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MONA OFFSHORE WIND PROJECT

Preliminary Environmental Information Report

Volume 2, chapter 7: Benthic subtidal and intertidal ecology

Image of an offshore wind farm

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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.
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.
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.

Acronyms

Acronym	Description
AC	Alternating Current
Cefas	Centre for Environment, Fisheries and Aquaculture Science
CIEEM	Chartered Institute of Ecology and Environmental Management
CPT	Cone Penetration Test
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
EcoW	Ecological Clerk of Works
EIA	Environmental Impact Assessment
EMF	Electromagnetic Field
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
IMO	International Maritime Organisation
INNS	Invasive Non-Native Species

Acronym	Description
IPC	Infrastructure Planning Commission
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
MHWS	Mean High Water Springs
MLWS	Mean Low Water Springs
MMO	Marine Management Organisation
MPCP	Marine Pollution Contingency Plan
NMBAQC	National Marine Biological Analytical Quality Control Scheme
NPS	National Policy Statement
NRW	Natural Resources Wales
NRW (A)	Natural Resources Wales Advisory
NSIPs	Nationally Significant Infrastructure Project
OESEA	Offshore Energy Strategic Environmental Assessment
OSP	Offshore Substation Platform
OSPAR	The Convention for the Protection of the Marine Environment of the North-East Atlantic
PAH	Polycyclic Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyls
PEIR	Preliminary Environmental Information Report
SAC	Special Area of Conservation
sp	Species
SSC	Suspended Sediment Concentration
SPM	Suspended Particulate Matter
TSC	Isle of Man Territorial Sea Committee
TWT	The Wildlife Trust
WFD	Water Framework Directive
ZOI	Zone Of Influence

Units

Unit	Description
%	Percentage
mm	Millimetres
cm	Centimetres
m	Metres
km	Kilometres
m^2	Square metres
km^2	Square kilometres
m^3	Cubed metres
m/s	Metres per second
m/h	Metres per hour
m^3/h	Cubed metres per hour
mg/l	Milligrams per litre
kv	Kilovolts
mG	Milligauss
mV/cm	Millivolt per centimetre
μT	Microtesla
^oC	Degrees centigrade

7 Chapter 7 – Benthic subtidal and intertidal ecology

7.1 Introduction

7.1.1 Overview

7.1.1.1 This chapter of the Preliminary Environmental Information Report (PEIR) 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, operational and maintenance, and decommissioning phases. Those impacts of the Mona Offshore Wind Project landward of MHWS, with the exception of intertidal birds which includes to Mean Low Water Springs (MLWS), are addressed in volume 3, chapter 18: Onshore Ecology of the PEIR.

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

- Volume 2, chapter 6: Physical processes of the PEIR
- Volume 2, chapter 8: Fish and shellfish ecology of the PEIR.

7.1.1.3 This chapter also draws upon information contained within:

- Volume 6, annex 6.1: Physical processes technical report of the PEIR
- Volume 6, annex 7.1: Benthic ecology technical report of the PEIR.

7.1.2 Purpose of chapter

7.1.2.1 The primary purpose of the PEIR is outlined in volume 1, chapter 1: Introduction of the PEIR. In summary, the primary purpose of an Environmental Statement is to support the Development Consent Order (DCO) application for the Mona Offshore Wind Project under the Planning Act 2008 (the 2008 Act). The PEIR constitutes the Preliminary Environmental Information for the Mona Offshore Wind Project and sets out the findings of the Environmental Impact Assessment (EIA) to date to support the pre-application consultation activities required under the 2008 Act. The EIA will be finalised following completion of pre-application consultation and the Environmental Statement will accompany the application to the Secretary of State for Development Consent.

7.1.2.2 The PEIR forms the basis for statutory consultation which will last for 47 days and conclude on 4 June 2023 as outlined in volume 1, chapter 2: Policy and legislation of the PEIR. At this point, comments received on the PEIR will be reviewed and incorporated (where appropriate) into the Environmental Statement, which will be submitted in support of the application for Development Consent scheduled for quarter one of 2024.

7.1.2.3 In particular, this PEIR 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.

7.1.3 Study area

7.1.3.1 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 Zone Of Influence (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 7.1). The site-specific surveys within the Mona Array Area and at the landfall have been completed and were available to inform this chapter for the purposes of the PEIR. Further site-specific surveys were undertaken in the summer of 2022 to include the Mona Offshore Cable Corridor and the ZOI (Figure 7.1). A further intertidal survey is also planned for spring 2023 to characterise the east section of the landfall. This chapter will therefore be updated with this additional data for the final Environmental Statement following the completion of the data analysis.
- 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 7.1). It has been characterised by desktop data and provides a wider context to the site-specific data
- The CEA benthic subtidal and intertidal ecology study area has been defined as a 50km buffer around the Mona Array Area and Offshore Cable Corridor (Figure 7.8). This 50km 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 suspended sediment concentration (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.

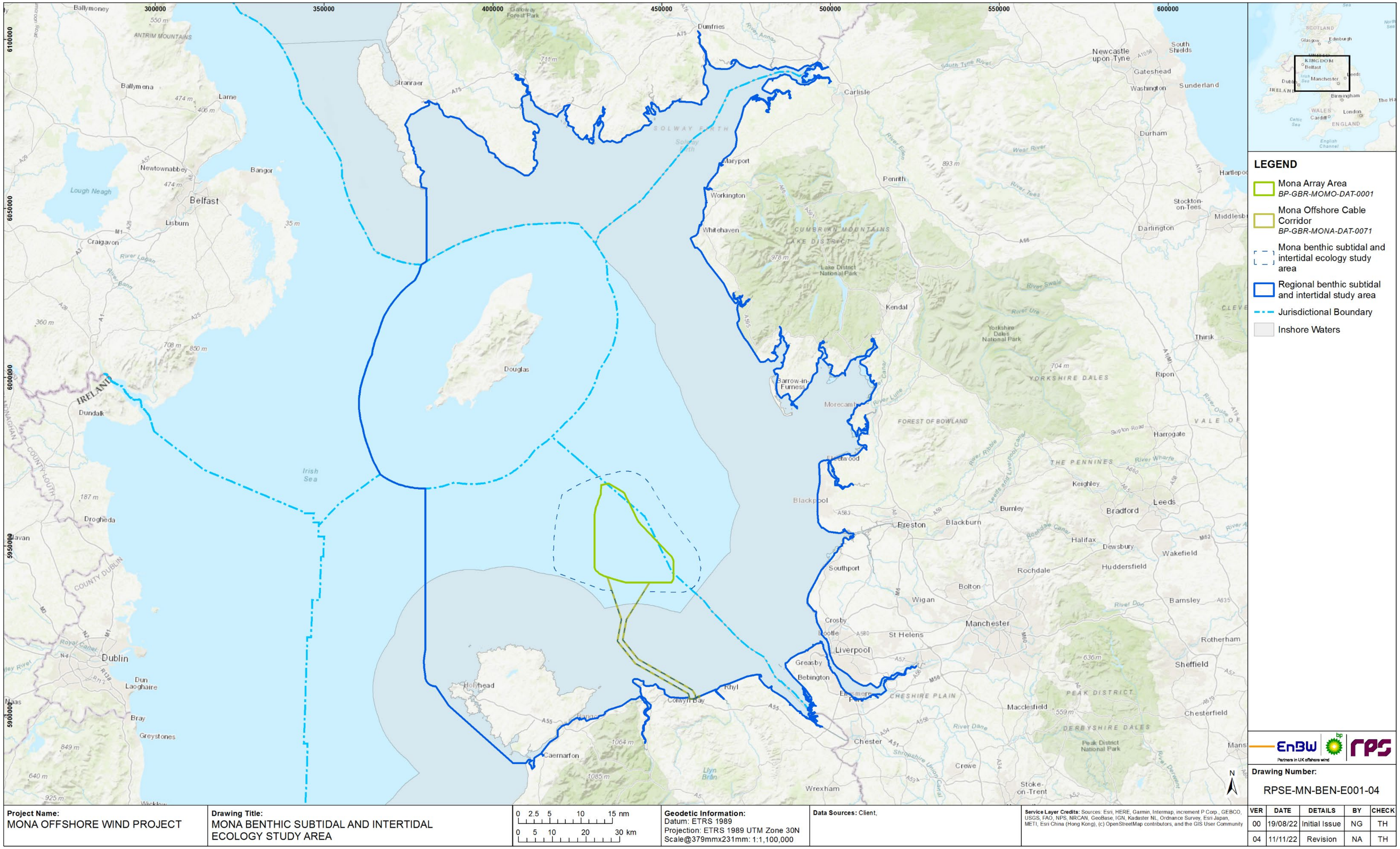


Figure 7.1: Benthic subtidal and intertidal ecology study areas.

7.2 Policy context

7.2.1 National Policy Statements

7.2.1.1 Planning policy on renewable energy infrastructure is presented in volume 1, chapter 2: Policy and legislation of the PEIR. Planning policy on offshore renewable energy Nationally Significant Infrastructure Projects (NSIPs), specifically in relation to benthic subtidal and intertidal ecology, is contained in the Overarching National Policy Statement (NPS) for Energy (EN-1; DECC, 2011a), and the NPS for Renewable Energy Infrastructure (EN-3, DECC, 2011b).

7.2.1.2 NPS EN-1 and NPS EN-3 include guidance on what matters are to be considered in the assessment. These are summarised in Table 7.1 below. 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 7.2 below.

7.2.1.3 Table 7.1 refers to the current NPSs, specifically NPS EN-1 (DECC, 2011a) and NPS EN-3 (DECC, 2011b). If the NPSs are updated prior to the application for Development Consent, the revised NPSs will be fully considered in relation to benthic subtidal and intertidal ecology within the Environmental Statement.

Table 7.1: Summary of the NPS EN-1 and NPS EN-3 provisions relevant to benthic subtidal and intertidal ecology.

Summary of NPS EN-3 and EN-1 provision	How and where considered in the PEIR
NPS EN-1	
The NPS aims to help the Infrastructure Planning Commission (IPC) consider thoroughly the potential effects of a proposed project in cases where the EIA Directive does not apply and an Environmental Statement is not therefore required, the applicant should instead provide information proportionate to the scale of the project on the likely significant environmental, social and economic effects. (NPS EN-1 paragraph 4.2.10)	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 (paragraph 7.6.2.1, Table 7.15) as this demonstrates a proportionate approach.
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 5.3.4)	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 7.7).
Marine Conservation Zones (MCZs) introduced under the Marine and Coastal Access Act 2009, are areas that have been designated for the purpose of conserving marine flora or fauna, marine habitats or types of marine habitat or features of geological or geomorphological interest. As a public authority, the IPC is bound by the duties in relation to MCZs imposed by sections 125 and 126 of the Marine and Coastal Access Act 2009. (NPS EN-1 paragraph 5.3.12)	MCZs have been taken account of through the identification of designated sites within the Mona benthic subtidal and intertidal study area (sections 7.4.3 and 7.4.6). As a result of this process no MCZs have been considered in this assessment.
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 • During construction and the operations and maintenance phase 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 and, where practicable, to create new habitats of value within the site landscaping proposals. (NPS EN-1 paragraph 5.3.18)	The Maximum Design Scenario (MDS) ensures that those assessing the Mona Offshore Wind Project are fully aware of the area which the Mona Offshore Wind Project will cover. It represents a realistic scenario without overcompensating for any one activity, in this sense it represents the minimum area required to work (section 7.6.1 and Table 7.14). Best practice during construction and maintenance will be set out in the Construction Method Statement and the Environmental Management Plan (Table 7.16). Following the completion of most activities sedimentary habitats will recover naturally (paragraph 7.8.1.6) and measures have been adopted for the Mona Offshore Wind Project to avoid direct impacts on sensitive habitats where recovery would be limited (section 7.7). 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 7.7).
NPS EN-3	
An assessment of the effects of installing cable across the intertidal zone should follow The Crown Estate's cable route protocol and include information, where relevant, about: • Any alternative landfall sites and cable installation methods that have been considered by the applicant during the design phase and an explanation for the final choice • 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 • Predicted rates at which the intertidal zone might recover from temporary effects, based on existing monitoring data. (NPS EN-3 paragraph 2.6.81)	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 chapter of the PEIR). Values for the potential habitat loss, disturbance from cable installation and maintenance and increased suspended sediments have been considered and quantified in the MDS (Table 7.14). 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 7.8.1).
Where cumulative effects on intertidal and subtidal 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 zone are minimised and installation and decommissioning phases are coordinated to ensure that disturbance is also reasonably minimised. (NPS EN-3 paragraph 2.6.89)	The project alone assessment MDS includes the impact of cable crossings where relevant (Table 7.14). Cumulative effects have been quantified and their significance assessed in section 7.10, including the impact of cables from other projects within the benthic subtidal and intertidal ecology CEA study area.

Summary of NPS EN-3 and EN-1 provision	How and where considered in the PEIR
The applicant should follow The Crown Estate's cable route protocol. 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 • Environmental appraisal of inter-array and export cable routes and installation/maintenance methods, including predicted loss of habitat due to predicted scour and scour protection • 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 (NPS EN-3 paragraph 2.6.113)	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 7.14). The effect of these impacts on the habitats within the Mona Array Area and Mona Offshore Cable Corridor has then been assessed throughout section 7.8. 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 7.8.1).

Table 7.2: 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 PEIR
NPS EN-1	
Its aim is to ensure a halting, and if possible, a reversal, of declines in priority habitats and species, with wild species and habitats as part of healthy, functioning ecosystems. (NPS EN-1 paragraph 5.3.5)	The conservation status of habitats and species is considered throughout this assessment and measures have been adopted to ensure impacts are reduced (section 7.7).
In having regard to the aim of the Government's biodiversity strategy the IPC should take account of the context of the challenge of climate change: failure to address this challenge will result in significant adverse impacts to biodiversity. (NPS EN-1 paragraph 5.3.6)	The future impact of climate change on the habitats in the east Irish Sea has been considered in section 7.4.8.
Developments should aim to avoid significant harm to biodiversity and geological conservation interests, including through mitigation and consideration of reasonable alternatives; where significant harm cannot be avoided, then appropriate compensation measures should be sought. (NPS EN-1 paragraph 5.3.7)	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.
In taking decisions, the IPC 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 5.3.8)	As part of this chapter the process of identifying designated sites has been undertaken for the Mona benthic subtidal and intertidal study area (sections 7.4.3 and 7.4.6). This was done to ensure all habitats, features and species of conservation importance were considered, where relevant, in this assessment.
NPS EN-3	
The conservation status of subtidal and intertidal habitat and species are of relevance to the Secretary of State. (NPS EN-3 paragraphs 2.6.84 and 2.6.115)	The conservation status of habitats and species has been considered in the designation of the importance of Important Ecological features (IEFs) which can be seen in Table 7.9.
The Secretary of State should be satisfied that cable installation and decommissioning has been designed sensitively, taking into account intertidal habitats. (NPS EN-3 paragraph 2.6.81)	The methods of cable installation and decommissioning and a quantification of the associated impacts is presented in the MDS (Table 7.14). The effect of these impacts on relevant habitats has been considered throughout section 7.8. Additionally, measures have been adopted to survey for sensitive features such as *Sabellaria spinulosa* and microsite around them where reasonably practicable (Table 7.16).
The Secretary of State should be satisfied that activities have been designed considering sensitive subtidal environmental aspects. (NPS EN-3 paragraph 2.6.116)	The effect of impacts related to the design of the Mona Offshore Wind Project have been assessed in section 7.8. This included the consideration of the sensitivity of the relevant subtidal habitats and the consideration of mitigation where necessary. An expert working group (EWG) has been set up with the statutory nature conservation bodies (SNCBs) to discuss, amongst other things, sensitive subtidal environmental aspects.

7.2.2 Welsh National Marine Plan

7.2.2.1 The Mona Offshore Wind Project predominantly sits in Welsh waters and therefore Welsh plans such as the relevant 2019 Welsh National Marine Plan (Welsh Government, 2019) have been considered. Key provisions are set out in Table 7.3 along with details as to how these have been addressed within the assessment.

Table 7.3: 2019 Welsh National Marine Plan policies of relevance to benthic subtidal and intertidal ecology.

Policy	Key provisions	How and where considered in the PEIR
• 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 7.8 and 7.9). Consideration of the impact of the Mona Offshore Wind Project on designated sites is considered in section 7.4.6 and those which have the potential to be impacted have been considered throughout this assessment.

Policy	Key provisions	How and where considered in the PEIR
• 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 7.8.6.
• 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 7.8 and 7.9).
• 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 7.8.1 and 7.8.4). These impacts consider pressures such as changes in substrate or seabed type and the 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 7.8.8). 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 impacts (section 7.8.3). This section evaluated the impact of historical contaminant on habitats and identified no significant effects.

7.2.3 North West Inshore and North West Offshore Coast Marine Plans

7.2.3.1 The Mona Offshore Wind Project predominantly sits in Welsh waters however a very small proportion of the Mona Array Area and ZOI overlap with English waters and therefore English plans such as the relevant Offshore Coast Marine Plan have been considered. The assessment of potential changes to benthic subtidal and intertidal ecology has, therefore, been made with consideration to the specific policies set out in the North West Inshore and North West Offshore Coast Marine Plans (MMO, 2021). Key provisions are set out in Table 7.4 along with details as to how these have been addressed within the assessment.

Table 7.4: 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 PEIR
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 7.1: Benthic ecology technical report of the PEIR), designated sites within the Mona benthic subtidal and intertidal study area have been identified (sections 7.4.3 and 7.4.6). 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 7.4.3 and 7.4.6). 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 Mona Offshore Wind Project will aim to conserve habitat through a number of measures adopted to reduce the impact of the Mona Offshore Wind Project (section 7.7).
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.
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 7.8 considers the magnitude, sensitivity and significance of the impacts associated with the Mona Offshore Wind Project on the relevant subtidal and intertidal IEFs. Additionally considering mitigation 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 Environmental Management Plan as part of the measures adopted by the Mona Offshore Wind Project (section 7.7 and Table 7.16) 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 7.10. This section includes the consideration of mitigation where the significance is found to be moderate or major.

7.3 Consultation

7.3.1.1 A summary of the key issues raised during consultation activities undertaken to date specific to benthic subtidal and intertidal ecology is presented in Table 7.5 below, together with how these issues have been considered in the production of this PEIR chapter.

7.3.1 Evidence plan

7.3.1.1 The purpose of the Evidence Plan process is to discuss and where possible 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, with Natural Resources Wales (NRW), Natural England, the Marine Management Organisation (MMO), the Joint Nature Conservation Committee (JNCC), the Centre for Environment, Fisheries and Aquaculture Science (Cefas), Environment Agency and The North West Wildlife Trust (TWT). The Evidence Plan seeks to ensure compliance with the Habitat Regulations Assessment (HRA) and EIA.

7.3.1.2 Discussion to date regarding benthic ecology with consultees via the benthic ecology, fish and shellfish and physical process EWG has focussed on providing consultees with information on the benthic subtidal surveys within the Mona Array Area which were undertaken in 2021. It was stated that the results of these surveys would be used to characterise the seabed sediments and habitats. Key comments from stakeholders on the scope of the 2021 Mona Array Area benthic survey included the absence of site-specific sampling with the ZOI, which was subsequently undertaken as part of the 2022 summer sampling campaign, together with sampling of the ZOI around the Mona Array Area. A further update on the 2022 benthic surveys was provided including the methods and sampling locations within the ZOI. The 2022 summer survey campaign also surveyed the Mona Offshore Cable Corridor, the sample plan for which was discussed with the EWG through correspondence. Stakeholders were keen to get early sight of this. Stakeholders were also informed that a Phase I intertidal walkover survey would be undertaken at each of the landfalls and received the scope of the survey.

7.3.1.3 Following the distribution of the 2022 survey scope the following responses were provided by the stakeholders:

- NRW – agreed in general with the sampling strategy proposed and the broadscale habitats described by the geophysical data. They provided guidance on the number of samples per habitat and sought clarification regarding sampling in the south of the ZOI and sample spacing in the ZOI. NRW also welcomed the avoidance of sensitive features as part of the grab sampling strategy and they made recommendations should a grab fail due to the presence of *Sabellaria spinulosa* reefs. They also welcomed the use of DNA metabarcoding analysis and were content with the approach for the Intertidal Phase 1 Walkover Survey. Natural England – welcomed that the survey scope was flexible based on data acquisition and adjustments can be made to ensure that all habitat types and sensitive habitats are appropriately sampled. They suggested sample stations should be located to allow ground truthing of the indicative habitats and sample stations should be increased should habitats differ from those expected. Transitional habitats should also be captured in this sampling plan. They welcomed that camera surveys will include both stills and video. They welcomed that eDNA procedure and physico-chemical sampling will be in line with appropriate guidance and that sensitive habitats will be avoided for grab sampling
- JNCC – requested clarification regarding the number of sample stations. They requested that the outcome of resampling at stations with low resemblance reefs could be shared. They commended the applicant and surveyors on their intentions to return *Arctica islandica* to the seabed and recommended this is done carefully. JNCC recognised that the initial station selection was based on available geophysical data and noted that necessary changes will be made on the receipt of new geophysical data

Table 7.5: 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 were considered in this chapter
November 2021	NRW, Natural England, MMO, JNCC and Planning Inspectorate - consultation meeting	If the intention was to cover the wider designations in the evidence plan, it was advised that the applicant look at the MCZ Stage 2 assessment and Measures of Equivalent Environmental Benefit (MEEB) requirements.	An MCZ screening was undertaken prior to the start of the benthic subtidal and intertidal ecology chapter and no MCZs were taken forward for a stage 2 assessment. MEEB have been considered where the SNCBs have requested.
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 saltmarsh habitats are considered under offshore EWGs. Benthic habitats can occur in the intertidal area up to MHWS, therefore would fall under the benthic ecology and fish and shellfish EWG. There will be some double counting between onshore and marine planning limits as onshore planning limits go down to MLWS.
February 2022	Natural England, MMO, JNCC Environment Agency, NRW, Cefas and TWT - 1st benthic ecology, fish and shellfish and physical process EWG	NRW requested to be consulted on the export cable corridor. They wanted to know why the route has been chosen and what has been considered within the process to choose the route.	The Mona Offshore Wind Project has not got a defined cable routes. The POI for the Mona Offshore Wind Project would be determined by National Grid. In parallel, the Applicants has been investigating potential Point of Interconnection (POIs) and there has been some cable routeing investigations undertaken to allow the Applicants to proceed with the POIs at the earliest opportunity once they have been identified by National Grid. The scoping report would detail the POI and a wider cable search area. The Applicants would further provide the SNCBs with the rational for identification of the proposed export cable corridor from within the wider cable search area.
		Natural England and JNCC have been working on best practice guidance which has been published on a Natural England SharePoint site to inform external stakeholders (Natural England, 2022). The Applicants should review this guidance.	The draft guidance has been reviewed and it has been taken into account in the evidence plan process.
March 2022	JNCC - EWG Meeting Response	JNCC noted the presence and initial analysis of sea-pen and burrowing megafauna communities within the array area and welcomed the opportunity to review the assessment of this feature. JNCC provided information which may prove useful in further analysis.	The presence of this feature was assessed Gardline following the 2021 site specific survey, a summary of these results can be found in volume 6, annex 7.1: Benthic ecology technical report of the PEIR. The results concluded that the habitats within the Mona Array Area had only a negligible resemblance to the seapens and burrowing megafauna habitat.
		JNCC also noted the presence of habitat which is being categorised as "low" resemblance to rocky reef habitat and provided guidance to ensure JNCC Report 6562 published in September 2020 is considered in the assessment of this habitat.	An assessment of the stony reefs present in the Mona Array Area was undertaken by Gardline following the 2021 site specific survey. A summary of these results can be found in volume 6, annex 7.1: Benthic ecology technical report of the PEIR.
April 2022	MMO - EWG Meeting Response	They requested confirmation that the benthic grab samples collected in relation to the developments will be processed to the recommended national processing guidelines (Worsfold and Hall, 2010) and that the resultant data be made available as soon as possible.	All macrofauna processing was done in line with the National Marine Biological Analytical Quality Control Scheme (NMBAQC) Processing Requirements Protocol.
		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 will expect 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 7.9, non-native invasive species assessed in section 7.8.6, electromagnetic fields have been assessed in section 7.8.9).
April 2022	NRW Advisory (A) - 2022 Survey Scope Response	In general, NRW (A) advised a minimum of one sample station per broadscale habitat (EUNIS L3/L4), and where the indicative habitat areas are extensive, the minimum number of sample stations per habitat type should be increased accordingly to provide sufficient coverage of that habitat type.	The sampling strategy ensured that a minimum of one sample station per broadscale habitat was undertaken with the most prevalent habitats having the most sample stations.

Date	Consultee and type of response	Issues raised	Response to issue raised and/or were considered in this chapter
April 2022	NRW (A) - 2022 Survey Scope Response	NRW (A) noted that the plan did not include proposed targets for sampling within the Export Cable Route (ECR) scoping areas as the final ECR had not yet been defined. NRW (A) broadly agree with the sampling at 1–2km spacing, but advised that in nearshore/ intertidal areas, the sampling frequency may need to be greater than this.	This advice was considered when designing 2022 survey strategy. To date, only the site-specific surveys within the Mona Array Area and at the landfall have been completed and were available to inform this chapter for the purposes of the PEIR. Further site-specific surveys were undertaken in the summer of 2022 to include the Mona Offshore Cable Corridor and the ZOI (Figure 1.1). The results of these surveys will be consulted on through the EWG prior to application and this chapter will be updated with this additional data for the final Environmental Statement.
April 2022	NRW (A) - 2022 Survey Scope Response	NRW (A) welcomed the avoidance of sensitive features such as biogenic reef. If sensitive habitats (i.e. *Sabellaria spinulosa* reef, *Sabellaria alveolata* reef, *Modiolus* etc.) are encountered during grab sampling, NRW (A) advised that any replicate grab samples should be moved a sensible distance from the sensitive habitat e.g. 50m, or at the discretion of the monitoring officer, based on survey specificity and sensitivity of the habitat.	All sample stations were preceded by drop down video (DDV) to identify habitat and determine sensitivity. Some stations were moved based on the sediment or habitat encountered (section 7.4.9 and volume 6, annex 7.1: Benthic ecology technical report of the PEIR).
December 2022	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 will be revisited for the final Environmental Statement.
April 2022	Natural England - 2022 Survey Scope Response	Natural England welcomed: • The wider scope of the survey areas included in the 2022 primarily the ZOI for the array areas, which has been defined as the array area plus a buffer of one tidal excursion. • The survey scope remained flexible to ensure that there was appropriate coverage of all habitat types and sensitive features. • That camera survey consisted of both stills and video was undertaken and extended to map condition. • That the survey sampling methods remained the same as with those set out and agreed by Natural England for the previous surveys in 2021, allowing for data comparison. • The additional information on the analysis of the physio-chemical samples in accordance with MMO specifications and hydrocarbons analysis as set out in the report. • That eDNA procedures were in line with those set out to the UK Marine DNA Working Group. • The avoidance of sensitive habitats (i.e. *Sabellaria* sp.) and the detail for recording *Arctica islandica*. • That Golding *et al.* (2020) refinement of the criteria for defining areas with low resemblance to stony reef was taken into consideration in the analysis. • The consideration of species of conservation interest. • Commended bp, EnBW and Gardline on their intentions to return individual *A. islandica* to the sea and recommended that individuals be returned carefully to the seabed, in a suitable habitat.	No response required.
		The sampling stations should be suitably located and representative to allow ground truthing of the indicative habitats. Should habitats encountered differ from those expected based on the geophysical data acquired then we would expect to see an increase in sample stations to ensure that all potential habitats are sampled and mapped. The stations should ensure sampling of all habitats and particularly transitions between habitats.	The sample stations have been located to sample the full range of habitats expected to occur in the Mona Array Area, the Mona Offshore Cable Corridor and ZOI. As noted in the previous comment the survey scope remained flexible to allow for the addition of sample stations if necessary, based on the future data.

Date	Consultee and type of response	Issues raised	Response to issue raised and/or were considered in this chapter
April 2022	JNCC - 2022 Survey Scope Response	Requested clarity on whether the 50 stations for co-located camera and sediment sampling across the Morgan and Mona Offshore Wind Projects Array Areas and ZOIs were the combined total for both projects or 50 stations per project. |JNCC recommended that the number of sample sites not be capped at 50 and should instead be based on geophysical evidence.	As noted in previous consultation the scope of works remained flexible so that sample stations could be added based on future data analysis such as geophysical data.
		JNCC noted that until further information from geophysical acquisition is complete the information gathered to date will be used as the basis for initial station selection. JNCC assumed and recommended that any necessary changes be made on receipt of new geophysical data.	As noted in previous consultation the scope of works remained flexible so that sample stations could be added based on future data such as geophysical data.
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 Assessment2 (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 7.1: Benthic ecology technical report of the PEIR). 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 7.6 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 7.1 and volume 6, annex 7.1: Benthic ecology technical report of the PEIR).
		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 Manx Marine Environmental Assessment has now been added to the key desktop sources table (Table 7.6) and used to characterise the waters around the isle of Man in volume 6, annex 7.1: Benthic ecology technical report of the PEIR.
May 2022	NRW (A) - Scoping Opinion	NRW (A) suggested adding the following data sources to Parts 2 and 3: Table 4.1 Summary of key desktop datasets and reports: • Lle Geo-Portal for Wales: Lle - Home (gov.wales) • Data Map Wales: Home | DataMapWales (gov.wales)	These sources have been considered and added to the key desktop resource table (Table 7.6) and used to characterise the environment on the north coast of Wales in volume 6, annex 7.1: Benthic ecology technical report of the PEIR.
		NRW (A) advised that Table 4.3 Relevant protected benthic species and habitats should have also included Annex I features outside Special Areas of Conservation (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). They will be considered in the Environmental Statement chapter should any activities interact with these habitats.
		Noted that all reference to 'Cobble reef' should be amended to 'Stony reef' as this is the correct habitat name/definition under the Habitats Directive.	Reference to cobble reef have been changed to stony reef throughout this report and in volume 6, annex 7.1: Benthic ecology technical report of the PEIR.
		NRW did not agree that the potential impacts from Electromagnetic Fields (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 7.8.9.
		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 7.8.6.
		NRW advised that habitat alteration is scoped in during the operations and maintenance phase.	Effects of habitat creation and colonisation on benthic receptors are assessed in section 7.8.5 and changes in physical processes is assessed in section 7.8.8.
		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 7.8.10.
		When assessing removal of hard substrate, the applicant should 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 colonisation of hard substrate impact assessment (section 7.8.7).

Date	Consultee and type of response	Issues raised	Response to issue raised and/or were considered in this chapter
		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.	Considerations for Little Ormes Head SSSI can be found in section 7.4.6.
		NRW (A) advised that the potential to release bacteria from sediment at landfall should also be scoped into the project assessment.	The Applicant proposes that this is best addressed in the post-consent phase as this will ensure a more realistic measurement of the contamination present in the areas to be impacted just prior to disturbance.
June 2022	Natural England - Scoping Opinion	Natural England advised that there may be additional data available from Channel Coast Observatory, North West and North Wales Shoreline Management Plan, and Environment Agency LiDAR data which should be reviewed and included in the ES.	These sources have been reviewed and data has been included where relevant to benthic subtidal and intertidal ecology in the volume 6, annex 7.1: Benthic ecology technical report of the PEIR.
June 2022	The Planning Inspectorate - Scoping Opinion	The generation assets 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 (volume 6, annex 7.1: Benthic ecology technical report of the PEIR).

7.4 Baseline environment

7.4.1 Methodology to inform baseline

7.4.2 Desktop study

7.4.2.1 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 7.6 below.

Table 7.6: Summary of key desktop reports.

Title	Source	Year	Author
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 Marine Protected Area (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	Natural Resources Wales
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
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.

7.4.3 Identification of designated sites

7.4.3.1 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 Mona benthic subtidal and intertidal ecology study area were identified using a number of sources. These sources included the Department for Environment, Food and Rural Affairs (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 6: Physical processes of the PEIR).

7.4.4 Site specific surveys

7.4.4.1 In order to inform the PEIR, site-specific surveys were undertaken, as agreed with the JNCC, NRW and Natural England (see Table 7.5 for further details). A summary of the surveys undertaken to inform the benthic subtidal and intertidal ecology impact assessment is outlined in Table 7.7 below.

Table 7.7: Summary of site-specific survey data.

Title	Extent of survey	Overview of survey	Survey contractor	Date	Reference to further information
Geophysical survey	Mona Array Area	Geophysical survey to establish bathymetry, seabed sediment and identify seabed features.	XOcean Ltd	June 2021 - March 2022	XOCEAN (2022) and volume 6, annex 6.1: Physical processes technical report of the PEIR
Geophysical Survey	Mona Array Area	High resolution side scan sonar and multibeam bathymetry.	Gardline Ltd.	June - September 2021	Volume 6, annex 6.1: Physical processes technical report of the PEIR
Benthic Subtidal Survey	Mona Array Area	Grab samples and 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 Areas 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 7.1: Benthic subtidal and intertidal ecology technical report of the PEIR
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 7.1: Benthic subtidal and intertidal ecology technical report of the PEIR

7.4.5 Baseline environment

Subtidal seabed sediments

7.4.5.1 Subtidal sediments recorded from infaunal grab samples collected across the Mona Array Area during the site-specific benthic subtidal surveys ranged from gravelly sand to muddy sandy gravel with most samples classified as gravelly sand (Figure 7.2). A single sample station was classified as slightly gravelly muddy sand, (ENV95) which was located in the southeast section of the Mona Array Area. According to the simplified Folk Classification (Long, 2006), most stations were classified as mixed sediments. 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).

7.4.5.2 The percentage sediment composition (i.e. mud ≤0.63mm; sand <2mm; gravel ≥2mm) 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 17.59% gravel, 72.96% sand and 9.44% mud, with sand making up the highest proportion of the sediment composition. Sediments across the Mona Array Area were typically very poorly sorted (75% of samples). Of the samples, 15% were classified as poorly sorted and 8% were classified as moderately well sorted.

Subtidal sediment contamination

7.4.5.3 As part of the subtidal sediment contamination analysis from samples within the Mona Array 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) as well as the Canadian Environmental Quality Guidelines (CSQGs) (i.e. Canadian probable effect level (PEL) and threshold effect level (TEL)). In summary, no contaminants were found to exceed Cefas AL2 or the Canadian PEL. Levels of arsenic, however, marginally exceeded the Cefas AL1 at one sample station and the Canadian TEL at all sample locations in the Mona Array Area however all samples were below Cefas AL2 and Canadian PEL. Concentrations of PCBs and PAHs in all samples were found to be below AL1 and the CSQGs. As outlined in section 7.1.3.1, further site-specific surveys were undertaken in the summer of 2022 which included characterisation of sediment contamination in the Mona Offshore Cable Corridor. This chapter will therefore be updated with this additional data for the final Environmental Statement.

Subtidal biotopes and habitats

7.4.5.4 Across the Mona Array Area, 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 with a total of 896 individuals recorded. The biomass data reflected the dominance of Annelida with respect to the number of individuals and number of taxa, in 37% of stations Annelida contributed the most to biomass. Mollusca and Echinoderms contributed the second and third most to biomass (36% and 17% respectively).

7.4.5.5 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 Annelida and Echinoderms with low numbers of Molluscs and Arthropods. Stations in areas of coarse and mixed sediments were associated with the presence of dead man's fingers *Alcyonium digitatum*, common starfish *Asterias rubens,* brittle stars *Ophiura* sp. and the common hermit crab *Pagurus bernhardus*.

7.4.5.6 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 7.3, are provided in volume 6, annex 7.1: Benthic ecology technical report of the PEIR. The distribution of combined infaunal and epifaunal biotopes is presented in Figure 7.3. The benthic communities in the Mona Array Area were characterised by the polychaete-rich deep Venus community in offshore mixed sediments (SS.SMx.OMx.PoVen) biotope. Figure 7.3 shows this biotope was recoded across the majority of the Mona Array Area. 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*, *Aonides paucibranchiata*, 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 southern regional of the Mona Array Area. The SS.SCS.CCS biotope was characterised by a robust community of infaunal polychaetes, mobile crustacea and bivalves which included species such as *Scoloplos armiger*, *Owenia* sp., *Nemertea* and *Abra* sp. In the southeast of the Mona Array Area 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, in close proximity to the boundary. This biotope was characterised at this site by bivalves such as *Kurtiella bidentata,* polychaetes such as *Scoloplos armiger*, and the brittlestar *Amphiura filiformis*. Similarly SS.SMx.CMx was present in two small areas in the southeast of the Mona Array Area. This biotope encompasses a broad array of communities but in the Mona Array Area it was characterised by *Glycera lapidum*, *Nemertea, Leptochiton asellus* and *Syllis* sp.

7.4.5.7 The Constable Bank (Annex I sandbank outside an SAC) IEF is also present within the Mona Offshore Cable Corridor and is located approximately 7km from the landfall and approximately 24km from the Mona Array Area. Constable Bank is an Annex I sandbank which occurs outside an SAC (Figure 7.7), lying in shallow coastal waters with high wave stress (NRW, 2015). The bank is over 20km long and up to 2km wide in its outer part widening towards the coast and is up to 10m high (Kenyon and Cooper, 2005). The main body of the sandbank is located to the east of the Mona Offshore Cable Corridor (see Figure 7.7 and volume 2, chapter 6: Physical processes of the PEIR). As outlined in section 7.1.3.1, further site-specific surveys were undertaken in the summer of 2022 to characterise the benthic habitats and communities present in the Mona Offshore Cable Corridor. This chapter will therefore be updated with this additional data for the final Environmental Statement.

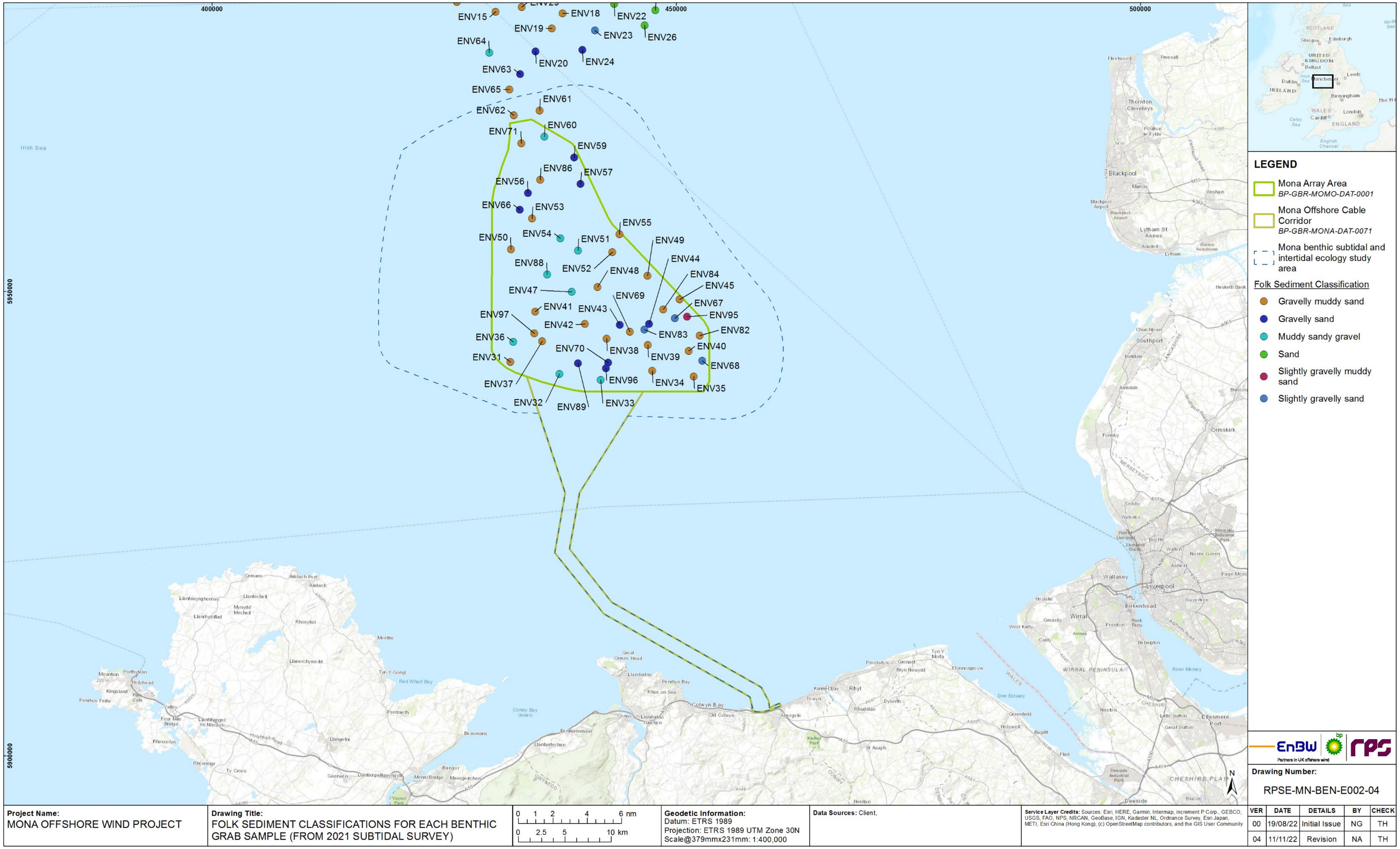
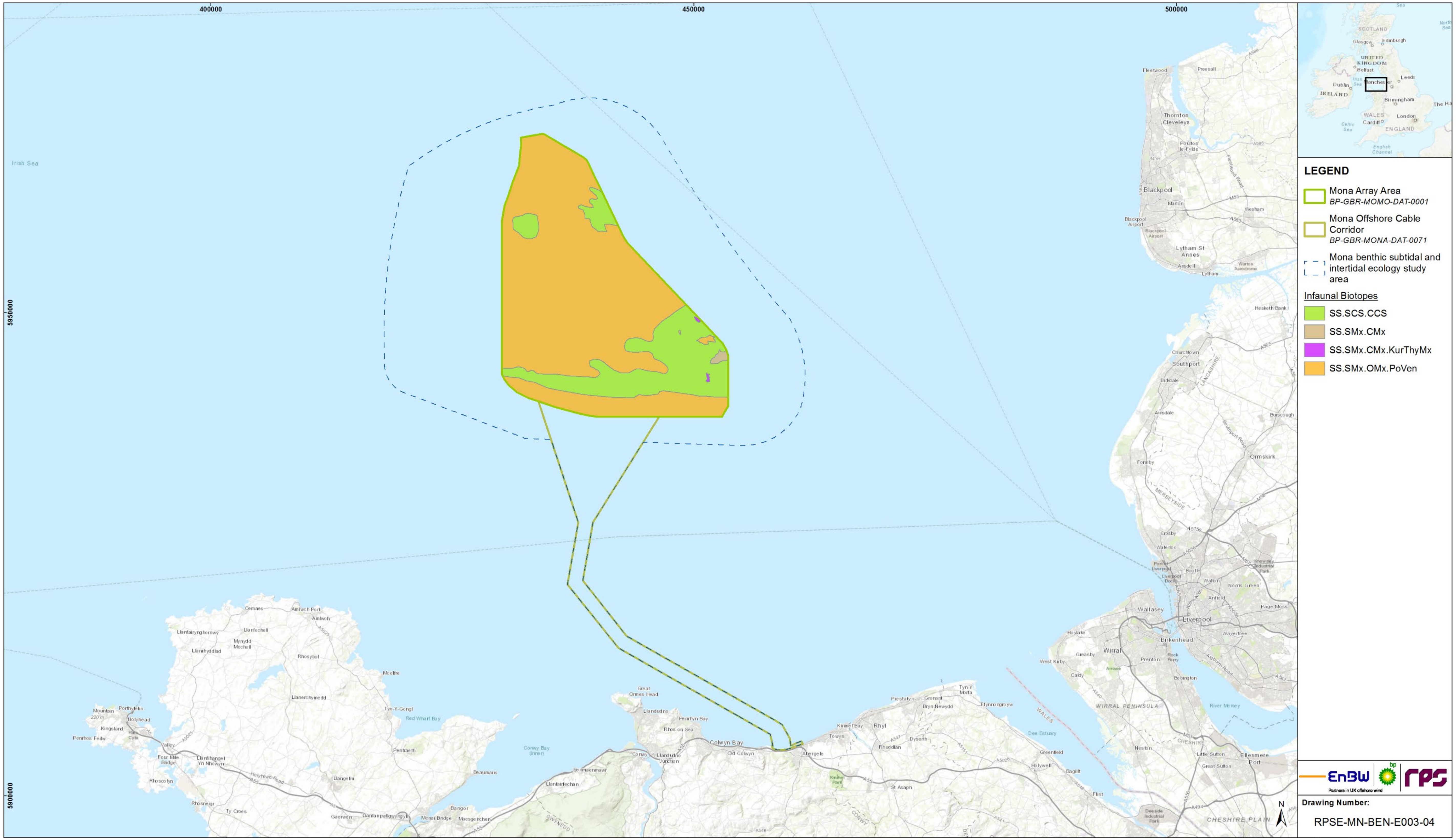


Figure 7.2: Folk sediment classifications for benthic grab samples in the Mona Array Area within the Mona benthic subtidal and intertidal ecology study area (ENV codes refer to sample station numbers).



Project Name:	Drawing Title:	Scale	Geodetic Information:	Data Sources:	Service Layer Credits:
MONA OFFSHORE WIND PROJECT	COMBINED INFAUNAL AND EPIFAUNAL BIOTOPE MAP OF THE MONA BENTHIC SUBTIDAL AND INTERTIDAL ECOLOGY STUDY AREA (BASED ON 2021 SUBTIDAL SURVEY)	0 1 2 4 6 nm; 0 2.5 5 10 km	Datum: ETRS 1989; Projection: ETRS 1989 UTM Zone 30N; Scale@379mmx231mm: 1:400,000	Client,	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

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Figure 7.3: Combined infaunal and epifaunal biotope map of the Mona Array Area within the Mona benthic subtidal and intertidal ecology study area.

Intertidal sediments

7.4.5.8 The results of the Phase 1 intertidal survey (completed in May 2022) are presented in Figure 7.4 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 7.4 also includes characterisation of the area in the east of the landfall site, which was also surveyed during the May 2022 intertidal survey. This corresponds with the area which will be used for access for construction equipment and vehicles to the landfall. As outlined in section 7.1.3.1, an infill Phase I intertidal survey is scheduled for spring 2023 to characterise the currently un-surveyed benthic intertidal habitats and communities present in the part of the landfall which is to be used for access only. This chapter will therefore be updated with this additional data for the final Environmental Statement.

7.4.5.9 The results of the Phase I intertidal survey (completed in May 2022), 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

7.4.5.10 The results of the phase 1 intertidal survey (completed in May 2022) 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).

7.4.5.11 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 7.4). 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.

7.4.5.12 An extensive *S. alveolata* reef (*Sabellaria alveolata* reefs on sand-abraded eulittoral rock (LS.LBR.Sab.Salv)) occurred at the west of the site covering 47,473m^2 of the mid and lower shore (Figure 7.4). In terms of structure the reef was approximately 30cm 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 25cm with some over 40cm, 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 *Patellla vulgata*, *Nucella lapillus*, *Steromphala umbilicalis*, *Steromphala cineraria* and *Plotosus lineatus*.

7.4.5.13 In the west of the site *Mytilus edulis* (mussel) beds were identified in close proximity to the *S. alveolata* reef (Figure 7.4). These mussel beds were 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* at the landfall was formerly a *M. edulis* bed.

7.4.5.14 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. 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 (CR.MCR.SfR.Pid) lacked any associated species. The piddock *Barnea candida* occurred in densities of up to 80 per m^2.

Habitat assessment

7.4.5.15 Several seabed habitats were taken forward for further assessment to determine their potential to align with features of conservation habitats.

7.4.5.16 Across the Mona Array Area small pencil burrows were observed in the site-specific surveys. Although no seapens were observed the JNCC (2014a) guidance stipulates that ‘sea pen and burrowing megafauna communities’ habitat can occur without sea pens. 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 (Superabundant, Abundant, Common, Frequent, Occasional and Rare) abundance scale. The density of burrows varied from 0.02 burrows per m^2 at one station in the southwest of the Mona Array Area (ENV97; see Figure 7.2) to 5.15 burrows per m^2 at one station in the southeast of the Mona Array Area (ENV40; see Figure 7.2). 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 Areas. 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 'sea pen and burrowing megafauna communities' habitat.

7.4.5.17 Seabed imagery indicated potential stony reef across the Mona Array Area at eleven 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 (2020) considering sediment composition, elevation, extent and ecological communities. At most stations that were subject to assessment in the Mona Array Area, the resemblance was determined to be low where cobbles and boulders were found. Seven stations within the Mona Array Area were classified as low resemblance to Annex I stony reef (all other sample stations which were assessed had no resemblance to stony reefs), and this was often a reflection of a wider geophysical feature nearby as the quality observed was low (Figure 7.5).

7.4.5.18 Hard substrate Porifera were observed across both the Mona Array Areas within the benthic subtidal and intertidal ecology study areas with 21 stations across the Mona survey area 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. Although several of the sponge species present and non-sponge species (e.g. *Nemertesia* sp.) 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.

7.4.5.19 As outlined in section 7.1.3.1, further site-specific surveys were undertaken in the summer of 2022 to characterise the benthic habitats present in the Mona Offshore Cable Corridor and ZOI. This chapter will therefore be updated with this additional data for the final Environmental Statement.

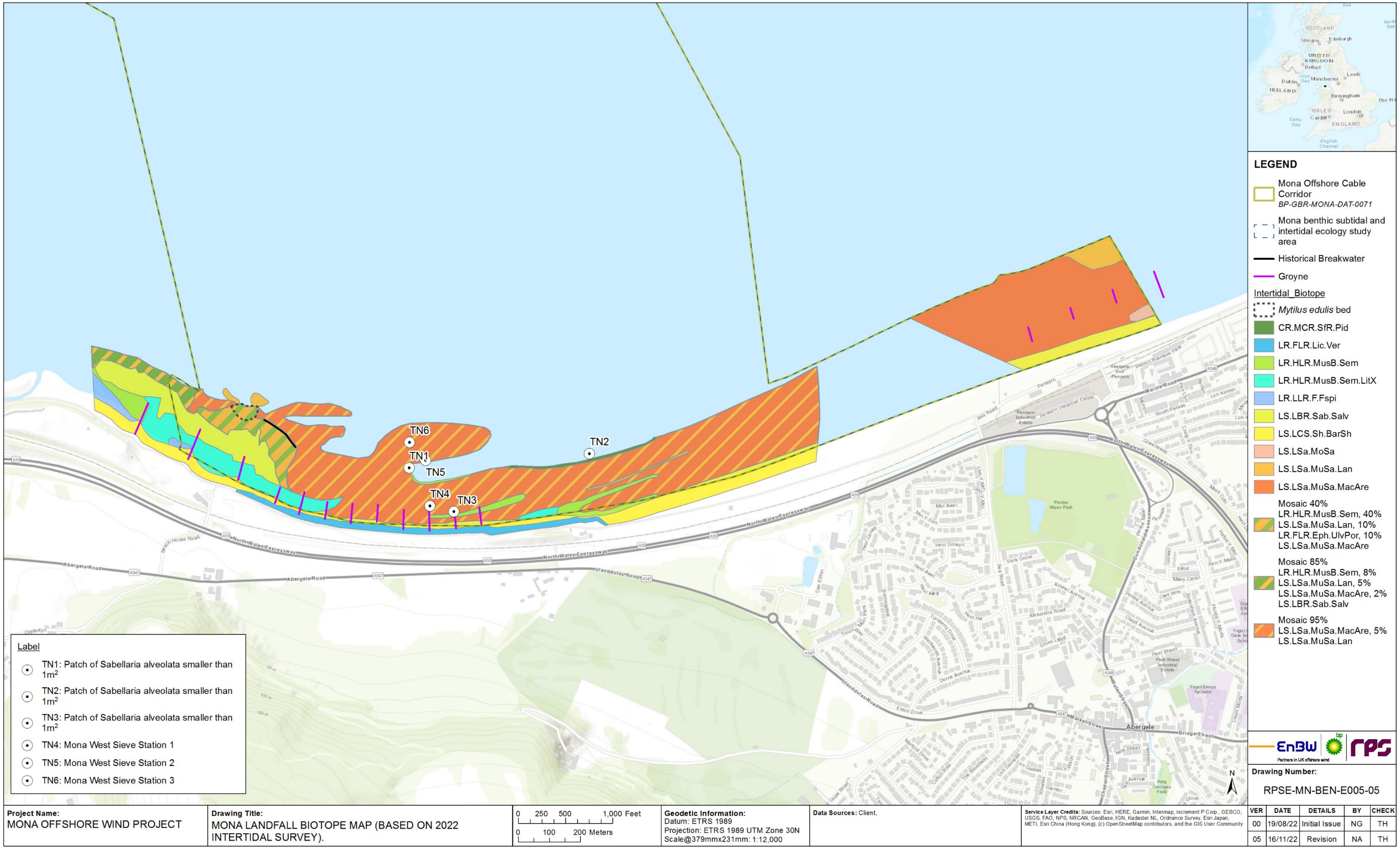


Figure 7.4: Phase I intertidal biotope map of the Mona landfall.

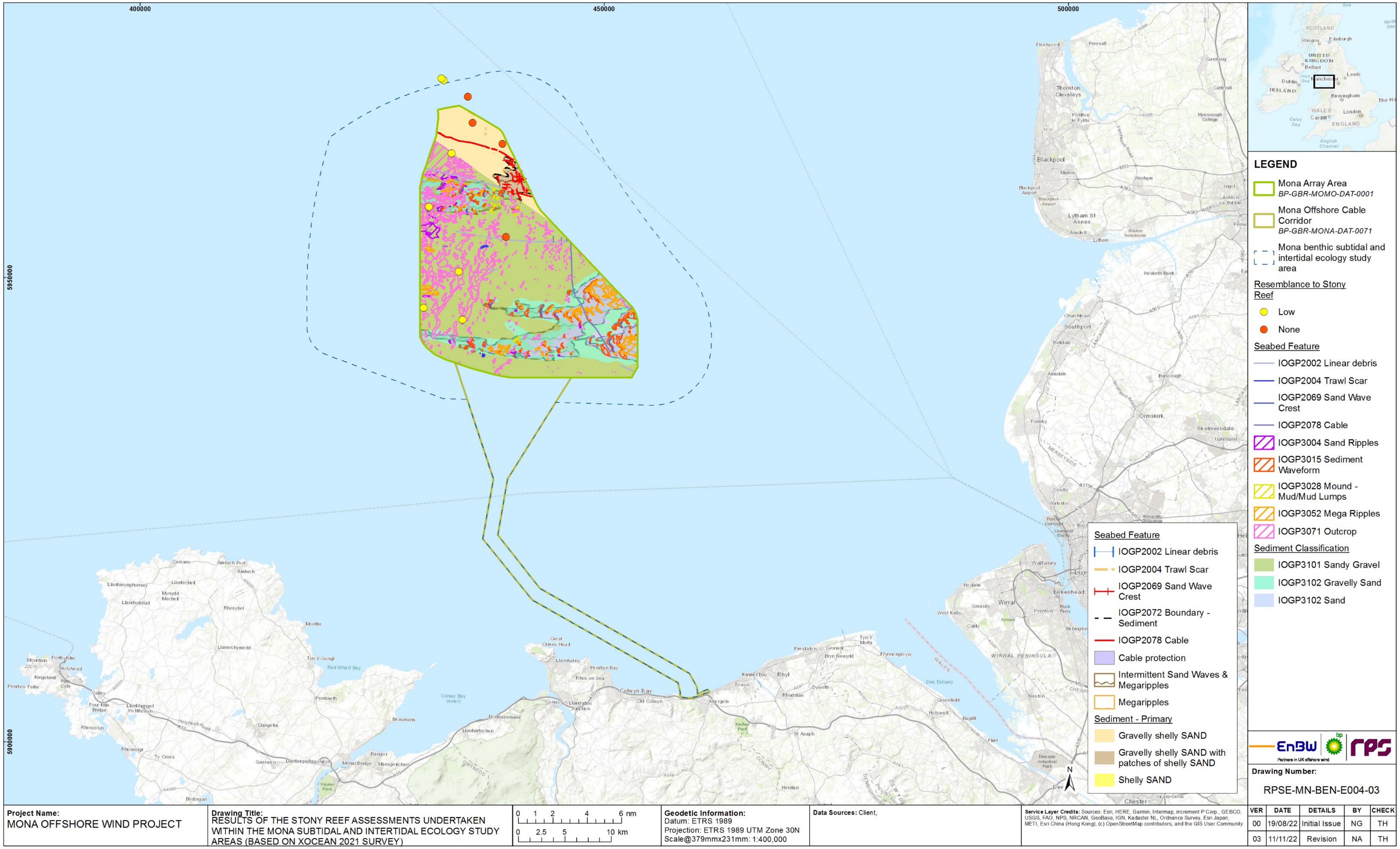


Figure 7.5: Results of the Annex I reef assessment within the Mona benthic subtidal and intertidal ecology study area.

7.4.6 Designated sites

7.4.6.1 Designated sites identified for the benthic subtidal and intertidal ecology chapter are described below in Table 7.8. The location of these sites is presented in

7.4.6.2 Figure 7.6. All designated sites including Marine Nature Reserves (MNRs) and Marine Conservation Zones (MCZs) within the regional benthic subtidal and intertidal ecology study area were identified within volume 6, annex 7.1: Benthic ecology technical report of the PEIR. 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)
- Sites with relevant benthic ecology features with the potential to be indirectly affected by the Mona Offshore Wind Project (i.e. by changes in SCC and/or sediment deposition as determined by the assessment presented in volume 2, chapter 6: Physical processes of the PEIR).

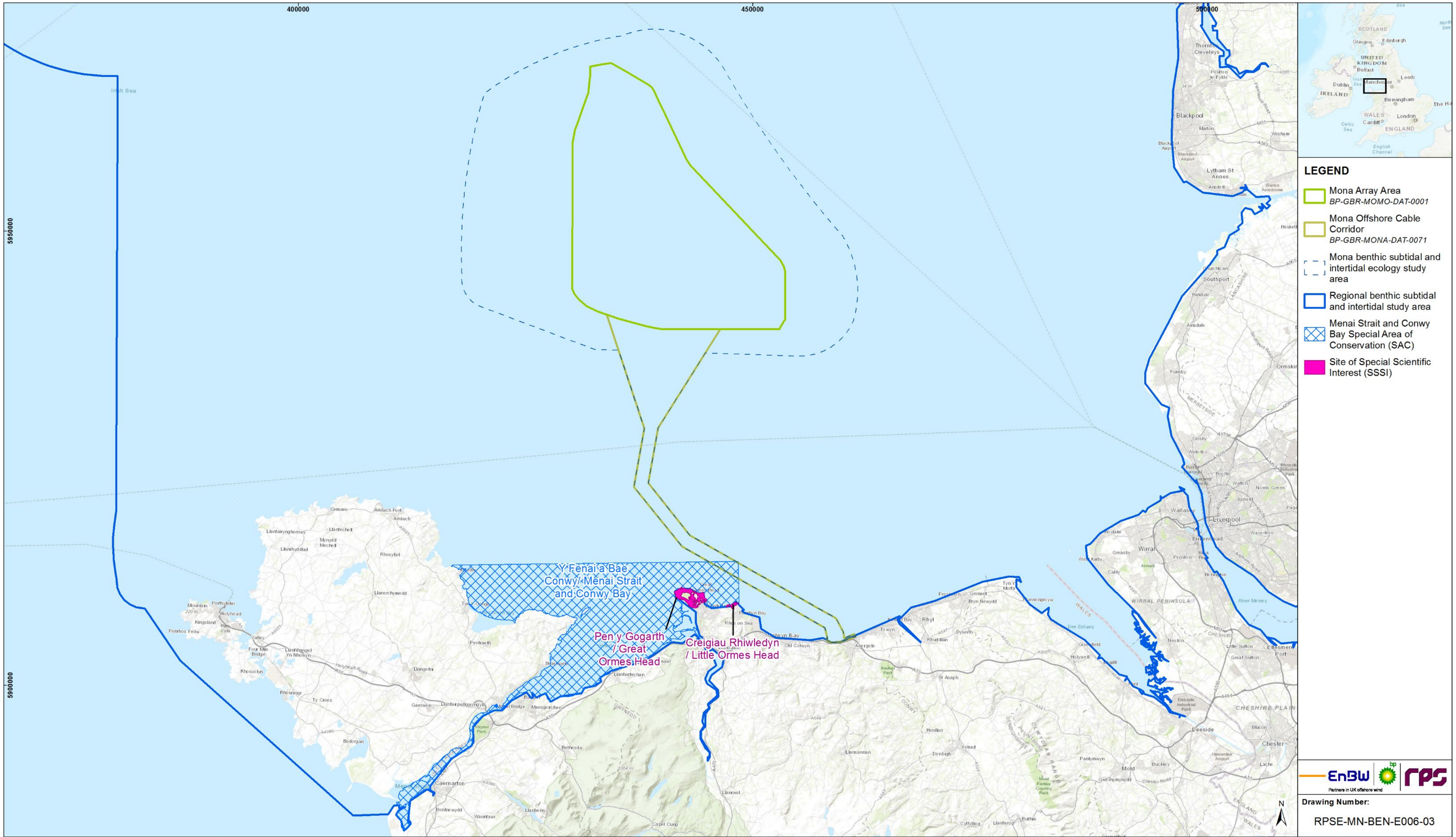
7.4.6.3 Of the identified designated sites in Table 7.8, only the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC has been taken forward for assessment within this chapter. Whilst the Great Ormes Head Site of Special Scientific Interest (SSSI) and Little Ormes Head SSSI both lie within the ZOI of 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 7.5.3, 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 7.8) 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 7.9 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.

7.4.6.4 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 project specific outputs of the physical processes assessment, have been taken forward for assessment based on their location within the SAC (Figure 7.7) (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 7.7). 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. These features have been included as a precautionary approach as our current mapping of the features of this SAC (Figure 7.7) based on NRW data shows the Mona Offshore Cable Corridor doesn’t overlap with any features although some may be affected indirectly.

This approach will be revised following the inclusion of the 2022 benthic survey data for the Mona Offshore Cable Corridor.

Table 7.8: 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	25.7	0	• Sandbanks which are slightly covered by sea water all the time • Reefs.
Great Ormes Head SSSI	28.5	3.2	• Moderately exposed rock • Rockpools • Soft piddock bored substrata • Under boulders
Little Ormes Head SSSI	30.2	2.3	• Moderately exposed rock • Rockpools • Soft piddock bored substrata • Under boulders



Project Name:	Drawing Title:	Scale	Geodetic Information:	Data Sources:	Service Layer Credits:
MONA OFFSHORE WIND PROJECT	DESIGNATED SITES WITH BENTHIC ECOLOGY FEATURES IN THE MONA BENTHIC SUBTIDAL AND INTERTIDAL ECOLOGY STUDY AREA	0 1 2 4 Nautical Miles; 0 2.5 5 10 Kilometers	Datum: ETRS 1989; Projection: ETRS 1989 UTM Zone 30N; Scale@379mmx231mm: 1:425,000	Client, JNCC	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

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Figure 7.6: 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.

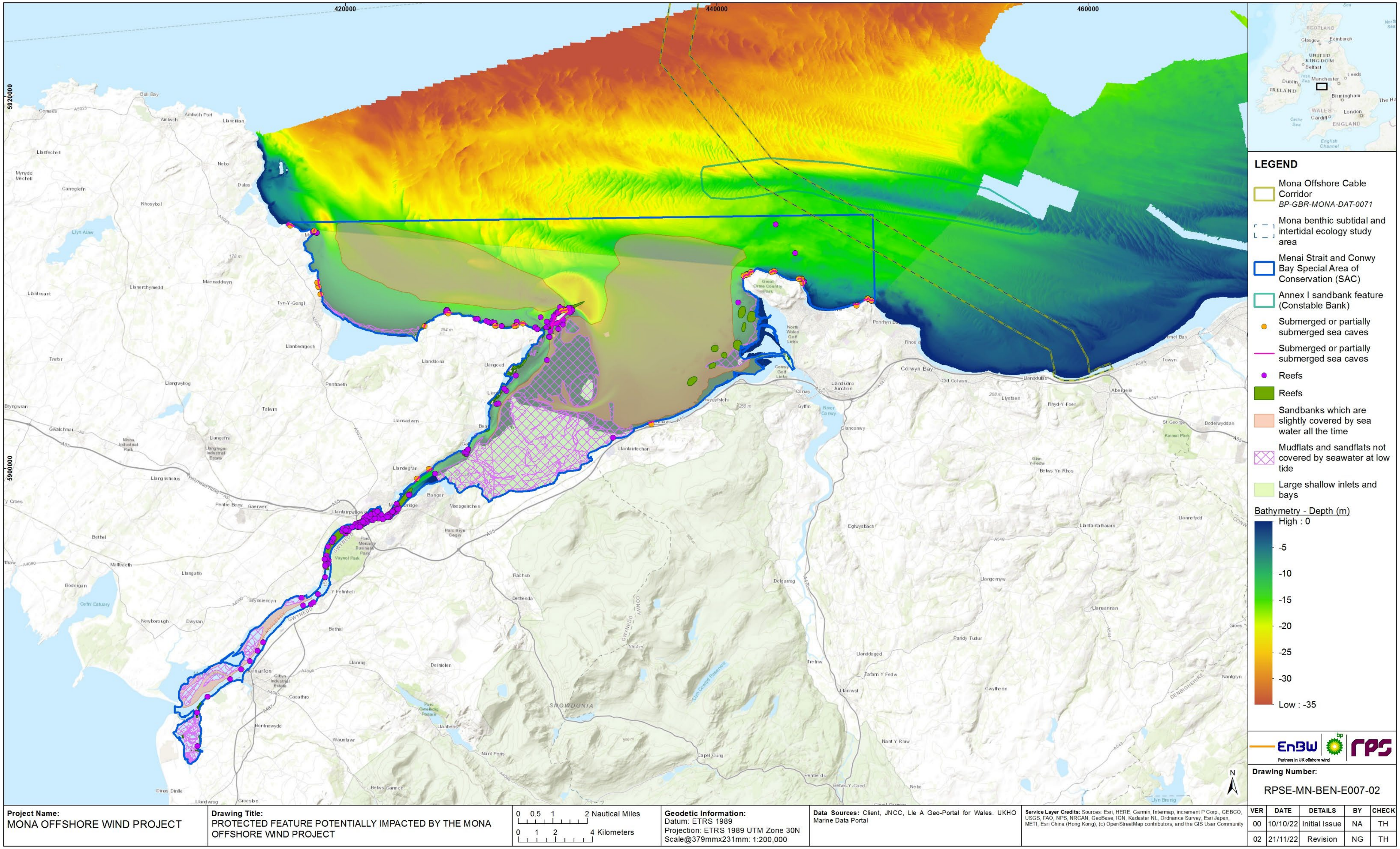

Figure 7.7: Distribution of designated features of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC and bathymetry across Constable Bank.

7.4.7 Important ecological features

7.4.7.1 In accordance with the best practice guidelines for ecological impact assessment 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, The Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR), National Biodiversity Plan or the Marine Strategy Framework Directive).

7.4.7.2 All of the IEFs within the Mona benthic subtidal and intertidal ecology study area are listed in Table 7.9. The main habitats identified throughout the Mona benthic subtidal and intertidal ecology study area comprise three broad subtidal IEFs and nine broad intertidal IEFs.

Table 7.9: IEFs within the Mona benthic subtidal and intertidal ecology study area.

IEF	Description and representative biotopes	Protection status/ Conservation interest	Importance within the Mona 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[1] • SS.SMx.CMx • SS.SMx.CMx.KurThyMx • SS.SMx.OMx.PoVen.	UK Biodiversity Action Plan (BAP) priority habitat	National
Low resemblance stony reef	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.	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.	Annex I habitat outside an SAC	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.	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	OSPAR habitat, Environment (Wales) Act 2016: Section 7, Water Framework Directive (WFD)	National
Sublittoral very soft chalk or clay with piddocks	Circalittoral soft rocks such as chalks and clays with the faunal community dominated by bivalves such as *Pholas dactylus*. Identified within the Mona landfall. • CR.MCR.SfR.Pid.	Environment (Wales) Act 2016: Section 7, WFD, UK BAP, Sub-feature of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC reef protected feature	National
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.	None	Local
Sabellaria alveolata reef	Exposed bedrock and boulders characterised by reefs of the polychaete *Sabellaria alveolata* which form large reef-	Environment (Wales) Act 2016: Section 7, UK BAP	National

[1] 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	Protection status/ Conservation interest	Importance within the Mona benthic subtidal and intertidal ecology study area
	like hummocks. Identified within the Mona landfall. • LS.LBR.Sab.Salv.	Annex I habitat outside an SAC	
Mytilus edulis beds	*Mytilus edulis* beds. Identified within the Mona landfall.	Environment (Wales) Act 2016: Section 7, WFD, UK BAP Annex I habitat outside an SAC	National
Y Fenai a Bae Conwy/ Menai Strait and Conwy Bay SAC subtidal and intertidal habitats			
Annex I sandbanks[2]	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.	Annex I Habitats Directive	International
Annex I subtidal reefs[2]	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 Representative of the soft piddock bored substrata feature of the Great Orme's Head SSSI and Little Ormes Head SSSI	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.	Annex I Habitats Directive Representative of the moderately exposed rock, rockpools and under boulder features of the Great Orme's Head SSSI and Little Ormes Head SSSI	International

7.4.8 Future baseline scenario

7.4.8.1 The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 requires 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.

7.4.8.2 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).

7.4.9 Data limitations

7.4.9.1 The data sources used in this chapter are detailed in Table 7.6. 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.

7.4.9.2 During the 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-

[2] 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.

located camera and grab stations to target additional features of interest in the newly reviewed data.

7.4.9.3 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, Mona Offshore Cable Corridor and landfall site. Due to the limitations described previously, the biotope map shown in Figure 7.3 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, Mona Offshore Cable Corridor and landfall site for the purposes of the assessment.

7.5 Impact assessment methodology

7.5.1 Overview

7.5.1.1 The benthic subtidal and intertidal ecology impact assessment has followed the methodology set out in volume 1, chapter 5: EIA methodology of the PEIR. Specific to the benthic subtidal and intertidal ecology impact assessment, the following guidance documents have also been considered:

- Guidelines for Ecological Impact Assessment (EcIA) in the UK and Ireland. Terrestrial, Freshwater and Coastal (CIEEM, 2019)
- 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; Golding, 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).

7.5.1.2 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 Natural Resources Wales (NRW))
- The Marine and Coastal Access Act 2009 (relevant to the marine licence application to NRW).

7.5.2 Impact assessment criteria

7.5.2.1 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 PEIR.

7.5.2.2 The criteria for defining magnitude in this chapter are outlined in Table 7.10 below.

Table 7.10: 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.

7.5.2.3 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.

7.5.2.4 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 7.8. The process for defining sensitivity in this chapter follows that defined by the MarESA sensitivity assessment, which correlates resistance and recoverability/resilience to categorise sensitivity, as set out in Table 7.11.

7.5.2.5 The sensitivities of benthic subtidal and intertidal IEFs presented within this benthic subtidal and intertidal ecology PEIR chapter have therefore been defined by an assessment of the combined vulnerability (i.e. resistance, following 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/resilience 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 7.11: Definition of terms relating to the sensitivity of the receptor (applicable to MarESA sensitivity assessment).

Recoverability/ Resilience	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)

7.5.2.6 The conclusions of the MarESA assessment have been combined with the importance of the relevant IEFs as presented in Table 7.9 for the benthic subtidal and intertidal IEFs considered in this assessment. The criteria for defining sensitivity in this chapter are outlined in Table 7.12 below.

Table 7.12: 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.

7.5.2.7 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 7.13. Where a range of significance of effect is presented in Table 7.13, the final assessment for each effect is based upon expert judgement.

7.5.2.8 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 EIA Regulations.

Table 7.13: Matrix used for the assessment of the significance of the effect.

Sensitivity of Receptor	Magnitude of Impact				
	No Change	**Negligible**	**Low**	**Medium**	**High**
Negligible	No change	Negligible	Negligible or Minor	Negligible or Minor	Minor
Low	No change	Negligible or Minor	Negligible or Minor	Minor	Minor or Moderate
Medium	No change	Negligible or Minor	Minor	Moderate	Moderate or Major
High	No change	Minor	Minor or Moderate	Moderate or Major	Major
Very High	No change	Minor	Moderate or Major	Major	Major

7.5.3 Designated sites

7.5.3.1 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 7.1.1 of this chapter (with the assessment on the site itself deferred to the Draft ISAA). With respect to nationally and locally designated sites, where these sites fall within the boundaries of an internationally designated site (e.g. SSSIs which have not been assessed within the Draft 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).

7.5.3.2 The Draft ISAA is currently being prepared in accordance with the Habitats Regulations and Advice Note Ten: Habitats Regulations Assessment Relevant to Nationally Significant Infrastructure Projects (The Planning Inspectorate, 2022) and will be submitted as part of the application for Development Consent.

7.6 Key parameters for assessment

7.6.1 Maximum design scenario

7.6.1.1 The MDSs identified in Table 7.14 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 Envelope provided in volume 1, chapter 3: Project description of the PEIR. 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 infrastructure layout), to that assessed here be taken forward in the final design scheme.

Table 7.14: Maximum design scenario 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]			Maximum Design Scenario	Justification
	C	O	D		
Temporary habitat loss/disturbance	✓	✓	✓	**Construction phase** *Up to* 131,068,792m^2 of subtidal habitat loss/disturbance due to: • Jack-up events: up to 908,400m^2 of disturbance from the use of jack-up vessels during foundation installation, with up to four jack-up events at each of 107 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 Offshore Substation Platform (OSP). • Cable installation: up to 62,888,000m^2 of disturbance comprising: – Inter-array cables: up to 31,000,000m^2 disturbance from installation of up to 500km of inter-array cables – Interconnector cables: up to 3,520,000m^2 disturbance from installation of up to 50km of interconnector cables – Export cables: up to 28,368,000m^2 disturbance from installation of up to 360km of buried offshore export cables (MDS assumes 100% of all cables are buried) – seabed disturbance width of up to 104m for sandwave clearance, up to 20m for boulder and debris clearance along inter-array, interconnector and export cables, and up to 3m for cable burial – Sandwave clearance: required for up to 50% of inter-array, 60% of interconnector, and 70% of export cables – Pre-lay preparation (boulder and debris clearance): is likely to be required across all inter-array, interconnector and export cables. Although, for the purposes of the MDS boulder and debris clearance only has been assumed across up to 50% of inter-array, 40% of interconnector, and 30% of export cables (see justification) • Sandwave clearance deposition: Up to 66,144,392m^2 of habitat disturbance associated with the deposition of: – 21,020,241m^3 of sandwave clearance material within the Mona Array Area affecting up to 42,040,482m^2 – 12,051,955m^3 of sandwave clearance material within the Mona Offshore Cable Corridor affecting up to 24,103,910m^2 • Anchor placement: Up to 208,000m^2 of habitat disturbance from a 100m^2 anchor placement event every 500m during offshore export cable installation within the nearshore area (10km for each of the four export cables) only and two 100m^2 anchor placements per inter-array cable link. • Cable removal: Up to 920,000m^2 from the removal of 46,000m of disused cables Up to 306,000 m^2 of intertidal habitat loss/disturbance due to: • Intertidal export cable: offshore export cable installation at the landfall via open cut trenching techniques – Open cut trenching: total area of intertidal habitat loss/disturbance of up to 306,000m^2, based on four export cables, a trench length of 1,500m and working areas of 51m width – Barge vessel grounding at the landfall. • Maximum duration of the offshore construction phase is up to four years. **Operations and maintenance phase** Up to 17,606,500m^2 of temporary habitat loss/disturbance due to: • Up to 2,026,500m^2 of temporary habitat loss/disturbance due to jack-ups at wind turbines and OSPs over the lifetime of the Mona Offshore Wind Project for the following: – Up to 937 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 15,580,000m^2 of temporary habitat loss/disturbance due to inter-array, interconnector and subtidal/intertidal export cables – Inter-array cables: up to 20,000m for reburial events every five years and up to 10,000m for cable repair events every three years (assuming 20m width seabed disturbance for repair and remedial burial) – Interconnector cables: up to 2,000m for reburial events with one event every five years and up to 16,000m of cable in each of three events every 10 years for repair events (assuming 20m width seabed disturbance for repair and remedial burial)	Construction phase: Maximum footprint which would be affected during the construction, operations and maintenance and decommissioning phases. The MDS assumes that the width of disturbance for sandwave and pre-lay preparation (boulder and debris clearance) also includes subsequent burial. Pre-lay preparation is likely to be required across all inter-array, interconnector and export cables. For the purposes of the MDS, and to avoid double counting of the total footprint with sandwave clearance activities, the MDS assumes up to 50% of inter-array, 40% of interconnector, and 30% of export cables will be subject to pre-lay preparation only. It is anticipated that the sandwaves requiring clearance in the Mona Array Area are likely to be in the range 15m in height. 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 0.5m height. The MDS assumes temporary loss of benthic habitat is beneath this. The disturbance width is driven by the need to survey for UXO over the cable route. The actual disturbance width for cable installation is likely to be considerably less. Operations and maintenance phase: The MDS for habitat disturbance associated with export cable maintenance includes repairs/reburial of both subtidal and intertidal cables. Decommissioning phase: 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 will be left *in situ*. The MDS assumes that cable removal in the intertidal will involve open cut trenching and that all cables would be removed. 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
				– Subtidal export cables: repair of up to 32km of cable in eight events every five years – Export cable (subtidal and intertidal): reburial of up to 15km of cable in one event every five years – Intertidal export cables: repair of up to 1.6km of intertidal cable every five years • Operational phase up to 35 years. **Decommissioning phase** Temporary subtidal habitat loss/disturbance due to: • Cable removal: disturbance from the removal of 500km of inter-array cables, 50km of interconnector cables and 360km 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.	
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: the MDS assumes sandwave clearance for wind turbine foundations and that clearance is 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 205m to an average depth of 7.5m. This equates to a total spoil volume of 8,416,621m^3 and a volume of 247,548m^3 per location • Inter-array cables: sandwave clearance along 250km of cable length, with a width of 104m, to an average depth of 5.1m. Total spoil volume of 9,542,806m^3 • Interconnector cables: sandwave clearance along 30km of cable length, with a width of 104m, to an average depth of 5.1m. Total spoil volume of 3,060,814m^3 • Offshore export cables: sandwave clearance along 252km of export cable, with a width of 104m, to an average depth of 5.1m. Total spoil volume of 12,051,955m^3 • Removal of up to 46km of disused cables Foundation installation: Undertaken over an approximate 12-month duration • Wind turbines: installation of up to 68 monopiles of 16m diameter, drilled to a depth of 60m at a rate of up to 0.89m/h. Two monopiles installed concurrently. Spoil volume of 13,460m^3 per pile • OSPs: installation of one OPS with foundations consisting of two 16m monopiles, drilled to a depth of 60m at a rate of up to 0.89m/h. Two monopiles installed concurrently. Spoil volume of 13,460m^3 per pile Cable installation: • Inter-array cables: Installation via trenching of up to 500km of cable, with a trench width of up to 3m and a depth of up to 3m. Total spoil volume of 2,250,000m^3. Installed over a period of approximately12-months • Interconnector cables: installation via trenching of up to 50km of cable, with a trench width of up to 3m and a depth of up to 3m. Total spoil volume of 225,000m^3. Installed over a period of approximately four-months • Offshore export cables: installation via trenching of up to 360km of cable, with a trench width of up to 3m and a depth of up to 3m. Total spoil volume of 1,620,000m^3. Installed over a period of 15-months • Intertidal export cable: installation via open trenching of up to 6km of cable, with a trench width of 1m and a depth of up to 3m. Total spoil volume of 18,000m^3. Installed over a period of approximately nine-months **Operations and maintenance phase** Mona Offshore Wind Project lifetime of 35-years • Inter-array cables: repair of up 10km of cable in one event every three years. Reburial of up to 20km of cable in one event every five years	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 15m in height. 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 disposal of material. Boulder and debris clearance activities will result in minimal increases in SSC and have therefore not been considered in the assessment. Foundation installation: Installation of foundations via augured (drilled) operations results in the release of the largest volume of sediment. The greatest volume of sediment disturbance by drilling at individual foundation locations and across the site as a whole is associated with the largest diameter monopile for wind turbines. The selected OSP scenario represents the greatest volume of sediment to be released for a drilling event. The greatest drilling rate represents the maximum level of increase in SSC. Cable installation: Cable routes inevitably include a variety of seabed material and in some areas 3m depth may not be achieved or may be of a coarser nature which settles in the vicinity of the cable route. 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 jetting mobilising the greatest volume of material to increase SSC. The use of open trenching in the intertidal area releases the greatest volume of material into the water column and therefore provides the upper bound of impacts as compared with HDD installation.

Potential impact	Phase[a] C	O	D	Maximum Design Scenario	Justification
				• Interconnector cables: repair of up to 16km of cable in each of three events every 10 years. Reburial of up to 2km of cable in one event every five years • Offshore export cables: repair of up to 32km of subtidal cables in eight events every five years. Reburial of up to 15km of cable in one event every five years • Intertidal export cables: Repair of up to 1.6km of intertidal cable 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 HDD or trenchless exit pits in the intertidal zone and disposed of onshore.	Operations 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.
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	✓	✓	✓	**Construction and operations and maintenance phase** Up to 2,363,092m² of long term habitat loss over the lifetime of the Mona Offshore Wind Project associated with the following: • Presence of foundations and scour protection: up to 760,452m² of habitat loss comprising: – Wind turbines: up to 735,488m² from the presence of up to 68 wind turbine foundations on suction bucket 4-legged jacket foundations with associated scour protection – OSPs: up to 24,964m² from four OSPs on suction bucket jacket foundations with associated scour protection • Presence of cable protection: up to 1,320,000m² of habitat loss comprising: – Inter-array cable protection: 500,000m² associated with up to 10% of 500km of inter-array cables requiring cable protection (10m width of cable protection) – Interconnector cable protection: 100,000m² for up to 20% of 50km of interconnector cables requiring cable protection (10m width of cable protection) – Offshore export cable protection: 720,000m² for up to 20% of 360km of offshore export cables requiring cable protection (10m width of cable protection) • Presence of cable crossing protection: up to 282,640m² of habitat loss comprising: – Cable protection for cable crossings for inter-array cables: 128,640m² from 67 cable crossings (each up to 60m in length and 32m in width) – Cable protection for cable crossings for interconnector cables: 5,000² from 10 cable crossings (each up to 50m in length and 20m in width) – Cable protection for cable crossings for offshore export cables: 144,000m² from, and 24 crossings (each up to 50m in length and 30m in width) • Operational phase up to 35 years. **Decommissioning phase** Up to 2,305,956m² of permanent subtidal habitat loss due to scour and cable protection left *in situ* post decommissioning.	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.
Colonisation of hard structures.	×	✓	×	**Operations and maintenance phase** Long term habitat creation of up to 2,856,296m² due to: • 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 500km of inter-array cables, 20% of the 50km of interconnector cables and up to 20% of the 360km of offshore export cables	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 habitat creation from the presence of foundations has been calculated as if the foundations were a solid structure. This is, therefore, likely to be a conservative

Potential impact	Phase[a] C	O	D	Maximum Design Scenario	Justification
				• Cable crossing protection: Presence of cable protection for cable crossings, 67 cable crossings for inter-array cables (each up to 60m in length and 32m in width), 10 cable crossings for interconnector cables (each up to 50m in length and 20m in width), and 24 cable crossings for each of the four offshore export cables (each up to 50m in length and 30m in width) • Operational phase up to 35 years.	estimate of habitat creation on the basis that the jacket foundations will have a lattice design rather than a solid surface.
Increased risk of introduction and spread of invasive non-native species (INNS)	✓	✓	✓	**Construction phase** Increased risk of INNS due to: • Long term habitat creation: up to 2,856,296m² 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 2,004 vessel round trips in total over the construction phase • Maximum duration of the offshore construction phase is up to four years. • Intertidal: Barge vessel grounding at the landfall. **Operations and maintenance phase** Increased risk of INNS due to: • Vessel return trips: Up to 82,285 vessel return trips during the operations and maintenance phase • Operational phase up to 35 years. **Decommissioning phase** Increased risk of INNS due to: • Long term habitat creation: up to 2,305,956m² due to scour and cable protection left *in situ* post decommissioning • Vessel return trips: Up to 2,004 decommissioning vessel return trips during the decommissioning phase • Maximum duration of the offshore decommissioning phase is up to four years.	Maximum surface area created by offshore infrastructure and maximum number of vessel movements during construction, operations and maintenance and decommissioning phases.
Removal of hard substrates	×	×	✓	**Decommissioning phase** Removal of hard substrate of up to 550,340m² due to: • Wind turbines and OSPs: Removal of up to 68 suction bucket 4-legged jacket foundations for wind turbines and up to four suction bucket jacket foundations for OSPs.	The MDS is based on the removal of foundations and cables but assumes that all cable protection and scour protection will be left *in situ*.
Changes in physical processes	×	✓	×	**Operations and maintenance phase** • Wind turbines: 68 installations with four-legged suction bucket foundations, each jacket leg with a diameter of 5m, spaced 48m apart, and each bucket with a diameter of 16m. Scour protection to a height of 2.5m. Total footprint of 10,816 m² per wind turbine • OSPs: four installations with gravity base foundations, each with a 14m diameter at the surface, a slab base diameter of 52.5m and with scour protection to a height of 2.6m. Total footprint of 6,236m² per OSP. • Inter-array cables: cable protection along 50km of the cable, with a height of up to 3m and up to 10m width. Up to 67 cable crossings, each crossing has a height of up to 4m, a width of up to 32m and a length of up to 60m • Interconnector cables: cable protection along 10km of the cable, with a height of up to 3m and up to 10m width. Up to ten cable crossings, each crossing has a height of up to 3m, a width of up to 20m and a length of up to 50m • Export cables: cable protection along 72km of the cable, with a height of up to 3m and up to 10m width. Up to 24 cable crossings, each crossing has a height of up to 3m, a width of up to 30m and a length of up to 50m.	This provides the largest obstruction to flow in the water column. See volume 2, chapter 6: Physical processes of the PEIR.
EMF from subsea electrical cabling	×	✓	×	**Operations and maintenance phase** Presence of inter-array and offshore export cables: • Inter-array cables: between 450km and 500km of inter-array cables of 66kV to 132kV • Interconnector cables: up to 50km of 275kV HVAC cables • Offshore export cables: up to 360km of 275kV HVAC cables	Maximum length of cables across the array area and offshore export cable route 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
				• Minimum burial depth 0.5m • The MDS assumes up to 10% of inter-array cables, 20% of interconnector cables, and 20% of export cables may require cable protection • Cable protection: cables will also require cable protection at asset crossings (up to 67 crossings for inter-array cables, 10 crossings for interconnector cables and up to 24 crossings for offshore export cables) • Operations and maintenance phase of up to 35 years.	
Heat from subsea electrical cables	×	✓	×	**Operations and maintenance phase** Presence of inter-array and offshore export cables: • Inter-array cables: between 450km and 500km of inter-array cables of 66kV to 132kV • Interconnector cables: up to 50km of 275kV HVAC cables • Offshore export cables: up to 360km of 275kV HVAC cables • Minimum burial depth 0.5m • The MDS assumes up to 10% of inter-array cables, 20% of interconnector cables, and 20% of export cables may require cable protection • Cable protection: cables will also require cable protection at asset crossings (up to 67 crossings for inter-array cables, 10 crossings for interconnector cables and up to 24 crossings for offshore export cables) • Operations and maintenance phase of up to 35 years.	

7.6.2 Impacts scoped out of the assessment

7.6.2.1 On the basis of the baseline environment and the description of development outlined in volume 1, chapter 3: Project description of the PEIR, a number of impacts are proposed to be scoped out of the assessment for benthic subtidal and intertidal ecology. These impacts are outlined, together with a justification for scoping them out, in Table 7.15.

Table 7.15: Impacts scoped out of the assessment for benthic subtidal and intertidal ecology.

Potential impact	Justification
Accidental pollution during construction, operations and maintenance and decommissioning.	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. Environmental Management Plan, including 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 volume 2, chapter 7: Benthic subtidal and intertidal ecology of the PEIR. NRW and the Planning Inspectorate agreed through their Scoping responses that the impact of accidental pollution could be scoped out of the assessment.

7.7 Measures adopted as part of the Mona Offshore Wind Project

7.7.1.1 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 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).

7.7.1.2 A number of measures adopted as part of the Mona Offshore Wind Project have been proposed to reduce the potential for impacts on benthic subtidal and intertidal ecology (see Table 7.16). 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 7.8 below (i.e. the determination of magnitude and therefore significance assumes implementation of these measures).

Table 7.16: 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		
Appropriate measures (e.g. micro-siting) will be discussed with statutory consultees to avoid direct impacts to the *Sabellaria alveolata* reef at the landfall during the construction phase. A 50m exclusion buffer from the edge of the reef will be proposed, as per industry standard practice. The buffer will be based on the current extent of the reef as mapped during the 2022 Mona Phase I intertidal survey.	This designed-in measure will ensure that direct impacts (e.g. habitat loss or disturbance) to ecologically sensitive and nationally protected *Sabellaria alveolata* reefs will be avoided.	Proposed to be secured as a condition of the marine licence(s).
Commitment to cable burial where possible.	This commitment 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.	Proposed to be secured as a condition of the marine licence(s) requiring the development of, and adherence to, a Cable Specification and Installation Plan (CSIP) and Construction Method Statement (CMS).
To minimise cable protection placed on the Constable Bank and within the Menai Strait and Conwy Bay SAC.	Commitment to investigate opportunities to limit the extent of cable protection within the Menai Strait and Conwy Bay SAC and Constable Bank once the site-specific geophysical and geotechnical data for the Mona Offshore Cable Corridor are available.	Proposed to be secured as a condition of the marine licence(s) requiring the development of, and adherence to, a CSIP and CMS.
To minimise sandwave clearance on the Constable Bank and within the Menai Strait and Conwy Bay SAC.	To minimise potential impacts on Constable Bank and Annex I habitats within the SAC. Investigations will be undertaken to identify opportunities to limit sandwave clearance on the Constable Bank and within the Menai Strait and Conwy Bay SAC. This will be guided by survey data and when all Mona Offshore Cable Corridor results have been evaluated this will inform the assessment within the Environmental Statement accompanying the application for consent.	Proposed to be secured as a condition of the marine licence(s) requiring the development of, and adherence to, a CSIP and CMS.
Tertiary measures: Measures required to meet legislative requirements, or adopted standard industry practice		
Development and adherence to a CSIP which will include cables to be buried where possible and cable protection only as necessary.	The CSIP will aim to facilitate greater clarity with specific regard to sandwave clearance, cable burial and cable protection. The CSIP would be developed in line with standard industry approach to the CSIP documentation.	Proposed to be secured as a requirement of the marine licence(s).

Measures adopted as part of the Mona Offshore Wind Project	Justification	How the measure will be secured
Development of, and adherence to, a CMS.	The purpose of this measure is to confirm the actual methodology that will be employed to construct the windfarm, provide details on aspects of the methodology not known at the application stage and confirm that the methodology falls within the parameters assessment in the EIA.	Proposed to be secured as a requirement of the marine licence(s).
Development of, and adherence to, an Environmental Management Plan, including actions to minimise INNS, and a MPCP which will include planning for accidental spills, address all potential contaminant releases and include key emergency details.	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 (e.g. carpet sea squirt *Didemnum vexillum*). Measures will also be adopted to ensure that the potential for release of pollutants from construction, operations and maintenance and decommissioning plant is reduced so far as reasonably practicable. These will likely include: designated areas for refuelling where spillages can be easily contained, storage of chemicals in secure designated areas in line with appropriate regulations and guidelines, double skinning of pipes and tanks containing hazardous substances, and storage of these substances in impenetrable bunds.	Proposed to be secured as a requirement of the marine licence(s).
An Ecological Clerk of Works (ECoW) will supervise the construction works in the intertidal zone. This is to ensure that all works within the intertidal construction area, including plant movement, are undertaken outwith the proposed 50m buffer zone for the S. alveolata reef, based on the extent mapped during the 2022 Mona Phase I intertidal survey.	This designed-in measure will ensure that direct impacts (e.g. habitat loss or disturbance) to ecologically sensitive and nationally protected *Sabellaria alveolata* reefs will be avoided.	Proposed to be secured as a requirement of the marine licence(s).

7.7.1.3 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 7.8 below.

7.8 Assessment of significant effects

7.8.1.1 The impacts of the construction, operational 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 7.14, along with the MDS against which each impact has been assessed.

7.8.1.2 A description of the potential effect on benthic subtidal and intertidal ecology receptors caused by each identified impact is given below.

7.8.1 Temporary habitat loss/disturbance

7.8.1.1 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), cable installation and repair as well as anchor placements associated with these activities. 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 7.14.

7.8.1.2 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 30cm. 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 construction of exit pits associated with trenchless techniques such as HDD
- 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 and anchor placements
- 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 30cm 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.

Construction phase

Magnitude of impact

Subtidal habitat IEFs

7.8.1.3 The installation of the Mona Offshore Wind Project infrastructure within the Mona benthic subtidal and intertidal ecology study area may lead to up to 131,068,792m^2 of temporary habitat loss/disturbance during the construction phase (Table 7.14). This equates to approximately 10.22% of the Mona benthic subtidal and intertidal ecology study area.

7.8.1.4 Temporary habitat disturbance in the construction phase is likely to result from pre-lay preparations (sandwave and boulder and debris clearance and associated deposition), jack up events, cable installation (subtidal and intertidal) and cable removal. Long term habitat loss associated with the footprint of the wind turbine foundations and associated scour protection is considered in section 7.8.4.

7.8.1.5 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 7.8.1.21 and 7.8.1.23 below).

7.8.1.6 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).

7.8.1.7 The subtidal IEFs mostly likely to be affected by this impact are those which are sedimentary based. The majority of sandwave clearance and cable installation will take place within the subtidal coarse and mixed sediments with diverse benthic communities IEF. As detailed in paragraphs 7.8.1.5 and 7.8.1.6 this IEF is likely to recover from activities of this nature. There may also be some habitat disturbance to the low resemblance stony reef IEF, although given the limited and highly patchy distribution of this habitat within the Mona Array Area, the magnitude of potential impact is also likely to be limited.

7.8.1.8 There is the potential that 19.72km of export cable (i.e. four cables up to 4.93km in length) may be installed within Constable Bank (Annex I sandbank outside an SAC) which could require sandwave clearance prior to installation. Although the Mona Offshore Cable Corridor does not pass through the main body of the bank it crosses the ‘tail’ of the bank feature to the west (see Figure 7.7). This may result in up to 2.05km^2 of temporary habitat loss/disturbance within Constable Bank which would equate to 5.89% of the feature. As outlined in Table 7.16 however, measures have been adopted as part of the Mona Offshore Wind Project to minimise the extent of sandwave clearance within Constable Bank.

7.8.1.9 The maximum duration of the offshore construction phase for the Mona Offshore Wind Project is up to four years. Within the four year construction period, construction activities are anticipated to occur intermittently.

7.8.1.10 The impact on subtidal coarse and mixed sediments with diverse benthic communities IEF is predicted to be of local 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**.

7.8.1.11 The impact on low resemblance stony reef 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.**

7.8.1.12 The impact on Constable Bank (Annex I 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.**

Intertidal Habitat IEFs

7.8.1.13 As outlined in Table 7.14, the installation of up to four export cables within the intertidal area at the landfall, via open cut trenching techniques, may result in up to 306,000m^2 of temporary habitat loss/disturbance. The MDS assumes a trench length for each cable of up to 1,500m and working areas of 51m width.

7.8.1.14 Measures have been adopted by the Mona Offshore Wind Project to avoid direct impacts to the intertidal *S. alveolata* reef (Table 7.16). As part of these measures, during the construction there will be a proposed 50m buffer around the reef, based on the current extent of the reef as mapped during the 2022 Mona Phase 1 intertidal survey and shown in Figure 7.4. An EcoW will also be on site during construction works to ensure no work occurs within the proposed 50m buffer.

7.8.1.15 Temporary disturbance to intertidal IEFs across the whole landfall area may also arise as a result of the movement of machinery, equipment, vehicles and personnel as well as barge vessel grounding. These activities are likely to result in surface level abrasion and disturbance or compaction of sediments. Whilst the intertidal habitats present in the part of the landfall which is to be used for access were not fully mapped during the site-specific surveys undertaken to date, a Phase I intertidal walkover survey of this area is scheduled for spring 2023. Therefore, for the purposes of undertaking the assessment for PEIR, the IEFs present in the part of the intertidal to be used for access only are assumed to be a continuation of those mapped to date (i.e. the littoral shingle with *Verrucaria maura* IEF and the littoral sand and muddy sand supporting infaunal communities IEF).

7.8.1.16 With the measures adopted as part of the Mona Offshore Wind Project in place, there will be no temporary habitat loss/disturbance to the *Sabellaria alveolata* reef IEF. The magnitude is therefore, considered to be **no change**.

7.8.1.17 The impact on all other intertidal habitat IEFs 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**.

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

7.8.1.18 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. The total area of the SAC is 264.83km^2 (CCW, 2012) and, the MDS assumes that up to 14km of export cables (i.e. four cables each up to 3.5km in length) may be installed within the SAC which all could require sandwave clearance prior to installation (noting that this is precautionary and that not all cables within the SAC are likely to require sandwave clearance). This may result in up to 1.46km^2 of temporary habitat loss/disturbance within the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC which equates to 0.55% of the SAC. As outlined in Table 7.16, measures have been adopted as part of the Mona Offshore Wind Project to minimise the extent of sandwave clearance within the Menai Strait and Conwy Bay SAC. On the basis of NRW's mapped distribution of designated features within the SAC (NRW, 2016), as shown in Figure 7.7, the Mona Offshore Cable Corridor does not spatially overlap with any protected features. This assessment for PEIR has, however, adopted a precautionary approach which assumes that there may be some impact to the Annex I sandbanks IEF and the Annex I subtidal reefs IEF. This assessment will, however, be updated for the final Environmental Statement to include the results of the site-specific surveys in the Mona Offshore Cable Corridor.

7.8.1.19 The impact on the Annex I sandbanks IEF and the Annex I subtidal reefs IEF of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC is predicted to be of local 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

7.8.1.20 Subtidal IEFs which are expected to be affected by temporary subtidal habitat loss/disturbance are listed in Table 7.9. The sensitivity of the IEFs to temporary subtidal habitat loss are presented in Table 7.17. These sensitivities are based on assessments made by the MarESA. Most IEFs have medium sensitivity to the MarESA pressures associated with temporary habitat loss/disturbance.

7.8.1.21 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. 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 (Tillin, 2016a; De-Bastos and Marshall, 2016; Tillin, 2016b). 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 (30cm of fine material added to the seabed in a single discrete event) (Bijkerk, 1988; Powilleit *et al*., 2009; Maurer *et al*., 1982).

7.8.1.22 The low resemblance stony reef 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, 2016). 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, 2016). 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).

7.8.1.23 The Constable Bank (Annex I sandbank outside an SAC) 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 30cm 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). Trawling studies and the comparative study by Capasso *et al*. (2010) suggest that the biological assemblage present in this biotope are characterised by species that are relatively tolerant of penetration and disturbance of the sediments. 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. Individuals are however more likely to escape from a covering similar to the sediments in which the species is found (Tillin, 2016c). As the sediment which will be deposited from the temporary habitat loss/disturbance 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.

7.8.1.24 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* beds 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).

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

7.8.1.26 The low resemblance stony reef IEF are deemed to be of medium vulnerability, medium recoverability and national value. The sensitivity of the receptor is therefore, considered to be **medium**.

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

Intertidal habitat IEFs

7.8.1.28 The intertidal IEFs which are expected to be affected by temporary subtidal habitat disturbance are listed in Table 7.9. The sensitivity of the IEFs to temporary subtidal habitat loss are presented in Table 7.17. These sensitivities are based on assessments made by the MarESA. Most IEFs have medium sensitivity to the MarESA pressures associated with temporary habitat loss/disturbance. Measures have been adopted to reduce the effect of this impact including adopting appropriate measure (e.g. micro-siting) to avoid direct impacts (Table 7.16).

7.8.1.29 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. Habitat structure change, such as that which may result from intertidal open cut trenching, would result in the temporary removal of the abiotic habitat which characterises the biotope as the trench would be backfilled following cable installation. *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 is likely to be rapid following sediment redistribution by wave action (Tillin, Budd and Tyler-Walters, 2019).

7.8.1.30 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. The extraction of sediment would remove the characterizing species *L. conchilega*, and other polychaetes, such as *S. armiger* and *Pygospio elegans* that burrow between 5 and 20cm into the sediment (Schöttler, 1982; Pedersen, 1991; Kruse *et al*., 2004). The burrowing traits of *A. marina* and *Macoma balthica* may provide some resistance to these effects. 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, 2016). As noted in paragraph 7.8.1.21, 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 and Tillin, 2016). 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. The removal of substratum however would cause a change to the physical environment however where extraction has occurred it will be filled in following the completion of construction allowing a recovery of the habitat.

7.8.1.31 The sublittoral very soft chalk or clay with piddocks IEF is characterised by specific abiotic and biotic features which would be adversely affected by temporary habitat loss/disturbance associated with open cut trenching for export cable installation. Abrasion, penetration and habitat structure change would result in damage to or the removal of these features (Tillin and Hill, 2016). Additionally, piddocks would not be able to excavate their burrows following smothering as more mobile bivalves can (Tillin and Hill, 2016). Recovery from this effect however can be facilitated by water currents and wave exposure rapidly removing the sediment. As the substratum could not, however, recover from removal of the substratum during open cut trenching, and would result in a shift to a different biotope, this would result in long term habitat loss and is assessed accordingly in section 7.8.4.

7.8.1.32 The communities of this littoral and eulittoral rock dominated by epifaunal communities IEF are however epifaunal and are therefore affected by 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.

7.8.1.33 The *Sabellaria alveolata* reef IEF has a medium sensitivity to penetration and habitat structure change as both would result in sub-surface damage to the reef or complete removal which would only be able to recover in the long term. Recovery was assessed as medium (2-10 years) considering that larval recruitment may be necessary for the reef structure to recover although small, localised areas of repair would take place within months (Tillin, Jackson and Garrard, 2020). These recovery rates are why abrasion is assessed as a low sensitivity impact for this IEF. The daily growth rate of the worms during the restoration phase was significantly higher than undisturbed growth (undisturbed: 0.7mm, after removal of 2cm of surface: 4.4mm) and indicates that as long as the reef is not completely destroyed recovery can occur rapidly. These recovery rates are as a result of short-term effects following once-only disturbance. At normal concentrations of suspended sediments *S. alveolata* rely on suspended particles for material to build their tubes, increased concentrations however may clog feeding apparatus (Jackson, 2008). In terms of smothering *S. alveolata* have been reported to survive short-term burial for days and even weeks in the southwest of England as a result of storms that altered sand levels up to two meters, they were, however, killed by longer-term burial (Earll and Erwin, 1983). Given the high sensitivity of this IEF, measures will be adopted as part of the Mona Offshore Wind Project to avoid direct impacts to the reef. Table 7.16 provides details on the measures adopted as part of the Mona Offshore Wind Project, which include a proposed 50m buffer around the reef, based on the current extent of the reef as mapped during the 2022 Mona Phase 1 intertidal survey and shown in Figure 7.4, to avoid direct impacts. Furthermore, an ECoW will supervise the intertidal construction area to ensure works are not undertaken within the proposed 50m buffer. With these measures in place, there will be no temporary loss or disturbance to the *Sabellaria alveolata* reef IEF.

7.8.1.34 The *Mytilus edulis* beds typically occur on rock substrate therefore, as noted in paragraph 7.8.1.32 regarding the littoral and eulittoral rock dominated by epifaunal communities IEF, the habitat structure change and penetration effects are irrelevant. Abrasion however can result in mussels being crushed or the weakening or breaking of their byssus threads which hold groups together making them vulnerable to displacement (Denny, 1987), overall reducing survival. Recovery cannot occur until all abrasion has ceased. *M. edulis* often occur in areas of high suspended sediment and therefore they are adapted to a certain level of siltation. Burial of *M. edulis* beds by large-scale movements of sand and resultant mortalities have been reported from Morecambe Bay, the Cumbrian coast and Solway Firth (Holt *et al*., 1998). Furthermore burial experiments by Last *et al.* (2011) found 16% of buried mussels died after 16 days compared to almost 50% mortality at 32 days. Therefore, the continual actions of the tide and waves removing sediment as well as the ability of mussels to move to the surface may prevent mortality in the short term following smothering events. These activities however are likely to have a reduced impact on this IEF because of its proximity to the *S. alveolata* reef. Measures have been adopted to reduce the effect of this impact on the *S. alveolata* reef including the introduction of a proposed 50m buffer around the reef at its current extent (Table 7.16) which is likely to offer some protection for the *M. edulis* beds.

7.8.1.35 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**.

7.8.1.36 The littoral sand and muddy sand supporting infaunal communities IEF and littoral and eulittoral rock dominated by epifaunal communities IEF is deemed to be of low vulnerability, high recoverability and national value. The sensitivity of the receptor is therefore, considered to be **low**.

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

7.8.1.38 The sublittoral very soft chalk or clay with piddocks IEF is 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

7.8.1.39 Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC IEFs which may be affected by temporary subtidal habitat loss/disturbance associated with export cable installation and associated activities (e.g. anchor placement, sandwave clearance, pre-lay preparation) are listed in Table 7.9. The sensitivity of the IEFs to temporary subtidal habitat loss/disturbance are presented in Table 7.17. These sensitivities are based on assessments made by the MarESA.

7.8.1.40 The effect of these impacts on the Annex I sandbanks IEF will be the same as those described for the Constable Bank (Annex I sandbank outside an SAC) IEF, paragraph 7.8.1.23, as they are characterised by similar communities.

7.8.1.41 The Annex I subtidal reefs IEF in the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC has a high sensitivity to habitat structure change and penetration based on the MarESA. The biotopes in this IEF are dependent on the presence of soft rock to support populations of the characterising *Hiatella arctica,* when lost recovery would not be feasible. Sub-surface penetration and disturbance could result in damage and removal of the surface epifauna. The burrowing of the characterising species of this biotope provides some protection from abrasion (*H. arctica* burrow depths were approximately 2cm). Abrasion however would damage or remove erect epifauna and may damage substratum resulting in loss of habitat and exposing burrowing species. Whilst a large proportion of the sponge community is likely to be affected by abrasion events, there is some debate as to the level of effects depending on the size of the sponge and the type of abrasion effect (Coleman *et al*., 2013). Trawling studies have shown sponges such as *Cliona* sp. are the most likely to be negatively affected by abrasion however size was not a contributing factor to the level of impact (Tilmant, 1979). Tilmant (1979) however also found sponges showed evidence of recovery 12 months after trawling but were not yet fully recovered. The majority of the literature agrees that damage would fall within the low bracket of 25-75% reduction (Readman, 2018). Exposure to smothering will depend on the prevailing hydrodynamic conditions which can reduce sediment accumulation. *H. arctica* are essentially sedentary with relatively short siphons, siltation from fine sediments rather than sands, even at low levels for short periods could result in mortality. Despite sediment being considered to have a negative impact on suspension feeders (Gerrodette and Flechsig, 1979), many encrusting sponges appear to be able to survive in highly sedimented conditions, and in fact, many species prefer such habitats (Bell *et al*., 2015; Schönberg, 2015). Other sponge species however are not adapted to smothering and extended periods (e.g. four weeks) of burial can lead to mortality (Wulff, 2006). The activities involved in the construction of the Mona Offshore Wind Project are however unlikely to result in large areas of smothering for long periods of time, limiting the risk of mortality.

7.8.1.42 The Annex I sandbanks IEF is deemed to be of medium vulnerability, high recoverability and international value. The sensitivity of the receptor is therefore, considered to be **low**.

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

Table 7.17: Sensitivity of the benthic subtidal IEFs to temporary subtidal or intertidal habitat loss/disturbance.

IEF	Representative Biotope	Sensitivity to defined MarESA pressure				Overall sensitivity (based on Table 7.12)
		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 biotopes						
Subtidal coarse and mixed sediments with diverse benthic communities.	Subtidal coarse and mixed sediments characterised by polychaetes, bivalves and mobile crustacean. • SS.SCS.CCS • SS.SMx.CMx • SS.SMx.CMx.KurThyMx • SS.SMx.OMx.PoVen.	Medium	Low	Low	Low - Medium	Low
Low resemblance stony reef	Cobbles and boulders with indicator species such as *A. digitatum*, *Nemertesia* sp. and *Tubularia* sp. • CR.HCR.XFa.SpNemAdia.	Medium	Medium	Medium	Low	Medium
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.	Medium	Low	Low	Low - Medium	Low
Intertidal biotopes						
Littoral shingle with *Verrucaria maura*.	Shingle or gravel shore in the littoral fringe which is covered by the black lichen *Verrucaria maura*. • LS.LCS.Sh.BarSh.	Medium	Not sensitive	Not sensitive	Not sensitive	Negligible
Littoral sand and muddy sand supporting infaunal communities	Littoral sand and muddy sand supporting infaunal communities including *Lanice conchilega, Macoma balthica* and *Arenicola marina*. • LS.LSa.MoSa • LS.LSa.MuSa.Lan • LS.LSa.MuSa.MacAre.	Not sensitive - Medium	Not sensitive - High	Not sensitive - High	Not sensitive - Medium	Low
Sublittoral very soft chalk or clay with piddocks	Circalittoral soft rocks such as chalks and clays with the faunal community dominated by bivalves such as *Pholas dactylus*. • CR.MCR.SfR.Pid	High	Medium	High	Medium	High

IEF	Representative Biotope	Sensitivity to defined MarESA pressure				Overall sensitivity (based on Table 7.12)
		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)	
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*. • LR.LLR.F.Fspi • LR.FLR.Lic.Ver • LR.FLR.Eph.UlvPor • LR.HLR.MusB.Sem.LitX • LR.HLR.MusB.Sem.	Not relevant	Low - Medium	Not relevant	Low - Medium	Low
Sabellaria alveolata reef	Exposed bedrock and boulders characterised by reefs of the polychaete *Sabellaria alveolata* which form large reef-like hummocks. • LS.LBR.Sab.Salv.	Medium	Low	Medium	Medium	Medium
Mytilus edulis beds	*Mytilus edulis* beds	Not relevant	Medium	Not relevant	Medium	Medium
Y Fenai a Bae Conwy/ Menai Strait and Conwy Bay SAC						
Annex I sandbank	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.	Medium	Low	Low	Low - Medium	Low
Annex I subtidal reefs	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.	Medium - High	Not relevant - Medium	Medium - High	Medium - High	High

Significance of the effect

Subtidal IEFs

7.8.1.44 Overall, for the subtidal coarse and mixed sediments with diverse benthic communities IEF the magnitude of the temporary habitat disturbance/loss impact in the construction phase is deemed to be medium 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.

7.8.1.45 Overall, for the low resemblance stony reef 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.

7.8.1.46 Overall, for the 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 low. 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.

Intertidal IEFs

7.8.1.47 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.

7.8.1.48 Overall, for the littoral sand and muddy sand supporting infaunal communities IEF and 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 low. 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.

7.8.1.49 Overall, for the *Sabellaria alveolata* reef IEF the magnitude of the impact is deemed to be no change and the sensitivity of the receptor is considered to be medium. The effect will, therefore, be no change, which is not significant in EIA terms.

7.8.1.50 Overall, for the *Mytilus edulis* beds 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.

7.8.1.51 Overall for the sublittoral very soft chalk or clay with piddocks 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 due to the small scale of the impact on this sensitive IEF. The intertidal trench will be 20m in width creating a limited area for disturbance.

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

7.8.1.52 On the basis of the mapped distribution of the Annex I habitats within this SAC (as shown in Figure 7.7), temporary habitat disturbance/loss is unlikely to occur within any of the designated features. However, this assessment will be updated for the final Environmental Statement to include the results of the site-specific surveys in the Mona Offshore Cable Corridor and a precautionary approach has been adopted for PEIR which assumes there may be some disturbance to the Annex I sandbank IEF and the Annex I subtidal reefs IEF.

7.8.1.53 Overall Annex I sandbank 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 low. 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.

7.8.1.54 Overall for the Annex I subtidal reefs 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. The effects of temporary habitat disturbance are highly localised which would result in minimal adverse effects from this impact.

Operations and maintenance phase

Magnitude of impact

Subtidal habitat IEFs

7.8.1.55 Operations and maintenance activities within the Mona benthic subtidal and intertidal study area (i.e. jack-ups associated with maintenance and cable repair/reburial events) will result in temporary habitat disturbance. The MDS accounts for up to 17,606,500m^2 of temporary habitat disturbance within this phase (Table 7.14). This equates to a small proportion (1.37%) 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.

7.8.1.56 The activities which contribute to temporary habitat disturbance in this phase may include jack-up events at wind turbines and OSPs and inter-array, interconnector and export cable repairs and remedial burial over the 35 year lifetime of the Mona Offshore Wind Project.

7.8.1.57 The 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 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. 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 effects on seabed habitats and associated benthic communities expected to be similar to the construction phase.

7.8.1.58 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 (19.72km) 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 7.14). The MDS assumes the repair of up to 16km (i.e. four cables each with a length of 4km) of subtidal export cable in each repair event and the reburial of up to 15km of subtidal export cable in each reburial event, with a disturbance width of 20m. This could result in up to 320,000m^2 of temporary habitat disturbance within the Constable Bank per repair event (0.92% of the total area of Constable Bank) and up to 300,000m^2 of temporary habitat disturbance per reburial event (0.86% of the total area of Constable Bank). Over the 35 year lifetime of the Mona Offshore Wind Project there may be repeat habitat disturbance 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 360km of the export cable, and it is highly unlikely all of this will occur within Constable Bank.

7.8.1.59 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.**

Intertidal habitat IEFs

7.8.1.60 In the intertidal zone of the Mona landfall, the MDS is that up to 1.6km of intertidal cable will require repairs every five years. The nature of this disturbance is likely to be similar to that experienced in the construction phase affecting the same habitats. The impact however will be of a lower magnitude and spread over a much longer time period, with only up to seven repair events anticipated over the 35 year operational lifetime of the Mona Offshore Wind Project.

7.8.1.61 With the measures adopted as part of the Mona Offshore Wind Project in place, there will be no temporary habitat loss/disturbance to the *Sabellaria alveolata* reef IEF. The magnitude is therefore, considered to be **no change**.

7.8.1.62 The impact on all other intertidal habitat IEFs 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

7.8.1.63 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. The overall figures for the spatial overlap are outlined in paragraph 7.8.1.18. In the operations and maintenance phase, the MDS assumes the repair and/or reburial of up to 14km (i.e. four cables each with a length of 3.5km) of subtidal export cable, with a disturbance width of 20m, potentially resulting in the temporary habitat disturbance of up to 280,000m^2 per repair/reburial event (each event equating to 0.11% of the SAC). Over the 35 year lifetime of the Mona Offshore Wind Project there may be repeat habitat disturbance twice every five years 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 16km of the total 360km of offshore export cables are expected to require repair every five years and only 15km 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, if any is required at all.

7.8.1.64 As noted in the construction phase (paragraph 7.8.1.18), on the basis of NRW's mapped distribution of designated features within the SAC (NRW, 2016), as shown in Figure 7.7, the Mona Offshore Cable Corridor does not spatially overlap with any protected features. This assessment for PEIR has, however, adopted a precautionary approach which assumes that there may be some impact to the Annex I sandbanks IEF and the Annex I subtidal reefs IEF. This assessment will, however, be updated for the final Environmental Statement to include the results of the site-specific surveys in the Mona Offshore Cable Corridor.

7.8.1.65 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**.

Sensitivity of receptor

Subtidal habitat IEFs

7.8.1.66 The sensitivity of the IEFs is as described previously for the construction phase assessment in paragraph 7.8.1.20 to 7.8.1.27 and above in Table 7.17.

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

7.8.1.68 The low resemblance stony reef IEF are deemed to be of medium vulnerability, medium recoverability and national value. The sensitivity of the receptor is therefore, considered to be **medium**.

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

Intertidal habitat IEFs

7.8.1.70 The sensitivity of the IEFs is as described previously for the construction phase assessment in paragraph 7.8.1.28 to 7.8.1.38 and above in Table 7.17.

7.8.1.71 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**.

7.8.1.72 The littoral sand and muddy sand supporting infaunal communities IEF and littoral and eulittoral rock dominated by epifaunal communities IEF is deemed to be of low vulnerability, high recoverability and national value. The sensitivity of the receptor is therefore, considered to be **low**.

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

7.8.1.74 The sublittoral very soft chalk or clay with piddocks IEF is 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

7.8.1.75 The sensitivity of the IEFs is as described previously for the construction phase assessment in paragraphs 7.8.1.39 to 7.8.1.43 and above in Table 7.17. The communities are anticipated to recover between export cable repair/reburial events.

7.8.1.76 The Annex I sandbanks IEF is deemed to be of medium vulnerability, high recoverability and international value. The sensitivity of the receptor is therefore, considered to be **low**.

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

Significance of effect

Subtidal habitat IEFs

7.8.1.78 Overall, for the low resemblance stony reef 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.

7.8.1.79 Overall, for the subtidal coarse and mixed sediments with diverse benthic communities 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 low. The effect will, therefore, be of **negligible** 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.

Intertidal habitat IEFs

7.8.1.80 Overall, for the littoral shingle with *Verrucaria maura* 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 negligible. The effect will, therefore, be of **negligible** significance, which is not significant in EIA terms.

7.8.1.81 Overall, for the littoral sand and muddy sand supporting infaunal communities IEF and littoral and eulittoral rock dominated by epifaunal 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 low. The effect will, therefore, be of **negligible** significance, which is not significant in EIA terms. This conclusion has been reached based on the small size of the impact and high likelihood of recovery.

7.8.1.82 Overall, for the *Sabellaria alveolata* reef IEF the magnitude of the impact is deemed to be no change and the sensitivity of the receptor is considered to be medium. The effect will, therefore, be no change, which is not significant in EIA terms.

7.8.1.83 Overall, for the *Mytilus edulis* beds 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 reached based on the small size of the impact as well as the low resilience of these IEFs.

7.8.1.84 Overall, for the sublittoral very soft chalk or clay with piddocks 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. 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

7.8.1.85 On the basis of the mapped distribution of the Annex I habitats within this SAC (as shown in Figure 7.7), temporary habitat disturbance is unlikely to occur within any of the designated features. However, this assessment will be updated for the final Environmental Statement to include the results of the site-specific surveys in the Mona Offshore Cable Corridor and a precautionary approach has been adopted for PEIR which assumes there may be some disturbance to the Annex I sandbank IEF and the Annex I subtidal reefs IEF.

7.8.1.86 Overall, for the Annex I sandbanks 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 low. The effect will, therefore, be of **minor** adverse significance, which is not significant in EIA terms. This receptor is relatively close to the potential site of repair or reburial so may experience limited temporary habitat disturbance, but this will be highly localised and short term in duration.

7.8.1.87 Overall, for the Annex I subtidal reefs 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. The effect will, therefore, be of **minor** adverse significance, which is not significant in EIA terms.

Decommissioning phase

Magnitude of impact

7.8.1.88 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

7.8.1.89 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 7.8.1.3 to 7.8.1.12. On the basis that there will be no requirement for sandwave clearance or pre-lay preparation during decommissioning, the magnitude of the impact is likely to be lower than during construction.

7.8.1.90 The impact on subtidal coarse and mixed sediments with diverse benthic communities IEF is predicted to be of local 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**.

7.8.1.91 The impact on low resemblance stony reef 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.**

7.8.1.92 The impact on Constable Bank (Annex I 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.**

Intertidal habitat IEFs

7.8.1.93 The extent of temporary habitat disturbance to intertidal 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 7.8.1.13 to 7.8.1.16.

7.8.1.94 With the measures adopted as part of the Mona Offshore Wind Project in place, there will be no temporary habitat loss/disturbance to the *Sabellaria alveolata* reef IEF. The magnitude is therefore, considered to be **no change**.

7.8.1.95 The impact on all other intertidal habitat IEFs 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**.

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

7.8.1.96 The extent of temporary habitat disturbance to 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 in paragraph 7.8.1.18 to 7.8.1.19. On the basis of NRW's mapped distribution of designated features within the SAC (NRW, 2016), as shown in Figure 7.7, the Mona Offshore Cable Corridor does not spatially overlap with any protected features. This assessment for PEIR has, however, adopted a precautionary approach which assumes that there may be some impact to the Annex I sandbanks IEF and the Annex I subtidal reefs IEF. This assessment will, however, be updated for the final Environmental Statement to include the results of the site-specific surveys in the Mona Offshore Cable Corridor. The inclusion of detail regarding the MDS for installation of subsea cables within the SAC is in line with best practice guidance from Natural England and JNCC (2022).

7.8.1.97 The impact on the Annex I sandbanks IEF and the Annex I subtidal reefs IEF of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC is predicted to be of local 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 receptor

Subtidal habitat IEFs

7.8.1.98 The sensitivity of the IEFs is as described previously for the construction phase assessment in paragraph 7.8.1.20 to 7.8.1.27 and above in Table 7.17.

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

7.8.1.100 The low resemblance stony reef IEF are deemed to be of medium vulnerability, medium recoverability and national value. The sensitivity of the receptor is therefore, considered to be **medium**.

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

Intertidal habitat IEFs

7.8.1.102 The sensitivity of the IEFs is as described previously for the construction phase assessment in paragraph 7.8.1.28 to 7.8.1.38 and above in Table 7.17.

7.8.1.103 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**.

7.8.1.104 The littoral sand and muddy sand supporting infaunal communities IEF and littoral and eulittoral rock dominated by epifaunal communities IEF is deemed to be of low vulnerability, high recoverability and national value. The sensitivity of the receptor is therefore, considered to be **low**.

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

7.8.1.106 The sublittoral very soft chalk or clay with piddocks IEF is 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

7.8.1.107 The sensitivity of the IEFs is as described previously for the construction phase assessment in paragraphs 7.8.1.39 to 7.8.1.43 and above in Table 7.17.

7.8.1.108 The Annex I sandbanks IEF is deemed to be of medium vulnerability, high recoverability and international value. The sensitivity of the receptor is therefore, considered to be **low**.

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

Significance of effect

Subtidal habitat IEFs

7.8.1.110 Overall, for the subtidal coarse and mixed sediments with diverse benthic communities IEF the magnitude of the temporary habitat disturbance/loss impact in the decommissioning phase is deemed to be medium 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.

7.8.1.111 Overall, for the 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 low. 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 the high likelihood of recovery.

7.8.1.112 Overall, for the low resemblance stony reef 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. This conclusion has been reached based on the small area impacted in this phase as well as the measures which have been adopted avoid direct impacts to any biogenic or geogenic reefs identified (Table 7.16).

Intertidal habitat IEFs

7.8.1.113 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.

7.8.1.114 Overall, for the littoral sand and muddy sand supporting infaunal communities IEF and 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 low. 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.

7.8.1.115 Overall, for the *Sabellaria alveolata* reef IEF the magnitude of the impact is deemed to be no change and the sensitivity of the receptor is considered to be medium. The effect will, therefore, be no change, which is not significant in EIA terms.

7.8.1.116 Overall, for the *Mytilus edulis* beds 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.

7.8.1.117 Overall for the sublittoral very soft chalk or clay with piddocks IEF the magnitude of the impact 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 due to the small scale of the impact on this sensitive IEF. The intertidal trench will be 20m in width creating a limited area for disturbance.

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

7.8.1.118 On the basis of the mapped distribution of the Annex I habitats within this SAC (as shown in Figure 7.7), temporary habitat disturbance/loss during the decommissioning phase is unlikely to occur within these habitats. However, this assessment has adopted a precautionary approach for PEIR which assumes there may be some disturbance to the Annex I sandbank IEF and the Annex I subtidal reefs IEF and will be updated for the final Environmental Statement to include the results of the site-specific surveys in the Mona Offshore Cable Corridor.

7.8.1.119 Overall, for the Annex I sandbanks 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 low. 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.

7.8.1.120 Overall, for the Annex I subtidal reefs 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. The effect will, therefore, be of **minor** adverse significance, which is not significant in EIA terms. The effects of temporary habitat disturbance are highly localised which would result in minimal adverse effects from this impact.

7.8.2 Increase in suspended sediment concentrations and associated deposition

7.8.2.1 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, appendix 6.1: Physical processes technical report of the PEIR 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.

7.8.2.2 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 5cm of fine material added to the habitat in a single discrete event.

7.8.2.3 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.

7.8.2.4 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 30mg/l. Based on the data provided within this study, the SPM associated with the Mona Offshore Wind Project has been estimated as approximately 0.9mg/l to 3mg/l over 1998 to 2005.

7.8.2.5 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.

Construction phase

Magnitude of impact

Subtidal habitat IEFs

7.8.2.6 Full details of the modelling undertaken to inform this assessment including relevant figures are presented in volume 6, appendix 6.1: Physical processes technical report of the PEIR, 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 7.14):

- Seabed preparation (sandwave, boulder and debris clearance)
- Drilling for foundation installation
- Installation of inter-array, interconnector, and export cables.

7.8.2.7 As outlined in Table 7.14, site clearance activities may be undertaken using a range of techniques, but 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 disposal of material. Although a suction hopper dredger has been modelled in practice, plough dredging which mobilises a much smaller amount of sediment into suspension at the seabed and has reduced sediment plume concentrations and extents compared to other types of dredging activities may be undertaken. However, 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 cable corridor to remove material from the crest of sandwaves and deposit on material in a trough as it progressed along the route, resulting in higher quantification of sedimentation compared to the plough dredging. The dredging phase plumes are predicted to be smaller than the plumes generated during the dumping phase (50mg/l). The plume however is expected to be most extensive when the deposited material is redistributed on the successive tides with average levels of <500mg/l in the Mona Array Area. During the dumping phase the plume is slightly larger with concentrations reaching 1,000mg/l at the release site for export cable clearance and 3,000mg/l at the release site for the inter-array and interconnector cables. Sedimentation of deposited material in the Mona Offshore Cable Corridor is focussed within 100m of the site of release with a maximum depth of 0.5 – 1m, whilst the finer sediment fractions are distributed in the vicinity at much smaller depths of 5 – 10mm. 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 1m whilst in the locality lower depths, typically <30mm, are present at 100m distance from the release with the formation of sandwaves being visible.

7.8.2.8 As outlined in Table 1.13, the MDS for foundation installation assumes all wind turbine and OSP foundations will be installed by drilling monopiles to a depth of 7.5m at a rate of 0.89m/h. A sample of three representative pile installation scenarios were simulated to cover the range of conditions in terms of water depth, tidal currents and sediment grading. At each location modelling assessed two piles being installed simultaneously. Modelling of suspended sediments associated with foundation installation (showed in volume 2, chapter 6: Physical processes of the PEIR) in the northeast of the Mona Array Area found an average concentration of <10mg/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 <1mg/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 50mg/l and average values are typically less than one fifth of this magnitude. In the central north of the site average sediment concentrations are <50mg/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 14km (east to west) with the SSC of the majority of the plume between 30mg/l and 1mg/l. In the southeast this extends to approximately 22km (east to west) with the SSC of the majority of the plume between 50mg/l and 10mg/l and approximately 21km (east to west) in the central north of the site where currents with the SSC of the majority of the plume between 50mg/l and 1mg/l.

7.8.2.9 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 <10mg/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 at the centre of the plume envelope peak values are circa 50mg/l. 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. Under these circumstances peak concentrations are <30mg/l and average values are typically one tenth of this value, with the peaks centred on areas of remobilised material.

7.8.2.10 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 300mm. 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 <0.1mm 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 300mm. However, the material carried to the east on the residual current is circa twice the depth of northeast location at 3mm. 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 23km the majority of which was predicted to be <1mm. The area impacted by sedimentation extended to approximately 30km in the central north the majority of which is predicted to experience sedimentation of <5mm. Whereas in the southeast the distribution of sedimentation was spread over a distance of 16km 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 0.1mm – 0.3mm of sedimentation.

7.8.2.11 For the inter-array cable installation, peak plume concentrations are highest at around 500mg/l (at the release site) with the sediment settling during slack water becoming resuspended in the form of an amalgamated plume. Sedimentation of 30mm depth occurs at the trench site, with sediment depths 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 20km from the site, is associated with re-mobilisation of the deposited material on subsequent tides. SSC associated with this event range between 1,000mg/l – 0.3mg/l.

7.8.2.12 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 depths of <30mm arise beyond the immediate vicinity of the trench the day after drilling cessation and therefore would be indiscernible from the existing seabed sediment.

7.8.2.13 For the installation of offshore export cables, the SSC along the route range between 50 and 1000mg/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 <0.5mm and the greatest levels of deposition occur along the trenching route as coarser material settles. Although the material is widely dispersed, sediment remains within the cell and would be drawn into the baseline transport regime with small increases in bed sediment levels. It is noted that due to the nature of the tidal flow mobilised sediment is carried offshore and does not accumulate along the coastline. The suspended sediment plume envelope for the operational phase of export cable installation has a width of circa 20km which corresponds with the tidal excursion. The maximum SSC during the dredging phase of the export cable installation was predicted to be 30mg/l.

7.8.2.14 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**.

Intertidal habitat IEFs

7.8.2.15 Modelling related to the trenching of offshore export cables in the intertidal zone was also undertaken (volume 2, chapter 6: Physical processes of the PEIR). The modelling predicts that the resulting plume will be strongly dependant on the prevailing tidal conditions at the time of sediment release. This gives rise to average SSC 500 – 1,000mg/l due to the limited water depth however the plume extent is restricted circa 5km. From cable trenching in the inter-tidal area, material released may migrate within the sediment cell but it would be insufficient to impact the beach morphology, increasing baseline levels of sediment by circa 5-10mm along the coast and typically far less along the shoreline which is redistributed on successive tides flowing cable installation. It should however be noted that this is native material, originating from less than 1km from the shoreline and would therefore remain within the existing shoreline transport cell. Sedimentation one day following the cessation of installation was influenced by tidal patterns spreading sediment east and west (parallel to the coast) however upon re-suspension sediment was deposited on the shoreline with a maximum depth of 10mm. In reality, the use of cofferdams during installation at the Bodelwyddan landfall site may provide a reduction in suspended sediment released from the modelled scenario as the movement of material is undertaken in a more controlled and enclosed environment.

7.8.2.16 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 **negligible**.

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

7.8.2.17 The Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC overlaps with a small section of the Mona Offshore Cable Corridor. Therefore, the magnitude of the change in environmental condition due to the impact of increased SSC and associated sediment deposition is the same as described for the sandwave clearance and cable installation for the offshore export cable. Detail on the magnitude of this impact from these activities is detailed in paragraphs 7.8.2.7 and 7.8.2.13.

7.8.2.18 The impact within the intertidal zone of the SAC is likely to be reduced compared to the subtidal zone. Volume 2, chapter 6: Physical processes of the PEIR details that due to the nature of the tidal flow mobilised sediment is carried offshore and does not accumulate along the coastline.

7.8.2.19 The impact on the subtidal of the SAC 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**.

7.8.2.20 The impact on the intertidal of the SAC 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 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

7.8.2.21 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 7.18).

7.8.2.22 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 32-41cm 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, 2016b), 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, 2016b).

7.8.2.23 The low resemblance stony reef IEF is assessed by the MarESA as having no sensitivity to this pressure. Whilst increases in SSC may result in extra energetic expenditure in cleaning, it is unlikely to increase mortality (Readman, 2016). Deposition of 5cm 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.

7.8.2.24 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 5cm layer of fine sediments, reducing the likelihood of mortality from light smothering for short periods (Tillin and Garrard, 2019).

7.8.2.25 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**.

7.8.2.26 The low resemblance stony reef IEF is deemed to be of low vulnerability, high recoverability and national value. The sensitivity of the receptor is therefore, considered to be **negligible.**

7.8.2.27 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**.

Intertidal habitat IEFs

7.8.2.28 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 7.18. 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.

7.8.2.29 The littoral shingle with *Verrucaria maura* IEF, and littoral sand and muddy sand supporting infaunal communities IEF are all identified by the MarESA as being not sensitive to these pressures. 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 and Tillin, 2016). 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 5cm 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, 2016). 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.

7.8.2.30 The sublittoral very soft chalk or clay with piddocks IEF is also assessed to be not sensitive to changes in water clarity 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.

7.8.2.31 The littoral and eulittoral rock dominated by epifaunal communities IEF is also likely to experience short term effects. 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.

7.8.2.32 *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.

7.8.2.33 *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 2cm (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.

7.8.2.34 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**.

7.8.2.35 The littoral sand and muddy sand supporting infaunal 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**.

7.8.2.36 The *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 **medium**

7.8.2.37 The sublittoral very soft chalk or clay with piddocks IEF and *Mytilus edulis* beds IEF are deemed to be of medium vulnerability, high recoverability and national value. The sensitivity of the receptor is therefore, considered to be **medium**.

7.8.2.38 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**.

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

7.8.2.39 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 7.18).

7.8.2.40 As the Constable Bank (Annex I sandbank outside an SAC) and Annex I sandbanks IEFs are associated with the same biotopes the effect of this impact on both IEFs will be similar. Therefore for detail in relation to this IEF see paragraph 7.8.2.24.

7.8.2.41 The Annex I subtidal reef IEF is likely to 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, 2018). 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.

7.8.2.42 The representative biotope of the Annex I intertidal reefs IEF 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 compensated 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 *et al*, 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 5cm 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, 2016).

7.8.2.43 The Annex I sandbanks IEF is deemed to be of low vulnerability, medium recoverability and international value. The sensitivity of the receptor is therefore, considered to be **low**.

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

7.8.2.45 The Annex I intertidal reef IEF is deemed to be of medium vulnerability, high recoverability and international value. The sensitivity of the receptor is therefore, considered to be **low**.

Table 7.18: Sensitivity of all of the relevant IEFs to increased SSC and associated sediment deposition.

IEF	Description and representative biotopes	Sensitivity to defined MarESA		
		Changes in suspended solids (water clarity)	Smothering and siltation rate changes (light)	Overall sensitivity (based on Table 7.12)
Subtidal habitats				
Subtidal coarse and mixed sediments with diverse benthic communities.	Subtidal coarse and mixed sediments characterised by polychaetes, bivalves and mobile crustacean. • SS.SCS.CCS • SS.SMx.CMx • SS.SMx.CMx.KurThyMx • SS.SMx.OMx.PoVen.	Not sensitive - Low	Not sensitive - Medium	Low
Low resemblance stony reef	Cobbles and boulders with indicator species such as *A. digitatum*, *Nemertesia* sp. and *Tubularia* sp. • CR.HCR.XFa.SpNemAdia.	Not sensitive	Not sensitive	Negligible
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	Low	Not sensitive - Low	Low
Intertidal habitats				
Littoral shingle with *Verrucaria maura.*	Shingle or gravel shore in the littoral fringe which is covered by the black lichen *Verrucaria maura*. • LS.LCS.Sh.BarSh.	Not sensitive	Not sensitive	Negligible
Littoral sand and muddy sand supporting infaunal communities	Littoral sand and muddy sand supporting infaunal communities including *Lanice conchilega, Macoma balthica* and *Arenicola marina*. • LS.LSa.MoSa • LS.LSa.MuSa.Lan • LS.LSa.MuSa.MacAre.	Not sensitive	Not sensitive	Negligible
Sublittoral very soft chalk or clay with piddocks	Circalittoral soft rocks such as chalks and clays with the faunal community dominated by bivalves such as *Pholas dactylus*. • CR.MCR.SfR.Pid.	Not sensitive	Medium	Medium
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*. • LR.LLR.F.Fspi • LR.FLR.Lic.Ver • LR.FLR.Eph.UlvPor • LR.HLR.MusB.Sem.LitX • LR.HLR.MusB.Sem.	Not sensitive - Medium	Low - Medium	Medium

IEF	Description and representative biotopes	Sensitivity to defined MarESA		
		Changes in suspended solids (water clarity)	Smothering and siltation rate changes (light)	Overall sensitivity (based on Table 7.12)
Sabellaria alveolata reef	Exposed bedrock and boulders characterised by reefs of the polychaete *Sabellaria alveolata* which form large reef-like hummocks. • LS.LBR.Sab.Salv.	Medium	Not sensitive	Medium
Mytilus edulis beds	*Mytilus edulis* beds	Not sensitive	Medium	Medium
Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC				
Annex I sandbank	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	Not sensitive - Low	Not sensitive - Medium	Low
Annex I subtidal reefs	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.	Low	Medium	Low
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	Not sensitive - Medium	Not sensitive - Low	Low

Significance of effect

Subtidal habitat IEFs

7.8.2.46 Overall, for the subtidal coarse and mixed sediments with diverse benthic communities 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 biotope being highly resistant to these specific pressures.

7.8.2.47 Overall, for the low resemblance stony reef 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.

Intertidal habitat IEFs

7.8.2.48 Overall, for the *Sabellaria alveolata* reef IEF the magnitude of the impact of increases in SSC and associated deposition 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.

7.8.2.49 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 construction 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.

7.8.2.50 Overall, for the littoral and eulittoral rock dominated by epifaunal communities IEF, sublittoral very soft chalk or clay with piddocks IEF and *Mytilus edulis* beds IEF the magnitude of the impact of increase 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. As although they are not sensitive there are likely to be some short term indirect effects to the communities associated with these IEFs.

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

7.8.2.51 Overall, for the Annex I sandbanks IEF and Annex I subtidal reefs IEF 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 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.

7.8.2.52 Overall, for the Annex I intertidal reefs IEF 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 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 characteristic communities of this biotope being resistant to this impact and likely recovering swiftly following this impact.

Operations and maintenance phase

Magnitude of impact

7.8.2.53 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 10km of inter-array cable in one event every three years, 16km of interconnector cable in three events every 10 years, and 32km of export cable every five years. The MDS also describes the reburial of 20km of inter-array cable in one event every five years, 2km of interconnector cable in one event every five years and 15km of export cable in one event every five years.

7.8.2.54 In each case the length of the repair or reburial activity may be up to 20km; therefore, the magnitude of the impacts would be a fraction of those for the construction phase (volume 2, chapter 6: Physical processes of the PEIR). 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.

7.8.2.55 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 southwestern 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).

7.8.2.56 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 10m to 15m 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 and is considered further in section 7.8.5.

7.8.2.57 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

7.8.2.58 Maintenance activities at the landfall may lead to increases in SSC and associated sediment deposition over the operational lifetime of the Mona Offshore Wind Project. The MDS describes the repair of 1.6km of intertidal cable every five years. As with the subtidal effects the repair of cable in the intertidal zone is not expected to result in SSC and associated deposition greater than the construction phase and in reality, will be substantially less than the construction phase.

7.8.2.59 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

7.8.2.60 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 7.8.2.53 to 7.8.2.56).

7.8.2.61 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.

7.8.2.62 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

7.8.2.63 The sensitivity of the subtidal habitat IEFs is as described previously for the construction phase assessment in paragraph 7.8.2.21 to 7.8.2.27 and above in Table 7.18.

7.8.2.64 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**.

7.8.2.65 The low resemblance stony reef IEF is deemed to be of low vulnerability, high recoverability and national value. The sensitivity of the receptor is therefore, considered to be **negligible.**

7.8.2.66 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**.

Intertidal habitat IEF

7.8.2.67 The sensitivity of the intertidal habitat IEFs is as described previously for the construction phase assessment in paragraph 7.8.2.28 to 7.8.2.38 and above in Table 7.18.

7.8.2.68 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**.

7.8.2.69 The littoral sand and muddy sand supporting infaunal 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**.

7.8.2.70 The *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 **medium.**

7.8.2.71 The sublittoral very soft chalk or clay with piddocks IEF and *Mytilus edulis* beds IEF are deemed to be of medium vulnerability, high recoverability and national value. The sensitivity of the receptor is therefore, considered to be **medium**.

7.8.2.72 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**.

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

7.8.2.73 The sensitivity of the subtidal and intertidal IEF features of the SAC are as described previously for the construction phase assessment in paragraph 7.8.2.39 to 7.8.2.45 and above in Table 7.18.

7.8.2.74 The Annex I sandbanks IEF is deemed to be of low vulnerability, medium recoverability and international value. The sensitivity of the receptor is therefore, considered to be **low**.

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

7.8.2.76 The Annex I intertidal reef IEF is deemed to be of medium vulnerability, high recoverability and international value. The sensitivity of the receptor is therefore, considered to be **low**.

Significance of effect

Subtidal habitat IEFs

7.8.2.77 Overall, for the subtidal coarse and mixed sediments with diverse benthic communities 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.

7.8.2.78 Overall, for the low resemblance stony reef 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.

Intertidal habitat IEF

7.8.2.79 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 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.

7.8.2.80 Overall, for the *Sabellaria alveolata* reef 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 conclusion has been reached based on the short term and localised nature of the impact as well as the sensitivity of this IEF to the associated pressures.

7.8.2.81 Overall, for the littoral and eulittoral rock dominated by epifaunal communities IEF, sublittoral very soft chalk or clay with piddocks IEF and *Mytilus edulis* beds 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

7.8.2.82 Overall, for the Annex I sandbanks IEF, Annex I intertidal reefs IEF and Annex I subtidal reefs 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.

Decommissioning phase

Magnitude of impact

Subtidal habitat IEF

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

7.8.2.84 Following 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 7.14), SSC would increase temporarily if suction caissons 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. 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 physical features may persist during decommissioning, however they are temporary and localised in nature.

7.8.2.85 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**.

Intertidal habitat IEF

7.8.2.86 The MDS assumes that export cables at the landfall will be removed at the landfall, therefore the impact to intertidal habitats is likely to be of a similar magnitude to that defined for the construction phase in paragraphs 7.8.2.15 to 7.8.2.16.

7.8.2.87 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

7.8.2.88 The impact of cable and cable protection removal as part of the decommissioning phase, as noted in paragraph 7.8.2.84, 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 drilling and seabed preparation.

7.8.2.89 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.

7.8.2.90 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

7.8.2.91 The sensitivity of the subtidal habitat IEFs is as described previously for the construction phase assessment in paragraph 7.8.2.21 to 7.8.2.27 and above in Table 7.18.

7.8.2.92 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**.

7.8.2.93 The low resemblance stony reef IEF is deemed to be of low vulnerability, high recoverability and national value. The sensitivity of the receptor is therefore, considered to be **negligible.**

7.8.2.94 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**.

Intertidal habitat IEFs

7.8.2.95 The sensitivity of the intertidal habitat IEFs is as described previously for the construction phase assessment in paragraph 7.8.2.28 to 7.8.2.38 and above in Table 7.18.

7.8.2.96 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**.

7.8.2.97 The littoral sand and muddy sand supporting infaunal 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**.

7.8.2.98 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.**

7.8.2.99 The sublittoral very soft chalk or clay with piddocks IEF and *Mytilus edulis* beds IEF are deemed to be of medium vulnerability, high recoverability and national value. The sensitivity of the receptor is therefore, considered to be **medium**.

7.8.2.100 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**.

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

7.8.2.101 The sensitivity of the subtidal and intertidal IEF features of the SAC are as described previously for the construction phase assessment in paragraph 7.8.2.39 to 7.8.2.45 and above in Table 7.18.

7.8.2.102 The Annex I sandbanks IEF is deemed to be of low vulnerability, medium recoverability and international value. The sensitivity of the receptor is therefore, considered to be **low**.

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

7.8.2.104 The Annex I intertidal reef IEF is deemed to be of medium vulnerability, high recoverability and international value. The sensitivity of the receptor is therefore, considered to be **low**.

Significance of effect

Subtidal habitat IEFs

7.8.2.105 Overall, for the subtidal coarse and mixed sediments with diverse benthic communities 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.

7.8.2.106 Overall, for the low resemblance stony 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 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.

Intertidal habitat IEFs

7.8.2.107 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.

7.8.2.108 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.

7.8.2.109 Overall, for increase in SSC and associated deposition the littoral and eulittoral rock dominated by epifaunal communities IEF, sublittoral very soft chalk or clay with piddocks IEF and *Mytilus edulis* beds 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.

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

7.8.2.110 Overall, for the Annex I sandbanks IEF and Annex I subtidal reefs IEFs 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.

7.8.2.111 Overall, for the Annex I intertidal reefs IEFs 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.

7.8.3 Disturbance/remobilisation of sediment-bound contaminants

7.8.3.1 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.

7.8.3.2 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.

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

Construction phase

Magnitude of impact

Subtidal habitat IEFs

7.8.3.4 Samples from the Mona Array Area were analysed for contaminants including heavy metals, PCBs and PAHs. The full results of this sediment chemistry analysis are detailed in volume 6, annex 7.1: Benthic ecology technical report of the PEIR. The concentrations of the heavy metals, PAHs and PCBs was compared to the corresponding Cefas AL1 and AL2 and the Canadian TEL and PEL. Within the Mona Array Area one site, in the southwest near the Mona Array Area boundary, exceeded the limit Cefas Action Level (AL) 1 and Canadian temporary effect level (TEL) for Arsenic (Figure 7.2). Concentrations of PCBs and PAHs in all samples were found to be under AL1 and the CSQGs.

7.8.3.5 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 21.020.241m^3 of spoil from sandwave clearance within the Mona Array Area and 12,051,955m^3 of spoil from sandwave clearance within the Mona Offshore Cable Corridor (over a period of 12 months). The MDS also assumes 13,460m^3 of spoil per monopile for installation of OSP and wind turbine foundations, 1,620,000m^3 for export cable installation (over a period of 15 months), 2,250,000m^3 for inter-array cable installation (over a period of 12 months) and 225,000m^3 for interconnector cable installation (over a period of four months) (Table 7.14).

7.8.3.6 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 7.8.2). 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.

7.8.3.7 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 IEFs

7.8.3.8 Open cut trenching for the installation of the export cable in the intertidal zone has the potential to result in disturbance/remobilisation of sediment-bound contaminants. During the construction phase 18,000m^3 of spoil material will be moved during export cable installation in the intertidal zone. Furthermore, the majority of open cut trenching will be undertaken at low water and therefore the potential for resuspension of contaminated sediment is minimal. As in the subtidal, disturbance as a result of construction activities, will result in sediment deposition in the immediate vicinity of the works (for further detail on deposition see section 7.8.2). The release of contaminants from the small proportion of fine sediments is likely to be rapidly dispersed with the tide and therefore increased bioavailability resulting in adverse eco-toxicological effects are not expected.

7.8.3.9 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

7.8.3.10 The impact of disturbance/remobilisation of sediment-bound contaminants in the part of the Mona Offshore Cable Corridor which overlaps with the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC is likely to be similar to that predicted for subtidal habitat IEFs in paragraphs 7.8.3.4 to 7.8.3.6.

7.8.3.11 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.

7.8.3.12 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

7.8.3.13 The disturbance/remobilisation of sediment-bound contaminants has the potential to affect all the subtidal IEFs. 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). The only heavy metal of concern within the subtidal area of the Mona Offshore Wind Project is arsenic, which is present in levels lower than those typical of deep-sea sediments (typically 40 µg/g) (Bostrom and Valdes, 1969). As such, the benthic communities have developed in an environment of existing contamination, so any release of contaminants from construction activities is not likely to significantly increase bioavailability.

7.8.3.14 The subtidal coarse and mixed sediments with diverse benthic communities IEF, low resemblance stony reef 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 receptors is therefore, considered to be **low**.

Intertidal habitat IEFs

7.8.3.15 The disturbance/remobilisation of sediment-bound contaminants has the potential to affect all the intertidal IEFs. All the representative biotopes for the intertidal habitat IEFs were not assessed by the MarESA, with the exception of the biotope *Verrucaria maura* on littoral shingle (LR.FLR.Lic.Ver) representative of the littoral and eulittoral rock dominated by epifaunal communities IEF which was identified as not sensitive to transition elements and organo-metal contamination. The ability of the lichens in this biotope to accumulate heavy metals to such high levels suggests a high resistance to the heavy metal ions studied. Therefore, the lichen community is unlikely to be sensitive to heavy metal contamination.

7.8.3.16 Similarly to subtidal IEFs, heavy metal sensitivity varies depending on the intertidal species, intolerance tends to be high for most groups of benthic species in these IEFs. Bryan (1984) reported that short-term toxicity in polychaetes was highest to mercury, copper and silver, declined with aluminium, chromium, zinc and lead with cadmium, nickle, cobalt and selenium being the least toxic. The effects of contaminants specifically on *Mytilus* sp. to heavy metal contamination were extensively reviewed by Widdows and Donkin, (1992). Widdows and Donkin (1992) list tolerances of *Mytilus edulis* adults and larvae but note that lethal responses give a false impression of high tolerance, since the adults can close their valves and isolate themselves from the environment for days. Recovery may occur rapidly through good annual recruitment. Most research focusses on heavy metals which are often anthropogenically introduced such as mercury and cadmium however within the Mona Array Area the metal arsenic is in high levels but is naturally introduced and consistent in the environment. Therefore, any release of contaminants from construction activities is not likely to significantly increase bioavailability. Where this IEF is characterised by sparse community (e.g. the LS.LSa.MoSa biotope) it is very unlikely there will be any effect on the environment.

7.8.3.17 The littoral shingle with *Verrucaria maura* IEF and littoral and eulittoral rock dominated by epifaunal communities IEF are deemed to be of low vulnerability, high recoverability and local value. The sensitivity of the receptor is therefore, considered to be low. The littoral sand and muddy sand supporting infaunal communities IEF, sublittoral very soft chalk or clay with piddocks IEF, *Mytilus edulis* beds IEF and *Sabellaria alveolata* reef 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

7.8.3.18 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.

7.8.3.19 The effect of this impact on the Annex I sandbanks IEF will be the same as those described for the Constable Bank (Annex I sandbank outside an SAC) IEF, paragraphs 7.8.3.13 and **Error! Reference source not found.**, as they both represent similar features.

7.8.3.20 The Annex I subtidal reef IEF 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.

7.8.3.21 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.

7.8.3.22 The Annex I sandbanks IEF, Annex I intertidal reefs IEF and Annex I subtidal reefs IEF 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

7.8.3.23 Overall, for the low resemblance stony reef IEF, subtidal coarse and mixed sediments with diverse benthic communities IEF and Constable Bank (Annex I sandbank outside an SAC) 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.

Intertidal habitat IEFs

7.8.3.24 Overall, for the littoral shingle with *Verrucaria maura* IEF, littoral and eulittoral rock IEF, littoral sand and muddy sand supporting infaunal communities IEF, sublittoral very soft chalk or clay with piddocks IEF, *Sabellaria alveolata* reef IEF, and *Mytilus edulis* beds 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 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.

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

7.8.3.25 Overall, for the, Annex I intertidal reefs IEF, Annex I subtidal reefs IEF and Annex I sandbanks 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 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

7.8.3.26 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.

7.8.3.27 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 in the decommissioning phase. Therefore the magnitude of this impact will be similar to the construction phase aspresented in paragraphs 7.8.3.4 and 7.8.3.6.

7.8.3.28 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 7.8.2). 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.

7.8.3.29 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**.

Intertidal habitat IEFs

7.8.3.30 The MDS assumes that all export cables will be removed at the landfall. The magnitude of this impact is predicted to be similar to the construction phase as the activities will be of a similar nature.

7.8.3.31 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

7.8.3.32 Cables and cable protection may be removed from within the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC during the decommissioning phase which could result in the remobilisation of sediment bound contaminants.

7.8.3.33 The potential extent and duration of the effects associated with this impact will be the same as for the subtidal environment (see paragraph 7.8.3.28).

7.8.3.34 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.

7.8.3.35 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

7.8.3.36 The sensitivity of the IEFs is as described previously for the construction phase assessment in paragraph 7.8.3.13 to 7.8.3.14.

7.8.3.37 The subtidal coarse and mixed sediments with diverse benthic communities IEF, low resemblance stony reef 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 receptors is therefore, considered to be **low**.

Intertidal habitat IEFs

7.8.3.38 The sensitivity of the IEFs is as described previously for the construction phase assessment in paragraph 7.8.3.16 to 7.8.3.18.

7.8.3.39 The littoral shingle with *Verrucaria maura* IEF and littoral and eulittoral rock dominated by epifaunal communities IEF are deemed to be of low vulnerability, high recoverability and local value. The sensitivity of the receptor is therefore, considered to be low. The littoral sand and muddy sand supporting infaunal communities IEF, sublittoral very soft chalk or clay with piddocks IEF, *Mytilus edulis* beds IEF and *Sabellaria alveolata* reef 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

7.8.3.40 The sensitivity of the IEFs is as described previously for the construction phase assessment in paragraph 7.8.3.18 to 7.8.3.21.

7.8.3.41 The Annex I sandbanks IEF, Annex I intertidal reefs IEF and Annex I subtidal reefs IEF 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

7.8.3.42 Overall, for the low resemblance stony reef IEF, subtidal coarse and mixed sediments with diverse benthic communities IEF and Constable Bank (Annex I sandbank outside an SAC) 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.

Intertidal habitat IEFs

7.8.3.43 Overall, for the littoral shingle with *Verrucaria maura* IEF, littoral and eulittoral rock IEF, littoral sand and muddy sand supporting infaunal communities IEF, sublittoral very soft chalk or clay with piddocks IEF, *Sabellaria alveolata* reef IEF, and *Mytilus edulis* beds 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. 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.

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

7.8.3.44 Overall, for the Annex I subtidal reefs IEF, Annex I intertidal reefs IEF and Annex I sandbanks IEFs 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.

7.8.4 Long term habitat loss

7.8.4.1 Long term subtidal habitat loss 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 7.14). 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. 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.

7.8.4.2 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.

7.8.4.3 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 years).

Construction and operations and maintenance phases

Magnitude of impact

Subtidal habitat IEFs

7.8.4.4 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. The MDS is for up to 2,363,092m^2 of long term habitat loss due to the installation of suction bucket jacket foundations and associated scour protection and cable protection associated with wind turbines and all types of cable (Table 7.14). This represents 0.18% of the Mona benthic subtidal and intertidal ecology study area.

7.8.4.5 Foundations and associated scour protection may account for up to 760,452m^2 of the total long term habitat loss in the Mona Array Area. Cable protection may account for up to 1,320,000m^2 of long term habitat loss. 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 10m. Additionally cable crossing protection may result in 282,640m^2 of long term habitat loss. Cable protection may be required for 67 crossings for the inter-array cable, 10 crossings for the interconnector cable and 24 crossings for the export cable.

7.8.4.6 Long term habitat loss may also occur within Constable Bank as a result of the placement of cable protection. For the purpose of this assessment, the MDS assumes that 39,440m^2 of long term habitat loss may occur within Constable Bank, equating to 0.11% of its total area. The MDS assumes that 20% of the 19.72km of cables within the Constable Bank could require cable protection with a width of 10m. As outlined in Table 7.16, however, there is a commitment to investigate opportunities to limit the extent of cable protection within Constable Bank once the site-specific geophysical and geotechnical data for the Mona Offshore Cable Corridor are available.

7.8.4.7 Long term subtidal habitat loss potential impacts will occur during the construction phase and will be continuous throughout the 35 year operations and maintenance phase.

7.8.4.8 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**.

Intertidal habitat IEFs

7.8.4.9 No above surface cable protection will be placed in the intertidal zone. There will, therefore, be no long-term loss of intertidal habitats or IEFs as a result of cable protection. The MDS for the installation of the export cable in the intertidal zone is for open cut trenching. This method will remove the top layers of sediment to create a trench, the majority of habitats within the intertidal zone will be able to recover from this potential impact. For the majority of intertidal IEFs this has been assessed as temporary habitat loss/disturbance in section 7.8.1. For the sublittoral very soft chalk or clay with piddocks IEF, however, the removal of the top layers of chalk and clay could result in a permanent loss of the habitat as the sediment is highly unlikely to return following its removal. Only a very small proportion (2,040m^2) of the sublittoral very soft chalk or clay with piddocks IEF could be affected by long term habitat loss, as a result of the burial of up to four cables (each up to 10m long within this IEF and with a working area width of 51m).

7.8.4.10 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

7.8.4.11 As the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC overlaps spatially with the Mona Offshore Cable Corridor there will be long term habitat loss within the SAC. The MDS assumes the need for cable protection over up to 20% of the entire length of the export cable, therefore the MDS assumes that up to 20% of the export cable within the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC will have cable protection with a width of 10m. This results in long term habitat loss of 28,000m^2, which represents 0.01% of the total area of the SAC. As outlined in Table 7.16, however, there is a commitment to investigate opportunities to limit the extent of cable protection within the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC once the site- specific geophysical and geotechnical data for the Mona Offshore Cable Corridor are available. On the basis of NRW's mapped distribution of designated features within the SAC (NRW, 2016), as shown in Figure 7.7, the Mona Offshore Cable Corridor does not spatially overlap with any protected features. This assessment for PEIR has, however, adopted a precautionary approach which assumes that there may be some long term loss of the Annex I sandbanks IEF and the Annex I subtidal reefs IEF. This assessment will, however, be updated for the final Environmental Statement to include the results of the site-specific surveys in the Mona Offshore Cable Corridor.

7.8.4.12 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

7.8.4.13 Long term habitat loss will affect subtidal IEFs, including subtidal coarse and mixed sediments with diverse benthic communities IEF and Constable Bank (Annex I sandbank outside an SAC) IEF.

7.8.4.14 All subtidal IEFs have high sensitivity to long term habitat loss where a change in seabed type would cause a fundamental change in habitat type (Table 7.19). As outlined previously, this habitat alteration represents a small proportion of the Mona benthic subtidal and intertidal ecology study area.

7.8.4.15 The subtidal coarse and mixed sediments with diverse benthic communities IEF and Constable Bank (Annex I sandbank outside an SAC) 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 (Tillin, 2016a; De-Bastos and Marshall, 2016; Perry, 2018; Tillin, 2016b). The low resemblance stony reef 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 7.8.5).

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

Intertidal habitat IEFs

7.8.4.17 As discussed in paragraphs 7.8.4.9 and 7.8.4.18 open cut trenching through the Sublittoral very soft chalk or clay with piddocks IEF has the potential to result in long term habitat loss, due to the inability of this habitat to recover from this potential impact. As such, an assessment of this potential impact is included in this section.

7.8.4.18 This biotope is characterised by the clay or soft chalk substratum which supports populations of burrowing piddocks. A review of the potential impacts of cable installation undertaken by RPS (2019) found that disturbance within clay would likely result in a permanent scar in the clay following cable activities, infilling may occur if the clay is soft. The biotope is therefore considered to have no resistance to this pressure. This habitat is unlikely to recover on its own, however following habitat restoration recovery may occur in 2-10 years (Tillin and Hill, 2016).

7.8.4.19 The sublittoral very soft chalk or clay with piddocks IEF is 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

7.8.4.20 The MarESA determines the Annex I sandbanks IEF and Annex I subtidal reefs IEF which occurs within the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC to have a high sensitivity to the pressures associated with long term subtidal habitat loss (Table 7.19).

7.8.4.21 The Annex I sandbanks IEF is 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 (Tillin and Garrard, 2019; Tillin, 2016c).

7.8.4.22 The Annex I subtidal reefs IEF is characterised by soft rock substratum which supports a specialised community including burrowing *H. arctica*. A change to this underlying substratum to artificial substratum would result in the loss of the specialised characterising community (Tillin, 2016d, Readman, 2016). 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 the Annex I subtidal reefs (further detail on the colonisation of hard structures can be found in section 7.8.5).

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

Table 7.19: Sensitivity of the benthic IEFs to long term subtidal habitat loss.

IEF	Representative biotope	Sensitivity to defined MarESA Physical change (to another seabed type)	Overall sensitivity (based on Table 7.12)
Subtidal biotopes			
Subtidal coarse and mixed sediments with diverse benthic communities.	Subtidal coarse and mixed sediments characterised by polychaetes, bivalves and mobile crustacean. • SS.SCS.CCS • SS.SMx.CMx • SS.SMx.CMx.KurThyMx • SS.SMx.OMx.PoVen.	High	High
Low resemblance stony reef	Cobbles and boulders with indicator species such as *A. digitatum*, *Nemertesia* sp. and *Tubularia* sp. • CR.HCR.XFa.SpNemAdia.	High	High
Constable Bank (Annex I sandbank outside an SAC)	Sandbank off the north coast of Wales, and north of the Mona landfall.	High	High
Intertidal biotopes			
Sublittoral very soft chalk or clay with piddocks	Circalittoral soft rocks such as chalks and clays with the faunal community dominated by bivalves such as *Pholas dactylus*. • CR.MCR.SfR.Pid.	High	High
Y Fenai a Bae Conwy/ Menai Strait and Conwy Bay SAC			
Annex I sandbank	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.	High	High
Annex I subtidal reefs	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.	High	High

Significance of effect

Subtidal habitat IEFs

7.8.4.24 Overall, for the subtidal coarse and mixed sediments with diverse benthic communities IEF, low resemblance stony reef IEF and Constable Bank (Annex I sandbank outside an SAC) IEF the magnitude of the impact of long term habitat loss 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 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.

Intertidal habitat IEFs

7.8.4.25 Overall, for the sublittoral very soft chalk or clay with piddocks IEF the magnitude of the long term habitat loss 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. The long term habitat loss will only affect a small proportion of this habitat at the Mona landfall.

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

7.8.4.26 Overall, for the Annex I sandbanks and Annex I subtidal reefs IEFs the magnitude of the long term habitat loss 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. The habitat loss is unlikely to interact within these habitats however should it occur within these IEFs this is likely to represent the loss of a small portion of the feature. Although on the basis of the mapped distribution of the Annex I habitats within this SAC (as shown in Figure 7.7), long term habitat loss is unlikely to occur within these habitats. However, this assessment will be updated for the final Environmental Statement to include the results of the site-specific surveys in the Mona Offshore Cable Corridor.

Decommissioning phase

Magnitude of impact

7.8.4.27 The presence of the Mona Offshore Wind Project infrastructure within the Mona benthic subtidal and intertidal ecology study area post-decommissioning will result in permanent habitat alteration. The MDS is for up to 2,305,956m^2 of permanent habitat alteration due to scour protection and cable protection associated with cables and cable crossings being left *in situ* after decommissioning. This equates to a very small proportion (0.68%) 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 Mona Offshore Wind Project infrastructure will be colonised by hard structure adapted communities similar to those which occur on the natural hard substrates (further detail on the colonisation of hard structures can be found in section 7.8.5). As a result of this it may be more accurate to refer to the permanent placement of Mona Offshore Wind Project infrastructure as habitat alteration rather than loss, as used for the other phases, as these artificial habitats will provide a basis for benthic communities although they are likely to be different from those originally found at these sites.

7.8.4.28 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

7.8.4.29 On the basis of the mapped distribution of the Annex I habitats within this SAC (as shown in Figure 7.7), long term habitat loss is unlikely to occur within any of the designated features. However, this assessment will be updated for the final Environmental Statement to include the results of the site-specific surveys in the Mona Offshore Cable Corridor and a precautionary approach has been adopted for PEIR which assumes there may be some long term habitat loss in the Annex I sandbank IEF and the Annex I subtidal reefs IEF.

7.8.4.30 The MDS states that cables and cable protection will remain *in situ* following decommissioning. The MDS assumes that as the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC overlaps with the Mona Offshore Cable Corridor any cable protection which was installed here will remain there contributing towards permanent habitat alteration. Paragraph 7.8.4.11 provides an explanation of the assumptions used to determine the MDS for cable protection within the SAC. There may be up to 28,000m^2 of permanent habitat alteration, which represents 0.01% of the total area of the SAC.

7.8.4.31 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

7.8.4.32 The sensitivity of the IEFs is as described previously for the construction phase assessment in paragraph 7.8.4.13 to 7.8.4.16 and above in Table 7.19.

7.8.4.33 The subtidal coarse and mixed sediments with diverse benthic communities IEF, low resemblance stony reef IEF and Constable Bank (Annex I sandbank outside an SAC) 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

7.8.4.34 The sensitivity of the IEFs is as described previously for the construction phase assessment in paragraph 7.8.4.20 to 7.8.4.23 and above in Table 7.19.

7.8.4.35 The Annex I sandbanks and Annex I subtidal reefs IEFs are deemed to be of high vulnerability, low recoverability and international value. The sensitivity of the receptor is therefore considered to be **high**.

Significance of effect

Subtidal habitat IEFs

7.8.4.36 Overall, for the subtidal coarse and mixed sediments with diverse benthic communities IEF, low resemblance stony reef IEF and Constable Bank (Annex I sandbank outside an SAC) IEF the magnitude of the long term habitat loss 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 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

7.8.4.37 Overall, for the Annex I sandbanks IEF and Annex I subtidal reefs IEF the magnitude of the long term habitat loss 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. On the basis of the mapped distribution of the Annex I habitats within this SAC (as shown in Figure 7.7), habitat loss is unlikely to occur within these habitats. However, this assessment will be updated for the final Environmental Statement to include the results of the site-specific surveys in the Mona Offshore Cable Corridor. Should habitat loss occur within the Annex I sandbanks IEF and Annex I subtidal reefs IEF this is likely to represent the loss of a small portion of these features.

7.8.5 Colonisation of hard structures

7.8.5.1 The introduction of infrastructure within the Mona benthic subtidal and intertidal ecology study area may result in the colonisation of foundations, scour protection and cable protection.

7.8.5.2 The environmental pressures associated with this potential impact are the same as those associated with long term subtidal habitat loss 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 7.8.4.2.

Construction and operations and maintenance phases

Magnitude of impact

Subtidal habitat IEF

7.8.5.3 The MDS is for up to 2,856,296m^2 of habitat creation 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 7.14). This equates to 0.22% of the Mona benthic subtidal and intertidal ecology study area. This value however is likely an over estimation of habitat creation 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).

7.8.5.4 The introduction of new hard substrate 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). 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.

7.8.5.5 The reef effect may be enhanced by the deposition of fouling material on the seabed. An investigation conducted at the research platform Forschungsplattformen in Nord-und Ostsee 1 FINO 1 in the south-western 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 10m to 15m 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.

7.8.5.6 The increased biodiversity, species richness and species abundance which has been noted as a feature of colonised infrastructures, 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 8: Fish and shellfish ecology of the PEIR). 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 9: Marine mammals of the PEIR) and ornithology (volume 2, chapter 10: Offshore ornithology of the PEIR) in their individual chapters.

7.8.5.7 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).

7.8.5.8 Furthermore there is the potential for the presence of the infrastructure to result in reduced fishing pressure within the Mona Offshore Wind Project. During the construction phase, it is proposed that temporary 500m safety zones will be present around wind turbine generators and OSPs where works are underway. Whilst existing UK legislation does not prohibit commercial fishing within operational offshore wind farms, during the operations and maintenance phase it is reasonable to assume that certain types of fishing may be restricted within the Mona Array Area based on safety requirements. The effect of this may be that trawling activity such as beam may potentially be reduced within the Mona Array Area. A recent study by Dunkley and Solandt (2022) used publicly available fishing effort data and found fishing rate from vessels using bottom-towed gear was reduced by 77 % following offshore wind farm construction in 11 of the 12 sites studied within the UK exclusive economic zone. A decline in bottom-towed fishing activity was recorded in offshore wind farms where wind turbines were constructed in a densely aggregated patch (Dunkley and Solandt, 2022). Based on these findings Dunkley and Soldandt (2022) concluded that offshore wind farms afforded the marine ecosystem within their array areas some protection from bottom trawling.

7.8.5.9 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**.

Intertidal habitat IEF

7.8.5.10 The MDS for cable installation at the landfall is open cut trenching which will result in export cables being buried in the intertidal zone. Therefore there will be no above surface cable protection installed in the intertidal zone resulting in limited introduction pathways for INNS through the colonisation of hard substrate, the main method of introduction of INNS, as a result no further assessment of this impact is required for the intertidal habitats.

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

7.8.5.11 Within the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC during the construction and operations and maintenance phases of the Mona Offshore Wind Project there may be colonisation of hard substrate. Cable protection may be installed in the section of the SAC which overlaps with the Mona Offshore Cable Corridor. The MDS(Table 7.14) assumes the need for cable protection over up to 20% of the entire length of the export cable, therefore the MDS assumes that up to 20% of the export cable within the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC will have cable protection with a width of 10m. This results in up to 28,000m^2 of cable protection available for colonisation within the SAC, which represents 0.01% of the total area of the SAC. On the basis of NRW's mapped distribution of designated features within the SAC (NRW, 2016), as shown in Figure 7.7, the Mona Offshore Cable Corridor does not spatially overlap with any protected features. This assessment for PEIR has, however, adopted a precautionary approach which assumes that there may be some impact to the Annex I sandbanks IEF and the Annex I subtidal reefs IEF. This assessment will, however, be updated for the final Environmental Statement to include the results of the site-specific surveys in the Mona Offshore Cable Corridor. The inclusion of detail regarding the MDS for installation of subsea cables within the SAC is in line with best practice guidance from Natural England and JNCC (2022).

7.8.5.12 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 7.8.5.4 to 7.8.5.7 for the rest of the Mona benthic subtidal and intertidal ecology study area.

7.8.5.13 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**.

Sensitivity of receptor

Subtidal habitat IEFs

7.8.5.14 The sensitivity of the IEFs to physical change (to another substratum) is as described previously for the long term subtidal habitat loss assessment and above in 7.8.4.2.

7.8.5.15 Within the Mona benthic subtidal and intertidal ecology study area sediments are dominated by gravelly sand. Furthermore, Annex I subtidal reefs have also been identified in the Mona benthic subtidal and intertidal ecology study area. As such, the introduction of hard substrates 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.

7.8.5.16 The colonisation of hard structures will affect subtidal IEFs (subtidal coarse and mixed sediments with diverse benthic communities IEF, low resemblance stony reef IEF and Constable Bank (Annex I sandbank outside an SAC) IEF).

7.8.5.17 Colonisation of the wind turbine 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.

7.8.5.18 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).

7.8.5.19 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 30m to 90m distance bands of the wind turbines (Hutchison *et al*., 2020).

7.8.5.20 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).

7.8.5.21 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 45m) 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 40m with lower biomass above and below. The splash zone and top 5m of the foundations was dominated by algal turf and kelp, this gave way to cnidarian dominated community at around 5m to 10m and this transitioned to a keel worm dominated zone between 25m and 40m 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.

7.8.5.22 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 ~300km (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.

7.8.5.23 All of the subtidal IEFs (subtidal coarse and mixed sediments with diverse benthic communities IEF, low resemblance stony reef IEF and Constable Bank (Annex I sandbank outside an SAC) 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

7.8.5.24 The sensitivity of the IEFs within the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC to physical change (to another substratum) is as described previously for the long term subtidal habitat loss assessment and in Table 7.19.

7.8.5.25 The SAC contains the Annex I subtidal reefs IEF which will be potentially impacted differently by the introduction of hard substrate compared to the sedimentary communities. Communities found on hard substrate may be able to make greater use of the hard substrates and current research suggests it could result in the spread of such communities.

7.8.5.26 Coolen *et al*. (2020) examined the differences in communities and species richness between a natural reef and a wind farm. They found some overlap in the species found on each substrate but also a number of substrate specific species which are the result in differences in material and the depth of the structures. The potential impact of colonisation of wind farm structures will likely potentially impact a small area (i.e. close to the wind turbines), and none of the reviewed studies reported potential impacts at an entire offshore wind farm scale (Bergström *et al*., 2014). Therefore, it is unlikely that any of the reefs within the Mona Offshore Cable Corridor will be adversely impacted by habitat creation and they may even offer some benefit by providing habitat for some rocky reef species. The potential benefits of offshore wind farms for epifaunal organisms has been recognised in recent research by Hofstede *et al.* (2022). This research concluded that scour protection in particular can provide refuge and complex habitats for many North Sea benthic species. Species abundance was found to be higher on scour protection compared to the surrounding seabed. This suggests that these structures can provide habitat for rock-dwelling species where it has been removed or degraded by bottom-trawling over the last century. Although this research was conducted in the North Sea the processes described are likely to be applicable to the Irish Sea habitat in the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC.

7.8.5.27 The discussion regarding the potential adverse and beneficial potential impact of the introduction of hard substrate into soft sediment environments is also relevant to the IEFs found within the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC. See paragraphs 7.8.5.19 to 7.8.5.22 for further detail on this impact.

7.8.5.28 The Annex I sandbanks and Annex I subtidal reefs IEFs 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

7.8.5.29 Overall, for the subtidal coarse and mixed sediments with diverse benthic communities IEF, low resemblance stony reef IEF and Constable Bank (Annex I sandbank outside an SAC) IEF the magnitude of the colonisation of hard substrate 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 as well as cable and scour protection.

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

7.8.5.30 On the basis of the mapped distribution of the Annex I habitats within this SAC (as shown in Figure 7.7), colonisation of hard substrate is unlikely to occur within any of the designated features. However, this assessment will be updated for the final Environmental Statement to include the results of the site-specific surveys in the Mona Offshore Cable Corridor and a precautionary approach has been adopted for PEIR which assumes there may be some habitat creation within the Annex I sandbank IEF and the Annex I subtidal reefs IEF.

7.8.5.31 Overall, for the Annex I sandbanks IEF and Annex I subtidal reefs IEF the magnitude of the colonisation of hard substrate 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 cable protection, as well as the small amount of hard substrate which could potentially be installed within the SAC.

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

7.8.6.1 The risk of introduction and spread of INNS during the construction, operations and maintenance and decommissioning phases has been considered in this assessment.

7.8.6.2 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.

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

Construction phase

Magnitude of impact

Subtidal habitat IEFs

7.8.6.4 The installation of hard substrates and the presence of construction vessels may lead to an increased risk of introduction and spread of INNS. The MDS is represented by up to 2,004 vessel round trips during the construction phase, including those required during site preparation activities, which will occur over a maximum duration of up to four years (Table 7.14). 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. A total of 2,154 ferry transits passed through the Mona Array Area in 2019, a rate of six per day (Nash Maritime, 2022). 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 34 fishing vessels were identified in the Mona Array Area or Offshore Cable Corridor or in the vicinity. The addition of Mona Offshore Wind Project construction traffic to this region 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.

7.8.6.5 As presented in Table 7.14, the risk of introduction and spread of INNS will be increased through the construction period due to the creation of 2,856,296m^2 of hard substrate from the installation of suction bucket jacket foundations, associated scour protection and any cable protection.

7.8.6.6 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.

7.8.6.7 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).

7.8.6.8 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.

7.8.6.9 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.

7.8.6.10 As set out in Table 7.16, an Environmental Management Plan will be implemented, which will aim to manage and reduce the risk of potential introduction and spread of INNS so far as reasonably practicable. Also vessels will be required to comply with the IMO ballast water management guidelines. This will ensure that the risk of potential introduction and spread of INNS will be minimised.

7.8.6.11 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**.

Intertidal habitat IEFs

7.8.6.12 As construction in the intertidal will likely be conducted by onshore vehicles it is unlikely that they will introduce marine INNS to the landfall. Whilst there may be the requirement for barge vessels to ground in the intertidal during installation at the landfall, the risk from INNS from these activities is considered to be minimal. No assessment of intertidal IEFs is therefore required for this impact.

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

7.8.6.13 Due to the overlap between the Mona Offshore Cable Corridor and the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC it is possible that cable protection associated with the export cable could be installed within the boundary of the SAC. Paragraph 7.8.5.11 outlines the assumptions used to determine the MDS for the extent of cable protection that could be installed within the SAC. The MDS equates to the potential for up to 28,000m^2 of cable protection within the SAC, which represents 0.01% of the total area of the SAC. At the start of the construction phase the amount of introduced hard substrate will be greatly reduced and increase to the full amount by the end of the phase. Vessel movements will also occur within the SAC during construction, the amount of activity specifically in the SAC area is unknown. The inclusion of detail regarding the MDS for installation of subsea cables within the SAC is in line with best practice guidance from Natural England and JNCC (2022).

7.8.6.14 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**.

Sensitivity of receptor

Subtidal habitat IEFs

7.8.6.15 The sensitivities of the benthic subtidal IEFs to this impact are presented in Table 7.20 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.

7.8.6.16 The subtidal coarse and mixed sediments with diverse benthic communities IEF has been assessed by the MarESA as having a high sensitivity to the introduction of INNS. Few non-indigenous species are able to colonise mobile sands due to the high level of disturbance (Tillin, 2016a). 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, 2016a). 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, 2016a). Additionally, although not currently established in UK waters, the whelk *Rapana venosa* may spread to UK habitats from Europe (Tillin, 2016b). Both *C. fornicata* and *D. vexillum* have been identified on the north Wales coast and therefore have the potential to extend into this biotope.

7.8.6.17 Due to the challenging habitat that the low resemblance stony reef IEF occupies, with high levels of scour, it is unlikely invasive species will enter this biotope (Readman, 2016). 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.

7.8.6.18 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 7.8.6.16 for details on the potential effect of INNS on this IEF.

7.8.6.19 The subtidal coarse and mixed sediments with diverse benthic communities IEF, low resemblance stony reef IEF and Constable Bank (Annex I sandbank outside an SAC) 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

7.8.6.20 The Annex I sandbanks IEF contains the same biotopes as the Constable Bank (Annex I sandbank outside an SAC) IEF which was found to have sensitivity to the same INNS as the subtidal coarse and mixed sediments with diverse benthic communities IEF. Therefore see paragraph 7.8.6.16 for details on the potential effect of INNS on this IEF.

7.8.6.21 The Annex I subtidal reefs IEF is considered by the MarESA to have no sensitivity to this impact. 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 *Didemnum 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).

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

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

Table 7.20: 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 7.12)
Subtidal biotopes			
Subtidal coarse and mixed sediments with diverse benthic communities.	Subtidal coarse and mixed sediments characterised by polychaetes, bivalves and mobile crustacean. • SS.SCS.CCS • SS.SMx.CMx • SS.SMx.CMx.KurThyMx • SS.SMx.Omx.PoVen.	High	High
Low resemblance stony reef	Cobbles and boulders with indicator species such as *A. digitatum*, *Nemertesia* sp. And *Tubularia* sp. • CR.HCR.Xfa.SpNemAdia.	No evidence	High
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.	Not sensitive – High	High
Y Fenai a Bae Conwy/ Menai Strait and Conwy Bay SAC			
Annex I sandbank	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.	Not sensitive – High	High
Annex I subtidal reefs	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.	Not sensitive	Negligible

Significance of effect

Subtidal habitat IEFs

7.8.6.24 Overall, for the subtidal coarse and mixed sediments with diverse benthic communities IEF, low resemblance stony reef IEF and Constable Bank (Annex I sandbank outside an SAC) 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 measure have been adopted to minimise the effects from introduction or spread of INNS.

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

7.8.6.25 Overall, for the Annex I sandbanks 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 Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC that may be colonised as well as the designed in measures put in place to minimise the effects from introduction or spread of INNS.

7.8.6.26 Overall, for the Annex I subtidal reefs 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 negligible. 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 Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC that may be colonised. Furthermore measures have been adopted as part of the Mona Offshore Wind Project (Table 7.16) to minimise the effects from introduction or spread of INNS and the unsuitability of this IEF for potential INNS.

Operations and maintenance phase

Magnitude of impact

Subtidal habitat IEFs

7.8.6.27 The installation of hard substrates 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 82,285 vessels return trips during the 35 year operations and maintenance phase(Table 7.14). Furthermore, the long term creation of 2,856,296m^2 hard substrate, in the form of 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 7.8.5.3 the estimate for habitat creation 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.

7.8.6.28 Details of INNS of concern in these regions of Wales and England are as outlined previously in paragraphs 7.8.6.6 and 7.8.6.8.

7.8.6.29 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 Environmental Management Plan will be implemented to reduce the transmission of species through actions involved in the various phases of the Mona Offshore Wind Project (Table 7.16). Also vessels will have to comply with the IMO ballast water management guidelines. This will ensure that the risk of potential introduction and spread of INNS will be minimised.

7.8.6.30 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**.

Intertidal habitat IEFs

7.8.6.31 As operations and maintenance activities in the intertidal will be conducted by onshore vehicles it is unlikely that they will introduce marine INNS to the landfall, therefore no further assessment of intertidal IEFs has been undertaken for this impact.

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

7.8.6.32 During the operations and maintenance phase of the Mona Offshore Wind Project the amount of contributing infrastructure will be the same as the construction value detailed in paragraph 7.8.6.13. Vessel movements will still occur for maintenance of infrastructure however those occurring within the SAC will be a small proportion of the overall vessel movements.

7.8.6.33 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

7.8.6.34 The sensitivity of the IEFs is as described previously for the construction phase assessment in paragraph 7.8.6.15 to 7.8.6.19 and above in Table 7.20.

7.8.6.35 The subtidal coarse and mixed sediments with diverse benthic communities IEF, low resemblance stony reef IEF and Constable Bank (Annex I sandbank outside an SAC) 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

7.8.6.36 The sensitivity of the IEFs is as described previously for the construction phase assessment in paragraph 7.8.6.20 to 7.8.6.23 and above in Table 7.20.

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

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

Significance of effect

Subtidal habitat IEFs

7.8.6.39 Overall, for the subtidal coarse and mixed sediments with diverse benthic communities IEF, low resemblance stony reef IEF and Constable Bank (Annex I sandbank outside an SAC) 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 measure have been adopted to minimise the effects from introduction or spread of INNS.

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

7.8.6.40 Overall, for the Annex I sandbanks 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 Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC that may be colonised. Furthermore, measures have been adopted to minimise the effects from introduction or spread of INNS.

7.8.6.41 Overall, for the Annex I subtidal reefs 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 negligible. 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 Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC that may be colonised. Furthermore, measures have been adopted to minimise the effects from introduction or spread of INNS and the unsuitability of this IEF for potential INNS.

Decommissioning phase

Magnitude of impact

7.8.6.42 The presence of decommissioning vessels may lead to an increased risk of introduction and spread of INNS. The MDS for the decommissioning phase contains the same activities number of vessel return trips as the construction phase (2,004) over up to four years (Table 7.14). Permanent habitat creation (i.e. persisting post-decommissioning) of up to 2,305,956m^2 due to the presence of scour and cable protection, including cable protection for cable crossings, being potentially left *in situ* (0.18% of the Mona benthic subtidal and intertidal ecology study area) may also contribute to an increased risk of introduction and spread of INNS.

7.8.6.43 As set out in Table 7.16, an Environmental Management Plan 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. Vessels will have to comply with the IMO ballast water management guidelines. This will ensure that the risk of potential introduction and spread of INNS will be minimised.

7.8.6.44 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**.

Intertidal habitat IEFs

7.8.6.45 As in the construction phase, decommissioning of cables in the intertidal will likely be conducted by onshore vehicles therefore it is unlikely that they will introduce marine INNS to the landfall, therefore no further assessment of intertidal IEFs has been undertaken for this impact.

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

7.8.6.46 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 MPA to result in the introduction and spread of INNS. In the decommissioning phase of the Mona Offshore Wind Project it is expected that cable protection will be left *in situ*. As a result the amount of permanent habitat creation will be the same as in the operations and maintenance phase, 28,000m^2.

7.8.6.47 As set out in Table 8.16, an Environmental Management Plan will be implemented as part of the Mona Offshore Wind Project (see Table 7.16), which will include measures such as ensuring any new infrastructure coming from another marine environment are cleaned and checked prior to installation and that vessels comply with the IMO ballast water management guidelines will be developed and adhered to for the duration of the Mona Offshore Wind Project. This will ensure that the risk of potential introduction and spread of INNS will be minimised.

7.8.6.48 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

7.8.6.49 The sensitivity of the IEFs is as described previously for the construction phase assessment in paragraph 7.8.6.15 to 7.8.6.19 and above in Table 7.20.

7.8.6.50 The subtidal coarse and mixed sediments with diverse benthic communities IEF, low resemblance stony reef IEF and Constable Bank (Annex I sandbank outside an SAC) 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

7.8.6.51 The sensitivity of the IEFs is as described previously for the construction phase assessment in paragraph 7.8.6.20 to 7.8.6.24 and above in Table 7.20.

7.8.6.52 The Annex I sandbanks IEF are deemed to be of high vulnerability, low recoverability, and international value. The sensitivity of the receptor is therefore considered to be **high**.

7.8.6.53 The Annex I subtidal reefs IEF 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

7.8.6.54 Overall, for the subtidal coarse and mixed sediments with diverse benthic communities IEF, low resemblance stony reef IEF and Constable Bank (Annex I sandbank outside an SAC) 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

7.8.6.55 Overall, for the Annex I sandbanks 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 Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC that may be colonised. Furthermore, measures have been adopted to minimise the effects from introduction or spread of INNS.

7.8.6.56 Overall, for the Annex I subtidal reefs 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 receptor is not considered to be sensitive to this impact. 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 Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC that may be colonised. Furthermore, measures have been adopted as part of the Mona Offshore Wind Project to minimise the effects from introduction or spread of INNS and the unsuitability of this IEF for potential INNS.

7.8.7 Removal of hard substrates

7.8.7.1 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.

7.8.7.2 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.

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

Decommissioning phase

Magnitude of impact

Subtidal habitat IEFs

7.8.7.4 The decommissioning of Mona Offshore Wind Project infrastructure may result in the removal of up to 550,340m^2 of hard substrate associated with the wind turbine and OSP foundations (see Table 7.14), resulting in the loss of the associated colonising communities. This equates to 0.04% of the Mona benthic subtidal and intertidal ecology study area.

7.8.7.5 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 receptors directly. The magnitude is therefore considered to be **low**.

Sensitivity of receptor

Subtidal habitat IEFs

7.8.7.6 The removal of wind turbine and OSP foundations 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 7.8.1.21 and 7.8.1.23). 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).

7.8.7.7 The only structures which are to be installed in the Constable Bank (Annex I sandbank outside an SAC) IEF will be cable protection which is being left *in situ* during the decommissioning. Therefore no assessment for the impact of hard substrate removal is required.

7.8.7.8 The subtidal coarse and mixed sediments with diverse benthic 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

Subtidal habitat IEFs

7.8.7.9 Overall, for the subtidal coarse and mixed sediments with diverse benthic 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.

7.8.8 Changes in physical processes

7.8.8.1 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, appendix 6.1: Physical processes technical report of the PEIR provides a full description of the modelling used to inform this assessment.

7.8.8.2 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 0.1m/s to 0.2m/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 and cable protection
- 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.

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

Operations and maintenance phase

Magnitude of impact

Subtidal habitat IEFs

7.8.8.4 The presence of Mona Offshore Wind Project infrastructure may obstruct tidal flow and lead to changes in the wave regime. 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 7.14, 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 5m diameter and scour protection covering a total footprint of 10,816m^2. Additionally, the MDS includes four OSPs each with gravity base foundations, each with a diameter of 14m at the surface and a slab base 52.5m diameter at the bed. Associated scour protection extends from the slab base by 18.3m at a height of 2.6m giving rise to 6,236m^2 footprint per unit.

7.8.8.5 The parameters in terms of seabed footprint and water column obstruction are similar between each wind turbine unit, as modelled, and each of the four OSP units. Therefore, it is appropriate to infer the impacts on tidal flows and wave climate due to each of the OSPs would be of the same extent and order of magnitude as those modelled wind turbine sites and to occur at the OSP locations.

7.8.8.6 The results of the modelling presented in volume 6, annex 6.1: Physical processes technical report of the PEIR indicated that peak tidal flows are redirected in the immediate proximity of foundations by a maximum variation of 5cm/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.

7.8.8.7 Examination of a 1in1 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 turbine structures are modelled to be in the order of 3cm equating to <1% of the baseline significant wave height. For a 1in20 year storm event, the pattern is similar however the change in wave height at the foundations is 3–4.5cm and due to the larger baseline associated with the return period the overall impact on the wave climate is less obvious.

7.8.8.8 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 1in1 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.

7.8.8.9 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 6.1: Physical processes technical report of the PEIR). 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.

7.8.8.10 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. Ongoing geophysical surveys within the Mona Offshore Cable Corridor will be used to determine cable protection requirements and inform detailed design parameters. It is predicted that the impact will directly affect Constable Bank however the changes to tidal regime due to the presence of infrastructure identified is localised therefore the sandbank is of low vulnerability and recoverable.

7.8.8.11 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. Effects on tidal current and wave climate would be reversible on decommissioning (i.e. following removal of the wind turbine structures).

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

Intertidal habitat IEFs

7.8.8.13 Cable installation in the intertidal region will be undertaken such that no additional material will be placed on the surface in the intertidal region and therefore not to disrupt sediment transport pathways or impede tidal flow. This may be achieved by the provision of any necessary cable protection within the burial trench below bed level i.e. no above surface cable protection will be present. 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 PEIR.

7.8.8.14 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 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.

7.8.8.15 The impact is predicted to be of local spatial extent, long term duration, continuous 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

7.8.8.16 It is predicted that the impact will affect the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC features directly. The magnitude of change in wave and tidal currents as well as sediment transport is consistent throughout the Mona Array Area and Mona Export Cable Corridor where there are wind turbines and OSP foundations. The magnitude of impact within the SAC is therefore as described in paragraphs 7.8.4.1 to 7.8.8.11.

7.8.8.17 The impact for the subtidal features of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC is predicted to be of local spatial extent, long term duration, continuous and high reversibility. It is predicted that the impact will affect the receptors directly. The magnitude is therefore considered to be **low**.

7.8.8.18 The magnitude of the impact in the intertidal zone of the SAC will be even further reduced than in the subtidal as it is further from any infrastructure which could result in physical processes changes.

7.8.8.19 The impact for the intertidal features of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC is predicted to be of local spatial extent, long term duration, continuous 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

7.8.8.20 Subtidal IEFs which are expected to be affected by the changes in physical processes are listed in Table 7.21. The sensitivity of the IEFs to the pressures associated with changes in physical processes are presented in Table 7.21. 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.

7.8.8.21 The representative biotopes of the subtidal coarse and mixed sediments with diverse benthic communities IEF have been identified as not sensitive to the relevant pressures as most of these biotopes are exposed to a variety of tidal regimes. 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 may alter the topography of the habitat and may cause some shifts in abundance (Tillin, 2016a) resulting in a spatial and demographic shift which is unlikely to lead to any notable changes in these biotopes as a whole. In the Mona Array Area this IEF occurs subtidally and therefore will not be exposed to any change in wave exposure.

7.8.8.22 The low resemblance stony reef IEF is assessed as being not sensitive to the relevant pressures because only a substantial decrease in water flow would result in the decline in this biotope. 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 impact however makes it unlikely conditions detrimental to this biotope will be produced. Additionally in the Mona Array Area this IEF occurs subtidally and therefore will not be exposed to any change in wave exposure.

7.8.8.23 The Constable Bank (Annex I sandbank outside an SAC) IEF is has also been assessed as not sensitive to the relevant pressures. 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 sorting. 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 subtidally and therefore will not be exposed to any change in wave exposure.

7.8.8.24 The subtidal coarse and mixed sediments with diverse benthic communities IEF, low resemblance stony reef 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**.

Intertidal habitat IEFs

7.8.8.25 The intertidal IEFs which are expected to be affected by changes in physical processes are listed in Table 7.21. The sensitivity of the IEFs to changes in physical processes are presented in Table 7.21. 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.

7.8.8.26 The littoral shingle with *Verrucaria maura* IEF is not sensitive 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 0.1-0.2m/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 7.8.8.14). 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 impact.

7.8.8.27 The sublittoral very soft chalk or clay with piddocks IEF is considered to be potentially vulnerable to these pressures as high tidal currents or wave exposure could erode 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.

7.8.8.28 The biotopes which represent the littoral and eulittoral rock dominated by epifaunal communities IEF are largely assessed as being not sensitive to this 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* spp. That characterize 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. The actual pressure which will be experienced by this biotope is however less than half the pressure benchmark making the likelihood damage from these changes unlikely.

7.8.8.29 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, 2020). 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, 2020). 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 (Tillin, Jackson and Garrard, 2020).

7.8.8.30 The *Mytilus edulis* beds IEF has been assessed by the MarESA as having a medium sensitivity to water flow change and no sensitivity to wave exposure change. *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.

7.8.8.31 The littoral shingle with *Verrucaria maura* IEF and littoral and eulittoral rock dominated by epifaunal 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**.

7.8.8.32 The littoral sand and muddy sand supporting infaunal communities IEF, sublittoral very soft chalk or 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**.

7.8.8.33 The *Mytilus edulis* beds 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

7.8.8.34 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 7.21. The sensitivity of the IEFs to physical processes are presented in Table 7.21. These sensitivities are based on assessments made by the MarESA.

7.8.8.35 The effect of these impacts on the Annex I sandbanks IEF will be the same as those described for the Constable Bank (Annex I sandbank outside an SAC) IEF, paragraph 7.8.8.23, as they both represent similar features.

7.8.8.36 The Annex I subtidal reefs IEF is also identified as being not sensitive to the relevant pressures. 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 where as encrusting sponges dominate in wave exposed environments. The scale of change associated with the Mona Offshore Wind Farm infrastructure, <1% of the baseline significant wave height, makes the likelihood of physically damaging conditions unlikely.

7.8.8.37 The Annex I intertidal reefs IEF is also identified as being not sensitive to the relevant pressures. 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.

7.8.8.38 The Annex I sandbanks IEF and Annex I subtidal reefs IEF are deemed to be of low vulnerability, high recoverability and international value. The sensitivity of the receptor is therefore considered to be **negligible**.

7.8.8.39 The Annex I intertidal reefs IEFs are deemed to be of low vulnerability, high recoverability and international value. The sensitivity of the receptor is therefore considered to be **negligible**.

Table 7.21: 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 7.12)
Subtidal biotopes				
Subtidal coarse and mixed sediments with diverse benthic communities.	Subtidal coarse and mixed sediments characterised by polychaetes, bivalves and mobile crustacean. • SS.SCS.CCS • SS.SMx.CMx • SS.SMx.CMx.KurThyMx • SS.SMx.Omx.PoVen.	Not sensitive	Not sensitive	Negligible
Low resemblance stony reef	Cobbles and boulders with indicator species such as *A. digitatum*, *Nemertesia* sp. And *Tubularia* sp. • CR.HCR.Xfa.SpNemAdia.	Not sensitive	Not sensitive	Negligible
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.	Not sensitive	Not sensitive	Negligible
Intertidal biotopes				
Littoral shingle with *Verrucaria maura.*	Shingle or gravel shore in the littoral fringe which is covered by the black lichen *Verrucaria maura*. • LS.LCS.Sh.BarSh.	Not sensitive	Not sensitive	Negligible
Littoral sand and muddy sand supporting infaunal communities	Littoral sand and muddy sand supporting infaunal communities including *Lanice conchilega, Macoma balthica* and *Arenicola marina*. • LS.Lsa.MoSa • LS.Lsa.MuSa.Lan • LS.Lsa.MuSa.MacAre.	Not sensitive – Medium	Not sensitive	Negligible
Sublittoral very soft chalk or clay with piddocks	Circalittoral soft rocks such as chalks and clays with the faunal community dominated by bivalves such as *Pholas dactylus*. • CR.MCR.SfR.Pid	Not sensitive	Not sensitive	Negligible

IEF	Representative biotope	Sensitivity to defined MarESA pressure		Overall sensitivity (based on Table 7.12)
		Water flow (tidal current) changes (local)	Wave exposure changes (local)	
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*. • LR.LLR.F.Fspi • LR.FLR.Lic.Ver • LR.FLR.Eph.UlvPor • LR.HLR.MusB.Sem.LitX • LR.HLR.MusB.Sem.	Not sensitive – Low	Not sensitive	Negligible
Sabellaria alveolata reef	Exposed bedrock and boulders characterised by reefs of the polychaete *Sabellaria alveolata* which form large reef-like hummocks. • LS.LBR.Sab.Salv.	Not sensitive	Not sensitive	Negligible
Mytilus edulis beds	*Mytilus edulis* beds	Medium	Not sensitive	Medium
Y Fenai a Bae Conwy/ Menai Strait and Conwy Bay SAC				
Annex I sandbank	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.	Not sensitive	Not sensitive	Negligible
Annex I subtidal reefs	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.	Not sensitive	Not sensitive	Negligible
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.	Not sensitive	Not sensitive	Negligible

Significance of effect

Subtidal habitat IEFs

7.8.8.40 Overall, for the subtidal coarse and mixed sediments with diverse benthic communities IEF, low resemblance stony reef 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.

Intertidal habitat IEFs

7.8.8.41 Overall, for the littoral shingle with *Verrucaria maura* IEF and littoral and eulittoral rock dominated by epifaunal communities IEF, littoral sand and muddy sand supporting infaunal communities IEF, sublittoral very soft chalk or 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.

7.8.8.42 Overall, for the *Mytilus edulis* beds 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.

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

7.8.8.43 Overall, for the Annex I sandbanks IEF and Annex I subtidal reefs 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.

7.8.8.44 Overall, for the Annex I intertidal reefs 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.

7.8.9 Electromagnetic fields from subsea electrical cables

7.8.9.1 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.

Operations and maintenance phase

Magnitude of impact

Subtidal habitat IEFs

7.8.9.2 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 50μT 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 10μT/m with a cable that is buried 1.5m down in the sea floor (Hutchison *et al*., 2021).

7.8.9.3 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).

7.8.9.4 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 1m to 2m 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.

7.8.9.5 CSA (2019) investigated the relationship between voltage, current, and burial depth, the results of which are presented in Table 7.22 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 1m above the cable, while as you move laterally away from the cable, at distances greater than 3m the magnetic fields at the seafloor and at 1m above the seafloor are comparable.

Table 7.22: 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 7.5m 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

7.8.9.6 During the operational phase of the Mona Offshore Wind Project there will be up to 500km of 66kV to 132kV HVAC inter-array cables, up to 50km of 275kV HVAC interconnector cables and up to 360km of 275kV HVAC export cables (Table 7.14). The minimum burial depth for cables will be 0.5m.

7.8.9.7 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

7.8.9.8 The magnitude of the 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 7.8.9.2 and 7.8.9.5. Although there is potential for the Mona Offshore Wind Project to impact upon this SAC the current mapped distributions of features within the SAC doesn't overlap with the Mona Offshore Cable Corridor. This assessment however will be updated for the final Environmental Statement to include the results of the site-specific surveys in the Mona Offshore Cable Corridor.

7.8.9.9 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 14km of HVAC export cables installed within the SAC.

7.8.9.10 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**.

Sensitivity of receptor

Subtidal habitat IEFs

7.8.9.11 Gill and Desender (2020) summarised current research on the impact of EMF emissions on organisms and acknowledged that relatively little is known about the 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.

7.8.9.12 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 1000 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.

7.8.9.13 The conclusion that the 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).

7.8.9.14 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 1,000μT 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 500μT 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 8: Fish and shellfish ecology of the PEIR.

7.8.9.15 Research regarding the 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.

7.8.9.16 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.

7.8.9.17 The subtidal coarse and mixed sediments with diverse benthic communities IEF, low resemblance stony reef IEF and Constable Bank (Annex I sandbank outside an SAC) 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

7.8.9.18 The sensitivity of IEFs within the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC is the same as described in paragraphs 7.8.9.12 to 7.8.9.16 for the subtidal IEFs.

7.8.9.19 The Annex I sandbanks and Annex I subtidal reefs IEFs are deemed to be of low vulnerability (recoverability is not applicable to this impact) and international value. The sensitivity of the IEFs is therefore, considered to be **low**.

Significance of effect

Subtidal habitat IEFs

7.8.9.20 Overall, for all the subtidal IEFs (subtidal coarse and mixed sediments with diverse benthic communities IEF, low resemblance stony reef IEF and Constable Bank (Annex I sandbank outside an SAC) 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

7.8.9.21 Overall, for all the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC IEFs (annex I sandbanks and Annex I subtidal reefs) the magnitude of EMF 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 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. Although there is potential for the Mona Offshore Wind Project to impact upon this SAC the current mapped distributions of features within the SAC doesn't overlap with the Mona Offshore Cable Corridor. This assessment however will be updated for the final Environmental Statement to include the results of the site-specific surveys in the Mona Offshore Cable Corridor.

7.8.10 Heat from subsea electrical cables

7.8.10.1 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 heating of seabed affecting benthic subtidal receptors.

7.8.10.2 This assessment has been undertaken on the broad IEFs and separately on the IEFs that comprise features of the Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC.

7.8.10.3 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.

Operations and maintenance phase

Magnitude of impact

Subtidal habitat IEFs

7.8.10.4 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.

7.8.10.5 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 25cm away from the cable. Results showed a 2°C maximum difference between sites with a mean difference of 1°C, with similar results for a HVAC 33kV cable and HVAC 132kV cable (low and high voltage cables respectively).

7.8.10.6 Additionally the 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°C (BERR, 2008). The seasonal temperature range in the Irish Sea is 11°C – 5°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.

7.8.10.7 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 20°C above the ambient temperature resulting in temperature change up to 1m above the heat sources surface (when the heat source was buried at 1m). In coarse sands convection occurred at a lower temperature (>9°C) 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).

7.8.10.8 During the operational phase of the Mona Offshore Wind Project there will be up to 500km of 66kV to 132kV HVAC inter-array cables, up to 50km of 275kV HVAC interconnector cables and up to 360km of 275kV HVAC export cables (Table 7.14). The minimum burial depth for cables will be 0.5m.

7.8.10.9 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

7.8.10.10 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 7.8.10.4 and 7.8.10.9. Although there is potential for the Mona Offshore Wind Project to impact upon this SAC the current mapped distributions of features within the SAC doesn't overlap with the Mona Offshore Cable Corridor. This assessment however will be updated for the final Environmental Statement to include the results of the site-specific surveys in the Mona Offshore Cable Corridor.

7.8.10.11 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 14 km of HVAC export cables installed within the SAC.

7.8.10.12 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**.

Sensitivity of receptor

Subtidal habitat IEFs

7.8.10.13 The sensitivities of the benthic subtidal IEFs to this impact are presented in Table 7.23 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.

7.8.10.14 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 northern 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.

7.8.10.15 The low resemblance stony reef 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.

7.8.10.16 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. For example, Preece (1971) tested temperature tolerances of *Bathyporeia pelagica* and *Bathyporeia pilosa* in the laboratory. Individuals acclimated to 15°C for 24 hours were exposed to temperature increases (water temperature raised by 0.2°C/minute). 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.

7.8.10.17 The subtidal coarse and mixed sediments with diverse benthic communities 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**.

7.8.10.18 The low resemblance stony reef IEF is deemed to not be sensitive to this pressure and national value. The sensitivity of the IEFs is therefore considered to be **negligible**.

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

7.8.10.19 The Annex I sandbanks IEF contains the same biotopes as the Constable Bank (Annex I sandbank outside an SAC) IEF which is deemed to have low sensitivity to temperature increase as outlined in paragraph 7.8.6.15.

7.8.10.20 The Annex I subtidal reefs IEF is assessed by the MarESA to not be sensitive to temperature increase at the pressure benchmark. Berman *et al*. (2013) monitored sponge communities off Skomer Island, UK over three years with all characterizing sponges for this biotope assessed. 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-characterizing *Hymeraphia, Stellifera* and *Halicnemia patera*, no significant difference in sponge density was recorded in all sites studied. The current distribution of *H. arctica* is predominantly arctic and boreal (Sejr *et al*., 2004; Gordillo, 2001), however, populations have been identified in the Mediterranean and have clearly acclimated to the warmer temperatures (Oberlechner, 2008). Experiments by (Ali, 1970) suggest that *H. arctica* would be able to tolerate an acute or chronic increase in temperature at the pressure benchmark although an acute or chronic increase may result in sub-lethal effects on feeding. The magnitude of this impact however makes it highly unlikely that the characteristic community of this IEF will experience any effects related to acute temperature increase.

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

7.8.10.22 The Annex I subtidal reefs IEFs are deemed to not be sensitive to this pressure and of international value. The sensitivity of the IEFs is therefore considered to be **negligible**.

Table 7.23: 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 7.12)
Subtidal biotopes			
Subtidal coarse and mixed sediments with diverse benthic communities.	Subtidal coarse and mixed sediments characterised by polychaetes, bivalves and mobile crustacean. • SS.SCS.CCS • SS.SMx.CMx • SS.SMx.CMx.KurThyMx • SS.SMx.OMx.PoVen.	Not sensitive - Low	Low
Low resemblance stony reef	Cobbles and boulders with indicator species such as *A. digitatum*, *Nemertesia* sp. and *Tubularia* sp. • CR.HCR.XFa.SpNemAdia.	Not sensitive	Negligible
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.	Not sensitive - Low	Low
Y Fenai a Bae Conwy/ Menai Strait and Conwy Bay SAC			
Annex I sandbank	Consist of sandy sediments that are permanently covered by shallow sea water, typically at depths of less than 20m below chart datum. The habitat comprises distinct banks. • SS.SSa.IFiSa.NcirBat • SS.SSa.CFiSa.ApriBatPo.	Not sensitive - Low	Low
Annex I subtidal reefs	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.	Not sensitive	Negligible

Significance of effect

Subtidal habitat IEFs

7.8.10.23 Overall, for the subtidal coarse and mixed sediments with diverse benthic communities 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.

7.8.10.24 Overall, for the low resemblance stony reef 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

7.8.10.25 Overall, for the Annex I sandbanks 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 this IEF. Although there is potential for the Mona Offshore Wind Project to impact upon this SAC the current mapped distributions of features within the SAC doesn’t overlap with the Mona Offshore Cable Corridor. This assessment however will be updated for the final Environmental Statement to include the results of the site-specific surveys in the Mona Offshore Cable Corridor.

7.8.10.26 Overall, for the Annex I subtidal reefs 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. Although there is potential for the Mona Offshore Wind Project to impact upon this SAC the current mapped distributions of features within the SAC doesn’t overlap with the Mona Offshore Cable Corridor. This assessment however will be updated for the final Environmental Statement to include the results of the site-specific surveys in the Mona Offshore Cable Corridor.

7.8.11 Future monitoring

7.8.11.1 No benthic subtidal and intertidal ecology monitoring to test the predictions made within the impact assessment is considered necessary.

7.9 Cumulative effect assessment methodology

7.9.1 Methodology

7.9.1.1 The Cumulative Effects Assessment (CEA) takes into account the 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 PEIR). 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.

7.9.1.2 The benthic subtidal and intertidal ecology CEA methodology has followed the methodology set out in volume 1, chapter 5: EIA methodology of the PEIR. 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.

7.9.1.3 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.

7.9.1.4 This tiered approach is adopted to provide a clear assessment of the Mona Offshore Wind Project alongside other projects, plans and activities.

7.9.1.5 The specific projects, plans and activities scoped into the CEA, are outlined in Table 7.24 and shown in Figure 7.8.

7.9.1.6 A number of the impacts considered for the Mona Offshore Wind Project alone, as outlined in Table 7.14 and section 7.8, 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 7.24: 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 – Q4 2029**	**Q1 2030 – Q4 2065**	**-**
Tier 1							
Offshore renewables							
Awel y Môr Offshore Wind Farm	Application Submitted	12.2	0.0	Up to 100MW (48 to 91 wind turbines)	2026 - 2030	2030 - 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)	23.3	3.8	Up to 150MW (30 wind turbines)	2004	2004 - 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	23.3	3.8	Operations and maintenance activities at Rhyl Flats Offshore Wind Farm (no further information)	n/a	2015 - 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.
Gwynt y Mor Offshore Wind Farm	Operational (with ongoing activities)	13.8	9.9	Up to 750MW (150 to 250 wind turbines)	2008 - 2011	2011 - 2061	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)	24.7	13.6	Up to 60MW (30 wind turbines)	2002 - 2003	2003 - 2028	The operations and maintenance and decommissioning phases of this project will overlap with the construction phase of the Mona Offshore Wind Project.
North Hoyle Offshore Wind Farm Operational Marine Licence - operation and maintenance activities	Operational	24.7	13.6	Operations and maintenance activities at North Hoyle Offshore Wind Farm (no further information)	n/a	2015 - 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)	24.6	26.1	Up to 258MW (32 wind turbines)	2016 - 2017	2017 - 2042	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 Extension Operational Marine Licence - array cable repair and remediation activities (MLA/2017/00164)	Operational	24.6	26.1	Up to 10 discrete array cable repair or remediation events over the lifetime of the wind farm (25 years).	n/a	2018 - 2042	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
Burbo Bank Extension Operational Marine Licence - export cable repair and remediation activities (MLA/2017/00166/1)	Operational	24.6	26.1	Up to 4 discrete export cable repair or remediation events over the lifetime of the wind farm (25 years).	n/a	2017 - 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)	27.2	47.8	Up to 659 MW (87 wind turbines)	2015 - 2018	2018 – 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)	30.4	43.9	Up to 389MW (108 wind turbines)	2012 - 2014	2014 - 2034	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 Marine Licence operations and maintenance activities (MLA/2016/00150/3)	Operational	30.4	43.9	Covers licensable O&M activities to be carried out as and when required over the lifetime of the wind farm	n/a	2016 - 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)	31.0	51.5	Up to 367MW (51 wind turbines)	2010 - 2012	2012 - 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	31.0	51.5	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 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.	n/a	2018 - 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
Walney 1 Offshore Wind Farm	Operational (with ongoing activities)	32.8	49.6	Up to 367MW (51 wind turbines)	2010 - 2011	2011 - 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	32.8	49.6	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 reasonable period of time.	n/a	2014 - 2027	Cable repair/remediation activities associated with this project overlaps with the construction phase of the Mona Offshore Wind Project.
Walney Offshore Wind Farm Operational Marine Licence - composite operations and maintenance activities (MLA/2017/00081/2)	Operational	32.8	49.6	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 - 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	32.8	49.6	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 - 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	32.8	49.6	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 major breakage/fault in an inter array cable.	n/a	2018 - 2032	Cable repair/remediation activities associated with this project overlaps with the construction and operations and maintenance phases of the Mona Offshore Wind Project.
Walney 1 and 2 Offshore Wind Farms Operational Marine Licence - operation 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 - 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)	34.0	32.8	Up to 90MW (25 wind turbines)	2004 - 2005	2007 - 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.

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
Burbo Bank Offshore Wind Farm Operational Marine Licence - cable repair and remediation (MLA/2014/00336/1)	Operational	34.0	32.8	Burbo Bank cable repair and remediation works (no further information)	n/a	2018 -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 repair/remediation activities (MLA/2016/00406)	Operational	34.0	32.8	Up to four discrete export cable repair/remediation events over the remaining lifetime of the wind farm (15 years).	n/a	2018 - 2032	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 - inter-array cable repair (MLA/2014/00336/1)	Operational	34.0	32.8	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 - 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)	41.2	58.0	Up to 150MW (30 wind turbines)	2009 - 2010	2011 - 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	41.2	58.0	5 x cable repair events, with associated jacking-up; and 10 x cable remediation events (via jetting).	n/a	2015 - 2030	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 Marine Licence - operation and maintenance activities (MLA/2016/00224/2)	Operational	41.2	58.0	Operations and maintenance activities to be carried out as and when required over the lifetime of the wind farm.	n/a	2017 - 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)	52.2	41.8	Up to 90MW (30 wind turbines)	2004 - 2006	2006 - 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)[3]	Operational	52.2	41.8	5 x cable repair events, with associated jacking-up; and 10 x cable remediation events (via jetting).	n/a	2015 - 2030	Cable repair/remediation activities associated with this project overlaps with the construction and operations and maintenance phases of the Mona Offshore Wind Project.

[3] 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
Barrow Offshore Wind Farm Operational Marine Licence - operation and maintenance (MLA/2016/00149/3)	Operational	52.2	41.8	This licence permits a number of operations and maintenance activities including - Removal of marine growth and/or guano - Replacement of access ladders	n/a	2016 - 2026	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.
Routine operations and maintenance activities at five OSPs (Barrow, Ormonde, Lincs, Westermost Rough, and Gunfleet Sands) (MLA/2017/00100/1)	Operational	44.8	54.0	Repainting of offshore structures, removal of algal growth/bird guano and removal of growth around J Tubes.	n/a	2017 - 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.
Dredging activities and dredge disposal sites							
Conwy River	Operational (with ongoing activities)	33.9	7.7	Dredging, no further information given.	n/a	2022 - 2037	Dredging and disposal activities associated with this project will overlap with the construction and 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)	15.5	22.4	Capital dredging in front of the proposed terminal to create a berth pocket.	n/a	2019 - 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)	15.6	22.5	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 - 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.
Dee River	Operational (with ongoing activities)	46.1	26.7	Dredging, no further information given.	n/a	2022 – 2037	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 Regional Maintenance (MLA/2015/00016)	Operational (with ongoing activities)	54.8	31.8	Low impact maintenance works to RNLI operated lifeboat stations and associated slipways, berths and other infrastructure.	n/a	2019 - 2029	Dredging and disposal activities associated with this project will overlap 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
Liverpool Marina Maintenance Dredging - sustainable relocation of dredged material to the River Mersey (MLA/2020/00492)	Operational (with ongoing activities)	53.6	42.0	Annual campaigns of maintenance dredging over the next ten years using small hydraulic dredger.	n/a	2021 - 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	Dredging to deepen harbour channels and capital dredging in front of the proposed terminal to create a berth pocket.	n/a	2016 - 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 and disposal (MLA/2018/00403)	Operational (with ongoing activities)	45.3	55.3	Twice yearly dredging campaigns over the next 10 years at each of the two dredge locations.	n/a	2019 - 2029	Dredging and disposal activities associated with this project overlaps with the construction phase of the Mona Offshore Wind Project.
Port of Barrow maintenance dredging disposal licence (MLA/2015/00458/1)	Operational (with ongoing activities)	47.7	58.1	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 -2026	Dredging and disposal activities associated with this project will overlap with the construction phase of the Mona Offshore Wind Project.
Castletown Bay, Isle of Man	Operational (with ongoing activities)	47.0	66.8	Dredging to deepen harbour channels.	n/a	2022 - 2037	Dredging and disposal activities associated with this project will overlap with the construction and operations and maintenance phases of the Mona Offshore Wind Project.
Deposit and removals							
Hilbre Swash (392/393)[4]	Operational (with ongoing activities)	14.5	20.1	Licence to extract up to 12 million tonnes of aggregate (mainly sand) over 15 years.	n/a	2015 - 2029	Aggregate extraction activities associated with this project will overlap with the construction phase of the Mona Offshore Wind Project.
Coastal Protection							
Llanddulas to Kinmel Bay coastal defence scheme	Application Submitted	35.0	0.0	Coastal defence scheme	Unknown	Unknown	Unknown
Remedial works							
Isle of Man to UK Interconnector Cable - maintenance and repair (MLA/2016/00211)	Operational	17.8	37.0	This licence is for depositing additional armouring or protection whilst carrying out contingency repair and maintenance works on the IOM interconnector.	n/a	2018 - 2033	Maintenance activities associated with this project will overlap with the construction and operations and maintenance phases of the Mona Offshore Wind Project.

[4] 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
Isle of Man to UK Interconnector Cable - cable protection remedial works (MLA/2014/00201/2)	Operational	20.6	40.1	The licence is to remove displaced concrete mattresses and install flexible filter units in the original positions.	n/a	2014 - 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	5.5	32.9	1.5 GW (Up to 107 wind turbines)	2028 - 2029	2030 - 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.
Round 4 Preferred Project 5 (Morecambe Offshore Windfarm Generation Assets)	Pre-application	8.9	21.5	12 -24MW (Up to 40 wind turbines)	2026 - 2028	2029 -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.
Cables and pipelines							
Morgan/ Morecambe Transmission Assets (scoping search area)	Pre- application	0.0	10.0	Morgan Transmission Assets	2028 - 2029	2030 - 2065	Project construction phase overlaps with Mona Offshore Wind Farm construction phase.
Tier 3							
Cables and pipelines							
MaresConnect – Wales-Ireland Interconnector Cable	Permitted but not yet implemented	14.7	0.0	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.

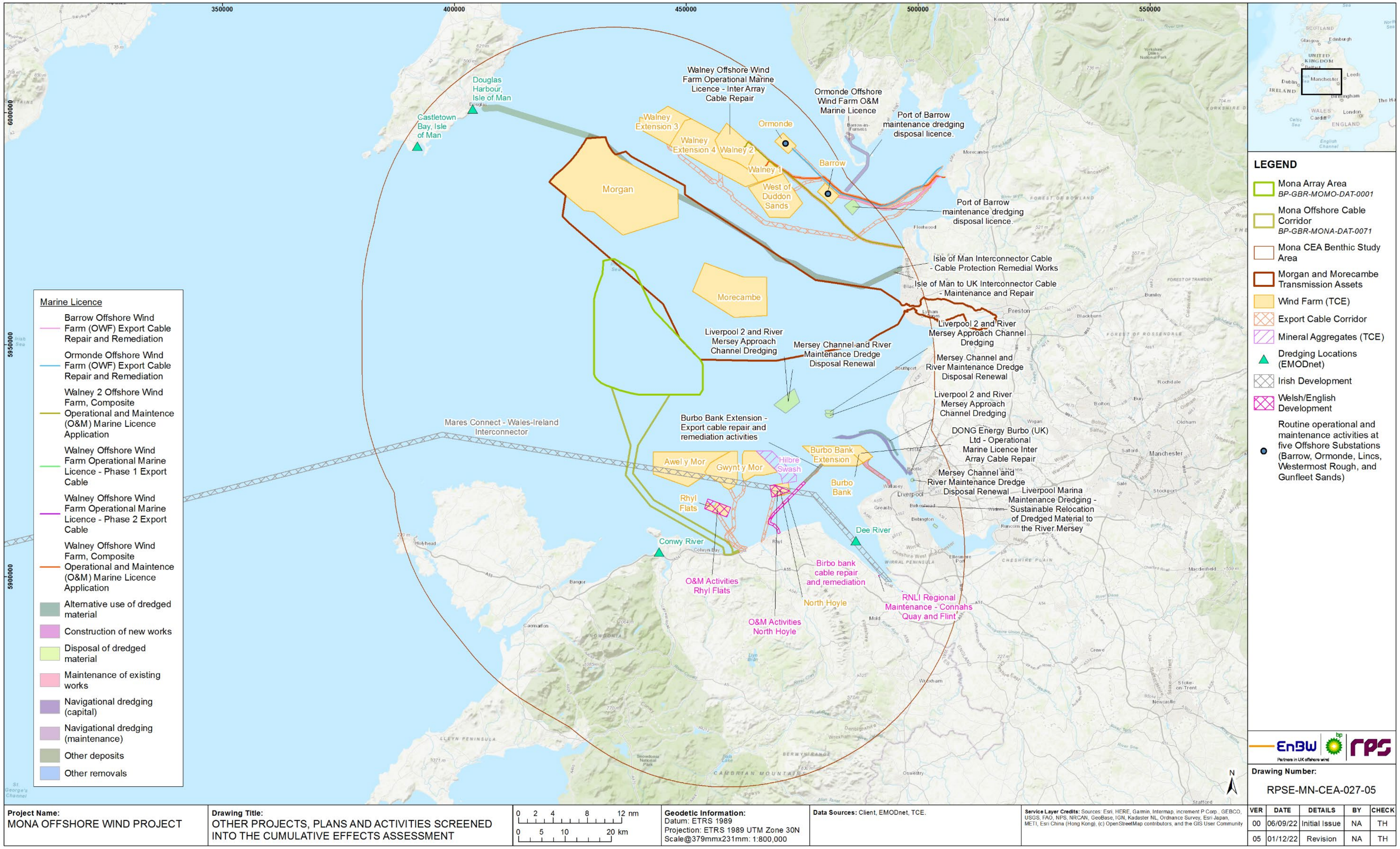

Figure 7.8: Other projects, plans and activities screened into the cumulative effects assessment[5].

[5] The Awel y Môr agreement for lease area extends further to the west than the application boundary presented, however Awel y Môr Offshore Wind Farm Ltd. have decided to develop in the area presented

7.9.2 Maximum design scenario

7.9.2.1 The MDSs identified in Table 7.25 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 PEIR as well as the information available on other projects and plans, in order to inform a '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 7.25: 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] C	O	D	Maximum Design Scenario	Justification
Temporary habitat loss/disturbance	✓	×	×	The MDS as described for the Mona Offshore Wind Project (Table 7.14) assessed cumulatively with the following other projects/plans: **Tier 1** • Offshore Wind Farm 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 Mor Offshore Wind Farm operations and maintenance – 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) – 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) – 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) • 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) – 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) – Castletown Bay, Isle of Man • Aggregate extraction activities – Hilbre Swash aggregate extraction • Inter-connector cables – Isle of Man to UK Interconnector Cable - maintenance and repair **Tier 2** • Tier 1 projects • Offshore Wind Farm projects:	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
				– Morgan/ Morecambe Transmission Assets (scoping search area) – Morecambe Offshore Windfarm Generation Assets construction and operations and maintenance phases – Morgan Generation Assets construction phase **Tier 3** • Tier 1 and 2 projects • Cables/pipelines: – MaresConnect	
	×	✓	×	The MDS as described for the Mona Offshore Wind Project (Table 7.14) assessed cumulatively with the following other projects/plans: **Tier 1** • Offshore Wind Farm projects: – Awel y Môr Offshore Wind Farm operations and maintenance and decommissioning phases – Gwynt y Mor Offshore Wind Farm operations and maintenance and decommissioning phases – Burbo Bank Extension Offshore Wind Farm - operations and maintenance marine licences (MLA/2017/00164 and MLA/2017/00166/1) and decommissioning phase – 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) • 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 – Castletown Bay, Isle of Man • Cables/pipelines: – Isle of Man to UK Interconnector Cable - maintenance and repair **Tier 2** • Tier 1 projects • Offshore Wind Farm projects: – Morgan/ Morecambe Transmission Assets (scoping search area) – Morecambe Offshore Windfarm Generation Assets operations and maintenance phase – Morgan Generation Assets operations and maintenance 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]			Maximum Design Scenario	Justification
	C	O	D		
				Tier 3 • Tier 1 and 2 projects • Cables/pipelines: – MaresConnect	
	×	×	✓	The MDS as described for the Mona Offshore Wind Project (Table 7.14) 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 wind farm projects: – Morgan Generation Assets decommissioning phase – Morecambe Offshore Windfarm Generation Assets operations and maintenance phase – Morgan/ Morecambe Transmission Assets (scoping search area) **Tier 3** • Tier 1 and 2 projects • Cables/pipelines: – MaresConnect	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.
Increased SSC and associated deposition	✓	×	×	The MDS as described for the Mona Offshore Wind Project (Table 7.14) assessed cumulatively with the following other projects/plans: **Tier 1** • Offshore wind farm projects: – Proposed development of Awel y Môr Offshore Wind Farm – Maintenance of Rhyl Flats Wind Farm – Maintenance of Gwynt y Mor Offshore Wind Farm – Maintenance of North Hoyle Wind Farm • Aggregate extraction activities: – Operation of Hilbre Swash extraction – Operation of Hilbre Swash marine minerals Area 393 • Disposal sites: – Use of Conwy River disposal site • Cables and pipelines: – Construction of MaresConnect cable • Coastal protection: – Proposed development of Llanddulas to Kinmel Bay coastal defence scheme **Tier 2** • Tier 1 projects • Offshore wind farm projects: – Construction of Morgan Generation Assets – Construction of Morgan/ Morecambe Transmission Assets – Construction of Morecambe Offshore Windfarm 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 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]			Maximum Design Scenario	Justification
	C	O	D		
	×	✓	×	The MDS as described for the Mona Offshore Wind Project (Table 7.14) assessed cumulatively with the following other projects/plans: **Tier 1** • Offshore wind farm projects: – Proposed development of Awel y Môr Offshore Wind Farm – Maintenance of Rhyl Flats Wind Farm – Maintenance of Gwynt y Mor Offshore Wind Farm • Aggregate extraction activities: – Operation of Hilbre Swash marine minerals Area 393 • Disposal sites: – Use of Conwy River disposal site • Coastal protection: – Proposed development of Llanddulas to Kinmel Bay coastal defence scheme **Tier 2** • Tier 1 projects • Offshore wind farm projects: – Operational and maintenance of Morecambe Offshore Windfarm Generation Assets – Operational and maintenance of Morgan Offshore Wind Project Generation AssetsOperational and maintenance of Morgan/ Morecambe 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.
	×	×	✓	The MDS as described for the Mona Offshore Wind Project (Table 7.14) assessed cumulatively with the following other projects/plans: **Tier 1** • Offshore wind farm projects: – Awel y Môr Offshore Wind Farm decommissioning structures – Rhyl Flats Wind Farm decommissioning structures – Gwynt y Mor Offshore Wind Farm decommissioning structures **Tier 2** • Tier 1 projects • Offshore wind farm projects: – Morecambe Offshore Windfarm Generation Assets decommissioning structures – Morgan Generation 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	✓	✓	×	The MDS as described for the Mona Offshore Wind Project (Table 7.14) 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 wind farm projects: – Morgan/ Morecambe Transmission Assets (scoping search area) – Morgan Generation Assets – Morecambe Offshore Windfarm Generation Assets	These projects will all result in the installation of hard structures on the seabed which will lead to long term habitat loss 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]			Maximum Design Scenario	Justification
	C	O	D		
				Tier 3 • Tier 1 and 2 projects • Cables/pipelines: MaresConnect	
	×	×	✓	The MDS as described for the Mona Offshore Wind Project (Table 7.14) 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 wind farm projects: – Morecambe Offshore Windfarm Generation Assets – Morgan Generation Assets – Morgan/ Morecambe Transmission Assets (scoping search area) **Tier 3** • Tier 1 and 2 projects • Cables/pipelines: – MaresConnect	These projects will all result in the installation of hard structures on the seabed which will lead to long term habitat loss 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.
Colonisation of hard structures	×	✓	×	The MDS as described for the Mona Offshore Wind Project (Table 7.14) 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 wind farm projects: – Morgan/ Morecambe Transmission Assets (scoping search area) – Morgan Generation Assets – Morecambe Offshore Windfarm Generation Assets **Tier 3** • Tier 1 and 2 projects • Cables/pipelines: – MaresConnect	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 7.14) assessed cumulatively with the following other projects/plans: **Tier 1** • Offshore Wind Farm projects: – Awel y Môr Offshore Wind Farm construction phase – **Tier 2** • Tier 1 projects • Offshore Wind projects:	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.

Potential cumulative effect	Phase[a] C	O	D	Maximum Design Scenario	Justification
				– Morgan/ Morecambe Transmission Assets (scoping search area) – Morgan Generation Assets construction phase – Morecambe Offshore Windfarm Generation Assets construction and operations and maintenance phase **Tier 3** • Tier 1 and 2 projects • Cables/pipelines: – MaresConnect	
	×	✓	×	The MDS as described for the Mona Offshore Wind Project (Table 7.14) assessed cumulatively with the following other projects/plans: **Tier 1** • Offshore Wind Farm projects: – Awel y Môr Offshore Wind Farm operations and maintenance and decommissioning phases **Tier 2** • Offshore Wind Farm projects: – Morgan/ Morecambe Transmission Assets (scoping search area) – Morecambe Offshore Windfarm Generation Assets operations and maintenance phase – Morgan Generation Assets operations and maintenance phase **Tier 3** • Tier 1 projects • Cables/pipelines: – MaresConnect	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.
	×	×	✓	The MDS as described for the Mona Offshore Wind Project (Table 7.14) 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 wind farm projects: – Morgan/ Morecambe Transmission Assets (scoping search area) – Morgan Generation Assets decommissioning phase – Morecambe Offshore Windfarm Generation Assets operations and maintenance phase **Tier 3** • Tier 1 and 2 projects • Cables/pipelines: – MaresConnect	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.
Changes in physical processes.	×	✓	×	The MDS as described for the Mona Offshore Wind Project (Table 7.14) assessed cumulatively with the following other projects/plans: **Tier 1** • Offshore wind farm projects: – Proposed development of Awel y Môr Offshore Wind Farm	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

Potential cumulative effect	Phase[a] C	O	D	Maximum Design Scenario	Justification
				Tier 2 • Tier 1 projects • Offshore wind farm projects: – Operation and maintenance of Morgan/ Morecambe Transmission Assets – Operation and maintenance of Morecambe Offshore Windfarm Generation Assets – Operation and maintenance of Morgan Generation Assets	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.
Removal of hard substrate	×	×	✓	The MDS as described for the Mona Offshore Wind Project (Table 7.14) 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 wind farm projects: – Morgan 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.

7.10 Cumulative effects assessment

7.10.1.0 A description of the significance of cumulative effects upon benthic subtidal and intertidal ecology receptors arising from each identified impact is given below.

7.10.1 Temporary habitat loss/disturbance

7.10.1.1 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 Figure 7.7). For the purposes of this PEIR, this additive impact has been assessed within the CEA benthic subtidal and intertidal ecology study area, defined as the area within a 50km buffer of the Mona Offshore Wind Project, using the tiered approach outlined above in paragraph 7.9.1.3. 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.

7.10.1.2 All plans/projects/activities screened into the assessment for cumulative effects from temporary habitat loss/disturbance are either on-going activities (i.e. maintenance licenses and licensed aggregate extraction areas) or projects with sufficient information in the public domain. Tier 1 includes 20 projects, as well as some of their accompanying operations and maintenance licences, which are consented, submitted, under construction or operational. Three tier 2 projects (Morgan Offshore Wind Project, Morecambe Offshore Wind Project and Morgan/Morecambe Transmission Assets) and one tier 3 project (MaresConnect) have been identified within the CEA benthic subtidal and intertidal ecology study area.

Tier 1

Construction phase

Magnitude of impact

Subtidal habitat IEFs

7.10.1.3 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 7.26 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 7.26 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 148.48km^2 (including the Mona Offshore Wind Project).

7.10.1.4 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 7.26) within the CEA benthic subtidal and intertidal ecology study area is 12.12km^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 7.26, 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.

7.10.1.5 For licensed aggregate deposits and removal the maximum total temporary habitat loss/disturbance is estimated at approximately 1.09km^2 (Table 7.26). 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 21.79km^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.

7.10.1.6 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 4.22km^2 of seabed over the construction period and potentially beyond (Table 7.26). There are also a number of dredge licences without readily available environmental information (i.e. Castletown Bay, Isle of Man, Douglas Harbour, Isle of Man, Conwy River, Dee River and RNLI Regional Maintenance (Figure 7.7)). 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.

7.10.1.7 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 7.26: 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	131.07	See Table 7.14	n/a
Offshore renewables			
Awel y Mor 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 official figure given	Temporary habitat disturbance/loss in the operations and maintenance phase has not been considered in this licence.	Celtic Offshore Wind Ltd (2002)
	Decommissioning: No official figure given	Temporary habitat disturbance/loss may result from: Infrastructure removal.	
Gwynt y Mor Offshore Wind Farm	Operation and maintenance: No official figure given	Temporary habitat disturbance/loss may result from: • Component repairs and replacement • Biofouling removal	CMACS (2005)
North Hoyle Offshore Wind Farm	Operational and maintenance: No official figure given	No significant impacts on benthic communities would arise from operation of the North Hoyle Offshore Wind Farm	North Hoyle (2002)
	Decommissioning: No official figure given	Potential total removal of wind turbines and scour protection.	
Burbo Bank Extension Offshore Wind Farm	Operational and maintenance: No official figure given	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 – operation 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	Operation 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 official figure given	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 official figure given	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 – operation 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 official figure given	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 – operation 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 official figure given	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 – operation 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 official figure given	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 – operation 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 official figure given	Temporary habitat disturbance/loss in the operations and maintenance phase has not been considered in this licence.	Warwick Energy (2005)
	Decommissioning: No official figure given	Potential total removal of wind turbines, scour protection and subsea cables.	

Project	Predicted temporary habitat disturbance/loss (km^2)	Component parts of temporary habitat disturbance/loss	Source
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 official figure given.	Temporary habitat disturbance/loss may result from: • Removal of algal growth	Transmission Capital Partners Ltd (2017)
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)
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 official figure given.	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)

Project	Predicted temporary habitat disturbance/loss (km^2)	Component parts of temporary habitat disturbance/loss	Source
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)
Cables and pipelines			
MaresConnect	No official figure given.	Temporary habitat disturbance/loss may result from: • Cable repair/reburial	
Remedial works			
Isle of Man Interconnector Cable – cable protection remedial works	No official figure given.	Temporary habitat disturbance/loss may result from: • Anchoring • Concrete mattress installation	Intertek (2014)
Isle of Man to UK Interconnector Cable – maintenance and repair	No official figure given.	Temporary habitat disturbance/loss may result from: • Cable repair/reburial	Intertek (2016)
Total	148.48		

7.10.1.8 The cumulative impact on subtidal coarse and mixed sediments with diverse benthic 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 **medium**.

7.10.1.9 The cumulative impact on low resemblance stony reef IEF is predicted to be of local 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**.

7.10.1.10 No other tier 1 projects in the CEA for temporary habitat loss/disturbance overlap with the Constable Bank (Annex I reef outside an SAC) IEF, so this IEF is not considered further in this assessment.

Intertidal habitat IEFs

7.10.1.11 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.

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

7.10.1.12 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.

7.10.1.13 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**.

Sensitivity of the receptor

Subtidal habitat IEFs

7.10.1.14 The sensitivity of the subtidal IEFs is as described previously for the construction phase assessment for the Mona Offshore Wind Project alone in paragraph 7.8.1.20 to 7.8.1.27 and Table 7.17.

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

7.10.1.16 The low resemblance stony reef IEF are 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

7.10.1.17 The sensitivity of the IEFs is as described previously for the construction phase assessment for the Mona Offshore Wind Project alone in paragraph 7.8.1.39 to 7.8.1.43 and Table 7.17.

7.10.1.18 The Annex I sandbanks IEF is deemed to be of medium vulnerability, high recoverability and international value. The sensitivity of the receptor is therefore, considered to be **low**.

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

Significance of effect

Subtidal habitat IEFs

7.10.1.20 Overall for the subtidal coarse and mixed sediments with diverse benthic communities 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 low. 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 comparatively small amount of temporary habitat disturbance/loss from the tier 1 projects over the construction phase (i.e. predominantly associated with small scale and localised maintenance activities/events) which will be temporally intermittent and spatially distributed over the CEA benthic subtidal and intertidal ecology study area.

7.10.1.21 Overall for low resemblance stony reef 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 medium. The cumulative effect will, therefore, be of **minor** adverse significance, which is not significant in EIA terms. This conclusion has been made based on the measures which have been adopted for the Mona Offshore Wind Project to avoid direct impact to this IEF (Table 7.16).

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

7.10.1.22 Overall for the Annex I sandbanks 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 not significant in EIA terms. This conclusion has been reached based on the comparatively small amount of temporary habitat disturbance/loss from these projects over the construction phase (i.e. predominantly associated with small scale and localised maintenance activities/events) which will be temporally intermittent and spatially distributed over the CEA benthic subtidal and intertidal ecology study area.

7.10.1.23 Overall for Annex I subtidal reefs 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 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 comparatively small amount of temporary habitat disturbance/loss from these projects over the construction phase (i.e. predominantly associated with small scale and localised maintenance activities/events) which will be temporally intermittent and spatially distributed over the CEA benthic subtidal and intertidal ecology study area. This conclusion has been made based on the measures which have been adopted for the Mona Offshore Wind Project to avoid direct impact to this IEF (Table 7.16).

Operations and maintenance phase

Magnitude of impact

7.10.1.24 Predicted cumulative temporary habitat loss/disturbance from each of the tier 1 plans/projects/activities is presented in Table 7.27 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 7.27 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 37.06km^2 (including the Mona Offshore Wind Project).

7.10.1.25 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 17.87km^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 7.26, 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.

7.10.1.26 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 0.5km^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 7.27). There are also a number of dredge licences without readily available environmental information (i.e. Castletown Bay, Isle of Man, 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.

7.10.1.27 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 7.27: Cumulative temporary habitat loss 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	17.61	See Table 7.14	n/a
Offshore renewables			
Awel y Mor 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 official figure given	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 Mor Offshore Wind farm	Operation and maintenance: No official figure given	Temporary habitat disturbance/loss may result from: • Component repairs and replacement • Biofouling removal	CMACS (2005)
	Decommissioning: No official figure given	Temporary habitat disturbance/loss may result from: • Jack up events	
Burbo Bank Extension Offshore Wind Farm	Operational and Maintenance: No official figure given	Temporary habitat disturbance/loss in the operations and maintenance phase has not been considered in this licence.	Dong Energy (2013a)
	Decommissioning: No official figure given	Temporary habitat disturbance/loss may result from: • Jack-up events	
Burbo Bank Extension Offshore Wind Farm - operation 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	Operation and maintenance: 0.24	Temporary habitat disturbance/loss may result from: • Jack-up events	Dong Energy (2013b)
	Decommissioning: No official figure given	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 official figure given	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 official figure given	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: • Jack-up events • Foundation removal Scour protection removal	

Project	Predicted temporary habitat disturbance/loss (km²)	Component parts of temporary habitat disturbance/loss	Source
Walney 2 Offshore Wind farm – operation 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 official figure given	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 – operation 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 — operation 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 official figure given	Temporary habitat disturbance/loss in the operations and maintenance phase has not been considered in this licence.	Eclipse Energy Company Ltd (2005)
	Decommissioning: 5.25	Temporary habitat disturbance/loss may result from: • Removal of wind turbines • Removal of scour protection	
Ormonde Offshore Wind farm – operation 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 official figure given.	Temporary habitat disturbance/loss may result from: • Removal of algal growth	Transmission Capital Partners Ltd (2017)
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 official figure given.	Temporary habitat disturbance/loss may result from: Dredging	Anthony D Bates Partnership LLP (2020)
Cables and pipelines			
Remedial works			
Isle of Man Interconnector Cable - cable protection remedial works	No official figure given.	Temporary habitat disturbance/loss may result from: • Anchoring • Concrete mattress installation	Intertek (2014)
Isle of Man to UK Interconnector Cable - maintenance and repair	No official figure given.	Temporary habitat disturbance/loss may result from: • Cable repair/reburial	Intertek (2016)
Total	37.06		

7.10.1.28 The cumulative effect 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**.

7.10.1.29 No other tier 1 projects in the CEA for temporary habitat loss/disturbance overlap with the Constable Bank (Annex I reef outside an SAC) IEF, so this IEF is not considered further in this assessment.

Intertidal habitat IEFs

7.10.1.30 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.

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

7.10.1.31 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.

7.10.1.32 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**.

Sensitivity of the receptor

Subtidal habitat IEFs

7.10.1.33 The sensitivity of the subtidal IEFs is as described previously for the construction phase assessment for the Mona Offshore Wind Project alone in paragraph 7.8.1.20 to 7.8.1.27 and Table 7.17.

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

7.10.1.35 The low resemblance stony reef IEF are 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

7.10.1.36 The sensitivity of the IEFs is as described previously for the construction phase assessment for the Mona Offshore Wind Project alone in paragraph 7.8.1.39 to 7.8.1.43 and Table 7.17.

7.10.1.37 The Annex I sandbanks IEF is deemed to be of medium vulnerability, high recoverability and international value. The sensitivity of the receptor is therefore, considered to be **low**.

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

Significance of effect

Subtidal habitat IEFs

7.10.1.39 Overall subtidal coarse and mixed sediments with diverse benthic 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 low. The cumulative effect will, therefore, be of **minor** adverse significance, which is/is not significant in EIA terms. This conclusion has been reached based on the comparatively small amount of temporary habitat disturbance/loss from the tier 1 projects over the operations and maintenance phase (i.e. predominantly associated with small scale and localised maintenance activities/events) which will be temporally intermittent and spatially distributed over the CEA benthic subtidal and intertidal ecology study area.

7.10.1.40 Overall low resemblance stony reef 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.

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

7.10.1.41 Overall for the Annex I sandbanks IEF, the of the cumulative temporary habitat disturbance/loss impact during the operations and maintenance phase is deemed to be negligible and the sensitivity of the receptor is considered to be low. 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 comparatively small amount of temporary habitat disturbance/loss from the tier 1 projects over the operations and maintenance phase (i.e. predominantly associated with small scale and localised maintenance activities/events) which will be temporally intermittent.

7.10.1.42 Overall Annex I subtidal reefs IEF, the magnitude of the cumulative temporary habitat disturbance/loss impact during the operations and maintenance phase is deemed to be negligible 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 comparatively small amount of temporary habitat disturbance/loss from the tier 1 projects over the operations and maintenance phase (i.e. predominantly associated with small scale and localised maintenance activities/events) which will be temporally intermittent.

Decommissioning phase

7.10.1.43 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

7.10.1.44 The maximum total temporary habitat disturbance/loss associated with the tier 2 projects (i.e. tier 1 projects together with Morgan Generation Assets, Morecambe Offshore Windfarm Generation Assets and Morgan/ Morecambe Transmission Assets) is estimated at up to 253.84km^2. For the Morgan 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 Generation Assets is 87.36km^2 (Morgan Offshore Wind Ltd, 2023).

7.10.1.45 No publicly available information was available, at the time of writing, which quantifies the extent of temporary habitat disturbance/loss associated with the Morecambe Offshore Windfarm Generation Assets and so this is not represented in the cumulative tier 2 total of 253.84km^2. The indicative capacity of the Morecambe Offshore Windfarm Generation Assets (Table 7.24) is however much smaller than the Mona Offshore Wind Project and therefore the scale of the temporary habitat disturbance/loss associated with the tier 2 project is likely to be less than that associated with the Mona Offshore Wind Project.

7.10.1.46 The construction of the Morgan/ Morecambe Transmission Assets are likely to result in temporary habitat disturbance/loss as a result of the installation of cables. Currently there is only a scoping report available for this project therefore no specific values can be attributed to this impact (Morecambe Offshore Windfarm Ltd and Morgan Offshore Wind Ltd, 2022).

7.10.1.47 The cumulative impact on subtidal coarse and mixed sediments with diverse benthic 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 **medium**.

7.10.1.48 The cumulative impact on low resemblance stony reef 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**.

7.10.1.49 No tier 2 projects in the CEA for temporary habitat loss/disturbance overlap with the Constable Bank (Annex I reef outside an SAC) IEF, so this IEF is not considered further.

Intertidal habitat IEFs

7.10.1.50 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.

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

7.10.1.51 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.

Sensitivity of the receptor

Subtidal habitat IEFs

7.10.1.52 The sensitivity of the subtidal IEFs is as described previously for the construction phase assessment for the Mona Offshore Wind Project alone in paragraph 7.8.1.20 to 7.8.1.27 and Table 7.17.

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

7.10.1.54 The low resemblance stony reef 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

7.10.1.55 Overall for the subtidal coarse and mixed sediments with diverse benthic communities 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 low. The cumulative effect will, therefore, be of **minor** adverse significance, which is not significant in EIA terms.

7.10.1.56 Overall for low resemblance stony reef 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 medium. 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

7.10.1.57 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 Generation Assets, Morecambe Offshore Windfarm Generation Assets and Morgan/ Morecambe Transmission Assets) is estimated at up to 48.63km^2. For the Morgan 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 Generation Assets is 11.57km^2 (Morgan Offshore Wind Ltd, 2023) and is therefore similar to that arising from the Mona Offshore Wind Project.

7.10.1.58 No publicly available information was available, at the time of writing, which quantifies the extent of temporary habitat disturbance/loss associated with the Morecambe Offshore Windfarm Generation Assets and so this is not represented in the cumulative tier 2 total of 48.63km^2.

7.10.1.59 The indicative capacity of the Morecambe Offshore Windfarm Generation Assets (Table 7.24) is however much smaller than the Mona Offshore Wind Project and therefore the scale of the temporary habitat disturbance/loss associated with the tier 2 project is likely to be less than that associated with the Mona Offshore Wind Project.

7.10.1.60 The operation and maintenance of the Morgan/ Morecambe Transmission Assets are likely to result in temporary habitat disturbance/loss as a result of the cable maintenance. Currently there is only a scoping report available for this project therefore no specific values can be attributed to this impact.

7.10.1.61 The cumulative effect 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**.

7.10.1.62 No tier 2 projects in the CEA for temporary habitat loss/disturbance overlap with the Constable Bank (Annex I reef outside an SAC) IEF, so this IEF is not considered further.

Intertidal habitat IEFs

7.10.1.63 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.

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

7.10.1.64 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.

Sensitivity of the receptor

Subtidal habitat IEFs

7.10.1.65 The sensitivity of the subtidal IEFs is as described previously for the construction phase assessment for the Mona Offshore Wind Project alone in paragraph 7.8.1.20 to 7.8.1.27 and Table 7.17.

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

7.10.1.67 The low resemblance stony reef 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

7.10.1.68 Overall for the subtidal coarse and mixed sediments with diverse benthic 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 low. The cumulative effect will, therefore, be of **minor** adverse significance, which is not significant in EIA terms.

7.10.1.69 Overall for low resemblance stony reef 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.

Decommissioning phase

Magnitude of impact

7.10.1.70 The MDS for temporary habitat disturbance/loss associated with the tier 2 offshore renewables projects within the CEA benthic subtidal and intertidal ecology study area includes three projects (i.e. Morgan Generation Assets, Morecambe Offshore Windfarm Generation Assets and Morgan/Morecambe Transmission Assets). For the Morgan Generation Assets temporary habitat disturbance/loss is predicted to result from cable removal as well as, wind turbine and OSP foundation removal. The temporary habitat disturbance/loss predicted to result from the decommissioning of the Morgan Generation Assets is likely to be similar to the construction phase (Morgan Offshore Wind Ltd, 2023) and is therefore similar to that arising from the Mona Offshore Wind Project.

7.10.1.71 No publicly available information was available, at the time of writing, which quantifies the extent of temporary habitat disturbance/loss associated with the decommissioning of the Morecambe Offshore Windfarm Generation Assets. The indicative capacity of the Morecambe Offshore Windfarm Generation Assets (Table 7.24) is however much smaller than the Mona Offshore Wind Project and therefore the scale of the temporary habitat disturbance/loss associated with the tier 2 project is likely to be less than that associated with the Mona Offshore Wind Project.

7.10.1.72 The potential decommissioning of the Morgan/Morecambe Transmission Assets may result in temporary habitat disturbance/loss as a result of the decommissioning of cables or cable protection. Currently there is only a scoping report available for this project therefore no specific values can be attributed to this project (Morecambe Offshore Windfarm Ltd and Morgan Offshore Wind Ltd, 2022).

7.10.1.73 The cumulative impact on subtidal coarse and mixed sediments with diverse benthic 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 **medium**.

7.10.1.74 The cumulative impact on low resemblance stony reef 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**.

7.10.1.75 No tier 1 projects in the CEA for temporary habitat loss/disturbance overlap with the Constable Bank (Annex I reef outside an SAC) IEF so this IEF is not considered further in this assessment.

Intertidal habitat IEFs

7.10.1.76 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.

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

7.10.1.77 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.

Sensitivity of the receptor

Subtidal habitat IEFs

7.10.1.78 The sensitivity of the subtidal IEFs is as described previously for the construction phase assessment for the Mona Offshore Wind Project alone in paragraph 7.8.1.20 to 7.8.1.27 and Table 7.17.

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

7.10.1.80 The low resemblance stony reef 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

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

7.10.1.82 Overall for low resemblance stony reef 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 not significant in EIA terms.

<u>Tier 3</u>

Construction phase

Magnitude of impact

Subtidal habitat IEFs

7.10.1.83 The only 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 is the MaresConnect interconnector cable. There is, however, 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).

7.10.1.84 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.

7.10.1.85 The cumulative impact on subtidal coarse and mixed sediments with diverse benthic 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 **medium**.

7.10.1.86 The cumulative impact on low resemblance stony reef 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**.

7.10.1.87 No tier 3 projects in the CEA for temporary habitat loss/disturbance overlap with the Constable Bank (Annex I reef outside an SAC) IEF so this IEF is not considered further.

Intertidal habitat IEFs

7.10.1.88 The tier 3 project 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.

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

7.10.1.89 The tier 3 project 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.

Sensitivity of the receptor

Subtidal habitat IEFs

7.10.1.90 The sensitivity of the subtidal IEFs is as described previously for the construction phase assessment for the Mona Offshore Wind Project alone in paragraph 7.8.1.20 to 7.8.1.27 and Table 7.17.

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

7.10.1.92 The low resemblance stony reef 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

7.10.1.93 Overall for the subtidal coarse and mixed sediments with diverse benthic communities 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 low. The cumulative effect will, therefore, be of **minor** adverse significance, which is not significant in EIA terms.

7.10.1.94 Overall for low resemblance stony reef 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 medium. 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

7.10.1.95 The only 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 is the MaresConnect interconnector cable. There is, however, 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).

7.10.1.96 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.

7.10.1.97 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

7.10.1.98 The sensitivity of the subtidal IEFs is as described previously for the construction phase assessment for the Mona Offshore Wind Project alone in paragraph 7.8.1.20 to 7.8.1.27 and Table 7.17.

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

7.10.1.100 The low resemblance stony reef 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

7.10.1.101 Overall for the subtidal coarse and mixed sediments with diverse benthic 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 low. The cumulative effect will, therefore, be of **minor** adverse significance, which is not significant in EIA terms.

7.10.1.102 Overall for low resemblance stony reef 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.

7.10.2 Increase in suspended sediment concentrations and associated deposition

Tier 1

Construction phase

Magnitude of impact

7.10.2.1 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 7.8.1. The greatest impacts are due to installation of the export cabling through the Constable Bank.

7.10.2.2 The construction phase of the Mona Offshore Wind Project may coincides with the maintenance activities associated with of the Rhyl Flats Wind Farm, Gwynt y Mor 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.

7.10.2.3 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 offshore 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 2mg/l on the outer extent of the plume.

7.10.2.4 The cumulative impact assessment encompasses aggregate extraction at both Hilbre Swash licensed areas located within 14.5km of the Mona array area and 17.2km of the 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.

7.10.2.5 Similarly, the cumulative impact assessment considers sea disposal of dredged material at the Conwy River disposal site, located 33.9 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.

7.10.2.6 During the construction phase the MaresConnect cable will be in construction which may result in increased SSC. The MaresConnect cable is located 14.7km from the Mona offshore array area and crosses the Mona offshore cable corridor. As expected, the trenching activities for both projects will 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 10mg/l around 80km away therefore the potential overlap of resultant plumes would be low.

7.10.2.7 The cumulative effect on subtidal receptors is predicted to be of local spatial extent, short term duration, intermittent and high reversibility. The magnitude is therefore, considered to be **low**.

7.10.2.8 Construction phases may overlap between the Mona Offshore Wind Project and the proposed coastal defence scheme Llanddulas to Kinmel Bay. Construction activities coinciding would most likely not cause a cumulative increase in SSC as the coastal defence works are proposed to occur on the high water mark. The cumulative effect on intertidal receptors 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

7.10.2.9 The sensitivity of the subtidal habitat IEFs is as described previously for the construction phase assessment in paragraph 7.8.2.21 to 7.8.2.27 and Table 7.18.

7.10.2.10 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**.

7.10.2.11 The low resemblance stony reef IEF is deemed to be of low vulnerability, high recoverability and national value. The sensitivity of the receptor is therefore, considered to be **negligible.**

7.10.2.12 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**.

Intertidal habitat IEF

7.10.2.13 The sensitivity of the intertidal habitat IEFs is as described previously for the construction phase assessment in paragraph 7.8.2.28 to 7.8.2.38 and Table 7.18.

7.10.2.14 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.**

7.10.2.15 The littoral sand and muddy sand supporting infaunal 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**.

7.10.2.16 The *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 **medium**.

7.10.2.17 The sublittoral very soft chalk or clay with piddocks IEF and *Mytilus edulis* beds IEF are deemed to be of medium vulnerability, high recoverability and national value. The sensitivity of the receptor is therefore, considered to be **medium**.

7.10.2.18 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**.

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

7.10.2.19 The sensitivity of the subtidal and intertidal IEF features of the SAC are as described previously for the construction phase assessment in paragraph 7.8.2.39 to 7.8.2.45 and Table 7.18.

7.10.2.20 The Annex I sandbanks IEF is deemed to be of low vulnerability, medium recoverability and international value. The sensitivity of the receptor is therefore, considered to be **low**.

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

7.10.2.22 The Annex I intertidal reef IEF is deemed to be of medium vulnerability, high recoverability and international value. The sensitivity of the receptor is therefore, considered to be **low**.

Significance of effect

Subtidal habitat IEFs

7.10.2.23 Overall, for the subtidal coarse and mixed sediments with diverse benthic communities 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.

7.10.2.24 Overall, for the low resemblance stony reef 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.

Intertidal habitat IEFs

7.10.2.25 Overall, for the *Sabellaria alveolata* reef IEF the magnitude of the cumulative increase in SSC and associated deposition impact in 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. As although they are not sensitive there are likely to be some short term indirect effects to the communities associated with these IEFs.

7.10.2.26 Overall, for the littoral shingle with *Verrucaria maura IEF* and the littoral sand and muddy sand supporting infaunal communities IEF the magnitude of the cumulative increase in SSC and associated deposition impact in the construction 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.

7.10.2.27 Overall, for the littoral and eulittoral rock dominated by epifaunal communities IEF, sublittoral very soft chalk or clay with piddocks IEF and *Mytilus edulis* beds IEF the magnitude of the cumulative increase in SSC and associated deposition impact in 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. As although they are not sensitive there are likely to be some short term indirect effects to the communities associated with these IEFs.

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

7.10.2.28 Overall, for the Annex I sandbanks IEF and Annex I subtidal reefs 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 resistant to these specific pressures.

7.10.2.29 Overall, for the Annex I intertidal reefs IEF the magnitude of the cumulative increase in SSC and associated deposition impact in the construction 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.

Operation and Maintenance phase

Magnitude of impact

7.10.2.1 The magnitude of the increase in suspended sediment concentrations arising from maintenance activities during operation and maintenance phase, has been assessed as negligible for the Mona Offshore Wind Project alone, as described in section 7.8.

7.10.2.2 The operation and maintenance phase of the Mona Offshore Wind Project may coincide with the maintenance activities associated with the Rhyl Flats Wind Farm and Gwynt y Mor 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 operation and maintenance phase.

7.10.2.3 The cumulative impact assessment considers the proposed development of Awel y Mor Offshore Wind Farm potential maintanence for the wind farm coinciding with the operation and maintanence phase of Mona Offshore Wind Project. 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.

7.10.2.4 Potential cumulative impacts may relate to maintenance of offshore cables coinciding with the use of the Conwy River disposal site and aggregate extraction from Hilbre Swash. 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.

7.10.2.5 Operation and maintenance phase of the Mona Offshore Wind Project and the proposed construction of the coastal defence scheme Llanddulas to Kinmel Bay. Construction activities coinciding with the operation and maintenance phase of Mona Offshore Wind Project would most likely not cause a cumulative increase in suspended sediment concentration as the coastal defence works are proposed to occur on the high water mark.

7.10.2.6 The projects 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 suspended sediment concentrations, 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).

7.10.2.7 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 the receptor

Subtidal habitat IEFs

7.10.2.8 The sensitivity of the subtidal habitat IEFs is as described previously for the construction phase assessment in paragraph 7.8.2.21 to 7.8.2.27 and Table 7.18.

7.10.2.9 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**.

7.10.2.10 The low resemblance stony reef IEF is deemed to be of low vulnerability, high recoverability and national value. The sensitivity of the receptor is therefore, considered to be **negligible.**

7.10.2.11 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**.

Intertidal habitat IEF

7.10.2.12 The sensitivity of the intertidal habitat IEFs is as described previously for the construction phase assessment in paragraph 7.8.2.28 to 7.8.2.38 and Table 7.18.

7.10.2.13 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.**

7.10.2.14 The littoral sand and muddy sand supporting infaunal 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**.

7.10.2.15 The *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 **medium**

7.10.2.16 The sublittoral very soft chalk or clay with piddocks IEF and *Mytilus edulis* beds IEF are deemed to be of medium vulnerability, high recoverability and national value. The sensitivity of the receptor is therefore, considered to be **medium**.

7.10.2.17 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**.

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

7.10.2.18 The sensitivity of the subtidal and intertidal IEF features of the SAC are as described previously for the construction phase assessment in paragraph 7.8.2.39 to 7.8.2.45 and Table 7.18.

7.10.2.19 The Annex I sandbanks IEF is deemed to be of low vulnerability, medium recoverability and international value. The sensitivity of the receptor is therefore, considered to be **low**.

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

7.10.2.21 The Annex I intertidal reef IEF is deemed to be of medium vulnerability, high recoverability and international value. The sensitivity of the receptor is therefore, considered to be **low**.

Significance of effect

Subtidal habitat IEFs

7.10.2.22 Overall, for the subtidal coarse and mixed sediments with diverse benthic communities 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.

7.10.2.23 Overall, for the low resemblance stony reef 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.

Intertidal habitat IEFs

7.10.2.24 Overall, for the *Sabellaria alveolata* reef 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 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.

7.10.2.25 Overall, for the littoral shingle with *Verrucaria maura IEF* and the littoral sand and muddy sand supporting infaunal 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.

7.10.2.26 Overall, for the littoral and eulittoral rock dominated by epifaunal communities IEF, sublittoral very soft chalk or clay with piddocks IEF and *Mytilus edulis* beds 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 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.

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

7.10.2.27 Overall, for the Annex I sandbanks IEF and Annex I subtidal reefs 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 resistant to these specific pressures.

7.10.2.28 Overall, for the Annex I intertidal reefs 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.

Decommissioning phase

Magnitude of impact

7.10.2.29 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 caisson foundations were to be removed this would result in an increase in SSC.

7.10.2.30 Following decommissioning, increases in SSC and potential impacts on benthic receptors 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 7.14), SSC would increase temporarily if suction caissons 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. 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 physical features may persist during decommissioning, however they are temporary and localised in nature.

7.10.2.31 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 the receptor

Subtidal habitat IEFs

7.10.2.32 The sensitivity of the subtidal habitat IEFs is as described previously for the construction phase assessment in paragraph 7.8.2.21 to 7.8.2.27 and Table 7.18.

7.10.2.33 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**.

7.10.2.34 The low resemblance stony reef IEF is deemed to be of low vulnerability, high recoverability and national value. The sensitivity of the receptor is therefore, considered to be **negligible.**

7.10.2.35 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**.

Intertidal habitat IEF

7.10.2.36 The sensitivity of the intertidal habitat IEFs is as described previously for the construction phase assessment in paragraph 7.8.2.28 to 7.8.2.38 and Table 7.18.

7.10.2.37 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.**

7.10.2.38 The littoral sand and muddy sand supporting infaunal 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**.

7.10.2.39 The *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 **medium**

7.10.2.40 The sublittoral very soft chalk or clay with piddocks IEF and *Mytilus edulis* beds IEF are deemed to be of medium vulnerability, high recoverability and national value. The sensitivity of the receptor is therefore, considered to be **medium**.

7.10.2.41 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**.

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

7.10.2.42 The sensitivity of the subtidal and intertidal IEF features of the SAC are as described previously for the construction phase assessment in paragraph 7.8.2.39 to 7.8.2.45 and Table 7.18.

7.10.2.43 The Annex I sandbanks IEF is deemed to be of low vulnerability, medium recoverability and international value. The sensitivity of the receptor is therefore, considered to be **low**.

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

7.10.2.45 The Annex I intertidal reef IEF is deemed to be of medium vulnerability, high recoverability and international value. The sensitivity of the receptor is therefore, considered to be **low**.

Significance of effect

Subtidal habitat IEFs

7.10.2.46 Overall, for the subtidal coarse and mixed sediments with diverse benthic communities 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 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.

7.10.2.47 Overall, for the low resemblance stony reef IEF the magnitude of the cumulative increase in SSC and associated deposition 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. 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.

Intertidal habitat IEFs

7.10.2.48 Overall, for the *Sabellaria alveolata* reef IEF the magnitude of the cumulative increase in SSC and associated deposition impact in 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.

7.10.2.49 Overall, for the littoral shingle with *Verrucaria maura IEF* and the littoral sand and muddy sand supporting infaunal communities IEF the magnitude of the cumulative increase in SSC and associated deposition 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.

7.10.2.50 Overall, for the littoral and eulittoral rock dominated by epifaunal communities IEF, sublittoral very soft chalk or clay with piddocks IEF and *Mytilus edulis* beds IEF the magnitude of the cumulative increase in SSC and associated deposition impact in 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.

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

7.10.2.51 Overall, for the Annex I sandbanks IEF and Annex I subtidal reefs IEF the magnitude of the cumulative increase in SSC and associated deposition 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 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.

7.10.2.52 Overall, for the Annex I intertidal reefs IEF the magnitude of the cumulative increase in SSC and associated deposition 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.

Tier 2

Construction phase

Magnitude of impact

7.10.2.53 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 7.8.2.

7.10.2.54 During the construction phase of the Mona Offshore Wind Project there is the potential for cumulative impacts with two proposed offshore wind farm installations (Morgan Generation Assets and Morecambe Offshore Windfarm Generation Assets) including the transmission assets combined for Morgan/Morecambe wind farms. 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 7.8.2, 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.

7.10.2.55 The cumulative effect on intertidal receptors 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

7.10.2.56 The sensitivity of the subtidal habitat IEFs is as described previously for the construction phase assessment in paragraph 7.8.2.21 to 7.8.2.27 and Table 7.18.

7.10.2.57 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**.

7.10.2.58 The low resemblance stony reef IEF is deemed to be of low vulnerability, high recoverability and national value. The sensitivity of the receptor is therefore, considered to be **negligible.**

7.10.2.59 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**.

Intertidal habitat IEF

7.10.2.60 The sensitivity of the intertidal habitat IEFs is as described previously for the construction phase assessment in paragraph 7.8.2.28 to 7.8.2.38 and Table 7.18.

7.10.2.61 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.**

7.10.2.62 The littoral sand and muddy sand supporting infaunal 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**.

7.10.2.63 The *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 **medium**.

7.10.2.64 The sublittoral very soft chalk or clay with piddocks IEF and *Mytilus edulis* beds IEF are deemed to be of medium vulnerability, high recoverability and national value. The sensitivity of the receptor is therefore, considered to be **medium**.

7.10.2.65 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**.

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

7.10.2.66 The sensitivity of the subtidal and intertidal IEF features of the SAC are as described previously for the construction phase assessment in paragraph 7.8.2.39 to 7.8.2.45 and Table 7.18.

7.10.2.67 The Annex I sandbanks IEF is deemed to be of low vulnerability, medium recoverability and international value. The sensitivity of the receptor is therefore, considered to be **low**.

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

7.10.2.69 The Annex I intertidal reef IEF is deemed to be of medium vulnerability, high recoverability and international value. The sensitivity of the receptor is therefore, considered to be **low**.

Significance of effect

Subtidal habitat IEFs

7.10.2.70 Overall, for the subtidal coarse and mixed sediments with diverse benthic communities 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.

7.10.2.71 Overall, for the low resemblance stony reef 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.

Intertidal habitat IEFs

7.10.2.72 Overall, for the *Sabellaria alveolata* reef IEF the magnitude of the cumulative increase in SSC and associated deposition impact in 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.

7.10.2.73 Overall, for the littoral shingle with *Verrucaria maura,* and littoral sand and muddy sand supporting infaunal communities IEF the magnitude of the cumulative increase in SSC and associated deposition impact in the construction 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.

7.10.2.74 Overall, for the littoral and eulittoral rock dominated by epifaunal communities IEF, sublittoral very soft chalk or clay with piddocks IEF and *Mytilus edulis* beds IEF the magnitude of the cumulative increase in SSC and associated deposition impact in 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. As although they are not sensitive there are likely to be some short term indirect effects to the communities associated with these IEFs.

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

7.10.2.75 Overall, for the Annex I sandbanks IEF and Annex I subtidal reefs 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 resistant to these specific pressures.

7.10.2.76 Overall, for the Annex I intertidal reefs IEF the magnitude of the cumulative increase in SSC and associated deposition impact in the construction 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.

Operation and Maintenance phase

Magnitude of impact

7.10.2.77 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 7.8.2.

7.10.2.78 During the operations and maintenance phase of the Mona Offshore Wind Project there is the potential for cumulative impacts with two proposed offshore wind farm installations (Morgan Generation Assets and Morecambe Offshore Windfarm Generation Assets) including the transmission assets combined for Morgan/Morecambe wind farms. 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. SSC plumes are localised to within the immediate vicinity of the maintenance activity and returning to background levels.

7.10.2.79 The cumulative effect on intertidal receptors 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

7.10.2.80 The sensitivity of the subtidal habitat IEFs is as described previously for the construction phase assessment in paragraph 7.8.2.21 to 7.8.2.27 and Table 7.18.

7.10.2.81 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**.

7.10.2.82 The low resemblance stony reef IEF is deemed to be of low vulnerability, high recoverability and national value. The sensitivity of the receptor is therefore, considered to be **negligible.**

7.10.2.83 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**.

Intertidal habitat IEF

7.10.2.84 The sensitivity of the intertidal habitat IEFs is as described previously for the construction phase assessment in paragraph 7.8.2.28 to 7.8.2.38 and Table 7.18.

7.10.2.85 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.**

7.10.2.86 The littoral sand and muddy sand supporting infaunal 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**.

7.10.2.87 The *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 **medium**

7.10.2.88 The sublittoral very soft chalk or clay with piddocks IEF and *Mytilus edulis* beds IEF are deemed to be of medium vulnerability, high recoverability and national value. The sensitivity of the receptor is therefore, considered to be **medium**.

7.10.2.89 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**.

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

7.10.2.90 The sensitivity of the subtidal and intertidal IEF features of the SAC are as described previously for the construction phase assessment in paragraph 7.8.2.39 to 7.8.2.45 and Table 7.18.

7.10.2.91 The Annex I sandbanks IEF is deemed to be of low vulnerability, medium recoverability and international value. The sensitivity of the receptor is therefore, considered to be **low**.

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

7.10.2.93 The Annex I intertidal reef IEF is deemed to be of medium vulnerability, high recoverability and international value. The sensitivity of the receptor is therefore, considered to be **low**.

Significance of effect

Subtidal habitat IEFs

7.10.2.94 Overall, for the subtidal coarse and mixed sediments with diverse benthic communities 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.

7.10.2.95 Overall, for the low resemblance stony reef 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.

Intertidal habitat IEFs

7.10.2.96 Overall, for the *Sabellaria alveolata* reef 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 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.

7.10.2.97 Overall, for the littoral shingle with *Verrucaria maura IEF* and the littoral sand and muddy sand supporting infaunal 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.

7.10.2.98 Overall, for the littoral and eulittoral rock dominated by epifaunal communities IEF, sublittoral very soft chalk or clay with piddocks IEF and *Mytilus edulis* beds 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 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.

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

7.10.2.99 Overall, for the Annex I sandbanks IEF and Annex I subtidal reefs 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 resistant to these specific pressures.

7.10.2.100 Overall, for the Annex I intertidal reefs 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.

Decommissioning phase

Magnitude of impact

7.10.2.101 The magnitude of the increase in SSC arising from decommissioning activities, has been described in section 7.8.2 as having no significant disturbance of the seabed during decommissioning and subsequently no impact on SSC and sedimentation for the Mona Offshore Wind Project alone. The SSC would however increase temporarily during cable removal and if suction caissons were removed using overpressure to release. The increase in suspended sediments and the potential impact on physical features may persist during decommissioning, however they are localised in nature.

7.10.2.102 Decommissioning of the Morecambe Offshore Windfarm Generation Assets and Morgan Generation 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.

7.10.2.103 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

7.10.2.104 The sensitivity of the subtidal habitat IEFs is as described previously for the construction phase assessment in paragraph 7.8.2.21 to 7.8.2.27 and Table 7.18.

7.10.2.105 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**.

7.10.2.106 The low resemblance stony reef IEF is deemed to be of low vulnerability, high recoverability and national value. The sensitivity of the receptor is therefore, considered to be **negligible.**

7.10.2.107 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**.

Intertidal habitat IEF

7.10.2.108 The sensitivity of the intertidal habitat IEFs is as described previously for the construction phase assessment in paragraph 7.8.2.28 to 7.8.2.38 and Table 7.18.

7.10.2.109 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.**

7.10.2.110 The littoral sand and muddy sand supporting infaunal 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**.

7.10.2.111 The *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 **medium**.

7.10.2.112 The sublittoral very soft chalk or clay with piddocks IEF and *Mytilus edulis* beds IEF are deemed to be of medium vulnerability, high recoverability and national value. The sensitivity of the receptor is therefore, considered to be **medium**.

7.10.2.113 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**.

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

7.10.2.114 The sensitivity of the subtidal and intertidal IEF features of the SAC are as described previously for the construction phase assessment in paragraph 7.8.2.39 to 7.8.2.45 and Table 7.18.

7.10.2.115 The Annex I sandbanks IEF is deemed to be of low vulnerability, medium recoverability and international value. The sensitivity of the receptor is therefore, considered to be **low**.

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

7.10.2.117 The Annex I intertidal reef IEF is deemed to be of medium vulnerability, high recoverability and international value. The sensitivity of the receptor is therefore, considered to be **low**.

Significance of effect

Subtidal habitat IEFs

7.10.2.118 Overall, for the subtidal coarse and mixed sediments with diverse benthic communities 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 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.

7.10.2.119 Overall, for the low resemblance stony reef IEF the magnitude of the cumulative increase in SSC and associated deposition 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. This conclusion has been reached based on the highly localised nature of this impact.

Intertidal habitat IEFs

7.10.2.120 Overall, for the *Sabellaria alveolata* reef IEF the magnitude of the cumulative increase in SSC and associated deposition impact in 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.

7.10.2.121 Overall, for the littoral shingle with *Verrucaria maura IEF* and the littoral sand and muddy sand supporting infaunal communities IEF the magnitude of the cumulative increase in SSC and associated deposition 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.

7.10.2.122 Overall, for the littoral and eulittoral rock dominated by epifaunal communities IEF, sublittoral very soft chalk or clay with piddocks IEF and *Mytilus edulis* beds IEF the magnitude of the cumulative increase in SSC and associated deposition impact in 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.

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

7.10.2.123 Overall, for the Annex I sandbanks IEF and Annex I subtidal reefs IEFs the magnitude of the cumulative increase in SSC and associated deposition 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 conclusion has been reached based on the highly localised nature of this impact.

7.10.2.124 Overall, for the Annex I intertidal reefs IEFs the magnitude of the cumulative increase in SSC and associated deposition 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 conclusion has been reached based on the highly localised nature of this impact.

7.10.3 Long term habitat loss

7.10.3.1 Tier 1 cumulative long term habitat loss is predicted to occur as a result of the presence of the Mona Offshore Wind Project and the Awel y Môr Offshore Wind Farm; 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 7.25). Long term habitat loss may result from the physical presence of foundations, scour protection and cable protection.

7.10.3.2 Two tier 2 offshore wind farms have been identified within the CEA benthic subtidal and intertidal ecology study area (Morecambe Offshore Windfarm Generation Assets and Morgan Generation Assets) and Morgan/Morecambe Transmission Assets as well as one tier 3 project the MaresConnect interconnector cable.

Tier 1

Construction and operations and maintenance phases

Magnitude of impact

7.10.3.3 The predicted cumulative long term habitat loss from the tier 1 offshore wind farm projects (i.e. Mona Offshore Wind Project and Awel y Môr Offshore Wind Farm) is estimated to be up to 3.43km^2. Awel y Môr Offshore Wind Farm is predicted to result in 1.07km^2 of long term habitat loss as a result of wind turbine and OSP foundations, scour protection, met masts, cable protection and cable crossings.

7.10.3.4 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**.

7.10.3.5 No tier 1 projects in the CEA for long term habitat loss overlap with the Constable Bank (Annex I reef outside an SAC) IEF, so this IEF is not considered further in this assessment.

Intertidal habitat IEFs

7.10.3.6 None of the cumulative long term habitat loss 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.

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

7.10.3.7 None of the cumulative long term habitat loss 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.

Sensitivity of the receptor

Subtidal habitat IEFs

7.10.3.8 The sensitivity of the IEFs is as described previously for the construction phase assessment for the Mona Offshore Wind Project alone in paragraph 7.8.4.13 to 7.8.4.16 and above in Table 7.19.

7.10.3.9 The subtidal coarse and mixed sediments with diverse benthic communities IEF and low resemblance stony reef 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

7.10.3.10 Overall for the subtidal habitat IEFs (subtidal coarse and mixed sediments with diverse benthic communities IEF and low resemblance stony reef IEF), the magnitude of the cumulative long term subtidal habitat loss 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 is spread, together with the likely gradual reduction in magnitude throughout the operations and maintenance phase of the Mona Offshore Wind Project.

Decommissioning phase

7.10.3.11 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

7.10.3.12 The maximum total long term habitat loss associated with the tier 2 assessment offshore renewables projects within the CEA benthic subtidal and intertidal ecology study area (i.e. Morgan Generation Assets, Morecambe Offshore Windfarm Generation Assets and Morgan/ Morecambe Transmission Assets) is estimated at up to 4.95km^2. For the Morgan Generation Assets long term habitat loss is likely to arise under foundation structures and associated scour protection, and under any cable protection required. The long term habitat loss predicted to result from the Morgan Generation Assets is 1.52km^2 (see Morgan Offshore Wind Ltd, 2023) and is therefore similar to that arising from the Mona Offshore Wind Project.

7.10.3.13 No publicly available information was available, at the time of writing, which quantifies the extent of long term habitat loss associated with the Morecambe Offshore Windfarm Generation Assets and so this is not represented in the cumulative tier 2 total of 4.95km^2.

7.10.3.14 The indicative capacity of the Morecambe Offshore Windfarm Generation Assets (Table 7.24) is however much smaller than the Mona Offshore Wind Project and therefore the scale of the long term habitat loss associated with the tier 2 project is likely to be less than that associated with the Mona Offshore Wind Project.

7.10.3.15 The Morgan/ Morecambe Transmission Assets are likely to result in long term habitat loss as a result of the presence of cable protection. Currently there is only a scoping report available for this project (Morecambe Offshore Windfarm Ltd and Morgan Offshore Wind Ltd, 2022) therefore no specific values can be attributed to this impact for this project.

7.10.3.16 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**.

7.10.3.17 No tier 1 projects in the CEA for long term habitat loss overlap with the Constable Bank (Annex I reef outside an SAC) IEF, so this IEF is not considered further in this assessment.

Intertidal habitat IEFs

7.10.3.18 None of the cumulative long term habitat loss 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.

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

7.10.3.19 The tier 2 projects will not cumulatively interact with the long term habitat loss 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.

Sensitivity of the receptor

Subtidal habitat IEFs

7.10.3.20 The sensitivity of the IEFs is as described previously for the construction phase assessment for the Mona Offshore Wind Project alone in paragraph 7.8.4.13 to 7.8.4.16 and above in Table 7.19.

7.10.3.21 The subtidal coarse and mixed sediments with diverse benthic communities IEF and the low resemblance stony reef 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

7.10.3.22 Overall for the subtidal habitat IEFs (subtidal coarse and mixed sediments with diverse benthic communities IEF and low resemblance stony reef IEF), the magnitude of the cumulative long term subtidal habitat loss 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 is spread over.

Decommissioning phase

Magnitude of impact

7.10.3.23 The maximum total long term habitat loss/permanent habitat alteration associated with the tier 2 assessment includes the permanent habitat alteration resulting from the cable and scour protection remaining *in situ* for the Morgan Generation Assets together with three offshore renewables projects within the CEA benthic subtidal and intertidal ecology study (i.e. Morgan Generation Assets, Morecambe Offshore Windfarm Generation Assets, and Morgan/ Morecambe Transmission Assets) is estimated at up to 3.76km^2. There may be up to 1.46km^2 of permanent habitat alteration from the Morgan Generation Assets after decommissioning. As Morecambe Offshore Windfarm Generation Assets is still in its scoping phase there is currently no value available in relation to the amount of long term habitat associated with the project in its operations and maintenance phase. Morecambe Offshore Wind Farm will however is estimated to enter the decommissioning phase in 2089 (14 years after Mona Offshore Wind Project), therefore the amount of long term habitat loss associated with this project is likely to decrease with time.

7.10.3.24 No publicly available information was available, at the time of writing, which quantifies the extent of long term habitat loss associated with the Morecambe Offshore Windfarm Generation Assets and so this is not represented in the cumulative tier 2 total of 3.76km^2.

7.10.3.25 The indicative capacity of the Morecambe Offshore Windfarm Generation Assets (Table 7.24) is however much smaller than the Mona Offshore Wind Project and therefore the scale of the long term habitat loss associated with the tier 2 project is likely to be less than that associated with the Mona Offshore Wind Project.

7.10.3.26 The Morgan/ Morecambe Transmission Assets are likely to result in permanent habitat loss as a result of the presence of cable protection. Currently there is only a scoping report available for this project (Morecambe Offshore Windfarm Ltd and Morgan Offshore Wind Ltd, 2022), therefore no specific values can be attributed to this impact for this project.

7.10.3.27 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**.

7.10.3.28 No tier 1 projects in the CEA for long term habitat loss/permanent habitat alteration overlap with the Constable Bank (Annex I reef outside an SAC) IEF, so this IEF is not considered further in this assessment.

Intertidal habitat IEF

7.10.3.29 None of the cumulative long term habitat loss 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.

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

7.10.3.30 None of the cumulative long term habitat loss 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.

Sensitivity of the receptor

Subtidal habitat IEFs

7.10.3.31 The sensitivity of the IEFs is as described previously for the construction phase assessment for the Mona Offshore Wind Project alone in paragraph 7.8.4.13 to 7.8.4.16 and above in Table 7.19.

7.10.3.32 The subtidal coarse and mixed sediments with diverse benthic communities IEF and low resemblance stony reef 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

7.10.3.33 Overall for the subtidal habitat IEFs (subtidal coarse and mixed sediments with diverse benthic communities IEF and low resemblance stony reef IEF), the magnitude of the cumulative long term subtidal habitat loss/permanent 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/permanent 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

7.10.3.34 The only tier 3 project which has been identified in the CEA with the potential to result in cumulative long term habitat loss with the Mona Offshore Wind Project is the MaresConnect interconnector cable. There is, however, 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).

7.10.3.35 Cable protection associated with the MaresConnect interconnector cable is activities likely to result in long term habitat loss 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.

7.10.3.36 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**.

Intertidal habitat IEF

7.10.3.37 None of the cumulative long term habitat loss 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.

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

7.10.3.38 None of the cumulative long term habitat loss 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.

Sensitivity of the receptor

Subtidal habitat IEFs

7.10.3.39 The sensitivity of the IEFs is as described previously for the construction phase assessment for the Mona Offshore Wind Project alone in paragraph 7.8.4.13 to 7.8.4.16 and above in Table 7.19.

7.10.3.40 The subtidal coarse and mixed sediments with diverse benthic communities IEF and low resemblance stony reef 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

7.10.3.41 Overall for the subtidal habitat IEFs (subtidal coarse and mixed sediments with diverse benthic communities IEF and low resemblance stony reef IEF), the magnitude of the cumulative long term subtidal habitat loss 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 is spread over and the likely gradual reduction in magnitude throughout the operations and maintenance phase of the Mona Offshore Wind Project.

7.10.4 Colonisation of hard substrate

7.10.4.1 The introduction of hard substrate 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.

7.10.4.2 The only projects which is screened into the tier 1 assessment for cumulative effects from the introduction of hard substrate is the Awel y Môr Offshore Wind Farm. All other operational offshore wind farms within the CEA benthic subtidal and intertidal ecology study area are considered to be part of the baseline.

7.10.4.3 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 and Morgan Generation Assets) and Morgan/Morecambe Transmission Assets. In tier 3 there is only one project, the MaresConnect interconnector cable.

Tier 1

Construction and operations and maintenance phases

Magnitude of impact

7.10.4.4 The maximum cumulative tier 1 habitat creation is estimated at 3.93km^2. Awel y Môr Offshore Wind Farm is the only tier 1 project and it is likely to result in 1.07km^2 of hard substrate from wind turbine and OSP foundations, scour protection, met masts, cable protection and cable crossings.

7.10.4.5 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**.

7.10.4.6 No tier 1 projects in the CEA for habitat creation overlap with the Constable Bank (Annex I reef outside an SAC) IEF, so this IEF is not considered further in this assessment.

Intertidal habitat IEFs

7.10.4.7 None of the cumulative long term habitat loss 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.

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

7.10.4.8 None of the cumulative long term habitat loss 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.

Sensitivity of the receptor

Subtidal habitat IEFs

7.10.4.9 The sensitivity of the IEFs is as described previously for the construction phase assessment for the Mona Offshore Wind Project alone in paragraph 7.8.5.14 to 7.8.5.23.

7.10.4.10 All of the subtidal IEFs (subtidal coarse and mixed sediments with diverse benthic communities IEF and low resemblance stony reef 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

7.10.4.11 Overall for all of the subtidal IEFs (subtidal coarse and mixed sediments with diverse benthic communities IEF and low resemblance stony reef 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 phases

7.10.4.12 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

7.10.4.13 The maximum predicted extent of introduced hard substrate associated with the tier 2 assessment which includes offshore wind farms within the CEA benthic subtidal and intertidal ecology study (i.e. Morgan Generation Assets, Morecambe Offshore Windfarm Generation Assets and Morgan/ Morecambe Transmission Assets) is estimated at up to 5.92km^2. This value considers the hard substrate resulting from the cable and scour protection remaining *in situ* for the Mona Offshore Wind Project, together with the infrastructure associated with the Morgan Generation Assets (2.00km^2) and the Morecambe Offshore Wind Farm.

7.10.4.14 No publicly available information was available, at the time of writing, which quantifies the extent of hard substrate associated with the Morecambe Offshore Windfarm Generation Assets and so this is not represented in the cumulative tier 2 total of 5.92km^2.

7.10.4.15 The indicative capacity of the Morecambe Offshore Windfarm Generation Assets (Table 7.24) is however much smaller than the Mona Offshore Wind Project and therefore the scale of the hard substrate associated with the tier 2 project is likely to be less than that associated with the Mona Offshore Wind Project.

7.10.4.16 The Morgan/ Morecambe Transmission Assets are likely to create hard substrate as a result of the cable protection. Currently there is only a scoping report available for this project (Morecambe Offshore Windfarm Ltd and Morgan Offshore Wind Ltd, 2022) therefore no specific values can be attributed to this impact.

7.10.4.17 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**.

7.10.4.18 No tier 1 projects in the CEA for habitat creation overlap with the Constable Bank (Annex I reef outside an SAC) IEF, so this IEF is not considered further in this assessment.

Intertidal habitat IEFs

7.10.4.19 None of the cumulative long term habitat loss 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.

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

7.10.4.20 None of the cumulative long term habitat loss 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.

Sensitivity of the receptor

Subtidal habitat IEFs

7.10.4.21 The sensitivity of the IEFs is as described previously for the construction phase assessment for the Mona Offshore Wind Project alone in paragraph 7.8.5.14 to 7.8.5.23.

7.10.4.22 All of the subtidal IEFs (subtidal coarse and mixed sediments with diverse benthic communities IEF and low resemblance stony reef 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

7.10.4.23 Overall for all of the subtidal IEFs (subtidal coarse and mixed sediments with diverse benthic communities IEF and low resemblance stony reef 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.

Tier 3

Construction and operations and maintenance phases

Magnitude of impact

Subtidal habitat IEFs

7.10.4.24 The only tier 3 project which has been identified in the CEA with the potential to result in cumulative colonisation of hard substrate with the Mona Offshore Wind Project is the MaresConnect interconnector cable. There is, however, 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).

7.10.4.25 Cable protection associated with the MaresConnect interconnector cable is likely to result in the introduction of hard substrate 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.

7.10.4.26 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**.

Intertidal habitat IEFs

7.10.4.27 None of the cumulative long term habitat loss 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.

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

7.10.4.28 None of the cumulative long term habitat loss 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.

Sensitivity of the receptor

Subtidal habitat IEFs

7.10.4.29 The sensitivity of the IEFs is as described previously for the construction phase assessment for the Mona Offshore Wind Project alone in paragraph 7.8.5.14 to 7.8.5.23.

7.10.4.30 All of the subtidal IEFs (subtidal coarse and mixed sediments with diverse benthic communities IEF and low resemblance stony reef 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

7.10.4.31 Overall for all of the subtidal IEFs (subtidal coarse and mixed sediments with diverse benthic communities IEF and low resemblance stony reef 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.

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

7.10.5.1 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 project (i.e. Awel y Môr) within the CEA benthic subtidal and intertidal ecology study area (see Table 7.25).

7.10.5.2 Three tier 2 offshore wind farms have been identified within the CEA benthic subtidal and intertidal ecology study area (Morecambe Offshore Windfarm Generation Assets, Morgan Generation Assets and Morgan/Morecambe Transmission Assets), as well as one tier 3 project, the MaresConnect interconnector cable.

Tier 1

Construction and operations and maintenance phases

Magnitude of impact

7.10.5.3 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 project (i.e. Awel y Môr Offshore Wind Farm) will result in the introduction of 1.07km^2 of new hard substrate, resulting in a total of up to 3.93km^2 of new hard substrate together with the Mona Offshore Wind Project.

7.10.5.4 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 Generation Assets in Table 7.16, 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.

7.10.5.5 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

7.10.5.6 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.

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

7.10.5.7 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.

Sensitivity of the receptor

Subtidal habitat IEFs

7.10.5.8 The sensitivity of the IEFs is as described previously for the construction phase assessment for the Mona Offshore Wind Project alone in paragraph 7.8.6.15 to 7.8.6.19 and above in Table 7.20.

7.10.5.9 The subtidal coarse and mixed sediments with diverse benthic communities IEF, low resemblance stony reef IEF and Constable Bank (Annex I sandbank outside an SAC) 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

7.10.5.10 Overall for the subtidal coarse and mixed sediments with diverse benthic communities IEF, low resemblance stony reef IEF and Constable Bank (Annex I sandbank outside an SAC) 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.

Further mitigation and residual effect

7.10.5.11 No benthic subtidal and intertidal ecology mitigation is considered necessary for the cumulative impact of the increased risk of introduction and spread of INNS during the construction phase of the Mona Offshore Wind Project because the likely effects in the absence of further mitigation (beyond the measure adopted as part of the Mona Offshore Wind Project to avoid direct impacts on sensitive IEFs outlined in section 7.7) is not significant in EIA terms.

Decommissioning phase

7.10.5.12 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

7.10.5.13 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 5.92km^2. The tier 2 offshore renewables projects within the CEA benthic subtidal and intertidal ecology study are Morgan Generation Assets, Morecambe Offshore Windfarm Generation Assets and Morgan/ Morecambe Transmission Assets. The total area for colonisation considers the hard substrate resulting from the cable and scour protection remaining *in situ* for Mona, together with the infrastructure associated with the Morgan Generation Assets (2.00km^2) and Morecambe Offshore Wind Farm.

7.10.5.14 No publicly available information was available, at the time of writing, which quantifies the extent of hard substrate associated with the Morecambe Offshore Windfarm

Generation Assets and so this is not represented in the cumulative tier 2 total of 5.92km^2.

7.10.5.15 The indicative capacity of the Morecambe Offshore Windfarm Generation Assets (Table 7.24) is however much smaller than the Mona Offshore Wind Project and therefore the scale of the hard substrate associated with the tier 2 project (Morecambe Offshore Windfarm Ltd and Morgan Offshore Wind Ltd, 2022) is likely to be less than that associated with the Mona Offshore Wind Project.

7.10.5.16 Furthermore, it is likely that both of these projects will have measures in place to reduce the potential for the introduction and spread of INNS based on national and international guidance.

7.10.5.17 The Morgan/ Morecambe Transmission Assets have the potential to facilitate the introduction and spread of INNS as a result of the cable protection. Currently there is only a scoping report available for this project therefore no specific values can be attributed to this impact (Morecambe Offshore Windfarm Ltd and Morgan Offshore Wind Ltd, 2022).

7.10.5.18 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

7.10.5.19 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

7.10.5.20 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.

Sensitivity of the receptor

Subtidal habitat IEFs

7.10.5.21 The sensitivity of the IEFs is as described previously for the construction phase assessment for the Mona Offshore Wind Project alone in paragraph 7.8.6.15 to 7.8.6.19 and above in Table 7.20.

7.10.5.22 The subtidal coarse and mixed sediments with diverse benthic communities IEF, low resemblance stony reef IEF and Constable Bank (Annex I sandbank outside an SAC) 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

7.10.5.23 Overall, 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

7.10.5.24 The maximum total hard substrate available for colonisation by INNS associated with the tier 2 assessment is estimated at up to 3.77km^2, and offshore renewable projects within the CEA benthic subtidal and intertidal ecology study (i.e. Morgan Generation Assets and Morecambe Offshore Windfarm Generation Assets). 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 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 associated with this project is likely to decrease with time.

7.10.5.25 No publicly available information was available, at the time of writing, which quantifies the extent of hard substrate associated with the Morecambe Offshore Windfarm Generation Assets and so this is not represented in the cumulative tier 2 total of 3.77km^2.

7.10.5.26 The indicative capacity of the Morecambe Offshore Windfarm Generation Assets (Table 7.24) is however much smaller than the Mona Offshore Wind Project and therefore the scale of the hard substrate associated with the tier 2 project is likely to be less than that associated with the Mona Offshore Wind Project.

7.10.5.27 The Morgan/ Morecambe Transmission Assets have the potential to facilitate the introduction and spread of INNS as a result of the cable protection which may be left *in situ* following decommissioning. Currently there is only a scoping report available for this project (Morecambe Offshore Windfarm Ltd and Morgan Offshore Wind Ltd, 2022) therefore no specific values can be attributed to this impact.

7.10.5.28 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

7.10.5.29 The sensitivity of the IEFs is as described previously for the construction phase assessment for the Mona Offshore Wind Project alone in paragraph 7.8.6.15 to 7.8.6.19 and above in Table 7.20.

7.10.5.30 The subtidal coarse and mixed sediments with diverse benthic communities IEF, low resemblance stony reef IEF and Constable Bank (Annex I sandbank outside an SAC) 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

7.10.5.31 Overall, 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

7.10.5.32 The only 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. There is, however, 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).

7.10.5.33 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.

7.10.5.34 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

7.10.5.35 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

7.10.5.36 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

7.10.5.37 The sensitivity of the IEFs is as described previously for the construction phase assessment for the Mona Offshore Wind Project alone in paragraph 7.8.6.15 to 7.8.6.19 and above in Table 7.20.

7.10.5.38 The subtidal coarse and mixed sediments with diverse benthic communities IEF, low resemblance stony reef IEF and Constable Bank (Annex I sandbank outside an SAC) 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

7.10.5.39 Overall, 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.

7.10.6 Removal of hard substrates

Tier 1

Decommissioning phase

7.10.6.1 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

7.10.6.2 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 Generation Assets and Morecambe Offshore Windfarm Generation Assets) is estimated at up to 1.08km^2. This value considers the hard substrate removed during the Morgan Generation Assets decommissioning phase (0.53km^2). The Morecambe Offshore Wind Farm will decommission 14 years after the decommissioning of the Mona Offshore Wind Farm (i.e. 2086) and therefore won't overlap temporally with this phase.

7.10.6.3 No publicly available information was available, at the time of writing, which quantifies the extent of hard substrate associated with the Morecambe Offshore Windfarm Generation Assets and so this is not represented in the cumulative tier 2 total of 1.08km^2.

7.10.6.4 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

7.10.6.5 The sensitivity of the IEFs is as described previously for the construction phase assessment for the Mona Offshore Wind Project alone in paragraph 7.8.7.6 to 7.8.7.8 and Table 7.20.

7.10.6.6 The subtidal coarse and mixed sediments with diverse benthic 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

7.10.6.7 Overall, 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.

7.10.7 Changes in physical processes

Tier 1

Operations and maintenance phase

Magnitude of impact

7.10.7.1 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 7.10.7.

7.10.7.2 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 12.2km 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 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 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.

7.10.7.3 The Mona Offshore Wind Project will not affect the proposed works at Llanddulas to Kinmel Bay and will not result in a cumulative impact on the tidal regime as the proposed rock revetment within the Mona offshore cable corridor is to be constructed above the high water mark and there will be no changes the tide regime or water levels.

7.10.7.4 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

7.10.7.5 The sensitivity of the IEFs is as described previously for the construction phase assessment for the Mona Offshore Wind Project alone in paragraph 7.8.6.15 to 7.8.6.19 and above in Table 7.21.

7.10.7.6 The subtidal coarse and mixed sediments with diverse benthic communities IEF, low resemblance stony reef 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**.

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

7.10.7.7 The sensitivity of the IEFs is as described previously for the construction phase assessment for the Mona Offshore Wind Project alone in paragraph 7.8.8.34 to 7.8.8.39 and above in Table 7.21.

7.10.7.8 The Annex I sandbanks IEF and Annex I subtidal reefs IEF are deemed to be of low vulnerability, high recoverability and international value. The sensitivity of the receptor is therefore considered to be **negligible**.

7.10.7.9 The Annex I intertidal reefs IEFs 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

7.10.7.10 Overall, for the subtidal coarse and mixed sediments with diverse benthic 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 low. 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.

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

7.10.7.11 Overall, for the Annex I sandbanks IEF and Annex I subtidal reefs 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 **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.

7.10.7.12 Overall, for the Annex I intertidal reefs 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 **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

7.10.7.13 The presence of Mona Offshore Wind Farm 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 7.10.7.

7.10.7.14 On similar project timelines, the construction and operation of both the Morecambe Offshore Windfarm Generation Assets and Morgan Generation Assets alongside the Morecambe/ Morgan Transmission Assets are expected to coincide with the construction and operations and maintenance phase of the Mona Offshore Wind Project. The impact of 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 7.10.7. As highlighted above the increase in infrastructure will not cause a cumulative change on the tidal regime as the 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.

7.10.7.15 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 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 site 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 offshore wind farm. 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.

7.10.7.16 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

7.10.7.17 The sensitivity of the IEFs is as described previously for the construction phase assessment for the Mona Offshore Wind Project alone in paragraph 7.8.6.15 to 7.8.6.19 and above in Table 7.21.

7.10.7.18 The subtidal coarse and mixed sediments with diverse benthic communities IEF, low resemblance stony reef 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**.

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

7.10.7.19 The sensitivity of the IEFs is as described previously for the construction phase assessment for the Mona Offshore Wind Project alone in paragraph 7.8.8.34 to 7.8.8.39 and above in Table 7.21.

7.10.7.20 The Annex I sandbanks IEF and Annex I subtidal reefs IEF are deemed to be of low vulnerability, high recoverability and international value. The sensitivity of the receptor is therefore considered to be **negligible**.

7.10.7.21 The Annex I intertidal reefs IEFs 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

7.10.7.22 Overall, for the subtidal coarse and mixed sediments with diverse benthic communities IEF, low resemblance stony reef 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.

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

7.10.7.23 Overall, for the Annex I sandbanks IEF and Annex I subtidal reefs 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 **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.

7.10.7.24 Overall, for the Annex I intertidal reefs 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 **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.

7.10.8 Future monitoring

7.10.8.1 There is no monitoring proposed in relation to the cumulative impacts associated with the Mona Offshore Wind Project.

7.11 Transboundary effects

7.11.1.1 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.

7.12 Inter-related effects

7.12.1.1 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.

7.12.1.2 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 15: Inter-related effects of the PEIR.

7.13 Summary of impacts, mitigation measures and monitoring

7.13.1.1 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. Information and assessment of the Mona ZOI and Offshore Cable corridor will be added later following results of the 2022 survey campaign.

- Table 7.28 presents a summary of the potential 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, 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. Overall 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 7.29 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, colonisation of hard structures, increased risk of introduction and spread of INNS and changes in physical processes. Overall it is concluded that there will be no significant cumulative effects 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 7.28: Summary of potential environmental effects, mitigation and monitoring.

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

Description of impact	Phase[a] C	O	D	Measures adopted as part of the project	Magnitude of impact	Sensitivity of the receptor	Significance of effect	Further mitigation	Residual effect	Proposed monitoring
Temporary habitat loss/disturbance	✓	✓	✓	• Appropriate measures (e.g. micro-siting) will be discussed with statutory consultees to avoid direct impacts to the *Sabellaria alveolata* reef at the landfall this feature during the construction phase. A 50m exclusion buffer from the edge of the reef will be proposed, as per industry standard practice. The buffer will be based on the current extent of the reef as mapped during the 2022 Mona Phase I intertidal survey. An ECoW will supervise the construction works in the intertidal zone and ensure that all works within the intertidal construction area, including plant movement, are undertaken outwith the proposed 50m buffer zone for the *S. alveolata* reef based on the current extent of the reef as mapped during the 2022 Mona Phase I intertidal survey. • Commitment to minimise sandwave clearance on the Constable Bank and within the Menai Strait and Conwy Bay SAC.	Subtidal IEFs C: Low - Medium O: Negligible D: Low - Medium Intertidal IEFs C: Low O: Negligible D: Low Menai Strait and Conwy Bay SAC IEFs C: Low O: Negligible D: Low	Subtidal IEFs • Low - Medium Intertidal IEFs • Negligible - High Menai Strait and Conwy Bay SAC IEFs • Low - High	Subtidal IEFs C: Minor O: Negligible - Minor D: Minor Intertidal IEFs C: Minor O: Negligible - Minor D: Minor Menai Strait and Conwy Bay SAC IEFs C: Minor O: Minor D: Minor	None	C: Minor O: Negligible - Minor D: Negligible	None
Increased SSC and associated deposition	✓	✓	✓	• Commitment to minimise sandwave clearance on the Constable Bank and within the Menai Strait and Conwy Bay SAC.	Subtidal IEFs C: Low O: Negligible D: Negligible Intertidal IEFs C: Negligible O: Negligible D: Negligible Menai Strait and Conwy Bay SAC IEFs C: Negligible - Low O: Negligible D: Negligible	Subtidal IEFs • Negligible - Low Intertidal IEFs • Negligible - Medium Menai Strait and Conwy Bay SAC IEFs • Low	Subtidal IEFs C: Negligible O: Negligible D: Negligible Intertidal IEFs C: Negligible - Minor O: Negligible D: Negligible - Minor Menai Strait and Conwy Bay SAC IEFs C: Negligible O: Negligible D: Negligible	None	C: Negligible - Minor O: Negligible D: Negligible - Minor	None
Disturbance/remobilisation of sediment-bound contaminants	✓	×	✓	None	Subtidal IEFs C: Negligible D: Negligible Intertidal IEFs C: Negligible	Subtidal IEFs • Low Intertidal IEFs • Low	Subtidal IEFs C: Negligible D: Negligible Intertidal IEFs C: Negligible	None	C: Negligible D: Negligible	None

Description of impact	Phase[a] C	O	D	Measures adopted as part of the project	Magnitude of impact	Sensitivity of the receptor	Significance of effect	Further mitigation	Residual effect	Proposed monitoring
					D: Negligible Menai Strait and Conwy Bay SAC IEFs C: Negligible D: Negligible	Menai Strait and Conwy Bay SAC IEFs • Low	D: Negligible Menai Strait and Conwy Bay SAC IEFs C: Negligible D: Negligible			
Long term habitat loss	✓	✓	✓	• Commitment to minimise cable protection placed on the Constable Bank and within the Menai Strait and Conwy Bay SAC. • Commitment to no above surface cable protection in the intertidal zone. • Commitment to cable burial where possible. • Appropriate measures (e.g. micro-siting) will be discussed with statutory consultees to avoid direct impacts to the *Sabellaria alveolata* reef at the landfall this feature during the construction phase. A 50m exclusion buffer from the edge of the reef will be proposed, as per industry standard practice. The buffer will be based on the current extent of the reef as mapped during the 2022 Mona Phase I intertidal survey. An ECoW will supervise the construction works in the intertidal zone and ensure that all works within the intertidal construction area, including plant movement, are undertaken outwith the proposed 50m buffer zone for the *S. alveolata* reef based on the current extent of the reef as mapped during the 2022 Mona Phase I intertidal survey.	Subtidal IEFs C and O: Low D: Low Intertidal IEFs C and O: Low Menai Strait and Conwy Bay SAC IEFs C and O: Low D: Low	Subtidal IEFs • High Intertidal IEFs • High Menai Strait and Conwy Bay SAC IEFs • High	Subtidal IEFs C and O: Minor D: Minor Intertidal IEFs C and O: Minor Menai Strait and Conwy Bay SAC IEFs C and O: Minor D: Minor	None	C and O: Minor D: Minor	None
Colonisation of hard structures	✓	✓	×	None	Subtidal IEFs C and O: Low Menai Strait and Conwy Bay SAC IEFs C and O: Low	Subtidal IEFs • High Menai Strait and Conwy Bay SAC IEFs • High	Subtidal IEFs C and O: Minor Menai Strait and Conwy Bay SAC IEFs C and O: Minor	None	C and O: Minor	None
Increased risk of introduction and spread of invasive non-native species (INNS)	✓	✓	✓	• Development of, and adherence to, an Environmental Management Plan, including actions to minimise INNS, and a MPCP which will include planning for accidental spills, address all potential contaminant releases and include key emergency details.	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 • Negligible - High	Subtidal IEFs C: Minor O: Minor D: Minor Menai Strait and Conwy Bay SAC IEFs C: Minor O: Minor D: Minor	None	C: Minor O: Minor D: Minor	None
Removal of hard substrates	×	×	✓	None	Subtidal IEFs D: Low	Subtidal IEFs • Low	Subtidal IEFs D: Minor	None	D: Minor	None

Description of impact	Phase[a]			Measures adopted as part of the project	Magnitude of impact	Sensitivity of the receptor	Significance of effect	Further mitigation	Residual effect	Proposed monitoring
	C	O	D							
Changes in physical processes	×	✓	×	None	Subtidal IEFs O: Low Intertidal IEFs O: Negligible Menai Strait and Conwy Bay SAC IEFs O: Negligible - Low	Subtidal IEFs • Negligible Intertidal IEFs • Negligible - Medium Menai Strait and Conwy Bay SAC IEFs • Negligible	Subtidal IEFs O: Negligible Intertidal IEFs O: Negligible Menai Strait and Conwy Bay SAC IEFs O: Negligible	None	O: Negligible	None
Electromagnetic Fields (EMF) from subsea electrical cabling	×	✓	×	• Development and adherence to a CSIP which will include cables to be buried to where possible and cable protection as necessary. • Commitment to cable burial where possible.	Subtidal IEFs O: Negligible Menai Strait and Conwy Bay SAC IEFs O: Negligible	Subtidal IEFs • Low 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 a CSIP which will include cables to be buried to where possible and cable protection as necessary. • Commitment to cable burial where possible.	Subtidal IEFs O: Negligible Menai Strait and Conwy Bay SAC IEFs O: Negligible	Subtidal IEFs • Low - Negligible Menai Strait and Conwy Bay SAC IEFs • Low - Negligible	Subtidal IEFs O: Negligible Menai Strait and Conwy Bay SAC IEFs O: Negligible	None	O: Negligible	None

Table 7.29: Summary of potential cumulative environmental effects, mitigation and monitoring.

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

Description of effect	Phase[a]			Measures adopted as part of the project	Magnitude of impact	Sensitivity of the receptor	Significance of effect	Further mitigation	Residual effect	Proposed monitoring
	C	O	D							
Tier 1										
Temporary habitat loss/disturbance	✓	✓	✓	• Appropriate measures (e.g. micro-siting) will be discussed with statutory consultees to avoid direct impacts to the *Sabellaria alveolata* reef at the landfall this feature during the construction phase. A 50m exclusion buffer from the edge of the reef will be proposed, as per industry standard practice. The buffer will be based on the current extent of the reef as mapped during the 2022 Mona Phase I intertidal survey. An ECoW will supervise the construction works in the intertidal zone and ensure that all works within the intertidal construction area, including plant movement, are undertaken outwith the proposed 50m buffer zone for the *S. alveolata* reef based on the current extent of the reef as mapped during the 2022 Mona Phase I intertidal survey.	Subtidal IEFs C: Low - Medium O: Low Menai Strait and Conwy Bay SAC IEFs C: Low O: Negligible	Subtidal IEFs • Low - Medium Menai Strait and Conwy Bay SAC IEFs • Low - High	Subtidal IEFs C: Minor O: Minor Menai Strait and Conwy Bay SAC IEFs C: Minor O: Minor	None	C: Minor O: Minor	None

Description of effect	Phase[a]			Measures adopted as part of the project	Magnitude of impact	Sensitivity of the receptor	Significance of effect	Further mitigation	Residual effect	Proposed monitoring
	C	O	D							
Increased SSC and associated deposition	✓	✓	✓	• Commitment to minimise sandwave clearance on the Constable Bank and within the Menai Strait and Conwy Bay SAC.	Subtidal IEFs C: Low O: Negligible D: Negligible Intertidal IEFs C: Negligible O: Negligible D: Negligible Menai Strait and Conwy Bay SAC IEFs C: Low O: Negligible D: Negligible	Subtidal IEFs • Negligible - Low Intertidal IEFs • Negligible - Medium Menai Strait and Conwy Bay SAC IEFs • Low	Subtidal IEFs C: Negligible O: Negligible D: Negligible Intertidal IEFs C: Negligible – Minor O: Negligible D: Negligible - Minor Menai Strait and Conwy Bay SAC IEFs C: Negligible O: Negligible D: Negligible	None	C: Negligible Minor D: Negligible - Minor	None
Long term habitat loss	✓	✓	✓	• Commitment to minimise cable protection placed on the Constable Bank and within the Menai Strait and Conwy Bay SAC. • Commitment to no above surface cable protection in the intertidal zone. • Commitment to cable burial where possible. • Appropriate measures (e.g. micro-siting) will be discussed with statutory consultees to avoid direct impacts to the *Sabellaria alveolata* reef at the landfall this feature during the construction phase. A 50m exclusion buffer from the edge of the reef will be proposed, as per industry standard practice. The buffer will be based on the current extent of the reef as mapped during the 2022 Mona Phase I intertidal survey. An ECoW will supervise the construction works in the intertidal zone and ensure that all works within the intertidal construction area, including plant movement, are undertaken outwith the proposed 50m buffer zone for the *S. alveolata* reef based on the current extent of the reef as mapped during the 2022 Mona Phase I intertidal survey.	Subtidal IEFs C and O: Low	Subtidal IEFs • High	Subtidal IEFs C and O: Minor	None	C and O: Minor	None
Colonisation of hard structures	✓	✓	×	None	Subtidal IEFs C and O: Low	Subtidal IEFs • High	Subtidal IEFs C and O: Minor	None	C and O:Minor	None
Increased risk of introduction and spread of invasive non-native species (INNS)	✓	✓	✓	• Development of, and adherence to, an Environmental Management Plan, including actions to minimise INNS, and a MPCP which will include planning for accidental spills, address all potential contaminant releases and include key emergency details.	Subtidal IEFs C and O: Low	Subtidal IEFs • High	Subtidal IEFs C and O: Minor	None	C and O: Minor	None
Changes in physical processes	×	✓	×	None	Subtidal IEFs O: Low Menai Strait and Conwy Bay SAC IEFs O: Low	Subtidal IEFs • Negligible Menai Strait and Conwy Bay SAC IEFs • Negligible	Subtidal IEFs O: Negligible Menai Strait and Conwy Bay SAC IEFs O: Negligible	None	O: Negligible	None

Description of effect	Phase[a] C	O	D	Measures adopted as part of the project	Magnitude of impact	Sensitivity of the receptor	Significance of effect	Further mitigation	Residual effect	Proposed monitoring
Tier 2										
Temporary habitat loss/disturbance	✓	✓	✓	• Appropriate measures (e.g. micro-siting) will be discussed with statutory consultees to avoid direct impacts to the *Sabellaria alveolata* reef at the landfall this feature during the construction phase. A 50m exclusion buffer from the edge of the reef will be proposed, as per industry standard practice. The buffer will be based on the current extent of the reef as mapped during the 2022 Mona Phase I intertidal survey. An ECoW will supervise the construction works in the intertidal zone and ensure that all works within the intertidal construction area, including plant movement, are undertaken outwith the proposed 50m buffer zone for the *S. alveolata* reef based on the current extent of the reef as mapped during the 2022 Mona Phase I intertidal survey.	Subtidal IEFs C: Low - Medium O: Low D: Low - Medium	Subtidal IEFs • Low - Medium	Subtidal IEFs C: Minor O: Minor D: Minor	None	C: Minor O: Minor D: Minor	None
Increased SSC and associated deposition	✓	✓	✓	• Commitment to minimise sandwave clearance on the Constable Bank and within the Menai Strait and Conwy Bay SAC.	Subtidal IEFs C: Low O: Negligible D: Negligible Intertidal IEFs C: Negligible O: Negligible D: Negligible Menai Strait and Conwy Bay SAC IEFs C: Low O: Negligible D: Negligible	Subtidal IEFs • Negligible - Low Intertidal IEFs • Negligible - Medium Menai Strait and Conwy Bay SAC IEFs • Low	Subtidal IEFs C: Negligible O: Negligible D: Negligible Intertidal IEFs C: Negligible – Minor O: Negligible D: Negligible - Minor Menai Strait and Conwy Bay SAC IEFs C: Negligible O: Negligible D: Negligible	None	C: Negligible O: Negligible - Minor D: Negligible	None
Long term habitat loss	✓	✓	✓	• Commitment to minimise cable protection placed on the Constable Bank and within the Menai Strait and Conwy Bay SAC. • Commitment to no above surface cable protection in the intertidal zone. • Commitment to cable burial where possible. • Appropriate measures (e.g. micro-siting) will be discussed with statutory consultees to avoid direct impacts to the *Sabellaria alveolata* reef at the landfall this feature during the construction phase. A 50m exclusion buffer from the edge of the reef will be proposed, as per industry standard practice. The buffer will be based on the current extent of the reef as mapped during the 2022 Mona Phase I intertidal survey. An ECoW will supervise the construction works in the intertidal zone and ensure that all works within the intertidal construction area, including plant movement, are undertaken outwith the proposed 50m buffer zone for the *S. alveolata* reef based on the current extent of the reef as mapped during the 2022 Mona Phase I intertidal survey.	Subtidal IEFs C and O: Low D: Low	Subtidal IEFs • High	Subtidal IEFs C and O: Minor D: Minor	None	C and O: Minor D: Minor	None
Colonisation of hard structures	✓	✓	×	None	Subtidal IEFs C and O: Low	Subtidal IEFs • High	Subtidal IEFs C and O: Minor	None	C and O: Minor	None

Description of effect	Phase[a] C	O	D	Measures adopted as part of the project	Magnitude of impact	Sensitivity of the receptor	Significance of effect	Further mitigation	Residual effect	Proposed monitoring
Increased risk of introduction and spread of invasive non-native species (INNS)	✓	✓	✓	• Development of, and adherence to, an Environmental Management Plan, including actions to minimise INNS, and a MPCP which will include planning for accidental spills, address all potential contaminant releases and include key emergency details.	Subtidal IEFs C and O: Low D: Low	Subtidal IEFs • High	Subtidal IEFs C and O: Minor D: Minor	None	C and O: Minor D: Minor	None
Removal of Hard Substrates	×	×	✓	None	Subtidal IEFs D: Low	Subtidal IEFs • Low	Subtidal IEFs D: Minor	None	D: Minor	None
Changes in physical processes	×	✓	×	None	Subtidal IEFs O: Low Menai Strait and Conwy Bay SAC IEFs O: Low	Subtidal IEFs • Negligible Menai Strait and Conwy Bay SAC IEFs • Negligible	Subtidal IEFs O: Negligible Menai Strait and Conwy Bay SAC IEFs O: Negligible	None	O: Negligible	None
Tier 3										
Temporary habitat loss/disturbance	✓	✓	✓	• Appropriate measures (e.g. micro-siting) will be discussed with statutory consultees to avoid direct impacts to the *Sabellaria alveolata* reef at the landfall this feature during the construction phase. A 50m exclusion buffer from the edge of the reef will be proposed, as per industry standard practice. The buffer will be based on the current extent of the reef as mapped during the 2022 Mona Phase I intertidal survey. An ECoW will supervise the construction works in the intertidal zone and ensure that all works within the intertidal construction area, including plant movement, are undertaken outwith the proposed 50m buffer zone for the *S. alveolata* reef based on the current extent of the reef as mapped during the 2022 Mona Phase I intertidal survey.	Subtidal IEFs C: Low - Medium O: Low	Subtidal IEFs • Low - Medium	Subtidal IEFs C: Minor O: Minor	None	C: Minor O: Minor	None
Long term habitat loss	✓	✓	✓	• Commitment to minimise cable protection placed on the Constable Bank and within the Menai Strait and Conwy Bay SAC. • Commitment to no above surface cable protection in the intertidal zone. • Commitment to cable burial where possible. • Appropriate measures (e.g. micro-siting) will be discussed with statutory consultees to avoid direct impacts to the *Sabellaria alveolata* reef at the landfall this feature during the construction phase. A 50m exclusion buffer from the edge of the reef will be proposed, as per industry standard practice. The buffer will be based on the current extent of the reef as mapped during the 2022 Mona Phase I intertidal survey. An ECoW will supervise the construction works in the intertidal zone and ensure that all works within the intertidal construction area, including plant movement, are undertaken outwith the proposed 50m buffer zone for the *S. alveolata* reef based on the current extent of the reef as mapped during the 2022 Mona Phase I intertidal survey.	Subtidal IEFs C and O: Low	Subtidal IEFs High	Subtidal IEFs C and O: Minor	None	C and O: Minor	None
Colonisation of hard structures	✓	✓	×	None	Subtidal IEFs C and O: Low	Subtidal IEFs • High	Subtidal IEFs C and O: Minor	None	C and O: Minor	None

Description of effect	Phase[a]			Measures adopted as part of the project	Magnitude of impact	Sensitivity of the receptor	Significance of effect	Further mitigation	Residual effect	Proposed monitoring
	C	O	D							
Increased risk of introduction and spread of invasive non-native species (INNS)	✓	✓	✓	• Development of, and adherence to, an Environmental Management Plan, including actions to minimise INNS, and a MPCP which will include planning for accidental spills, address all potential contaminant releases and include key emergency details.	Subtidal IEFs • C and O: Low	Subtidal IEFs • High	Subtidal IEFs C and O: Minor	None	C and O: Minor	None

7.14 Next steps

7.14.1.1 As outlined in section 7.1.3, to date, only the site-specific surveys within the Mona Array Area, and within the part of the landfall that cables will be installed, have been completed and were available to inform this chapter for the purposes of the PEIR. Further site-specific surveys were undertaken in the summer of 2022 to include the Mona Offshore Cable Corridor and the ZOI around the Mona Array Area. An additional Phase I intertidal survey of the part of the landfall that is to be used for access is scheduled for spring 2023. The baseline description and impact assessments in this chapter will therefore be updated with this additional data for the final Environmental Statement.

7.15 References

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