Port of Mostyn

Mostyn Energy Park Extension

Scoping Report

October 2021





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		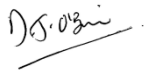

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Notice

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Non-Technical Summary

The Port of Mostyn, located on the Dee Estuary in North Wales, is proposing to extend upon recent developments as part of the Mostyn Energy Park (MEP) development so that the Port can continue to support and service current and anticipated future offshore wind development. This proposed development is to be known as the MEP Extension Project. The location of the MEP Extension Project is shown in Figure NTS1.

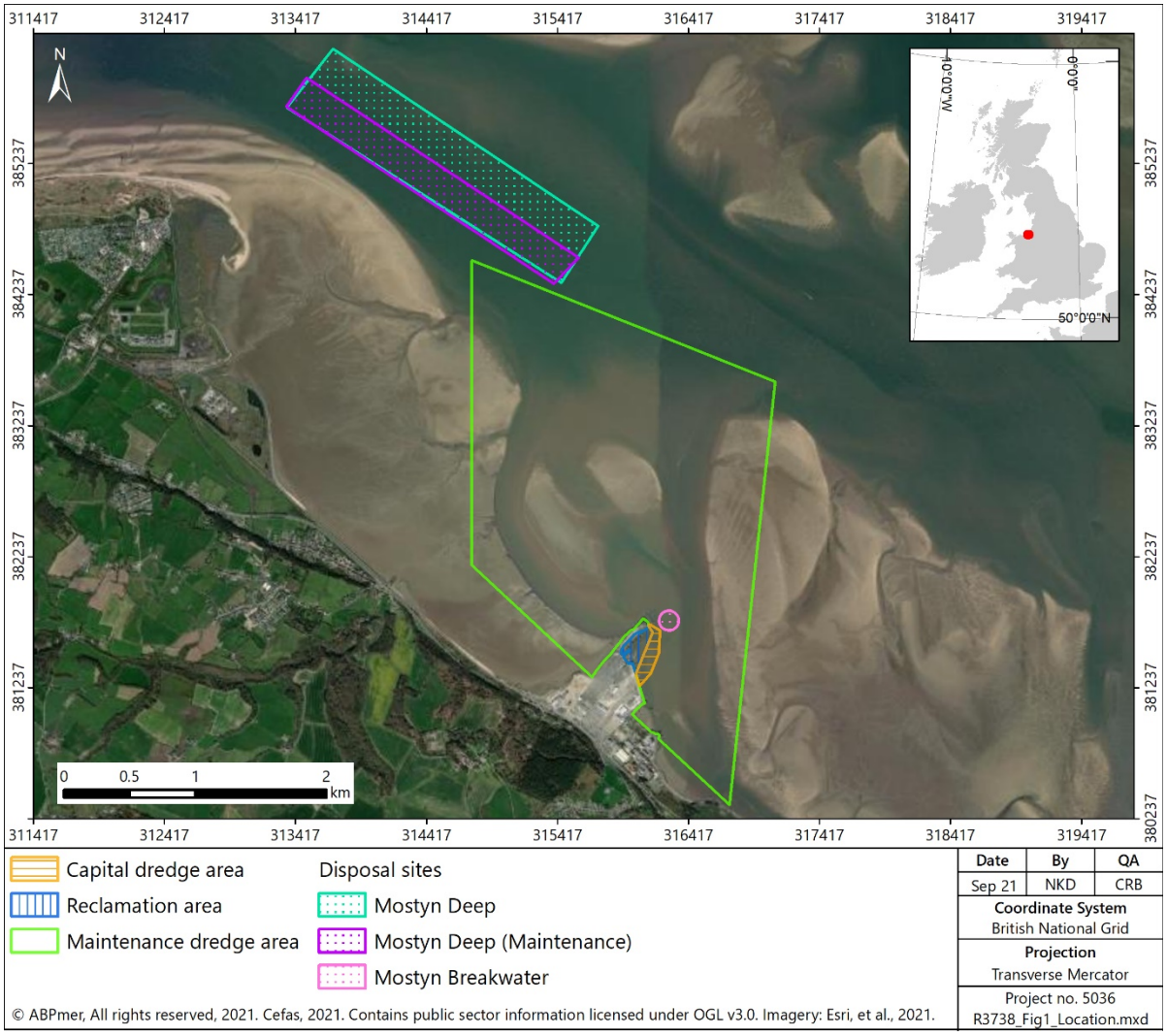

Figure NTS1. Location of MEP Extension Project

The proposed development will involve marine works and landside works.

Marine works - The marine works will comprise the construction of a new quay wall so as to provide, together with a retained section of existing quay, a continuous berthing frontage. This will involve undertaking a capital dredge to create a new berth pocket. The capital dredge arisings are being considered to be reused as fill material for the landside works (see below) or disposed of at one of the existing licensed marine disposal sites. Once the constructed quay is operational, a maintenance dredging and disposal programme for the new berth will be put in place. The marine works will also comprise the continued ongoing maintenance dredging of the navigation channel and harbour area.

The maintenance dredge material will be disposed of at the existing marine disposal sites and/or reused as is currently undertaken under the existing maintenance dredge and disposal licences.

Landside works – The landside works will involve an infill behind the newly created quay wall (i.e. a small reclamation of the harbour area). The reclaimed area will comprise hardstanding that will be primarily used as a storage/laydown area with workshops and office space if required. There is no requirement for any other associated landside infrastructure.

The works proposed will enable the Port of Mostyn to expand and enhance its current offering to the offshore energy sector, to provide construction support and an operations and maintenance facility to accommodate both existing and potential future customer demand at the Port with associated socioeconomic benefits to the region. In describing and assessing the need for the proposed development, the ES will, amongst other things, have regard to UK and Welsh Government policy on the need for new port infrastructure and the need to support the renewable energy sector.

The majority of the proposed development will take place below mean high water springs (MHWS) and, therefore, a marine licence will be required from the marine licensing authority (Natural Resources Wales (NRW)) under the Marine and Coastal Access Act 2009. This single marine licence will subsume the existing dredge marine licences for ongoing maintenance dredge and disposal activities in the harbour and its approaches (DML1542v2 and DML2001) and replace the existing construction marine licence to build a new quay and extend the MEP development (CML1343v3).

The proposed development is considered to require an Environmental Impact Assessment (EIA) in accordance with the Marine Works EIA Regulations 2007 (as amended) given that it is likely, because of its size, nature or location, to have significant effects on the environment. The marine licence application will, therefore, need to be accompanied by an Environmental Statement (ES) that documents all of the relevant EIA information in accordance with the information detailed in Schedule 3 of the Marine Works EIA Regulations 2007 (as amended).

This report is being submitted to Natural Resources Wales (NRW) under the provisions of Regulation 13 of the Marine Works EIA Regulations 2007 (as amended) to support the request for a scoping opinion as to the information to be provided in the required ES.

A comprehensive exercise has been undertaken to identify the potential topics for assessment thereby enabling the Port of Mostyn to determine the scope and approach to be adopted for the EIA. This has involved undertaking an initial review of the baseline environmental conditions, identifying the key potential impacts that might arise during the construction and operational phases of the MEP Extension project, and taking into account the further work that will be required to determine the significance of any potential impacts. This exercise has also assisted in identifying whether there is a need for mitigation to avoid or minimise any significant adverse impacts that may be caused by the development.

In summary, the following EIA topics are proposed to be scoped into the EIA for the MEP Extension Project:

- Physical processes;
- Water and sediment quality;
- Nature conservation and marine ecology;
- Fisheries;
- Commercial and recreational navigation;
- Flood risk and drainage; and
- Cultural heritage and archaeology.

The topics that are proposed to be scoped out of the EIA are as follows:

- Terrestrial ecology;
- Transport and access;
- Air quality and greenhouse gas emissions;
- Airborne noise and vibration; and
- Landscape/seascape and visual impact.

Contents

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1 Introduction

The Port of Mostyn, located on the Dee Estuary in North Wales, is proposing to extend the Mostyn Energy Park (MEP) so that the Port can continue to support and service current and anticipated future offshore wind development. This proposed development is to be known as the MEP Extension Project. The location of the MEP Extension Project is shown in Figure 1.

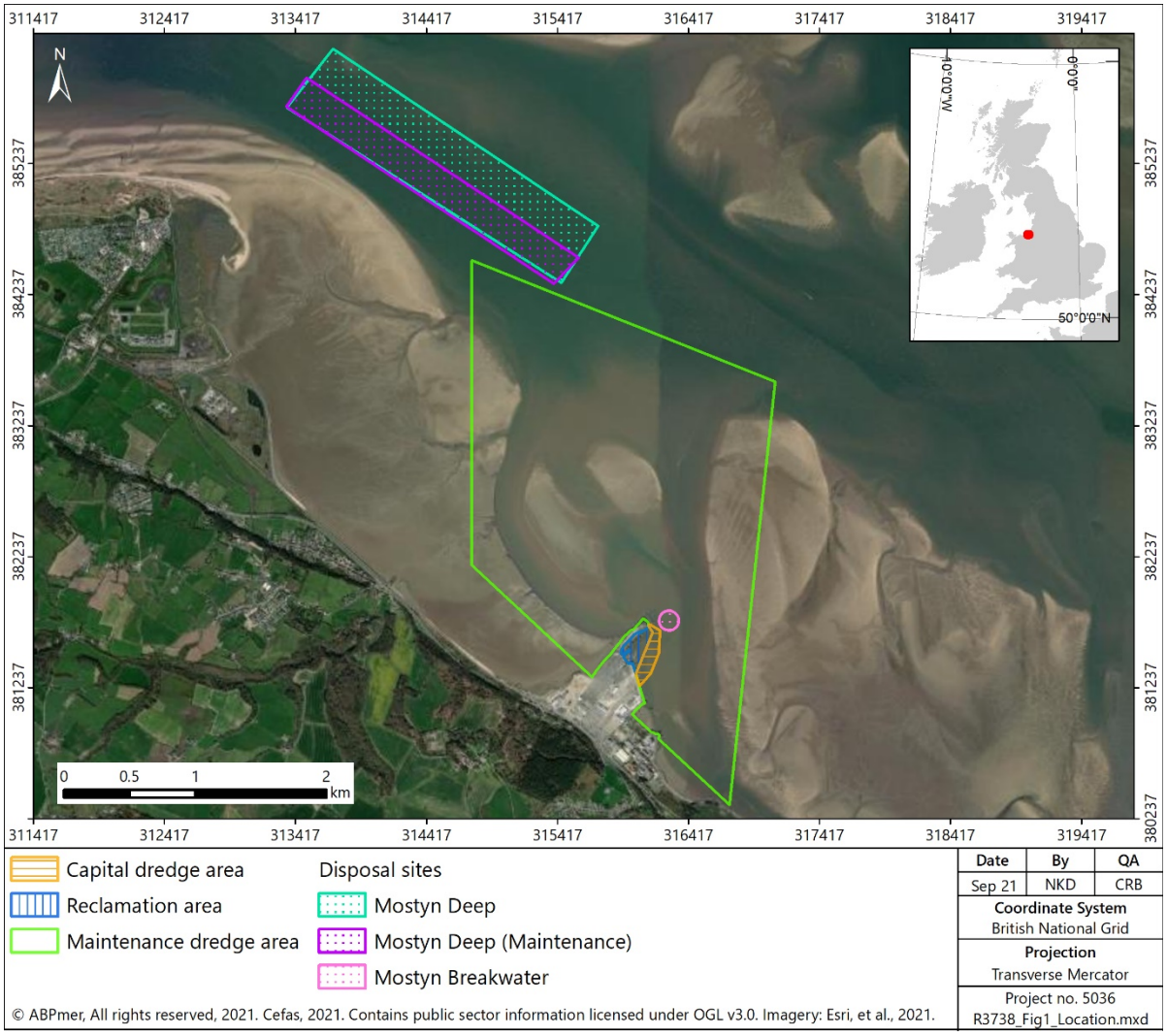

Figure 1. Location of MEP Extension Project

The proposed development will involve marine works and associated landside works.

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The majority of the proposed development will take place below mean high water springs (MHWS) and, therefore, a marine licence will be required from the marine licensing authority (Natural Resources Wales (NRW)) under the Marine and Coastal Access Act 2009. This single marine licence will subsume the existing dredging related marine licences for ongoing maintenance dredge and disposal activities in the harbour and its approaches (DML1542v2 and DML2001). It will also replace the existing construction marine licence to build a new quay and extend the MEP development (CML1343v3).

The proposed development is considered to require an Environmental Impact Assessment (EIA) in accordance with the Marine Works EIA Regulations 2007 (as amended) given that it is likely, because of its size, nature or location, to have significant effects on the environment. The marine licence application will, therefore, need to be accompanied by an Environmental Statement (ES) that documents all of the relevant EIA information in accordance with the information detailed in Schedule 3 of the Marine Works EIA Regulations 2007 (as amended).

This report is being submitted to NRW under the provisions of Regulation 13 of the Marine Works EIA Regulations 2007 (as amended) to support the request for a scoping opinion as to the information to be provided in the required ES.

ABPmer has been commissioned by the Port of Mostyn to produce this Scoping Report. This report has been structured as follows:

Section 1: **Introduction**: Provides a brief project background, purpose of report and report structure;

Section 2: **Project Description**: Presents background on the project need and consideration of alternatives, and a description of the proposed development;

Section 3: **Legislative and Consenting Framework**: Sets out the principal consents/approvals and studies that are likely to be required;

Section 4: **Proposed EIA Methodology** – Presents the proposed content and structure of the ES and the impact assessment methodology;

Section 5: **Scoping Review** - Reviews the scope of potential impacts and further assessment work required for each of the EIA topics; and

Section 6: **Summary** - Provides a summary of the EIA topics, receptors and impact pathways that require further assessment work.

2 Project Description

2.1 Project need and alternatives

The ES will include a chapter explaining the need for the MEP Extension Project. In summary, the rationale for the proposed development is based on the need for the Port of Mostyn to deliver infrastructure upgrades to enable it to support and service existing and anticipated future growth in the offshore energy industry within Liverpool Bay and in the Irish and Celtic Seas. The Port of Mostyn has been in discussion with developers and turbine suppliers for a number of Welsh coast and Irish Sea fixed foundation and floating offshore windfarm projects. This has resulted in the defining marine and landside works that would be required at the Port of Mostyn to support these developments.

The works proposed will enable the Port of Mostyn to expand and enhance its current offering to the offshore energy sector. This includes providing construction support and an operations and maintenance facility to accommodate both existing and potential future customer demand at the Port along with associated socioeconomic benefits to the region. In describing and assessing the need for the proposed development, the ES will, amongst other things, have regard to UK and Welsh Government policy on the need for new port infrastructure and the need to support the renewable energy sector.

Preliminary engineering design work has considered the following alternative options for the proposed development:

- Option 1 – a complete new quay wall of 500 m length; and
- Option 2 – the replacement of the existing 200 m Roll-on Roll-off (RoRo) berth with a new 360 m quay and retention of 200 m of existing quay.

The advantage of Option 1 is that the entire length of quay can be designed for deeper drafted vessels which would maximise operational flexibility. From an environmental perspective, however, it would involve a larger reclamation and area of habitat loss, and a greater volume of capital dredging and infill material. As a result, it would be a more costly option and would result in significant disruption to port operations during the construction works.

The 200 m length of existing quay that would be retained by Option 2 will not be as deep as the new quay and, therefore, limit operational flexibility compared to Option 1. However, it will involve a smaller reclamation and less dredging/infill material, thereby minimising the footprint and scale of the works and associated environmental impact. It will also result in a less costly option that will be quicker to build and result in less disruption to the existing facility. Option 2 is, therefore, the preferred option that is being taken forward for the MEP Extension Project.

The ES chapter will outline and identify the alternatives to the MEP Extension Project that have been considered by the Port of Mostyn, including the option of "doing nothing" and the rationale for the option chosen. It will also set out the legislative and policy context against which the consideration of alternatives has taken place.

2.2 Proposed development

2.2.1 Marine works

The marine works will comprise the construction of 360 m length of new quay. The detailed design for the quay wall has not yet been developed but it is assumed that it will likely comprise sheet and/or combi piles installed using a combination of vibratory and percussive (impact) piling to reach the required design depths.

A capital dredge will be required to create a new berth pocket alongside the 360 m section of new quay wall (Figure 2). This berth pocket will be dredged to a depth of -11 m Chart Datum (CD). The total volume of capital dredge material is approximately 400,000 m³, including side slopes and an allowance for overdredge. The capital dredge material comprises predominately sand (80 %) with some silt (10%) in the upper recently deposited layer and some gravelly sand (10 %) at greater depth.

Subject to sediment analysis, the capital dredge arisings are being considered to be reused as engineering fill material for the reclamation (see Section 2.2.2) or disposed of at one of the existing licensed marine disposal sites used by the Port for maintenance dredge arisings, namely the Mostyn Deep disposal site (IS102) or Mostyn Breakwater disposal site (IS103).

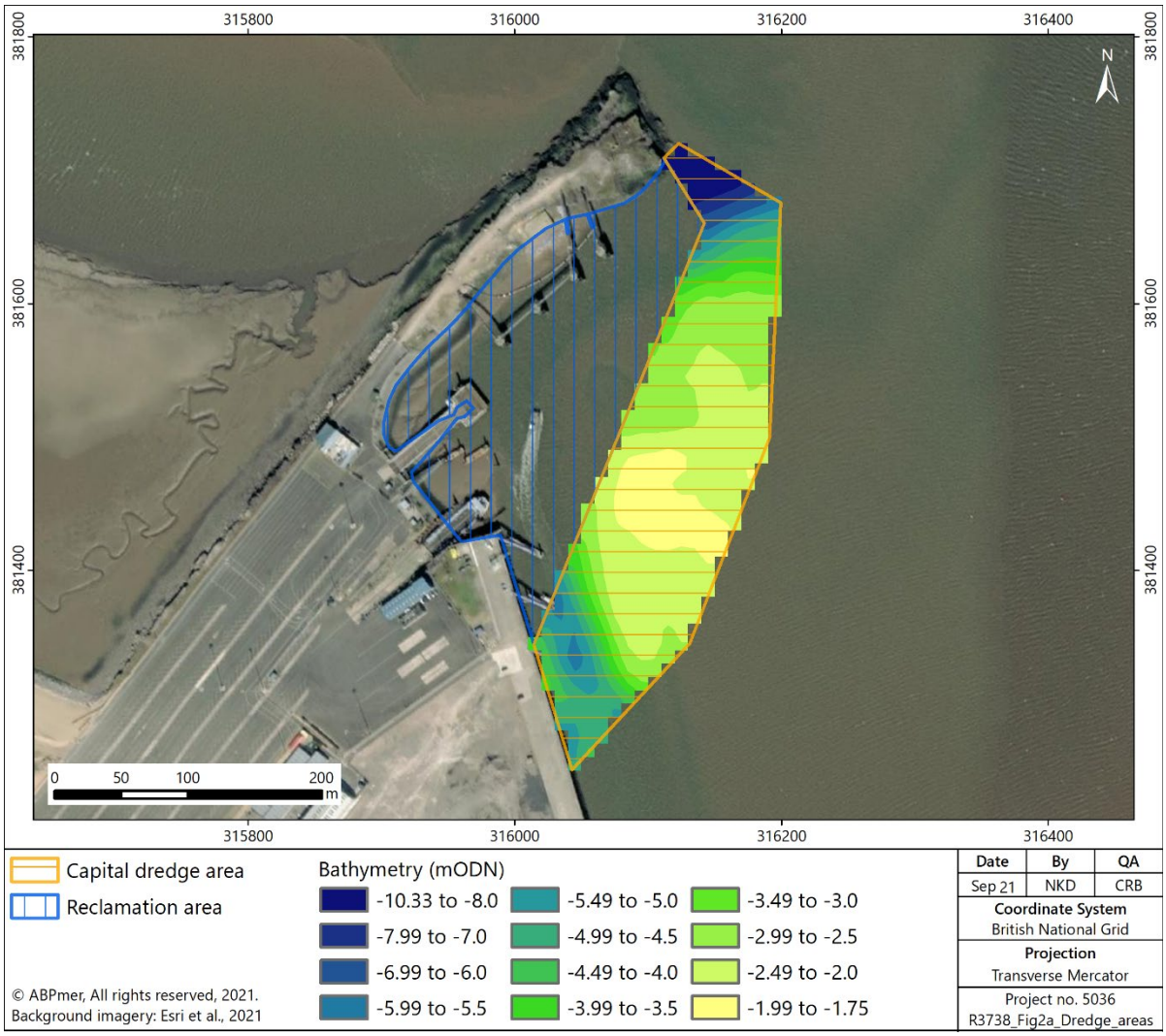

Figure 2. Proposed capital dredge and reclamation areas

Once the constructed quay is operational, a maintenance dredging and disposal programme for the new berth will be put in place. The marine works will also comprise the continued ongoing maintenance dredging of the navigation channel and harbour area. The maintenance dredge area is shown on Figure 3.

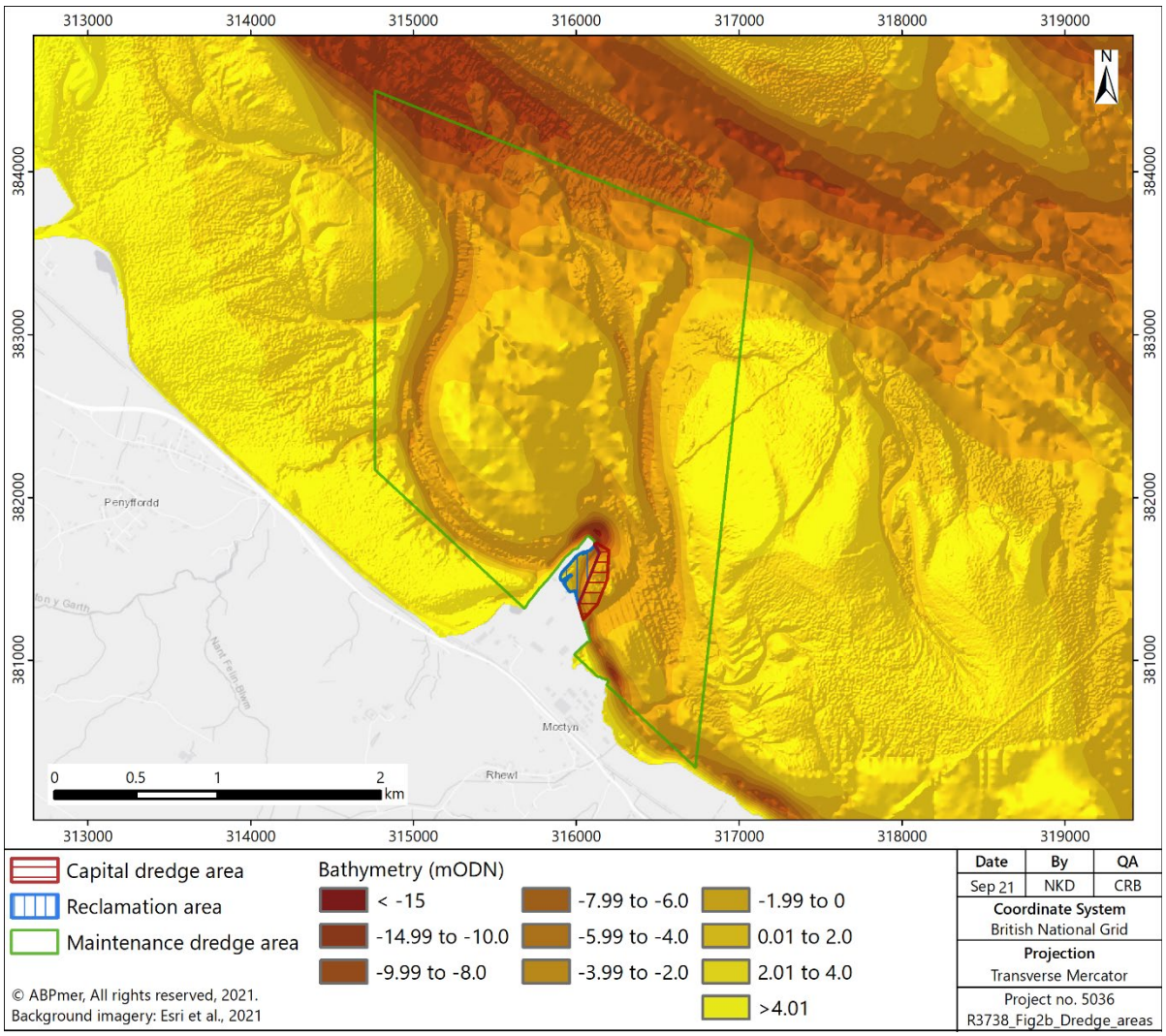

Figure 3. Proposed maintenance dredge area

The total volume of maintenance dredge material that is permitted to be dredged is up to 900,000 tonnes (approximately 600,000 m^3) per annum under the existing dredge marine licence (DML1542v2) and an additional 99,990 tonnes (approximately 66,660 m^3) per annum under the existing dredge marine licence (DML2001). The maintenance dredge material comprises predominately fine to medium sand (60-70 %) with smaller variable proportions of silt (30-40 %).

The maintenance dredge material will be disposed of at the existing marine disposal sites at Mostyn Deep (IS102) and Mostyn Breakwater (IS103) and/or reused as is currently permitted under the existing dredge marine licences. A range of dredging methods, including trailer suction hopper dredger (TSHD), plough and water injection dredging (WID) techniques are likely to be used for the maintenance dredge activities as per the existing licences.

2.2.2 Landside works

The landside works will involve reclaiming an area of approximately 4 ha of the existing harbour behind the newly created quay wall using around 600,000 m^3 of fill. The potential option of reusing the suitable capital dredge material from the MEP Extension Project as engineering fill within the proposed MEP reclamation is being considered. If this is not possible, engineering grade material from a marine aggregate licence area may need to be imported either by sea or land.

The reclaimed area will comprise hardstanding that will be used primarily as a storage/laydown area with workshops and office space if required. No other landside infrastructure is proposed as part of the MEP Extension Project.

2.2.3 Construction programme

There is demand for an operational offshore energy facility at the Port of Mostyn by early 2025. In order to meet this demand, an indicative programme for the MEP Extension Project is included in Table 1.

Table 1. Indicative programme for the proposed development

Project element	2021	2022				2023				2024				2025
	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1
Environmental assessments	x	x												
Marine environmental surveys	x													
Submission and determination of licence applications			x	x										
Preliminary and detailed design	x	x	x	x	x	x								
Construction works						x	x	x	x	x	x	x	x	
Site operational														x

3 Legislative and Consenting Framework

3.1 Introduction

The MEP Extension Project will require a range of consents and approvals under different enabling and authorising legislative provisions, supported by comprehensive technical and environmental investigations to inform the necessary environmental assessment work. The principal consents/approvals and studies that are likely to be required are summarised in the following sections.

The UK is no longer a member of the European Union. EU legislation as it applied to the UK on 31 December 2020 is now a part of UK domestic legislation, under the control of the UK's Parliaments and Assemblies, and is published on legislation.gov.uk.

Some types of EU legislation such as Regulations and Decisions, are directly applicable as law in an EU Member State. This means that, as a Member State, these types of legislation applied automatically in the UK, under Section 2(1) of the European Communities Act 1972 (c.68), without any further action required by the UK. These types of legislation are published by the Publications Office of the European Union on the EUR-Lex website. This legislation is now published on legislation.gov.uk as 'legislation originating from the EU'.

Other types of EU legislation, such as Directives, are indirectly applicable, which means they require a Member State to make domestic implementing legislation before becoming law in that State. In the UK this was often achieved by making Statutory Instruments rather than passing primary legislation. This implementing legislation has always been published on https://www.legislation.gov.uk.

EU legislation which applied directly or indirectly to the UK before 31 December 2020 has been retained in UK law as a form of domestic legislation known as 'retained EU legislation'. This is set out in Sections 2 and 3 of the European Union (Withdrawal) Act 2018 (c. 16). Section 4 of the 2018 Act ensures that any remaining EU rights and obligations, including directly effective rights within EU treaties, continue to be recognised and available in domestic law after exit.

3.2 Seabed owner consent

The Port of Mostyn lies within two jurisdictions: its Statutory Harbour Authority (SHA) area which is immediately around the harbour itself and extends over 52 ha; and a more extensive area in the Port's freehold ownership extending outwards from the Mean High Water (MHW) mark around the harbour over about 1,425 ha of mainly intertidal estuary (Figure 4).

The area of seabed covered by the MEP Extension Project is wholly owned by the Port of Mostyn. Engagement with and permission from other seabed owners is, therefore, not considered to be necessary.

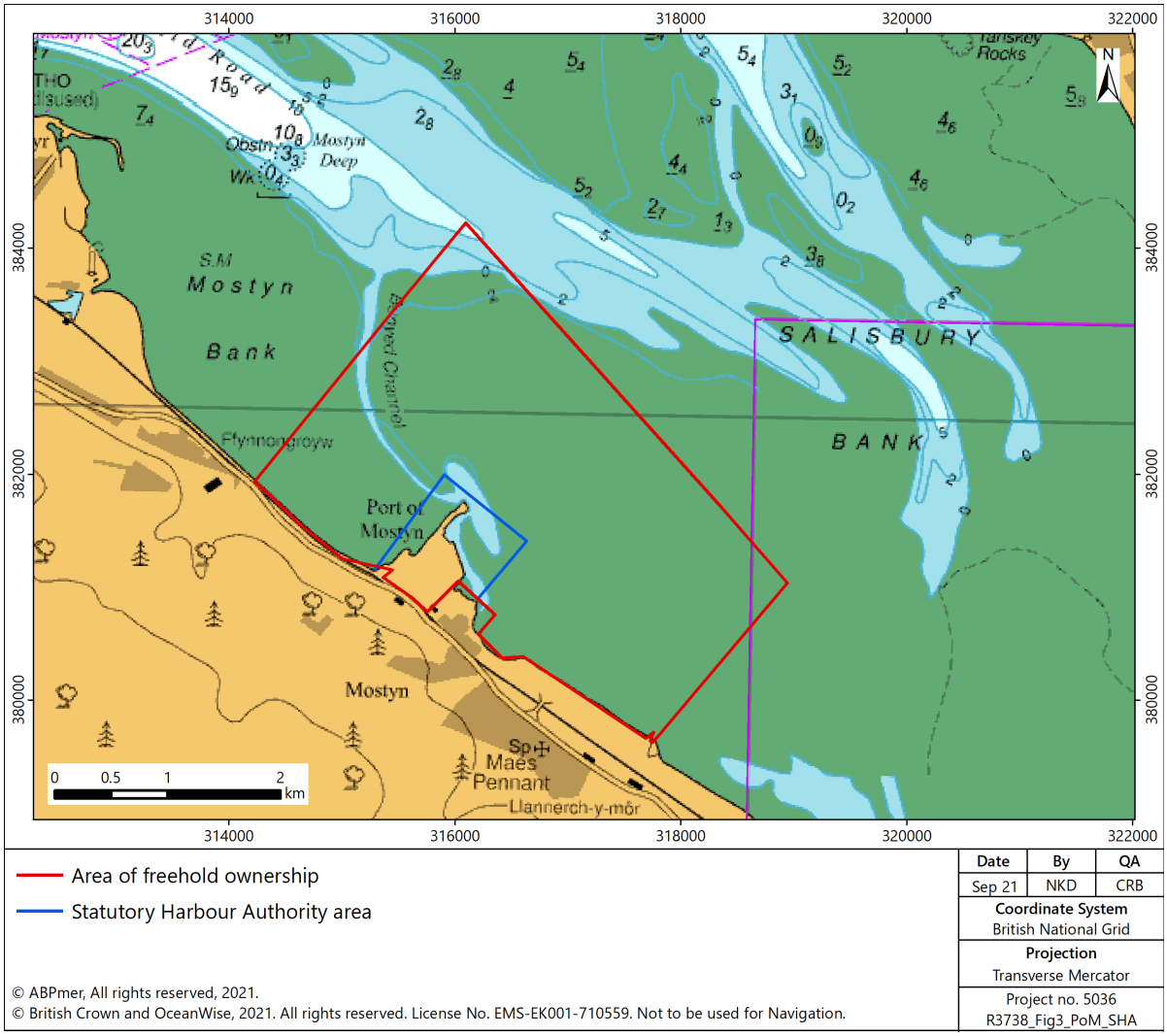

Figure 4. Port of Mostyn's freehold ownership and Statutory Harbour Authority area

3.3 Local Act approval

The proposed development is located within the Port of Mostyn's SHA area which covers the immediate approach areas to the port and the berths by virtue of the Mostyn Docks Harbour Empowerment Order (1988) (Figure 4). The Port of Mostyn is also the Competent Harbour Authority (CHA) for Pilotage in the Dee Estuary as defined by The Mostyn Docks (Pilotage) Harbour Revision Order 1989. The Dee Conservancy is the SHA and local lighthouse authority for the River Dee and the remainder of the estuarine area (Section 3.9.3).

3.4 Marine licence

The current process of marine licensing under the Marine and Coastal Access Act 2009 came into force on 6 April 2011 and covers the area from Mean High Water Springs (MHWS) out to 12 nautical miles. This process requires anybody wishing to undertake works below MHWS to obtain a marine licence from NRW. The proposed development, therefore, requires a marine licence. The licence will cover those works that impact upon the marine environment, namely the proposed new quay wall and reclamation, the capital dredge and maintenance dredge activities, and the disposal of any dredge material at the existing marine disposal sites.

3.5 Permitted development for landside works

The landside works associated with the MEP Extension Project will involve an infill behind the newly created quay wall and the provision of an area of hardstanding for storage/laydown and possible workshops and office space if required. As a Statutory Undertaker and under the Harbours Act 1964, the Port of Mostyn has permitted development rights which allows it to undertake development associated with the movement of goods and passengers. The proposed landside works are considered to be covered by the permitted development rights.

3.6 Flood risk activity permit

Flood risk activities are regulated through environmental permits (previously flood defence consents) under the Environmental Permitting (England and Wales) Regulations 2016. Flood risk activity permits are required for works in, over, under or near a main river or flood defence, or within a flood plain. This is to ensure activities do not cause a risk of flooding, make existing flood risk worse or interfere with flood risk management assets.

Exclusions for a flood risk activity permit include circumstances when an application has been made for a marine licence. The exclusion must be agreed in writing by the regulator (in this case NRW) and the requirements of an environmental permit for a flood risk activity must be fulfilled by the marine licence. It is anticipated that the scoping opinion from NRW will confirm the need for a flood risk activity permit for the proposed development.

3.7 Protected species licence

Various species of marine animal are protected from being killed, injured or disturbed under provisions in the Conservation of Habitats and Species Regulations 2017 (as amended) (commonly referred to as the Habitats Regulations)[1] and Section 9(4) and Schedule 5 of the Wildlife and Countryside Act 1981 (as amended). In particular, Regulation 43 of the Habitats Regulations makes it an offence deliberately to disturb wild animals of any such species (i.e. European Protected Species) in such a way as to be of likely significance:

To impair their ability:

- To survive, to breed or reproduce, or to rear or nurture their young; or
- In the case of animals of a hibernating or migratory species, to hibernate or migrate; or
- To affect significantly the local distribution or abundance of the species to which they belong.

Section 9(4) of the Wildlife and Countryside Act 1981 (as amended) makes it an offence intentionally or recklessly to disturb dolphins, whales or basking sharks subject to a defence that the act was the incidental result of a lawful operation and could not reasonably have been avoided. The scoping opinion from NRW will confirm the likely requirement for any protected species licences.

3.8 Assessment requirements

As part of the various approval processes, NRW will take account of, and give consideration to, the need for additional environmental and project information. The following sections summarise the various

[1] These have been modified by the Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019. Available at: https://www.legislation.gov.uk/uksi/2019/579/contents/made (accessed January 2021).

assessments and documentation that are likely to be required, alongside supporting plans and figures, to support the marine licence application for the MEP Extension Project.

3.8.1 Environmental Impact Assessment

The Environmental Impact Assessment (EIA) Directive (2011/92/EU) requires plans, programmes or projects likely to have significant effects on the environment to undergo an environmental assessment, prior to their approval or authorisation. As noted in Section 3.1, EU legislation which applied directly or indirectly to the UK before 31 December 2020 has been retained in UK law as a form of domestic legislation known as 'retained EU legislation'. The implementing legislation which transposes the EIA Directive into UK law is a series of EIA regulations. The EIA regulations which apply to the MEP Extension Project are the Marine Works (Environmental Impact Assessment) Regulations 2007 (as amended) (hereafter referred to as the Marine Works EIA Regulations).

The Marine Works EIA Regulations set out the procedure that must be followed before approval is granted for a range of plans and projects. In the Marine Works EIA Regulations, these are defined in Schedules A1 and A2. Schedule A1 identifies those activities for which EIA is mandatory. The proposed development is not considered to comprise any of these activities.

Schedule A2 of the Marine Works EIA Regulations identifies those developments that require EIA if they exceed specified thresholds, and/or if it is deemed the development may have likely significant effects on the environment by virtue of factors such as its nature, size or location. The proposed development is considered to fall within Paragraph 63 of Schedule A2 of the Marine Works EIA Regulations, which state "*Construction of harbours and port installations including fishing harbours*".

An EIA is not mandatory for all Schedule A2 developments. The proposed development is considered to require an EIA because there may be potential for the project to result in significant effects on the environment, specifically on interest features of designated nature conservation sites (Section 3.8.3).

This Scoping Report has been prepared to support the formal request for an EIA scoping opinion from NRW. It sets out the proposed approach to and scope of the information required to inform the preparation of an EIA required to support the marine licence application. Following receipt of the scoping opinion from NRW, which will confirm the final scope of any survey requirements, supporting assessments and consultation, an ES will be prepared.

The ES will document all the relevant EIA information in accordance with the requirements detailed in Schedule 3 of the Marine Works EIA Regulations, including identification and consideration of all potential significant impacts on population, human health, biodiversity, land, soil, water, air, climate, material assets, cultural heritage, and landscape. It will also include an assessment of the interaction between these elements and identify any measures that are required to prevent, reduce or offset any significant adverse effects which may be caused by the proposed development.

3.8.2 Marine Plan Conformance Assessment

In considering an application for a marine licence, NRW will take into account Government policy statements and guidance, including the Marine Policy Statement (MPS) and Welsh National Marine Plan (Section 3.9).

A marine plan conformance assessment will, therefore, be prepared to support the marine licence application for the MEP Extension Project. This will review of the proposed development against the vision, objectives and policies of the Welsh National Marine Plan. This marine plan conformance assessment will be informed by the information provided in the ES. In taking a proportionate approach

to applying policies, consideration will be given to the scale, complexity and impact of the proposed development.

3.8.3 Habitats Regulations Assessment

Where a development project is located close to, or within, an area designated or proposed under the Birds[2] and Habitats Directives[3] (European Sites), the requirements of Part 6 of the Conservation of Habitats and Species Regulations 2017 (as amended) apply (hereafter referred to as the Habitats Regulations)[4]. This requires the competent authority, in this case NRW, to determine whether the proposed development has the potential for a likely significant effect (LSE) on a European/Ramsar Site and, if so, to undertake an Appropriate Assessment (AA) of the implications of the proposals in light of the site's conservation objectives. The AA takes account of the in-combination effects of the proposal on the protected areas in association with other relevant projects and plans.

The MEP Extension Project is located within the Dee Estuary SAC, SPA and Ramsar site (Section 5.4.2). It is also adjacent to the Liverpool Bay SPA. The Mersey Narrows and North Wirral Foreshore SPA and Ramsar site is located approximately 8 km away and the River Dee and Bala Lake/ Afon Dyfrdwy a Llyn Tegid SAC approximately 16 km away from the proposed development.

The Mostyn Deep (IS102) disposal site is located within the Dee Estuary SAC, SPA and Ramsar site, adjacent to the Liverpool Bay SPA and approximately 6 km away from the Mersey Narrows and North Wirral Foreshore SPA and Ramsar site.

The Mostyn Breakwater (IS103) disposal site is located within the Dee Estuary SAC, SPA and Ramsar site, adjacent to the Liverpool Bay SPA and approximately 8 km away from the Mersey Narrows and North Wirral Foreshore SPA and Ramsar site.

Given the proposed development overlaps and/or is in close proximity to internationally designated sites, the proposed development is anticipated to trigger the requirement for a Habitats Regulations Assessment (HRA).

The process that needs to be followed for an HRA is clearly laid out by NRW in their marine licensing advice (NRW, 2021a). In simple terms, it involves two key stages. The first stage (Stage 1: Test of Likely Significant Effect (LSE)) determines if the proposed development has the potential to result in an LSE on a European/Ramsar site and if there is a need to progress to the next stage of the HRA. Stage 2 (Appropriate Assessment), if required, provides the evidence required to confirm whether the proposed development has the potential to result in an adverse effect on integrity (AEOI) on any European/Ramsar site either alone or in-combination with other plans and projects. Unless the conclusion is that there will be no adverse impact, the applicant will have to consider measures to mitigate any adverse effects. If appropriate and adequate mitigation measures are not possible, the project may only be consented if there is no alternative approach, that there are reasons of overriding public interest for it to proceed, and after a suitable compensation package has been agreed. The information contained in the HRA will enable the competent authority to undertake an AA, assessing the effects of the proposed development on the features for which the sites are designated. The HRA will be provided as an appendix to the ES.

[2] Council Directive 79/409/EEC on the conservation of wild birds.

[3] Council Directive 92/43/EEC on the conservation of natural habitats and wild fauna.

[4] These have been modified by the Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019. Available at: https://www.legislation.gov.uk/uksi/2019/579/contents/made (accessed August 2021).

3.8.4 Marine Conservation Zones

The Marine and Coastal Access Act 2009 facilitates the establishment of an ecologically coherent network of Marine Protected Areas (MPAs). The Act established a new type of MPA called a MCZ to protect nationally important marine wildlife, habitats, geology and geomorphology.

There are no MCZs within 100 km of the MEP Extension Project. Given that there are no MCZs in proximity to the proposed development, a formal MCZ assessment is not considered necessary.

3.8.5 Water Framework Directive

The Water Framework Directive (WFD) (2000/60/EC) establishes a framework for the management and protection of Europe's water resources. It is implemented in England and Wales through the Water Environment (WFD) (England and Wales) Regulations 2017, known as the Water Framework Regulations[5].

The overall objectives of the WFD as implemented by the Water Framework Regulations is to achieve "good ecological and good chemical status" in all inland and coastal waters by 2021 unless alternative objectives are set or there are grounds for time limited derogation. For example, where pressures preclude the achievement of good status (e.g. navigation, coastal defence) in heavily modified water bodies (HMWBs), the WFD provides that an alternative objective of "good ecological potential" is set. Groundwater waterbodies are included in the WFD and are assessed on quantitative and chemical status. There is also a general "no deterioration" provision to prevent decline in status.

To support the marine licence application, a WFD compliance assessment will be required to determine whether the proposed development complies with the objectives of the WFD. This will be undertaken in two stages; an initial screening/scoping stage to review the potential for the proposed development to cause a 'deterioration' or failure of the water body to meet its WFD objectives, followed by a full assessment if required. A full WFD assessment will consider the potential implications of the proposed development on the achievement of 'good' status within adjacent WFD water bodies. This information will be provided as an appendix to the ES following the format specified in the latest Environment Agency 'Clearing the Waters for All' guidance.

3.8.6 Waste Hierarchy Assessment

Waste policy and, consequently, the Waste Hierarchy Assessment (WHA) are strongly governed by the waste hierarchy set out in Article 4 of the Waste Framework Directive (2008/98/EC). This Directive is transposed in England and Wales through the Waste (England and Wales) Regulations 2011[6]. The waste hierarchy ranks waste management options according to what is best for the environment and comprises the following in order of most to least favoured (top to bottom):

- Prevention;
- Re-use;
- Recycle;
- Other recovery; and
- Disposal.

[5] Following the UK leaving the EU, the main provisions of the WFD have been retained through the Floods and Water (Amendment etc.) (EU Exit) Regulations 2019. Available at: https://www.legislation.gov.uk/uksi/2019/558/contents/made (accessed August 2021).

[6] Following the departure of the UK from the EU, the main provisions of the Waste Framework Directive have been retained through the Waste and Environmental Permitting etc. (Legislative Functions and Amendment etc.) (EU Exit) Regulations 2020. Available at: https://www.legislation.gov.uk/uksi/2020/1540/contents/made (accessed January 2021).

The waste hierarchy places emphasis on waste prevention or minimisation of waste, followed where possible by re-use of the material.

For any dredging project, the *in situ* characteristics of the material (physical and chemical), the method and frequency of dredging (and any subsequent processing), determines its characteristics for consent through the waste hierarchy. This understanding is central for consideration of management options for dealing with dredged material with respect to the WHA.

A Waste Hierarchy Assessment (WHA) will be prepared to determine the Best Practical Environmental Option (BPEO) for dealing with the dredge arisings. This assessment will involve an evaluation of the dredge and disposal methods with a discussion based on the Waste Hierarchy Framework to provide evidence for any practical, cost effective methods of dealing with the dredged material other than disposal. The WHA will be included within the ES.

3.8.7 Flood Consequence Assessment

The marine licence application will need to be accompanied by a site and development specific flood consequence assessment (FCA). This assessment will consider the flood risk to the development being proposed as well as the implications of the development on flooding elsewhere. The assessment will need to demonstrate that the MEP Extension Project is acceptable in flood risk terms (including satisfactorily addressing the relevant aspects of the sequential test and exception test) before both the marine licence and prior approval will be granted. The FCA will be provided as an appendix to the ES. The outputs will inform the ES chapter for the flood risk and drainage topic.

3.8.8 Marine Strategy Framework Directive

The aim of the Marine Strategy Framework Directive (MSFD) (2008/56/EC) is to protect more effectively the marine environment across Europe. It aims to achieve good environmental status (GES) of marine waters by 2020 and to protect the resource base upon which marine-related economic and social activities depend. The MSFD constitutes the vital environmental component of future maritime policy, designed to achieve the full economic potential of oceans and seas in harmony with the marine environment. It establishes European Marine Regions on the basis of geographical and environmental criteria. Each Member State is required to develop strategies for its marine waters. A Statutory Instrument transposing the MSFD into UK law came into force on 15 July 2010 and puts in place a clear legal framework to enable the MSFD to be implemented in the UK. The UK Marine Strategy provides the framework for delivering the MSFD at a national level and sets out how the UK will achieve the vision of clean, healthy, safe, productive and biologically diverse oceans and seas.

There are 11 descriptors of GES, including seafloor integrity, biological diversity and introduction of energy (e.g. noise). GES is assessed at the level of the European Marine Regions, of which there are two covering UK waters. The MSFD does not apply to coastal waters which are covered by the WFD. The proposed development is located within the WFD Dee (N. Wales) transitional water body. The MSFD, therefore, does not apply to the proposed development and this project is not expected to impact the environmental status of the surrounding marine environment.

3.9 Policy context

In considering an application for a marine licence, NRW will take into account UK and Welsh Government policy statements and guidance. The following sections provide an overview of the key planning context applicable to the MEP Extension Project and identifies some of the policy considerations that will be material to the decision-making process. The ES will present a more detailed review of the national and local policy context of the proposed development.

3.9.1 UK Marine Policy Statement

The UK Marine Policy Statement (HM Government, 2011) contributes to the achievement of sustainable development in the UK marine area. Prepared under Section 44 of the Marine and Coastal Access Act 2009, it provides the framework for the preparation of Marine Plans and informing decisions affecting the marine environment.

The UK vision for the marine environment is identified as being "*clean, healthy, safe, productive and biologically diverse oceans and seas*" (Paragraph 2.1.1). The delivery of the high level marine objectives provided within the MPS will contribute to the delivery of the vision. These objectives reflect the principles for sustainable development.

In terms of decision making, the MPS explains at a high level that the decision maker should make authorisation decisions in accordance with the relevant marine policy documents unless relevant considerations indicate otherwise (Paragraph 2.3.2.1).

Chapter 3 of the MPS sets out the policy objectives for key activities that take place in the marine environment. Section 3.3 deals with the key activity of "*energy production and infrastructure development*", recognising at the outset the central importance of a secure, sustainable and affordable supply of energy to the economic and social wellbeing of the UK. It is recognised that the marine environment will make an increasing major contribution to the provision of the UK's energy supply and distribution. Contributing to the UK's energy objectives, while protecting the environment, will be a priority for marine planning (Paragraph 3.3.1).

Section 3.4 recognises that ports play an important role in the activities taking place within the marine environment and that they are an essential part of the UK economy (Paragraph 3.4.1). Ports are also identified as essential to support emerging industries, including renewable energy development (Paragraph 3.4.3).

3.9.2 Welsh National Marine Plan

The proposed development is within the area covered by the Welsh National Marine Plan (part of the Welsh National Marine Plan) published in November 2019 by the Welsh Government (Welsh Government, 2019). Policies are presented within an economic, social and environmental framework, helping to support the high-level objectives set out in the UK Marine Policy Statement, as well as sustainable development of the marine area.

The role of Marine Plan is to set out how the MPS will be implemented in specific areas, providing detailed policy and spatial guidance and to help ensure that decisions within an area contribute to the delivery of UK, national and any area specific policy objectives.

The vision of the Welsh National Marine Plan is:

"Welsh Seas are clean, healthy, safe, productive and biologically diverse:

- Through an ecosystem approach, natural resources are sustainably managed, and our seas are healthy and resilient, supporting a sustainable and thriving economy;
- Through access to, understanding of and enjoyment of the marine environment and maritime cultural heritage, health and well-being are improving;

- Through Blue Growth more jobs and wealth are being created and are helping coastal communities become more resilient, prosperous and equitable with a vibrant culture; and
- Through the responsible deployment of low carbon technologies, the Welsh marine area is making a strong contribution to energy security and climate change emissions targets. "

In order to deliver the marine plan vision and support sustainable development, 13 objectives have been defined. Objective 1 relates to sustainable economic activity, including port and harbour activities:

"Objective 1 - Support the sustainable development of the Welsh marine area by contributing across Wales' well-being goals, supporting the Sustainable Management of Natural Resources (SMNR) through decision making and by taking account of the cumulative effects of all uses of the marine environment."

Under this objective, there are three particular marine plan policies of direct relevance to the MEP Extension Project:

- Policy D&D_01 recognises that proposals that maintain navigable channels and long-term access to open at-sea disposal sites for appropriate material will be supported where they contribute to the objectives of this plan. Proposals should comply with the relevant general policies and sector safeguarding policies of this plan and any other relevant considerations.

- Policy P&S_01 a/b recognises that proposals for ports, harbours and shipping activities will be supported where they contribute to the objectives of this plan. Proposals should comply with the relevant general policies and sector safeguarding policies of this plan and any other relevant considerations. Relevant public authorities and the sector are encouraged, in liaison with other interested parties, to collaborate to understand opportunities to support the sustainable development of the ports and shipping sector through marine planning.

- Policy P&S_02 recognises that Proposals that provide for the maintenance, repair, development and diversification of port and harbour facilities will be supported where they contribute to the objectives of this plan. Proposals should comply with the relevant general policies and sector safeguarding policies of this plan and any other relevant considerations.

In support of the above policies, the Welsh National Marine Plan "*anticipates that ports will play an increasingly significant role in supporting the development of the marine renewables sector*" (Paragraph 418) and that current trends indicate that ports offer "*opportunities to host value added processes such as manufacturing, e.g. supporting and servicing offshore renewable energy, particularly for ports in close proximity to developments*" (Paragraph 421, bullet 3).

The Plan also notes that a number of Welsh ports, including the Port of Mostyn "*have all been identified as having the greatest competitive advantage in exploiting opportunities arising from low carbon and renewable energy generation*" (Paragraph 425).

3.9.3 Well-being and Future Generations (Wales) Act

The Well-being of Future Generations (Wales) Act is concerned with improving the social, economic, environmental and cultural well-being of Wales. It requires public bodies to consider the long-term issues, work better with people and communities and each other, look to prevent problems and take a more joined-up approach. To help public bodies achieve the same vision, the Well-being of Future Generations (Wales) Act puts in place seven well-being goals.

The proposed development is considered to be consistent with the goals of the Well-being of Future Generations (Wales) Act, in particular in supporting 'A Resilient Wales' *"A nation which maintains and enhances a biodiverse natural environment with healthy functioning ecosystems that support social, economic and ecological resilience and the capacity to adapt to change*".

3.9.4 Environment (Wales) Act

Proposals in Wales also need to demonstrate consistency with policies of the Environment (Wales) Act (2016). The Environment (Wales) Act puts in place a legislative framework to promote the Sustainable Management of Natural Resources in Wales. The Natural Resources Policy, developed under the Environment (Wales) Act, sets out that the Welsh National Marine Plan will guide the way in which Welsh Government will take forward the delivery of Natural Resources Policy priorities in the marine environment as a part of its approach to the management of Wales' marine natural resources.

3.9.5 Dee Conservancy Safety Management System

Dee Conservancy is the formal name given to a defined harbour area for which NRW is the conservancy, harbour and local lighthouse authority. This harbour area includes the River Dee and its estuary, extending from Wilcox Point downstream of the weir at Chester, seawards to an imaginary line linking the Point of Ayr on the Welsh coast to Hilbre Point on the Wirral peninsular.

The Port Marine Safety Code published by the Department of Transport (DfT) requires harbour authorities to publish a safety plan for marine operations. The Dee Conservancy Safety Management System (DCMSMS) has been developed to meet this Code.

The Policy Statement of the Dee Conservancy states that NRW is committed to promoting good management of its available resources, so as to:

- Undertake and regulate marine operations in a way that safeguards the Dee Conservancy, its users, the public and the environment to achieve the standard of marine safety required by the Port Marine Safety Code; and
- Promote the use of the Dee Conservancy and ensure that its economic development considers and balances the views and needs of all stakeholders with regards to the use of natural resources and conservation of the environment.

4 Proposed EIA Methodology

4.1 Further assessment content and structure

An EIA of the proposed development will be undertaken and documented in an ES. The ES will include the requirements outlined in Schedule 3 of the Marine Works EIA Regulations as set out in Table 2. Consideration of the potential risks to human health, the potential impacts on climate and the vulnerability of the proposed development to climate change, as well as to risks of major accidents and/or disasters will be considered within each individual EIA topic as appropriate.

Table 2. ES requirements according to the Marine Works (EIA) Regulations (Schedule 3)

Schedule Ref	Requirements for ES
1	A description of the project, including in particular:
	a) A description of the location of the development.
	b) A description of the physical characteristics of the whole development, including, where relevant, requisite demolition works, and the land-use requirements during the construction and operational phases.
	c) A description of the main characteristics of the operational phase of the development (in particular any production process), for instance, energy demand and energy used, nature and quantity of the materials and natural resources (including water, land, soil and biodiversity).
	d) An estimate, by type and quantity, of expected residues and emissions such as water, air, soil and subsoil pollution, noise, vibration, light, heat, radiation and quantities and types of waste produced during the construction and operation phases.
2	A description of the reasonable alternatives (for example in terms of development design, technology, location, size and scale) studied by the developer, which are relevant to the proposed project and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects.
3	A description of the relevant aspects of the current state of the environment (baseline scenario) and 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.
4	a) A description of the factors specified in regulation 21A(2)(a) to (e) likely to be significantly affected by the development:
	b) Population, human health;
	c) Biodiversity (for example fauna and flora);
	d) Land (for example land take), soil (for example organic matter, erosion, compaction, sealing);
	e) Water (for example hydromorphological changes, quantity and quality);
	f) Air, climate (for example greenhouse gas emissions, impacts relevant to adaptation);
	g) Material assets;
	h) Cultural heritage, including architectural and archaeological aspects; and
	i) Landscape.

Schedule Ref	Requirements for ES
5	A description of the likely significant effects of the development on the environment resulting from, inter alia:
	a) The construction and existence of the development, including, where relevant, demolition works;
	b) The use of natural resources, in particular land, soil, water and biodiversity, considering as far as possible the sustainable availability of these resources;
	c) The emission of pollutants, noise, vibration, light, heat and radiation, the creation of nuisances, and the disposal and recovery of waste;
	d) The risks to human health, cultural heritage or the environment (for example due to accidents or disasters);
	e) The cumulation of effects with other existing and/or approved projects, taking into account any existing environmental problems relating to areas of particular environmental importance likely to be affected or the use of natural resources;
	f) The impact of the project on climate (for example the nature and magnitude of greenhouse gas emissions) and the vulnerability of the project to climate change;
	g) The technologies and the substances used.
6	The description of the likely significant effects should cover the direct effects and any indirect, secondary, cumulative, transboundary, short-term, medium-term and long-term, permanent and temporary, positive and negative effects of the development.
7	A description of the forecasting methods or evidence, used to identify and assess the significant effects on the environment, including details of difficulties (for example technical deficiencies or lack of knowledge) encountered compiling the required information and the main uncertainties involved.
8	A description of the measures envisaged to avoid, prevent, reduce or, if possible, offset any identified significant adverse effects on the environment and, where appropriate, of any proposed monitoring arrangements (for example the preparation of a post-project analysis). That description should explain the extent, to which significant adverse effects on the environment are avoided, prevented, reduced or offset, and should cover both the construction and operational phases.
9	A description of the expected significant adverse effects of the development on the environment deriving from the vulnerability of the development to risks of major accidents and/or disasters which are relevant to the project concerned.
10	A non-technical summary of the information provided under Paragraphs 1 to 9.
11	A reference list detailing the sources used for the descriptions and assessments included in the environmental statement.

4.2 Impact assessment methodology

To facilitate the impact assessment process and ensure consistency in the terminology of significance, a standard assessment methodology will be applied where possible. This methodology has been developed from a range of sources, including the Marine Works EIA Regulations, the EIA Directive (2014/52/EU), statutory guidance, consultations and ABPmer's previous (extensive) EIA project experience and is explained in the following sections. ABPmer has an IEMA Quality Mark, demonstrating their commitment to excellence in leading the co-ordination of statutory EIAs in the UK. The ES will also follow the principles of relevant guidance, including the Chartered Institute of Ecology and Environmental Management (CIEEM) guidelines for ecological impact assessment in the UK and Ireland (which consolidate advice for terrestrial, freshwater and coastal environments) (CIEEM, 2018) and Institute of Environmental Management and Assessment (IEMA) guidelines (IEMA, 2016).

The effect of the proposed works on each of the environmental receptors will be assessed by describing in turn: the baseline environmental conditions of each receiving environment; the 'impact pathways' by which the receptors could be affected; the significance of the impacts occurring; and the measures to mitigate for significant adverse impacts where these are predicted.

This impact assessment methodology, which is presented in the following sections, is designed to incorporate the key criteria and considerations without being overly prescriptive.

4.2.1 Stage 1 – Identify receptors and changes

The first stage identifies the potential environmental changes resulting from the proposed activity and the features of interest (receptors) that are likely to be affected (which are together referred to as the impact pathway). The potential impact pathways which are considered relevant to this EIA will be set out within each topic-specific assessment chapter.

4.2.2 Stage 2 – Understand change and sensitivity

The second stage involves understanding the nature of the environmental changes to provide a benchmark against which the changes and levels of exposure can be compared. The scale of the impacts via the impact pathways depends upon a range of factors, including the following:

- Magnitude (local/strategic):
  - Spatial extent (small/large scale);
  - Duration (temporary/short/intermediate/long-term);
  - Frequency (routine/intermittent/occasional/rare);
  - Reversibility;
- Probability of occurrence;
- The margins by which set values are exceeded (e.g. water quality standards);
- The baseline conditions of the system;
- Existing long-term trends and natural variability;
- The sensitivity of the receptor (resistance/adaptability/recoverability);
- The importance of the receptor (e.g. designated habitats and protected species); and
- Confidence, or certainty, in the impact prediction.

4.2.3 Stage 3 – Impact assessment

To assess the significance of effects, the magnitude of the impact pathway and the probability of it occurring is evaluated to understand the exposure to change, and this is assessed against the sensitivity of a receptor/feature to understand its vulnerability. Finally, this is compared against the importance of a receptor/feature to generate a level of significance for effects resulting from each impact pathway. This is summarised in the following sections.

The key significance levels for either beneficial or adverse impacts are described as follows:

1. Insignificant: Change not having a discernible effect;
2. Minor: Change is discernible but tolerable and not significant;
3. Moderate: Change is significant and if adverse, is likely to require mitigation; and
4. Major: Change is highest in magnitude, and the receptor has a high vulnerability and importance. Change is significant and if adverse, will require mitigation.

To ensure transparency in the impact assessment, it is important to make clear the evidence-based or value-based judgments used at each stage of the assessment, and how they have been attributed to a level of significance. This will be presented in the impact assessment for each impact pathway.

Impact assessment guidance tables

The matrices in Table 3 to Table 5 will be used to help assess significance (see below).

Table 3 will be used as a means of generating an estimate of exposure to change for each impact pathway. Magnitude of change needs to be considered in spatial and temporal terms (including duration, frequency and seasonality), and against the background environmental conditions in a study area (Section 4.4). Once a magnitude has been assessed, this should be combined with the probability of occurrence to arrive at an exposure score which can then be used for the next step of the assessment, which is detailed in Table 4. For example, an impact pathway with a medium magnitude of change and a high probability of occurrence would result in a medium exposure to change.

Table 3. Exposure to change, combining magnitude and probability of change

Probability of Occurrence	Magnitude of Change			
	Large	Medium	Small	Negligible
High	High	Medium	Low	Negligible
Medium	Medium	Medium/Low	Low /Negligible	Negligible
Low	Low	Low /Negligible	Negligible	Negligible
Negligible	Negligible	Negligible	Negligible	Negligible

Table 4 will then be used to score the vulnerability of the features/receptors of interest based on the sensitivity of those features and their exposure to a given change. Where the exposure and sensitivity characteristics overlap then vulnerability exists, and an adverse effect may occur. For example, if the impact pathway previously assessed with a medium exposure to change acted on a receptor which had a high sensitivity, this would result in an assessment of high vulnerability. Sensitivity can be described as the intolerance of a habitat, community or individual of a species to an environmental change and essentially considers the response characteristic of the feature. Thus, if a single or combination of environmental changes is likely to elicit a response then the feature under assessment can be considered to be sensitive. Where an exposure or change occurs for which the receptor is not sensitive, then no vulnerability can occur. Similarly, vulnerability will always be 'none' no matter how sensitive the feature is, if the exposure to change had been assessed as 'negligible'.

Table 4. Estimation of vulnerability based on sensitivity and exposure to change

Sensitivity of Feature	Exposure to Change			
	High	Medium	Low	Negligible
High	High	High	Moderate	None
Moderate	High	Moderate	Low	None
Low	Moderate	Low	Low	None
None	None	None	None	None

The vulnerability will then be combined with the importance of the feature of interest using Table 5 to generate an initial level of significance. The importance of a feature is based on its value and rarity (e.g. to either ecosystem or economy), such as the levels of protection, whilst recognising that importance should be determined having regard to geographic context (i.e. international/European, national, regional, and local). For an example of estimating significance, if a high vulnerability was previously given to a feature of low importance, an initial level of significance of minor would be given.

Table 5. Estimation of significance based on vulnerability and importance

Importance of Feature	Vulnerability of Feature to Impact			
	High	Moderate	Low	None
High	Major	Moderate	Minor	Insignificant
Moderate	Moderate	Moderate/Minor	Minor/Insignificant	Insignificant
Low	Minor	Minor/Insignificant	Insignificant	Insignificant
None	Insignificant	Insignificant	Insignificant	Insignificant

4.2.4 Stage 4 – Impact management (mitigation)

The final stage is to identify any impacts that are found to be significant (i.e. moderate and/or major adverse) and require mitigation measures to reduce residual impacts, as far as possible, to environmentally acceptable levels. Mitigation measures considered throughout the EIA process can take three forms (IEMA, 2016):

- **Primary (inherent)** – modifications to the location or design of the development made during the pre-application phase that are an inherent (or embedded) part of the project. These are captured and taken account of in the initial impact assessment (Section 4.2.3);
- **Secondary (foreseeable)** – actions that will require further activity in order to achieve the anticipated outcome (identified as necessary through the assessment process). Within the impact assessment process, the use of secondary mitigation measures will alter the risk of exposure and, hence, will require significance to be re-assessed and thus the residual impact (i.e. with mitigation) identified; and
- **Tertiary (inexorable)** – actions that would occur with or without input from an environmental impact assessment process, including actions that will be undertaken to meet other existing legislative requirements, or actions considered to be standard practices to manage commonly occurring environmental effects. These are captured and taken account of in the initial impact assessment (Section 4.2.3)

In addition, it is appropriate to adopt a mitigation hierarchy which, from the CIEEM (2018) guidance on ecological impact assessment specifically, can be summarised as follows:

- Seek to adopt options that **avoid** harm in the first instance;
- Identify ways to **minimise** adverse effects that cannot be completely avoided;
- Undertake **compensation** where there are significant residual adverse effects despite the mitigation proposed; and
- Provide **net benefits** (for biodiversity) above requirements for avoidance, mitigation or compensation.

In instances, a decision may need to be taken despite residual uncertainty about the effects. In such cases, adaptive management, linked to a bespoke monitoring programme, is a well-established and recommended way of ensuring that any negative impacts or effects are addressed in the course of the development and during the subsequent operational phase.

4.2.5 Confidence assessment

Following the significance assessment, a confidence assessment will be undertaken which recognises the degree of interpretation and expert judgement applied. This will be presented in the summary table contained within the conclusions section of each impact assessment section. Confidence will be assessed on a scale incorporating three values: low, medium and high.

4.2.6 Cumulative impact and in-combination assessment

Under the Marine Works EIA Regulations, it is necessary to assess the potential cumulative impacts of a proposed activity on all environmental receptors together with other existing or consented developments in the area. Under the Habitats Regulations, it is also necessary to consider the in-combination effects of a development proposal specifically on the interest features of European/Ramsar sites.

The cumulative (and in-combination) assessment will consider the effects of the proposed works alongside those arising from other plans, projects and activities. Cumulative impacts result from the combined impacts of multiple developments or from the combined effect of individual impacts (e.g. where different project elements in different locations have a cumulative impact on a particular feature). The impacts resulting from a single scheme may not be significant on their own but when combined with impacts resulting from other schemes, these could become significant.

The cumulative and in-combination assessment will be presented in a separate ES chapter. The assessment of cumulative impacts will involve a desk-based review of relevant marine licence applications within 2 km of the proposed development. Further consultation with the NRW will also be undertaken to understand any other plans, projects or activities which may have the potential for cumulative effects with the proposed development. At this stage, other known projects include plans by Mostyn SeaPower Ltd to build a tidal energy lagoon on the Dee Estuary (BBC News, 2020).

4.3 Consultation

Consultation is a crucial part of the assessment process. During the scoping phase of the application, formal consultation will be led by the NRW to seek views of statutory consultees and any other non-statutory consultees that NRW consider may be impacted by the proposed development.

4.4 Study area

The scope of the study area to be considered will be defined on the basis of the preferred design for the proposed development. It will also take into account the spatial and temporal extent (zone of influence) of the likely significant effects and their importance in a geographical context that could arise from the proposed development and the sensitivities of the relevant topics/receptors on an individual basis. Areas outside the range of any potential impacts are representative of the wider natural environment and form part of the wider study area.

An initial study area has been identified in this scoping report as part of the baseline review that has been undertaken for each EIA topic (Section 5). The study area for each EIA topic will be refined in the ES, within the topic-specific chapters.

5 Scoping Review

5.1 Key issues and approach to scoping

To develop the scope of the further assessment that will be required, relevant environmental topics are reviewed in the sections below. These EIA topics are as follows:

- Physical processes;
- Water and sediment quality;
- Nature conservation and marine ecology;
- Fisheries;
- Commercial and recreational navigation;
- Flood risk and drainage; and
- Cultural heritage and archaeology.

Each of the EIA topic sections below initially presents the relevant legislation, policy and guidance position for that specific topic, followed by a brief overview of the baseline environmental conditions, and consideration of the key 'impact pathways' for the proposed development (i.e. the potential mechanisms by which a source of change could occur that is sufficient to cause a possible significant impact to a feature/receptor). Any impact pathways that are not considered to be relevant and are proposed to be scoped out of the EIA are also reviewed. Details are then provided of the specific impact assessment approach and further work that is proposed to be carried out to determine the significance of scoped-in impact pathways.

A number of topics/receptors are proposed to be scoped out of the EIA. The rationale for not undertaking further assessment is presented in Table 6.

Table 6. Topics or receptors scoped out of the EIA

Topic or Receptor	Justification
Terrestrial ecology	The proposed development will primarily take place below MHWS and within the marine environment. The landside works relate to the reclamation of an area of the harbour seabed adjacent to the existing operational quayside which will become hardstanding and an additional laydown/storage area once the site is operational (Section 2.2). There will, therefore, be no potential effect on terrestrial ecology features and this topic is proposed to be scoped out of the EIA.
Transport and access	The main potential transport impacts during the construction phase of the proposed development are envisaged to be associated with temporary changes in traffic flows along the existing road network (A548). The overall traffic movements are, however, not expected to exceed the 30 % threshold figure provided in the IEMA (1993) Guidance. The construction work will occur on a temporary basis and can be adequately accommodated without any significant environmental traffic impacts. The traffic impact associated with the assembly of the offshore wind turbines during operation is anticipated to be minimal given that the construction material is anticipated to be delivered by sea.

Topic or Receptor	Justification
	The percentage increase in overall vehicle movements on the existing road transport network, including the A548, relating to the labour trips associated the future operation and maintenance of offshore wind farms is not expected to exceed the 30 % threshold figure provided in the IEMA Guidance. In impact terms, the traffic impacts as set out in the IEMA (1993) Guidance include severance, driver delay, pedestrian delay and amenity, accidents and safety, fear and intimidation and hazardous loads. Based on the small percentage increase in traffic that is anticipated, the impacts are unlikely to be significant. Overall, therefore, this topic is proposed to be scoped out of the EIA.
Air quality and greenhouse gas emissions	Any changes in local air quality associated with the operation of the construction plant during construction are considered to be temporary and negligible in scale. The number of additional vessel movements during construction works is, also anticipated to be minimal, particularly considering the existing operational use of the port facility. Significant air quality impacts are not, therefore, envisaged during construction. Defra's Local Air Quality Management LAQM Technical Guidance (TG16) (Defra, 2018) provides screening criteria to determine whether emissions from shipping operations require quantitative assessment. This guidance advises that the assessment of vessel emissions is likely to be necessary for port extensions where: ▪ There are more than 5,000 large ship movements per year, with relevant exposure within 250 m of the shipping berths and main areas of manoeuvring; or ▪ There are more than 15,000 large shipping movements per year, with relevant exposure within 1 km of the port / shipping area. The total number of vessel movements when the MEP Extension Project is operating at peak capacity is anticipated to be less than 5,000 per year. The contribution of emissions from vessels to local air quality is, therefore, not considered be significant. Overall, therefore, this topic is proposed to be scoped out of the EIA.
Airborne noise and vibration	The main potential source of construction noise and vibration will be works related to the construction of the new quay wall which will involve piling works and a small infill behind the new structure. Lower levels of airborne noise will also be generated by the proposed dredging works. The nearest existing sensitive receptor to the proposed development is located *circa* 670 m away, to the southwest of the MEP Extension Project, 4 m from the carriageway of the A548, representative of the Quay House, nearby hotel and other nearby dwellings. Given the distance from the nearest receptor, the temporary nature of construction activities, and the existing levels of noise associated with the adjacent A548, any airborne noise and vibration impacts are unlikely to be significant. Once operational, the main sources of noise associated with the proposed development will be from site activities, including vessel movements.

Topic or Receptor	Justification
	The use of the site for the MEP Extension Project will be similar to the existing and surrounding land uses, therefore, any effects are not likely to be significant. Overall, therefore, this topic is proposed to be scoped out of the EIA.
Landscape/seascape and visual impact	Due to the current port related and industrial character of the site and its existing use as part of a wider operational port, it is considered that the landscape and visual effects generated by the MEP Extension Project will be limited and not result in any significant effects. The proposed works will allow for additional vessels to be accommodated along the new quay wall. However, these vessels will be of a similar character to those that are already regular visitors at the port facility and thus any changes are unlikely to be perceptible. The proposed dredging and disposal works will be temporary and similar in character to the use of the existing berths, harbour, main navigation channel and sea disposal sites. Given the high level of existing vessel activity and operations at the Port of Mostyn and the temporary nature of the proposed dredging and disposal activities, there will be no change to the landscape/seascape character or visual appearance. Overall, therefore, this topic is proposed to be scoped out of the EIA.

5.2 Physical processes

This section sets out the proposed scope of the ES chapter that will report the findings of the physical processes assessment of the proposed development.

5.2.1 Legislation, policy and guidance position

The potential effects of the proposed development on physical processes will be considered in the respective topic-specific ES chapter, which will cross-reference, as appropriate, relevant policy, legislation and guidance, including:

- The Marine and Coastal Access Act 2009 (MCAA);
- The Habitats Regulations, which implement the Birds and Habitats Directives;
- The Water Framework Regulations, which implement the European WFD (2000/60/EC);
- The Waste (England and Wales) Regulations 2011, which implement the Waste Framework Directive (2008/98/EC);
- UK Marine Policy Statement (MPS) (HM Government, 2011) as required by Section 44 of the Marine and Coastal Access Act 2009;
- Welsh National Marine Plan (Welsh Government, 2019);
- Environment (Wales) Act;
- UK Marine Strategy (Defra, 2019); and
- Relevant local policy.

5.2.2 Description of the existing environment

Data sources

A desk-based study will be undertaken to inform the baseline characterisation on which the impact assessment will be based. This will include the following key data sources:

- ABPmer (2017). Review of Dredge and Disposal Monitoring, Overview of survey work carried out by the Port in the Dee Estuary from 2005 to 2016, ABPmer Report No. R.2713. A report produced by ABPmer for Port of Mostyn, March 2017;
- ABPmer (2019a). Overview of Maintenance Dredge and Disposal, Report to accompany Progress Note 48; June 2019, ABPmer Report No. R.3230TN. A report produced by ABPmer for Port of Mostyn Ltd., July 2019;
- ABPmer (2019b). Mostyn Deep bed sample PSA Memorandum. 18 January 2019;
- ABPmer (2020). Maintenance Dredge and Disposal Surveys, Annual review of monitoring during 2019 and into early 2020 under Marine Licence DML1542v2, ABPmer Report No. R.3375. A report produced by ABPmer for Port of Mostyn Ltd., August 2020;
- ABPmer (2021a). Maintenance Dredge and Disposal Surveys, Year-end annual review of monitoring during 2019 and 2020 (DML1542v2), ABPmer Report No. R.3566. A report produced by ABPmer for Port of Mostyn, February 2021;
- ABPmer (2021b) Maintenance Dredge Monitoring Progress Note DML1542v2. R3597PN;
- Port of Mostyn (2013). Mostyn Energy Park Development (MEP) at the Port of Mostyn. Environmental Statement Volume 1 - EIA Text July 2013;
- North West and North Wales Coastal Group (2011). North West England and North Wales Shoreline Management Plan SMP2.

Study area

The study area is the extent over which potential direct and indirect effects of the MEP Extension Project may occur during construction and operation. The direct effects on physical processes are those confined to within the footprint of the proposed development, e.g. the new quay wall, dredge and disposal of dredge material. Indirect effects are those that may arise due to wider changes in the estuary flow and sedimentary regime and any change to the estuary morphology as a result of the proposed works (including dredge disposal plume dispersion).

The study area for the physical processes topic is considered to be the Dee Estuary, particularly the areas adjacent to Mostyn and the existing licensed disposal sites at Mostyn Deep (IS102) and Mostyn Breakwater (IS203).

The physical processes ES chapter will, through further analysis and assessment, and including the use of numerical modelling tools, refine the study area for the purposes of the impact assessment.

General setting

The proposed works are located adjacent to the Port of Mostyn on the southern shoreline of the Dee Estuary. The Dee is a funnel-shaped estuary, around 30 km in length and with a maximum width of 8.5 km towards its mouth, where Mostyn is situated. The River Dee rises in Snowdonia, Wales, flows east via Chester, England and discharges into the Dee Estuary between the Wirral Peninsula in England and Wales where the Port of Mostyn is situated.

Bathymetry

The bathymetry in the outer and mid-estuary is governed by the variation in tidal flow passing into the estuary on the welsh side (through the Welsh Channel), and the proportion which passes out on the English side through the Hilbre Channel. The bathymetry suggests that the subtidal flood flows are typically dominant in the Welsh Channel. The ebb flow, however, is variable between the Hilbre and Welsh Channels.

The Port of Mostyn sits between Mostyn Bank and Salisbury Bank, both of which sit at between 0 and 4 m above CD. To the northwest of the Port is the Welsh Channel, which is over 20 meters deep (see Figure 5). Throughout the Dee Estuary, a complex system of intertidal and subtidal banks and channels exists, which are in constant flux. The overall estuary morphology is defined by the relative dominance of the main flood and ebb channels.

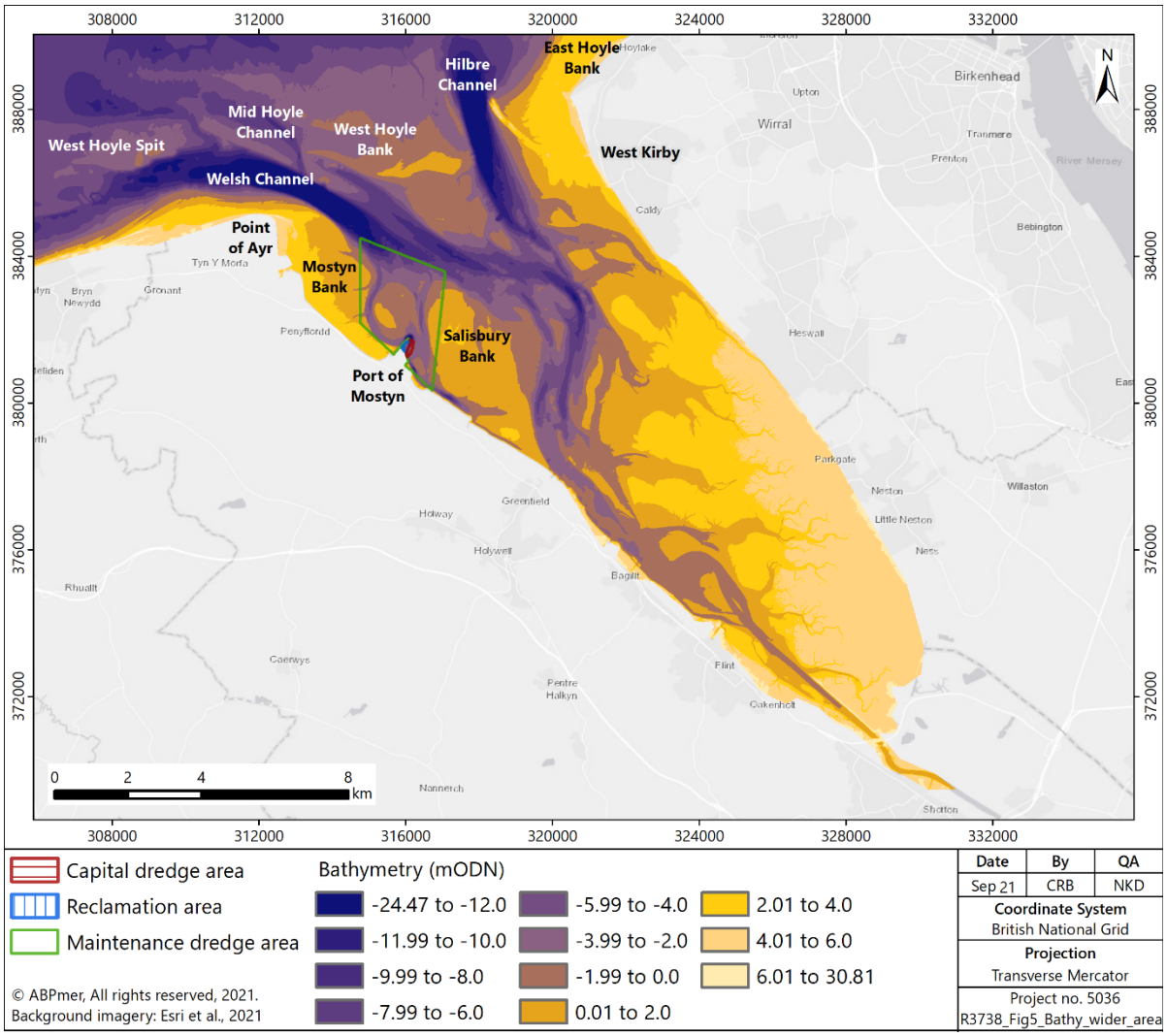

Figure 5 Bathymetry in the area of the proposed development

Tides and water levels

The Dee Estuary is hyper-tidal (>6 m tidal range on mean spring tides). The tidal regime is semi-diurnal with mean spring tidal ranges of 7.8 m and 4.1 m on mean neap tides (UKHO, 2021). Further towards the mouth of the estuary, spring and neap ranges at Hilbre Island are similar at 7.7 m and 4.1 m, respectively. Standard tidal water levels for the Port of Mostyn and Hilbre are provided in Table 7.

Maximum tidal ranges at Mostyn approach 10 m. Near the head of the estuary the tidal extent is restricted by a weir at Chester where mean spring and neap tidal ranges are 3.4 m and 1.7 m respectively. On average tides, water levels are generally similar across both the English and Welsh sides of the estuary mouth. On maximum tidal ranges (approaching astronomic tidal ranges) water levels are generally slightly higher on the east (English side) causing a small tidal gradient across the mouth. The average tidal prism for the Dee Estuary is of 4 x 10^8 m^3 with a mean annual river discharge of 31 m^3/s, meaning the estuary is tidally dominant (Bolaños *et al.*, 2014).

Table 7. Tidal levels for the Port of Mostyn and Hilbre Island

Tidal Level	Tidal Elevation (m Above/ Below CD)	
	Mostyn	Hilbre Island
Highest Astronomical Tide (HAT)	9.8	10.2
Mean High Water Spring (MHWS)	8.9	9.0
Mean High Water Neap (MHWN)	7.0	7.2
Mean Tide Level (MTL)	4.89	5.15
Mean Low Water Neap (MLWN)	2.9	3.1
Mean Low Water Spring (MLWS)	1.1	1.3
Lowest Astronomical Tide (LAT)	0.2	0.1
Astronomic Range (HAT - LAT)	9.6	10.1
Mean Spring Range (MHWS - MLWS)	7.8	7.7
Men Neap Range (MHWN - MLWN)	4.1	4.1

Source: Admiralty Tide Tables (2021)

Flows

In general, the large tidal ranges in the Dee Estuary result in strong tidal currents and create a very high energy, dynamic system (Moore *et al.*, 2009). Flow speeds are typically lower in the Welsh Channel than the Hilbre Channel, peaking at around 0.8 m/s on both the flood and ebb tides. In contrast, flows within the Hilbre Channel peak at over 1.2 m/s.

Flood tide duration is *circa* 1.5 hrs shorter than the ebb tide, indicating generally faster flows on the flood and suggesting a flood dominated flow regime during spring tide phases. The difference in flood/ebb tide duration increases with distance up-estuary, due to tidal propagation. Throughout the upper part of estuary (generally south of Flint), the flood tide has a shorter duration by approximately 2 to 3 hours, compared to over 9 hours on the ebb (Pye, 1996; Parsons *et al.*, 2013). This asymmetry in the tide throughout the estuary is a dominant factor in causing residual sediment transport and morphological changes (Moore *et al.*, 2009).

Freshwater flows and salinity

A salinity gradient within the Dee Estuary occurs due to an interface between freshwater fluvial discharge of the River Dee, and saline water entering the estuary mouth from Liverpool Bay and the Irish Sea. The overall regime has been observed and assessed within a number of existing research studies, particularly using numerical models to determine how density effects within the estuary vary as a result of forcing parameters such as wind, waves and fluvial discharge.

The freshwater flow of the River Dee is regulated by a series of weirs, reservoirs and dams along its length prior to entering the estuary (Lambert, 1988). However, maximum discharge can reach over 180 m^3/s during extreme cases. Freshwater influence is greatest towards the head of the estuary (Parsons *et al.*, 2013), lowering the salinity of the upper estuary compared to the estuary mouth. Average

fluvial discharge into the estuary is suggested to be *circa* 35 m^3/s based on a long record at Chester Weir, and equates to between 10 and 15% of the combined estuary discharge (Pye, 1996).

Waves

The general wave climate throughout the Flintshire and Wirral coastlines is primarily driven from offshore generation in the Irish Sea. A limited amount of sheltering from the westerly directions is provided by Anglesey. The most exposed directions are typically northerly or north-westerly, where waves can propagate generally unaffected from the northwest coast of England (northerly) and the east coasts of Ireland and Northern Ireland (north-westerly). The only interfering land mass is the Isle of Man, however the effective fetch from this is still significant at over 110 km. The majority of waves are therefore generated from within the Irish Sea, which is effectively a closed basin. Consequently, long-period Atlantic swell waves rarely occur. Most storm wave energy that affects the entrance to the Dee Estuary has periods of the order of 5 – 7 seconds.

It is understood, however, that mid and upper sections of the estuary are predominantly sheltered from the offshore derived wave conditions, with large intertidal sandbanks in the outer estuary (namely the West Hoyle Spit, West Hoyle Bank and East Hoyle Spit) providing considerable protection to the inner estuary (Wolf *et al.,* 2006, Parsons *et al.,* 2013). This is particularly the case during lower tide levels, where most of the high-energy waves are partially dissipated via wave shoaling and/or wave breaking.

Sediments

A variety of sea bed sediment types are found in the Dee Estuary (Port of Mostyn, 2013). Its bed comprises recent deposits of sand and mud in a trough eroded in glacial deposits of boulder clay, silts, sands and gravel deposited by ice. The post glacial inundation of the valley by the sea started the process of sediment accretion and the underlying solid geology is now overlain generally by 20 m to over 30 m of subsequently deposited sediment.

The estuary sand is generally of uniform grading within a narrow envelope (Port of Mostyn, 2013). The majority of the sediment in the area of the Inner Channel and berthing area is a medium grained sand, with only a small proportion of finer material present. The particle size of the sand on the sea bed along the whole navigation channel (outer and inner) shows little variation between offshore Prestatyn and the Port (ERM, 2007).

Morphology

The morphological conditions and evolution of the Dee Estuary were reviewed by Barber *et al.* (2009). They undertook a review of available historic charts and put forward a conceptual interpretation of the changes that were observed. This study generally concluded that variability of the bathymetry in the outer and mid-estuary is governed by the variation in tidal flow passing into the estuary on the Welsh side, and the proportion which passes out on the English side through the Hilbre Channel.

Future baseline

At present, the Dee Estuary has been identified as an overall sediment sink, and material imported into the estuary consists primarily of sand and finer silts/muds, with very small amounts of coarser gravels. The principal source of material into the estuary is from Liverpool Bay.

The overall hydrodynamic properties in the Dee Estuary are complex, with the main channels within the estuary having different dominant characteristics and flow patterns. Numerous studies have investigated the influence of stratification, river flow, meteorological forcing, waves and wind effect and their respective contributions to the overall hydrodynamics and sediment transport regime.

Hydrodynamic and sedimentary processes will continue to be influenced by natural and human-induced variability, ongoing cyclic patterns and trends (e.g. ongoing maintenance dredging and disposal) with or without the proposed development.

It is also important to recognise the potential effects of climate change on the Dee Estuary's future baseline. Future changes in Relative Sea Level (RSL) are quoted as the net effect of geological adjustments in land levels and the projected absolute changes in mean sea level.

A summary of the United Kingdom Climate Projections (UKCP18) relative Sea Level Rise (SLR) projections (Palmer *et al.*, 2018) up to 2100 has been extracted from the UKCP18 database for the grid cell at the entrance to the Dee Estuary. The 2100 SLR prediction is calculated to be an increase in mean sea level of 0.93 m from 2021 levels, based on the conservative RCP 8.5 95%ile emissions scenario. Water levels in the future, as now, will also be affected by meteorological surge and weather-related events.

5.2.3 Possible environmental impacts

The proposed development has the potential to affect physical processes during both construction and operation. The physical processes ES chapter will set out the assessment of the likely changes to be generated by the MEP Extension Project, both beneficial and adverse and during both the construction and operational phases.

Scoped in

The potential impact pathways during the construction phase are as follows:

- Increased SSC and potential sedimentation over the extent of the disturbance plume as a result of the construction of the new quay wall (piling) and capital dredging works;
- Increased SSC and potential sedimentation as a result of the deposit of capital dredge material at a licensed offshore disposal site; and
- Changes in seabed bathymetry and composition as a result of deposition of dredged/disposal material within the area of the respective plumes.

The potential impact pathways during the operational phase are as follows:

- Local changes to hydrodynamic regime (flow speed and direction) as a result of the new quay wall (piling) and capital dredging;
- Local changes to the wave regime, as a result of the new quay wall (piling) and capital dredging;
- Associated local changes to the sediment transport pathways, as a result of localised changes to the driving hydrodynamic (and wave) forcing;
- Increased SSC and potential sedimentation in the area of dispersal plume as a result of maintenance dredging;
- Increased SSC and potential sedimentation as a result of deposition of maintenance dredge material at a licensed disposal site; and
- Changes in seabed bathymetry and composition as a result of deposition of dredged/disposed maintenance dredge material.

Potential cumulative effects on physical processes could arise as a result of other coastal and marine developments in the area, as well as ongoing activities. These will be considered as part of the cumulative and in-combination assessment (Section 4.2.6).

Scoped out

At this current stage, there is considered to be insufficient evidence to exclude any potential pathways from further assessment within the EIA.

5.2.4 Further assessment work required

Physical processes changes may potentially impact on physical environmental receptors, such as the local coastline and the nearshore sandbank and channel system, along with existing berth and quay infrastructure. For these physical receptors, an assessment of impact significance will be undertaken following the methodology presented in Section 4.2. In accordance with published guidance and an established approach that has been used in numerous previous EIAs, this assessment will include an evaluation of the importance/value and sensitivity of relevant physical processes receptors.

It is recognised that whilst the proposed development has the potential to cause changes to hydrodynamic and sedimentary processes, these changes are not, in themselves, always recognised as environmental features/receptors and, therefore, do not equate to 'impacts'. The impacts will instead be the consequence of these changes on other environmental features. For example, 'changes' in the transport and deposition of sediment may 'impact' on the structure and function of marine habitats and their associated species. For the hydrodynamic and sediment processes that are not considered features/receptors in themselves, the physical processes assessment will assess the potential 'exposure to change' in accordance with the methodology presented in Section 4.2 but not the importance/value, sensitivity or significance. The consequent significance of effects resulting from physical processes changes on other environmental features/receptors will be assessed in other topic-specific ES chapters, including water and sediment quality, nature conservation and marine ecology, and flood defence and drainage.

Numerical modelling tools and conceptual analyses will be used to predict coastal processes, hydrodynamic and sedimentary effects by comparing the baseline and future environmental conditions created by the MEP Extension Project. This will include predicting the changes to tidal water levels and currents, SSC and erosion and accretion patterns, and waves. The models will also allow for the fate of sediment plumes from marine construction and maintenance dredging and disposal activities to be simulated.

Changes in hydrodynamic and sedimentary processes will be considered in the context of climate change (specifically sea level rise) over the design life of the MEP Extension Project by assessing the effects under projected future sea levels. The available geotechnical information will also be analysed to optimise the construction and dredging methods and minimise changes in physical processes during construction and operation. Further project-specific sediment sampling will also be undertaken to determine the suitability of the dredge material for disposal at a licensed marine disposal site (Section 5.3.4).

The modelling will be completed using existing models of the Dee Estuary, with updates to ensure mesh resolution and model performance across the primary study area remains suitable and relevant to the proposed MEP scheme. ABPmer hold existing models using a range of modelling software products, including Deltares Delft3D suite and the Danish Hydraulic Institute (DHI) software package MIKE21FM (Flexible Mesh). Both of these modelling tools have previously been developed specifically for oceanographic, coastal and estuarine applications within the Dee Estuary. Most recently, the ABPmer MIKE21 hydrodynamic modelling tool has been utilised to inform the annual monitoring required to discharge conditions of Marine Licences DML1542v2 and DML2001. It has also been used for the feasibility testing of a range of proposed MEP scheme alignments. The selected modelling tool will be

subject to update with latest available bathymetric and topographic data, along with a further verification stage using local measurements.

There is sufficient available information and data sources to support the numerical modelling and conceptual analyses and no further field survey work is considered necessary (with the exception of the sediment sampling and ground investigation (GI) survey to inform the engineering design).

5.3 Water and sediment quality

This section sets out the proposed scope of the ES chapter that will report the findings of the water and sediment quality assessment of the proposed development.

5.3.1 Legislation, policy and guidance position

The potential effects of the proposed development on water and sediment quality will be considered in the respective topic-specific ES chapter, which will cross-reference, as appropriate, relevant policy, legislation and guidance, including:

- The Marine and Coastal Access Act 2009 (MCAA);
- The Habitats Regulations, which implement the Birds and Habitats Directives;
- The Water Framework Regulations, which implement the European WFD (2000/60/EC);
- Bathing Waters Directive (2006/7/EC);
- Nitrates Directive (91/676/EEC);
- Urban Waste Water Treatment Directive (91/271/EEC);
- Shellfish Waters Directive 2006/113/EC[7] (now subsumed within the WFD);
- UK Marine Policy Statement (MPS) (HM Government, 2011) as required by Section 44 of the Marine and Coastal Access Act 2009;
- Welsh National Marine Plan (Welsh Government, 2019);
- Environment (Wales) Act;
- Relevant local policy; and
- The Environment Agency's "Clearing the Waters for All" guidance (Environment Agency, 2016).

5.3.2 Description of the existing environment

Data sources

A desk-based study will be undertaken to inform the baseline characterisation on which the impact assessment will be based. This will include the following key data sources:

- ABPmer (2019b). Mostyn Deep bed sample PSA Memorandum. 18 January 2019;
- Cefas (2021a). Shellfish classification zone maps;
- Environment Agency (2016) 'Clearing the Waters for All' guidance (including water body summary table);
- Environment Agency (2021) Find a bathing water;
- Food Standards Agency (2021). Shellfish Classifications England and Wales 2020-21: Designated bivalve mollusc production areas in England and Wales 2020/21. Effective from 1 September 2020 – 31 August 2021;
- Lle (2021). Nitrate Vulnerable Zones (NVZ);

[7] This Directive was repealed by the WFD in 2013. The rules set down, particularly in regard to microbiology and physical-chemistry parameters of relevance to River Basin Management Plans, were integrated in the WFD.

- NRW (2015). Dee River Basin Management Plan 2015 – 2021 Summary. Updated December 2015;
- NRW (2016). Shellfish Water Protected Areas in Wales;
- NRW (2021b). Bathing water quality;
- NRW (2021c). Water Watch Wales Map;
- Port of Mostyn (2013). Mostyn Energy Park Development (MEP) at the Port of Mostyn. Environmental Statement Volume 1 - EIA Text July 2011;
- Site specific marine sediment samples to be collected in 2021 within the boundaries of the MEP Extension Project for particle size analysis (PSA) and chemical contamination analysis (an application for a sediment sample plan has been submitted to NRW; Ref: SP2106); and
- Socotec (2019). Chemical analysis data of sediment samples taken from Mostyn Channel.

Study area

The study area is the extent over which potential direct and indirect effects of the MEP Extension Project may occur during construction and operation. The direct effects on water and sediment quality are those that may arise due to accidental releases and sediment disturbance during construction. Indirect effects are those that may arise due to sediment that is disturbed into the water column during the marine works resulting in changes in water quality through changes in the levels of dissolved oxygen or the release of sediment-bound contaminants.

The study area for the water and sediment quality topic is considered to be the Dee Estuary, particularly the Port of Mostyn and adjacent areas, as well as the existing licensed disposal sites at Mostyn Deep (IS102) and Mostyn Breakwater (IS103).

The water and sediment quality ES chapter will, through further desk-based analysis and assessment, refine the study area for the purposes of the impact assessment.

Water quality

Water quality standards are regulated at EU level through the WFD (2000/60/EC), the Priority Substances Directive (2008/105/EC, 2013/39/EU), the revised Bathing Water Directive (2006/113/EC) and the Marine Strategy Framework Directive (2008/56/EC). The WFD provides for holistic management of all water bodies including rivers, estuaries, groundwater, lakes and coastal waters to 1 nm offshore. The WFD integrates and requires protection of designated shellfish waters, through The Water Environment (Water Framework Directive) (England and Wales) (Amendment) Regulations 2016; bathing waters, through The Bathing Water Directive (2006/7/EC) (BWD); nature conservation sites, through the Habitats and Birds Directives (92/43/EEC, 2009/147/EC); and eutrophication, through the Nitrates Directive (91/676/EC).

NRW published River Basin Management Plan (RBMPs), which set out measures through which compliance with WFD objectives will be achieved. The 'Dee (N. Wales)' transitional waterbody (ID: GB531106708200) overlaps the proposed development and marine disposal sites (Figure 6). It is recorded as a heavily modified waterbody (HMWB) due to navigation, ports and harbours use. This means 'ecological potential' is applied rather than 'ecological status'. The current (2018) overall status of the waterbody is 'moderate', with an ecological potential of 'moderate', and a chemical status of 'fail'. Moderate ecological potential is due to the physico-chemical quality element 'Dissolved inorganic nitrogen' being classified as moderate. The reason for the 'fail' chemical status is based on priority substances trichlorobenzenes, and priority hazardous substances 'polybrominated diphenyl ethers (PBDE)' and 'mercury and its compounds'.

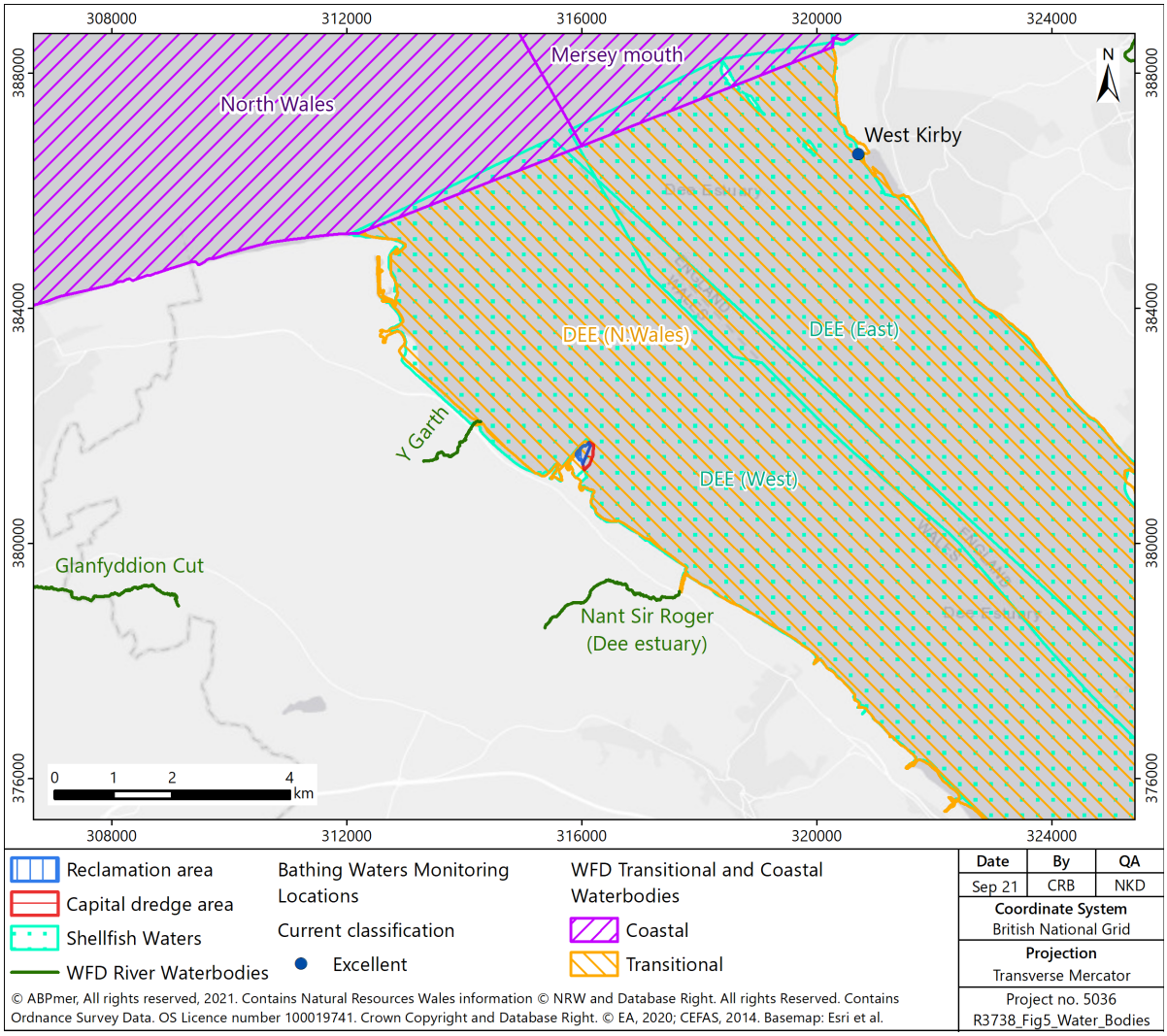

Figure 6. Location of Water Framework Directive water bodies, bathing waters and shellfish waters within the study area

The main watercourses in the vicinity of the proposed development site (within 5 km) are Y Garth river waterbody and Nant Sir Roger (Dee estuary) river waterbody which drains to the north-west and south-east of the Port of Mostyn, and the Dee Estuary itself which is designated as the Dee (N.Wales) transitional water body. The Y Garth and Nant Sir Roger (Dee estuary) river waterbodies are currently (2018) at moderate and good overall status respectively.

West Kirby designated bathing water is located approximately 7 km north east of the MEP Extension Project (Figure 6). West Kirby was assessed as having 'excellent' bathing water quality between 2016 and 2019 (Environment Agency, 2021).

The proposed development and marine disposal sites overlap the Dee (West) Shellfish Water Protected Area (NRW, 2021c; Figure 6) and the Salisbury and Salisbury Middle classification zone within the Dee bivalve mollusc production area (Cefas, 2021a). The Salisbury classification zone is currently designated as a Class A for *Cerastoderma edule* and *Mytilus* spp. between 1 August to 31 May and Class B at all other times (Cefas, 2021a; Food Standards Agency, 2021). The Salisbury Middle classification zone is currently designated as a Class A for *C. edule* between 1 August to 31 May and Class B at all other times (Cefas, 2021a; Food Standards Agency, 2021).

There are no Nitrate Vulnerable Zones (NVZs) or Sensitive Areas (Eutrophic) designated under the Urban Waste Water Treatment Directive in the vicinity of the proposed development and marine disposal sites.

Sediment quality

There are no formal quantitative environmental quality standards (EQSs) for the concentration of contaminants in sediments, although the WFD has introduced optional standards for a small number of priority (hazardous) substances. Cefas has prepared a series of guideline Action Levels (ALs) to assist in the assessment of dredged material (and its suitability for disposal to sea). In general, contaminant levels in dredged material below Action Level 1 (AL1) are of no concern and are unlikely to influence the licensing decision. However, dredged material with contaminant levels above Action Level 2 (AL2) is generally considered unsuitable for disposal at sea. Dredged material with contaminant levels between AL1 and AL2 requires further consideration before a decision can be made.

The Cefas Guideline ALs should not be viewed as pass / fail thresholds. However, these guidelines provide an appropriate context for consideration of contaminant levels in sediments and are used as part of a 'weight of evidence' approach to assessing dredged material.

Some areas of the Dee Estuary have historically had elevated levels of several metals largely resulting from industrial discharges (Port of Mostyn, 2013). The coastal strip along the Welsh shoreline of the estuary has accommodated extensive industrial development over the last two hundred years and as a consequence there is extensive ground contamination in the area. In more recent years, technology and the reduction and removal of many inputs has improved water quality over the years and industrial pollution has reduced.

Therefore, while areas of the Dee Estuary have had elevated levels of several trace metals largely resulting from industrial discharges, a survey in 1993 indicated that concentrations of all metals had decreased significantly and no major changes in metal concentration were observed with depth of sediment.

Sediment sampling has previously been undertaken by the Port of Mostyn to support the existing maintenance dredge licences, DML1542 and DML2001. The results from DML1542 showed slightly elevated levels (just above AL1) of nickel and zinc but most results for metals, organotins, hydrocarbons and polycyclic biphenyls were below Cefas Action Level 1 (Cefas, 2021b). The results from DML2001 showed results for trace metals and total hydrocarbons all being below Cefas Action Level 1 and therefore the material was deemed suitable for disposal to sea (Cefas, 2021b).

Future baseline

If the proposed development were not to take place, water and sediment quality will continue to be influenced by natural and human-induced variability, ongoing cyclic patterns and trends (e.g. ongoing maintenance dredging and disposal, and existing discharge licences in the area). The future baseline will also be influenced by climate change, such as changes in sea temperature.

5.3.3 Possible environmental impacts

The proposed development has the potential to affect water and sediment quality during both construction and operation. The water and sediment quality ES chapter will set out the assessment of the likely changes to be generated by the MEP Extension Project, both beneficial and adverse and during both the construction and operational phases.

Scoped in

5.2.35 The potential impact pathways during the construction phase are as follows:

- Changes to dissolved oxygen concentrations as a result of increased SSC during piling, capital dredging and disposal activities;
- Changes to chemical water quality as a result of potential sediment-bound contaminants being released during piling, capital dredging and disposal activities; and
- Redistribution of sediment-bound contaminants during piling, capital dredging and disposal activities.

5.2.36 The potential impact pathways during the operational phase are as follows:

- Changes to dissolved oxygen concentrations as a result of increased SSC during the maintenance dredging and disposal activities;
- Changes to chemical water quality as a result of potential contaminants in the seabed sediment being released during maintenance dredging and disposal activities; and
- Redistribution of sediment-bound contaminants during maintenance dredging and disposal activities.

Potential cumulative effects on water and sediment quality could arise as a result of other coastal and marine developments in the area, as well as ongoing activities. These will be considered as part of the cumulative and in-combination assessment (Section 4.2.6).

Scoped out

The following impact pathways are proposed to be scoped out of the EIA:

- **Changes to levels of contaminants in water (including accidental spillages) during construction and operation**: The proposed development will not directly introduce contaminants to the marine environment and the potential risk of spillages will be minimised and mitigated through the application of environmental good practice management measures. This impact pathway has, therefore, been scoped out of further assessment in the EIA.

5.3.4 Further assessment work required

A desk-based review of NRW's and Environment Agency's Water Quality Data Archive, and other historic developments and sample data will be undertaken to support a detailed understanding of water and sediment quality in the study area. This will include a review of dissolved oxygen, nutrient and contaminant concentrations, both dissolved in water and sediment bound.

A sediment contamination survey of the proposed dredge area will be required to characterise the dredge material and to support any application to dispose of dredge material at an existing licensed disposal site. A sediment sampling plan request was submitted to NRW on 2 August 2021 (Ref SP2106) to confirm the suite of contaminants, number of samples, sample locations, replicates and any sampling with depth required, taking account of available guidelines for the management of dredge material to be disposed at sea (OSPAR Commission, 2014).

A sample plan was issued by NRW on 23 August 2021 which advised that eight sample sites will need to be sampled from across the dredge area to provide adequate spatial coverage, specifically four sample sites along the quay next to existing Berths 1 and 2 and four sample sites along the berth pocket adjacent to the new quay. Samples will need to be taken at the surface (0 m depth) and at 2 m depth intervals to the maximum dredge depth. The samples will need to be analysed for trace metals (cadmium, chromium, copper, mercury, nickle, lead, zinc and arsenic), organotins, total hydrocarbons

(THC), polycyclic aromatic hydrocarbons (PAHs), organochlorine pesticides (OCs) and particle size analysis (PSA).

Contaminant concentrations in sediment samples will be compared to Cefas Guideline ALs to determine their suitability for disposal at sea. Contaminant concentrations in sediments will also inform the assessment of potential changes to dissolved concentrations in the water column and predicted redistribution of contaminants as a result of the proposed development.

The outputs of the physical processes assessment (Section 5.2) will be used to inform the water and sediment quality assessment. Incremental changes to dissolved contaminant concentrations, in addition to background concentrations, will be compared to EQS values to consider potential ecological impacts, based on maximum allowable concentrations (MAC; short-term) and thresholds for annual averages (long-term). The outputs of the physical processes assessment will also support an assessment of changes to dissolved oxygen concentrations.

A WFD assessment will be undertaken to determine the potential implications of the proposed development on the objectives of the relevant water bodies (Section 3.8.5). This assessment will be based on the information and analysis provided within the ES in relation to changes in physical processes, water and sediment quality, and impacts on nature conservation and marine ecology receptors. The WFD assessment will be provided as an appendix to the ES following the format specified in the latest 'Clearing the Waters for All' guidance (Environment Agency, 2016).

5.4 Nature conservation and marine ecology

This section sets out the proposed scope of the ES chapter that will report the findings of the nature conservation and marine ecology assessment of the proposed development. Specifically, this includes consideration of potential effects on benthic habitats and species (including non-native species), fish and shellfish, and marine mammals. This section also considers coastal waterbirds utilising intertidal and subtidal habitats for roosting and feeding.

5.4.1 Legislation, policy and guidance position

The potential effects of the proposed development on nature conservation and marine ecology receptors will be considered in the respective topic-specific ES chapter, which will cross-reference, as appropriate, relevant policy, legislation and guidance, including:

- The Marine and Coastal Access Act 2009 (MCAA);
- The Habitats Directive;
- The Birds Directive;
- The Wildlife and Countryside Act (WCA) 1981, as amended;
- The Countryside and Rights of Way Act 2000;
- The Natural Environment and Rural Communities (NERC) Act 2006;
- The Habitats Regulations, which implement the Birds and Habitats Directives;
- The Water Framework Regulations, which implement the European WFD (2000/60/EC);
- UK Marine Policy Statement (MPS) (HM Government, 2011) as required by Section 44 of the Marine and Coastal Access Act 2009;
- Welsh National Marine Plan (Welsh Government, 2019);
- Environment (Wales) Act;
- UK Biodiversity Action Plan (HMSO, 1994), superseded by the UK Post-2010 Biodiversity Framework (JNCC, 2012);
- UK Marine Strategy (Defra, 2019); and
- Relevant local policy.

5.4.2 Description of the existing environment

Data sources

A desk-based study will be undertaken to inform the baseline characterisation on which the impact assessment will be based. This will include the following key data sources:

Nature conservation sites

- Natura 2000 standard data forms or information sheets for each designation: Information on the species and habitats listed in the original citations;
- Natural England (2018). European Site Conservation Objectives for Dee Estuary/Aber Dyfrdwy Special Area of Conservation Site code: UK0030131;
- Natural England (2019). European Site Conservation Objectives for The Dee Estuary SPA Site Code: UK9013011;
- Natural England (2021). Multi-Agency Geographic Information for the Countryside (MAGIC) Interactive Map: Information on the boundaries of designated sites;
- Natural England and CCW (2010). The Dee Estuary European Marine Site Conservation Advice Package;
- NRW (2018). Dee Estuary / Aber Dyfrdwy Special Area of Conservation: Indicative site level feature condition assessments 2018;
- The Wales Biodiversity Partnership website (www.biodiversitywales.org.uk);
- Flintshire and Cheshire Local Biodiversity Partnerships website (www.cheshire-biodiversity.org.uk); and
- The National Biodiversity Network (NBN) website (www.nbn.org.uk/).

Benthic ecology

- **Project Specific Surveys:** Both intertidal and subtidal samples will be collected to characterise the infaunal benthic assemblage within the proposed development footprint. The proposed scope and methods of the surveys are described in more detail in Section 5.4.4;
- **Review of Dredge and Disposal Monitoring**: Overview of survey work carried out by the Port in the Dee Estuary from 2005 to 2016 (ABPmer, 2017);
- **Mostyn Dredge and Disposal Ecological Monitoring Work:** Recent broad-scale intertidal habitat surveys of the Dee Estuary (including the Mostyn Bank) have been undertaken for the Port by ABPmer. These have been carried out as part of the ecological monitoring component of the Port's inner Approach Channel monitoring programme. This ecological monitoring work has been undertaken since 2009. The most recent and reported survey is April 2021 (ABPmer, 2021c);
- **The Mostyn Energy Park Biotope Survey:** The Mostyn Energy Park Biotope Survey was undertaken in November 2012 jointly by staff members from both ABPmer and NRW. The survey extent approximately covered the Port of Mostyn Statutory Harbour Area (Port of Mostyn, 2013);
- **Mostyn Deep and Welsh Channel Benthic Surveys 2003-2005:** Subtidal invertebrate grab sampling at a total of 10 sites in the Mostyn Deep and Welsh Channel in May 2003 and 8 sites in the Mostyn Deep in August 2002 by Hydrosurveys using a 0.1 m^2 grab. The purpose of these surveys was to provide environmental baseline data for a proposed dredge disposal area in Mostyn Deep (Hydrosurveys, 2002, Hydrosurveys, 2003). Further surveys of the Welsh Channel, Mostyn Deep and the mouth of the Inner Channel were also undertaken by Cefas (September 2003), and Pelorus Surveys (August 2005) and were summarised by Unicomarine (2007); and
- **Port of Mostyn Wind Farm Service Vessel Pontoon Facility Benthic Surveys:** Subtidal grab survey to describe the benthic habitats around the Port of Mostyn Wind Farm Service Vessel Pontoon Facility development by Pelorus Surveys in May 2010 (GoBe Consultants, 2011).

Fish and shellfish

- **Quarterly Demersal Fish Surveys:** Subtidal fish surveys (involving otter and beam trawls) and quarterly intertidal surveys (involving fyke nets, seine netting and a small 1.5 m scientific light weight beam trawl) undertaken since November 2021. These surveys were conducted by ABPmer on behalf of the Port of Mostyn (ABPmer, *in prep.*);
- **Salmon and Sea Trout Catchment Data:** The latest available data on the status of the salmon and sea trout populations in the Dee catchment based on data from rod catches, stock assessments and juvenile monitoring (NRW, 2019);
- **NRW Transitional and Coastal Waters (TraC) Fish Monitoring:** The results of the most recently available WFD fish monitoring for the nearest sites in the Dee Estuary to the proposed development; and
- **Centre for Environment, Fisheries and Aquaculture Science (Cefas) Spawning and Nursery Grounds of Selected Fish Species in UK waters**: Distribution maps of the main spawning and nursery grounds for 14 commercially important species (cod, haddock, whiting, saithe, Norway pout, blue whiting, mackerel, herring, sprat, sandeels, plaice, lemon sole, sole and Norway lobster) (Ellis *et al.*, 2012).

Marine mammals

- **Dee Estuary Boat Based Marine Mammal Surveys:** Monthly vessel based marine mammal surveys which involved four transects in the Dee Estuary (at 1.5 km spacing) and four transects in the outer Dee Estuary/approaches (at 2 km spacings) between October 2020 and September 2021. These surveys were undertaken by ABPmer on behalf of the Port of Mostyn (ABPmer, *in prep.*);
- **Dee Estuary Passive Acoustic Monitoring:** Four F-PODs were successfully deployed in November 2020 at locations in the Dee Estuary (one off the Mostyn Deep, one in the channel near Hilbre Island and two in the Dee approaches). These surveys were undertaken by ABPmer on behalf of the Port of Mostyn (ABPmer, *in prep.*);
- **At-sea Distribution Data for Grey and Harbour Seals:** The latest habitat-based predictions of at-sea distribution for grey and harbour seals in the British Isles (including the Dee Estuary region) estimated using data from animal-borne telemetry tags by the Sea Mammal Research Unit (SMRU) (Carter *et al.,* 2020);
- **Special Committee on Seals Annual Report 2020:** Information on the status of seals around the UK coast is reported annually by the Sea Mammal Research Unit (SMRU) advised Special Committee on Seals (SCOS) (SCOS, 2021);
- **Atlas of the Marine Mammals of Wales:** The most comprehensive information on the distribution of marine mammals in Welsh waters is provided in the Atlas of the Marine Mammals of Wales (Baines and Evans, 2012). The study compiled and analysed data from sixteen projects including a total of 216,031 km of effort from vessel and aerial surveys and 13,399 hours of land-based effort, spanning the 20-year period 1990-2009;
- **Identification of Discrete and Persistent Areas of Relatively High Harbour Porpoise Density in the Wider UK Marine Area:** The report presents the results of 18 years of survey data in the Joint Cetacean Protocol (JCP) undertaken to inform the identification of discrete and persistent areas of relatively high harbour porpoise density in the UK marine area (Heinänen and Skov, 2015);
- **Small Cetaceans in European Atlantic Waters and the North Sea (SCANS) III**: Cetacean surveys to estimate the abundance of cetacean species in shelf and oceanic waters of the European Atlantic undertaken in 2016. Teams of observers searched along 60,000 km of transect line, recording thousands of groups of cetaceans from 19 different species. The survey (SCANS-III) is the third in a series that began in 1994 (SCANS) and continued in 2005 (SCANS-II) (Hammond *et al.*, 2017); and

- **Bottlenose dolphin and harbour porpoise monitoring in Cardigan Bay and Pen Llŷn a'r Sarnau Special Areas of Conservation**: Summary document that reports on the condition of bottlenose dolphins and harbour porpoises in both the Cardigan Bay and Pen Llyn a'r Sarnau SACs (Lohrengel *et al*, 2016).

Coastal waterbirds

- **Port of Mostyn Ornithology Surveys:** The most recent phase of coastal waterbirds surveys were undertaken from September 2017 to April 2021. The surveys involved monthly counts at high water and low water undertaken within established Wetland Bird Survey (WeBS) sectors (Mostyn Dock, Ffynnongroyw Bay South, Ffynnongroyw Bay North and Point of Ayr) (Figure 7). These surveys follow on from previous surveys undertaken from November 2009 to March 2016 on a monthly basis of the Ffynnongroyw Bay South and Mostyn Dock Shore WeBS Core Count counts sectors as well as subdivision sectors which focused on key roosting and foraging areas around the Port; and
- **Wetland Bird Survey (WeBS) Core Counts Data**: Core count data for data for Ffynnongroyw Bay South and Mostyn Dock Shore which overlap with the proposed development. The most recent 5-years of data available from the British Trust for Ornithology (BTO) (2015/16 to 2019/20) will be analysed. In addition, estuary wide WeBS data for the Dee Estuary for the same period will also be reviewed to provide contextual information (Frost *et al*., 2021).

Figure 7. Coastal waterbird count sectors

Study area

The study area is the extent over which potential direct and indirect effects of the MEP Extension and ongoing maintenance dredge works may occur during construction and operation. The direct effects on nature conservation and marine ecology receptors are those that occur within the footprint of the proposed development, such as the direct disturbance to benthic habitats and associated species as a result of the capital dredge works. Indirect effects are those that may arise outside this footprint, such as potential noise and visual disturbance effects on waterbirds during construction. The study area for the nature conservation and marine ecology topic is considered to be the body of water and intertidal areas comprising the Dee Estuary, particularly the subtidal and intertidal areas around Mostyn, as well as the existing licensed disposal sites at the Mostyn Deep (IS102) and the Mostyn Breakwater (IS103), and the adjacent coastline. The nature conservation and marine ecology ES chapter will, through further analysis and assessment, refine the study area for the purposes of the impact assessment.

Nature conservation sites

The Dee Estuary is an area of high conservation value and is designated under a range of national and international nature conservation legislations. The proposed development and marine disposal sites (Mostyn Deep (IS102) and Mostyn Breakwater (IS103)) are located within the Dee Estuary Special Protection Area (SPA), Special Area of Conservation (SAC) and Ramsar Site (Figure 8). They are also adjacent to the Liverpool Bay SPA (Figure 8).

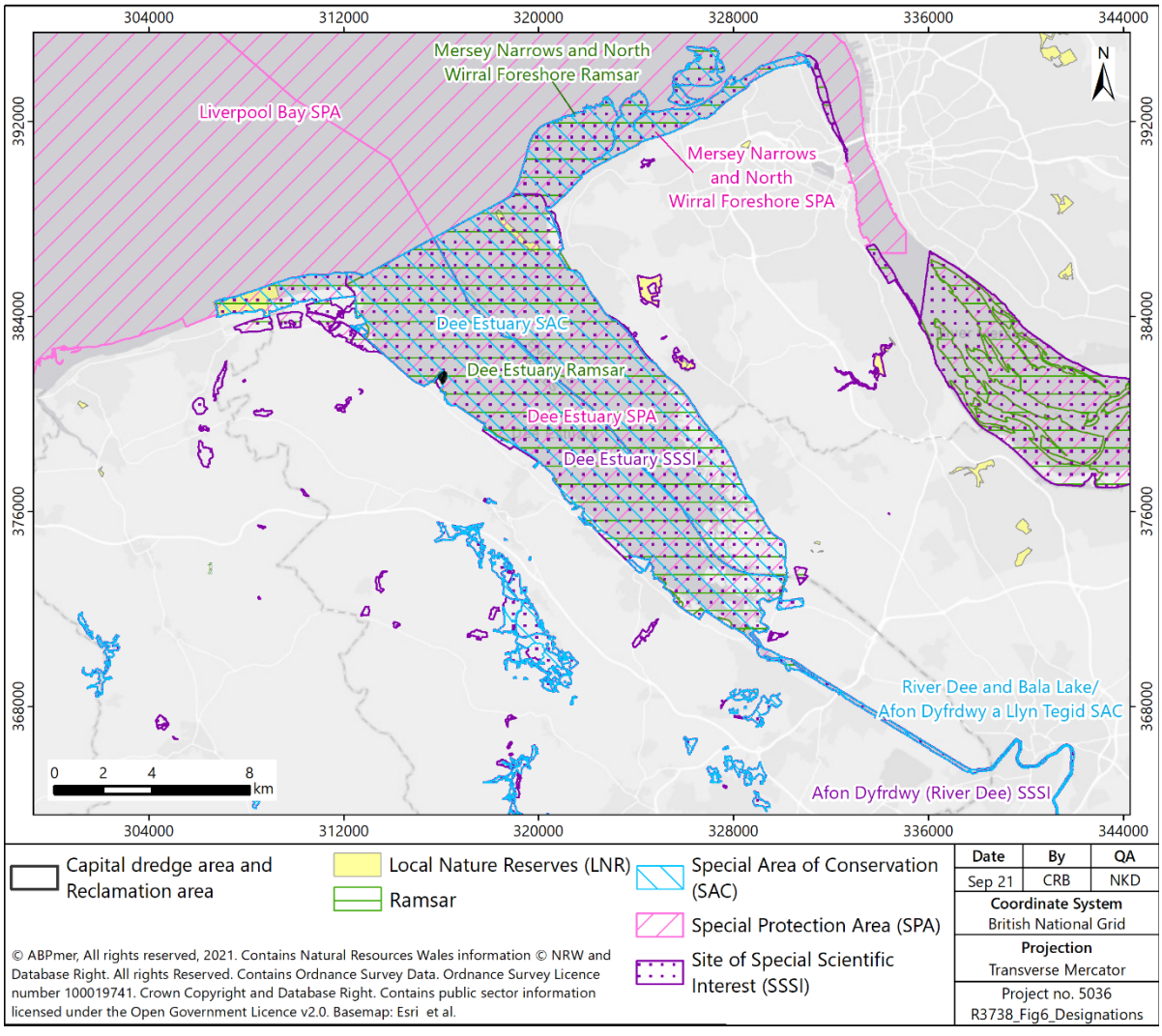

Figure 8. Location of protected sites

Table 8 to Table 10 show the qualifying features of these European and internationally designated sites. In addition, the Mersey Narrows and North Wirral Foreshore SPA and Ramsar site are located approximately 8 km away. These sites support a variety of coastal waterbird species. The River Dee and Bala Lake/ Afon Dyfrdwy a Llyn Tegid SAC is located approximately 16 km away from the proposed development. This site supports a variety of species including migratory fish species (Atlantic salmon, sea lamprey and river lamprey).

Table 8. Qualifying features of the two Special Protection Areas in the vicinity of the proposed development

Internationally Important Populations Within the Dee Estuary SPA	
Internationally Important Populations of Regularly Occurring Annex I Species (Article 4.1)	
Breeding Population (5 year peak mean 1994 -1999)	
Little Tern	69 (2.9 % of the GB Population)
Common Tern	392 (3.2 % of the GB Population)
Wintering Population (5 year peak mean 1994 -1999)	
Bar-tailed Godwit	1,150 (2.2 % of the GB Population)
On passage Population (5 year mean 1994 -1999)	
Sandwich tern	957 (2.3 % of the GB Population)
Internationally Important Populations of Regularly Occurring Migratory Species (Article 4.2)	
Wintering Population (5 year peak mean 1994-1999)	
Pintail	5,407 (9 % of the North-western Europe Population)
Teal	5,251 (1.3 % of the North-western Europe Population)
Dunlin	27,769 (2 % of the Northern Siberia/Europe/Western Africa population)
Knot	12,394 (3.5 % of the North-eastern Canada/Greenland/Iceland/ North-western Europe Population)
Oystercatcher	22,677 (2.5 % of the Europe and Northern/Western Africa Population)
Black-tailed Godwit	1,747 (2.5 % of the Icelandic Breeding Population)
Curlew	3,899 (1.1 % of the European Breeding Population)
Grey Plover	1,643 (1.1 % of the Eastern Atlantic Wintering Population)
Shelduck	7,725 (2.6 % of the North-western Europe Population)
Redshank	5,293 (3.5 % of the Eastern Atlantic Wintering Population)
On passage Population (5 year peak mean 1994-1999)	
Redshank	8,795 (5.9 % of the Eastern Atlantic Wintering Population)
Internationally Important Assemblage of Waterfowl (Article 4.2)	
Wintering waterfowl assemblage	120,726 waterfowl
Internationally Important Populations Within the Liverpool Bay SPA	
Internationally Important Populations of Regularly Occurring Annex I Species (Article 4.1)	
Breeding Population	
Little Tern	130 occupied nests (2.9 % of the GB Population)
Common Tern	180 pairs (1.8 % of the GB Population)
Wintering Population	
Red-throated Diver	1,171 (6.9 % of the GB Population)
Little Gull	319 (% of population not assessed)
Internationally Important Populations of Regularly Occurring Migratory Species (Article 4.2)	
Wintering Population	
Common Scoter	56,679 (10.4 % of the North West European Population)
Internationally Important Assemblage of Waterfowl (Article 4.2)	
Wintering waterfowl assemblage	69,687 waterfowl

Table 9. Qualifying features of the Dee Estuary Ramsar Site

Ramsar Criterion	
Ramsar Criterion 1 – Internationally important wetland habitat	
Extensive intertidal mud and sand flats (20 km by 9 km) with large expanses of saltmarsh towards the head of the estuary.	Also present are the Habitats Directive Annex I features: Estuaries; Mudflats and sandflats not covered by seawater at low tide; Annual vegetation of drift lines; Vegetated sea cliffs of the Atlantic and Baltic coasts; *Salicornia* and other annuals colonising mud and sand; Atlantic salt meadows (*Glauco-Puccinellietalia maritiame*); Embryonic shifting dunes; Shifting dunes along the shoreline with *Ammophila arenaria* ("white dunes"); Fixed dunes with herbaceous vegetation ("grey dunes"); and Humid dune slacks.
Ramsar Criterion 2 – Supports populations of vulnerable or endangered species	
Natterjack Toad, *Epidalea calamita*	Breeding colony in Red Rocks SSSI dune system
Ramsar Criterion 5 - Assemblages of international importance waterbirds	
Wintering Population (5 year peak mean 1994-1999)	
Wintering waterfowl assemblage	120,726 waterfowl
Ramsar Criterion 6 - Species/populations occurring at levels of international importance	
Spring/Autumn Population (5 year peak mean 1994-1999)	
Redshank	8,795 (5.9% of the Eastern Atlantic Population)
Wintering Population (5 year peak mean 1994-1999)	
Teal	5,251 (1.3% of the North-western Europe Population)
Shelduck	7,725 (2.6% of the North-western Europe Population)
Oystercatcher	22,677 (2.5% of the Europe and Northern/Western Africa population)
Curlew	3,899 (1.1% of the Europe Population)
Pintail	5,407 (9% of the North-western Europe Population)
Grey Plover	1,643 (1.1% of the GB Population)
Knot	12,394 (3.5% of the GB Population)
Dunlin	27,769 (2% of the European Breeding Population)
Black-tailed Godwit	1,747 (2.5% of the Icelandic Breeding Population)
Bar-tailed Godwit	1,150 (1.2% of the Europe Population)
Redshank	5,293 (3.5% of the Eastern Atlantic Population)

Table 10. Qualifying features of the Dee Estuary Special Area of Conservation

SAC Qualifying Features
Annex I habitats that are primary reason for selection
Mudflats and sandflats not covered by seawater at low tide
Salicornia and other annuals colonising mud and sand
Atlantic salt meadows (*Glauco-Puccinellietalia maritiame*)
Annex I habitats present as a qualifying feature, but not a primary reason
Estuaries
Annual vegetation of drift lines
Vegetated sea cliffs of the Atlantic and Baltic coasts
Embryonic shifting dunes
Shifting dunes along the shoreline with *Ammophila arenaria* ("white dunes")
Fixed dunes with herbaceous vegetation ("grey dunes")
Humid dune slacks

SAC Qualifying Features
Annex II species present as a qualifying feature, but not a primary reason
Sea lamprey *Petromyzon marinus*
River lamprey *Lampetra fluviatilis*
Petalwort *Petalophyllum ralfsii*

The project is located within the Dee Estuary/Aber Afon Dyfrdwy SSSI (see Figure 8). The qualifying features of this site are summarised in Table 11.

Table 11. Qualifying features of the two SSSIs in the vicinity of the proposed development

SSSI	Qualifying Feature
Dee Estuary/ Aber Afon Dyfrdwy	Species
	Common Tern *Sterna hirundo*
	Great Cormorant *Phalacrocorax carbo*
	Redshank *Tringa tetanus*
	Bar-tailed Godwit *Limosa lapponica*
	Black-tailed Godwit *Limosa limosa islandica*
	Curlew *Numenius arquata*
	Dunlin *Calidris alpina alpina*
	Great Crested Grebe *Podiceps cristatus*
	Grey Plover *Pluvialis squatarola*
	Knot *Calidris canutus*
	Oystercatcher *Haematopus ostralegus*
	Pintail *Anas acuta*
	Ringed Plover *Charadrius hiaticula*
	Shelduck *Tadorna tadorna*
	Teal *Anas crecca*
	Wigeon *Anas penelope*
	Sandhill rustic moth *Luperina nickerlii*
	Sea lamprey *Petromyzon marinus*
	River lamprey *Lampetra fluviatilis*
	Petalwort *Petalophyllum ralfsii*
	Habitats
	Estuaries
	Intertidal mud and sandflats
	Floodplain fen (lowland)
	Hard maritime cliff and slope
	Lowland wet neutral grassland
	Reeds and swamp/other freshwater transitions
	Saltmarsh
	Vascular plant assemblage
	Hard inter-tidal habitat including rocky shores
Gronant Dunes and Talacre Warren	Species
	Sanderling *Calidris alba*
	Great Cormorant *Phalacrocorax carbo*
	Little Tern *Sterna albifrons*
	Sandwich Tern *Thalasseus sandvicensis*
	Petalwort *Petalophyllum ralfsii*

SSSI	Qualifying Feature
	An assemblage of and individual invertebrate species (including Sandhill rustic moth *Luperina nickerlii*, mining bee *Colletes cunicularis* and sand wasp *Podalonia affinisI*)
	An assemblage of dune fungal species
	Habitats
	Areas of semi-fixed/fixed sand dune grassland communities
	Dune slacks
	An assemblage of higher plants
	Saltmarsh and transitions to swamp and reedbeds

Benthic ecology

The majority of the outer Dee Estuary in which the proposed development and marine disposal sites are situated consists of tide swept sandflat habitat with patches of muddy sand habitat and mixed substrate also present. Extensive mudflat habitat occurs along the inner Mostyn Bank with the majority of saltmarsh occurring on the upper sections of Gayton Sands and around Talacre. Small areas of rocky shore habitat and eroding clay features are also present in the Dee Estuary.

Intertidal habitats

Mudflat along the inner southern part of the Mostyn Bank in the vicinity of the Port of Mostyn, generally has a high number of taxa and species, characterised by typical mud dwelling species such as the bivalves (peppery furrow shell *Scrobicularia plana*, common cockle *Cerastoderma edule*, Baltic tellin *Limecola balthica*), the polychaete *Hediste diversicolor*, mud snail *Peringia ulvae,* the amphipods *Corophium volutator* and *C. arenaria,* and the oligochaete *Tubificoides* spp. (CCW, 2002; Port of Mostyn, 2013; ABPmer, 2017; ABPmer, 2021).

Much of the Salisbury Bank adjacent to the Port of Mostyn consists of tide-swept sandflat habitat which consists of a clean sand substratum (with no or very low silt content) with a relatively species poor, macrofaunal community. However, areas of muddy sand habitat rich in cockles occur in several areas on the Salisbury Bank. Along with abundant cockles, previous surveys in these areas have recorded a range of species including the mud snail *P. ulvae,* Baltic tellin *L. balthica,* sand mason *Lanice conchilega,* peppery furrow shell *S. plana*, lugworm *Arenicola marina* and mud shrimps *Corophium spp*. Clumps of mussels *Mytilus edulis* attached to surface cockles have also been observed at these sites (ABPmer, 2017; ABPmer, 2021).

Rocky shore habitat is generally restricted to around Hilbre Island and the Port of Mostyn (Dargie, 2001; Port of Mostyn, 2013). The largest extent of hard substrate at the Port of Mostyn is the breakwater which comprises rock, boulders, cobbles and tipped slag deposits which grades into sand and silt closer to the lower shore. Commonly intertidal species recorded in rocky areas of the Dee Estuary include wracks *Fucus* spp., green seaweeds *Ulva* spp., the edible periwinkle *Littorina littorea,* barnacles and blue mussels *M. edulis*. The common starfish *Asterias rubens* has also been recorded on lower shore mussel beds in the area (Port of Mostyn, 2013).

Subtidal habitats

Subtidal benthic surveys in the Port of Mostyn area in 2010 recorded a subtidal community dominated by the mussel *M. edulis* (juvenile individuals) (GoBe, 2011). Mussels contributed to half of the total abundance recorded from all of the stations, whereas other species accounted for <10 % of the total abundance in the samples. Other species recorded included the polychaetes (*Nephtys hombergii, Lanice conchilega* and *Lagis korei*) and bivalves (such as *Kurtiella bidentata* and *L. balthica*) (GoBe, 2011).

Fish and shellfish

The Dee Estuary contains a varied fish fauna, with the majority common to most UK estuaries. The Dee Estuary fish assemblage comprises resident, nursery, seasonal and migratory species, typical of estuarine fish communities.

The Dee Estuary comprises nursery grounds for tope shark *Galeorhinus galeus*, thornback ray *Raja clavata*, herring *Clupea harengus*, cod *Gadus morhua*, whiting *Merlangius merlangus,* anglerfish *Lophius piscatorius*, sandeel *Ammodyte*s sp., plaice *Pleuronectes platessa*, as well as sole *Solea solea* and spawning grounds for cod, whiting, sandeel, mackerel *Scomber scombrus*, plaice and sole (Ellis *et al*., 2012). The Dee Estuary is also a designated sea bass *Dicentrarchus labrax* nursery area (Port of Mostyn, 2013).

Other species considered commonly occurring in the region include sand goby *Pomatoschistus minutus*, lesser weaver *Echiichthys viper,* small-spotted catshark *Scyliorhinus canicular* and flatfish species such as dab *Limanda limanda* and flounder *Platichthys flesus* (Port of Mostyn, 2013; ABPmer, *in prep*.).

Diadromous fish (which migrate between salt and fresh water) recorded in the Dee Estuary include European eel *Anguilla anguilla*, Atlantic salmon *Salmo salar,* sea trout *Salmo trutta*, river lamprey *Lampetra fluviatilis*, sea lamprey *Petromyzon marinus* and twaite shad *Alosa fallax* (Port of Mostyn, 2013).

Marine mammals

The most commonly recorded marine mammals recorded in Liverpool Bay are grey seals *Halichoerus grypus* as well as the cetaceans harbour porpoise *Phocoena phocoena* and bottlenose dolphin *Tursiops truncates*. Other species are recorded more rarely.

On the eastern (English) side of the Dee Estuary a large grey seal haul out of 300 to 800 individuals can be found on the West Hoyle sandbank adjacent to Hilbre Island (Westcott and Stringell, 2004; CCW/NE, 2010; Baines and Evans, 2012). However, grey seals do not breed at this site as it is used solely for moulting and during feeding trips (Baines and Evans, 2012). This population forms part of the greater North Wales grey seal population with individuals returning to breeding colonies either off the Pembrokeshire or south-west coast of Scotland (SCOS, 2021). Grey seals are frequently recorded foraging in the Dee Estuary (Port of Mostyn, 2013; ABPmer, *in prep*.).

High densities of harbour porpoise have also been recorded within Liverpool Bay (Heinänen and Skov, 2015; DECC, 2016). Dedicated vessel based marine mammal surveys and passive acoustic monitoring using F-PODs have recorded harbour porpoise regularly occurring in the outer Dee Estuary and approaches (ABPmer, *in prep*.).

Bottlenose dolphins are also occasionally recorded near the mouth of the Dee Estuary and along the North Wales coast (Port of Mostyn, 2013; ABPmer, *in prep*.). Data suggest that individuals from the Cardigan Bay population leave Cardigan Bay in the winter, moving north towards the Isle of Man and Liverpool Bay and a large proportion of these have been positively matched to the Cardigan Bay population (Lohrengel and Evans, 2016).

Coastal waterbirds

The Dee Estuary is one of the most important estuaries in Britain for its populations of waterbirds and is also important in a European context, supporting internationally important bird populations (Frost *et al*., 2021). The results of monthly coastal waterbirds surveys commissioned by the Port of Mostyn

undertaken from September 2017 to April 2021 (during high and low water periods) for the count sectors which overlap with the Port of Mostyn (Ffynnongroyw Bay South and the Mostyn Dock) (Figure 7) have been summarised below.

The Ffynnongroyw Bay South count sector covers the inner section of the Mostyn Bank to the west of the Mostyn Dock. In total, 33 coastal waterbird species were recorded using the sector including a range of wading bird species in large numbers. This included nationally important numbers of both Black-tailed Godwit and Knot during low water surveys (4-year mean peak counts of approximately 2,000 birds).

Nationally important numbers of Redshank and Oystercatcher were also recorded during both high water (4-year mean peak counts of 1,031 and 4,150 birds respectively) and low water surveys (4-year mean peak counts of 1,850 and 4,645 birds respectively). Dunlin, as well as lower numbers of other waders, including Turnstone, Lapwing and Ringed Plover, were also recorded feeding and roosting in the area. With respect to duck species, Shelduck (4-year mean peak count of 450 birds during high water surveys and 260 birds during low water surveys) as well as Pintail and Teal (4-year mean peak counts of approximately 140 and 90 birds respectively during both high and low water surveys) were the main species recorded.

The main roost within this area of the Mostyn Bank is the upper foreshore between Mostyn and Ffynnongroyw (known as count sector 'H'). This roost is used extensively by waders, particularly Oystercatcher, Knot and Redshank. Waterbirds (mainly Oystercatcher and Redshank) have also been recorded roosting in flocks along the rock ledge on the North West side (downstream) of the Port breakwater usually at mid-high water.

The main feeding area for wading birds such as Oystercatcher and Redshank were the mudflat habitat of the Mostyn Bank and Salisbury Bank near the Approach Channel in the northern section of this area.

The intertidal habitat to the east of the Port of Mostyn (The Mostyn Dock Shore sector) was used by a total of 36 coastal waterbird species. The most common species were Oystercatcher and Redshank with the largest counts occurring during high water (4-year mean peak counts of 2,074 birds and 1,077 birds, respectively). Oystercatcher in this area predominantly roost on the shingle beach below Warwick Chemicals (Sector D). Redshank which were recorded in nationally important numbers, predominantly roost on the pebble beaches and boulder areas on the eastern side of the Mostyn Dock (Sector G).

Other wading birds recorded roosting and feeding in this area included Knot, Lapwing and Curlew. Waders roosting in this area often undertake short flights to the sandbanks on and around Salisbury Middle as they become exposed during low water for foraging. The most numerous duck species during the monitoring period in this sector was Shelduck which was recorded in nationally important numbers (4-year mean peak count of 813 birds recorded during the low water surveys).

Future baseline

If the proposed development were not to take place, nature conservation and marine ecology receptors, namely protected sites, benthic ecology, fish and shellfish, marine mammals and coastal waterbirds, will continue to be influenced by natural and human-induced variability, ongoing cyclic patterns and trends. The future baseline will also be influenced by climate change, ocean acidification and increases in non-native species. These could lead to changes in distribution, abundance, health and reproduction in marine species, potentially affecting future populations.

5.4.3 Possible environmental impacts

The proposed development has the potential to affect nature conservation and marine ecology receptors during both construction and operation. The nature conservation and marine ecology ES chapter will set out the assessment of the likely changes to be generated by the MEP Extension Project, both beneficial and adverse and during both the construction and operational phases.

Scoped in

The potential impact pathways during the construction phase are as follows:

Benthic ecology

- Direct loss of intertidal habitat as a result of capital dredging;
- Direct loss of intertidal and subtidal habitats and species as a result of the new quay wall;
- Direct changes to benthic habitats and species as a result of capital dredging and dredge disposal;
- Changes in water and sediment quality during capital dredging and dredge disposal;
- Underwater noise and vibration disturbance during construction; and
- Introduction and spread of non-native species.

Fish and shellfish

- Direct loss of intertidal habitat a result of capital dredging;
- Direct loss or changes to fish populations and habitat as a direct result of capital dredging and dredge disposal;
- Changes in water and sediment quality during capital dredging and dredge disposal; and
- Underwater noise and vibration disturbance during construction.

Marine mammals

- Underwater noise and vibration disturbance during construction.

Coastal waterbirds

- Direct loss of intertidal feeding and roosting habitat a result of capital dredging;
- Direct loss and change to feeding and roosting habitat a result of the new quay wall;
- Changes to foraging and roosting habitat as a result of capital dredging and dredge disposal; and
- Airborne noise and visual disturbance during construction.

The potential impact pathways during the operational phase are as follows:

Benthic ecology

- Direct changes to benthic habitats and species as a result of sediment removal and deposition during operation (specifically maintenance dredging, dredge disposal and due to operational berth vessel movements);
- Indirect changes to benthic habitats and species as a result of changes to hydrodynamic and sedimentary processes during operation;
- Changes in water and sediment quality during operation;
- Underwater noise and vibration disturbance during operation; and
- Introduction and spread of non-native species.

Fish and shellfish

- Changes to fish populations and fish habitat during operation (as a result of maintenance dredging, dredge disposal and operational berth vessel movements);
- Changes in water and sediment quality during operation; and
- Underwater noise and vibration disturbance operation.

Marine mammals

- Underwater noise and vibration disturbance during operation.

Coastal waterbirds

- Changes to foraging and roosting habitat during operation (as a result of maintenance dredging, dredge disposal and operational berth vessel movements); and
- Airborne noise and visual disturbance during operation.

Potential cumulative effects on nature conservation and marine ecology receptors could arise as a result of other coastal and marine developments in the area, as well as ongoing activities. These will be considered as part of the cumulative and in-combination assessment (Section 4.2.6).

Scoped out

The following impact pathways during the construction phase are proposed to be scoped out of the EIA:

Fish, marine mammals and coastal waterbirds

- **Changes to seabed habitats and species as a result of sediment deposition during the construction of the new quay wall**: Piling has the potential to result in the localised resuspension of sediment as a result of seabed disturbance. The amount of sediment that settles out of suspension back onto the seabed as result of piling is expected to be negligible. This impact pathway has, therefore, been scoped out of the assessment for fish, marine mammals and coastal waterbirds in terms of changes to supporting habitat and prey resources;
- **Indirect changes to seabed habitats and species as a result of changes to hydrodynamic and sedimentary processes due to the presence of the new quay wall**: The new quay wall has the potential to result in changes to hydrodynamic and sedimentary processes (e.g. flow rates, accretion and erosion patterns). However, such effects are anticipated to be negligible and highly localised (which will be confirmed by the physical processes assessment) and marine habitats and species are not expected to be sensitive to this level of change. This impact pathway has, therefore, been scoped out of the assessment for fish, marine mammals and coastal waterbirds in terms of changes to supporting habitat and prey resources. The physical processes assessment (Section 5.2) will determine the scale/magnitude of these indirect changes and confirm if this impact pathway requires any further consideration in the nature conservation and marine ecology assessment at the ES stage; and
- **Changes in water and sediment quality during the construction of the new quay wall**: The expected negligible, highly localised and temporary changes in suspended sediment levels (and related changes in sediment bound contaminants and dissolved oxygen) associated with bed disturbance during piling is considered unlikely to produce adverse effects in any marine species. This impact pathway has, therefore, been scoped out of the assessment for fish, marine mammals and coastal waterbirds. The physical processes assessment (Section 5.2) and water and sediment quality assessment (Section 5.3) will determine the scale/magnitude of these changes and confirm if this impact pathway requires any further consideration in the nature conservation and marine ecology assessment at the ES stage.

In addition, the following pathways during both the construction and operational phase are proposed to be scoped out of the EIA:

Marine mammals

- Changes to marine mammal foraging habitat and prey resources during dredging and dredge disposal (both capital and maintenance) and operational berth vessel movements: There is the potential for impacts to marine mammals as a result of changes to marine mammal foraging habitat and prey resources. However, the footprint of the proposed development only covers a highly localised area that constitutes a negligible fraction of the known ranges of local marine mammal populations. This impact pathway has, therefore, been scoped out of the assessment;
- **Collison risk during construction and operation**: Vessels involved in construction, dredging activity or berth operations will be mainly stationary or travelling at low speeds, making the risk of collision low. Furthermore, the region is already characterised by vessel traffic. Marine mammals foraging within the Dee Estuary routinely need to avoid collision with vessels and are, therefore, considered well adapted to living in an environment with high levels of vessel activity. This impact pathway has, therefore, been scoped out of the assessment; and
- **Water quality impacts during dredging and dredge disposal (both capital and maintenance) and operational berth vessel movements**: The plumes resulting from dredging would be expected to have a relatively minimal and local effect on SSC in the vicinity of the proposed development. Marine mammals in the Dee Estuary are well adapted to turbid and low visibility conditions and, therefore, not sensitive to the scale of changes in SSC anticipated during capital dredging (Todd *et al.*, 2015). Any temporary and localised changes in water column contamination levels are considered unlikely to produce any lethal and sub-lethal effects in these highly mobile species (the concentrations required to produce these effects are generally acquired through long-term, chronic exposure to prey species in which contaminants have bioaccumulated) (Todd *et al.*, 2015). The potential for water quality impacts to marine mammals has, therefore, been scoped out of the assessment. The physical processes assessment (Section 5.2) will determine the scale/magnitude of changes in SSC and confirm if this impact pathway requires any further consideration in the nature conservation and marine ecology assessment at the ES stage.

5.4.4 Further assessment work required

The significance of the above impact pathways will be assessed within the ES using the proposed impact assessment methodology (Section 4.2). In accordance with published guidance, the assessment will include a detailed evaluation of the importance/value and sensitivity of relevant marine ecology receptors at the site, as well as details of proposed mitigation measures to avoid or reduce any significant adverse effects. This will have specific reference to the CIEEM's latest guidelines for ecological impact assessment in the UK and Ireland (which consolidate advice for terrestrial, freshwater and coastal environments) (CIEEM, 2018). These updated guidelines combine the Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal, 2nd edition (CIEEM, 2016) and the Guidelines for Ecological Impact Assessment in Britain and Ireland: Marine and Coastal (IEEM, 2010), with the aim to promote good practice by ecologists, encourage a scientifically rigorous and transparent approach and create a common framework for ecological impact assessment (EcIA).

It is recognised that there are important linkages between the nature conservation and marine ecology topic and other EIA topics. For example, the assessment of indirect impacts on nature conservation and marine ecology receptors will be informed by the outcomes of the physical processes (Section 5.2) and water and sediment quality assessments (Section 5.3).

Information will also be provided to enable the competent authority to undertake an AA, assessing the effects of the proposed development on the interest features of European/Ramsar sites. This HRA will be provided as a technical appendix to the ES (Section 3.8.3).

Survey requirements

Site specific fish, marine mammal or waterbird surveys are not considered to be necessary for the MEP Extension Project given that the existing available data sources are adequate for the purposes of characterising these receptors in the study area as part of the EIA and HRA. The site-specific surveys and studies that are proposed to be carried out to inform the impact assessment are described in the following sections.

Subtidal benthic habitat survey

A benthic survey will be undertaken to characterise the benthic fauna within the footprint of the proposed development. It is currently proposed that up to six stations are sampled within the reclamation and proposed dredge areas. The indicative location of these stations is shown in Figure 9.

Figure 9. Proposed subtidal and intertidal survey sampling locations

Benthic samples will be collected using a 0.1 m^2 Day Grab for macrofauna analysis (faunal composition, abundance and biomass). An additional sample will be taken at each station for determination of particle size analysis (PSA) and total organic carbon (TOC).

At each site, up to three attempts will be made to retrieve a suitable sample (i.e. a grab containing sufficient volume of sediment for analysis). The sediment depths within the grab that will be used for sample acceptance are a minimum of 7 cm for muddy or soft sediments and 5 cm for hard packed or coarse sediments. Anything less than these values will only be retained if no other viable sample can be collected. Samples will be sieved and fixed on the vessel and sent to an accredited Marine Biological Analytical Quality Control (NMBAQC) laboratory within five hours of collection.

Intertidal benthic habitat survey

In order to characterise the intertidal benthic community present in the vicinity of the proposed marine works, an intertidal sampling survey will be undertaken using a dedicated two-person hovercraft to access the shoreline safely. It is proposed that seven stations are sampled (Figure 9).

At each of these stations, a sample will be collected using a 0.01 m^2 hand-held corer (to a depth of approximately 15 cm) and analysed for macrofaunal analysis (faunal composition, abundance and biomass). An additional core sample will also be collected at each station for PSA and TOC.

Field notes will also be made about the nature of the habitats at each of the sampling points. Information recorded will include details on the sediment type, evidence of bird feeding (e.g. footprints), the specific characteristics of the habitat at the precise point where the samples will be retrieved and general characteristics of the wider habitat. A photographic record of the sediment type and the broader habitat appearance will also be taken. Samples will be sent to an accredited NMBAQC laboratory to be analysed.

In order to better understand the distribution of intertidal habitats within the footprint of the proposed development, a Phase 1 intertidal habitat survey will also be undertaken of the existing quay wall adjacent to the proposed reclamation and proposed dredge areas. Standardised mapping methodology will be applied (Wyn and Brazier, 2001; Wyn *et al*., 2000) and Marine Habitat Classification for Britain & Ireland (MHCBI) will be used to define biotopes according to class levels 4 or 5. This survey will also help confirm the presence of any protected or nationally rare marine habitats or species.

Underwater noise modelling

Underwater noise modelling will be undertaken to assess the potential effects of underwater noise associated with the proposed development (i.e. piling, dredging and vessel movements). In accordance with good practice guidance (National Physics Laboratory (NPL), 2014), a simple logarithmic spreading model will be used to predict the propagation of sound pressure with range. This model is represented by a logarithmic equation and will incorporate factors for noise attenuation and absorption losses based on empirical data from coastal environments. The advantage of this model is that it is simple to use and quick to provide first order calculations of the received (unweighted) sound pressure levels (SPL) with distance from the source due to geometric spreading.

Although the logarithmic spreading model generally represents a simplistic model of propagation loss, its use is an established approach in EIAs that has been widely accepted by UK regulators for recent port and waterfront developments. Furthermore, the National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service (NMFS) in the United States recommends the use of the practical spreading model to developers and has incorporated this model in their pile driving calculation spreadsheet to assess the potential impacts of pile driving on fish (NMFS, 2021). In addition, NOAA's

(2021) has developed a user spreadsheet tool for assessing the potential effects of different types of noise activities on marine mammals which is based on the simple logarithmic spreading model.

The proposed piling and dredging works will be in very shallow water, with some being over the intertidal zone and, therefore, the propagation of noise will be limited. Furthermore, the proposed piling is located on the inshore (easterly) side of the existing breakwater at the Port of Mostyn which is a solid structure, which will act to reflect and absorb sound waves, and thus constrain and limit to some extent the propagation of underwater noise in this area. Overall, therefore, a simple logarithmic spreading model is considered proportionate and appropriate to use for this underwater noise assessment.

A range of available published criteria will be used to assess the potential physiological and behavioural effects of underwater noise on key sensitive receptors in the study area (or zone of influence), including fish and marine mammals (e.g. Popper *et al.* 2014; NOAA, 2018; Southall *et al.,* 2019).

The potential significance of these effects will then be assessed in the context of the physical nature of the location, the spatiotemporal variability of underwater noise generated by the proposed development, and the baseline (ambient noise) environment. The latest available scientific literature of vibration (particle motion) effects on benthic invertebrates and fish will also be reviewed to inform the underwater noise assessment.

5.5 Fisheries

This section sets out the proposed scope of the ES chapter that will report the findings of the fisheries assessment of the proposed development.

5.5.1 Legislation, policy and guidance position

The potential effects of the proposed development on fisheries receptors will be considered in the respective topic-specific ES chapter, which will cross-reference, as appropriate, relevant policy, legislation and guidance, including:

- The Marine and Coastal Access Act 2009 (MCAA);
- The Water Framework Regulations, which implement the European WFD (2000/60/EC);
- UK Marine Policy Statement (MPS) (HM Government, 2011) as required by Section 44 of the Marine and Coastal Access Act 2009; and
- UK Fisheries Act 2020;
- UK Marine Strategy (Defra, 2019);
- Welsh National Marine Plan (Welsh Government, 2019);
- Wales Marine and Fisheries Strategic Action Plan (Welsh Government, 2013); and
- Relevant local policy (e.g. Dee Estuary Cockle Fishery Order (2008) management plan, local byelaws).

5.5.2 Description of the existing environment

Data sources

A desk-based study will be undertaken to inform the baseline characterisation on which the impact assessment will be based.

This will include the following key data sources:

- International Council for the Exploration of the Sea (ICES) Fishing Intensity Data Layers for mobile demersal gears;
- National Statistics: UK sea fisheries annual statistics report 2019, and associated data tables (MMO, 2020);
- UK fishing vessel lists: Details of registered and licensed fishing vessels over 10 metres and 10 metres and under (MMO, 2021);
- Port of Mostyn (2013). Mostyn Energy Park Development at the Port of Mostyn. Environmental Statement Volume 1 - EIA Text July 2013;
- Wales Marine Planning Portal (Welsh Government, 2021a); and
- North Western Inshore Fisheries and Conservation Authority (NWIFCA) website (NWIFCA, 2021).

Study area

The study area is the extent over which potential direct and indirect effects of the MEP Extension and ongoing maintenance dredge works may occur during construction and operation. The direct effects on fisheries are those that occur as a result of loss or restricted access to fishing grounds, or interference with fishing activities due to vessel movements associated with the proposed development. Indirect effects to the fishing sector are those that may arise as a result of impacts on stocks of target finfish and shellfish species.

The study area for the fisheries topic is considered to be the body of water and intertidal areas comprising the Dee Estuary, particularly the subtidal and intertidal areas around Mostyn, as well as the existing licensed disposal sites at the Mostyn Deep (IS102) and the Mostyn Breakwater (IS103), and the adjacent coastline.

The fisheries ES chapter will, through further analysis and assessment, refine the study area for the purposes of the impact assessment.

Landings

Landings of 3,874 tonnes of fish and shellfish, worth £8.2 million, were received at major Welsh Ports (not including Fishguard or Milford Haven)[8] in 2019 (MMO, 2020) (Table 12). Landings were dominated by shellfish, specifically whelks, which comprised 69 % of total shellfish landings and 64 % of total landings for all species (by tonnage). Whelks constituted 45 % of total shellfish value and 40 % of total landings value for all species. Lobsters, scallops and crabs also make up a large proportion of the value of shellfish landings. Demersal and pelagic fish encompassed only 6 % of total landings by volume and 9 % by value, with bass the most valuable species.

The Port of Mostyn is not a key port for landings of fish and shellfish, having received landings of only 0.28 tonnes of demersal fish in 2018 worth a total £849, and landings of 0.0004 tonnes of shellfish worth £1.01 (MMO, 2018; Welsh Government, 2021).

The Port of Mostyn is located within ICES Rectangle 35E6 from which 28.49 tonnes of demersal fish were landed with a value of £52,163 and 348.13 tonnes of shellfish with a value of £767,354 in 2018 (MMO, 2018; Welsh Government, 2021).

[8] Landings at Fishguard and Milford Haven are provided separately in the UK sea fisheries annual statistics for major ports in Wales (MMO, 2020).

Table 12. Annual average landings to major ports in Wales[9] (2019), outlined as quantity (tonnes) and value (£ '000) landed per species

Species Landed	Annual Average Quantity Landed (tonnes)	Annual Average Value of Landed Species (£ '000)
Bass	35.77	325.90
Brill	0.21	1.59
Cod	2.84	9.17
Dogfish	46.72	16.72
Flounder or Flukes	5.41	4.50
Gurnard	0.25	0.57
Haddock	3.92	2.84
Hake	3.81	4.54
Plaice	3.79	11.15
Pollack (Lythe)	0.92	0.90
Skates and Rays	109.34	125.75
Sole	16.87	192.55
Turbot	0.16	1.38
Other Demersal [(a)]	8.78	18.90
Total Demersal	**240.24**	**717.05**
Herring	0.02	0.05
Mackerel	0.23	0.74
Other pelagic	0.16	0.16
Total Pelagic	**0.41**	**0.95**
Crabs	317.35	502.70
Cuttlefish	0.03	0.10
Lobsters	157.46	2067.28
Mussels	0.96	0.81
Nephrops	10.97	31.16
Scallops	627.79	1230.54
Squid	0.00	0.04
Whelks	2498.19	3365.31
Other Shellfish	20.40	297.87
Total Shellfish	**3633.14**	**7495.81**
Total All Species	**3873.78**	**8213.80**

Source: MMO (2020)

Vessels

No vessels 10 m and under or over 10 m have the Port of Mostyn as their registered home port (MMO, 2021).

Fishing activity

There are a number of local byelaws that restrict fishing activity in the Dee Estuary (NWIFCA, 2021). These include the following:

[9] Not including the ports at Fishguard and Milford Haven.

- The North Western Inshore Fisheries and Conservation Authority (NWIFCA) Byelaw 3 Permit to Fish for Cockles and Mussels - does not allow harvesting of cockles and mussels except by hand or using hand-held rakes;
- NWIFCA Byelaw 6 Protection for European Marine Site (EMS) Features – prohibits bottom towed gear in the Dee Estuary EMS Hilbre Island *Sabellaria alveolata* reef closed area;
- NWIFCA Byelaw Restrictions on the Use of a Dredge – restricts the use of a dredge for fishing;
- NWIFCA Byelaw Prohibition of Foul Hooking – prohibits the practice of foul hooking of fish;
- National Rivers Authority (NRA) Byelaw 5 Use of Instruments- introduces spatial and temporal restrictions on the use of different gears (nets, beam trawl length, trawl headline);
- NRA Byelaw 6 Shellfishery Temporary Closure – allows the temporary closure of a shellfish bed from fishing, removal or disturbance; and
- NRA Byelaw 12 Use of Nets – Beam Trawl or Otter Trawl – restricts the type and size of trawl that can be used to fish prawns and shrimps.

Finfish activity

Based on spatial data layers of fishing intensity in 2017 by fishing method produced by ICES, there does not appear to be any scallop dredging, beam trawling, otter trawling or demersal seine fishing activity within the Dee Estuary (Welsh Government, 2021). The nearest activity is scallop dredging located in the Irish Sea offshore Rhyl, off the north coast of Wales.

It is understood that static inshore fishing gears (such as pots and nets) are not released in the Approaches to the Port of Mostyn as the navigation channels must be kept clear for vessels. There is, therefore, not expected to be any overlap with, or impact on, commercial fisheries in relation to fishing grounds (the impacts on fish ecology and navigation are considered in Sections 5.4 and 5.6 respectively).

Shellfish activity

The proposed development and marine disposal sites overlap the Dee (West) Shellfish Water Protected Area (NRW, 2021c) and the Salisbury and Salisbury Middle classification zone within the Dee bivalve mollusc production area (Cefas, 2021a). The Salisbury classification zone is currently designated as a Class A for *Cerastoderma edule* and *Mytilus* spp. between 1 August to 31 May and Class B at all other times (Cefas, 2021a; Food Standards Agency, 2021). The Salisbury Middle classification zone is currently designated as a Class A for *C. edule* between 1 August to 31 May and Class B at all other times (Cefas, 2021a; Food Standards Agency, 2021). The Class A classification is highly significant given that bivalve molluscs can only be exported to the EU, without the need for additional treatment, from Class A waters.

The cockle fishery in the Dee Estuary is subject to a Cockle Regulatory Order, introduced by the Environment Agency Wales in 2008 to regulate cockle harvesting. The cockle *Cerastoderma edule* occurs in large numbers in the Dee Estuary, with the major cockle beds on the Welsh side of the Dee Estuary found on the Mostyn Bank near Ffynnongroyw, along the Salisbury Middle and on the flats offshore from Llannerch-y-môr (Port of Mostyn, 2013). Cockle beds on the English side are located in the vicinity of Thurstaston, West Kirby and Caldy, and are managed through byelaws issued by the NWIFCA. Stock assessment surveys of the Welsh cockle beds are carried out bi-annually (April/May and Sept/Oct) by NRW.

Mussels are also present throughout the Dee Estuary, although they are more randomly distributed than cockles. Within the estuary, mussels occur on hard substrates, especially the 'artificial' rocky shores around Port of Mostyn, and the rocky shore of the Hilbre Islands as well as on the intertidal mudflats and sandflats off West Kirby and Thurstaston (Port of Mostyn, 2013). Mussel settlement may also take place on very dense cockle beds. A small mussel fishery operates within the Dee Estuary.

Future baseline

If the proposed development were not to take place, fisheries receptors will continue to be influenced by natural and human-induced variability, ongoing cyclic patterns and trends (e.g. vessel movements). The future baseline will also be influenced by climate change, ocean acidification and increases in non-native species. These could lead to changes in distribution, abundance, health and reproduction in target finfish and shellfish species, potentially affecting stocks.

In terms of the EU-UK Trade and Cooperation Agreement (TCA) that has been negotiated as part of Brexit, the pattern of fishing by EU and UK vessels is not anticipated to change significantly, and access for EU vessels to the UK's 6-12 nm zone will continue in southern Wales for another five years, and most likely beyond that. However, the access for Irish and French vessels to the 6-12 nm zone off northern Wales, ceased on 1 January 2021. Under the TCA, the UK will receive higher quota shares for some stocks, phased in over a five-year period (ABPmer, 2021d). There will be no tariffs on fish products, which will be important for businesses that export fresh and chilled fish and shellfish to the EU, as well as for EU consumers. However, there are additional trade (non-tariff) barriers, such as catch certificates which will have to be completed, as well as the ban on exports to the EU of bivalve molluscs from Class B or C waters.

5.5.3 Possible environmental impacts

The proposed development has the potential to affect fisheries during both construction and operation. The fisheries ES chapter will set out the assessment of the likely changes to be generated by the MEP Extension Project, both beneficial and adverse and during both the construction and operational phases.

Scoped in

The potential impact pathways during the construction phase are as follows:

- Interference with fishing activities due to vessel movements obstructing navigation routes to fishing grounds;
- Interference with fishing activities due to vessel movements disrupting or obstructing fishing activities;
- Loss of or restricted access to fishing grounds; and
- Potential indirect impacts on stocks of target finfish and shellfish species.

The potential impact pathways during the operational phase are as follows:

- Potential indirect impacts on stocks of target finfish and shellfish species.

Potential cumulative effects on fisheries could arise as a result of other coastal and marine developments in the area, as well as ongoing activities. These will be considered as part of the cumulative and in-combination assessment (Section 4.2.6).

Scoped out

At this current stage, there is considered to be insufficient evidence to exclude any potential pathways from further assessment within the EIA.

5.5.4 Further assessment work required

A desk-based review of the most recent information and data for commercial and recreational fishing will be undertaken. This is likely to include the following:

- Fisheries landings by UK vessels from ICES rectangles from the MMO;
- Sightings and surveillance data (if available); and
- Inshore fisheries management measures (e.g. closed areas, closed periods) which influence fishing activity and intensity within the Dee Estuary.
-

Other available sources of information include the following, although it is recognised that the data is not current:

- The National Inshore Fisheries Data Layer (NIFDL) (Cefas, 2010).

Due to the paucity and limitations of publicly available data regarding commercial and recreational fisheries, these data sources will be supplemented through consultation with commercial and recreational fishing associations, fisheries regulators and charter fishermen. A list of relevant stakeholders will be confirmed with NRW and is likely to include Welsh Fishermen's Association amongst others. Examples of the data presented in this section which will be updated, where possible, through consultation include:

- The latest information regarding the principle locations for boat and shore angling in the Dee Estuary, and species targeted;
- Vessel usage of ports in the Dee Estuary;
- Information regarding the distribution, intensity and value of inshore fisheries in the Dee Estuary; and
- The current status of the shellfish fisheries in the Dee Estuary.

5.6 Commercial and recreational navigation

This section sets out the proposed scope of the ES chapter that will report the findings of the commercial and recreational navigation assessment of the proposed development.

5.6.1 Legislation, policy and guidance position

The potential effects of the proposed development on commercial and recreational navigation will be considered in the respective topic-specific ES chapter, which will cross-reference, as appropriate, relevant policy, legislation and guidance, including:

- UK Marine Policy Statement (MPS) (HM Government, 2011) as required by Section 44 of the Marine and Coastal Access Act 2009;
- Welsh National Marine Plan (Welsh Government, 2019);
- The Port Marine Safety Code (DfT, 2016);
- A Guide to Good Practice on Port Marine Operations (DfT, 2018);
- International Maritime Organization (IMO) Revised Guidelines for Formal Safety Assessment (FSA) for use in the IMO rule making process (IMO, 2018); and
- Maritime and Coastguard Agency (MCA), Marine Guidance Notice 654 (MGN 654 Merchant + Fishing) Offshore Renewable Energy Installations (OREIs) - Guidance on UK Navigational Practice, Safety and Emergency Response (MCA, 2021).

5.6.2 Description of the existing environment

Data sources

A desk-based study will be undertaken to inform the baseline characterisation on which the impact assessment will be based. This will include the following key data sources:

- Accident and Incident data from the Marine Accident Investigation Branch (MAIB) and Royal National Lifeboat Institution (RNLI);
- Automatic Identification System (AIS) data provided by the Marine Management Organisation (MMO) for 2019; and
- Navigational features and charted information from United Kingdom Hydrographic Office (UKHO) Admiralty Charts.

Study area

The study area is the extent over which potential direct and indirect effects of the proposed development may occur during construction and operation. This study area will include the dredge area, disposal sites and the area that dredge vessels will transit during operations. This is considered to be the area of the Port of Mostyn situated within the River Dee., the Mostyn Deep disposal site (IS102) and Mostyn Breakwater disposal site (IS103) dependent on which site will be used.

The commercial and recreational navigation ES chapter will, through further analysis and assessment, refine the study area for the purposes of the impact assessment.

Statutory authorities

Mostyn Docks Ltd is the Statutory Harbour Authority (SHA) for the Port of Mostyn including the berths and immediate approach areas. The Dee Conservancy is the SHA for the remainder of the Dee Estuary. The role of SHA includes duties to regulate shipping and manage safety within the harbour area. The Port of Mostyn follows the requirements of the Port Marine Safety Code (PMSC) which provides a national standard for the management of safety at UK ports.

Mostyn Docks Ltd is also a Competent Harbour Authority (CHA) with respect to Pilotage. This allows the port to specify the requirements for vessels to take marine Pilots when navigating within the CHA area defined by The Mostyn Docks (Pilotage) Harbour Revision Order (1989)).

Mostyn Docks Ltd is also the Local Lighthouse Authority (LLA) for the SHA area under the requirements of the Merchant Shipping Act 1995. This Act requires the LLA to maintain Aids to Navigation within its SHA area and to notify Trinity House Lighthouse Service of any defects as the General Lighthouse Authority for England and Wales.

Commercial shipping activity

Riverside Quay, at the Port of Mostyn, is currently is 310 m long and sits at a depth of 6.5 m below chart datum, and a 180-metre-long Ro-Ro Terminal. Commercial vessel activity continues year-round and relates to a range of commercial sectors.

A large amount of vessel traffic is related to offshore wind with Crew Transfer Vessels (CTVs) operating for the Gwynt y Môr, North Hoyle and Constable Bank Offshore Wind Farms. CTVs are small, fast moving and highly manoeuvrable craft which transfer engineers to/from OWF turbines for maintenance.

There are also commercial vessel movements at the Port of Mostyn related to the transport of aircraft wings for the Airbus A380 which are constructed nearby. The wings are transported by a purpose-built Roll on Roll off vessel transiting between the Port of Mostyn and Toulouse, France.

Recreational activity

There is limited recreational activity within the study area and in the Dee Estuary due to no marinas or permanent moorings for recreational vessels. There is a yacht club based at West Kirby with members

sailing on the tidal River Dee during summer months, however due to the distance from the Port of Mostyn there is unlikely to be an interaction with the commercial vessel movements.

Future baseline

The future baseline scenario considers that if the proposed development were not to proceed, activity within the Port of Mostyn would continue. There is unlikely to be any short-term changes to shipping and navigation management if the project were not to proceed.

The proposed extension to the Gwynt y Môr OWF may result in increased CTV activity at the Port of Mostyn if it were to be chosen to as the base to provide operations and maintenance services.

5.6.3 Possible environmental impacts

The proposed development has the potential to affect commercial and recreational navigation during dredging, reclamation, disposal and operations. Below describes the impact pathways and/or potential effects associated with the proposed development, and the rationale for any further environmental assessment work.

Scoped in

The potential impact pathways during the construction phase are as follows:

- Contact of works craft with Port infrastructure: manoeuvring of craft in close proximity to marine structures has the potential for contact with infrastructure during site development;
- Collision of passing vessels with works craft: as passing vessels are manoeuvring around or in close proximity to the works there is the potential for collision with craft associated with construction activities;
- Collision during navigation: vessel collision with works craft whilst transiting to/from the site or during activities within the disposal site;
- Collision during towage operations: if materials for the proposed development are transported to site through the use of barges, there is potential for collision with vessels in the area; and
- Payload related incidents: if lifting operations are required from barges/vessels associated with the Project, there is potential for incidents to arise from dropped items or affected vessel stability.

The following potential impact pathways have been identified as part of the operational phase:

- Collision due to increased commercial vessel movements: vessels transiting the area involved in a collision with other port traffic;
- Contact with the quay: manoeuvring vessel contact with the berth as a result of collision avoidance, adverse weather, nature of the operation or interaction with a passing vessel; and
- Mooring breakout: There is potential for a vessel to break its moorings and leave the berth due to stress of weather, passing vessel or mooring equipment failure.

Within the PMSC, the term ‘as low as reasonably practicable’ (ALARP) is an industry wide concept applying to both health and safety and port marine safety. The core concept is that of ‘reasonably practicable’ which involves weighing up risk against the effort, time and money needed to control it. The PMSC specifically references ALARP in respect of the Marine Safety Management System (MSMS).

Following the identification of impacts and likely effects to the environment their significance will be assessed within the EIA. This will determine whether the project's residual effects will be reduced to

minor adverse or insignificant, which equates to ALARP defined as applied within the context of the PMSC.

Potential cumulative effects on navigation could arise as a result of other coastal and marine developments in the area, as well as ongoing activities. These will be considered as part of the cumulative and in-combination assessment (Section 4.2.6).

Scoped out

At this current stage, there is considered to be insufficient evidence to exclude any potential pathways from further assessment within the EIA.

5.6.4 Further assessment work required

In order to assess the potential effects of the proposed development upon commercial shipping and recreational navigation, relative to the baseline, a combination of analytical methods and expert judgement will be used. This includes a qualitative desk-based review of data obtained from the Port of Mostyn and consideration of the existing evidence base and empirical evaluation. The information to be reviewed includes:

- Accident and Incident data;
- Automatic Identification System (AIS) data;
- Vessel movement statistics; and
- Navigational features and charted information

The assessment methodology will follow the source-pathway-receptor model and the findings will be used to establish the potential magnitude of the predicted changes to the levels of marine risk and the overall significance of the likely effect of those changes. A receptor can only be exposed to a change if a pathway exists through which an effect can be transmitted between the source activity and the receptor.

5.7 Flood risk and drainage

This section sets out the proposed scope of the ES chapter that will report the findings of the flood risk and drainage assessment of the proposed development.

5.7.1 Legislation, policy and guidance position

The potential effects of the proposed development on flood risk and drainage receptors will be considered in the respective topic-specific ES chapter, which will cross-reference, as appropriate, relevant policy, legislation and guidance, including:

- National Strategy for Flood and Coastal Erosion Risk Management (Welsh Government, 2020);
- Planning Policy Wales (Welsh Government, 2021b);
- Planning Policy Wales Technical advice note (TAN) 15: development and flood risk (Welsh Government, 2004);
- The Water Framework Regulations, which implement the European WFD (2000/60/EC);
- Flood and Water Management Act 2010;
- North West and North Wales Coastal Group (2011). North West England and North Wales Shoreline Management Plan SMP2;
- River Dee Catchment Flood Management Plan (Environment Agency Wales, 2013); and
- Relevant local policy.

5.7.2 Description of the existing environment

Data sources

A desk-based study will be undertaken to inform the baseline characterisation on which the impact assessment will be based. This will include the following key data sources:

- Great Orme's Head to Solway Firth SMP22 (North West North Wales Coastal Group, 2021);
- Dee River Basin District Flood Risk Management Plan 2015 – 2021 (NRW and Environment Agency, 2016); and
- NRW's Flood Risk Map Viewer (NRW, 2021d).

Study area

The study area is the extent over which potential direct and indirect effects of the MEP Extension Project may occur during construction and operation. The direct effects on flood risk and drainage receptors are those within which the footprint of the proposed development are confined, i.e. the marine works. Indirect effects are those that may arise due to changes in the hydrodynamic (wave) environment or surface water as a result of the proposed development.

The initial study area for the flood risk and drainage topic is considered to be the area of the coastline covered by Dee Estuary Cell 11a 5 of the Great Orme's Head to Solway Firth SMP22 and the area of the Dee Estuary and adjacent land covered by the Dee River Basin District Flood Risk Management Plan (NRW and Environment Agency, 2016). The study area will also extend upstream into the adjacent watercourse to the limit of tidal influence, including any surface water discharges into this waterbody.

The flood risk and drainage ES chapter will, through further analysis and assessment (e.g. based on the findings of the FCA), refine (and potentially reduce in size) the study area for the purposes of the impact assessment.

Coast protection

In Wales, operational management of coastal protection structures lies largely with District and Unitary Councils. Under the Water Resources Act 1991, the Environment Agency is responsible for supervision of all matters relating to flood defence and has permissive powers to maintain and improve water levels on main rivers, overseeing management and funding coast protection works.

Shoreline Management Plans (SMPs) are non-statutory documents intended to both inform and be supported by the statutory planning process. The intention of an SMP is to develop a broad coast defence strategy that is technically, economically and environmentally sustainable. The coastal management policies for the area encompassing the proposed development are detailed within the Great Orme's Head to Solway Firth SMP22 (North West North Wales Coastal Group, 2021). The preferred approach for the policy unit in which the Port of Mostyn is located (Point of Ayr to Mostyn, south of Mostyn Dock 11a.5.1) is to Hold the Line (HTL) in the short term (0-20 years), medium term (20-50 years) and long-term (50-100 years) (North West North Wales Coastal Group, 2021). This will be achieved through maintaining the level of protection provided by existing defences to an adequate standard.

Flood risk

The NRW Flood Risk Maps (NRW, 2021d) indicate that the Port of Mostyn has very low risk of flooding from rivers (risk less than 0.1 % chance each year). Most of the Port has a very low risk of flooding from surface water and small watercourses (risk less than 0.1 % chance each year), although there are some

isolated small areas across the site which are considered at risk. These generally occur around building footprints and hard standing areas.

The majority of the Port has a very low risk of flooding from the sea (risk less than 0.1% each year) (NRW, 2021d). There are some isolated areas within the Port that are at higher risk of flooding from the sea and this is associated with the Dee Estuary.

Future baseline

If the proposed development were not to take place, the existing coastal defence and drainage structures within the port estate would be maintained and hydrodynamic and sedimentary processes will continue to be influenced by natural and human-induced variability, ongoing cyclic patterns and trends (e.g. ongoing maintenance dredging and disposal).

The future baseline will also be influenced by climate change. The primary way in which climate change may interact with the proposed development is through changes in storminess/storm surges, wave heights, and sea levels, posing an increased risk of coastal damage and flooding. UK Climate Projections 2018 (UKCP18) provides a range of UK climate projection tools designed to help decision-makers assess their risk exposure to climate.

5.7.3 Possible environmental impacts

The proposed development has the potential to affect flood risk and drainage receptors during construction and operation. The flood risk and drainage ES chapter will set out the assessment of the likely changes to be generated by the MEP Extension Project, both beneficial and adverse and during both the construction and operational phases.

Scoped in

The potential impact pathways during the construction phase are as follows:

- Vulnerability to flood events during construction.

The potential impact pathways during the operational phase are as follows:

- Changes to current and future flood risk during operation; and
- Adaptation to future climate change allowing operations to continue.

The flood risk and drainage assessment will also include consideration of the vulnerability of the proposed development to climate change.

Potential cumulative effects on flood risk and drainage could arise as a result of other coastal and marine developments in the area, as well as ongoing activities. These will be considered as part of the cumulative and in-combination assessment (Section 4.2.6).

Scoped out

The following impact pathways are proposed to be scoped out of the EIA:

- **Interference with other coastal flood risk management assets during operation** – The proposed development will not interfere with the operation of other flood defences and, therefore, this impact pathway does not require further assessment.

5.7.4 Further assessment work required

A Flood Consequence Assessment (FCA) will be prepared to support the marine licence application for the MEP Extension Project. This will incorporate contingency plans to deal with the risk of flooding during construction. The FCA will form a standalone document and will be provided as an appendix to the ES (see Section 3.8.7). The flood risk and drainage chapter of the ES will draw upon the information within the FCA (which will include information on how surface water will be managed on the site) as necessary.

The flood risk and drainage assessment and the FCA will follow the requirements and guidance found in TAN 15: development and flood risk (Welsh Government, 2004) which accompanies the Planning Policy Wales (Welsh Government, 2021b). In accordance with the Planning Policy Wales, the FCA will be proportionate to the risk and appropriate to the scale, nature and location of the proposed development.

5.8 Cultural heritage and archaeology

This section sets out the proposed scope of the ES chapter that will report the findings of the cultural heritage and archaeology assessment of the proposed development.

5.8.1 Legislation, policy and guidance position

The potential effects of the proposed development on cultural heritage and archaeology will be considered in the respective topic-specific ES chapter, which will cross-reference, as appropriate, relevant policy, legislation and guidance, including:

- Ancient Monuments and Archaeological Areas Act 1979;
- Planning (Listed Buildings and Conservation Areas) Act 1990;
- Historic Environment (Wales) Act 2016
- The Marine and Coastal Access Act 2009;
- Merchant Shipping Act 1995;
- The Protection of Wrecks Act 1973;
- Protection of Military Remains Act 1986;
- Planning Policy Wales (Welsh Government, 2021);
- Planning Policy Wales Technical Advice Note (TAN) 24: The Historic Environment (Welsh Government, 2017);
- Welsh National Marine Plan (Welsh Government, 2019);
- Cadw best-practice guidance on the historic environment (Cadw, 2021); and
- Relevant local policy.

5.8.2 Description of the existing environment

Data sources

A desk-based study will be undertaken to inform the baseline characterisation on which the impact assessment will be based. This will include the following key data sources:

- United Kingdom Hydrographic Office (UKHO) wreck database;
- Historic Environment Records (HER) held by Archwilio (2021); and
- Listed buildings, scheduled monuments, World Heritage Sites (WHS), protected wrecks, registered historic landscapes available on the Lle Geoportal (Lle Geo-Portal, 2021); and
- National Monuments Record of Wales (Coflein, 2021).

Study area

The study area is the area over which potential direct and indirect effects of the MEP Extension and ongoing maintenance dredging may occur during construction and operation. The effects on potential cultural heritage and archaeological features are those relating to the excavation or direct physical impact of previously undisturbed sediment within the footprint of the proposed development, i.e. piling for the new quay wall and capital dredging. Indirect effects are those that may arise due to wider changes in the hydrodynamic and sedimentary regime, and any change to the estuary morphology, as a result of the proposed development.

The study area for the cultural heritage and archaeology topic comprises the marine and landside works associated with the proposed development and a 500 m buffer zone. This will be used to capture the relevant data on designated and non-designated archaeological assets, and to provide the necessary context for understanding archaeological potential and heritage significance of assets that may be affected by the proposed development.

The cultural heritage and archaeology ES chapter will, through further desk-based review and assessment, refine the study area for the purposes of the impact assessment.

Geology

Originally the Dee Estuary was an over-deepened glacial valley formed in the late Pleistocene. The English coastline (Wirral) of the estuary is mainly Triassic age, primarily Sandstone and Conglomerate interbedded. There are moderate boulder clay cliffs located along the foreshore which fall away moving inland. A more resistant sandstone outcrop, known as Hilbre Island, is located near to the northern estuary mouth. In contrast, the Welsh side (Flintshire) is dominated by geology formed approximately 313 to 326 million years ago in the Carboniferous period. The Carboniferous limestone forms steep hillsides at the coastline (Gresswell, 1964). Deposited surface material throughout the estuary overlays the solid geology by between 20 and 30 m in some locations (Olds and Davison, 2009), composed mainly of glacial till (Sand and gravel), outwash deposits and Holocene alluvium (Pye, 1996).

Prehistoric archaeology

Bathymetric data and the sea-level change models suggest the Dee Estuary is likely to have become fully inundated by the Neolithic, silting up since the 11th century (Marker, 1967). Prehistoric land use of the banks of the river is, therefore, likely to have occurred between the end of the Late Glacial and late Mesolithic.

Maritime archaeology

Maritime archaeological sites can be considered to comprise two broad categories; the remains of vessels that have been lost as a result of stranding, foundering, collision, enemy action and other causes, and those sites that consist of vessel-related material. Wreck related debris includes (but is not limited to) equipment lost overboard or deliberately jettisoned such as fishing gear, ammunition and anchors or the only surviving remains of a vessel such as its cargo or a ballast mound. Shipwrecks on the seabed provide an insight on the types of vessels used in the past, the nature of shipping activity in the wider area and the changing usage of the marine environment through different periods. Such remains are considered more likely in sediments which promote the preservation of wreck sites (e.g. finer grained sediments that are not subject to high levels of mobility), particularly where such sediments have seen limited, recent disturbance.

The potential for wrecks within the River Dee spans more than 2,000 years ago starting with the Romans who established in the ancient port of Chester (Mannering, 1997). From the 1600's, the Dee provided a route to transport troops, provisions and equipment for military expeditions to and from Ireland. Initially Milford Haven was used, but the River Dee had to be used to allow for the amount of sailing vessels required to transport troops and equipment. The recorded wrecks that overlap or are in the vicinity of the proposed development are shown on Figure 10.

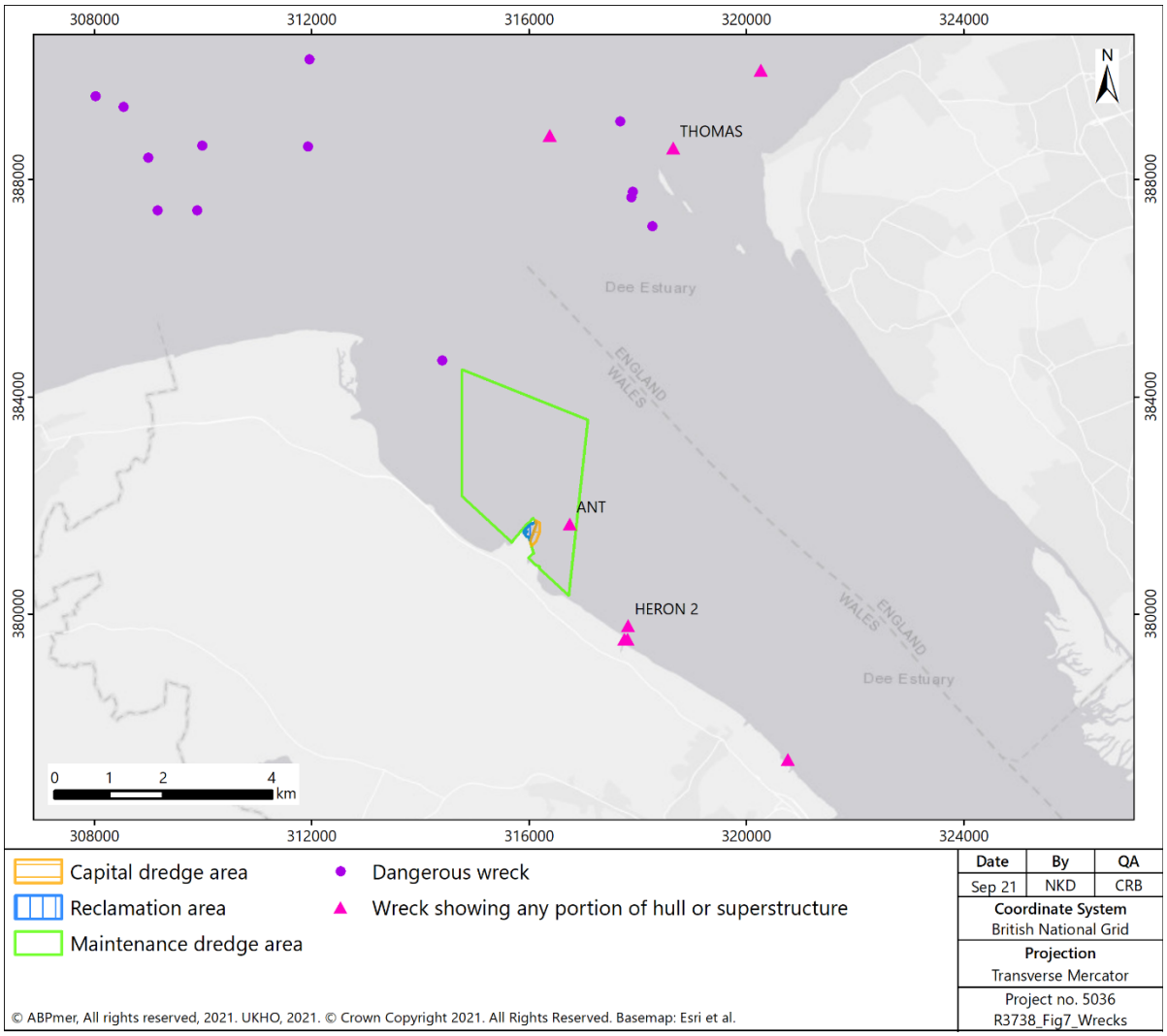

Figure 10. Recorded wrecks and obstructions

Aviation archaeology

Marine aviation archaeology receptors comprise the remains or associated remains of military and civilian aircraft that have been lost at sea. Evidence is divided into three primary time periods based on major technological advances in aircraft design: Pre-1939; 1939-1945; and post-1945. Although there are currently no known aircraft crash sites located within the study area, there is the potential for the discovery of previously unknown aircraft material.

Landside heritage assets

There are no scheduled monuments, WHS, registered landscapes of outstanding and of special interest in Wales or battlefields that overlap the proposed development or occur within the 500 m study area.

There are no listed buildings within the boundaries of the proposed development (Archwilio, 2021). The closest listed buildings (located more than approximately 400 m from the proposed development) are as follows:

- Mostyn No. 1 Signal Box (Grade II, Ref No. 597);
- Mostyn Lodge Hotel (Grade II, Ref No. 26264);
- Goods Shed to SE of Mostyn Station (Grade II, Ref No. 545); and
- Station Building, Mostyn Station (Grade II, Ref No. 544).

The listed buildings are predominantly located along the A548 and are consistent with the character of the area.

In terms of historic parks and gardens, Mostyn Park (Ref No. C14) is located immediately south of the A548, more than approximately 400 m from the proposed development. This is an extensive area of parkland associated with Mostyn Hall (Grade I) and contains a number of designated heritage assets. The park was designated as it is 'a fine example for the layout of early nineteenth century parkland, with numerous drives and lodges, and with long winding Marine Walk on the boundary of park and garden from which there are spectacular views over the Dee Estuary'. The views northwards from the western side of the park have been identified as being Significant Views. The Park is registered at Grade II.

Future baseline

In the absence of the proposed development, baseline conditions for cultural heritage and archaeology assets are anticipated to remain unchanged. The proposed development site, within the Port of Mostyn, has been in use for over 400 years as a commercial port and would continue in use as an operational port.

5.8.3 Possible environmental impacts

The proposed development has the potential to result in effects on marine archaeological assets or deposits of archaeological importance during both construction and operation. The cultural heritage and archaeology ES chapter will set out the assessment of the likely changes to be generated by the MEP Extension Project, both beneficial and adverse and during both the construction and operational phases.

Scoped in

The potential impact pathways during the construction phase are as follows:

- Direct impacts to known and potential marine archaeological assets and deposits of archaeological importance as a result of the piling and capital dredge;

The potential impact pathways during the operational phase are as follows:

- Indirect impacts to known and potential marine archaeology assets and deposits of archaeological importance due to changes in physical processes as a result of the piling and capital dredge.

Potential cumulative effects on marine archaeology assets and deposits of archaeological importance could arise as a result of other coastal and marine developments in the area, as well as ongoing activities. These will be considered as part of the cumulative and in-combination assessment (Section 4.2.6).

Scoped out

The following impact pathways are proposed to be scoped out of the EIA:

- **Effects on landside heritage assets during construction and operation** – The proposed development is unlikely to result in significant effects to terrestrial archaeology given that the landside works are non-intrusive and located more than 400 m from the nearest landside heritage assets; and
- **Effects on cultural heritage setting during construction and operation** - Given the existing industrial character of the site and distance from the nearest landside heritage assets, there is unlikely to be any significant impacts on the identified assets during construction or operation of the proposed development.

5.8.4 Further assessment work required

A Desk-Based Assessment (DBA) will be prepared in accordance with industry standards and best practice guidelines, and any responses received as part of the scoping phase and consultation on the MEP Extension Project. The DBA will form an appendix to the ES and will inform the marine archaeology ES chapter.

Relevant stakeholders will include NRW, the Royal Commission on the Ancient and Historical Monuments in Wales, Cadw

To inform the assessment, the following data sources will be consulted:

- Updated HER for known maritime and aircraft wrecks, coastal installations, archaeological sites, and events records;
- Spatial and non-spatial data for previous assessment reports and events;
- The UKHO for information regarding live wrecks, salvaged wrecks and dead wrecks; and
- Various online resources including the British Geological Survey (BGS) Geology of Britain Viewer;
- Published and unpublished literature (including a detailed review of reports for previous fieldwork carried out within the proximity to the proposed development boundary);
- Existing geotechnical, geophysical and geoarchaeological data;
- Available LiDAR and aerial photography; and
- Documentary, cartographic and other resources as deposited within the local archives.

The study area for the DBA will be confined to the area of the proposed footprint of the development, with a 500 m buffer zone as the search area.

Given the potential for unknown features of historical heritage value to be present, it is further proposed that mitigation measures and additional investigations be detailed in a Written Scheme of Investigation (WSI) that is drawn up prior to dredging and which will be subject to the approval of local and national curatorial bodies. The WSI will set out the respective responsibilities of the developer, the Port of Mostyn, dredging contractors and archaeological contractors/consultants, including formal lines of communication between the parties and archaeological curators.

6 Summary

Following this scoping review, a number of environmental topics and impact pathways are proposed to be either 'scoped in' (i.e. require further assessment as part of the EIA) and/or 'scoped out' (i.e. do not require further assessment as part of the EIA). The findings for each topic and the potential impact pathways that are proposed to be scoped in and out of the EIA are summarised in Table 13.

The relevant environmental topic sections of the report in Section 5 provide further detail on the justification for, and approach to, the further assessment work that will be undertaken as part of the EIA.

In addition, potential cumulative effects of the proposed development alone and as a result of other plans, projects and ongoing activities will be assessed for each topic that has been scoped into the EIA (Section 4.2.6).

In addition to the EIA which will be documented in the ES, a marine plan conformance assessment, an HRA, a WFD compliance assessment, a WHA and FCA will be provided within or as an appendix to the ES.

Table 13. Summary of 'scoped in' and 'scoped out' topics and potential impact pathways

Topic	Potential Impact Pathways	Scoped into EIA?
Physical processes	Increased SSC and potential sedimentation over the extent of the disturbance plume as a result of the construction of the new quay wall (piling) and capital dredging works	Yes
	Increased SSC and potential sedimentation as a result of the deposit of capital dredge material at a licensed offshore disposal site	Yes
	Changes in seabed bathymetry and composition as a result of deposition of dredged/disposal material within the area of the respective plumes	Yes
	Local changes to hydrodynamic regime (flow speed and direction) as a result of the new quay wall (piling) and capital dredging	Yes
	Local changes to the wave regime, as a result of the new quay wall (piling) and capital dredging	Yes
	Associated local changes to the sediment transport pathways, as a result of localised changes to the driving hydrodynamic (and wave) forcing	Yes
	Increased SSC and potential sedimentation in the area of dispersal plume as a result of maintenance dredging	Yes
	Increased SSC and potential sedimentation as a result of deposition of maintenance dredge material at a licensed disposal site	Yes
	Changes in seabed bathymetry and composition as a result of deposition of dredged/disposed maintenance dredge material	Yes
Water sediment quality	Changes to dissolved oxygen concentrations as a result of increased SSC during piling, capital dredging and disposal activities;	Yes

Topic	Potential Impact Pathways	Scoped into EIA?
	Changes to chemical water quality as a result of potential sediment-bound contaminants being released during piling, capital dredging and disposal activities	Yes
	Redistribution of sediment-bound contaminants during piling, capital dredging and disposal activities	Yes
	Changes to dissolved oxygen concentrations as a result of increased SSC during the maintenance dredging and disposal activities;	Yes
	Changes to chemical water quality as a result of potential contaminants in the seabed sediment being released during maintenance dredging and disposal activities	Yes
	Redistribution of sediment-bound contaminants during maintenance dredging and disposal activities	Yes
	Changes to levels of contaminants in water (including accidental spillages) during construction and operation	No
Nature conservation and marine ecology	Benthic habitats and species	
	Direct loss of intertidal habitat as a result of capital dredging	Yes
	Direct loss of intertidal and subtidal habitats and species as a result of the new quay wall	Yes
	Direct changes to benthic habitats and species as a result of capital dredging and dredge disposal	Yes
	Indirect changes to benthic habitats and species as a result of changes to hydrodynamic and sedimentary processes during capital dredging and dredge disposal	Yes
	Changes in water and sediment quality during capital dredging and dredge disposal	Yes
	Underwater noise and vibration disturbance during construction	Yes
	Introduction and spread of non-native species during construction	Yes
	Direct changes to benthic habitats and species as a result of sediment removal and deposition during operation (specifically maintenance dredging, dredge disposal and due to operational berth vessel movements)	Yes
	Indirect changes to benthic habitats and species as a result of changes to hydrodynamic and sedimentary processes during operation	Yes
	Changes in water and sediment quality during operation	Yes
	Underwater noise and vibration disturbance during operation	Yes
	Introduction and spread of non-native species during operation	Yes
	Fish and shellfish	
	Direct loss of intertidal habitat a result of capital dredging	Yes
	Direct loss or changes to fish populations and habitat as a direct result of capital dredging and dredge disposal	Yes
	Changes in water and sediment quality during capital dredging and dredge disposal	Yes
	Underwater noise and vibration disturbance during construction	Yes

Topic	Potential Impact Pathways	Scoped into EIA?
	Changes to fish populations and fish habitat during operation (as a result of maintenance dredging, dredge disposal and operational berth vessel movements)	Yes
	Changes in water and sediment quality during operation	Yes
	Underwater noise and vibration disturbance operation	Yes
	Marine mammals	
	Underwater noise and vibration disturbance during construction	Yes
	Underwater noise and vibration disturbance during operation	Yes
	Changes to marine mammal foraging habitat and prey resources during dredging and dredge disposal (both capital and maintenance) and operational berth vessel movements	No
	Collison risk during construction and operation	No
	Water quality impacts during dredging and dredge disposal (both capital and maintenance) and operational berth vessel movements	No
	Coastal waterbirds	
	Direct loss of intertidal feeding and roosting habitat a result of capital dredging	Yes
	Direct loss and change to feeding and roosting habitat a result of the new quay wall	Yes
	Changes to foraging and roosting habitat as a result of capital dredging and dredge disposal	Yes
	Airborne noise and visual disturbance during construction	Yes
	Changes to foraging and roosting habitat during operation (as a result of maintenance dredging, dredge disposal and operational berth vessel movements)	Yes
	Airborne noise and visual disturbance during operation	Yes
	Fish, marine mammals and coastal waterbirds	
	Changes to seabed habitats and species as a result of sediment deposition during the construction of the new quay wall	No
	Indirect changes to seabed habitats and species as a result of changes to hydrodynamic and sedimentary processes due to the presence of the new quay wall	No
	Changes in water and sediment quality during the construction of the new quay wall	No
Fisheries	Interference with fishing activities due to vessel movements obstructing navigation routes to fishing grounds	Yes
	Interference with fishing activities due to vessel movements disrupting or obstructing fishing activities	Yes
	Loss of or restricted access to fishing grounds	Yes
	Potential indirect impacts on stocks of target finfish and shellfish species during construction	Yes
	Potential indirect impacts on stocks of target finfish and shellfish species during operation	Yes
Commercial and recreational navigation	Contact of works craft with Port infrastructure: manoeuvring of craft in close proximity to marine structures has the potential for contact with infrastructure during site development	Yes

Topic	Potential Impact Pathways	Scoped into EIA?
	Collision of passing vessels with works craft: as passing vessels are manoeuvring around or in close proximity to the works there is the potential for collision with craft associated with construction activities	Yes
	Collision during navigation: vessel collision with works craft whilst transiting to/from the site or during activities within the disposal site	Yes
	Collision during towage operations: if materials for the proposed development are transported to site through the use of barges, there is potential for collision with vessels in the area	Yes
	Payload related incidents: if lifting operations are required from barges/vessels associated with the Project, there is potential for incidents to arise from dropped items or affected vessel stability	Yes
	Collision due to increased commercial vessel movements: vessels transiting the area involved in a collision with other port traffic	Yes
	Contact with the quay: manoeuvring vessel contact with the berth as a result of collision avoidance, adverse weather, nature of the operation or interaction with a passing vessel	Yes
	Mooring breakout: There is potential for a vessel to break its moorings and leave the berth due to stress of weather, passing vessel or mooring equipment failure	Yes
Flood risk and drainage	Vulnerability to flood events during construction	Yes
	Changes to current and future flood risk during operation	Yes
	Adaptation to future climate change allowing operations to continue	
	Interference with other coastal flood risk management assets during operation	No
Cultural heritage and archaeology	Direct impacts to known and potential marine archaeological assets and deposits of archaeological importance as a result of the piling and capital dredge	Yes
	Indirect impacts to known and potential marine archaeology assets and deposits of archaeological importance due to changes in physical processes as a result of the piling and capital dredge	Yes
	Effects on landside heritage assets during construction and operation	No
	Effects on cultural heritage setting during construction and operation	No
Terrestrial ecology	Effects on terrestrial ecology features during construction and operation	No
Transport and access	Changes in traffic flows during construction and operation	No
Air quality and greenhouse gas emissions	Changes in air quality and greenhouse gas emissions during construction and operation	No
Airborne noise and vibration	Airborne noise and vibration effects during construction and operation	No
Landscape/seascape and visual impact	Landscape and visual effects during construction and operation	No

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8 Abbreviations/Acronyms

AA	Appropriate Assessment
AEOI	Adverse Effect on Integrity
AIS	Automatic Identification System
AL	Action Level
ALARP	As Low As Reasonably Practicable
ANSI	American National Standards Institute
ASA	Acoustical Society of America
BBC	British Broadcasting Corporation
BGS	British Geological Survey
BPEO	Best Practical Environmental Option
BTO	British Trust for Ornithology
BWD	Bathing Water Directive
CCW	Countryside Council for Wales
CD	Chart Datum
Cefas	Centre for Environment, Fisheries and Aquaculture Science
CHA	Competent Harbour Authority
CIEEM	Chartered Institute of Ecology and Environmental Management
CML	Construction Marine Licence
CTV	Crew Transfer Vessel
D&D	Dredging and Disposal
DBA	Desk-Based Assessment
DCMSMS	Dee Conservancy Safety Management System
DECC	Department of Energy and Climate Change
Deflt3D	Deltares Open Software Three Dimensional
Defra	Department for Environment, Food and Rural Affairs
DfT	Department for Transport
DHI	Danish Hydraulic Institute
DML	Dredge Marine Licence
EC	European Commission
EcIA	Ecological Impact Assessment
EEC	European Economic Community
EIA	Environmental Impact Assessment
EMS	European Marine Site
EQS	Environmental Quality Standards
ERM	Environmental Resources Management
ES	Environmental Statement
EU	European Union
EUR-Lex	European Union Law Website
FCA	Flood Consequence Assessment
FM	Flexible Mesh
F-PODs	Acoustic Monitoring Device
FRA	Flood Risk Assessment
FSA	Formal Safety Assessment
GB	Great Britain
GES	Good Environmental Status
GI	Ground Investigation
GoBe	GoBe Consultants
HAT	Highest Astronomical Tide

HER	Historic Environment Record
HM	Her Majesty's
HMSO	Her Majesty's Stationery Office
HMWB	Heavily Modified Water Body
HRA	Habitats Regulations Assessment
HTL	Hold the Line
ICES	International Council for the Exploration of the Sea
ID	Identity
IEEM	Institute of Ecology and Environmental Management
IEMA	Institute of Environmental Management and Assessment
IMO	International Maritime Organization
JCP	Joint Cetacean Protocol
JNCC	Joint Nature Conservation Committee
LAT	Lowest Astronomical Tide
LiDAR	Light Detection And Ranging
LLA	Local Lighthouse Authority
LSE	Likely Significant Effect
MAC	Maximum Allowable Concentration
MAGIC	Multi-Agency Geographic Information for the Countryside
MAIB	Marine Accident Investigation Branch
MCA	Maritime and Coastguard Agency
MCCA	Marine and Coastal Access Act
MCZ	Marine Conservation Zone
MEP	Mostyn Energy Park
MGN	Marine Guidance Notice
MHCBI	Marine Habitat Classification for Britain & Ireland
MHW	Mean High Water
MHWN	Mean High Water Neap
MHWS	Mean High Water Springs
MLWN	Mean Low Water Neap
MLWS	Mean Low Water Springs
MMO	Marine Management Organisation
MPA	Marine Protected Area
MPS	Marine Policy Statement
MSFD	Marine Strategy Framework Directive
MSMS	Marine Safety Management System
MTL	Mean Tide Level
NBN	National Biodiversity Network
NE	Natural England
NERC	Natural Environment and Rural Communities
NIFDL	National Inshore Fisheries Data Layer
NMBAQC	NE Atlantic Marine Biological Analytical Quality Control Scheme
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NPL	National Physics Laboratory
NRA	National Rivers Authority
NRW	Natural Resources Wales
NTS	Non-Technical Summary
NVZ	Nitrate Vulnerable Zone
NWIFCA	North Western Inshore Fisheries and Conservation Authority
OCs	Organochlorine Pesticides
OREI	Offshore Renewable Energy Installations

OSPAR	Convention for the Protection of the Marine Environment of the North-East Atlantic
OWF	Offshore Wind Farm
P&S	Ports and Shipping
PAH	Polycyclic Aromatic Hydrocarbon
PBDE	Polybrominated Diphenyl Ethers
PMSC	Port Marine Safety Code
PSA	Particle Size Analysis
Q	Quarter
Ramsar	Wetlands of International Importance (Ramsar Sites)
RBMP	River Basin Management Plan
RCP	Representative Concentration Pathway
RNLI	Royal National Lifeboat Institute
RoRo	Roll-on Roll-off
RSL	Relative Sea Level
RSPB	Royal Society for the Protection of Birds
SAC	Special Area Conservation
SCANS	Small Cetaceans in the European Atlantic and North Sea
SCOS	Special Committee on Seals
SHA	Statutory Harbour Authority
SI	International System of Units
SLR	Sea Level Rise
SMNR	Sustainable Management of Natural Resources
SMP	Shoreline Management Plan
SMRU	Sea Mammal Research Unit
SPA	Special Protection Area
SPL	Sound Pressure Level
SSC	Suspended Sediment Concentration
SSSI	Site of Special Scientific Interest
TAN	Technical Advice Note
TCA	Trade and Cooperation Agreement
TG	Technical Guidance
THC	Total Hydrocarbon
TOC	Total Organic Carbon
TraC	Transitional and Coastal Waters
TSHD	Trailing Suction Hopper Dredger
UK	United Kingdom
UKBAP	United Kingdom Biodiversity Action Plan
UKCP18	United Kingdom Climate Projection 2018
UKHO	United Kingdom Hydrographic Office
WCA	Wildlife and Countryside Act
WeBS	Wetland Bird Survey
WFD	Water Framework Directive
WHA	Waste Hierarchy Assessment
WHS	World Heritage Sites
WID	Water Injection Dredging
WSI	Written Scheme of Investigation
WWT	Wildfowl & Wetlands Trust

Cardinal points/directions are used unless otherwise stated.

SI units are used unless otherwise stated.

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