

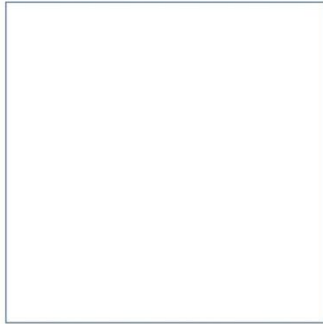
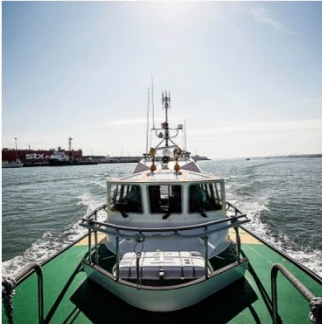
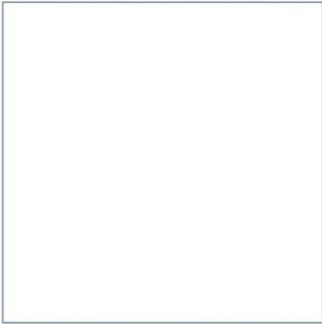
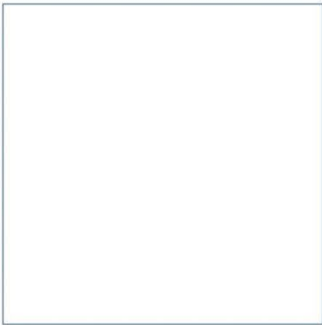
Port of Mostyn

Mostyn Energy Park Extension

Environmental Statement

Appendix 6.1: Waste Hierarchy Assessment

December 2022



Innovative Thinking - Sustainable Solutions

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Mostyn Energy Park Extension

Environmental Statement



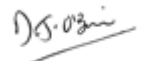
Appendix 6.1: Waste Hierarchy Assessment

December 2022



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E San Martin	N J Frost	D O'Brien
		

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ABPmer

Quayside Suite, Medina Chambers, Town Quay, Southampton, Hampshire SO14 2AQ
T: +44 (0) 2380 711844 W: <http://www.abpmer.co.uk/>

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1 Introduction

This Waste Hierarchy Assessment (WHA) presents a review of the Best Practical Environmental Option (BPEO) for the use/disposal of the dredge material from the Mostyn Energy Park Extension (MEPE) Project. The assessment has been undertaken to support the marine licence application for the proposed development. The assessment has been informed by the outcomes of the Physical Processes and Water and Sediment Quality assessments (Chapters 6 and 7 of the Environmental Statement (ES) respectively). A detailed description of the proposed development and construction methodology on which this assessment is based on is included in Chapters 2 and 3 of the ES.

This report has been structured as follows:

- Section 1:** **Introduction** provides a brief introduction to the project and need for this assessment;
- Section 2:** **Policy Review** provides a review of the policy relating to WHA;
- Section 3:** **Dredge Material Characterisation and Dredge methodology** outlines the options for dredging and the dredge material characterisation;
- Section 4:** **Waste Hierarchy Assessment** provides an audit of the WHA;
- Section 5:** **Disposal Options** reviews the disposal area alternatives; and
- Section 6:** **Conclusion** presents the overall conclusions.

2 Policy Review

Dredged material is classed as a waste material once removed and is strictly controlled as it enters the waste stream (HM Government, 2011). The beneficial use of waste arisings and the possible disposal of dredged material at sea are both matters which are controlled and regulated by, amongst others, the London Convention 1972, the 1996 London Protocol, the OSPAR Convention 1992 and the revised European Union (EU) Waste Framework Directive (2008/98/EC). Whilst the UK left the EU on 31 January 2020, the UK continues to be committed to meeting high environmental standards and the main provisions of the EU Waste Framework Directive have been retained in English law through the Waste (Circular Economy) (Amendment) Regulations 2020¹.

As discussed below, extant policy views the disposal of dredged material at sea to be a last option and requires all and any alternatives to be explored and where practical exploited before the option of disposal at sea (or land) is selected. In addition, any locations identified for use and/or disposal will also, as noted below, need to take account of the UK Government Sustainable Development Strategy (HM Government, 2005) and the Marine Policy Statement (HM Government, 2011).

2.1 Policy context

The UK Marine Policy Statement (HM Government, 2011) follows the principles of sustainable development set out in UK Government Sustainable Development Strategy (HM Government, 2005). These principles are expressed through the five high level marine objectives which take forward the UK vision for the marine environment of "*clean, healthy, safe, productive and biologically diverse oceans and seas*" (HM Government, 2011). These high-level objectives are:

- Achieving a sustainable marine economy;
- Ensuring a strong healthy and just society;
- Living within environmental limits;
- Promoting good governance; and
- Using sound science responsibly.

It is important that space within the marine environment is utilised effectively to ensure activities can be undertaken in a sustainable manner with minimal conflict between users. The UK Marine Policy Statement states that "*The Marine Plan should identify areas of constraint and locations where a range of activities may be accommodated. This will reduce real and potential conflict, maximise compatibility between marine activities and encourage co-existence of multiple uses*" (HM Government, 2011).

The Marine Policy Statement also states that "*applications to dispose of wastes must demonstrate that appropriate consideration has been given to the internationally agreed hierarchy of waste management options for sea disposal*". This hierarchy requires consideration to be given, in terms of dredged material, to the reuse or recycling of such material before selecting the option of disposal at sea, or indeed on land.

The MEPE Project is within the area covered by the Welsh National Marine Plan, published in November 2019 by Welsh Government. The Dredging and Disposal (supporting) Policy D&D_01 of the Welsh National Marine Plan supports the UK Marine Policy Statement position on sea disposal of waste by stating that "*The beneficial use of dredged material is encouraged. In accordance with the Waste*

¹ The Waste (Circular Economy) (Amendment) Regulations 2020. Available at: <https://www.legislation.gov.uk/uksi/2020/904/made> (Accessed September 2022).

(England and Wales) Regulations 2011, relevant authorities should apply the waste hierarchy. The disposal of dredged material (whether from navigation or environmental dredging) includes both deposition for beneficial uses (e.g. beach nourishment) and the use of at-sea disposal sites in licensed areas of seabed. Dredged material can be a valuable resource and the preference is, wherever possible, to re-use the material to support other activities, for example actions relating to ecosystem resilience, in engineering projects for construction materials, in flood defences, for land reclamation or for beach nourishment. In some cases, disposal to land may be appropriate" (paragraph 313, Welsh Government, 2019).

The Welsh National Marine Plan further states that *"When considering suitable management options, it is generally the preferred option to retain dredged material within the same sediment cell from where it originated, if it can be demonstrated that, in line with this Plan's General and Safeguarding Policies, it is environmentally, technically, socially and economically feasible to do so. Preferred areas for disposal are those with a long record of use and/or those that have been characterised to receive dredged materials in line with Chapter 6 of the Dredged material assessment guidelines ("Waste Assessment Guidelines under the London Convention and Protocol: 2014 edition"). Minimising the distance between dredge and re-use/disposal locations can reduce environmental impacts and supports sustainable development"* (paragraph 316, Welsh Government, 2019).

This approach is also advocated within the OSPAR Guidelines for the Management of Dredged Material at Sea (Agreement 2014-06). Recognition of the importance of retaining dredged sediment within the natural sediment cycle is the driving principal behind this approach.

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"*.

NRW is in the process of developing a formal position statement around the sustainable management of marine and coastal sediment. Ahead of the publication of this position statement, NRW has provided general advice in their Scoping Opinion to the MEPE Project. This noted that the position statement is likely to encourage retention of sediment, followed by beneficial uses which support ecosystem resilience ahead of other options.

2.2 Waste Framework Directive

Waste policy and, consequently, this WHA are strongly influenced by the waste hierarchy set out in Article 4 of the Waste Framework Directive, (2008/98/EC; as amended). The Waste Hierarchy approach is illustrated in Figure 1, and the assessment stages (and considerations to be made) are provided in Table 1. The waste hierarchy ranks waste management options according to what is considered best for the environment.

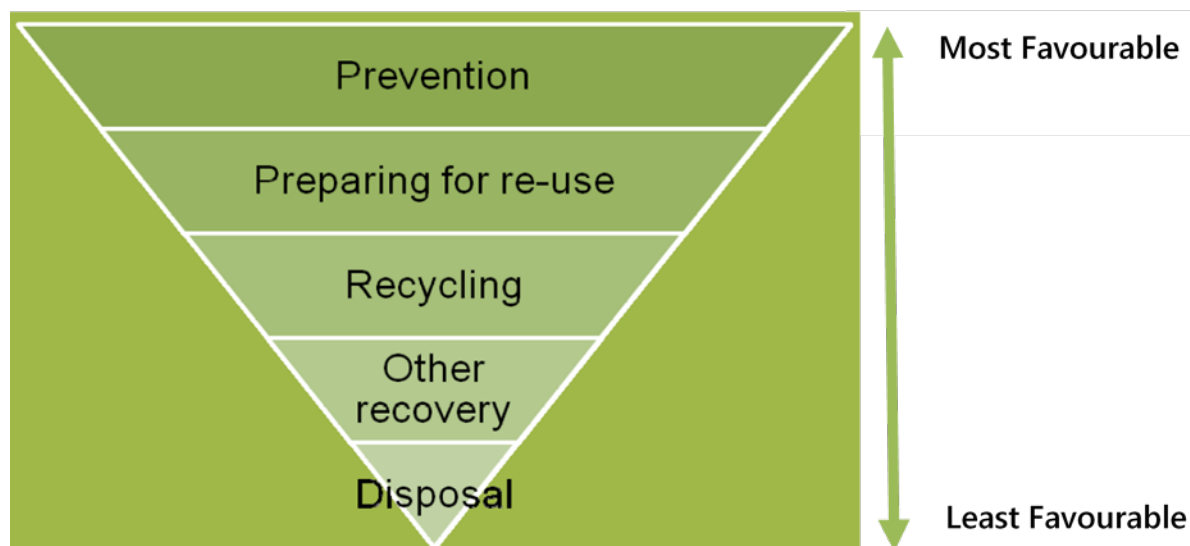


Figure 1. Waste hierarchy (adapted from Defra, 2011)

Table 1. Stages of the waste hierarchy

Stage	Name	Definition
1	Prevention	Measures taken before a substance, material or product has become waste, that reduce: (a) The quantity of waste, including through the re-use of products or the extension of the life span of products; (b) The adverse impacts of the generated waste on the environment and human health; or (c) The content of harmful substances in materials and products.
2	Preparing for re-use	Any operation by which products or components that are not waste are used again for the same purpose for which they were conceived.
3	Recycling	Any recovery operation by which waste materials are reprocessed into products, materials or substances whether for their original or other purposes. It includes the reprocessing of organic material but does not include energy recovery and the reprocessing into materials that are to be used as fuels or for backfilling operations.
4	Other recovery (e.g. energy recovery)	Any operation, the principal result of which is waste serving a useful purpose by replacing other materials which would otherwise have been used to fulfil a particular function, or waste being prepared to fulfil that function, in the plant or in the wider economy. Annex II of the Waste Framework Directive sets out a non-exhaustive list of recovery operations (e.g. solvent reclamation/regeneration and oil re-refining or other reuses of oil).
5	Disposal	Any operation which is not recovery even where the operation has as a secondary consequence the reclamation of substances or energy. Annex I of the Waste Framework Directive sets out a non-exhaustive list of disposal operations (e.g. deposit into or on to land, land treatment, and release to seas/oceans including seabed insertion).

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), and the method and frequency of dredging (and any subsequent processing), inform the consideration of management options for dealing with dredged material with respect to the WHA.

Where prevention of the dredging is not possible, then the volume to be dredged should be minimised and any options for re-use of the material, recycling and other methods of recovery must first be considered before the option of disposal is selected.

In the context of the re-use and recycling of dredged material this could include the following activities:

- Engineering uses, such as:
 - Aggregate for the construction industry;
 - Land creation and improvement;
 - Beach nourishment;
 - Construction of offshore berms;
 - Capping material; and
 - Temporary disposal at sea (e.g. in an aggregate site) for future re-use.
- Agriculture and product uses:
 - Aquaculture; and
 - Construction material.
- Environmental enhancement:
 - Intertidal feeding/creation, e.g. islands for birds, mudflat and saltmarsh creation, fisheries habitat and wetland restoration.
- Post treatment of the dredge material to change its character prior to determining a potential use, for example:
 - Dewatering to create consolidated sediments;
 - Separation basins; to separate sediments into different size classes for different uses;
 - Soil manufacturing; and
 - Physico-chemical treatments of contaminated sediments.

Following treatment, it might then be possible to use the material, for example, as top soil or as a constituent for bricks for the construction sector. In accordance with UK Government guidance on applying the waste hierarchy, should no technically feasible or economically viable option be available (Defra, 2011), options for the disposal of the dredged material are considered. These include:

- Marine disposal in licenced deposit sites; and
- Land-based disposal in terrestrial landfill.

As part of this assessment, in terms of the options available for the management of the dredge arisings, each of the stages in the waste hierarchy has been separately considered. In undertaking this assessment, full account has been taken of the policies outlined above and published guidance.

3 Dredge Material Characterisation and Dredge Methodology

Prior to undertaking the WHA, it is important to understand the characteristics of the dredge material likely to arise as a result of the MEPE Project as well as the dredging methods that could be used. This is because the nature of the material post dredging is an important factor in determining how the material can be used.

3.1 Physical characteristics

Seabed grab sampling has been undertaken to support the application for the MEPE Project, along with boreholes for contamination analysis. In addition, long-term annual monitoring for the existing dredge and disposal licences held by the Port of Mostyn also require the periodic collection of seabed grab samples across the wider study area. These results are described in detail in the Physical Processes Chapter 6 and Water and Sediment Quality Chapter 7 of the ES. In summary, these indicate that the proposed dredge material primarily comprises sand (circa 90%) with a small proportion of silt (circa 10%) in the upper recently deposited layer. For the MEPE Project, a capital dredge will be required to create a new berth pocket alongside the 360 m section of new quay wall and to dredge the existing berth pocket along the existing quay wall (Figure 2).

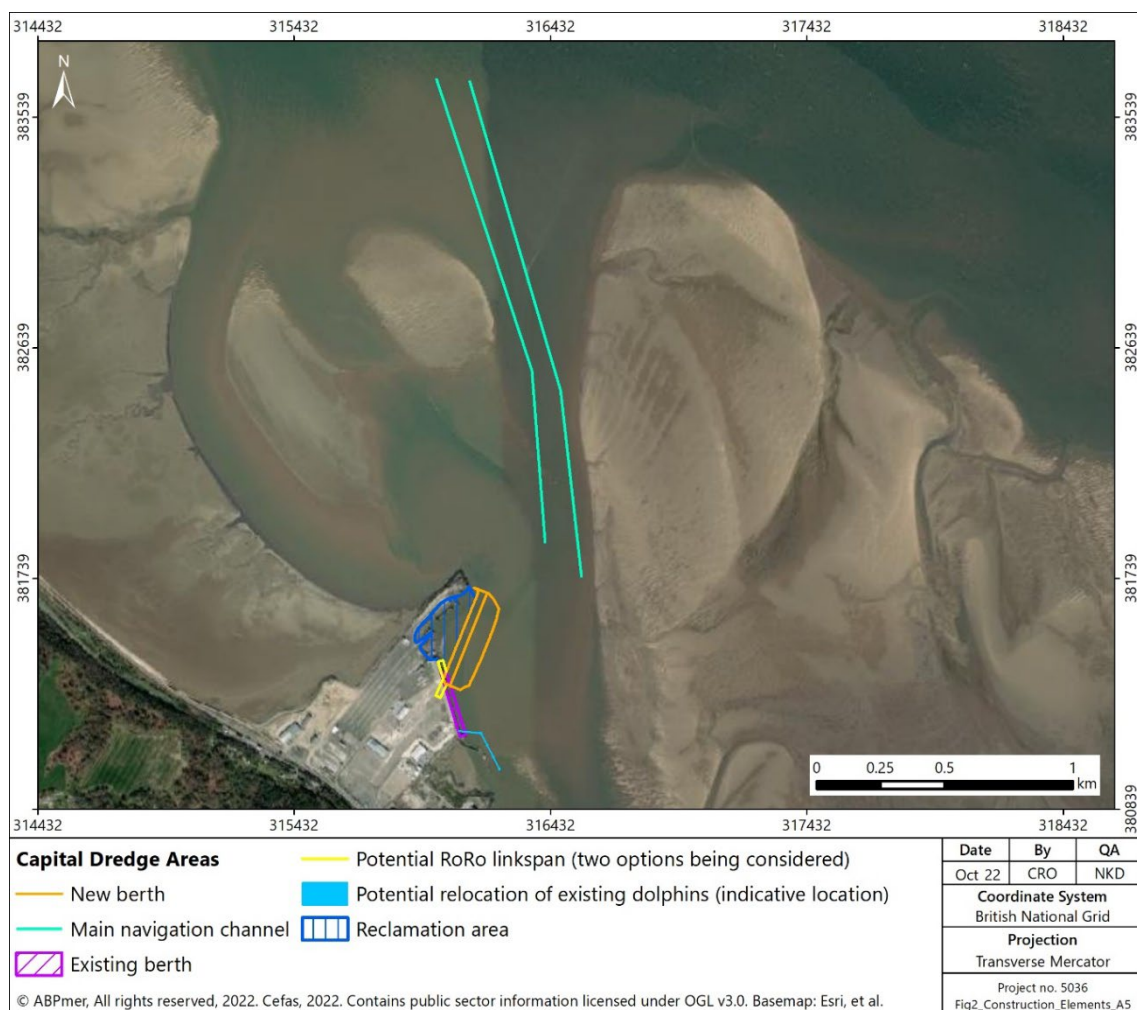


Figure 2. Key construction elements comprising MEPE Project

The new berth pocket will be deepened to a depth of -11 m Chart Datum (CD) plus a 1 m overdredge allowance. The total volume of capital dredge material from the berth pocket is approximately 400,000 m³, including side slopes and overdredge allowance, over an area of approximately 40,000 m² (4 ha). The existing berth pocket will be dredged to a design depth of -9 m CD. The total dredge volume is estimated to be approximately 100,000 m³, including side slopes and overdredge allowance. The dredge pocket side slopes for both the new and existing berth pocket will be approximately 1 in 5 below CD and approximately 1 in 20 above CD.

The main navigation channel will need to be deepened to a depth of - 4 m CD as is already consented (DML1542v2). The total volume of capital dredge material that needs to be removed from the main navigation channel is estimated to be up to 3 million m³. The capital dredge areas are shown on Figure 2.

Once the constructed quay is operational, a maintenance dredging and disposal programme for the new and existing berths will be put in place. The marine works will also comprise the continued ongoing maintenance dredging of the navigation channel to a depth of -4 m CD. The maintenance dredge area is shown on Figure 3.

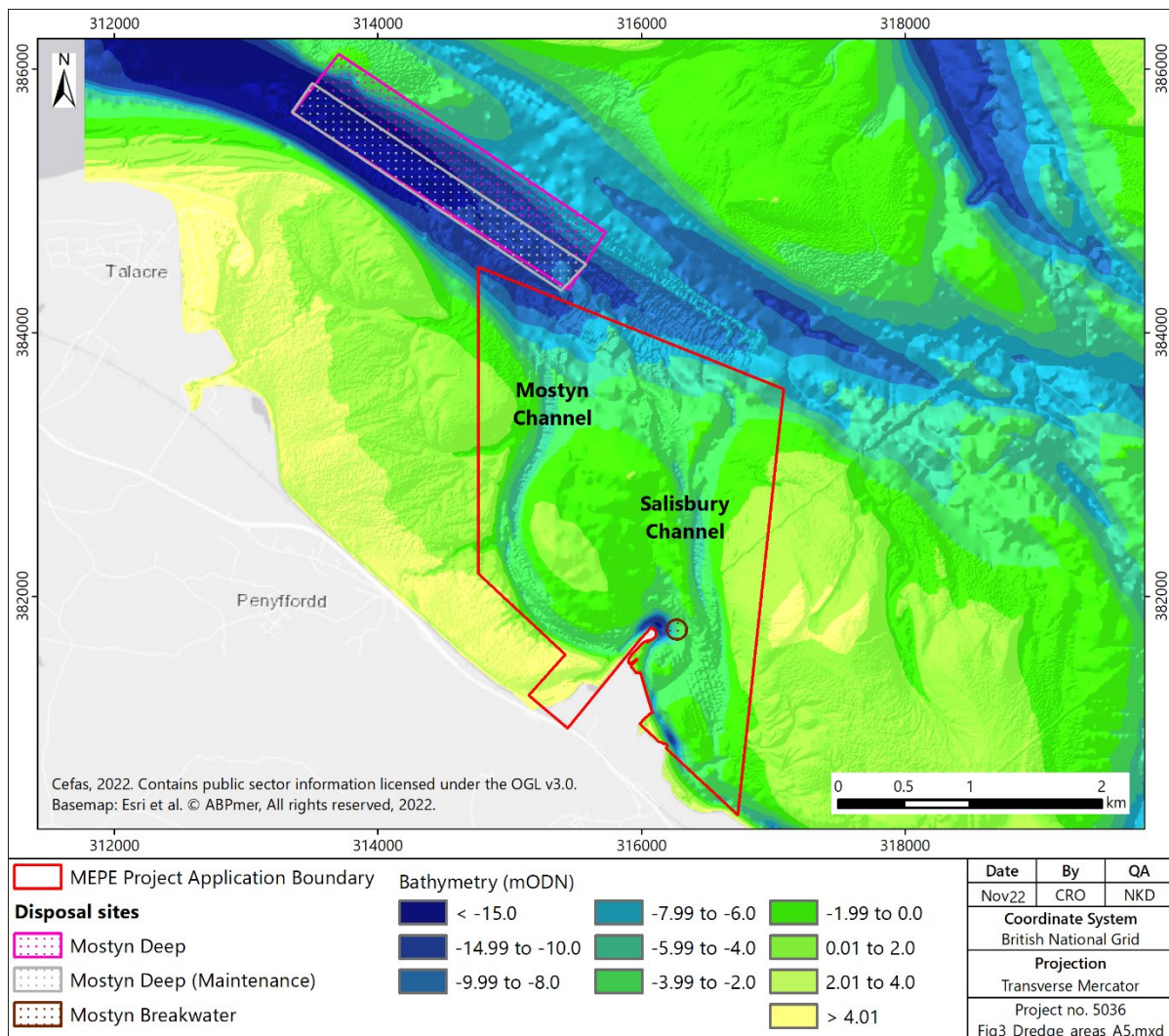


Figure 3. Proposed maintenance dredge area

The maintenance dredge area comprises a polygon that shows where maintenance dredging of the navigation channel may take place in response to the natural movement of the Salisbury and Mostyn channels. In reality, any dredging that is required will be limited to one main channel that is dominant at any given time and will not take place across the entire area of the polygon. This will minimise the volume of dredging that is required and, therefore, the environmental and cost implications.

The total volume of maintenance dredge material that needs to be removed from the new berth, harbour and navigation channel is estimated to be up to 600,000 m³ per annum.

The maintenance dredge material comprises predominately fine to medium sand (60-70 %) with smaller variable proportions of silt (30-40 %). The material that is removed is proposed to be disposed of and/or reused as is currently permitted under the existing maintenance dredge and disposal marine licences, specifically:

- Transported and disposed of at the existing Mostyn Deep disposal site (IS102);
- Pumped through a floating pipeline directly into the existing Mostyn Breakwater disposal site (IS103); and/or
- Pumped ashore into a prepared site at the Port of Mostyn to be beneficially used in other projects.

3.2 Chemical characteristics

The UK has not adopted formal quantitative Environmental Quality Standards (EQS) for sediments. In the absence of any quantified UK standards, therefore, common practice for characterising baseline sediment quality conditions is to compare against the Centre for Environment, Fisheries and Aquaculture Science (Cefas) Guideline Action Levels for the disposal of dredged material (MMO, 2014).

Cefas Guideline Action Levels are used as part of a 'weight of evidence' approach to assessing material suitability for disposal at sea. Cefas guidance indicates that, in general, contaminant levels below Action Level 1 (AL1) are of no concern and are unlikely to influence the licensing decision. Material with contaminant levels above Action Level 2 (AL2), however, is generally considered unsuitable for disposal at sea whilst dredged material with contaminant levels between AL1 and AL2 requires further consideration before a decision can be made as to disposal. Consequently, the Action Levels should not be viewed as pass/fail thresholds, and it is also recognised that these guidelines are not statutory requirements.

In August 2021, a sample plan (SP2106) was provided by NRW, prepared in consultation with Cefas. In September 2022, sediment samples were collected from eight borehole stations (A to H) across the proposed dredge area comprising the proposed development, including subsurface samples (see the Water and Sediment Quality Chapter 7 of the ES).

The sampling regime and analysis was undertaken in accordance with the sample plan. The sediment samples were analysed by NRW-approved laboratories for the following physical and chemical parameters:

- Particle size analysis (PSA);
- Trace metals;
- Organotins;
- Polycyclic aromatic hydrocarbons (PAHs);
- Total hydrocarbon content (THC); and
- Organochlorine pesticides (OCPs).

The results are presented in the Water and Sediment Quality Chapter 7 of the ES. In summary, sediments from most sampling locations were dominated by sand material. Contaminant concentrations were low, with most values below the respective AL1. There were no instances where the concentration exceeded the respective AL2 (or a sample concentration was close to exceeding this threshold). Trace metal concentrations were below AL1 in most samples. AL1 for nickel, cadmium, mercury and zinc was only marginally exceeded in three samples. Organotins in all samples were below the respective AL1. Some individual PAHs were found to be marginally above AL1 (there is currently no AL2 for individual or total PAHs). OCP concentrations were often below the limit of detection (LOD) in most samples.

Since 2001, surface sediment analysis has routinely been undertaken at the Port of Mostyn and it approaches every two years in respect of dredging activities, and this is a condition of the existing dredge marine licence (DML1542v2). Overall, it is considered that the chemical analysis of sediment samples collected in September 2022 are comparable to previous sampling programmes at the Port of Mostyn.

3.3 Dredge methodology

Due to the nature of the material to be dredged, the berth pockets are likely to be dredged by a cutter suction dredger and the main navigation channel is anticipated to be dredged by a trailer suction hopper dredger (TSHD). The capital dredge material that is removed is proposed to be disposed of and/or reused as follows:

- Up to 600,000 m³ to be pumped directly ashore into the reclamation area to be reused as fill; and
- Up to 3 million m³ to be transported and disposed of at the existing Mostyn Deep disposal site (IS102).

A range of dredging methods, including TSHD, plough and water injection dredging (WID) techniques are likely to be used for the maintenance dredge activities. The material that is removed is proposed to be disposed of and/or reused as is currently permitted under the existing maintenance dredge and disposal marine licences, specifically:

- Up to 900,000 tonnes (approximately 600,000 m³) per annum to be transported and disposed of at the existing Mostyn Deep disposal site (IS102);
- Up to 99,900 tonnes (approximately 66,660 m³) per annum to be pumped through a floating pipeline directly into the existing Mostyn Breakwater disposal site (IS103); and/or
- Up to 150,000 tonnes (approximately 75,000 m³) per annum to be pumped ashore into a prepared site at the Port of Mostyn to be beneficially used in other projects.

It is important to note that dredging is only undertaken by the Port of Mostyn when and where it is absolutely necessary to maintain the port operational. The maintenance dredging and disposal requirements presented above are, therefore, considered worst case maximum limits for the purposes of ensuring there is sufficient flexibility to maintain adequate access to the port and harbour area, and reflect the dynamic hydrodynamic and sediment system of the Dee Estuary.

3.3.1 Cutter suction dredger

A cutter suction dredger is a self-propelled or non-propelled vessel that uses a rotating cutter head to loosen the material in the bed ('cutting'). A suction inlet located beneath the cutter head (known as the suction mouth) is connected by a suction tube directly to one or more centrifugal pumps. The vacuum force at the suction inlet sucks up the loosened material. The suction tube and cutter head are attached to a ladder. The ladder with cutter head is positioned at the fore of the vessel. On the aft side, the

dredger generally has two spud poles. One spud pole (the auxiliary spud) passes straight through the vessel, while the other is mounted on a movable spud carriage, which can be moved lengthwise along the vessel or pontoon. Steel cables are used to move the ladder or cutter head back and forth, with the spud in the spud carriage as the centre of each concentric circle that it describes. Moving the spud carriage causes the cutter suction dredger to move as well ('stepping'). The cutter suction dredger discharges the dredged material directly to shore via a floating pipeline or into a barge with a special loading system.

3.3.2 Trailer suction hopper dredger (TSHD)

A TSHD uses suction to raise loosened material from the bed through a pipe connected to a centrifugal pump. Suction alone may not be sufficient to remove the sand. Therefore, the dredger draghead often includes 'ripping teeth' and utilises water jets to help loosen the sediments. The TSHD is the most efficient method when working with fine substrates such as mud, silt, sand and loose gravel as the material can be easily remobilised into suspension for suction through the pipe. Coarser materials can also be dredged using this method, but with a greater demand on pump power and with greater wear on pumps and pipes. Material dredged by TSHD will need to be either used, recycled or disposed of at a licensed disposal site.

3.3.3 Plough dredging (bed levelling)

Plough dredging utilises a tug equipped with a plough unit, e.g. a steel box suspended on cables/chains. The plough is lowered to a predetermined depth and is used to drag sediment along the seabed. Ploughing is typically used in confined areas due to the small size and manoeuvrability of the vessel, moving material from inaccessible areas such as dock entrances, corners or complicated areas of bathymetry to areas accessible by TSHD. Ploughing should not typically lead to significant re-suspension of sediment, but if the sediment ploughed is soft, it may be sufficiently disturbed to rise into suspension. Ploughing equipment can also be deployed to level sand waves in the channel bed.

3.3.4 Water injection dredging (WID)

The technique involves the injection of high volumes of water at low pressure into the recently deposited seabed sediments. This re-fluidises the silts and fine sands, which then flow by gravity or current from the dredge site. The water is injected at low pressures, ensuring the sediment material is re-energised as a density current at the bed, rather than being re-suspended into the full water column. To be effective, the technique requires a flow gradient away from the dredge site, so material is transported to locations from which it is subsequently re-distributed by natural currents in conjunction with the tidal cycle. The technique, therefore, promotes relocation of material based on local dispersion rather than removal to licensed marine or land (terrestrial) disposal sites. Re-deposition rates vary depending on the grading of the dredged materials. Sand material will be re-deposited within close proximity of the dredge site whereas fine silts may remain in suspension for a period of days following dredging.

4 Waste Hierarchy Assessment

As described in Section 1.2, the waste hierarchy (see Figure 1 and Table 1) ranks waste management options according to best environmental practice. The following sections discuss the options available with respect to the management of the capital and maintenance dredge arisings from the MEPE Project.

4.1 Prevention

There are three principal alternatives available for the prevention of generating waste material, in the context of the MEPE Project, namely:

- Do Nothing (i.e. do not undertake the capital and maintenance dredge for the MEPE Project);
- Reduce the dredging requirement; and
- Reduce the disposal requirement.

The simple approach to avoiding the generation of waste would be not to undertake the proposed capital or maintenance dredge at the Port of Mostyn and its approaches. This would mean, however, that the Port of Mostyn would be unable to take forward the MEPE Project and as such, would not be able to satisfy the identified needs of the offshore energy sector. The proposed development is essential if the Port of Mostyn is to be able to continue and also to enhance its contribution to meeting the increasing market demand for facilities to service this sector.

On a practical operational level, the offshore energy sector will always take a commercial view of the facilities being offered by local ports. The 'do nothing' course of action would send the message that the Port of Mostyn is not prepared to invest in this sector which would not only make the port less attractive to the market, but could lead to a decline in the port's existing business. At the national level, port facilities such as the Port of Mostyn have a vital role in the construction and servicing of offshore energy installations to help meet the UK renewable energy targets. In addition, port facilities operate in a market led industry where they need to be competitive, resilient and in locations able to serve the needs of the market efficiently and effectively. In light of the above, proceeding with a strategy of 'doing nothing' at the Port of Mostyn is, therefore, considered, to be *'an outcome strongly against the public interest'* (DfT, 2012, paragraph 3.4.16) and indeed, in terms of the best interests of both the market and the port itself, is not a realistic option.

The capital dredge for the proposed development is necessary to create the required new berthing for accommodate offshore jack up installation vessels used in the construction of wind farms (e.g. Jan De Nul's *Voltaire*) as well as Service Operation Vessels (SOVs). The capital and maintenance dredging of the berths and main navigation channel to the Port of Mostyn is, therefore, essential if the Port is to be able to guarantee ongoing safe and adequate vessel access to these berths.

The capital dredge will involve a combination of cutter suction dredger and TSHD and the maintenance dredge will involve a combination of TSHD, plough dredging and WID (Section 3.3). Cutter suction dredging and TSHD will involve the need for a separate waste disposal activity. However, it is not possible to undertake all dredging activities by plough or WID given the nature and location of the material to be dredged. Material dredged by either cutter suction dredger or TSHD will, therefore, need to be dealt with in accordance with the Waste Hierarchy, namely used, recycled or disposed of at a licensed disposal site.

In summary, all measures to prevent and/or reduce the volume of waste generated by the MEPE Project have been fully considered.

4.2 Preparing for re-use

As described in Section 3.2, the levels of contamination in the dredge material are low and unlikely to prove unsuitable for use in the marine environment or marine disposal. It is, therefore, expected that no de-contamination processes will be required should the material eventually be re-used or disposed of in the marine environment. The capital dredge of the main navigation channel will involve using a TSHD and the material in the berth pockets is anticipated to be dredged using a cutter suction dredger. The material dredged will be of relatively low density when removed and will contain significant volumes of water.

Re-use is defined "as any operation by which products or components that are not waste are used again for the same purpose for which they were conceived" (Defra, 2012). As the material is of natural origin it does not have a 'purpose' but was laid down (naturally) to form the underlying seabed morphology of the area. A re-use could, therefore, be seen to result from the discharge of the material within the marine system. This could involve discharging the material directly into the navigation channel to, for example, restore local equilibrium or to any nearby intertidal areas (without significant processing costs). This type of re-use, however, is not considered feasible for the proposed development as dispersion of sediment within the marine system in this manner (either in the navigation channel or surrounding area) is likely to result in additional maintenance dredging activities within the harbour and/or its approaches which would not be economically feasible or sustainable.

In light of the above, it is considered that the 'preparation' of dredge material is neither a practical nor economically viable option. As a consequence, in accordance with the Waste Hierarchy, the option of recycling has to be considered.

4.3 Recycling

The physical properties of the dredged material may make some of it potentially suitable for recycling for use as engineering fill material, beach management or habitat restoration.

The area that is reclaimed behind the new quay wall will require approximately 600,000 m³ of infill material. The majority of the capital dredged material will be predominantly sand with a small proportion of silt and gravel. The sand/gravel is suitable to be used as infill material for the MEPE Project. A proportion of the capital dredge arisings from the berth pockets and main navigation channel is, therefore, proposed to be reused as engineering grade fill within the reclamation. The dredge arisings will be pumped or rainbowed in over the top of the new quay wall directly into the reclamation area by the dredger. In addition, up to 50,000 m³ per year of the maintenance dredge material will be pumped ashore into a prepared site at the Port of Mostyn to be beneficially reused in other projects as is currently permitted under the existing maintenance dredge and disposal marine licence (DML 1542v2).

The potential retention of the dredged material within the sediment system to support ecosystem resilience is NRW's preferred management option in relation to dredged material if it is environmental, technically, socially and economically feasible to do so (Section 2.10). If the engineering fill required for reclamation were to be imported to the area via land it would involve a significant number of truck movements on the existing road network (approximately 40,000 deliveries using a large tipper truck with a maximum authorised mass of 30 tonnes and a carrying capacity of 15 m³). This same volume of infill would involve 300 barge movements with a 2,000 m³ capacity should it be imported to the area via sea. Both of these options are likely to have potentially significant environmental and cost implications. Furthermore, the effects of the proposed removal of a proportion of the dredge material on sediment transport pathways and the overall sediment budget of the estuary have been assessed in the Physical Processes assessment as insignificant (see Chapter 6 of the ES).

With respect to other potential uses, use in future developments such as, flood defences, beach replenishment (or nourishment) and habitat restoration projects have been considered. Following consultation with relevant stakeholders in the area, namely Flintshire County Council and Denbighshire County Council, there are potentially suitable locations for beach replenishment at Rhyl and Prestatyn but these are located more than 10 km from the proposed development and outside of the estuary system. The Port of Mostyn is not aware of any other initiatives in the estuary, which may be able to use the capital dredge material. In addition, it is considered that the material is unlikely to be of suitable composition/character for flood defence purposes such as the construction of embankments. Granular soils, such as sands and gravels, are considered less resistant to erosion than cohesive soils once the topsoil layer has been eroded. Silts with high clay content are also best avoided as they crack when they dry out compromising the integrity of the flood defence. There are also no known existing nearby habitat restoration or recharge projects within the Dee Estuary that are likely to accept the material types that will be dredged by the MEPE Project.

It is recognised that schemes may be promoted in the future where the use of the capital dredge material from the MEPE Project may become practically viable and cost-effective. It is also recognised, however, that the consideration of future development opportunities for the use of this material cannot be allowed to delay the delivery of the MEPE Project. Nevertheless the position will be kept under review for as long as possible bearing in mind that, to avoid undue delay and consequent commercial uncertainty within the market, any potential receiving scheme would be required to have the necessary consents in place to avoid negatively impacting on the programme of the MEPE Project.

4.4 Other recovery

No practical methods of other recovery (e.g. energy recovery) from dredge material have been identified at this time. No further uses in the marine environment to those highlighted above have, therefore, been identified. To use the material in a terrestrial environment would require large areas for de-hydration and de-salination of the sediment to occur. Even after these processes, material is likely only suitable for agricultural use and thus of limited practicality. Therefore, given no realistic alternative uses have been identified, consideration of disposal options is required.

4.5 Disposal

The above assessment has considered each level of the waste hierarchy with respect to the options available for management of the capital and maintenance dredged arisings from the MEPE Project. The reuse of part of the capital dredge material as infill for the reclamation required for the MEPE Project has been identified. The results of the chemical analysis of sediment samples collected in September 2022 (Section 3.2) indicates that the dredged material does not contain levels of contamination that would restrict the material being disposed of in the marine environment.

As noted above, however, it is fully recognised that the dredge arisings could have a higher value within the waste hierarchy if suitable future uses are identified and as a consequence the position will be kept under continuous review up to the time of the proposed capital dredge and future maintenance dredge campaigns.

5 Disposal Options

Disposal of material to land is not considered feasible due to practical, economic and environmental costs. Disposal of material to landfill would involve the transfer of material from the cutter suction dredger or TSHD to land, followed by the transport of that material to the nearest landfill site available that would accept that material. The volume of material to be dredged that requires disposal (approximately 3 million m³ of capital dredge material and 600,000 m³ per annum of maintenance dredge material) would involve a significant number of truck movements on the existing road network. A large tipper truck with a maximum authorised mass of 30 tonnes and a carrying capacity of 15 m³ would require 200,000 deliveries for the disposal of the capital dredge material and up to 40,000 deliveries per year for the disposal of the maintenance dredge material. This is considered neither feasible, cost effective nor environmentally acceptable.

Following progression through the stages within the waste hierarchy, the BPEO option for the capital dredge material at this stage is considered to be the reuse of a proportion of the dredge arisings as engineering grade fill within the reclamation or in other projects and the disposal at sea at a licensed disposal ground for the remainder of the dredge material (Section 4.2). In terms of the maintenance dredge material, the BPEO option is considered to be the beneficial reuse of a proportion of the dredge arisings in other projects and the disposal at sea at a licensed disposal ground for the remainder of the dredge material (Section 4.2).

The optimum disposal location is determined through consideration of practical, environmental and economic parameters. The selection of the deposit ground should also take into account any potential for recycling of the sediment (i.e. the placement of the material in the same sedimentary cell from which it was dredged).

The actual method of placement also needs to be considered. In this context, it has been assumed that best practice will be followed, whereby each load will be deposited at a different location within the site, targeting the deeper areas initially and hence minimising the absolute depth change.

5.1 Potential disposal locations

There are a number of licensed open marine disposal sites close to the Port of Mostyn and further afield. Of these, the Mostyn Deep disposal site (IS102) and Mostyn Breakwater disposal site (IS103) is used for the disposal of existing maintenance dredge activities within the harbour and its approaches. Beyond this site, the nearest open marine disposal sites are Broughton (IS099) located over 20 km upstream between Chester and the Dee estuary in the canalised and tidally restricted section of the Afon Dyfrdwy, and two disposal sites more than 25 km distance in Liverpool Bay (Site Z (IS140) and Site Y (IS150)). There are also two beneficial use sites located outside the Dee Estuary and over 30 km away within the Conwy Estuary (Deganwy (IS035) and Conwy (IS065)) which are only used for the disposal of maintenance dredge arisings of the nearby marinas. Consideration of each of these options is provided in the following sections.

5.2 Mostyn Breakwater (IS103)

Mostyn Breakwater (IS103) occurs within the boundaries of the proposed development. The Port of Mostyn is currently able to deposit up to a maximum of 99,900 tonnes (approximately 66,660 m³) of material per annum at Mostyn Breakwater (IS103) under its existing maintenance dredge disposal licence for the harbour and existing berths (DML2001). In accordance with this marine licence, the maintenance dredging activity is undertaken by a cutter suction hopper dredger and the material is

pumped through a floating pipeline directly into the disposal site. This disposal site, however, has not been used since the licence was granted in October 2020, indicating some spare capacity.

This disposal site is accessible for the cutter suction dredger that is anticipated to be used for depositing the dredge arisings from the berths. The proposed use of the Mostyn Breakwater (IS103) means a considerable saving in transport time, costs and a significantly reduced carbon footprint in comparison to the alternative open marine disposal sites considered below. Furthermore, this site is already characterised for the purpose of receiving the type of material that will be dredged and has been used in the recent past for maintenance dredge campaigns.

Mostyn Breakwater (IS103) is the preferred option for the disposal of material that is maintenance dredged from the berths and harbour approaches given that it is the closest disposal site to this proposed dredge area with appropriate sediment acceptance type. Sand/gravel placed at this site would remain in the existing sediment system of the nearshore sandbank and channels. This is explained further in the Physical Processes assessment (Chapter 6 of the ES). The carbon footprint associated with the use of this site would also be significantly less than the other available disposal sites discussed below.

5.3 Mostyn Deep (IS102)

Mostyn Deep (IS102) is approximately 90 m from the MEPE Project application boundary (Figure 3). The first documented disposal at this site took place in 2005, and the site has received an average of 253,677 tonnes of maintenance dredge material per annum between 2005 and 2017 (Clarke and Rees, 2020). Mostyn Deep (Maintenance) (IS102) used to be a part of the larger Mostyn Deep (IS101) disposal site, which is now classified as "disused", but has previously received disposal. There were no reported impacts at IS101 and, therefore, any risk of impact is considered to be low (Clarke and Rees, 2020).

This disposal site is accessible for the large-sized attendant barges and dredgers that are anticipated to be used for depositing the dredge arisings. The proposed use of the Mostyn Deep (IS102) means a considerable saving in transport time, costs and a significantly reduced carbon footprint in comparison to the alternative open marine disposal sites considered below. Furthermore, this site is already characterised for the purpose of receiving the type of material that will be dredged and has been used in the recent past for capital and maintenance dredge campaigns. The Port of Mostyn is currently able to deposit up to a maximum of 900,000 tonnes (approximately 600,000 m³) of material per annum at Mostyn Deep (IS102) under its existing capital and maintenance dredge disposal licence for the main navigation channel (DML1542v2). Since the renewed maintenance dredge and disposal licence was granted in December 2019, the total disposal quantity has been approximately 100,000 m³ and the annual average disposal quantity has been around 50,000 m³, indicating some spare capacity.

Mostyn Deep (IS102) is the preferred option for the disposal of material that is capital and/or maintenance dredged from the main navigation channel given that it is the closest disposal site to this proposed dredge area with appropriate sediment acceptance type. As noted in the Physical Processes assessment (Chapter 6 of the ES), sand/gravel placed at this site would remain in the existing sediment system of the nearshore sandbank and channels. The carbon footprint associated with the use of this site would also be significantly less than the other available disposal sites discussed below.

5.4 Broughton (IS099)

Broughton (IS099) disposal site is located approximately 20 km upstream of the proposed development between Chester and the Dee estuary in the canalised and tidally restricted section of the Afon Dyfrdwy. It received approximately 780,875 tonnes over the years 2010 to 2017 (Clarke and Rees, 2020). This was

dominated by a single disposal of 722,778 tonnes in 2012. The site, on average, annually receives 9,682 tonnes (excluding the 2012 disposal). Disposals are dominated by sands (95%) with some silts (5%). This site is in shallower water and not accessible for the dredging plant that are anticipated to be used for depositing the dredge arisings associated with the MEPE Project. The distance would also result in a larger carbon emission footprint than either of the above two disposal site options and, therefore, this site is not considered the BPEO for the MEPE Project.

5.5 Site Z (IS140) and Site Y (IS150)

Site Z (IS140), situated within Liverpool Bay, is the only open licensed marine disposal site serving Mersey Docks and Harbour Company Limited, Manchester Ship Canal Company and ABP Garston, receiving dredge arisings from the Outer Mersey Estuary, Liverpool and Birkenhead enclosed docks and riverside berths in The Narrows (ABPmer, 2022; Bolam *et al.*, 2016). It has also previously received dredge arisings from the outer navigation channel to the Port of Mostyn which is located outside the Dee Estuary. Records between 2002 and 2020 show that annual quantities of maintenance dredge material disposed of at Site Z ranged from 333,892 hopper tonnes (2015) to approximately 2.1 million hopper tonnes (2007 and 2012), except for 2016 and 2017 where no deposits were made to this site (ABPmer, 2022). The mean annual disposal quantity to Site Z over the period 2002 to 2020 was approximately 1.25 million hopper tonnes.

Site Y (IS150), located not far north of Site Z, receives material resulting from dredging of the docks and navigation channels, and that from capital projects, in the Mersey (Bolam *et al.*, 2016). Since 2002, this licensed marine disposal site has only been used in 2020 to receive maintenance dredge material, with a total of 618,532 hopper tonnes deposited to the site from the Outer Mersey (ABPmer, 2022). Historically, this site has received capital dredge material derived from the construction of the Liverpool2 container terminal (1.8 million tonnes in 2013).

Both Site Z (IS140) and Site Y (IS150) are accessible for the dredging plant that will be used for the MEPE Project. However, the distance from the proposed development would also result in a larger carbon emission footprint than either of the disposal site options in the Dee Estuary and, therefore, this site is not considered the BPEO for the MEPE Project.

5.6 Deganwy (IS035) and Conwy (IS065)

The next nearest disposal sites are two beneficial use sites within the Conwy estuary (IS035 (Deganwy) and IS065 (Conwy)) which are located over 30 km from the proposed development. These sites are only used to dispose of the maintenance dredge arisings from the nearby marinas. Records of disposal volumes since 2009 show a total of 37,015 tonnes disposed at IS035 with annual averages of 6,169 tonnes (Clarke and Rees, 2020). Across the estuary, IS065 received 169,216 tonnes between 2009 and 2017 with annual averages of 28,202 tonnes. Particle size analysis of IS065 shows a dominance of silts 81% and a smaller proportion of sand (18%). IS035 is likely to have similar particle size characteristics, however this information was not available in the returns data (Clarke and Rees, 2020).

These sites are less accessible for the dredging plant that are anticipated to be used for depositing the dredge arisings associated with the MEPE Project. The longer transport route will reduce the overall efficiency and prolong the duration of the dredge. Furthermore, if this site were used, the deposited dredge material would be moved to a location outside the sedimentary regime of the nearshore mobile sandbanks and channel system in the Dee Estuary. The distance to the disposal site would also make the operation very inefficient with a larger carbon emission footprint. These sites are, therefore, not considered the BPEO for the MEPE Project.

5.7 Disposal Summary

In light of the assessment of potential disposal sites for the disposal of capital and maintenance dredge material from the MEPE Project, it is considered that the Mostyn Breakwater (IS103) and Mostyn Deep (IS102) would be the best locations for disposal for a number of reasons:

- These sites are considerably closer to the dredge sites than the other options;
- The reduced distance compared to the option options, means a considerable saving in transport time, costs and a significantly reduced carbon footprint;
- These sites are already characterised for the purpose of receiving the type of material that would be dredged for the MEPE Project;
- The sites are accessible for the dredging plant; and
- The deposited sediment will remain within the nearshore sandbank and channel system of the Dee Estuary thus maintaining the overall sediment budget, although with some relocation.

6 Conclusion

Following progression through the stages within the waste hierarchy, the BPEO for the capital dredge material at this stage is considered to be the beneficial reuse of the dredge arisings as engineering grade fill within the reclamation or in other projects, and the disposal at sea at a licensed disposal ground for the remainder of the dredge material. In terms of the maintenance dredge material, the BPEO option is considered to be the beneficial reuse of a proportion of the dredge arisings in other projects and the disposal at sea at a licensed disposal ground for the remainder of the dredge material.

It is recognised that the capital and/or maintenance dredge material could potentially be used for other initiatives and whilst no potential receiving schemes have been identified at this time, the position will be kept under continuous review so as to enable any suitable opportunities to be identified.

A review of the available licensed disposal sites in the vicinity of the MEPE Project indicates that the BPEO for the remainder of the material that is not being reused is Mostyn Deep (IS102) and Mostyn Breakwater (IS103).

7 References

ABPmer (2022). Mersey Maintenance Dredge Protocol (MDP) Baseline Document, Update, ABPmer Report No. R.3721. A report produced by ABPmer for Peel Ports Group, July 2022.

Bolam, S.G., Bolam, T., Emerson, H., Barber, J., Mason, C., and McIlwaine, P. (2016). Dredged Material Disposal Site Monitoring Round the Coast of England: Results of Sampling (2015-16). Issue Date: March 2016

Clarke, C. and Rees, J. (2020). Welsh Disposal Site Review. Cefas Project Report for Welsh Government. 79pp.

Defra (2011). Guidance on applying the waste hierarchy. Available at: <https://www.gov.uk/government/publications/guidance-on-applying-the-waste-hierarchy> (accessed September 2022).

Defra (2012). Guidance on the legal definition of waste and its application. Date: August 2012

DfT (2012). National Policy Statement for Ports. HMSO, London.

HM Government (2005). UK Government Sustainable Development Strategy. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/69412/pb10589-securing-the-future-050307.pdf (accessed September 2022).

HM Government (2011). UK Marine Policy Statement. HMSO, London.

MMO (2014). Marine Licencing: sediment analysis and sample plans. Available at: <https://www.gov.uk/guidance/marine-licencing-sediment-analysis-and-sample-plans###Suitability%20of%20material> (accessed November 2022).

Welsh Government (2019) Welsh National Marine Plan. November 2019. Available at: <https://gov.wales/welsh-national-marine-plan-document> (accessed September 2022).

8 Abbreviations/Acronyms

ABP	Associated British Ports
AL	Action Level
BPEO	Best Practical Environmental Option
Cefas	Centre for Environment, Fisheries and Aquaculture Science
CD	Chart Datum
DML	Dredge Marine Licence
EC	European Commission
EQS	Environmental Quality Standards
ES	Environmental Statement
EU	European Union
GI	Ground Investigation
HM	Her Majesty's
HMSO	Her Majesty's Stationary Office
LOD	Limit of Detection
MDP	Maintenance Dredge Protocol
MEPE	Mostyn Energy Park Extension
MMO	Marine Management Organisation
NRW	Natural Resources Wales
OCP	Organochlorine pesticide
OSPAR	Convention for the Protection of the Marine Environment of the North-East Atlantic
PAH	Polycyclic aromatic hydrocarbon
PSA	Particle Size Analysis
SOV	Service Operation Vessel
SP	Sample Plan
THC	Total hydrocarbon content
TSHD	Trailer Suction Hopper Dredger
UK	United Kingdom
WHA	Waste Hierarchy Assessment
WID	Water Injection Dredging

Cardinal points/directions are used unless otherwise stated.

SI units are used unless otherwise stated.

Contact Us

ABPmer

Quayside Suite,
Medina Chambers
Town Quay, Southampton
SO14 2AQ

T +44 (0) 23 8071 1840

F +44 (0) 23 8071 1841

E enquiries@abpmer.co.uk

www.abpmer.co.uk

