wind Project due to their distance from the Mona landfall site. As a result the intertidal habitat IEFs have not been considered further in this tier 1 assessment of the cumulative temporary habitat disturbance/loss.

Sensitivity of the receptor

Subtidal habitat IEFs

2.11.2.33 The sensitivity of the subtidal IEFs is as described previously for the construction phase assessment for the Mona Offshore Wind Project alone in paragraph 2.9.2.21 to 2.9.2.27 and Table 2.21.

2.11.2.34 The subtidal coarse and mixed sediments with diverse benthic communities IEF, sand and muddy sand communities with polychaetes and bivalves IEF and Annex I low resemblance stony reef (outside an SAC) IEF is deemed to be of medium vulnerability, medium recoverability and national value. The sensitivity of the receptor is therefore, considered to be **medium**.

2.11.2.35 The seapens and burrowing megafauna habitat IEF are deemed to be of medium vulnerability, medium recoverability and national value. The sensitivity of the receptor is therefore, considered to be **high** (and reduced to **medium** in the absence of seapens).

Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC

2.11.2.36 The sensitivity of the relevant IEFs (subtidal coarse and mixed sediments with diverse benthic communities IEF and the sand and muddy sand communities with polychaetes and bivalves IEF) is as described previously for the construction phase assessment in paragraphs 2.9.2.22 to 2.9.2.23 and above in Table 2.21.

2.11.2.37 The subtidal coarse and mixed sediments with diverse benthic communities IEF and sand and muddy sand communities with polychaetes and bivalves IEF is deemed to be of medium vulnerability, medium recoverability and national value. The sensitivity of the receptor is therefore, considered to be **medium**.

Significance of effect

Subtidal habitat IEFs

2.11.2.38 Overall, for the subtidal coarse and mixed sediments with diverse benthic communities IEF, sand and muddy sand communities with polychaetes and bivalves IEF and Annex I low resemblance stony reef (outside an SAC) IEF the magnitude of the cumulative temporary habitat disturbance impact in the operations and maintenance phase is deemed to be low and the sensitivity of the receptor is considered to be medium. The cumulative effect will, therefore, be of **minor** adverse significance, which is not significant in EIA terms.

2.11.2.39 Overall, for the subtidal coarse and mixed sediments with diverse benthic communities IEF, sand and muddy sand communities with polychaetes and bivalves IEF, and seapens and burrowing megafauna communities IEF the magnitude of the cumulative temporary habitat disturbance impact in the operations and maintenance phase is deemed to be low and the sensitivity of the receptor is considered to be high (and reduced to medium in the absence of seapens). The cumulative effect will, therefore, be of **minor** adverse significance, which is not significant in EIA terms. This conclusion has been reached based on the small scale of the activities in this phase and high likelihood of recovery.

Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC

2.11.2.40 Overall, for the subtidal coarse and mixed sediments with diverse benthic communities IEF (within the SAC) and sand and muddy sand communities with polychaetes and bivalves IEF (within the SAC) the magnitude of the cumulative temporary habitat disturbance impact in the operations and maintenance phase is deemed to be low and the sensitivity of the receptor is considered to be medium. The cumulative effect will, therefore, be of **minor** adverse significance, which is not significant in EIA terms.

Decommissioning phase

2.11.2.41 There are no tier 1 projects active in the Mona Offshore Wind Project decommissioning phase to consider for cumulative impacts based on current knowledge.

Tier 2

Construction phase

Magnitude of impact

Subtidal habitat IEFs

2.11.2.42 The maximum total temporary habitat disturbance/loss associated with the tier 2 projects (i.e. tier 1 projects together with Morgan Offshore Wind Project Generation Assets, Morecambe Generation Assets, Morgan and Morecambe Offshore Windfarms Transmission Assets, ENI Hynet CCS and Liverpool Bay aggregate extraction area 457) is estimated at up to 236.02 km^2 (Table 2.32).

2.11.2.43 For the Morgan Offshore Wind Project Generation Assets temporary habitat disturbance/loss is likely to result from site preparation activities in advance of installation activities, cable installation activities (including UXO detonation, pre-cabling seabed clearance and anchor placements), and placement of spud-can legs from jack-up operations. The temporary habitat disturbance/loss predicted to result from the Morgan Offshore Wind Project Generation Assets is 87.36 km^2 (Morgan Offshore Wind Ltd, 2023).

2.11.2.44 For the Morecambe Offshore Windfarm: Generation Assets, the predicted temporary habitat loss/disturbance the construction phase is estimated at 3.46 km^2. This includes the installation of wind turbines, OSPs and inter-array and interconnector cables for the Morecambe Offshore Windfarm: Generation Assets as well as jack-up events (Morecambe Offshore Windfarm Ltd., 2023).

2.11.2.45 For the construction of the Morgan and Morecambe Offshore Windfarms Transmission Assets the predicted cumulative temporary habitat loss/disturbance the construction phase is estimated at 64.03 km^2. This includes the installation of OSPs, inter-array cables, interconnector cables, export cables, cable protection and scour protection (Morecambe Offshore Windfarm Ltd and Morgan Offshore Wind Ltd, 2023).

2.11.2.46 The Liverpool Bay aggregate extraction area 457 may be licenced during the construction phase of the Mona Offshore Wind Project. A scoping report for this area suggests a 15 year licencing period which would allow for the extraction of 18 Mt of marine aggregates with an annual extraction rate of 1.2 Mt (Westminster Gravels Ltd, 2023). The Liverpool Bay aggregate extraction site extends over 64.8 km^2 (Westminster Gravels Ltd, 2023) however only a fraction of this will be operational at any one time as with Hilbre Swash in tier 1 resulting in 3.24 km^2 of temporary habitat disturbance/loss. For the purposes of this assessment, the MDS assumes that a precautionary 5% of the proposed total licensed area of Liverpool Bay will be actively dredged during this period.

2.11.2.47 A scoping report is available for the ENI Hynet CCS project which outlines the impact on benthic ecology from temporary habitat disturbance/loss may result from site preparation activities and the installation, maintenance, refurbishment, and removal of development infrastructure (subsea cable and pipeline installation, temporary oil platform refurbishment, drill cutting deposits, jack-up vessel and drill rig spud deployments) (Liverpool Bay CCS Limited, 2022). The scoping report does not however provide estimates of habitat disturbance with which to make any quantitative assessment of the cumulative impact with the Mona Offshore Wind Project.

Table 2.32: Cumulative temporary habitat loss/disturbance for the Mona Offshore Wind Project construction phase and other tier 2 plans/projects/activities in the CEA benthic subtidal and intertidal ecology study area.

Project	Predicted temporary habitat disturbance/loss (km²)	Component parts of temporary habitat disturbance/loss	Source
Mona Offshore Wind Project	60.51	See Table 2.18	See Table 2.18
Other tier 1 projects	17.42	See Table 2.30	See Table 2.30
Offshore renewables			
Morgan Offshore Wind Project Generation Assets	87.36	• Site preparation activities, • Wind turbine and OSP foundation installation • Cable installation activities (including UXO detonation, pre-cabling seabed clearance and anchor placements) • Jack up events.	Morgan Offshore Wind Ltd, 2023
Morecambe Offshore Windfarm Generation Assets	3.46	• Wind turbine and OSP foundation installation • Cable installation activities • Jack up events.	Morecambe Offshore Windfarm Ltd., 2023
Morgan and Morecambe Offshore Windfarms Transmission Assets	64.03	• OSP foundation installation • Cable installation activities • Jack up events.	Morecambe Offshore Windfarm Ltd and Morgan Offshore Wind Ltd, 2023
ENI Hynet CCS	No quantification provided.	• Site preparation • Cable installation • Maintenance activities.	Liverpool Bay CCS Limited, 2022
Deposits and removals			
Liverpool Bay aggregate extraction area 457	3.24	• Aggregate extraction.	Westminster Gravels Ltd, 2023
Total	236.02		

2.11.2.48 The cumulative impact on subtidal coarse and mixed sediments with diverse benthic communities IEF and sand and muddy sand communities with polychaetes and bivalves IEF is predicted to be of regional spatial extent, medium term duration, intermittent and high reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore considered to be **medium**.

2.11.2.49 The impact on seapens and burrowing megafauna communities IEF and Annex I low resemblance stony reef (outside an SAC) IEF is predicted to be of local spatial extent, short term duration, intermittent and high reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore considered to be **low.**

2.11.2.50 No tier 2 projects in the CEA for temporary habitat loss/disturbance overlap with the Constable Bank (Annex I sandbank outside an SAC) IEF, so this IEF is not considered further.

Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC

2.11.2.51 The tier 2 projects will not cumulatively interact with the temporary habitat disturbance/loss in the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC associated with the Mona Offshore Wind Project due to their distance from the SAC and the fact that the tier 2 projects will have no physical overlap with this SAC. As a result, the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC IEFs have not been considered further in this tier 2 assessment of cumulative temporary habitat disturbance/loss.

Intertidal habitat IEFs

2.11.2.52 The tier 2 projects will not cumulatively interact with the temporary habitat disturbance/loss in the intertidal zone associated with the Mona Offshore Wind Project due to their distance from the Mona landfall site. As a result, the intertidal habitat IEFs have not been considered further in this tier 2 assessment of cumulative temporary habitat disturbance/loss.

Sensitivity of the receptor

Subtidal habitat IEFs

2.11.2.53 The sensitivity of the subtidal IEFs is as described previously for the construction phase assessment for the Mona Offshore Wind Project alone in paragraph 2.9.2.21 to 2.9.2.27 and Table 2.21.

2.11.2.54 The subtidal coarse and mixed sediments with diverse benthic communities IEF, sand and muddy sand communities with polychaetes and bivalves IEF and Annex I low resemblance stony reef (outside an SAC) IEF is deemed to be of medium vulnerability, medium recoverability and national value. The sensitivity of the receptor is therefore, considered to be **medium**.

2.11.2.55 The seapens and burrowing megafauna habitat IEF are deemed to be of medium vulnerability, medium recoverability and national value. The sensitivity of the receptor is therefore, considered to be **high** (and reduced to **medium** in the absence of seapens).

Significance of effect

Subtidal habitat IEFs

2.11.2.56 Overall for the subtidal coarse and mixed sediments with diverse benthic communities IEF and the sand and muddy sand communities with polychaetes and bivalves IEF, the magnitude of the cumulative temporary habitat disturbance/loss impact during the construction phase is deemed to be medium and the sensitivity of the receptor is considered to be medium. In accordance with the methodology for determining the significance of effects outlined in section 2.6.2 and the matrix in Table 2.17, this correlates with a moderate adverse effect, however, this would only be applicable in the short term and will not extend beyond the construction phase. As outlined in paragraphs 2.9.2.21 to 2.9.2.32, the sediments and associated benthic communities are predicted to recover over time, and therefore no mitigation is required to reduce the significance of the effects. The overall significance of the effects in the medium to long term is **minor** adverse significance, which is not significant in EIA terms.

2.11.2.57 Overall, for the Annex I low resemblance stony reef (outside an SAC) IEF the magnitude of the cumulative temporary habitat disturbance/loss impact in the construction phase is deemed to be low and the sensitivity of the receptor is considered to be medium. The cumulative effect will, therefore, be of **minor** adverse significance, which is not significant in EIA terms.

2.11.2.58 Overall, for the seapens and burrowing megafauna communities IEF the magnitude of the cumulative temporary habitat disturbance/loss impact in the construction phase is deemed to be low and the sensitivity of the receptor is considered to be high (and reduced to medium in the absence of seapens). The cumulative effect will, therefore, be of **minor** adverse significance, which is not significant in EIA terms.

Operations and maintenance phase

Magnitude of impact

Subtidal habitat IEFs

2.11.2.59 The maximum total temporary habitat disturbance/loss associated with the tier 2 assessment offshore renewables projects within the CEA benthic subtidal and intertidal ecology study area (i.e. Morgan Offshore Wind Project Generation Assets, Morecambe Offshore Windfarm Generation Assets, Morgan and Morecambe Offshore Windfarms Transmission Assets, Mooir Vannin Offshore Windfarm and Liverpool Bay aggregate extraction area 457) is estimated at up to 62.08 km^2 (Table 2.33).

2.11.2.60 For the Morgan Offshore Wind Project Generation Assets temporary habitat disturbance loss is likely to result from cable repair and reburial. The temporary habitat disturbance/loss predicted to result from operations and maintenance of the Morgan Offshore Wind Project Generation Assets is 11.57 km^2 (Morgan Offshore Wind Ltd, 2023) and is therefore similar to that arising from the Mona Offshore Wind Project.

2.11.2.61 For the Morecambe Offshore Windfarm: Generation Assets, the predicted cumulative temporary habitat loss/disturbance during the operations and maintenance phase would equate to 0.16 km^2. This includes jack up events and cable repair and replacement activities (Morecambe Offshore Windfarm Ltd., 2023). For this impact on both projects the impact will occur intermittently across the 35 year operational lifetime of the projects.

2.11.2.62 For the operations and maintenance of the Morgan and Morecambe Offshore Windfarms Transmission Assets the predicted cumulative temporary habitat loss/disturbance the construction phase is estimated at 10.26 km^2. This includes the maintenance to the OSPs as well as cable repair and reburial (Morecambe Offshore Windfarm Ltd and Morgan Offshore Wind Ltd, 2023).

2.11.2.63 A scoping report is also available for the Mooir Vannin Offshore Windfarm (Ørsted, 2023). This report does not specify the impacts which will be assessed in association with the project however it does provide some of the parameters of the project including that up to 100 turbines may be installed as well as up to five OSPs and 490 km of inter-array cables, 100 km of interconnector cables, 90 km of offshore electrical connection cables and 125 km of export cables may also be installed which will result in habitat disturbance (Ørsted, 2023). Additionally regular maintenance is expected to occur on infrastructure throughout the lifetime of the project (Ørsted, 2023).

2.11.2.64 The Liverpool Bay aggregate extraction site may be licenced during the operations and maintenance phase of the Mona Offshore Wind Project. An environmental statement for this area suggests a 15 year licencing period which would allow for the extraction of 18 Mt of marine aggregates with an annual extraction rate of 1.2 Mt (Westminster Gravels Ltd, 2023). The Liverpool Bay aggregate extraction site extends over 64.8 km^2 (Westminster Gravels Ltd, 2023) however only a fraction of this will be operational at any one time as with Hilbre Swash in tier 1 resulting in up to 3.24 km^2 of temporary habitat disturbance/loss. For the purposes of this assessment, the MDS assumes that a precautionary 5% of the proposed total licensed area of Liverpool Bay will be actively dredged during this period.

2.11.2.65 A scoping report is available for the ENI Hynet CCS project which outlines the impact on benthic ecology from temporary habitat disturbance/loss in its construction phase may result from site preparation activities and the installation, maintenance, refurbishment, and removal of development infrastructure (subsea cable and pipeline installation, temporary oil platform refurbishment, drill cutting deposits, jack-up vessel and drill rig spud deployments) (Liverpool Bay CCS Limited, 2022). In its operations and maintenance phase the project may contribute to temporary habitat loss through device repair, cable repair and vessel anchoring. The scoping report does not however provide estimates of habitat disturbance with which to make any quantitative assessment of the cumulative impact with the Mona Offshore Wind Project.

Table 2.33: Cumulative temporary habitat disturbance for the Mona Offshore Wind Project operations and maintenance phase and other tier 2 plans/projects/activities in the CEA benthic subtidal and intertidal ecology study area.

Project	Predicted temporary habitat disturbance/loss (km^2)	Component parts of temporary habitat disturbance/loss	Source
Mona Offshore Wind Project	17.40	See Table 2.18	See Table 2.18
Other tier 1 projects	19.46	See Table 2.31	Table 2.31
Offshore renewables			
Morgan Offshore Wind Project Generation Assets	11.57	• Wind turbine and OSP maintenance • Cable repair and reburial.	Morgan Offshore Wind Ltd, 2023
Morecambe Offshore Windfarm Generation Assets	0.16	• Wind turbine and OSP maintenance • Cable repair and reburial.	Morecambe Offshore Windfarm Ltd., 2023
Morgan and Morecambe Offshore Windfarms Transmission Assets	10.26	• OSP maintenance • Cable repair and reburial.	Morecambe Offshore Windfarm Ltd and Morgan Offshore Wind Ltd, 2023
Mooir Vannin Offshore Windfarm	No quantification provided.	• Wind turbine and OSP foundation installation • Cable installation activities	Ørsted, 2023

Project	Predicted temporary habitat disturbance/loss (km²)	Component parts of temporary habitat disturbance/loss	Source
		• Maintenance activities.	
ENI Hynet CCS	No quantification provided	• Site preparation • Cable and pipeline installation • Maintenance works	Liverpool Bay CCS Limited, 2022
Deposits and removals			
Liverpool Bay aggregate extraction area 457	3.24	• Aggregate extraction.	Westminster Gravels Ltd, 2023
Total	62.08		

2.11.2.66 The cumulative effect on all the relevant subtidal IEFs is predicted to be of regional spatial extent, short term duration (the maintenance activities are likely to occur over a period of days to weeks, over the lifetime of the projects), intermittent and high reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be **low**.

2.11.2.67 No tier 2 projects in the CEA for temporary habitat loss/disturbance overlap with the Constable Bank (Annex I sandbank outside an SAC) IEF, so this IEF is not considered further.

Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC

2.11.2.68 The tier 2 projects will not cumulatively interact with temporary habitat disturbance/loss in the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC of the Mona Offshore Wind Project due to their distance from the SAC. As a result the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC IEFs have not been considered further in this tier 2 assessment of the cumulative temporary habitat disturbance/loss.

Intertidal habitat IEFs

2.11.2.69 The tier 2 will not cumulatively interact with temporary habitat disturbance/loss in the intertidal zone of the Mona Offshore Wind Project due to their distance from the Mona landfall site. As a result the intertidal habitat IEFs have not been considered further in this tier 2 assessment of the cumulative temporary habitat disturbance/loss.

Sensitivity of the receptor

Subtidal habitat IEFs

2.11.2.70 The sensitivity of the subtidal IEFs is as described previously for the construction phase assessment for the Mona Offshore Wind Project alone in paragraph 2.9.2.21 to 2.9.2.27 and Table 2.21.

2.11.2.71 The subtidal coarse and mixed sediments with diverse benthic communities IEF, sand and muddy sand communities with polychaetes and bivalves IEF and Annex I low resemblance stony reef (outside an SAC) IEF is deemed to be of medium vulnerability, medium recoverability and national value. The sensitivity of the receptor is therefore, considered to be **medium**.

2.11.2.72 The seapens and burrowing megafauna habitat IEF are deemed to be of medium vulnerability, medium recoverability and national value. The sensitivity of the receptor is therefore, considered to be **high** (and reduced to **medium** in the absence of seapens).

Significance of effect

Subtidal habitat IEFs

2.11.2.73 Overall for the subtidal coarse and mixed sediments with diverse benthic communities IEF, sand and muddy sand communities with polychaetes and bivalves IEF and Annex I low resemblance stony reef (outside an SAC) IEF the magnitude of the cumulative temporary habitat disturbance/loss impact during the operations and maintenance phase is deemed to be low and the sensitivity of the receptor is considered to be medium. The cumulative effect will, therefore, be of **minor** adverse significance, which is not significant in EIA terms. This conclusion has been reached based on the small scale and localised nature of the maintenance activities in this phase and high likelihood of recovery.

2.11.2.74 Overall for the seapens and burrowing megafauna communities IEF, the magnitude of the cumulative temporary habitat disturbance/loss impact during the operations and maintenance phase is deemed to be low and the sensitivity of the receptor is considered to be high (and reduced to medium in the absence of seapens). The cumulative effect will, therefore, be of **minor** adverse significance, which is not significant in EIA terms. This conclusion has been reached based on the small scale of the activities in this phase and high likelihood of recovery.

Decommissioning phase

Magnitude of impact

2.11.2.75 During the decommissioning phase of the Mona Offshore Wind Project most of the tier 2 offshore windfarm projects will also be in their decommissioning phase, however the licence for the Liverpool Bay aggregate extraction are 457 will have expired and it is currently unknown when the Mooir Vannin Offshore Windfarm will enter its decommissioning phase. The maximum total temporary habitat disturbance/loss associated with the tier 2 projects within the Mona CEA subtidal and intertidal ecology study area within the decommissioning phase is estimated to be the same as for the construction phase (paragraphs 2.11.2.43 to 2.11.2.45). This is, however, likely to be an over estimation as the decommissioning phase will not include site preparation activities such as sand wave clearance which account for a large amount of temporary habitat loss/disturbance in the construction phase. For all of these projects, decommissioning is over 35 years away making it difficult to determine the regulation and guidelines which will govern this process in the future making it difficult to determine a more specific number for this phase.

2.11.2.76 The cumulative impact on subtidal coarse and mixed sediments with diverse benthic communities IEF, sand and muddy sand communities with polychaetes and bivalves IEF, Annex I low resemblance stony reef (outside an SAC) IEF and seapens and burrowing megafauna communities IEF is predicted to be of regional spatial extent, medium term duration, intermittent and high reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore considered to be **low**.

2.11.2.77 No tier 1 projects in the CEA for temporary habitat loss/disturbance overlap with the Constable Bank (Annex I sandbank outside an SAC) IEF so this IEF is not considered further in this assessment.

Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC

2.11.2.78 The tier 2 projects will not cumulatively interact with temporary habitat disturbance/loss in the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC of the Mona Offshore Wind Project due to their distance from the SAC. As a result the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC IEFs have not been considered further in this tier 2 assessment of the cumulative temporary habitat disturbance/loss.

Intertidal habitat IEFs

2.11.2.79 The tier 2 projects will not cumulatively interact with temporary habitat disturbance/loss in the intertidal zone of the Mona Offshore Wind Project due to their distance from the Mona landfall site. As a result the intertidal habitat IEFs have not been considered further in this tier 2 assessment of the cumulative temporary habitat disturbance/loss.

Sensitivity of the receptor

Subtidal habitat IEFs

2.11.2.80 The sensitivity of the subtidal IEFs is as described previously for the construction phase assessment for the Mona Offshore Wind Project alone in paragraph 2.9.2.21 to 2.9.2.27 and Table 2.21.

2.11.2.81 The subtidal coarse and mixed sediments with diverse benthic communities IEF, sand and muddy sand communities with polychaetes and bivalves IEF and Annex I low resemblance stony reef (outside an SAC) IEF is deemed to be of low vulnerability, high recoverability and national value. The sensitivity of the receptor is therefore, considered to be **medium**.

2.11.2.82 The seapens and burrowing megafauna habitat IEF are deemed to be of medium vulnerability, medium recoverability and national value. The sensitivity of the receptor is therefore, considered to be **high** (and reduced to **medium** in the absence of seapens).

Significance of effect

Subtidal habitat IEFs

2.11.2.83 Overall for the subtidal coarse and mixed sediments with diverse benthic communities IEF, the sand and muddy sand communities with polychaetes and bivalves IEF and Annex I low resemblance stony reef (outside an SAC) IEF, the magnitude of the cumulative temporary habitat disturbance/loss impact during the decommissioning phase is deemed to be low and the sensitivity of the receptor is considered to be medium. The cumulative effect will, therefore, be of **minor** adverse significance, which is significant in EIA terms.

2.11.2.84 Overall for seapens and burrowing megafauna communities IEF, the magnitude of the cumulative temporary habitat disturbance/loss impact during the decommissioning phase is deemed to be low and the sensitivity of the receptor is considered to be high (and reduced to medium in the absence of seapens). The cumulative effect will, therefore, be of **minor** adverse significance, which is not significant in EIA terms.

Tier 3

Construction phase

Magnitude of impact

Subtidal habitat IEFs

2.11.2.85 There is one tier 3 project which has been identified in the CEA with the potential to result in cumulative temporary habitat loss/disturbance during the construction phase of the Mona Offshore Wind Project.

2.11.2.86 There is currently no information on the impact that the MaresConnect interconnector cable will have on benthic ecology receptors. A planning application is predicted to be submitted in 2024 which will identify and assess these impacts (MaresConnect, 2022). The activities associated with the MaresConnect interconnector cable which are likely to result in temporary habitat disturbance/loss are similar to those expected for the installation of cables for the Mona Offshore Wind Project. Construction is likely to occur in 2025 and the project is anticipated to become operational in 2027 (MaresConnect 2022), although it should be noted that these timeframes are only indicative at this stage. The construction activities are likely to involve cable installation such as jet trenching and the installation of cable protection. Maintenance activities are likely to involve the repair and reburial of cables.

2.11.2.87 The cumulative impact on subtidal coarse and mixed sediments with diverse benthic communities IEF, the sand and muddy sand communities with polychaetes and bivalves IEF is predicted to be of regional spatial extent, medium term duration, intermittent and high reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore considered to be **medium**.

2.11.2.88 The cumulative impact on the seapens and burrowing megafauna communities IEF and Annex I low resemblance stony reef (outside an SAC) IEF is predicted to be of regional spatial extent, short term duration, intermittent and high reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore considered to be **low**.

2.11.2.89 No tier 3 projects in the CEA for temporary habitat loss/disturbance overlap with the Constable Bank (Annex I sandbank outside an SAC) IEF so this IEF is not considered further.

Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC

2.11.2.90 The tier 3 projects will not cumulatively interact with temporary habitat disturbance/loss in the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC of the Mona Offshore Wind Project due to their distance from the SAC. As a result the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC IEFs have not been considered further in this tier 3 assessment of the cumulative temporary habitat disturbance/loss.

Intertidal habitat IEFs

2.11.2.91 The tier 3 projects will not cumulatively interact with temporary habitat disturbance/loss in the intertidal zone of the Mona Offshore Wind Project due to their distance from the Mona landfall site. As a result the intertidal habitat IEFs have not been considered further in this tier 3 assessment of the cumulative temporary habitat disturbance/loss.

Sensitivity of the receptor

Subtidal habitat IEFs

2.11.2.92 The sensitivity of the subtidal IEFs is as described previously for the construction phase assessment for the Mona Offshore Wind Project alone in paragraph 2.9.2.21 to 2.9.2.27 and Table 2.21.

2.11.2.93 The subtidal coarse and mixed sediments with diverse benthic communities IEF, sand and muddy sand communities with polychaetes and bivalves IEF and Annex I low resemblance stony reef (outside an SAC) IEF are deemed to be of medium vulnerability, medium recoverability and national value. The sensitivity of the receptor is therefore, considered to be **medium**.

2.11.2.94 The seapens and burrowing megafauna habitat IEF are deemed to be of medium vulnerability, medium recoverability and national value. The sensitivity of the receptor is therefore, considered to be **high** (and reduced to **medium** in the absence of seapens).

Significance of effect

Subtidal habitat IEFs

2.11.2.95 Overall for the subtidal coarse and mixed sediments with diverse benthic communities IEF and the sand and muddy sand communities with polychaetes and bivalves IEF, the magnitude of the cumulative temporary habitat disturbance/loss impact during the construction phase is deemed to be medium and the sensitivity of the receptor is considered to be medium. In accordance with the methodology for determining the significance of effects outlined in section 2.6.2 and the matrix in Table 2.17, this correlates with a moderate adverse effect, however, this would only be applicable in the short term and will not extend beyond the construction phase. As outlined in paragraphs 2.9.2.21 to 2.9.2.32, the sediments and associated benthic communities are predicted to recover over time, and therefore no mitigation is required to reduce the significance of the effects. The overall significance of the effects in the medium to long term is **minor** adverse significance, which is not significant in EIA terms.

2.11.2.96 Overall, for the Annex I low resemblance stony reef (outside an SAC) IEF the magnitude of the cumulative temporary habitat disturbance/loss impact in the construction phase is deemed to be low and the sensitivity of the receptor is considered to be medium. The cumulative effect will, therefore, be of **minor** adverse significance, which is not significant in EIA terms.

2.11.2.97 Overall, for the seapens and burrowing megafauna communities IEF the magnitude of the temporary habitat disturbance/loss impact in the decommissioning phase is deemed to be low and the sensitivity of the receptor is considered to be high (and reduced to medium in the absence of seapens). The effect will, therefore, be of **minor** adverse significance, which is not significant in EIA terms. This conclusion has been reached based on the small area impacted in this phase and limited area of penetrative disturbance and substratum removal.

Operations and maintenance phase

Magnitude of impact

Subtidal habitat IEFs

2.11.2.98 There is one tier 3 project which has been identified in the CEA with the potential to result in cumulative temporary habitat loss/disturbance during the operations and maintenance phase of the Mona Offshore Wind Project

2.11.2.99 There is currently no information on the impact that the MaresConnect interconnector cable will have on benthic ecology receptors. A planning application is predicted to be submitted in 2024 which will identify and assess these impacts (MaresConnect, 2022). The activities associated with the MaresConnect interconnector cable which are likely to result in temporary habitat disturbance/loss are similar to those expected for the installation of cables for the Mona Offshore Wind Project. Construction is likely to occur in 2025 and the project is anticipated to become operational in 2027 (MaresConnect 2022), although it should be noted that these timeframes are only indicative at this stage.

2.11.2.100 The cumulative effect is predicted to be of regional spatial extent, medium term duration, intermittent and high reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be **low**.

Sensitivity of the receptor

Subtidal habitat IEFs

2.11.2.101 The sensitivity of the subtidal IEFs is as described previously for the construction phase assessment for the Mona Offshore Wind Project alone in paragraph 2.9.2.21 to 2.9.2.27 and Table 2.21.

2.11.2.102 The subtidal coarse and mixed sediments with diverse benthic communities IEF, sand and muddy sand communities with polychaetes and bivalves IEF and Annex I low resemblance stony reef (outside an SAC) IEF is deemed to be of medium vulnerability, medium recoverability and national value. The sensitivity of the receptor is therefore, considered to be **medium**.

2.11.2.103 The seapens and burrowing megafauna habitat IEF are deemed to be of medium vulnerability, medium recoverability and national value. The sensitivity of the receptor is therefore, considered to be **high** (and reduced to **medium** in the absence of seapens).

Significance of effect

Subtidal habitat IEFs

2.11.2.104 Overall for the subtidal coarse and mixed sediments with diverse benthic communities IEF, sand and muddy sand communities with polychaetes and bivalves IEF and Annex I low resemblance stony reef (outside an SAC) IEF, the magnitude of the cumulative temporary habitat disturbance/loss impact during the operations and maintenance phase is deemed to be low and the sensitivity of the receptor is considered to be medium. The cumulative effect will, therefore, be of **minor** adverse significance, which is not significant in EIA terms. This is due to the large area over which the impact is spread and the small amount of temporary habitat loss which will occur over the wide CEA benthic subtidal and intertidal ecology study area.

2.11.2.105 Overall for the seapens and burrowing megafauna communities IEF, the magnitude of the cumulative temporary habitat disturbance/loss impact during the operations and maintenance phase is deemed to be low and the sensitivity of the receptor is considered to be high (and reduced to medium in the absence of seapens). The cumulative effect will, therefore, be of **minor** adverse significance, which is not significant in EIA terms. This is due to the large area over which the impact is spread and the small amount of temporary habitat loss which will occur over the wide CEA benthic subtidal and intertidal ecology study area.

2.11.3 Increase in suspended sediment concentrations and associated deposition

Tier 1

Construction phase

Magnitude of impact

2.11.3.1 The magnitude of the increase in SSC arising from seabed preparation involving sandwave clearance, the installation of the wind turbines, OSP foundations and cables, has been assessed as low for the Mona Offshore Wind Project alone, as described in section 2.9.2. The greatest impacts are due to installation of the export cabling through the Constable Bank.

2.11.3.2 The construction phase of the Mona Offshore Wind Project may coincide with the maintenance activities associated with of the Rhyl Flats Wind Farm, Gwynt y Môr Offshore Wind Farm and North Hoyle Wind Farm, maintenance activities may result in increased SSC, however these activities would be of limited spatial extent and frequency and unlikely to interact with sediment plumes from the Mona Offshore Wind Project.

2.11.3.3 Also coinciding with the construction phase of the Mona Offshore Wind Project is the proposed development of Awel y Môr Offshore Wind Farm. Construction activities may result in increased SSC; however, these activities would be of limited spatial extent and frequency and unlikely to interact with sediment plumes from the Mona Array Area. However, the Mona Offshore Cable Corridor runs adjacent to Awel y Môr array area and the cable corridors are parallel. Therefore, interaction of SSC plumes on spring tide events may occur should trenching activities be undertaken simultaneously however this is unlikely. SSC plumes would most likely reach background levels before overlapping with the Awel y Môr development area, when travelling on the flood tide as they would run in parallel. Resultant overlapping plumes may have increased SSC between 2 mg/l on the outer extent of the plume.

2.11.3.4 The cumulative impact assessment encompasses aggregate extraction at both Hilbre Swash licensed areas located within 22.4 km of the Mona Array Area and 17.2 km of the Mona Offshore Cable Corridor. Resultant plumes from the disposal of dredged material and extraction of aggregate would be advected on the tidal current running in parrallel and not coincide.

2.11.3.5 Similarly, the cumulative impact assessment considers sea disposal of dredged material at the Conwy River disposal site, located 35.2 km and 7.7 km from the Mona Array Area and Mona Offshore Cable Corridor respectively. If the offshore cable installation and dredge material dumping coincided both resultant plumes would be advected on the tidal currents, they would travel in parallel, and not towards one another, and are unlikely to interact if offshore cable installation coincides with the use of the licensed sea disposal site.

2.11.3.6 The cumulative effect is predicted to be of local spatial extent, short term duration, intermittent and high reversibility. The magnitude is therefore, considered to be **low**.

Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC

2.11.3.7 The potential impact of increased SSC and associated deposition in the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC will be similar to the impact in the subtidal habitats as described in paragraphs 2.11.3.1 to 2.11.3.5. however there will be no impact on the intertidal features of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC.

2.11.3.8 The cumulative effect is predicted to be of local spatial extent, short term duration, intermittent and high reversibility. The magnitude is therefore, considered to be **low**.

Intertidal habitat IEFs

2.11.3.9 None of the cumulative increases in SSC and associated deposition in this phase of the Mona Offshore Wind Project will occur within the intertidal landfall of the Mona Offshore Wind Project therefore no further assessment of the intertidal habitat IEFs has been undertaken for this impact in the CEA.

Sensitivity of the receptor

Subtidal habitat IEFs

2.11.3.10 The sensitivity of the subtidal habitat IEFs is as described previously for the construction phase assessment in paragraph 2.9.3.29 to 2.9.3.35 and Table 2.22.

2.11.3.11 The subtidal coarse and mixed sediments with diverse benthic communities IEF is deemed to be of low vulnerability, medium recoverability and national value. The sensitivity of the receptor is therefore, considered to be **low**.

2.11.3.12 The sand and muddy sand communities with polychaetes and bivalves IEF is deemed to be of low vulnerability, medium recoverability and national value. The sensitivity of the receptor is therefore, considered to be **low**.

2.11.3.13 The Annex I low resemblance stony reef (outside an SAC) IEF is deemed to be of low vulnerability, high recoverability and national value. The sensitivity of the receptor is therefore, considered to be **negligible**.

2.11.3.14 The Constable Bank (Annex I sandbank outside an SAC) IEF is deemed to be of low vulnerability, medium recoverability and national value. The sensitivity of the receptor is therefore, considered to be **low**.

2.11.3.15 The seapens and burrowing megafauna communities IEF is deemed to be of low vulnerability, high recoverability and national value. The sensitivity of the receptor is therefore, considered to be **negligible**.

2.11.3.16 The mixed sediments dominated by brittlestars IEF is deemed to be of medium vulnerability, medium recoverability and national value. The sensitivity of the receptor is therefore, considered to be **medium**.

Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC

2.11.3.17 The sensitivity of the subtidal and intertidal IEF features of the SAC are as described previously for the construction phase assessment in paragraph 2.9.3.39 to 2.9.3.45 and Table 2.22.

2.11.3.18 The Annex I sandbanks IEF of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC is deemed to be of low vulnerability, medium recoverability and international value. The sensitivity of the receptor is therefore, considered to be **low**.

2.11.3.19 The Annex I subtidal reef IEF of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC is deemed to be of medium vulnerability, medium recoverability and international value. The sensitivity of the receptor is therefore, considered to be **medium**.

Significance of effect

Subtidal habitat IEFs

2.11.3.20 Overall, for the subtidal coarse and mixed sediments with diverse benthic communities IEF, the sand and muddy sand communities with polychaetes and bivalves IEF and Constable Bank (Annex I sandbank outside an SAC) IEF the magnitude of the cumulative increase in SSC and associated deposition impact in the construction phase is deemed to be low and the sensitivity of the receptor is considered to be low. The effect will, therefore, be of **negligible** significance, which is not significant in EIA terms. This conclusion is due to the impact being small in magnitude and short term in nature as well as the biotope being highly resistant to these specific pressures.

2.11.3.21 Overall, for the low resemblance stony reef (outside an SAC) IEF and seapens and burrowing megafauna communities IEF the magnitude of the cumulative increase in SSC and associated deposition impact in the construction phase is deemed to be low and the sensitivity of the receptor is considered to be negligible. The effect will, therefore, be of **negligible** significance, which is not significant in EIA terms. This conclusion is due to the impact being small in magnitude and short term in nature as well as the biotope being highly resistant to these specific pressures.

2.11.3.22 Overall, for the mixed sediments dominated by brittlestars IEF the magnitude of the impact of cumulative increases in SSC and associated deposition during the operations and maintenance phase is deemed to be low, and the sensitivity of the receptor is considered to be medium. The cumulative effect will, therefore, be of **minor** adverse significance, which is not significant in EIA terms.

Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC

2.11.3.23 Overall, for the Annex I sandbanks IEF of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC the magnitude of the cumulative increase in SSC and associated deposition impact in the construction phase is deemed to be low and the sensitivity of the receptor is considered to be low. The effect will, therefore, be of **negligible** significance, which is not significant in EIA terms. This conclusion is due to the impact being small in magnitude and short term in nature as well as the biotope being resistant to these specific pressures.

2.11.3.24 Overall, for the Annex I subtidal reefs IEF of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC the magnitude of the cumulative increase in SSC and associated deposition impact in the construction phase is deemed to be low, and the sensitivity of the receptor is considered to be medium. The effect will, therefore, be of **minor** adverse significance, which is not significant in EIA terms.

Operations and maintenance phase

Magnitude of impact

2.11.3.25 The magnitude of the increase in SSC arising from maintenance activities during operations and maintenance phase, has been assessed as negligible for the Mona Offshore Wind Project alone, as described in section 2.9.

2.11.3.26 The operations and maintenance phase of the Mona Offshore Wind Project may coincide with the maintenance activities associated with the Awel y Môr Offshore Wind Farm, Rhyl Flats Wind Farm and Gwynt y Môr Offshore Wind Farm. Maintenance activities may result in increased suspended sediment concentration however, these activities would be of limited spatial extent and frequency and unlikely to interact with sediment plumes from the Mona Offshore Wind Project maintenance activities. With resultant plumes from the Mona Offshore Wind Project being smaller in scale than during the construction phase potential cumulative impacts are less likely to occur during this operations and maintenance phase.

2.11.3.27 Awel y Môr, Rhyl Flats and Gwynt y Môr Offshore Wind Farms may be decommissioned on a similar time frame as the Mona Offshore Wind Project. As highlighted previously, any potential increase in SSC associated with sediment plumes as a result of decommissioning activities would be advected on tidal currents. These plumes would run in parallel and are not advected towards each other and therefore do not overlap. Residual structures remaining from the decommissioning of these wind farms would not have a cumulative impact on suspended sediment concentrations.

2.11.3.28 Potential cumulative impacts may relate to maintenance of offshore cables coinciding with the use of the Conwy River disposal site. Maintenance activities are both intermittent and a smaller scale than that of the construction phase and therefore any potential cumulative impacts are less likely to occur and be on a smaller scale.

2.11.3.29 The operation and maintenance phase of the Mona Offshore Wind Project may coincide with the decommissioning activities associated with the North Hoyle Offshore Wind Farm. Decommissioning activities would result in increased suspended sediment concentration however, these activities would be of limited spatial extent and frequency and unlikely to interact with sediment plumes from the Mona Offshore Wind Project given the significant distance separating the sites (13.6 km).

2.11.3.30 The cumulative effect is predicted to be of local spatial extent, short term duration, intermittent and high reversibility. The magnitude is therefore, considered to be **negligible.**

Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC

2.11.3.31 The potential impact of increased SSC and associated deposition in the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC will be similar to the impact in the subtidal habitats as described in paragraphs 2.11.3.25 to 2.11.3.29. however there will be no impact on the intertidal features of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC.

2.11.3.32 The cumulative effect is predicted to be of local spatial extent, short term duration, intermittent and high reversibility. The magnitude is therefore, considered to be **negligible.**

Sensitivity of the receptor

Subtidal habitat IEFs

2.11.3.33 The sensitivity of the subtidal habitat IEFs is as described previously for the construction phase assessment in paragraph 2.9.3.29 to 2.9.3.35 and Table 2.22.

2.11.3.34 The subtidal coarse and mixed sediments with diverse benthic communities IEF is deemed to be of low vulnerability, medium recoverability and national value. The sensitivity of the receptor is therefore, considered to be **low**.

2.11.3.35 The sand and muddy sand communities with polychaetes and bivalves IEF is deemed to be of low vulnerability, medium recoverability and national value. The sensitivity of the receptor is therefore, considered to be **low**.

2.11.3.36 The Annex I low resemblance stony reef (outside an SAC) IEF is deemed to be of low vulnerability, high recoverability and national value. The sensitivity of the receptor is therefore, considered to be **negligible.**

2.11.3.37 The Constable Bank (Annex I sandbank outside an SAC) IEF is deemed to be of low vulnerability, medium recoverability and national value. The sensitivity of the receptor is therefore, considered to be **low**.

2.11.3.38 The seapens and burrowing megafauna communities IEF is deemed to be of low vulnerability, high recoverability and national value. The sensitivity of the receptor is therefore, considered to be **negligible.**

2.11.3.39 The mixed sediments dominated by brittlestars IEF is deemed to be of medium vulnerability, medium recoverability and national value. The sensitivity of the receptor is therefore, considered to be **medium**.

Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC

2.11.3.40 The sensitivity of the subtidal and intertidal IEF features of the SAC are as described previously for the construction phase assessment in paragraph 2.9.3.39 to 2.9.3.45 and Table 2.22.

2.11.3.41 The Annex I sandbanks IEF of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC is deemed to be of low vulnerability, medium recoverability and international value. The sensitivity of the receptor is therefore, considered to be **low**.

2.11.3.42 The Annex I subtidal reef IEF of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC is deemed to be of medium vulnerability, medium recoverability and international value. The sensitivity of the receptor is therefore, considered to be **medium**.

Significance of effect

Subtidal habitat IEFs

2.11.3.43 Overall, for the subtidal coarse and mixed sediments with diverse benthic communities IEF, the sand and muddy sand communities with polychaetes and bivalves IEF and Constable Bank (Annex I sandbank outside an SAC) IEF the magnitude of the cumulative increase in SSC and associated deposition impact in the operations and maintenance phase is deemed to be negligible and the sensitivity of the receptor is considered to be low. The effect will, therefore, be of **negligible** significance, which is not significant in EIA terms. This conclusion is due to the impact being small in magnitude and short term in nature as well as the biotope being highly resistant to these specific pressures.

2.11.3.44 Overall, for the low resemblance stony reef (outside an SAC) IEF and the seapens and burrowing megafauna communities IEF the magnitude of the cumulative increase in SSC and associated deposition impact in the operations and maintenance phase is deemed to be negligible and the sensitivity of the receptor is considered to be negligible. The effect will, therefore, be of **negligible** significance, which is not significant in EIA terms. This conclusion is due to the impact being small in magnitude and short term in nature as well as the biotope being highly resistant to these specific pressures.

2.11.3.45 Overall, for the mixed sediments dominated by brittlestars IEF the magnitude of the impact of cumulative increases in SSC and associated deposition during the operations and maintenance phase is deemed to be negligible, and the sensitivity of the receptor is considered to be medium. The cumulative effect will, therefore, be of **negligible** significance, which is not significant in EIA terms. This is due to the small magnitude and short term nature of this impact in this phase of the Mona Offshore Wind Project.

Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC

2.11.3.46 Overall, for the Annex I sandbanks IEF of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC the magnitude of the cumulative increase in SSC and associated deposition impact in the operations and maintenance phase is deemed to be negligible and the sensitivity of the receptor is considered to be low. The effect will, therefore, be of **negligible** significance, which is not significant in EIA terms. This conclusion is due to the impact being small in magnitude and short term in nature as well as the biotope being resistant to these specific pressures.

2.11.3.47 Overall, for the Annex I intertidal reefs IEF and Annex I subtidal reefs IEF of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC the magnitude of the cumulative increase in SSC and associated deposition impact in the operations and maintenance phase is deemed to be negligible, and the sensitivity of the receptor is considered to be medium. The effect will, therefore, be of **negligible** significance, which is not significant in EIA terms. This conclusion has been reached based on the low levels of increase in SSC associated with project in this tier.

Tier 2

Construction phase

Magnitude of impact

2.11.3.48 The magnitude of the increase in SSC arising from seabed preparation involving sandwave clearance, the installation of the wind turbines, OSP foundations and cables during the construction phase, has been assessed as low for the Mona Offshore Wind Project alone, as described in section 2.9.3. The greatest impacts are due to installation of the export cabling through the Constable Bank.

2.11.3.49 During the construction phase of the Mona Offshore Wind Project there is the potential for cumulative impacts with two proposed offshore wind farm installations (the Morgan Offshore Wind Project Generation Assets and the Morecambe Offshore Windfarm Generation Assets) and the Morgan and Morecambe Offshore Windfarms Transmission Assets. Construction activities may result in increased SSC; however, these activities would be of limited spatial extent and frequency and unlikely to interact with sediment plumes from the Mona Offshore Wind Project. As described in section 2.9.3, SSC plumes are localised to within the immediate vicinity of the construction activity and returning to background levels therefore travelling on the tide in parallel will most likely avoid interception of the most concentrated suspended sediment part of each plume.

2.11.3.50 Scoping reports have been submitted to the Offshore Petroleum Regulator for Environment and Decommissioning (OPRED) in relation to the Eni Hynet CCS storage project. Although limited information is available on the project it is likely that it may involve the installation of cables via trenching to accommodate the redevelopment of existing pipelines for CCS. The construction phase of the Mona Offshore Wind Project coincides with that of the Eni Hynet CCS project located 12.1 km east of the Mona Array Area. As such, interaction between suspended sediment plumes may occur should trenching activities be undertaken simultaneously, however, this is unlikely given the length of construction phase and range of activities. SSC plumes are expected to reach background levels before overlapping and additionally plumes would not directly interact as they would run in parallel.

2.11.3.51 A scoping report is available regarding potential aggregate extraction at Liverpool Bay aggregate extraction area 457. The existing site is the north of the two mineral extraction sites in Figure 1.13, located 11 km to the east of the Mona Array Area. Aggregate extraction activities are typically intermittent and given their nature, to remove rather than deposit material, spilled material will be kept to a minimum. Due to the distance from the Mona Array Area sediment plumes will be greatly dispersed and SSC low when the extraction site is reached meaning that cumulative impacts are unlikely.

2.11.3.52 The cumulative effect is predicted to be of local spatial extent, short term duration, intermittent and high reversibility. The magnitude is therefore, considered to be **low**.

Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC

2.11.3.53 The potential impact of increased SSC and associated deposition in the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC will be similar to the impact in the subtidal habitats as described in paragraphs 2.11.3.48 to 2.11.3.51. however there will be no impact on the intertidal features of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC.

2.11.3.54 The cumulative effect is predicted to be of local spatial extent, short term duration, intermittent and high reversibility. The magnitude is therefore, considered to be **low**.

Intertidal habitat IEFs

2.11.3.55 None of the cumulative increases in SSC and associated deposition in this phase of the Mona Offshore Wind Project will occur within the intertidal landfall of the Mona Offshore Wind Project therefore no further assessment of the intertidal habitat IEFs has been undertaken for this impact in the CEA.

Sensitivity of the receptor

Subtidal habitat IEFs

2.11.3.56 The sensitivity of the subtidal habitat IEFs is as described previously for the construction phase assessment in paragraph 2.9.3.29 to 2.9.3.35 and Table 2.22.

2.11.3.57 The subtidal coarse and mixed sediments with diverse benthic communities IEF is deemed to be of low vulnerability, medium recoverability and national value. The sensitivity of the receptor is therefore, considered to be **low**.

2.11.3.58 The sand and muddy sand communities with polychaetes and bivalves IEF is deemed to be of low vulnerability, medium recoverability and national value. The sensitivity of the receptor is therefore, considered to be **low**.

2.11.3.59 The Annex I low resemblance stony reef (outside an SAC) IEF is deemed to be of low vulnerability, high recoverability and national value. The sensitivity of the receptor is therefore, considered to be **negligible.**

2.11.3.60 The Constable Bank (Annex I sandbank outside an SAC) IEF is deemed to be of low vulnerability, medium recoverability and national value. The sensitivity of the receptor is therefore, considered to be **low**.

2.11.3.61 The seapens and burrowing megafauna communities IEF is deemed to be of low vulnerability, high recoverability and national value. The sensitivity of the receptor is therefore, considered to be **negligible.**

2.11.3.62 The mixed sediments dominated by brittlestars IEF is deemed to be of medium vulnerability, medium recoverability and national value. The sensitivity of the receptor is therefore, considered to be **medium**.

Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC

2.11.3.63 The sensitivity of the subtidal and intertidal IEF features of the SAC are as described previously for the construction phase assessment in paragraph 2.9.3.39 to 2.9.3.45 and Table 2.22.

2.11.3.64 The Annex I sandbanks IEF of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC is deemed to be of low vulnerability, medium recoverability and international value. The sensitivity of the receptor is therefore, considered to be **low**.

2.11.3.65 The Annex I subtidal reef IEF of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC is deemed to be of medium vulnerability, medium recoverability and international value. The sensitivity of the receptor is therefore, considered to be **medium**.

Significance of effect

Subtidal habitat IEFs

2.11.3.66 Overall, for the subtidal coarse and mixed sediments with diverse benthic communities IEF, the sand and muddy sand communities with polychaetes and bivalves IEF and Constable Bank (Annex I sandbank outside an SAC) IEF the magnitude of the cumulative increase in SSC and associated deposition impact in the construction phase is deemed to be low and the sensitivity of the receptor is considered to be low. The effect will, therefore, be of **negligible** adverse significance, which is not significant in EIA terms. This conclusion is due to the impact being small in magnitude and short term in nature as well as the biotope being highly resistant to these specific pressures.

2.11.3.67 Overall, for the low resemblance stony reef (outside an SAC) IEF and seapens and burrowing megafauna communities IEF the magnitude of the cumulative increase in SSC and associated deposition impact in the construction phase is deemed to be low and the sensitivity of the receptor is considered to be negligible. The effect will, therefore, be of **negligible** adverse significance, which is not significant in EIA terms.

This conclusion is due to the impact being small in magnitude and short term in nature as well as the biotope being highly resistant to these specific pressures.

2.11.3.68 Overall, for the mixed sediments dominated by brittlestars IEF the magnitude of the impact of increases in SSC and associated deposition during the operations and maintenance phase is deemed to be low, and the sensitivity of the receptor is considered to be medium. The effect will, therefore, be of **minor** adverse significance, which is not significant in EIA terms. This is due to the small magnitude and short term nature of this impact in this tier.

Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC

2.11.3.69 Overall, for the Annex I sandbanks IEF of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC the magnitude of the cumulative increase in SSC and associated deposition impact in the construction phase is deemed to be low and the sensitivity of the receptor is considered to be low. The effect will, therefore, be of **negligible** significance, which is not significant in EIA terms. This conclusion is due to the impact being small in magnitude and short term in nature as well as the biotope being resistant to these specific pressures.

2.11.3.70 Overall, for the Annex I subtidal reefs IEF of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC the magnitude of the cumulative increase in SSC and associated deposition impact in the construction phase is deemed to be low, and the sensitivity of the receptor is considered to be negligible. The effect will, therefore, be of **minor** adverse significance, which is not significant in EIA terms.

Operations and maintenance phase

Magnitude of impact

2.11.3.71 The magnitude of the increase in SSC arising from maintenance activities during the operations and maintenance phase, has been assessed as negligible for the Mona Offshore Wind Project alone, as described in section 2.9.3.

2.11.3.72 The Morgan Offshore Wind Project Generation Assets and the Morecambe Offshore Windfarm Generation Assets, along with the Morgan and Morecambe Offshore Windfarms Transmission Assets as cited within the construction phase cumulative assessment will all be within the operational and maintenance phases therefore, as previously, maintenance activities may result in increased SSC, however these activities would be of limited spatial extent and frequency. The cumulative impacts would therefore be of a lesser magnitude, (i.e. also negligible).

2.11.3.73 During the operations and maintenance phase it is likely that the Liverpool Bay aggregate extraction area 457 will be operational. Given the intermittent nature of both activities and the 11 km separation of the sites, cumulative impacts are very unlikely.

2.11.3.74 The cumulative effect is predicted to be of local spatial extent, short term duration, intermittent and high reversibility. The magnitude is therefore, considered to be **negligible.**

Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC

2.11.3.75 The potential impact of increased SSC and associated deposition in the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC will be similar to the impact in the subtidal habitats as described in paragraphs 2.11.3.71 to 2.11.3.73. however there will be no impact on the intertidal features of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC.

2.11.3.76 The cumulative effect is predicted to be of local spatial extent, short term duration, intermittent and high reversibility. The magnitude is therefore, considered to be **negligible.**

Intertidal habitat IEFs

2.11.3.77 None of the cumulative increases in SSC and associated deposition in this phase of the Mona Offshore Wind Project will occur within the intertidal landfall of the Mona Offshore Wind Project therefore no further assessment of the intertidal habitat IEFs has been undertaken for this impact in the CEA.

Sensitivity of the receptor

Subtidal habitat IEFs

2.11.3.78 The sensitivity of the subtidal habitat IEFs is as described previously for the construction phase assessment in paragraph 2.9.3.29 to 2.9.3.35 and Table 2.22.

2.11.3.79 The subtidal coarse and mixed sediments with diverse benthic communities IEF is deemed to be of low vulnerability, medium recoverability and national value. The sensitivity of the receptor is therefore, considered to be **low**.

2.11.3.80 The sand and muddy sand communities with polychaetes and bivalves IEF is deemed to be of low vulnerability, medium recoverability and national value. The sensitivity of the receptor is therefore, considered to be **low**.

2.11.3.81 The Annex I low resemblance stony reef (outside an SAC) IEF is deemed to be of low vulnerability, high recoverability and national value. The sensitivity of the receptor is therefore, considered to be **negligible.**

2.11.3.82 The Constable Bank (Annex I sandbank outside an SAC) IEF is deemed to be of low vulnerability, medium recoverability and national value. The sensitivity of the receptor is therefore, considered to be **low**.

2.11.3.83 The seapens and burrowing megafauna communities IEF is deemed to be of low vulnerability, high recoverability and national value. The sensitivity of the receptor is therefore, considered to be **negligible.**

2.11.3.84 The mixed sediments dominated by brittlestars IEF is deemed to be of medium vulnerability, medium recoverability and national value. The sensitivity of the receptor is therefore, considered to be **medium**.

Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC

2.11.3.85 The sensitivity of the subtidal and intertidal IEF features of the SAC are as described previously for the construction phase assessment in paragraph 2.9.3.39 to 2.9.3.45 and Table 2.22.

2.11.3.86 The Annex I sandbanks IEF of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC is deemed to be of low vulnerability, medium recoverability and international value. The sensitivity of the receptor is therefore, considered to be **low**.

2.11.3.87 The Annex I subtidal reef IEF is deemed to be of medium vulnerability, medium recoverability and international value. The sensitivity of the receptor is therefore, considered to be **medium**.

Significance of effect

Subtidal habitat IEFs

2.11.3.88 Overall, for the subtidal coarse and mixed sediments with diverse benthic communities IEF, the sand and muddy sand communities with polychaetes and bivalves IEF and Constable Bank (Annex I sandbank outside an SAC) IEF the magnitude of the cumulative increase in SSC and associated deposition impact in the operations and maintenance phase is deemed to be negligible and the sensitivity of the receptor is considered to be low. The effect will, therefore, be of **negligible** significance, which is not significant in EIA terms. This conclusion is due to the impact being small in magnitude and short term in nature as well as the biotope being highly resistant to these specific pressures.

2.11.3.89 Overall, for the low resemblance stony reef (outside an SAC) IEF and seapens and burrowing megafauna communities IEF the magnitude of the cumulative increase in SSC and associated deposition impact in the operations and maintenance phase is deemed to be negligible and the sensitivity of the receptor is considered to be negligible. The effect will, therefore, be of **negligible** significance, which is not significant in EIA terms. This conclusion is due to the impact being small in magnitude and short term in nature as well as the biotope being highly resistant to these specific pressures.

2.11.3.90 Overall, for the mixed sediments dominated by brittlestars IEF the magnitude of the impact of cumulative increases in SSC and associated deposition during the operations and maintenance phase is deemed to be negligible, and the sensitivity of the receptor is considered to be medium. The cumulative effect will, therefore, be of **negligible** significance, which is not significant in EIA terms. This is due to the small magnitude and short term nature of this impact in this tier.

Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC

2.11.3.91 Overall, for the Annex I sandbanks IEF of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC the magnitude of the cumulative increase in SSC and associated deposition impact in the operations and maintenance phase is deemed to be negligible and the sensitivity of the receptor is considered to be low. The effect will, therefore, be of **negligible** significance, which is not significant in EIA terms. This conclusion is due to the impact being small in magnitude and short term in nature as well as the biotope being resistant to these specific pressures.

2.11.3.92 Overall, for the Annex I subtidal reefs IEF of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC the magnitude of the cumulative increase in SSC and associated deposition impact in the operations and maintenance phase is deemed to be negligible, and the sensitivity of the receptor is considered to be medium. The effect will, therefore, be of **negligible** significance, which is not significant in EIA terms.

Decommissioning phase

Magnitude of impact

2.11.3.93 Decommissioning of the Morecambe Offshore Windfarm Generation Assets, the Morgan Offshore Wind Project Generation Assets and the Morgan and Morecambe Offshore Windfarms Transmission Assets will most likely occur on the same projected timeline as the Mona Offshore Wind Project. Decommissioning activity may result in increased SSC; however, this would be localised and of a lesser magnitude than the construction phase. If decommissioned prior to the Mona Offshore Wind Project, the residual infrastructure on the seabed would not cause a cumulative increase in suspended sediment concentration.

2.11.3.94 The cumulative effect is predicted to be of local spatial extent, short term duration, intermittent and high reversibility. The magnitude is therefore, considered to be **low**.

Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC

2.11.3.95 The potential impact of increased SSC and associated deposition in the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC will be similar to the impact in the subtidal habitats as described in paragraph 2.11.3.93. however there will be no impact on the intertidal features of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC.

2.11.3.96 The cumulative effect is predicted to be of local spatial extent, short term duration, intermittent and high reversibility. The magnitude is therefore, considered to be **low**.

Intertidal habitat IEFs

2.11.3.97 None of the cumulative increases in SSC and associated deposition in this phase of the Mona Offshore Wind Project will occur within the intertidal landfall of the Mona Offshore Wind Project therefore no further assessment of the intertidal habitat IEFs has been undertaken for this impact in the CEA.

Sensitivity of the receptor

Subtidal habitat IEFs

2.11.3.98 The sensitivity of the subtidal habitat IEFs is as described previously for the construction phase assessment in paragraph 2.9.3.29 to 2.9.3.35 and Table 2.22.

2.11.3.99 The subtidal coarse and mixed sediments with diverse benthic communities IEF is deemed to be of low vulnerability, medium recoverability and national value. The sensitivity of the receptor is therefore, considered to be **low**.

2.11.3.100 The sand and muddy sand communities with polychaetes and bivalves IEF is deemed to be of low vulnerability, medium recoverability and national value. The sensitivity of the receptor is therefore, considered to be **low**.

2.11.3.101 The Annex I low resemblance stony reef (outside an SAC) IEF is deemed to be of low vulnerability, high recoverability and national value. The sensitivity of the receptor is therefore, considered to be **negligible.**

2.11.3.102 The Constable Bank (Annex I sandbank outside an SAC) IEF is deemed to be of low vulnerability, medium recoverability and national value. The sensitivity of the receptor is therefore, considered to be **low**.

2.11.3.103 The seapens and burrowing megafauna communities IEF is deemed to be of low vulnerability, high recoverability and national value. The sensitivity of the receptor is therefore, considered to be **negligible.**

2.11.3.104 The mixed sediments dominated by brittlestars IEF is deemed to be of medium vulnerability, medium recoverability and national value. The sensitivity of the receptor is therefore, considered to be **medium**.

Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC

2.11.3.105 The sensitivity of the subtidal and intertidal IEF features of the SAC are as described previously for the construction phase assessment in paragraph 2.9.3.39 to 2.9.3.45 and Table 2.22.

2.11.3.106 The Annex I sandbanks IEF of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC is deemed to be of low vulnerability, medium recoverability and international value. The sensitivity of the receptor is therefore, considered to be **low**.

2.11.3.107 The Annex I subtidal reef IEF of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC is deemed to be of medium vulnerability, medium recoverability and international value. The sensitivity of the receptor is therefore, considered to be **medium**.

2.11.3.108 The Annex I intertidal reef IEF of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC is deemed to be of medium vulnerability, medium recoverability and international value. The sensitivity of the receptor is therefore, considered to be **medium**.

Significance of effect

Subtidal habitat IEFs

2.11.3.109 Overall, for the subtidal coarse and mixed sediments with diverse benthic communities IEF, the sand and muddy sand communities with polychaetes and bivalves IEF and Constable Bank (Annex I sandbank outside an SAC) IEF the magnitude of the cumulative increase in SSC and associated deposition impact in the decommissioning phase is deemed to be low and the sensitivity of the receptor is considered to be low. The effect will, therefore, be of **negligible** significance, which is not significant in EIA terms. This conclusion has been reached based on the highly localised nature of this impact.

2.11.3.110 Overall, for the low resemblance stony reef (outside an SAC) IEF and the seapens and burrowing megafauna communities IEF the magnitude of the cumulative increase in SSC and associated deposition impact in the decommissioning phase is deemed to be low and the sensitivity of the receptor is considered to be negligible. The effect will, therefore, be of **negligible** significance, which is not significant in EIA terms. This conclusion has been reached based on the highly localised nature of this impact.

2.11.3.111 Overall, for the mixed sediments dominated by brittlestars IEF the magnitude of the impact of cumulative increases in SSC and associated deposition during the operations and maintenance phase is deemed to be low, and the sensitivity of the receptor is considered to be medium. The cumulative effect will, therefore, be of **minor** adverse significance, which is not significant in EIA terms. This is due to the small magnitude and short term nature of this impact in this phase of the Mona Offshore Wind Project.

Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC

2.11.3.112 Overall, for the Annex I sandbanks IEF of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC the magnitude of the cumulative increase in SSC and associated deposition impact in the decommissioning phase is deemed to be low and the sensitivity of the receptor is considered to be low. The effect will, therefore, be of **negligible** significance, which is not significant in EIA terms. This conclusion has been reached based on the highly localised nature of this impact.

2.11.3.113 Overall, for the Annex I subtidal reefs IEFs of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC the magnitude of the cumulative increase in SSC and associated deposition impact in the decommissioning phase is deemed to be low and the sensitivity of the receptor is considered to be medium. The effect will, therefore, be of **minor** adverse significance, which is not significant in EIA terms. This conclusion has been reached based on the highly localised nature of this impact.

Tier 3

Construction phase

Magnitude of impact

2.11.3.114 During the construction phase the MaresConnect cable may be in construction which may result in increased suspended sediment concentrations. The cable is located 16.4 km from the Mona Array Area and crosses the Mona Offshore Cable Corridor. The trenching activities for both projects may therefore run concurrently and interaction of SSC plumes on spring tide events may occur. However, the concentration of suspended sediment reduces significantly moving further from the activity with levels of less than 10 mg/l around 8 km away therefore the potential overlap of resultant plumes would be low.

2.11.3.115 The cumulative effect is predicted to be of local spatial extent, short term duration, intermittent and high reversibility. The magnitude is therefore, considered to be **low**.

Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC

2.11.3.116 The potential impact of increased SSC and associated deposition in the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC will be similar to the impact in the subtidal habitats as described in paragraphs 2.11.3.1 to 2.11.3.5. however there will be no impact on the intertidal features of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC.

2.11.3.117 The cumulative effect is predicted to be of local spatial extent, short term duration, intermittent and high reversibility. The magnitude is therefore, considered to be **low**.

Intertidal habitat IEFs

2.11.3.118 None of the cumulative increases in SSC and associated deposition in this phase of the Mona Offshore Wind Project will occur within the intertidal landfall of the Mona Offshore Wind Project therefore no further assessment of the intertidal habitat IEFs has been undertaken for this impact in the CEA.

Sensitivity of the receptor

Subtidal habitat IEFs

2.11.3.119 The sensitivity of the subtidal habitat IEFs is as described previously for the construction phase assessment in paragraph 2.9.3.29 to 2.9.3.35 and Table 2.22.

2.11.3.120 The subtidal coarse and mixed sediments with diverse benthic communities IEF is deemed to be of low vulnerability, medium recoverability and national value. The sensitivity of the receptor is therefore, considered to be **low**.

2.11.3.121 The sand and muddy sand communities with polychaetes and bivalves IEF is deemed to be of low vulnerability, medium recoverability and national value. The sensitivity of the receptor is therefore, considered to be **low**.

2.11.3.122 The Annex I low resemblance stony reef (outside an SAC) IEF is deemed to be of low vulnerability, high recoverability and national value. The sensitivity of the receptor is therefore, considered to be **negligible**.

2.11.3.123 The Constable Bank (Annex I sandbank outside an SAC) IEF is deemed to be of low vulnerability, medium recoverability and national value. The sensitivity of the receptor is therefore, considered to be **low**.

2.11.3.124 The seapens and burrowing megafauna communities IEF is deemed to be of low vulnerability, high recoverability and national value. The sensitivity of the receptor is therefore, considered to be **negligible**.

2.11.3.125 The mixed sediments dominated by brittlestars IEF is deemed to be of medium vulnerability, medium recoverability and national value. The sensitivity of the receptor is therefore, considered to be **medium**.

Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC

2.11.3.126 The sensitivity of the subtidal and intertidal IEF features of the SAC are as described previously for the construction phase assessment in paragraph 2.9.3.39 to 2.9.3.45 and Table 2.22.

2.11.3.127 The Annex I sandbanks IEF of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC is deemed to be of low vulnerability, medium recoverability and international value. The sensitivity of the receptor is therefore, considered to be **low**.

2.11.3.128 The Annex I subtidal reef IEF of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC is deemed to be of medium vulnerability, medium recoverability and international value. The sensitivity of the receptor is therefore, considered to be **medium**.

Significance of effect

Subtidal habitat IEFs

2.11.3.129 Overall, for the subtidal coarse and mixed sediments with diverse benthic communities IEF, the sand and muddy sand communities with polychaetes and bivalves IEF and Constable Bank (Annex I sandbank outside an SAC) IEF the magnitude of the cumulative increase in SSC and associated deposition impact in the construction phase is deemed to be low and the sensitivity of the receptor is considered to be low. The effect will, therefore, be of **negligible** significance, which is not significant in EIA terms. This conclusion is due to the impact being small in magnitude and short term in nature as well as the biotope being highly resistant to these specific pressures.

2.11.3.130 Overall, for the low resemblance stony reef (outside an SAC) IEF and the seapens and burrowing megafauna communities IEF the magnitude of the cumulative increase in SSC and associated deposition impact in the construction phase is deemed to be low and the sensitivity of the receptor is considered to be negligible. The effect will, therefore, be of **negligible** significance, which is not significant in EIA terms. This conclusion is due to the impact being small in magnitude and short term in nature as well as the biotope being highly resistant to these specific pressures.

2.11.3.131 Overall, for the mixed sediments dominated by brittlestars IEF the magnitude of the impact of cumulative increases in SSC and associated deposition during the operations and maintenance phase is deemed to be low, and the sensitivity of the receptor is considered to be medium. The cumulative effect will, therefore, be of **minor** adverse significance, which is not significant in EIA terms.

Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC

2.11.3.132 Overall, for the Annex I sandbanks IEF of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC the magnitude of the cumulative increase in SSC and associated deposition impact in the construction phase is deemed to be low and the sensitivity of the receptor is considered to be low. The effect will, therefore, be of **negligible** significance, which is not significant in EIA terms. This conclusion is due to the impact being small in magnitude and short term in nature as well as the biotope being resistant to these specific pressures.

2.11.3.133 Overall, for the Annex I subtidal reefs IEF of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC the magnitude of the cumulative increase in SSC and associated deposition impact in the construction phase is deemed to be low, and the sensitivity of the receptor is considered to be medium. The effect will, therefore, be of **minor** adverse significance, which is not significant in EIA terms.

2.11.4 Long term habitat loss/habitat alteration

2.11.4.1 Tier 1 cumulative long term habitat loss/habitat alteration is predicted to occur as a result of the presence of the Mona Offshore Wind Project, the Awel y Môr Offshore Wind Farm and the Isle of Man Crogga licence; all other offshore wind farms which are operational within the CEA benthic subtidal and intertidal ecology study area of Mona Offshore Wind Project are considered to be part of the baseline (see Table 2.29). Long term habitat loss/habitat alteration may result from the physical presence of foundations, scour protection and cable protection.

2.11.4.2 Five tier 2 projects have been identified within the CEA benthic subtidal and intertidal ecology study area (Morecambe Offshore Windfarm Generation Assets, Morgan Offshore Wind Project Generation Assets, Morgan and Morecambe Offshore Windfarms Transmission Assets, ENI Hynet CCS and Liverpool Bay aggregate extraction area 457) as well as two tier 3 projects (Isle of Man Offshore Windfarm and MaresConnect interconnector cable).

Tier 1

Construction and operations and maintenance phases

Magnitude of impact

2.11.4.3 The predicted cumulative long term habitat loss/habitat alteration from the tier 1 offshore wind farm projects and one oil and gas permit (i.e. Mona Offshore Wind Project, Awel y Môr Offshore Wind Farm and Isle of Man Crogga Licence) is estimated to be up to 3.26 km^2. Awel y Môr Offshore Wind Farm is predicted to result in 1.07 km^2 of long term habitat loss/habitat alteration as a result of wind turbine and OSP foundations, scour protection, met masts, cable protection and cable crossings.

2.11.4.4 There is one exploratory oil and gas permit approved within the Mona CEA benthic subtidal and intertidal ecology study area, the Isle of Man Crogga licence. There is however limited information regarding the potential impacts associated with this project, the project is however known to include exploratory drilling which may lead to the installation of a well head and jack up which may cause long term habitat loss (Isle of Man Government, 2021).

2.11.4.5 The cumulative effect is predicted to be of regional spatial extent, long term duration, continuous and low reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be **low**.

2.11.4.6 No tier 1 projects in the CEA for long term habitat loss/habitat alteration overlap with the Constable Bank (Annex I sandbank outside an SAC) IEF, so this IEF is not considered further in this assessment.

Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC

2.11.4.7 None of the cumulative long term habitat loss/habitat alteration in this phase of the Mona Offshore Wind Project will occur within the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC as no tier 1 projects overlap with the SAC therefore no further assessment of the SAC has been undertaken for this impact in the CEA.

Intertidal habitat IEFs

2.11.4.8 None of the cumulative long term habitat loss/habitat alteration in this phase of the Mona Offshore Wind Project will occur within the intertidal landfall of the Mona Offshore Wind Project therefore no further assessment of the intertidal habitat IEFs has been undertaken for this impact in the CEA.

Sensitivity of the receptor

Subtidal habitat IEFs

2.11.4.9 The sensitivity of the subtidal IEFs (i.e. subtidal coarse and mixed sediments with diverse benthic communities IEF, sand and muddy sand communities with polychaetes and bivalves IEF and seapens and burrowing megafauna communities IEF) is as described previously for the construction phase assessment for the Mona Offshore Wind Project alone in paragraph 2.9.5.14 to 2.9.5.17 and above in Table 2.23.

2.11.4.10 The subtidal coarse and mixed sediments with diverse benthic communities IEF, sand and muddy sand communities with polychaetes, Annex I low resemblance stony reef (outside an SAC) IEF and bivalves IEF and seapens and burrowing megafauna communities IEF are deemed to be of high vulnerability, low recoverability and national value. The sensitivity of the receptor is therefore, considered to be **high**.

Significance of effect

Subtidal habitat IEFs

2.11.4.11 Overall for the subtidal habitat IEFs (subtidal coarse and mixed sediments with diverse benthic communities IEF, sand and muddy sand communities with polychaetes and bivalves IEF, Annex I low resemblance stony reef (outside an SAC) IEF and seapens and burrowing megafauna communities IEF), the magnitude of the cumulative long term subtidal habitat loss/habitat alteration impact during the construction and operations and maintenance phases is deemed to be low and the sensitivity of the receptor is considered to be high. The cumulative effect will, therefore, be of **minor** adverse significance, which is not significant in EIA terms. This conclusion has been reached as a result of localised extent of the impact and the large area over which the long term habitat loss/habitat alteration is spread, together with the likely gradual reduction in magnitude throughout the operations and maintenance phase of the Mona Offshore Wind Project.

Decommissioning phase

2.11.4.12 There are no tier 1 projects active in the Mona Offshore Wind Project decommissioning phase to consider for cumulative impacts based on current knowledge.

Tier 2

Construction and operations and maintenance phases

Magnitude of impact

2.11.4.13 The maximum total long term habitat loss/habitat alteration associated with the tier 2 assessment offshore renewables projects within the CEA benthic subtidal and intertidal ecology study area (i.e. Morgan Offshore Wind Project Generation Assets, Morecambe Generation Assets, Morgan and Morecambe Offshore Windfarms Transmission Assets, Mooir Vannin Offshore Windfarm and ENI Hynet CCS) is estimated at up to 6.77 km^2 (Table 2.34).

2.11.4.14 For the Morgan Offshore Wind Project Generation Assets long term habitat loss/habitat alteration is likely to arise under foundation structures and associated scour protection, and under any cable protection required. The long term habitat loss/habitat alteration predicted to result from the Morgan Offshore Wind Project Generation Assets is 1.52 km^2 (see Morgan Offshore Wind Ltd, 2023) and is therefore similar to that arising from the Mona Offshore Wind Project.

2.11.4.15 For the Morecambe Offshore Windfarm Generation Assets, the predicted long term habitat loss/habitat alteration during the construction and operations and maintenance phase would equate to up to 0.46 km^2, with any long term habitat loss/habitat alteration likely to arise under foundation structures and associated scour protection, and under any cable protection required (Morecambe Offshore Windfarm Ltd., 2023).

2.11.4.16 For the Morgan and Morecambe Offshore Windfarms Transmission Assets, the predicted cumulative long term habitat loss/habitat alteration during the construction and operations and maintenance phase would equate to up to 1.53 km^2, with any long term habitat loss/habitat alteration likely to arise under OSP foundation structures and associated scour protection, and under any cable protection required (Morecambe Offshore Windfarm Ltd and Morgan Offshore Wind Ltd, 2023).

2.11.4.17 A scoping report is also available for the Mooir Vannin Offshore Windfarm (Ørsted, 2023). This report does not specify the impacts which will be assessed in association with the project however it does provide some of the parameters of the project including that up to 100 turbines may be installed as well as up to five OSPs and 490 km of inter-array cables, 100 km of interconnector cables, 90 km of offshore electrical connection cables and 125 km of export cables may also be installed which may result in the installation of cable protection (Ørsted, 2023).

2.11.4.18 A scoping report for the ENI Hynet CCS suggest that long term subtidal habitat loss/habitat alteration could occur directly under the newly installed cable route with rock armouring/protection in place (Liverpool Bay CCS Ltd, 2022). This would likely result in a very small amount of long term habitat loss/habitat alteration, a fraction of what is proposed for the Mona Offshore Wind Project. The scoping report does not however provide estimates of habitat loss with which to make any quantitative assessment of the cumulative impact with the Mona Offshore Wind Project.

Table 2.34: Cumulative long term habitat loss/habitat alteration for the Mona Offshore Wind Project construction and operations and maintenance phase and other tier 2 plans/projects/activities in the CEA benthic subtidal and intertidal ecology study area.

Project	Predicted long term habitat loss/habitat alteration (km²)	Component parts of long term habitat loss/habitat alteration	Source
Mona Offshore Wind Project	2.19	See Table 2.18	n/a
Other tier 1 projects	1.07	See Table 2.31	n/a
Offshore renewables			
Morgan Offshore Wind Project Generation Assets	1.52	• Wind turbine and OSP foundations • Cable and scour protection.	Morgan Offshore Wind Ltd, 2023
Morecambe Offshore Windfarm Generation Assets	0.46	• Wind turbine and OSP foundations • Cable and scour protection.	Morecambe Offshore Windfarm Ltd., 2023
Morgan and Morecambe Offshore Windfarms Transmission Assets	1.53	• OSP foundations • Cable and scour protection.	Morecambe Offshore Windfarm Ltd and Morgan Offshore Wind Ltd, 2023
Mooir Vannin Offshore Windfarm	No quantification provided.	• Wind turbine and OSP foundations • Cable protection.	Ørsted, 2023
ENI Hynet CCS	No quantification provided	• Cable protection	Liverpool Bay CCS Ltd, 2022
Total	6.77		

2.11.4.19 The cumulative effect is predicted to be of regional spatial extent, long term duration, continuous and low reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be **low**.

2.11.4.20 No tier 1 projects in the CEA for long term habitat loss/habitat alteration overlap with the Constable Bank (Annex I sandbank outside an SAC) IEF, so this IEF is not considered further in this assessment.

Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC

2.11.4.21 The tier 2 projects will not cumulatively interact with the long term habitat loss/habitat alteration associated with the Mona Offshore Wind Project in the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC as the tier 2 projects have no physical overlap with this SAC. No further assessment of the SAC IEFs is required for this impact in the CEA.

Intertidal habitat IEFs

2.11.4.22 None of the cumulative long term habitat loss/habitat alteration in this phase of the Mona Offshore Wind Project will occur within the Mona intertidal landfall as no tier 2 projects overlap with the intertidal landfall therefore no further assessment of the intertidal habitat IEFs has been undertaken for this impact in the CEA.

Sensitivity of the receptor

Subtidal habitat IEFs

2.11.4.23 The sensitivity of the subtidal IEFs (i.e. subtidal coarse and mixed sediments with diverse benthic communities IEF, sand and muddy sand communities with polychaetes and bivalves IEF, Annex I low resemblance stony reef (outside an SAC) IEF and seapens and burrowing megafauna communities IEF) is as described previously for the construction phase assessment for the Mona Offshore Wind Project alone in paragraph 2.9.5.14 to 2.9.5.17 and above in Table 2.23.

2.11.4.24 The subtidal coarse and mixed sediments with diverse benthic communities IEF, sand and muddy sand communities with polychaetes and bivalves IEF, Annex I low resemblance stony reef (outside an SAC) IEF and seapens and burrowing megafauna communities IEF are deemed to be of high vulnerability, low recoverability and national value. The sensitivity of the receptor is therefore, considered to be **high**.

Significance of effect

Subtidal habitat IEFs

2.11.4.25 Overall for the subtidal habitat IEFs (subtidal coarse and mixed sediments with diverse benthic communities IEF, sand and muddy sand communities with polychaetes and bivalves IEF, Annex I low resemblance stony reef (outside an SAC) IEF and seapens and burrowing megafauna communities IEF), the magnitude of the cumulative long term subtidal habitat loss/habitat alteration impact during the construction and operations and maintenance phases is deemed to be low and the sensitivity of the receptor is considered to be high. The cumulative effect will, therefore, be of **minor** adverse significance, which is not significant in EIA terms. This conclusion has been reached as a result of the localised extent of the impact and the large area over which the long term habitat loss/habitat alteration is spread over.

Decommissioning phase

Magnitude of impact

2.11.4.26 The maximum total permanent habitat loss/habitat alteration associated with the tier 2 assessment includes the permanent habitat loss /habitat alteration resulting from the cable and scour protection remaining *in situ* for the Morgan Offshore Wind Project Generation Assets together with three offshore renewables projects within the CEA benthic subtidal and intertidal ecology study (i.e. Morgan Offshore Wind Project Generation Assets, Morecambe Generation Assets, Morgan and Morecambe Offshore Windfarms Transmission Assets and Mooir Vannin) is estimated at up to 5.57 km^2 (Table 2.35).

2.11.4.27 For the Morgan Offshore Wind Project Generation Assets, the predicted cumulative long term habitat loss/habitat alteration during the decommissioning phase would equate to up to 1.46 km^2, with any long term habitat loss/habitat alteration likely to arise under foundation structures and associated scour protection, and under any cable protection required (Morecambe Offshore Windfarm Ltd., 2023).

2.11.4.28 For the Morecambe Offshore Windfarm Generation Assets, the potential cumulative permanent habitat loss/habitat alteration during the decommissioning phase would equate to up to 0.46 km^2, with no long term habitat loss/habitat alteration likely to arise. This is assumed to be the same as the long-term habitat loss/habitat alteration estimate on the basis that it is currently unknown whether structures associated with the project would be removed at the point of decommissioning.

2.11.4.29 For the Morgan and Morecambe Offshore Windfarms Transmission Assets, the predicted cumulative permanent habitat loss/habitat alteration during the decommissioning phase would equate to up to 1.52 km^2, with any long term habitat loss/habitat alteration likely to arise under associated scour protection, and under any cable protection required (Morecambe Offshore Windfarm Ltd and Morgan Offshore Wind Ltd, 2023).

2.11.4.30 A scoping report is also available for the Mooir Vannin Offshore Windfarm (Ørsted, 2023). This report does not specify the impacts which will be assessed in association with the project however it does provide some of the parameters of the project including that up to 100 turbines may be installed as well as up to five OSPs and 490 km of inter-array cables, 100 km of interconnector cables, 90 km of offshore electrical connection cables and 125 km of export cables may also be installed which may result in the installation of cable protection (Ørsted, 2023) which is likely to persist in to the decommissioning phase of the Mona Offshore Wind Project.

2.11.4.31 A scoping report for the ENI Hynet CCS suggest that long term subtidal habitat loss/habitat alteration could occur directly under the newly installed cable route with rock armouring/protection in place (Liverpool Bay CCS Ltd, 2022). This would likely result in a very small amount of long term habitat loss/habitat alteration, a fraction of what is proposed for the Mona Offshore Wind Project. The scoping report does not however provide estimates of habitat loss/habitat alteration with which to make any quantitative assessment of the cumulative impact with the Mona Offshore Wind Project.

Table 2.35: Cumulative permanent habitat loss/habitat alteration for the Mona Offshore Wind Project decommissioning phase and other tier 2 plans/projects/activities in the CEA benthic subtidal and intertidal ecology study area.

Project	Predicted long term habitat loss/habitat alteration (km^2)	Component parts of long term habitat loss/habitat alteration	Source
Mona Offshore Wind Project	2.14	See Table 2.18	n/a
Offshore renewables			
Morgan Offshore Wind Project Generation Assets	1.46	• Wind turbine and OSP foundations • Cable and scour protection.	Morgan Offshore Wind Ltd, 2023
Morecambe Offshore Windfarm Generation Assets	0.46	• Wind turbine and OSP foundations • Cable and scour protection.	Morecambe Offshore Windfarm Ltd., 2023
Morgan and Morecambe Offshore Windfarms Transmission Assets	1.53	• OSP foundations • Cable and scour protection.	Morecambe Offshore Windfarm Ltd and Morgan Offshore Wind Ltd, 2023
ENI Hynet CCS	No quantification provided	• Cable protection	Liverpool Bay CCS Ltd, 2022
Total	5.57		

2.11.4.32 The cumulative effect is predicted to be of regional spatial extent, long term duration, continuous and low reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be **low**.

2.11.4.33 No tier 1 projects in the CEA for long term habitat loss//habitat alteration overlap with the Constable Bank (Annex I sandbank outside an SAC) IEF, so this IEF is not considered further in this assessment.

Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC

2.11.4.34 None of the cumulative long term habitat loss/habitat alteration in this phase of the Mona Offshore Wind Project will occur within the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC as no tier 1 project except for the Mona Offshore Wind Project overlap with the SAC therefore no further assessment of the SAC has been undertaken for this impact in the CEA.

Intertidal habitat IEF

2.11.4.35 None of the cumulative long term habitat loss/habitat alteration in this phase of the Mona Offshore Wind Project will occur within the Mona intertidal landfall as no tier 1 projects overlap with the intertidal landfall therefore no further assessment of the intertidal habitat IEFs has been undertaken for this impact in the CEA.

Sensitivity of the receptor

Subtidal habitat IEFs

2.11.4.36 The sensitivity of the subtidal IEFs (i.e. subtidal coarse and mixed sediments with diverse benthic communities IEF, sand and muddy sand communities with polychaetes and bivalves IEF, Annex I low resemblance stony reef (outside an SAC) IEF and seapens and burrowing megafauna communities IEF) is as described previously for the construction phase assessment for the Mona Offshore Wind Project alone in paragraph 2.9.5.14 to 2.9.5.17 and above in Table 2.23.

2.11.4.37 The subtidal coarse and mixed sediments with diverse benthic communities IEF, sand and muddy sand communities with polychaetes and bivalves IEF, Annex I low resemblance stony reef (outside an SAC) IEF and seapens and burrowing megafauna communities IEF are deemed to be of high vulnerability, low recoverability and national value. The sensitivity of the receptor is therefore, considered to be **high**.

Significance of effect

Subtidal habitat IEFs

2.11.4.38 Overall for the subtidal habitat IEFs (subtidal coarse and mixed sediments with diverse benthic communities IEF, sand and muddy sand communities with polychaetes and bivalves IEF, Annex I low resemblance stony reef (outside an SAC) IEF and seapens and burrowing megafauna communities IEF), the magnitude of the cumulative long term subtidal habitat loss//habitat alteration impact during the decommissioning phase is deemed to be low and the sensitivity of the receptor is considered to be high. The cumulative effect will, therefore, be of **minor** adverse significance, which is not significant in EIA terms. This conclusion has been reached as a result of the localised extent of the impact and the large area over which the long term habitat loss//habitat alteration is spread over and the likely gradual reduction in magnitude throughout the operations and maintenance phase of the Mona Offshore Wind Project.

Tier 3

Construction and operations and maintenance phases

Magnitude of impact

Subtidal habitat IEFs

2.11.4.39 The one tier 3 project which has been identified in the CEA with the potential to result in cumulative long term habitat loss/habitat alteration with the Mona Offshore Wind Project is the ENI Hynet CCS.

2.11.4.40 There is currently no information on the impact that the MaresConnect interconnector cable will have on benthic ecology receptors. A planning application is predicted to be submitted in 2024 which will identify these impacts (MaresConnect, 2022). Cable protection associated with the MaresConnect interconnector cable is activities likely to result in long term habitat loss/habitat alteration are similar to those expected for the cables of the Mona Offshore Wind Project. Construction is likely to occur in 2025 and the protection is anticipated to become operational in 2027 (MaresConnect 2022), although it should be noted that these timeframes are only indicative at this stage.

2.11.4.41 The cumulative effect is predicted to be of regional spatial extent, long term duration, continuous and low reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be **low**.

2.11.4.42 No tier 1 projects in the CEA for long term habitat loss//habitat alteration overlap with the Constable Bank (Annex I sandbank outside an SAC) IEF, so this IEF is not considered further in this assessment.

Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC

2.11.4.43 None of the cumulative long term habitat loss/habitat alteration in this phase of the Mona Offshore Wind Project will occur within the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC as no tier 1 project except for the Mona Offshore Wind Project overlap with the SAC therefore no further assessment of the SAC has been undertaken for this impact in the CEA.

Intertidal habitat IEF

2.11.4.44 None of the cumulative long term habitat loss/habitat alteration in this phase of the Mona Offshore Wind Project will occur within the Mona intertidal landfall as no tier 1 projects overlap with the intertidal landfall therefore no further assessment of the intertidal habitat IEFs has been undertaken for this impact in the CEA.

Sensitivity of the receptor

Subtidal habitat IEFs

2.11.4.45 The sensitivity of the subtidal IEFs (i.e. subtidal coarse and mixed sediments with diverse benthic communities IEF, sand and muddy sand communities with polychaetes and bivalves IEF, Annex I low resemblance stony reef (outside an SAC) IEF and seapens and burrowing megafauna communities IEF) is as described previously for the construction phase assessment for the Mona Offshore Wind Project alone in paragraph 2.9.5.14 to 2.9.5.17 and above in Table 2.23.

2.11.4.46 The subtidal coarse and mixed sediments with diverse benthic communities IEF, sand and muddy sand communities with polychaetes and bivalves IEF, Annex I low resemblance stony reef (outside an SAC) IEF and seapens and burrowing megafauna communities IEF are deemed to be of high vulnerability, low recoverability and national value. The sensitivity of the receptor is therefore, considered to be **high**.

Significance of effect

Subtidal habitat IEFs

2.11.4.47 Overall for the subtidal habitat IEFs (subtidal coarse and mixed sediments with diverse benthic communities IEF, sand and muddy sand communities with polychaetes and bivalves IEF, Annex I low resemblance stony reef (outside an SAC) IEF and seapens and burrowing megafauna communities IEF), the magnitude of the cumulative long term subtidal habitat loss/habitat alteration impact during the construction and operations and maintenance phases impact is deemed to be low and the sensitivity of the receptor is considered to be high. The cumulative effect will, therefore, be of **minor** adverse significance, which is not significant in EIA terms. This conclusion has been reached as a result of the localised extent of the impact and the large area over which the long term habitat loss/habitat alteration is spread over and the likely gradual reduction in magnitude throughout the operations and maintenance phase of the Mona Offshore Wind Project.

2.11.5 Introduction of artificial structures

2.11.5.1 The introduction of artificial structures into areas of predominantly soft sediments, as a result of multiple plans and projects, has the potential to alter community composition and biodiversity within the CEA benthic subtidal and intertidal ecology study area.

2.11.5.2 The two projects which are screened into the tier 1 assessment for cumulative effects from the introduction of artificial structures are the Awel y Môr Offshore Wind Farm and Isle of Man Crogga licence. All other operational offshore wind farms within the CEA benthic subtidal and intertidal ecology study area are considered to be part of the baseline.

2.11.5.3 The only tier 2 projects which have been identified within the CEA benthic subtidal and intertidal ecology study area are offshore renewables projects (i.e. Morecambe Offshore Windfarm Generation Assets, Morgan Offshore Wind Project Generation Assets, Morgan and Morecambe Offshore Windfarms Transmission Assets and Mooir Vannin Offshore Windfarm) as well as ENI Hynet CCS.

2.11.5.4 In tier 3 there is one project, the MaresConnect interconnector cable.

Tier 1

<u>Construction and operations and maintenance phases</u>

Magnitude of impact

2.11.5.5 The maximum cumulative tier 1 surface area of artificial structures introduced is estimated at 3.76 km^2. Awel y Môr Offshore Wind Farm is the only tier 1 project and it is likely to result in 1.07 km^2 of hard substrate from wind turbine and OSP foundations, scour protection, met masts, cable protection and cable crossings.

2.11.5.6 There is one exploratory oil and gas permit approved within the Mona CEA benthic subtidal and intertidal ecology study area, the Isle of Man Crogga licence. There is however limited information regarding the potential impacts associated with this project, the project is however known to include exploratory drilling which may lead to the installation of artificial structures such as a well head and jack up which could be colonised by epifauna (Isle of Man Government, 2021).

2.11.5.7 The cumulative effect is predicted to be of regional spatial extent, long term duration, continuous and irreversible during the lifetime of the offshore wind farm projects. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be **low**.

2.11.5.8 No tier 1 projects in the CEA for the introduction of artificial structures overlap with the Constable Bank (Annex I sandbank outside an SAC) IEF, so this IEF is not considered further in this assessment.

Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC

2.11.5.9 None of the cumulative introduction of artificial structures in this phase of the Mona Offshore Wind Project will occur within the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC as no tier 1 project except for the Mona Offshore Wind Project overlaps with the SAC therefore no further assessment of the SAC has been taken for this impact in the CEA.

Intertidal habitat IEFs

2.11.5.10 None of the cumulative introduction of artificial structures in this phase of the Mona Offshore Wind Project will occur within the Mona intertidal landfall as no tier 1 projects overlap with the intertidal landfall therefore no further assessment of the intertidal habitat IEFs has been undertaken for this impact in the CEA.

Sensitivity of the receptor

Subtidal habitat IEFs

2.11.5.11 The sensitivity of the subtidal IEFs (i.e. subtidal coarse and mixed sediments with diverse benthic communities IEF, sand and muddy sand communities with polychaetes and bivalves IEF, Annex I low resemblance stony reef (outside an SAC) IEF and seapens and burrowing megafauna communities IEF) is as described previously for the construction phase assessment for the Mona Offshore Wind Project alone in paragraph 2.9.6.18 to 2.9.6.26.

2.11.5.12 All of the subtidal IEFs (subtidal coarse and mixed sediments with diverse benthic communities IEF, sand and muddy sand communities with polychaetes and bivalves IEF, Annex I low resemblance stony reef (outside an SAC) IEF and seapens and burrowing megafauna communities IEF) are deemed to be of high vulnerability, low recoverability, and national value. The sensitivity of the IEFs is therefore, considered to be **high**.

Significance of effect

2.11.5.13 Overall for all of the subtidal IEFs (subtidal coarse and mixed sediments with diverse benthic communities IEF, sand and muddy sand communities with polychaetes and bivalves IEF, Annex I low resemblance stony reef (outside an SAC) IEF and seapens and burrowing megafauna communities IEF), the magnitude of the cumulative colonisation of hard substrate impact during the operations and maintenance phase is deemed to be low and the sensitivity of the receptor is considered to be high. The cumulative effect will, therefore, be of **minor** adverse significance, which is not significant in EIA terms. This conclusion has been reached because of the localised extent of the impact, the large area over which this impact is dispersed and the likely gradual reduction in magnitude throughout the operations and maintenance phase of the Mona Offshore Wind Project.

Decommissioning phase

2.11.5.14 There are no tier 1 projects active in the Mona Offshore Wind Project decommissioning phase to consider for cumulative impacts based on current knowledge.

Tier 2

Construction and operations and maintenance phases

Magnitude of impact

2.11.5.15 The maximum predicted extent of introduced artificial structures associated with the tier 2 assessment which includes offshore wind farms within the CEA benthic subtidal and intertidal ecology study (i.e. Morgan Offshore Wind Project Generation Assets, Morecambe Offshore Windfarm Generation Assets, Morgan and Morecambe Offshore Windfarms Transmission Assets, Mooir Vannin Offshore Windfarm and ENI Hynet CCS) is estimated at up to 7.76 km^2.

2.11.5.16 For the Morecambe Offshore Windfarm: Generation Assets, the predicted introduction of artificial hard structures during the operations and maintenance phase would equate to up to 0.46 km^2 (Morecambe Offshore Windfarm Ltd., 2023).

2.11.5.17 For the Morgan Offshore Wind Project: Generation Assets, the predicted habitat creation during the operations and maintenance phase would equate to up to 1.99 km^2 (Morgan Offshore Wind Ltd., 2023).

2.11.5.18 For the Morgan and Morecambe Offshore Windfarms Transmission Assets, the predicted introduction of artificial hard structures during the operations and maintenance phase would equate to up to 1.55 km^2 (Morecambe Offshore Windfarm Ltd and Morgan Offshore Wind Ltd., 2023).

2.11.5.19 A scoping report is also available for the Mooir Vannin Offshore Windfarm (Ørsted, 2023). This report does not specify the impacts which will be assessed in association with the project however it does provide some of the parameters of the project including that up to 100 turbines may be installed as well as up to five OSPs and 490 km of inter-array cables, 100 km of interconnector cables, 90 km of offshore electrical connection cables and 125 km of export cables may also be installed which may result in the installation of cable protection (Ørsted, 2023).

2.11.5.20 A scoping report for the ENI Hynet CCS pipeline states that the introduction of new habitat, such as artificial structures used for pipeline protection, in the offshore marine environment may potentially affect the established community environment by providing new habitat and ecosystem function (Liverpool Bay CCS Ltd, 2022). It is expected that the artificial structures will be colonised by a range of organisms which could lead to increases in biodiversity locally (Liverpool Bay CCS Ltd, 2022). Overall this project is likely to introduce a very small amount of artificial substrate, a fraction of what is proposed for the Mona Offshore Wind Project. The scoping report does not however provide estimates of artificial substrate installation with which to make any quantitative assessment of the cumulative impact with the Mona Offshore Wind Project.

2.11.5.21 The cumulative effect is predicted to be of regional spatial extent, long term duration, continuous and irreversible during the lifetime of the offshore wind farm projects. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be **low**.

2.11.5.22 No tier 1 projects in the CEA for the introduction of artificial structures overlap with the Constable Bank (Annex I sandbank outside an SAC) IEF, so this IEF is not considered further in this assessment.

Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC

2.11.5.23 None of the cumulative introduction of artificial structures in this phase of the Mona Offshore Wind Project will occur within the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC therefore no further assessment of the SAC has been undertaken for this impact in the CEA.

Intertidal habitat IEFs

2.11.5.24 None of the cumulative introduction of artificial structures in this phase of the Mona Offshore Wind Project will occur within the Mona intertidal landfall as no tier 2 projects overlap with the intertidal landfall therefore no further assessment of the intertidal habitat IEFs has been undertaken for this impact in the CEA.

Sensitivity of the receptor

Subtidal habitat IEFs

2.11.5.25 The sensitivity of the subtidal IEFs (i.e. subtidal coarse and mixed sediments with diverse benthic communities IEF, sand and muddy sand communities with polychaetes and bivalves IEF, Annex I low resemblance stony reef (outside an SAC) IEF and seapens and burrowing megafauna communities IEF) is as described previously for the construction phase assessment for the Mona Offshore Wind Project alone in paragraph 2.9.6.18 to 2.9.6.26.

2.11.5.26 All of the subtidal IEFs (subtidal coarse and mixed sediments with diverse benthic communities IEF, sand and muddy sand communities with polychaetes and bivalves IEF, Annex I low resemblance stony reef (outside an SAC) IEF and seapens and burrowing megafauna communities IEF) are deemed to be of high vulnerability, low recoverability, and national value. The sensitivity of the IEFs is therefore, considered to be **high**.

Significance of effect

2.11.5.27 Overall for all of the subtidal IEFs (subtidal coarse and mixed sediments with diverse benthic communities IEF, sand and muddy sand communities with polychaetes and bivalves IEF, Annex I low resemblance stony reef (outside an SAC) IEF and seapens and burrowing megafauna communities IEF), the magnitude of the cumulative colonisation of hard substrate impact during the operations and maintenance phase is deemed to be low and the sensitivity of the receptor is considered to be high. The cumulative effect will, therefore, be of **minor** adverse significance, which is not significant in EIA terms. This conclusion has been reached because of the localised extent of the impact, the large area over which this impact is dispersed and the likely gradual reduction in magnitude throughout the operations and maintenance phase of the Mona Offshore Wind Project.

Decommissioning phase

Magnitude of impact

2.11.5.28 The maximum total area associated with artificial structures that may remain after decommissioning within the tier 2 assessment which includes offshore wind farms within the CEA benthic subtidal and intertidal ecology study (i.e. Morgan Offshore Wind Project Generation Assets, Morecambe Offshore Windfarm Generation Assets, Morgan and Morecambe Offshore Windfarms Transmission Assets and Mooir Vannin Offshore Windfarm) is estimated at up to 5.57 km^2 (Table 2.35).

2.11.5.29 For the Morgan Offshore Wind Project Generation Assets, the predicted area associated with artificial structures during the decommissioning phase would equate to up to 1.46 km^2, arising from foundation structures and associated scour protection, and cable protection (Morecambe Offshore Windfarm Ltd., 2023).

2.11.5.30 For the Morecambe Offshore Windfarm Generation Assets, the potential area associated with artificial structures during the decommissioning phase would equate to up to 0.46 km^2. This is assumed to be the same as the long-term habitat loss/habitat alteration in the construction and operation and maintenance phases on the basis that it is currently unknown whether structures associated with the project would be removed at the point of decommissioning.

2.11.5.31 For the Morgan and Morecambe Offshore Windfarms Transmission Assets, the predicted area associated with artificial structures during the decommissioning phase would equate to up to 1.52 km^2, arising from associated scour protection, and cable protection (Morecambe Offshore Windfarm Ltd and Morgan Offshore Wind Ltd, 2023).

2.11.5.32 A scoping report is also available for the Mooir Vannin Offshore Windfarm (Ørsted, 2023). This report does not specify the impacts which will be assessed in association with the project however it does provide some of the parameters of the project including that up to 100 turbines may be installed as well as up to five OSPs and 490 km of inter-array cables, 100 km of interconnector cables, 90 km of offshore electrical connection cables and 125 km of export cables may also be installed which may result in the installation of cable protection (Ørsted, 2023) which is likely to persist in to the decommissioning phase of the Mona Offshore Wind Project.

2.11.5.33 No tier 1 projects in the CEA for long term habitat loss/habitat alteration overlap with the Constable Bank (Annex I sandbank outside an SAC) IEF, so this IEF is not considered further in this assessment.

2.11.5.34 The cumulative effect is predicted to be of regional spatial extent, long term duration, continuous and irreversible during the lifetime of the offshore wind farm projects. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be **low**.

Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC

2.11.5.35 None of the cumulative introduction of artificial structures in this phase of the Mona Offshore Wind Project will occur within the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC therefore no further assessment of the SAC has been undertaken for this impact in the CEA.

Intertidal habitat IEFs

2.11.5.36 None of the cumulative introduction of artificial structures in this phase of the Mona Offshore Wind Project will occur within the Mona intertidal landfall as no tier 2 projects overlap with the intertidal landfall therefore no further assessment of the intertidal habitat IEFs has been undertaken for this impact in the CEA.

Sensitivity of the receptor

Subtidal habitat IEFs

2.11.5.37 The sensitivity of the subtidal IEFs (i.e. subtidal coarse and mixed sediments with diverse benthic communities IEF, sand and muddy sand communities with polychaetes and bivalves IEF, Annex I low resemblance stony reef (outside an SAC) IEF and seapens and burrowing megafauna communities IEF) is as described previously for the construction phase assessment for the Mona Offshore Wind Project alone in paragraph 2.9.6.18 to 2.9.6.26.

2.11.5.38 All of the subtidal IEFs (subtidal coarse and mixed sediments with diverse benthic communities IEF, sand and muddy sand communities with polychaetes and bivalves IEF, Annex I low resemblance stony reef (outside an SAC) IEF and seapens and burrowing megafauna communities IEF) are deemed to be of high vulnerability, low recoverability, and national value. The sensitivity of the IEFs is therefore, considered to be **high**.

Significance of effect

2.11.5.39 Overall for all of the subtidal IEFs (subtidal coarse and mixed sediments with diverse benthic communities IEF, sand and muddy sand communities with polychaetes and bivalves IEF, Annex I low resemblance stony reef (outside an SAC) IEF and seapens and burrowing megafauna communities IEF), the magnitude of the cumulative colonisation of hard substrate impact during the decommissioning phase is deemed to be low and the sensitivity of the receptor is considered to be high. The cumulative effect will, therefore, be of **minor** adverse significance, which is not significant in EIA terms. This conclusion has been reached because of the localised extent of the impact, the large area over which this impact is dispersed and the likely gradual reduction in magnitude throughout the decommissioning phase of the Mona Offshore Wind Project.

Tier 3

Construction and operations and maintenance phases

Magnitude of impact

Subtidal habitat IEFs

2.11.5.40 There is one tier 3 project which has been identified in the CEA with the potential to result in cumulative introduction of artificial structures with the Mona Offshore Wind Project are the MaresConnect interconnector cable.

2.11.5.41 There is currently no information on the impact that the MaresConnect interconnector cable will have on benthic ecology receptors. A planning application is predicted to be submitted in 2024 which will identify and assess these impacts (MaresConnect, 2022). Cable protection associated with the MaresConnect interconnector cable is likely to result in the introduction of artificial structures similar to that expected for the cables of the Mona Offshore Wind Project. Construction is likely to occur in 2025 and the project is likely to become operational in 2027 (MaresConnect 2022), although it should be noted that these timeframes are only indicative at this stage.

2.11.5.42 The cumulative effect is predicted to be of regional spatial extent, long term duration, continuous and irreversible during the lifetime of the offshore wind farm projects. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be **low**.

Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC

2.11.5.43 None of the cumulative introduction of artificial structures in this phase of the Mona Offshore Wind Project will occur within the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC therefore no further assessment of the SAC has been undertaken for this impact in the CEA.

Intertidal habitat IEFs

2.11.5.44 None of the cumulative introduction of artificial structures in this phase of the Mona Offshore Wind Project will occur within the Mona intertidal landfall as no tier 2 projects overlap with the intertidal landfall therefore no further assessment of the intertidal habitat IEFs has been undertaken for this impact in the CEA.

Sensitivity of the receptor

Subtidal habitat IEFs

2.11.5.45 The sensitivity of the subtidal IEFs (i.e. subtidal coarse and mixed sediments with diverse benthic communities IEF, sand and muddy sand communities with polychaetes and bivalves IEF, Annex I low resemblance stony reef (outside an SAC) IEF and seapens and burrowing megafauna communities IEF) is as described previously for the construction phase assessment for the Mona Offshore Wind Project alone in paragraph 2.9.6.18 to 2.9.6.26.

2.11.5.46 All of the subtidal IEFs (subtidal coarse and mixed sediments with diverse benthic communities IEF, sand and muddy sand communities with polychaetes and bivalves IEF, Annex I low resemblance stony reef (outside an SAC) IEF and seapens and burrowing megafauna communities IEF) are deemed to be of high vulnerability, low recoverability, and national value. The sensitivity of the IEFs is therefore, considered to be **high**.

Significance of effect

2.11.5.47 Overall for all of the subtidal IEFs (subtidal coarse and mixed sediments with diverse benthic communities IEF, sand and muddy sand communities with polychaetes and bivalves IEF, Annex I low resemblance stony reef (outside an SAC) IEF and seapens and burrowing megafauna communities IEF), the magnitude of the cumulative colonisation of hard substrate impact during the construction and operations and maintenance phases is deemed to be low and the sensitivity of the receptor is considered to be high. The cumulative effect will, therefore, be of **minor** adverse significance, which is not significant in EIA terms. This conclusion has been reached because of the localised extent of the impact, the large area over which this impact is dispersed and the likely gradual reduction in magnitude throughout the operations and maintenance phase of the Mona Offshore Wind Project.

2.11.6 Increased risk of introduction and spread of invasive non-native species

2.11.6.1 Cumulative increased risk of introduction or spread of INNS may result from the physical presence of infrastructure as well as increased boat activity in the region associated with other projects. Cumulative increased risk of introduction or spread of INNS is predicted to occur as a result of the presence of the Mona Offshore Wind Project, as well as other tier 1 projects (i.e. Awel y Môr and the Isle of Man Crogga licence) within the CEA benthic subtidal and intertidal ecology study area (see Table 2.29).

2.11.6.2 Four tier 2 projects have been identified within the CEA benthic subtidal and intertidal ecology study area (Morecambe Offshore Windfarm Generation Assets, Morgan Offshore Wind Project Generation Assets, Morgan and Morecambe Offshore Windfarms Transmission Assets and ENI Hynet CCS), as well as two tier 3 projects, the Isle of Man Offshore Windfarm and the MaresConnect interconnector cable.

Tier 1

Construction and operations and maintenance phases

Magnitude of impact

2.11.6.3 The introduction of hard substrate into areas of predominantly soft sediments has the potential to alter community composition and biodiversity and to facilitate the introduction and spread of INNS. The latter may be particularly important with regards to cumulative impacts as several offshore structures in relatively close proximity could enable the spread of INNS. The tier 1 projects (i.e. Awel y Môr Offshore Wind Farm and the Isle of Man Crogga licence) will result in the introduction of 1.07 km^2 of new hard substrate, resulting in a total of up to 3.76 km^2 of new hard substrate together with the Mona Offshore Wind Project.

2.11.6.4 The introduction and spread of INNS may also be facilitated by increased boat traffic in the region which may help transport INNS on the hull of vessels or in ballast water. Additionally the construction of Awel y Môr Offshore Wind Farm is likely to result in up to 3,436 round trips in total, the operations and maintenance phase is likely to result in 1,208 vessel round trips and the number of round trips for decommissioning has not been defined however is likely to be similar to the 3,436 round trips anticipated during construction (RWE, 2022). The Awel y Môr Offshore Wind Farm will have plans and measures in place to reduce the spread of INNS such as those proposed for the Morgan Offshore Wind Project Generation Assets in Table 2.19, for example Awel y Môr will ensure a biosecurity plan is implemented to ensure relevant best practice guidelines are followed (RWE, 2022). The extent of hard substrate available for colonisation by INNS is also likely to decline throughout the operations and maintenance phase as some of the projects enter their decommissioning phase.

2.11.6.5 There is one exploratory oil and gas permit approved within the Mona CEA benthic subtidal and intertidal ecology study area, the Isle of Man Crogga licence. There is however limited information regarding the potential impacts associated with this project, the project is however known to include exploratory drilling which may lead to the installation of artificial structures such as a well head and jack up which could be colonised by epifauna (Isle of Man Government, 2021). Additionally the geophysical and geotechnical surveys which have also been permitted under this licence will result in an increase in vessel traffic within the Mona CEA benthic subtidal and intertidal ecology study area (Isle of Man Government, 2021).

2.11.6.6 The cumulative effect is predicted to be of regional spatial extent, long term duration, intermittent and low reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be **low**.

Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC

2.11.6.7 Within the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC there are no projects relevant to this impact that will occur within the SAC. Therefore, no further assessment of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC IEFs has been considered for this impact.

Intertidal habitat IEFs

2.11.6.8 None of the cumulative increased risk of introduction and spread of INNS in this phase of the Mona Offshore Wind Project will occur within the Mona intertidal landfall as no tier 1 projects overlap with the intertidal landfall, therefore no further assessment of the intertidal habitat IEFs has been undertaken for this impact in the CEA.

Sensitivity of the receptor

Subtidal habitat IEFs

2.11.6.9 The sensitivity of the subtidal IEFs (i.e. subtidal coarse and mixed sediments with diverse benthic communities IEF, sand and muddy sand communities with polychaetes and bivalves IEF, Annex I low resemblance stony reef (outside an SAC) IEF, Constable Bank (Annex I sandbank outside an SAC) IEF and seapens and burrowing megafauna communities IEF) is as described previously for the construction phase assessment for the Mona Offshore Wind Project alone in paragraph 2.9.7.17 to 2.9.7.22 and above in Table 2.24.

2.11.6.10 The subtidal coarse and mixed sediments with diverse benthic communities IEF, sand and muddy sand communities with polychaetes and bivalves IEF, Annex I low resemblance stony reef (outside an SAC) IEF, Constable Bank (Annex I sandbank outside an SAC) IEF and seapens and burrowing megafauna communities IEF are deemed to be of high vulnerability, low recoverability, and national value. The sensitivity of the IEFs is therefore considered to be **high**.

Significance of effect

Subtidal habitat IEFs

2.11.6.11 Overall for the subtidal coarse and mixed sediments with diverse benthic communities IEF, sand and muddy sand communities with polychaetes and bivalves IEF, Annex I low resemblance stony reef (outside an SAC) IEF, Constable Bank (Annex I sandbank outside an SAC) IEF and seapens and burrowing megafauna communities IEF, the magnitude of the cumulative increased risk of introduction and spread of INNS impact during the construction and operations and maintenance phases is deemed to be low and the sensitivity of the receptor is considered to be high. The cumulative effect will, therefore, be of **minor** adverse significance, which is not significant in EIA terms. This conclusion has been reached on the basis of the likelihood that most offshore projects will implement designed-in measures that will ensure that the risk of potential introduction and spread of INNS is minimised including the Mona Offshore Wind Project.

Decommissioning phase

2.11.6.12 There are no tier 1 projects active in the Mona Offshore Wind Project decommissioning phase to consider for cumulative impacts based on current knowledge.

Tier 2

Construction and operations and maintenance phase

Magnitude of impact

2.11.6.13 The maximum extent of hard substrate which could be introduced and colonised by INNS as a result of projects in the tier 2 assessment is 7.76 km2. The tier 2 projects within the CEA benthic subtidal and intertidal ecology study are Morgan Offshore Wind Project Generation Assets, Morecambe Generation Assets, Morgan and Morecambe Offshore Windfarms Transmission Assets, Mooir Vannin Offshore Windfarm and ENI Hynet CCS.

2.11.6.14 For the Morgan Offshore Wind Project Generation Assets, the predicted habitat creation during the construction phase would equate to up to 1.96 km2, with up to 1,878 vessel round trips during the construction phase and up to 1,970 vessel return trips per year during the operations and maintenance phase (Morgan Offshore Wind Ltd., 2023).

2.11.6.15 For the Morecambe Offshore Windfarm Generation Assets, the predicted habitat creation would equate to up to 0.46 km2, with up to 150 vessel round trips for the delivery of main components during the construction phase and up to 2,778 return trips for support vessels. During the operations and maintenance phase there may be up to 776 return vessel trips per year (Morecambe Offshore Windfarm Ltd., 2023).

2.11.6.16 For the Morgan and Morecambe Offshore Windfarms Transmission Assets, the predicted habitat creation during the construction phase would equate to up to 1.55 km2, with up to 750 vessel round trips during the construction phase and up to 1,155 vessel return trips per year during the operations and maintenance phase (Morecambe Offshore Windfarm Ltd and Morgan Offshore Wind Ltd., 2023).

2.11.6.17 A scoping report is also available for the Mooir Vannin Offshore Windfarm (Ørsted, 2023). This report does not specify the impacts which will be assessed in association with the project however it does provide some of the parameters of the project including that up to 100 turbines may be installed as well as up to five OSPs and 490 km of inter-array cables, 100 km of interconnector cables, 90 km of offshore electrical connection cables and 125 km of export cables may also be installed which will result in artificial structures which would be colonised by INNS (Ørsted, 2023).

2.11.6.18 A scoping report for ENI Hynet CCS states that vessels utilised during all stages of the development area could inadvertently transport INNS resulting in significant impacts on the local fauna which have the potential to spread throughout the area. (Liverpool Bay CCS Ltd, 2022 Overall this project is likely to introduce a very small amount of artificial substrate, a fraction of what is proposed for the Mona Offshore Wind Project.

2.11.6.19 The cumulative effect is predicted to be of regional spatial extent, long term duration, intermittent and low reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be **low**.

Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC

2.11.6.20 Within the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC there are no projects relevant to this impact that will occur within the SAC. Therefore no further assessment of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC IEFs has been considered for this impact.

Intertidal habitat IEFs

2.11.6.21 None of the cumulative increased risk of introduction and spread of INNS in this phase of the Mona Offshore Wind Project will occur within the Mona intertidal landfall as no tier 1 project except for the Mona Offshore Wind Project overlap with the intertidal landfall therefore no further assessment of the intertidal habitat IEFs has been undertaken for this impact in the CEA.

Sensitivity of the receptor

Subtidal habitat IEFs

2.11.6.22 The sensitivity of the subtidal IEFs (i.e. subtidal coarse and mixed sediments with diverse benthic communities IEF, sand and muddy sand communities with polychaetes and bivalves IEF, Annex I low resemblance stony reef (outside an SAC) IEF, Constable Bank (Annex I sandbank outside an SAC) IEF and seapens and burrowing megafauna communities IEF) is as described previously for the construction phase assessment for the Mona Offshore Wind Project alone in paragraph 2.9.7.17 to 2.9.7.22 and above in Table 2.24.

2.11.6.23 The subtidal coarse and mixed sediments with diverse benthic communities IEF, sand and muddy sand communities with polychaetes and bivalves IEF, Annex I low resemblance stony reef (outside an SAC) IEF, Constable Bank (Annex I sandbank outside an SAC) IEF and seapens and burrowing megafauna communities IEF are deemed to be of high vulnerability, low recoverability, and national value. The sensitivity of the IEFs is therefore considered to be **high**.

Significance of effect

Subtidal habitat IEFs

2.11.6.24 Overall, for the subtidal coarse and mixed sediments with diverse benthic communities IEF, sand and muddy sand communities with polychaetes and bivalves IEF, Annex I low resemblance stony reef (outside an SAC) IEF, Constable Bank (Annex I sandbank outside an SAC) IEF and seapens and burrowing megafauna communities IEF the magnitude of the cumulative increased risk of introduction and spread of INNS impact during the construction and operations and maintenance phases is deemed to be low and the sensitivity of the receptor is considered to be high. The cumulative effect will, therefore, be of **minor** adverse significance, which is not significant in EIA terms. This conclusion has been reached based on the likelihood that most offshore projects will implement designed-in measures that will ensure that the risk of potential introduction and spread of INNS is minimised including the Mona Offshore Wind Project.

Decommissioning phase

Magnitude of impact

2.11.6.25 The maximum total hard substrate available for colonisation by INNS associated with the tier 2 assessment is estimated at up to 5.56 km^2, and offshore renewable projects within the CEA benthic subtidal and intertidal ecology study (i.e. Morgan Offshore Wind Project Generation Assets, Morecambe Generation Assets, Morgan and Morecambe Offshore Windfarms Transmission Assets and Mooir Vannin Offshore Windfarm). This value considers the hard substrate resulting from the cable and scour protection remaining *in situ* for Mona, together with the permanent habitat alteration from the Morgan Offshore Wind Project Generation Assets as it enter the decommissioning phase hard substrate associated with the operation of the Morecambe Offshore Wind Farm. The Morecambe Offshore Wind Farm is estimated to undergo decommissioning in 2089 (14 years after Mona Offshore Wind Project), therefore the amount of long term habitat loss/habitat alteration associated with this project is likely to decrease with time.

2.11.6.26 For the Morecambe Offshore Windfarm Generation Assets, the predicted habitat creation during the decommissioning phase would equate to up to 0.46 km^2, with a similar number of vessel round trips expected during this phase as during construction (Morecambe Offshore Windfarm Ltd., 2023).

2.11.6.27 For the Morgan Offshore Wind Project Generation Assets, the predicted habitat creation during the decommissioning phase would equate to up to 1.46 km^2, a similar number of vessel round trips expected during this phase as during construction (Morgan Offshore Wind Ltd, 2023).

2.11.6.28 For the Morgan and Morecambe Offshore Windfarms Transmission Assets, the predicted habitat creation during the decommissioning phase would equate to up to 1.50 km^2, a similar number of vessel round trips expected during this phase as during construction (Morecambe Offshore Windfarm Ltd and Morgan Offshore Wind Ltd, 2023).

2.11.6.29 A scoping report is also available for the Mooir Vannin Offshore Windfarm (Ørsted, 2023). This report does not specify the impacts which will be assessed in association with the project however it does provide some of the parameters of the project including that up to 100 turbines may be installed as well as up to five OSPs and 490 km of inter-array cables, 100 km of interconnector cables, 90 km of offshore electrical connection cables and 125 km of export cables (Ørsted, 2023) which may lead to the installation of cable protection. Some of this infrastructure is likely to persist in to the Mona Offshore Wind Project decommissioning phase.

2.11.6.30 A scoping report for ENI Hynet CCS states that vessels utilised during all stages of the development area could inadvertently transport INNS resulting in significant impacts on the local fauna which have the potential to spread throughout the area. (Liverpool Bay CCS Ltd, 2022 Overall this project is likely to introduce a very small amount of artificial substrate, a fraction of what is proposed for the Mona Offshore Wind Project.

2.11.6.31 The cumulative effect is predicted to be of regional spatial extent, long term duration, continuous and low reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be **low**.

Sensitivity of the receptor

Subtidal habitat IEFs

2.11.6.32 The sensitivity of the subtidal IEFs (i.e. subtidal coarse and mixed sediments with diverse benthic communities IEF, sand and muddy sand communities with polychaetes and bivalves IEF, Annex I low resemblance stony reef (outside an SAC) IEF, Constable Bank (Annex I sandbank outside an SAC) IEF and seapens and burrowing megafauna communities IEF) is as described previously for the construction phase assessment for the Mona Offshore Wind Project alone in paragraph 2.9.7.17 to 2.9.7.22 and above in Table 2.24.

2.11.6.33 The subtidal coarse and mixed sediments with diverse benthic communities IEF, sand and muddy sand communities with polychaetes and bivalves IEF, Annex I low resemblance stony reef (outside an SAC) IEF, Constable Bank (Annex I sandbank outside an SAC) IEF and seapens and burrowing megafauna communities IEF are deemed to be of high vulnerability, low recoverability, and national value. The sensitivity of the IEFs is therefore considered to be **high**.

Significance of effect

Subtidal habitat IEFs

2.11.6.34 Overall, for the subtidal coarse and mixed sediments with diverse benthic communities IEF, sand and muddy sand communities with polychaetes and bivalves IEF, Annex I low resemblance stony reef (outside an SAC) IEF, Constable Bank (Annex I sandbank outside an SAC) IEF and seapens and burrowing megafauna communities IEF the magnitude of the cumulative increased risk of introduction and spread of INNS impact during the decommissioning phase is deemed to be low and the sensitivity of the receptor is considered to be high. The cumulative effect will, therefore, be of **minor** adverse significance, which is not significant in EIA terms. This conclusion has been reached based on the likelihood that most offshore projects will implement designed-in measures that will ensure that the risk of potential introduction and spread of INNS is minimised including the Mona Offshore Wind Project.

Tier 3

Construction and operations and maintenance phases

Magnitude of impact

Subtidal habitat IEFs

2.11.6.35 There is one tier 3 project which has been identified in the CEA with the potential to result in cumulative increased risk of introduction and spread of INNS with the Mona Offshore Wind Project is the MaresConnect interconnector cable.

2.11.6.36 There is currently no information on the impact that the MaresConnect interconnector cable will have on benthic ecology receptors. A planning application is predicted to be submitted in 2024 which will identify and assess these impacts (MaresConnect, 2022). Cable protection associated with the MaresConnect interconnector cable is likely to result in the facilitation of the introduction and spread of INNS (e.g. introduction of new hard substrate through cable protection and vessel movements which are likely to be greatest during the construction phase) are similar to those expected for the cables of the Mona Offshore Wind Project. Construction is likely to occur in 2025 and the project is anticipated to become operational in 2027 (MaresConnect 2022), although it should be noted that these timeframes are only indicative at this stage.

2.11.6.37 The cumulative effect is predicted to be of regional spatial extent, long term duration, intermittent and low reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be **low**.

Intertidal habitat IEFs

2.11.6.38 None of the cumulative increased risk of introduction and spread of INNS in this phase of the Mona Offshore Wind Project will occur within the Mona intertidal landfall as no tier 1 project except for the Mona Offshore Wind Project overlap with the intertidal landfall therefore no further assessment of the intertidal habitat IEFs has been undertaken for this impact in the CEA.

Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC

2.11.6.39 Within the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC there are no projects relevant to this impact that will occur within the SAC. Therefore, no further assessment of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC IEFs has been considered for this impact.

Sensitivity of the receptor

Subtidal habitat IEFs

2.11.6.40 The sensitivity of the subtidal IEFs (i.e. subtidal coarse and mixed sediments with diverse benthic communities IEF, sand and muddy sand communities with polychaetes and bivalves IEF, Annex I low resemblance stony reef (outside an SAC) IEF, Constable Bank (Annex I sandbank outside an SAC) IEF and seapens and burrowing megafauna communities IEF) is as described previously for the construction phase assessment for the Mona Offshore Wind Project alone in paragraph 2.9.7.17 to 2.9.7.22 and above in Table 2.24.

2.11.6.41 The subtidal coarse and mixed sediments with diverse benthic communities IEF, sand and muddy sand communities with polychaetes and bivalves IEF, Annex I low resemblance stony reef (outside an SAC) IEF, Constable Bank (Annex I sandbank outside an SAC) IEF and seapens and burrowing megafauna communities IEF are deemed to be of high vulnerability, low recoverability, and national value. The sensitivity of the IEFs is therefore considered to be **high**.

Significance of effect

Subtidal habitat IEFs

2.11.6.42 Overall, for the subtidal coarse and mixed sediments with diverse benthic communities IEF, sand and muddy sand communities with polychaetes and bivalves IEF, Annex I low resemblance stony reef (outside an SAC) IEF, Constable Bank (Annex I sandbank outside an SAC) IEF and seapens and burrowing megafauna communities IEF the magnitude of the cumulative increased risk of introduction and spread of INNS impact during the construction and operations and maintenance phases is deemed to be low and the sensitivity of the receptor is considered to be high. The cumulative effect will, therefore, be of **minor** adverse significance, which is not significant in EIA terms. This conclusion has been reached based on the likelihood that most offshore projects will implement designed-in measures that will ensure that the risk of potential introduction and spread of INNS is minimised including the Mona Offshore Wind Project.

2.11.7 Removal of hard substrates

Tier 1

Decommissioning phase

2.11.7.1 There are no tier 1 projects active in the Mona Offshore Wind Project decommissioning phase to consider for cumulative impacts based on current knowledge.

Tier 2

Decommissioning phase

Magnitude of impact

2.11.7.2 The maximum total removal of hard substrate associated with the tier 2 offshore wind farms within the CEA benthic subtidal and intertidal ecology study (i.e. Morgan Offshore Wind Project Generation Assets, Morecambe Offshore Windfarm Generation Assets, Morgan and Morecambe Offshore Windfarms Transmission Assets and Mooir Vannin Offshore Windfarm) is estimated at up to 3.23 km^2. This value considers the hard substrate removed during the Morgan Offshore Wind Project Generation Assets decommissioning phase as well as the Morgan and Morecambe Offshore Windfarms Transmission Assets. The Morecambe Offshore Wind Farm will decommission 14 years after the decommissioning of the Mona Offshore Wind Project (i.e. 2086) and therefore won't overlap temporally with this phase.

2.11.7.3 For the Morecambe Offshore Windfarm: Generation Assets, the predicted maximum removal of hard substrate during the decommissioning phase would equate to up to 0.46 km^2 (Morecambe Offshore Windfarm Ltd., 2023). For the Morgan Offshore Wind Project: Generation Assets, the predicted maximum removal of hard substrate during the decommissioning phase would equate to up to 0.53 km^2 (Morgan Offshore Wind Ltd., 2023).

2.11.7.4 For the Morgan and Morecambe Offshore Windfarms Transmission Assets, the predicted maximum removal of hard substrate during the decommissioning phase would equate to up to 0.05 km^2 (Morecambe Offshore Windfarm Ltd and Morgan Offshore Wind Ltd., 2023).

2.11.7.5 A scoping report is also available for the Mooir Vannin Offshore Windfarm (Ørsted, 2023). This report does not specify the impacts which will be assessed in association with the project however it does provide information on some of the infrastructure including that up to 100 turbines may be installed as well as up to five OSPs and 490 km of inter-array cables, 100 km of interconnector cables, 90 km of offshore electrical connection cables and 125 km of export cables may also be installed (Ørsted, 2023). It is likely that some of this infrastructure such as the foundations for the wind turbines and OSPs will need to be removed during the decommissioning phase of the project which would temporally overlap with the Mona Offshore Wind Project.

2.11.7.6 There won't be any cable protection installed in the Constable Bank (Annex I sandbank outside an SAC) IEF. Therefore no cumulative assessment for the impact of hard substrate removal is required.

2.11.7.7 The cumulative effect is predicted to be of regional spatial extent, long term duration, continuous and low reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be **low**.

Sensitivity of the receptor

Subtidal habitat IEFs

2.11.7.8 The sensitivity of the subtidal IEFs (i.e. subtidal coarse and mixed sediments with diverse benthic communities IEF and sand and muddy sand communities with polychaetes and bivalves IEF, Annex I low resemblance stony reef (outside an SAC) IEF and seapens and burrowing megafauna communities IEF) is as described previously for the construction phase assessment for the Mona Offshore Wind Project alone in paragraph 2.9.8.11 to 2.9.8.12 and Table 2.24.

2.11.7.9 The subtidal coarse and mixed sediments with diverse benthic communities IEF and sand and muddy sand communities with polychaetes and bivalves IEF, Annex I low resemblance stony reef (outside an SAC) IEF and seapens and burrowing megafauna communities IEF is deemed to be of high vulnerability, high recoverability, and national value. The sensitivity of the IEFs is therefore, considered to be **low**.

Significance of effect

2.11.7.10 Overall, for the subtidal coarse and mixed sediments with diverse benthic communities IEF and sand and muddy sand communities with polychaetes and bivalves IEF, Annex I low resemblance stony reef (outside an SAC) IEF and seapens and burrowing megafauna communities IEF the magnitude of the cumulative removal of hard substrate impact in the decommissioning phase is deemed to be low and the sensitivity of the receptor is considered to be low. The cumulative effect will, therefore, be of **minor** adverse significance, which is/is not significant in EIA terms. This conclusion is based on the ability of soft sediment habitats to recover following the removal of hard structures and the likely small scale of the change in relation to the wider CEA benthic subtidal and intertidal ecology study area.

2.11.8 Changes in physical processes

Tier 1

Operations and maintenance phase

Magnitude of impact

2.11.8.1 The presence of infrastructure within the offshore wind farm area may lead to changes in tidal regime and the associated potential impacts along adjacent shorelines during the operations and maintenance phase of the Mona Offshore Wind Project. The magnitude of increased infrastructure leading to changes in the tidal regime during the operations and maintenance phase, has been assessed as low for the Mona Offshore Wind Project alone as described in section 2.11.8.

2.11.8.2 The proposed development of the Awel y Môr offshore wind farm comprising of 50 wind turbines may be in operation during the operations and maintenance phase of the Mona Offshore Wind Project. The Awel y Môr offshore wind farm array area is 13.5 km from the Mona Array Area and the agreement for lease area overlaps with the Mona Offshore Cable Corridor (due to licensing permits). The modelling carried out for Mona Offshore Wind Project concluded that the potential impact on tidal regime was low when considering the development alone. Changes are observed in close proximity to the wind turbine structures with tides returning to baseline levels beyond the array area. Therefore, no overlap is expected to create cumulative changes in the tidal regime between the two wind farm developments. With regards to the wave regime, changes are observed in close proximity to the wind turbine structures with changes to wave climate decreasing rapidly with distance from the infrastructure. Under storm conditions from the north the change in wave climate due to the Mona Offshore Wind Project may extend to the limit of the Awel y Môr offshore wind farm however at this distance the change is diminutive (i.e. circa 0.2% reduction in significant wave height during a 1in20 storm from the north). The modelling carried out for Mona Offshore Wind Project concluded that the potential impact on sediment transport and sediment transport pathways was low when considering the development alone. Changes are observed in close proximity to the wind turbine structures with sediment transport returning to baseline levels beyond the array area. Therefore, no overlap is expected to create cumulative changes in the sediment transport and sediment transport pathways between the two wind farm developments.

2.11.8.3 The Gwynt y Môr Offshore Wind Farm operations and maintenance phase also overlaps with that of the Mona Offshore Wind Project. Despite an increased number of wind turbine structures (160) compared to the Awel y Môr Offshore Wind Farm, the site is located further from the Mona Array Area (17.8 km). Changes in tidal regime, wave regime and sediment transport regime are observed in close proximity to the wind turbine structures, decreasing rapidly with distance from the infrastructure and returning to baseline levels within the Mona Array Area. Therefore, no overlap is expected to create cumulative changes in the tidal regime between the two wind farm developments.

2.11.8.4 The Rhyl Flats Offshore Wind Farm operations and maintenance phase also overlaps with that of the Mona offshore Wind Project. However given both reduced turbine numbers (25) and a greater distance of seperation (24.8 km) from the Mona Array Area, than the Awel y Môr Offshore Wind Farm. Again no overlap is expected to create cumulative changes in the tidal regime, wave regime and sediment transport regime between the two wind farm developments.

2.11.8.5 The cumulative effect is predicted to be of local spatial extent, long term duration, continuous and irreversible during the lifetime of the project. It is predicted that the impact will affect the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC features and Constable Bank directly. The magnitude is therefore, considered to be **low**.

Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC

2.11.8.6 The potential impact of changes in physical processes in the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC will be similar to the impact in the subtidal habitats as described in paragraphs 2.11.8.1 to 2.11.8.4. however there will be no impact on the intertidal features of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC.

2.11.8.7 The cumulative effect is predicted to be of local spatial extent, long term duration, continuous and irreversible during the lifetime of the project. The magnitude is therefore, considered to be **low**.

Sensitivity of the receptor

Subtidal habitat IEFs

2.11.8.8 The sensitivity of the subtidal IEFs (i.e. subtidal coarse and mixed sediments with diverse benthic communities IEF, mixed sediments dominated by brittlestars IEF, sand and muddy sand communities with polychaetes and bivalves IEF, Annex I low resemblance stony reef (outside an SAC) IEF and Constable Bank (Annex I sandbank outside an SAC) IEF) is as described previously for the construction phase assessment for the Mona Offshore Wind Project alone in paragraph 2.9.7.17 to 2.9.7.22 and above in Table 2.25.

2.11.8.9 The subtidal coarse and mixed sediments with diverse benthic communities IEF, mixed sediments dominated by brittlestars IEF, sand and muddy sand communities with polychaetes and bivalves IEF, Annex I low resemblance stony reef (outside an SAC) IEF and Constable Bank (Annex I sandbank outside an SAC) IEF are deemed to be of low vulnerability, high recoverability and national value. The sensitivity of the receptor is therefore, considered to be **negligible**.

2.11.8.10 The seapens and burrowing megafauna communities IEF are deemed to be of high vulnerability, low recoverability and national value. The sensitivity of the receptor is therefore considered to be **high** (reduced to **medium** in absence of seapens).

Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC

2.11.8.11 The sensitivity of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC designated feature IEFs (i.e. Annex I sandbanks, Annex I subtidal reefs, Annex I intertidal reefs) is as described previously for the construction phase assessment for the Mona Offshore Wind Project alone in paragraph 2.9.9.39 to 2.9.3.33 and above in Table 2.25.

2.11.8.12 The Annex I sandbanks IEF and Annex I subtidal reefs IEF of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC are deemed to be of low vulnerability, high recoverability and international value. The sensitivity of the receptor is therefore considered to be **negligible**.

Significance of effect

Subtidal habitat IEFs

2.11.8.13 Overall, for the subtidal coarse and mixed sediments with diverse benthic communities IEF, mixed sediments dominated by brittlestars IEF, sand and muddy sand communities with polychaetes and bivalves IEF, Annex I low resemblance stony reef (outside an SAC) IEF and Constable Bank (Annex I sandbank outside an SAC) IEF the magnitude of the cumulative changes in physical processes impact during the operations and maintenance phase is deemed to be low and the sensitivity of the receptor is considered to be negligible. The effect will, therefore, be of **negligible** significance, which is not significant in EIA terms. This conclusion is based on the ability of these habitat to recover following these activities and the small scale of the change in relation to the wider Mona benthic subtidal and intertidal ecology study area.

2.11.8.14 Overall, for the seapens and burrowing megafauna communities IEF the magnitude of the cumulative changes in physical processes impact during the operations and maintenance phase is deemed to be low and the sensitivity of the receptor is considered to be high (reducing to medium in the absence of seapens). The effect will, therefore, be of **minor** adverse significance, which is not significant in EIA terms. This conclusion is based on the ability of these habitat to recover following these activities, particularly as seapens have not been identified within the Mona benthic subtidal and intertidal ecology study area, and the small scale of the change in relation to the wider Mona benthic subtidal and intertidal ecology study area.

Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC

2.11.8.15 Overall, for the Annex I sandbanks IEF and Annex I subtidal reefs IEF of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC the magnitude of the impact is deemed to be low and the sensitivity of the receptor is considered to be negligible. The effect will, therefore, be of **negligible** significance, which is not significant in EIA terms. This significance has been assigned due to the minimal change to the physical environment which is unlikely to result in a change in conditions beyond the natural variation that these IEFs are adapted for.

Decommissioning phase

Magnitude of impact

Subtidal habitat IEFs

2.11.8.16 The presence of residual infrastructure within the Mona Array Area may lead to changes in tidal, wave and sediment transport regime the magnitude of which has been assessed as negligible for the Mona Offshore Wind Project alone as described in section 2.9.9, with no influence on shoreline wave climate.

2.11.8.17 With a similar lifespan to the Mona Offshore Wind Project Awel y Môr wind farm may be or have been decommissioned during the decommissioning phase of the Mona Offshore Wind Project. Residual structures left on the seabed from decommissioning will not cause a cumulative impact on changes to the tidal, wave and sediment transport regime and will result in a lesser magnitude of impact than that described in the operations and maintenance phase.

2.11.8.18 The cumulative effect is predicted to be of local spatial extent, long term duration, continuous and irreversible. The magnitude is therefore, considered to be **negligible**.

Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC

2.11.8.19 The potential impact of cumulative changes in physical processes in the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC will be similar to the impact in the subtidal habitats IEFs as described in paragraphs 2.11.8.16 to 2.11.8.17. However there will be no impact on the intertidal features of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC.

2.11.8.20 The cumulative effect is predicted to be of local spatial extent, long term duration, continuous and irreversible during the lifetime of the project. The magnitude is therefore, considered to be **low**.

Sensitivity of the receptor

Subtidal habitat IEFs

2.11.8.21 The sensitivity of the subtidal IEFs (i.e. subtidal coarse and mixed sediments with diverse benthic communities IEF, mixed sediments dominated by brittlestars IEF, sand and muddy sand communities with polychaetes and bivalves IEF, Annex I low resemblance stony reef (outside an SAC) IEF and Constable Bank (Annex I sandbank outside an SAC) IEF) is as described previously for the construction phase assessment for the Mona Offshore Wind Project alone in paragraph 2.9.7.17 to 2.9.7.22 and above in Table 2.25.

2.11.8.22 The subtidal coarse and mixed sediments with diverse benthic communities IEF, mixed sediments dominated by brittlestars IEF, sand and muddy sand communities with polychaetes and bivalves IEF, Annex I low resemblance stony reef (outside an SAC) IEF and Constable Bank (Annex I sandbank outside an SAC) IEF are deemed to be of low vulnerability, high recoverability and national value. The sensitivity of the receptor is therefore, considered to be **negligible**.

2.11.8.23 The seapens and burrowing megafauna communities IEF are deemed to be of high vulnerability, low recoverability and national value. The sensitivity of the receptor is therefore considered to be **high** (reduced to **medium** in absence of seapens).

Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC

2.11.8.24 The sensitivity of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC designated feature IEFs (i.e. Annex I sandbanks, Annex I subtidal reefs, Annex I intertidal reefs) is as described previously for the construction phase assessment for the Mona Offshore Wind Project alone in paragraph 2.9.9.39 to 2.9.3.33 and above in Table 2.25.

2.11.8.25 The Annex I sandbanks IEF and Annex I subtidal reefs IEF of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC are deemed to be of low vulnerability, high recoverability and international value. The sensitivity of the receptor is therefore considered to be **negligible**.

Significance of effect

Subtidal habitat IEFs

2.11.8.26 Overall, for the subtidal coarse and mixed sediments with diverse benthic communities IEF, mixed sediments dominated by brittlestars IEF, sand and muddy sand communities with polychaetes and bivalves IEF, Annex I low resemblance stony reef (outside an SAC) IEF and Constable Bank (Annex I sandbank outside an SAC) IEF the magnitude of the cumulative changes in physical processes impact during the decommissioning phase is deemed to be negligible and the sensitivity of the receptor is considered to be negligible. The effect will, therefore, be of **negligible** significance, which is not significant in EIA terms.

2.11.8.27 Overall, for the seapens and burrowing megafauna communities IEF the magnitude of the cumulative changes in physical processes impact during the decommissioning phase is deemed to be negligible and the sensitivity of the receptor is considered to be high (reducing to medium in the absence of seapens). The effect will, therefore, be of **minor adverse** significance, which is not significant in EIA terms. This conclusion is based on the ability of these habitat to recover following these activities, particularly as seapens have not been identified within the Mona benthic subtidal and intertidal ecology study area, and the small scale of the change in relation to the wider Mona benthic subtidal and intertidal ecology study area.

Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC

2.11.8.28 Overall, for the Annex I sandbanks IEF and Annex I subtidal reefs IEF of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC the magnitude of the cumulative changes in physical processes impact during the decommissioning phase is deemed to be low and the sensitivity of the receptor is considered to be negligible. The effect will, therefore, be of **negligible** significance, which is not significant in EIA terms. This significance has been assigned due to the minimal change to the physical environment which is unlikely to result in a change in conditions beyond the natural variation that these IEFs are adapted for.

Tier 2

Operations and maintenance phase

Magnitude of impact

2.11.8.29 The presence of Mona Offshore Wind Project infrastructure may lead to changes in tidal regime and the associated potential impacts along adjacent shorelines during the operations and maintenance phase of the Mona Offshore Wind Project. The magnitude changes in the tidal regime during the operations and maintenance phase, has been assessed as low for the Mona Offshore Wind Project alone as described in section 2.11.8.

2.11.8.30 On similar project timelines, the construction and operation of both the Morecambe Offshore Windfarm Generation Assets and Morgan Offshore Wind Project Generation Assets alongside the Morgan and Morecambe Offshore Windfarms Transmission Assets are expected to coincide with the construction and operations and maintenance phase of the Mona Offshore Wind Project. The potential impact of the Mona Offshore Wind Project on the tidal regime and wave regime has been modelled on its own, with a low magnitude of impact discussed in section 2.11.8. As highlighted above the increase in infrastructure will not cause a cumulative change on the tidal regime as the potential impacts caused by the wind turbines are localised and return to baseline levels just beyond the infrastructure. An overlap of these changes in the tidal flow is not expected as they are limited to the array area.

2.11.8.31 Storms approaching from the south are limited in magnitude due to restricted fetch length therefore the changes in wave field do not extend to Morgan Offshore Wind Project Generation Assets. However with storms approaching from the north Morgan offshore wind farm may influence the wave climate in the Mona Array Area to a small degree. The changes in wave climate due to storms from the southwest and west interacting with Mona Array infrastructure do not extend to the Morecambe Generation Assets due to the influence Anglesey. The limited frequency and fetch length would reduce the likelihood of storms from the east giving rise to a change in wave climate in the Mona Array Area due to the presence of the Morecambe Generation Assets. The increase in infrastructure will also not cause a cumulative change on the sediment transport and sediment transport pathways as the impacts caused by the wind turbines are localised and return to baseline levels just beyond the infrastructure.

2.11.8.32 The cumulative effect is predicted to be of local spatial extent, long term duration, continuous and high reversibility. The magnitude is therefore, considered to be **low**.

Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC

2.11.8.33 The potential impact of changes in physical processes in the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC will be similar to the impact in the subtidal habitats as described in paragraphs 2.11.8.29 to 2.11.8.31. however there will be no impact on the intertidal features of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC.

2.11.8.34 The cumulative effect is predicted to be of local spatial extent, long term duration, continuous and high reversibility. The magnitude is therefore, considered to be **low**.

Sensitivity of the receptor

Subtidal habitat IEFs

2.11.8.35 The sensitivity of the IEFs is as described previously for the construction phase assessment for the Mona Offshore Wind Project alone in paragraph 2.9.7.17 to 2.9.7.22 and above in Table 2.25.

2.11.8.36 The subtidal coarse and mixed sediments with diverse benthic communities IEF, mixed sediments dominated by brittlestars IEF, sand and muddy sand communities with polychaetes and bivalves IEF, Annex I low resemblance stony reef (outside an SAC) IEF and Constable Bank (Annex I sandbank outside an SAC) IEF are deemed to be of low vulnerability, high recoverability and national value. The sensitivity of the receptor is therefore, considered to be **negligible**.

2.11.8.37 The seapens and burrowing megafauna communities IEF are deemed to be of high vulnerability, low recoverability and national value. The sensitivity of the receptor is therefore considered to be **high** (reduced to **medium** in absence of seapens).

Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC

2.11.8.38 The sensitivity of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC designated feature IEFs (i.e. Annex I sandbanks, Annex I subtidal reefs, Annex I intertidal reefs) is as described previously for the construction phase assessment for the Mona Offshore Wind Project alone in paragraph 2.9.9.39 to 2.9.3.33 and above in Table 2.25.

2.11.8.39 The Annex I sandbanks IEF and Annex I subtidal reefs IEF of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC are deemed to be of low vulnerability, high recoverability and international value. The sensitivity of the receptor is therefore considered to be **negligible**.

Significance of effect

Subtidal habitat IEFs

2.11.8.40 Overall, for the subtidal coarse and mixed sediments with diverse benthic communities IEF, mixed sediments dominated by brittlestars IEF, sand and muddy sand communities with polychaetes and bivalves IEF, Annex I low resemblance stony reef (outside an SAC) IEF and Constable Bank (Annex I sandbank outside an SAC) IEF the magnitude of the cumulative changes in physical processes impact during the operations and maintenance phase is deemed to be low and the sensitivity of the receptor is considered to be negligible. The effect will, therefore, be of **negligible** significance, which is not significant in EIA terms. This significance has been assigned due to the minimal change to the physical environment which is unlikely to result in a change in conditions beyond the natural variation that these IEFs are adapted for.

2.11.8.41 Overall, for the seapens and burrowing megafauna communities IEF the magnitude of the cumulative changes in physical processes impact during the operations and maintenance phase is deemed to be low and the sensitivity of the receptor is considered to be high. The effect will, therefore, be of **minor** adverse significance, which is not significant in EIA terms. This conclusion is based on the ability of these habitat to recover following these activities, particularly as seapens have not been identified within the Mona benthic subtidal and intertidal ecology study area, and the small scale of the change in relation to the wider Mona benthic subtidal and intertidal ecology study area.

Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC

2.11.8.42 Overall, for the Annex I sandbanks IEF and Annex I subtidal reefs IEF of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC the magnitude of the impact is deemed to be low and the sensitivity of the receptor is considered to be negligible. The effect will, therefore, be of **negligible** significance, which is not significant in EIA terms. This significance has been assigned due to the minimal change to the physical environment which is unlikely to result in a change in conditions beyond the natural variation that these IEFs are adapted for.

Decommissioning phase

Magnitude of impact

Subtidal habitat IEFs

2.11.8.43 The presence of residual infrastructure within the Mona Array Area may lead to changes in tidal, wave and sediment transport regime the magnitude of which has been assessed as negligible for the Mona Offshore Wind Project alone as described in section 2.9.9, with no influence on shoreline wave climate.

2.11.8.44 Morecambe Generation Assets and Morgan Generation Assets, along with the Morgan and Morecambe Offshore Wind Farms: Transmission Assets, have a similar lifespan to that of the Mona Offshore Wind Project therefore decommissioning activities could coincide. However, residual structures left on the seabed from decommissioning will not cause a cumulative impact on changes to the tidal, wave and sediment transport regimes and will result in a lesser magnitude of impact than that described in the operations and maintenance phase.

2.11.8.45 The cumulative effect is predicted to be of local spatial extent, long term duration, continuous and irreversible. The magnitude is therefore, considered to be **negligible**.

Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC

2.11.8.46 The potential impact of changes in physical processes in the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC will be similar to the impact in the subtidal habitats as described in paragraphs 2.11.8.43 to 2.11.8.44. However there will be no impact on the intertidal features of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC.

2.11.8.47 The cumulative effect is predicted to be of local spatial extent, long term duration, continuous and irreversible during the lifetime of the projects. The magnitude is therefore, considered to be **low**.

Sensitivity of the receptor

Subtidal habitat IEFs

2.11.8.48 The sensitivity of the subtidal IEFs (i.e. subtidal coarse and mixed sediments with diverse benthic communities IEF, mixed sediments dominated by brittlestars IEF, sand and muddy sand communities with polychaetes and bivalves IEF, Annex I low resemblance stony reef (outside an SAC) IEF and Constable Bank (Annex I sandbank outside an SAC) IEF) is as described previously for the construction phase assessment for the Mona Offshore Wind Project alone in paragraph 2.9.7.17 to 2.9.7.22 and above in Table 2.25.

2.11.8.49 The subtidal coarse and mixed sediments with diverse benthic communities IEF, mixed sediments dominated by brittlestars IEF, sand and muddy sand communities with polychaetes and bivalves IEF, Annex I low resemblance stony reef (outside an SAC) IEF and Constable Bank (Annex I sandbank outside an SAC) IEF are deemed to be of low vulnerability, high recoverability and national value. The sensitivity of the receptor is therefore, considered to be **negligible**.

2.11.8.50 The seapens and burrowing megafauna communities IEF are deemed to be of high vulnerability, low recoverability and national value. The sensitivity of the receptor is therefore considered to be **high** (reduced to **medium** in absence of seapens).

Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC

2.11.8.51 The sensitivity of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC designated feature IEFs (i.e. Annex I sandbanks, Annex I subtidal reefs, Annex I intertidal reefs) is as described previously for the construction phase assessment for the Mona Offshore Wind Project alone in paragraph 2.9.9.39 to 2.9.3.33 and above in Table 2.25.

2.11.8.52 The Annex I sandbanks IEF and Annex I subtidal reefs IEF of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC are deemed to be of low vulnerability, high recoverability and international value. The sensitivity of the receptor is therefore considered to be **negligible**.

Significance of effect

Subtidal habitat IEFs

2.11.8.53 Overall, for the subtidal coarse and mixed sediments with diverse benthic communities IEF, mixed sediments dominated by brittlestars IEF, sand and muddy sand communities with polychaetes and bivalves IEF, Annex I low resemblance stony reef (outside an SAC) IEF and Constable Bank (Annex I sandbank outside an SAC) IEF the magnitude of the cumulative changes in physical processes impact during the decommissioning phase is deemed to be negligible and the sensitivity of the receptor is considered to be negligible. The effect will, therefore, be of **negligible** significance, which is not significant in EIA terms.

2.11.8.54 Overall, for the seapens and burrowing megafauna communities IEF the magnitude of the cumulative changes in physical processes impact during the decommissioning phase is deemed to be negligible and the sensitivity of the receptor is considered to be high (reducing to medium in the absence of seapens). The effect will, therefore, be of **minor adverse** significance, which is not significant in EIA terms. This conclusion is based on the ability of these habitat to recover following these activities, particularly as seapens have not been identified within the Mona benthic subtidal and intertidal ecology study area, and the small scale of the change in relation to the wider Mona benthic subtidal and intertidal ecology study area.

Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC

2.11.8.55 Overall, for the Annex I sandbanks IEF and Annex I subtidal reefs IEF of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC the magnitude of the cumulative changes in physical processes impact decommissioning phase is deemed to be low and the sensitivity of the receptor is considered to be negligible. The effect will, therefore, be of **negligible** significance, which is not significant in EIA terms. This significance has been assigned due to the minimal change to the physical environment which is unlikely to result in a change in conditions beyond the natural variation that these IEFs are adapted for.

2.11.9 Future monitoring

2.11.9.1 There is no monitoring proposed in relation to the cumulative impacts associated with the Mona Offshore Wind Project.

2.12 Transboundary effects

2.12.1.1 A screening of transboundary impacts has been carried out and has identified that there was no potential for significant transboundary effects with regard to benthic subtidal and intertidal ecology from the Mona Offshore Wind Project upon the interests of other states.

2.13 Inter-related effects

2.13.1.1 Inter-relationships are considered to be the impacts and associated effects of different aspects of the proposal on the same receptor. These are considered to be:

- Project lifetime effects: Assessment of the scope for effects that occur throughout more than one phase of the Mona Offshore Wind Project (construction, operational and maintenance, and decommissioning), to interact to potentially create a more significant effect on a receptor than if just assessed in isolation in these three phases (e.g. subsea noise effects from piling, operational wind turbines, vessels and decommissioning)
- Receptor led effects: Assessment of the scope for all effects to interact, spatially and temporally, to create inter-related effects on a receptor. As an example, all effects on benthic subtidal and intertidal ecology, such as direct habitat loss or disturbance, increased concentrations of suspended sediments, may interact to produce a different, or greater effect on this receptor than when the effects are considered in isolation. Receptor-led effects may be short term, temporary or transient effects, or incorporate longer term effects.

2.13.1.2 A description of the likely interactive effects arising from the Mona Offshore Wind Project on benthic subtidal and intertidal ecology is provided in Volume 2, Chapter 11: Inter-related effects of the Environmental Statement.

2.14 Summary of impacts, mitigation measures and monitoring

2.14.1.1 Information on benthic subtidal and intertidal ecology within the benthic subtidal and intertidal ecology study area was collected through desktop studies and site specific surveys. The habitats within the Mona Array Area and Offshore cable Corridor were found to be widespread and an assessment has been undertaken to understand the impact of the Mona Offshore Wind Project on these habitats. The impact pathways assessed and the assessment itself was informed by stakeholder engagement.

- Table 2.36 presents a summary of the potential direct and indirect impacts, measures adopted as part of the Mona Offshore Wind Project and residual effects in respect to benthic subtidal and intertidal ecology. The impacts assessed include: temporary habitat loss/disturbance, increased SSC and associated deposition, disturbance/remobilisation of sediment-bound contaminants, long term habitat loss/habitat alteration, colonisation of hard structures, increased risk of introduction and spread of INNS, removal of hard substrates, changes in physical processes, EMF from subsea electrical cabling and heat from subsea electrical cables. **For all of the impacts, phases and IEFs it is concluded that there will be no significant effects arising from the Mona Offshore Wind Project during the construction, operations and maintenance or decommissioning phases.**
- Table 2.37 presents a summary of the potential cumulative impacts, mitigation measures and residual effects. The cumulative impacts assessed include: temporary habitat loss/disturbance, increased SSC and associated deposition, long term habitat loss/habitat alteration, colonisation of hard structures, increased risk of introduction and spread of INNS and changes in physical processes. **For all of the cumulative impacts, phases and IEFs it is concluded that there will be no significant effects arising from the Mona Offshore Wind Project alongside other projects/plans.**
- **No potential transboundary impacts have been identified in regard to effects of the Mona Offshore Wind Project.**

Table 2.36: Summary of potential environmental effects, mitigation and monitoring.

[a] C=construction, O=operational and maintenance, D=decommissioning

Description of impact	Phase[a]			Measures adopted as part of the Mona Offshore Wind Project	Magnitude of impact	Sensitivity of the receptor	Significance of effect	Further mitigation	Residual effect	Proposed monitoring
	C	O	D							
Temporary habitat loss/disturbance	✓	✓	✓	• A 50 m exclusion buffer will be in place to avoid the *Sabellaria alveolata* reef and *Mytilus edulis* bed at the landfall. • Development and adherence to a Landfall construction method statement (in accordance with the Outline Landfall construction method statement (Document Reference J26.14)) which commits to the installation of Mona export cables via trenchless techniques under the intertidal area from below MLWS, where the exit pits will be located, to onshore. • An ECoW will supervise any planned construction works in the intertidal zone. • All construction and operation and maintenance activities at the Mona landfall (i.e. trenchless techniques working areas and movement of machinery, equipment and personnel) will be located	Subtidal IEFs C: Low O: Negligible D: Low Menai Strait and Conwy Bay SAC IEFs C: Low O: Negligible D: Low Intertidal IEFs C: Low D: Low	Subtidal IEFs • Medium - High Menai Strait and Conwy Bay SAC IEFs • Medium Intertidal IEFs • Negligible - High	Subtidal IEFs C: Minor adverse O: Minor adverse D: Minor adverse Menai Strait and Conwy Bay SAC IEFs C: Minor adverse O: Minor adverse D: Minor adverse Intertidal IEFs C: Minor adverse D: Minor adverse	None	C: Minor adverse O: Minor adverse D: Minor adverse	None

Description of impact	Phase[a] C	O	D	Measures adopted as part of the Mona Offshore Wind Project	Magnitude of impact	Sensitivity of the receptor	Significance of effect	Further mitigation	Residual effect	Proposed monitoring
				outside the clay with piddocks IEF. • Development and adherence to an Offshore CMS which includes a CSIP that will only permit sandwave clearance on the Constable Bank within the swept path area (20 m) of the cable burial tool. • Development and adherence to an Offshore CMS which includes a CSIP that does not permit sandwave clearance within the Menai Strait and Conwy Bay SAC.						
Increased SSC and associated deposition	✓	✓	✓	• Development and adherence to an Offshore CMS which includes a CSIP that will only permit sandwave clearance on the Constable Bank within the swept path area (20 m) of the cable burial tool. • Development and adherence to an Offshore CMS which includes a CSIP that does not permit sandwave clearance within the Menai Strait and Conwy Bay SAC.	<u>Subtidal IEFs</u> C: Low O: Negligible D: Negligible <u>Menai Strait and Conwy Bay SAC IEFs</u> C: Negligible - Low O: Negligible D: Negligible <u>Intertidal IEFs</u> C: Low	<u>Subtidal IEFs</u> • Negligible - Medium <u>Menai Strait and Conwy Bay SAC IEFs</u> • Low - Medium <u>Intertidal IEFs</u> • Negligible - Medium	<u>Subtidal IEFs</u> C: Negligible - Minor adverse O: Negligible D: Negligible - Minor adverse <u>Menai Strait and Conwy Bay SAC IEFs</u> C: Negligible - Minor adverse O: Negligible D: Negligible	None	C: Negligible - Minor adverse O: Negligible D: Negligible - Minor adverse	None

Description of impact	Phase[a]			Measures adopted as part of the Mona Offshore Wind Project	Magnitude of impact	Sensitivity of the receptor	Significance of effect	Further mitigation	Residual effect	Proposed monitoring
	C	O	D							
				• Development and adherence to an Offshore CMS which includes a CSIP which requires material arising from drilling and/or sandwave clearance to be deposited in close proximity to the works.	D: Negligible		Intertidal IEFs C: Negligible - Minor adverse D: Negligible - Minor adverse			
Disturbance/remobilisation of sediment-bound contaminants	✓	×	✓	• Development and adherence to an Offshore CMS which includes a CSIP that will only permit sandwave clearance on the Constable Bank within the swept path area (20 m) of the cable burial tool. • Development and adherence to an Offshore CMS which includes a CSIP that does not permit sandwave clearance within the Menai Strait and Conwy Bay SAC.	Subtidal IEFs C: Negligible D: Negligible Menai Strait and Conwy Bay SAC IEFs C: Negligible D: Negligible	Subtidal IEFs • Low Menai Strait and Conwy Bay SAC IEFs • Low	Subtidal IEFs C: Negligible D: Negligible Menai Strait and Conwy Bay SAC IEFs C: Negligible D: Negligible	None	C: Negligible D: Negligible	None
Long term habitat loss/habitat alteration	✓	✓	✓	• Development and adherence to an Offshore CMS which includes a CSIP that does not permit the percentage of export cable requiring cable protection to exceed 10% of the total length of the export cable within the	Subtidal IEFs C and O: Low D: Low Menai Strait and Conwy Bay SAC IEFs C and O: Low D: Low	Subtidal IEFs • High Menai Strait and Conwy Bay SAC IEFs • High	Subtidal IEFs C and O: Minor adverse D: Minor adverse Menai Strait and Conwy Bay SAC IEFs	None	C and O: Minor adverse D: Minor adverse	None

Description of impact	Phase[a]			Measures adopted as part of the Mona Offshore Wind Project	Magnitude of impact	Sensitivity of the receptor	Significance of effect	Further mitigation	Residual effect	Proposed monitoring
	C	O	D							
				Menai Strait and Conwy Bay SAC. • Development and adherence to an Offshore CMS which includes a CSIP that does not permit the installation of cable protection within Constable Bank. • Development and adherence to an Offshore CMS including a CSIP which will include cable burial where possible and cable protection. • A 50 m exclusion buffer will be in place to avoid the *Sabellaria alveolata* reef and *Mytilus edulis* bed at the landfall. • All construction and operation and maintenance activities at the Mona landfall (i.e. trenchless techniques working areas and movement of machinery, equipment and personnel) will be located outside the clay with piddocks IEF. • An ECoW will supervise any planned construction works in the intertidal zone.			C and O: Minor adverse D: Minor adverse			

Description of impact	Phase[a] C	O	D	Measures adopted as part of the Mona Offshore Wind Project	Magnitude of impact	Sensitivity of the receptor	Significance of effect	Further mitigation	Residual effect	Proposed monitoring
Introduction of artificial structures	✓	✓	×	None	Subtidal IEFs C and O: Low D: Low Menai Strait and Conwy Bay SAC IEFs C and O: Low D: Low	Subtidal IEFs • High Menai Strait and Conwy Bay SAC IEFs • High	Subtidal IEFs C and O: Minor adverse D: Minor adverse Menai Strait and Conwy Bay SAC IEFs C and O: Minor adverse D: Minor adverse	None	C and O: Minor adverse D: Minor adverse	None
Increased risk of introduction and spread of INNS	✓	✓	✓	• Development of, and adherence to, an Offshore EMP. This will include a Biosecurity Risk Assessment and an INNS Management Plan, including actions to minimise INNS.	Subtidal IEFs C: Low O: Low D: Low Menai Strait and Conwy Bay SAC IEFs C: Low O: Low D: Low	Subtidal IEFs • High Menai Strait and Conwy Bay SAC IEFs • High	Subtidal IEFs C: Minor adverse O: Minor adverse D: Minor adverse Menai Strait and Conwy Bay SAC IEFs C: Minor adverse O: Minor adverse D: Minor adverse	None	C: Minor adverse O: Minor adverse D: Minor adverse	None

Description of impact	Phase[a] C	O	D	Measures adopted as part of the Mona Offshore Wind Project	Magnitude of impact	Sensitivity of the receptor	Significance of effect	Further mitigation	Residual effect	Proposed monitoring
Removal of hard substrates	×	×	✓	None	Subtidal IEFs D: Low Menai Strait and Conwy Bay SAC IEFs D: Low	Subtidal IEFs • Low Menai Strait and Conwy Bay SAC IEFs • Low - High	Subtidal IEFs D: Minor adverse Menai Strait and Conwy Bay SAC IEFs D: Minor adverse	None	D: Minor adverse	None
Changes in physical processes	×	✓	✓	• Development and adherence to an Offshore CMS which includes a CSIP that does not permit cable protection higher than 70 cm to be installed within in the Menai Strait and Conwy Bay SAC. • No more than 5% reduction in water depth (referenced to Chart Datum) will occur at any point along the Mona Offshore Cable Corridor without prior written approval from the Licensing Authority in consultation with the MCA. • Development and adherence to an Offshore CMS, which will include details of scour protection	Subtidal IEFs O: Low D: Negligible Menai Strait and Conwy Bay SAC IEFs O: Low D: Low Intertidal IEFs O: Negligible D: Negligible	Subtidal IEFs • Negligible – Medium Menai Strait and Conwy Bay SAC IEFs • Negligible Intertidal IEFs • Negligible – Medium	Subtidal IEFs O: Negligible – Minor adverse D: Negligible – Minor adverse Menai Strait and Conwy Bay SAC IEFs O: Negligible D: Negligible Intertidal IEFs O: Negligible D: Negligible	None	O: Negligible - Minor adverse D: Negligible – Minor adverse	None

Description of impact	Phase[a] C	O	D	Measures adopted as part of the Mona Offshore Wind Project	Magnitude of impact	Sensitivity of the receptor	Significance of effect	Further mitigation	Residual effect	Proposed monitoring
				management, to be used around offshore structures and foundations to reduce scour as much as is practical.						
EMF from subsea electrical cabling	×	✓	×	• Development and adherence to an Offshore CMS including a CSIP which will include cable burial where possible and cable protection.	Subtidal IEFs O: Negligible Menai Strait and Conwy Bay SAC IEFs O: Negligible	Subtidal IEFs • Negligible to medium Menai Strait and Conwy Bay SAC IEFs • Low	Subtidal IEFs O: Negligible Menai Strait and Conwy Bay SAC IEFs O: Negligible	None	O: Negligible	None
Heat from subsea electrical cables	×	✓	×	• Development and adherence to an Offshore CMS including a CSIP which will include cable burial where possible and cable protection.	Subtidal IEFs O: Negligible Menai Strait and Conwy Bay SAC IEFs O: Negligible	Subtidal IEFs • Negligible - Medium Menai Strait and Conwy Bay SAC IEFs • Low	Subtidal IEFs O: Negligible Menai Strait and Conwy Bay SAC IEFs O: Negligible	None	O: Negligible	None

Table 2.37: Summary of potential cumulative environmental effects, mitigation and monitoring.

[a] C=construction, O=operational and maintenance, D=decommissioning

Description of effect	Phase[a] C	O	D	Measures adopted as part of the Mona Offshore Wind Project	Magnitude of impact	Sensitivity of the receptor	Significance of effect	Further mitigation	Residual effect	Proposed monitoring
Tier 1										
Temporary habitat loss/disturbance	✓	✓	✓	• A 50 m exclusion buffer will be in place to avoid the *Sabellaria alveolata* reef and *Mytilus edulis* bed at the landfall. • Development and adherence to a Landfall construction method statement (in accordance with the Outline Landfall construction method statement (Document Reference J26.14)) which commits to the installation of Mona export cables via trenchless techniques under the intertidal area from below MLWS, where the exit pits will be located, to onshore. • An ECoW will supervise any planned construction works in the intertidal zone. • All construction and operation and maintenance activities at the Mona landfall (i.e. trenchless techniques working areas and movement of machinery, equipment and personnel) will be located outside the clay with piddocks IEF. • Development and adherence to an Offshore CMS which includes a CSIP that will only permit sandwave clearance on the Constable Bank within the swept	<u>Subtidal IEFs</u> C: Low O: Low <u>Menai Strait and Conwy Bay SAC IEFs</u> C: Low O: Negligible	<u>Subtidal IEFs</u> • Medium <u>Menai Strait and Conwy Bay SAC IEFs</u> • Medium	<u>Subtidal IEFs</u> C: Minor adverse O: Minor adverse <u>Menai Strait and Conwy Bay SAC IEFs</u> C: Minor adverse O: Minor adverse	None	C: Minor adverse O: Minor adverse	None

Description of effect	Phase[a] C	O	D	Measures adopted as part of the Mona Offshore Wind Project	Magnitude of impact	Sensitivity of the receptor	Significance of effect	Further mitigation	Residual effect	Proposed monitoring
				path area (20 m) of the cable burial tool. • Development and adherence to an Offshore CMS which includes a CSIP that does not permit sandwave clearance within the Menai Strait and Conwy Bay SAC.						
Increased SSC and associated deposition	✓	✓	✓	• Development and adherence to an Offshore CMS which includes a CSIP that will only permit sandwave clearance on the Constable Bank within the swept path area (20 m) of the cable burial tool. • Development and adherence to an Offshore CMS which includes a CSIP that does not permit sandwave clearance within the Menai Strait and Conwy Bay SAC. • Development and adherence to an Offshore CMS which includes a CSIP which requires material arising from drilling and/or sandwave clearance to be deposited in close proximity to the works.	Subtidal IEFs C: Low O: Negligible Menai Strait and Conwy Bay SAC IEFs C: Low O: Negligible	Subtidal IEFs • Negligible - Medium Menai Strait and Conwy Bay SAC IEFs • Low - Medium	Subtidal IEFs C: Negligible - Minor adverse O: Negligible Menai Strait and Conwy Bay SAC IEFs C: Negligible – Minor adverse O: Negligible	None	C: Negligible Minor adverse O: Negligible	None
Long term habitat loss/habitat alteration	✓	✓	✓	• Development and adherence to an Offshore CMS which includes a CSIP that does not permit the percentage of export cable requiring cable protection to exceed 10% of the total length of the export cable within the Menai Strait and Conwy Bay SAC.	Subtidal IEFs C and O: Low	Subtidal IEFs • High	Subtidal IEFs C and O: Minor adverse	None	C and O: Minor adverse	None

Description of effect	Phase[a] C	O	D	Measures adopted as part of the Mona Offshore Wind Project	Magnitude of impact	Sensitivity of the receptor	Significance of effect	Further mitigation	Residual effect	Proposed monitoring
				• Development and adherence to an Offshore CMS which includes a CSIP that does not permit the installation of cable protection within Constable Bank. • Development and adherence to an Offshore CMS including a CSIP which will include cable burial where possible and cable protection. • A 50 m exclusion buffer will be in place to avoid the *Sabellaria alveolata* reef and *Mytilus edulis* bed at the landfall. • All construction and operation and maintenance activities at the Mona landfall (i.e. trenchless techniques working areas and movement of machinery, equipment and personnel) will be located outside the clay with piddocks IEF. • An ECoW will supervise any planned construction works in the intertidal zone.						
Introduction of artificial structures	✓	✓	×	None	Subtidal IEFs C and O: Low D: Low	Subtidal IEFs • High	Subtidal IEFs C and O: Minor adverse D: Minor adverse	None	C and O: Minor adverse D: Minor adverse	None
Increased risk of introduction and spread INNS	✓	✓	✓	• Development of, and adherence to, an Offshore EMP. This will include a Biosecurity Risk	Subtidal IEFs C and O: Low	Subtidal IEFs • High	Subtidal IEFs C and O: Minor adverse	None	C and O: Minor adverse	None

Description of effect	Phase[a] C	O	D	Measures adopted as part of the Mona Offshore Wind Project	Magnitude of impact	Sensitivity of the receptor	Significance of effect	Further mitigation	Residual effect	Proposed monitoring
				Assessment and an INNS Management Plan, including actions to minimise INNS.						
Changes in physical processes	×	✓	✓	• Development and adherence to an Offshore CMS which includes a CSIP that does not permit cable protection higher than 70 cm to be installed within in the Menai Strait and Conwy Bay SAC. • No more than 5% reduction in water depth (referenced to Chart Datum) will occur at any point along the Mona Offshore Cable Corridor without prior written approval from the Licensing Authority in consultation with the MCA. • Development and adherence to an Offshore CMS, which will include details of scour protection management, to be used around offshore structures and foundations to reduce scour as much as is practical.	Subtidal IEFs O: Low D: Negligible Menai Strait and Conwy Bay SAC IEFs O: Low D: Low	Subtidal IEFs • Negligible - Medium Menai Strait and Conwy Bay SAC IEFs • Negligible - Medium	Subtidal IEFs O: Negligible - Minor adverse D: Negligible - Minor adverse Menai Strait and Conwy Bay SAC IEFs O: Negligible D: Negligible	None	O: Negligible - Minor adverse D: Negligible - Minor adverse	None
Tier 2										
Temporary habitat loss/disturbance	✓	✓	✓	• A 50 m exclusion buffer will be in place to avoid the *Sabellaria alveolata* reef and *Mytilus edulis* bed at the landfall. • Development and adherence to a Landfall construction method statement (in accordance with the Outline Landfall construction method statement (Document	Subtidal IEFs C: Low - Medium O: Low D: Low	Subtidal IEFs • Medium	Subtidal IEFs C: Minor adverse O: Minor adverse D: Minor adverse	None	C: Minor adverse O: Minor adverse D: Minor adverse	None

Description of effect	Phase[a] C	O	D	Measures adopted as part of the Mona Offshore Wind Project	Magnitude of impact	Sensitivity of the receptor	Significance of effect	Further mitigation	Residual effect	Proposed monitoring
				Reference J26.14)) which commits to the installation of Mona export cables via trenchless techniques under the intertidal area from below MLWS, where the exit pits will be located, to onshore. • An ECoW will supervise any planned construction works in the intertidal zone. • All construction and operation and maintenance activities at the Mona landfall (i.e. trenchless techniques working areas and movement of machinery, equipment and personnel) will be located outside the clay with piddocks IEF. • Development and adherence to an Offshore CMS which includes a CSIP that will only permit sandwave clearance on the Constable Bank within the swept path area (20 m) of the cable burial tool. • Development and adherence to an Offshore CMS which includes a CSIP that does not permit sandwave clearance within the Menai Strait and Conwy Bay SAC.						
Increased SSC and associated deposition	✓	✓	✓	• Development and adherence to an Offshore CMS which includes a CSIP that will only permit sandwave clearance on the Constable Bank within the swept path area (20 m) of the cable burial tool.	Subtidal IEFs C: Low O: Negligible D: Low	Subtidal IEFs • Negligible - Medium Menai Strait and Conwy Bay SAC IEFs	Subtidal IEFs C: Negligible – Minor adverse O: Negligible D: Negligible – Minor adverse	None	C: Negligible – Minor adverse	None

Description of effect	Phase[a] C	O	D	Measures adopted as part of the Mona Offshore Wind Project	Magnitude of impact	Sensitivity of the receptor	Significance of effect	Further mitigation	Residual effect	Proposed monitoring
				• Development and adherence to an Offshore CMS which includes a CSIP that does not permit sandwave clearance within the Menai Strait and Conwy Bay SAC. • Development and adherence to an Offshore CMS which includes a CSIP which requires material arising from drilling and/or sandwave clearance to be deposited in close proximity to the works.	Menai Strait and Conwy Bay SAC IEFs C: Low O: Negligible D: Low	• Low – Medium	Menai Strait and Conwy Bay SAC IEFs C: Negligible – Minor adverse O: Negligible D: Negligible - Minor adverse		O: Negligible D: Negligible – Minor adverse	
Long term habitat loss/habitat alteration	✓	✓	✓	• Development and adherence to an Offshore CMS which includes a CSIP that does not permit the percentage of export cable requiring cable protection to exceed 10% of the total length of the export cable within the Menai Strait and Conwy Bay SAC. • Development and adherence to an Offshore CMS which includes a CSIP that does not permit the installation of cable protection within Constable Bank. • Development and adherence to an Offshore CMS including a CSIP which will include cable burial where possible and cable protection. • A 50 m exclusion buffer will be in place to avoid the *Sabellaria alveolata* reef and *Mytilus edulis* bed at the landfall.	Subtidal IEFs C and O: Low D: Low	Subtidal IEFs • High	Subtidal IEFs C and O: Minor adverse D: Minor adverse	None	C and O: Minor adverse D: Minor adverse	None

Description of effect	Phase[a] C	O	D	Measures adopted as part of the Mona Offshore Wind Project	Magnitude of impact	Sensitivity of the receptor	Significance of effect	Further mitigation	Residual effect	Proposed monitoring
				• All construction and operation and maintenance activities at the Mona landfall (i.e. trenchless techniques working areas and movement of machinery, equipment and personnel) will be located outside the clay with piddocks IEF. • An ECoW will supervise any planned construction works in the intertidal zone.						
Introduction of artificial structures	✓	✓	×	None	Subtidal IEFs C and O: Low D: Low	Subtidal IEFs • High	Subtidal IEFs C and O: Minor adverse D: Minor adverse	None	C and O: Minor adverse D: Minor adverse	None
Increased risk of introduction and spread of INNS	✓	✓	✓	• Development of, and adherence to, an Offshore EMP. This will include a Biosecurity Risk Assessment and an INNS Management Plan, including actions to minimise INNS.	Subtidal IEFs C and O: Low D: Low	Subtidal IEFs • High	Subtidal IEFs C and O: Minor adverse D: Minor adverse	None	C and O: Minor adverse D: Minor adverse	None
Removal of hard substrates	×	×	✓	None	Subtidal IEFs D: Low	Subtidal IEFs • Low	Subtidal IEFs D: Minor adverse	None	D: Minor adverse	None
Changes in physical processes	×	✓	✓	• Development and adherence to an Offshore CMS which includes a CSIP that does not permit cable protection higher than 70 cm to be installed within in the Menai Strait and Conwy Bay SAC.	Subtidal IEFs O: Low D: Negligible	Subtidal IEFs • Negligible - Medium	Subtidal IEFs O: Negligible – Minor adverse D: Negligible – Minor adverse	None	O: Negligible – Minor adverse D: Negligible –	None

Description of effect	Phase[a] C	O	D	Measures adopted as part of the Mona Offshore Wind Project	Magnitude of impact	Sensitivity of the receptor	Significance of effect	Further mitigation	Residual effect	Proposed monitoring
				• No more than 5% reduction in water depth (referenced to Chart Datum) will occur at any point along the Mona Offshore Cable Corridor without prior written approval from the Licensing Authority in consultation with the MCA. • Development and adherence to an Offshore CMS, which will include details of scour protection management, to be used around offshore structures and foundations to reduce scour as much as is practical.	Menai Strait and Conwy Bay SAC IEFs O: Low D: Low	Menai Strait and Conwy Bay SAC IEFs • Negligible	Menai Strait and Conwy Bay SAC IEFs O: Negligible D: Negligible		Minor adverse	
Tier 3										
Temporary habitat loss/disturbance	✓	✓	✓	• A 50 m exclusion buffer will be in place to avoid the *Sabellaria alveolata* reef and *Mytilus edulis* bed at the landfall. • Development and adherence to an Outline Landfall construction method statement (in accordance with the Outline Landfall construction method statement (Document Reference J26.14)) which commits to the installation of Mona export cables via trenchless techniques under the intertidal area from below MLWS, where the exit pits will be located, to onshore. • An ECoW will supervise any planned construction works in the intertidal zone.	Subtidal IEFs C: Low - Medium O: Low	Subtidal IEFs • Medium	Subtidal IEFs C: Minor adverse O: Minor adverse	None	C: Minor adverse O: Minor adverse	None

Description of effect	Phase[a] C	O	D	Measures adopted as part of the Mona Offshore Wind Project	Magnitude of impact	Sensitivity of the receptor	Significance of effect	Further mitigation	Residual effect	Proposed monitoring
				• All construction and operation and maintenance activities at the Mona landfall (i.e. trenchless techniques working areas and movement of machinery, equipment and personnel) will be located outside the clay with piddocks IEF. • Development and adherence to an Offshore CMS which includes a CSIP that will only permit sandwave clearance on the Constable Bank within the swept path area (20 m) of the cable burial tool. • Development and adherence to an Offshore CMS which includes a CSIP that does not permit sandwave clearance within the Menai Strait and Conwy Bay SAC.						
Increased SSC and associated deposition	✓	✓	✓	• Development and adherence to an Offshore CMS which includes a CSIP that will only permit sandwave clearance on the Constable Bank within the swept path area (20 m) of the cable burial tool. • Development and adherence to an Offshore CMS which includes a CSIP that does not permit sandwave clearance within the Menai Strait and Conwy Bay SAC. • Development and adherence to an Offshore CMS which includes a CSIP which requires material arising from drilling and/or	<u>Subtidal IEFs</u> C: Low <u>Menai Strait and Conwy Bay SAC IEFs</u> C: Low	<u>Subtidal IEFs</u> • Negligible - Medium <u>Menai Strait and Conwy Bay SAC IEFs</u> • Low – Medium	<u>Subtidal IEFs</u> C: Negligible – Minor adverse <u>Menai Strait and Conwy Bay SAC IEFs</u> C: Negligible – Minor adverse	None	C: Negligible – Minor adverse	None

Description of effect	Phase[a] C	O	D	Measures adopted as part of the Mona Offshore Wind Project	Magnitude of impact	Sensitivity of the receptor	Significance of effect	Further mitigation	Residual effect	Proposed monitoring
				sandwave clearance to be deposited in close proximity to the works.						
Long term habitat loss/habitat alteration	✓	✓	✓	• Development and adherence to an Offshore CMS which includes a CSIP that does not permit the percentage of export cable requiring cable protection to exceed 10% of the total length of the export cable within the Menai Strait and Conwy Bay SAC. • Development and adherence to an Offshore CMS which includes a CSIP that does not permit the installation of cable protection within Constable Bank. • Development and adherence to an Offshore CMS including a CSIP which will include cable burial where possible and cable protection. • A 50 m exclusion buffer will be in place to avoid the Sabellaria alveolata reef and Mytilus edulis bed at the landfall. • All construction and operation and maintenance activities at the Mona landfall (i.e. trenchless techniques working areas and movement of machinery, equipment and personnel) will be located outside the clay with piddocks IEF. • An ECoW will supervise any planned construction works in the intertidal zone.	<u>Subtidal IEFs</u> C and O: Low	<u>Subtidal IEFs</u> High	<u>Subtidal IEFs</u> C and O: Minor adverse	None	C and O: Minor adverse	None

Description of effect	Phase[a] C	O	D	Measures adopted as part of the Mona Offshore Wind Project	Magnitude of impact	Sensitivity of the receptor	Significance of effect	Further mitigation	Residual effect	Proposed monitoring
Introduction of artificial structures	✓	✓	✓	None	Subtidal IEFs C and O: Low	Subtidal IEFs • High	Subtidal IEFs C and O: Minor adverse	None	C and O: Minor adverse	None
Increased risk of introduction and spread of INNS	✓	✓	✓	• Development of, and adherence to, an Offshore EMP. This will include a Biosecurity Risk Assessment and an INNS Management Plan, including actions to minimise INNS.	Subtidal IEFs • C and O: Low	Subtidal IEFs • High	Subtidal IEFs C and O: Minor adverse	None	C and O: Minor adverse	None
Removal of hard substrates	×	×	✓	• None	Subtidal IEFs D: Low	Subtidal IEFs • Low	Subtidal IEFs D: Minor adverse	None	D: Minor adverse	None

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