Port of Mostyn Breakwater Quay Development Environmental Statement

Final Report

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The Port of Mostyn Ltd

Port of Mostyn Breakwater Quay Development Environmental Statement

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1.1 INTRODUCTION

This is a Non Technical Summary (NTS) of an Environmental Statement (ES) that has been prepared by Environmental Resources Management (ERM). The ES reports on the results of an assessment of the environmental impacts of proposals by the Port of Mostyn (PoM) to modify Berth Number One by constructing a solid quay to allow conventional ships to berth side on and load on and off using a shore side crane. The modification is proposed specifically to accommodate the offshore wind construction industry. The modified berth will continue to be able to operate as a Ro Ro berth.

Mostyn lies on the Welsh side of the River Dee in Flintshire, approximately twenty miles downstream from Chester. The Inner Channel extends from the end of the port Breakwater to Mostyn Deep.

1.1.1 NEED FOR PROPOSALS

International policy drivers have set ambitious targets for the reduction of greenhouse emissions and increases in the proportion of energy generated by renewables. National legislation to support these initiatives includes the Climate Change Act 2008 that requires a 26% reduction in greenhouse gas emissions by 2020 and an 80% reduction by 2050 against a 1990 baseline. The Welsh Assembly Government (WAG) National Policy Statement for Port consultative document released in 2009 specifically refers to the need to support port facilities to service the growth in the offshore renewables sector.

The proposed berth modifications at Mostyn will assist in increasing the capacity of the port to accommodate offshore renewable energy developments.

1.1.2 LICENCE APPLICATION

PoM requires authorisation under Part II of the *Food and Environment Protection Act 1985* (FEPA) as amended. The consent application must include appropriate supporting environmental information.

The Dee Estuary is within a European Marine Site (1) designated under the *Conservation (Natural Habitats &c) Regulations 1994 (Habitats Regulations)*. Due to potential impacts on the qualifying interests of the site an Appropriate Assessment is likely to be undertaken by the regulators. The ES provides relevant information to inform an Appropriate Assessment.

1.1.3 DESCRIPTION OF PROPOSED DEVELOPMENT

The existing Ro-Ro berth (Berth No1) is a dolphin berth and is not suitable for conventional (Lo-Lo) vessels and will be modified to form a solid quayside and berth which will be approximately 180 m along the line of the existing mooring dolphins with a wall 12 m in height above chart datum, 8 m AOD.

The area behind the wall will be infilled using a mixture of sand dredged from the harbour and locally sourced slate waste. The use of existing structures will minimise the area of reclamation to just under a hectare (9,669 m^2) of estuary below high water including approximately 4,248 m^2 of intertidal area and 5,421 m^2 of subtidal area. Approximately half a hectare of this proposed reclamation lies within a site already consented for development.

Construction is expected to take eight months, including four to six months of piling activity, beginning in April. Work will commence at the outer (north) end of the breakwater and work southwards. If consent is granted early in 2010, it is anticipated that the piling period will occur mainly over the summer month's thus reducing disturbance of SPA birds.

The existing Ro-Ro freight terminal will be used to store the piles. It is anticipated that 5 – 6 people will be engaged in the construction, plus two engineers, all of whom will be accommodated in the office and welfare buildings already on the site.

The new quay will be constructed by importing slate fill into the development area to create a base near high water for a crane to enable the construction of a sheet pile wall along the line of the existing dolphins. A capping beam will be installed along the top of the sheet pile quay wall. Bollard blocks, (foundations for mooring bollards to which a ship's mooring ropes are attached) will also be installed.

A crane, with approximately 140 tonnes capacity, approximately 25 m high will be used for the pile driving operations. The piling will be done using vibration piling, and if necessary finished off using percussion hammer piling. Once the sheet pile wall is in place, the area behind it will be in-filled with a total 90,000 m^3 of material. This comprises 50,000 m^3 of the fill will be material dredged from the harbour area (the current dredge/disposal consent includes for the dredging of this volume from this area) and approximately 40,000 m^3

(1) The collective term for Natura 2000 Sites (SCI/SAC's and SPAs) that are covered by tidal water and protect marine and coastal habitats and species of European importance.

of dense slate (at two tonnes per m^3) will be imported by road in covered wagons.

The steel sheet piles will be delivered directly to site by sea in one or two vessels. Concrete for the bollard blocks and concrete capping beam and the balance of the fill will be brought in by road. Each lorry will carry 28 tonnes of slate at two tonnes per m^3. This equates to around 2,850 lorry loads spread over 12 weeks giving around 40 loads per day (six days a week). Approximately 20 concrete mixer loads of concrete for the capping beam and bollard foundations construction will also be required.

Security fencing incorporating screening to reduce bird disturbance will be erected. Lighting will meet the relevant standards of the International Labour Organisation's: Code of Practice on Safety and Health in Ports. The lighting chosen will be designed to minimise light spill outside the berth area.

The modified berth will facilitate wind farm construction vessels and the Airbus vessels calling at the Port about once per week, although these would not be operated at the same time. Following the first phase of the port development, between Oct 1998 and Nov 2001 there were about 300 ship movements per annum. The ferry service operated from Nov 2001 until April 2004 when movements increased to around 1,500 per annum. Offshore wind farm and Airbus operations commenced in 2004 and whereas the number of commercial ship movements decreased, significant numbers of jack-up type craft and service boats commenced operating from the port.

As a result of the development there will be a significant decrease from previous general cargo handling and Ro-Ro ferry operations. The nature of the offshore wind farm industry will generate lower levels of vessel and road traffic than that generated from the ferry operations that used the dolphin berth. There will however be an increase in vessel and traffic movement compared to the current lower levels of use experienced by this area of the port since the cessation of the ferry service. During operation it is anticipated that only around 8 – 12 people will be working on or around the modified berth at any time.

It is likely that following the modification proposals all berths will be used for offshore wind farm construction projects concurrently at various stages and involving a number of different activities. Jack-up barges used for the offshore wind farm construction will be laid up for vessel repair and maintenance within the Port Harbour Authority Area. Airbus vessel movements will also continue.

1.1.4 PREVIOUS STUDIES

A large volume of technical data have been produced from studies and monitoring work carried out in the Dee Estuary over the last seven years. Much of this work is summarised in monitoring reports produced by Shoreline Management Partnership, ABPmer, Young Associates, and Dee

Estuary modelling reports produced by Hydraulics Research, Wallingford. An EIA was produced in 2007 for dredging and disposal consents that also contains much relevant information. Reference has been made to these in the main report and annexes of the ES.

1.2 BASELINE

1.2.1 PHYSICAL PROCESSES

The Dee Estuary is roughly rectangular, widening slightly towards its mouth. The bed of the estuary comprises recent deposits of sand and mud in a trough eroded in glacial deposits of boulder clay, silts, sands and gravels deposited by ice that moved south-east from the Irish Sea. Following the glacial period the sea flooded the valley and started the process of sediment accretion that is still occurring. The underlying solid geology is now overlain by 20 to over 30 m of subsequently deposited sediment.

The Dee is one of the most active and dynamic estuaries in the UK, with large scale changes in physical features such as tidal channel and mud bank locations observed in recent years. At low water the flow from the estuary divides into two deep channels on either side of the West Hoyle Bank; the Welsh Channel on the Western side and the Hilbre Channel extends northward.

The tides enter and leave the estuary twice a day and the tidal flows are responsible for the majority of changes to the sea-bed within the estuary. There is a short flood tide of varying duration subject to location within the estuary accompanied by strong upstream currents, followed by a longer ebb of complimentary duration with reduced currents to complete each tidal cycle.

The estuary is comparatively well studied and the regular monitoring survey reports concluded that the observed large scale changes in the central part of the estuary between 2003 and 2006. The monitoring survey reports further concluded that the estuary appears to be more stable in its current configuration than the pre 2005 configuration.

It is considered that the estuary is undergoing long term evolution with a new equilibrium becoming established in response to changes in tidal energies resulting in a continued broadening and shallowing of existing channels and/or creation of new channels providing a more direct route for tidal energy. The evolution trends and the extent to which there are also cyclic processes in the configurations of channels and banks will be examined through continued bathymetric monitoring.

The sediments transported into the estuary on the flood tide are only being partially removed on the ebb resulting in a net accretion of sediment within the estuary. This causes a reduced tidal volume entering the estuary and thus tidal energy is reduced.

Mean sea level is 5.15 m above CD in the Dee Estuary (Hilbre island) with a tidal range of 7.7 m during mean spring tides and 4.1 m during mean neap tides. Storm events vary from year to year, and in coincidence with tidal elevations these events can contribute to change in estuary morphology.

The changes in estuary morphology have been studied in some detail. In particular a series of swathe bathymetry surveys were undertaken in 2003 and repeated in 2006. A Comparison of 2003 and 2006 sea bed level surveys of the estuary showed the following.

- Changes in bathymetry have occurred over much of the estuary.

- The southern half of the estuary is mainly above CD and there has been accumulation of sediment volume but only a very minor increase in intertidal area between the surveys.

- The northern half of the estuary shows a decrease in sediment below CD, most notably from CD to 6m below CD. There is a minor loss of sub-tidal area and a corresponding increase in intertidal area.

- The large increases in sediment volumes between 3 and 5 m above CD co-incide approximately with mean sea level.

- 'There were no significant sea bed changes observed in the vicinity of the proposed development at Berth 1 at the Port of Mostyn from the survey comparison. However the more frequent channel surveys and estuary transect surveys show the dynamic response of the sea bed in general and around the Port to seasonal and storm influences.'

The sea bed level survey in 2009 has been used for a re-run of the numerical model (HR Wallingford Ex 6170, October 2009, see *Annex B* of the main ES) and the results are show that the proposed modification of Berth No. 1 occupies a low energy area of the estuary and thereby supports the view of minor development effects on estuary physical processes.

The estuary is a net importer of sediment at the present time (2003/2009) but the associated accretion is located upstream towards Flint and Oakenholt with no significant natural morphological changes in the estuary present or predicted around the Port.

Studies undertaken by the Port of Mostyn since 2000 show that the Port breakwater interacts with estuary tidal regime to generate a circulatory flow (gyre) within the harbour area. This gyre consequentially gives rise to the 'Bug bank' sandbank within the harbour area. This flow also means that the flow along the Berth No.1 is predominantly in line with the berth and directed towards the north-east. Dispersion studies from the seaward limit of the breakwater (approximately 20 m north-east of the north-eastern limit of the proposed development) show sediment to be transported upstream as far as Greenfield over a seventeen day cycle of Spring and Neap tides.

Direct exposure of the proposed berth area to waves is fetch-limited across the relative shallow water of the estuary in a south-easterly direction where typical annual wind energy (and therefore wave energy) is low. The prevailing wind and wave directions are between south-west and north-west. Waves entering the estuary from offshore have been studied and shown to be of secondary importance to tides regarding sediment transport.

There is minor wave activity within the harbour area from diffraction of waves around the breakwater from offshore and directly from the south-east when suitable weather conditions occur.

1.2.2 ECOLOGY AND NATURE CONSERVATION

The Dee Estuary is a nationally and internationally important area for wildlife and has been designated for its ecological and nature conservation interest as a Ramsar Site, Special Protection Area (SPA) and Site of Community Importance (SCI). It is also a Site of Special Scientific Interest (SSSI) under national legislation.

Taken together, SPA and SAC sites make up a network of sites known as Natura 2000 sites. Conservation objectives are set for Natura 2000 sites to ensure that the obligations of the Habitats Regulations are met, and particularly to ensure that there should be no deterioration or significant disturbance of the qualifying features from their condition at the time the Natura 2000 status of the site was formally identified.

In addition there are a number of other designated sites around the estuary including the Lake Bala and River Dee SAC, the Mersey Narrows and North Wirral Foreshore SPA, the Liverpool Bay proposed Marine SPA, Gronant Dunes and Talacre Warren SSSI, Red Rocks SSSI and Dee Cliffs SSSI.

The Dee SPA supports internationally important (ie over 1% of the relevant population) of four *Annex 1* species (species subject to special protection concerning their habitat), and ten regularly occurring migratory species which use the area, and an internationally important assemblage of over 20,000 waterbirds. In addition populations of turnstone are listed on the Ramsar citation. There are also a number of species or populations which are features of the Dee Estuary SSSI and which either contribute to the Internationally Important Assemblage of Waterbirds feature of the SPA or occur in nationally important numbers.

WeBs data, previous studies and surveys undertaken for this development indicated that significant (ie > 1%) proportions of the Dee qualifying populations of oystercatcher (1.2%), redshank (1.1%) and turnstone (6.3%) were present in the area likely to be impacted by the development. This area is highly modified, and includes roosting and feeding sites artificially created during previous port development phases.

The Dee SCI has been designated primarily for its extensive Annex 1 habitats (ie mudflats and sandflats, *salicornia* and other annuals colonising mud and sand, and Atlantic salt meadows (*Glauco-Puccinellietalia maritimae),* the range of other Annex 1 habitats present as qualifying features, and Annex II species (sea lamprey, river lamprey, and petalwort).

The sand and mudflats within the estuary grade into saltmarsh towards the head of the estuary, especially on the northern shore. The large expanses of intertidal areas support an abundant invertebrate population which forms an important part of the marine ecosystem, providing a food source for invertebrates, fish, birds and mammals as well as cycling nutrients and materials between the underlying sediments and overlaying water column.

The intertidal sediment areas of the Dee Estuary cover over 10,000 hectares accounting for approximately 3% of the UK total area for this habitat. The intertidal area comprises mainly sand, muddy sand and mud which provide a habitat for a variety of invertebrate species. Large cockle beds cover part of the muddy sand intertidal area on Mostyn Bank and Salisbury Bank.

The intertidal hard substrate communities recorded in the Dee Estuary are all small in extent. Of particular note are the Holocene clay deposits on Salisbury Bank. The clay bank is periodically inundated with sand which protects it from erosion. When the bank is not covered by sand it is colonised by burrowing bivalves (piddocks) and is subject to erosion.

Saltmarsh accounts for approximately 2,480 ha of habitat in the Dee Estuary, which is approximately 7% of the UK total for this habitat. The distribution of this habitat is increasing as the estuary accretes and new areas of mud and sand flats develop and are colonised. The majority of the saltmarsh is found towards the head of the estuary and on the English shore although small areas exist along the Welsh shore up to Greenfield and an area at Point of Ayr. Although not especially species rich, the saltmarsh provides an important habitat for roosting waders and other birds and the vegetation provides an important food source for birds.

Full details of the citations for the Dee SPA, Ramsar, SCI and SSSI status is given in the Environmental Statement (*Annex E)*.

1.3 IMPACTS OF THE PROPOSALS

1.3.1 ASSESSMENT PROCESS

In the Environmental Impact Assessment (EIA) the potential effects of the proposed project are predicted for each relevant environmental topic (eg, bird populations) by comparing baseline environmental conditions (ie the current situation) with the conditions that would occur during construction, and after the modified berth became operational. The assessment also considers the

variation in vessel and other activities within the port and its environs as the Port adapts to changing market opportunities

The purpose of the EIA is to identify the significant effects of the project to provide information to the regulators so that an informed decision on the consent applications can be reached.

Assessment of impacts requires identifying environmental resources and receptors in the project area and the potential interactions of the proposed development with these. The potential impacts arising from any interactions will depend on the magnitude (including nature, scale, duration, reversibility) of any changes, the likelihood of those changes occurring, and the sensitivity of the resource or receptor to these changes. Assessment of significance of any predicted changes requires consideration of the range of natural fluctuations.

Cumulative impact assessment is important for identifying those activities that in themselves may have an impact that is not significant, but taken into account with other activities across a wider area or over a longer period of time, may have potentially significant impacts.

1.3.2 PHYSICAL PROCESSES

Possible impacts relating to physical coastal processes from the proposed development are changes in:

- tidal flow regime;
- tidal prism of the estuary;
- local wave field interaction with the berth frontage;
- sedimentary processes - effective removal of intertidal and sub-tidal zone from the estuary; and
- adjacent sea bed level due to changes in the hydrodynamic regime.
- increased general activity in the area of the development over a period of six months;
- localised increases in estuary turbidity due to infilling operations;
- local hydrodynamic and sediment transport affects due to partial completion stages of the development.

Tidal flows are below the threshold for sea bed sand movement for over 90% of the tidal cycle. There will therefore be no discernible impact on the ambient tide regime. Locally, the revised profile of the development will result in some minor flow increases along the new sheet pile vertical seaward boundary, due largely to reduced hydraulic roughness. The local changes to water level will be very small (<1.0 cm) caused by the altered flow direction along the new sheet pile development boundary.

Wave reflection off the vertical steel sheet pile wall will not have an impact on habitats such as saltmarsh as wave dissipation will occur within ten wavelengths of travel or about 300m from the proposed development, ie before the wave reaches the Salisbury Bank. At this scale of energy

dissipation the wave will have no detectable impact on sea bed behaviour over the Salisbury Bank area.

Sediment at the end of the breakwater is transported upstream towards Greenfield some 5.0 km distant from the breakwater. The sand forming the 'Bug Bank' within the harbour area originated from downstream and will be the source for the infill of 50,000m3 to the development. The removal of this material from the sediment budget has been calculated to lower the sea bed level over the low water channel area between the breakwater and Greenfield by an average of 100mm. Studies indicate low water channel sea bed levels fluctuate by around 500mm between monthly surveys. This potential impact is not therefore considered to be detectable against natural process fluctuations. The estuary is a net importer of sediment at the present time with around 1.0 million m^3 shown to have entered the estuary between 2003 and 2006 (HR Wallingford, 2007). As a consequence any lowering of the sea bed will be reinstated from offshore sources and bed reinstatement is likely to occur over the first equinoctial tides occurring after the infill has been extracted.

There will be local increases in turbidity during the infilling operation behind the sheet-piled wall but previous work of a similar nature at the same location showed no detectable increases in turbidity 100m distant from the site. The installation of sheet pile walls will be undertaken as far as possible by vibro–piling; there may be some requirement for hammer percussive piling to finish them off. This will reduce the likelihood of sediment disturbance as a result of piling operations.

During operation of the berth vessels manoeuvring on and off the berth will cause local increases in turbidity due to their propulsion systems, as is noted in vessels using the RoRo Berth currently. The increase in vessel berthing activity on berth one as a result of the proposed development is anticipated to be small and well below the levels of vessel activity associated with the previous RoRo ferry operations. Any turbidity plume effects will be limited in extent to typically 100m from the vessel depending on tidal conditions and will be transient.

The potential effects considered above have shown that impacts arising from the construction and operation of the proposed alterations to Berth 1 will not be detectable against natural process fluctuations and that their extent is generally limited to the harbour berthing area and low water channels extending upstream towards Greenfield. There are no detectable impacts on the major sandbanks (Salisbury, Mostyn). As a consequence no significant impacts are anticipated and no mitigation is considered to be required.

1.3.3 ECOLOGY AND NATURE CONSERVATION

Impacts identified during the scoping stage were:

- direct loss of estuary habitat;

- loss of bird feeding habitat and bird food resource;
- disturbance during construction to waders roosting / loafing on the breakwater, and using the adjacent mudflats predominantly for feeding;
- disturbance to waders using the breakwater and adjacent mudflats during operation of the new berth.

The impacts analysis conducted for coastal processes indicates that effects such as increased turbidity and sediment movement will be localised (approximately 100 metres) and short term and therefore impact on invertebrate communities will be limited and not significant. There will be a permanent loss of approximately a hectare of intertidal and subtidal habitat due to the creation of the modified berth. Surveys (ABPmer 2009) indicate that the area has a low diversity and density of benthic fauna, and with the exception of the artificial rocky shore habitat created by the breakwater, is little used by qualifying bird species. Its loss will not affect the integrity or functioning of the SPA/ SCI.

A precautionary 300 metre potential impact zone where disturbance from construction and operations related to the modified berth has been used to quantify impacts on qualifying SPA/ Ramsar bird features. This is based on disturbance studies (IECS 2008) and reflects the disturbance distance of the most sensitive species (redshank) plus a 50 metres precautionary buffer.

Within this impact zone there is potential for construction and operation of the modified berth to displace up to 1.1% of redshank, 1.2% of oystercatcher and 6.3% of the Dee Estuary's turnstone population, although it should be noted these species are currently subject to disturbance associated with existing port operations and exhibit a degree of habituation. Various studies (ABPmer 2009, MFA 2008) make reference to the abundance of food resources for wading birds, and there are suitable alternative roost sites within a kilometre of the development site. Monitoring of impacts related to port development and dredging operations since 1998 (Young Associates 2003) found no impacts other than on Shelduck, although in the latter case there was no impact on the total number in the estuary, only locally due to loss of foraging habitat.

As a consequence of these factors and the element of habituation observed both locally and elsewhere (IECS 2008), no significant impacts on SPA/Ramsar populations are predicted. A method of work to deal with uncertainty and strengthen the robustness of this prediction has been recommended, particularly in the case of turnstone, the species most likely to be affected by the permanent loss of a currently favoured feeding area.

1.4 HABITAT REGULATIONS ASSESSMENT

Information has been provided in the ES to inform an Appropriate Assessment of the effects of the proposed operations on the Dee Estuary European Marine Site by the regulators.

1.5 OTHER ISSUES

There are no known sites of archaeological or cultural heritage importance in the area or sites of military interest.

The potential positive economic impacts associated with the further development of the port are linked both to the increase in port business and the associated regeneration potential in the North Wales area. No significant adverse economic impacts are predicted.

1.6 IN-COMBINATION EFFECTS

The potential impacts of other plans and projects taking place, or likely to take place, in the near future in the Dee Estuary and surrounding area, in combination with the proposed dredging and disposal activities, were considered.

These included dredging operations further up the Dee Estuary linked to the Airbus operation, previous dredging and disposal operations, aggregate dredging in Liverpool Bay, and windfarm and oil and gas developments in Liverpool Bay. Previous studies, including modelling studies, on the potential impacts of dredging of the Inner and Outer Channel and disposal operations at Mostyn Deep concluded that there were no significant impacts on the Dee Estuary. The other projects identified will not have an effect on the project area due to their distances from the port and the lack of direct physical connections.

1.7 MITIGATION

No significant impact on coastal processes or ecological receptors is predicted and as a consequence no mitigation is required. However in order to increase the robustness of this conclusion and deal with any potential uncertainty the following mitigation measures have been proposed to minimise potential environmental impacts;

- The existing habitat at the Young Associates Area E (see *Figure 4.10* in the main ES) to be augmented with scattered rip rap (small stones <15 cm long similar to that used in gabion baskets) at the intergrade between intertidal flats and drift sand over an area not exceeding 20 m long and 3 m wide at a density of no more than 5 % rocks per square metre. This will allow settlement surfaces and habitat for fucoids, mussels and barnacles thereby increasing the potential feeding habitat for turnstones (and other species) that may be displaced from the modified berth area.
- The works will be programmed to begin in April and finish in October (early November if there are project overruns) to ensure that the bulk of

the work, particularly piling, is carried out when SPA populations are largely absent.

- A narrow mesh screening to a height of 2 m will be erected prior to construction work commencing, along the breakwater, to protect feeding and roosting birds from visual stimulus. The efficacy of this screening should be monitored to ensure birds are not disturbed by the screening itself.
- Lighting will be directed away from the mudflats west of the breakwater and any roost sites.
- Non-essential presence of the workforce along the western edge of the breakwater will be avoided.
- Jack up barges that are required to be stationed in Mostyn Gutter on the western side of the breakwater, will be sited at least 250 m from the redshank roost at YA Area E (Grid ref 315320 381185), where the permanent impact mitigation is proposed.

1.8 CONCLUSIONS

Assessments of coastal processes and ecological interests based on both previous and current studies indicate that the construction and operation of the modified berth will not have a significant impact on any of the qualifying interests of the SPA/Ramsar or SCI. 0.006% of the European Marine Site will be permanently lost but due to this area's low level of biological interest no impacts on overall site integrity or functioning are anticipated. In the case of ornithological interests mitigation measures have been proposed to deal with any uncertainties to increase the robustness of these predictions.

1 INTRODUCTION

1.1 PURPOSE OF THIS REPORT

The Port of Mostyn lies on the Welsh (south west) side of the River Dee in Flintshire, approximately 4 km south east of the Point of Ayr and approximately 20 miles north west of Chester (see *Figure 1.1*).

The Port of Mostyn Limited (PoM) intends to modify the port's Berth No 1. This berth was designed for the 'Roll on Roll off' (Ro-Ro) ferry business and P&O Irish Sea operated their Mostyn–Dublin ferry service from this berth between 2001 and 2004. The development proposals involve the modification of the berth by constructing a solid quay to allow conventional ships to berth side on and load on and off using a shore side crane. The modification is proposed specifically to accommodate the offshore wind construction industry. The modified berth will continue to operate as a Ro Ro berth for Airbus vessels as well as being a conventional berth. More information on the background and need for the scheme is provided in *Section 2.3*.

This Environmental Statement (ES) has been prepared by Environmental Resources Management Ltd (ERM) on behalf of the Port of Mostyn (PoM) and is submitted in support of PoM's application to the Welsh Assembly Government (WAG) for Consents to Undertake Marine Works, under the Food and Environment Protection Act 1985 (FEPA). The ES presents the findings of an Environmental Impact Assessment (EIA) of PoM's proposed berth modification. Further details on the consenting requirements and the need for EIA are provided in *Section 1.2* below.

1.2 CONSENTING REQUIREMENTS AND THE NEED FOR EIA

Consents are required for the placement of articles or materials at sea or in tidal waters (below mean high water spring tide mark). In this case, a licence is required from WAG under Part II of the *Food and Environment Protection Act 1985* (FEPA) as amended. The consent application must include appropriate supporting environmental information.

The proposed works fall under Annex II of the *EU Directive 85/337/EEC* (as amended by Directive 97/11/EC and Directive 2003/35/EC), under Section 10:

> c) Construction of railways and intermodal transhipment facilities, and of intermodal terminals (projects not included in Annex I);
> e) Construction of roads, harbours and port installations, including fishing harbours (projects not included in Annex I); and
> k) Coastal work to combat erosion and maritime works capable of altering the coast through the construction, for example, of dykes, moles,

jetties and other sea defence works, excluding the maintenance and reconstruction of such works;

Schedule 1 of the *Marine Works (Environmental Impact Assessment) Regulations 2007*, helps determine whether an Environmental Impact Assessment (EIA) is required for Annex II developments. In terms of the environmental sensitivity of the location, Section 2 of the Schedule states that areas designated by any EC State under the Wild Birds Directive or the Habitats Directive need careful consideration. Because the proposals lie within the Dee Estuary European Marine Site (Special Area of Conservation (SAC), Special Protection Area (SPA) and Ramsar Site) it is deemed that an EIA is required.

Because the works fall within the boundary of a site designated for its European importance for nature conservation, the EIA must also consider any impacts on the qualifying interests of the sites under the *Conservation (Natural Habitats & c) Regulations 1994* as amended (the Habitat Regulations). This is discussed further in *Chapter 4, Ecology*.

1.3 POLICY CONTEXT

1.3.1 Introduction

The proposed development is a modification of one of the port's berths specifically to facilitate the construction of offshore wind farms. This section therefore summarises planning policy relevant to ports and renewable energy where appropriate to this project. The consenting process for this scheme is through a FEPA licence and a separate planning permission is not required; therefore detail on planning policy is not provided, but instead this section presents a summary of the key European, National and local policy that relates to this development.

KEY:

5 km from Quay

N
W E
S

0 2

Kilometres

CLIENT: Port of Mostyn

SIZE: A4

TITLE: Figure 1.1 Site Location

ERM
Norloch House
36 King's Stables Road
Edinburgh, EH1 2EU
Tel: 0131 478 6000
Fax: 0131 656 5813

ERM

DATE: 17/12/2009 | CHECKED: SO | PROJECT: 0103649

DRAWN: JJH | APPROVED: AD | SCALE: As Scale Bar

PROJECTION: British National Grid

DRAWING: Location.mxd

REV: 0

File: 0107468_PoM_JH_SMMAPS\Location.mxd

1.3.2 European Renewable Energy Policy

There are four key European energy and climate change policy drivers which combined encourage the United Kingdom to contribute to the European level commitments. These are:

- The European Union White Paper: *Energy for the Future: Renewable Sources of Energy 1997* – confirms a strategy and action plan to double renewable energy use to a level of 12% by 2010. This implies that generation of renewable energy from natural resources is required.

- European Union Emissions Trading Scheme (EU ETS) – The EU ETS is closely linked to the terms of the Kyoto Protocol. It is based on Directive 2009/87/EC, which has recently been updated as 2009/29/EC. When the Kyoto Protocol came into force on 16 February 2005, the EU ETS had already become operational. EU ETS limits allowed levels of carbon dioxide emissions by energy intensive users and power generators across the EU. Parties exceeding the limits are now allowed to purchase additional allowances from renewable sources. It is this mechanism that is driving growth in the investment of renewables in terms of the European market for trading energy allowances.

- The Renewable Energy Directive 2009/28/EC introduced April 2009, repeals Directive 2001/77/EC on the promotion of the use of energy from renewable sources. It establishes a common framework across the EU for the promotion of energy from renewable sources and sets mandatory national targets for the overall share of energy from renewable sources in gross final consumption of energy. As such the EU states have agreed to create a low carbon economy based on the following undertakings:
  - Reduce greenhouse gas emissions by 30% by 2020 – from 1990 levels and by 2050 to reduce them by 60-80%; and
  - Reduce the EU's energy consumption by 20% by 2020 – from 1990 levels (commonly referred to as the 20-20-20 Directive).

The UK will have to multiply its share of energy from renewable sources in gross final consumption of energy in 2005 sevenfold to meet the 2020 target of its share of 15%.

1.4 NATIONAL POLICY

1.4.1 UK Renewable Energy Policy

To meet the most recent EU Directives outlined above, the UK Government produced a consultation document *"UK Renewable Energy Strategy"* in June 2008. This set out a range of possible measures to deliver the UK share of the EU 20% target. The UK contribution should be to increase the share of renewables in its energy mix from around 1.5% in 2006 to 15% by 2020 (sevenfold increase). In July 2009, the *Renewable Energy Strategy 2009 (RES)*

was published to tackle the challenge and to date is the most recent and comprehensive national policy on the matter. The objectives of the RES include the UK Government's commitment to:

- driving delivery and clearing away barriers to implementation;
- increasing investment and pursue new sources of renewable energy supply; and
- creating new opportunities for individuals, communities and businesses to harness renewable energy.

In terms of legislating to implement the affirmed policies, the following Acts represent the most recent emergence of a clear legislative framework for energy and climate change in the UK. Three separate but interlinked Energy, Climate Change and Planning Bills are proceeding through Parliament. As at 2009, the following are now legal requirements:

- The proposals contained in the Energy White Paper of 2007 are formally enacted by the Energy Act 2008 and supported by the *Renewable Energy Strategy (RES 2009).* It is designed to speed up and increase the delivery of renewable energy in the UK.

- The Climate Change Act 2008 enacts a requirement for a 26% reduction in greenhouse gas emissions by 2020 and an 80% reduction by 2050 against a 1990 baseline. A key component of the Act that draws in EU targets, is the concept of 'five yearly carbon budgets' where the aim is to reduce emissions from proper forward planning, some 15 years ahead. This will operate towards the 2050 target and will be scrutinised by a Government expert committee on Climate Change.

- The Planning Act 2008 is relevant to delivery of renewable energy in terms of introducing procedures to deliver major infrastructure.

1.4.2 Renewable Energy Policy in Wales

The Welsh Assembly Government (WAG) works alongside the UK Government and the other administrations in Wales to implement sustainable development principles into every level of governance.

Ministerial Interim Planning Policy Statement 01/2005- Planning For Renewable Energy

This document details updated targets from Planning Policy Wales (2002) in line with developments in policy at a UK and European governance level. It specifically provides clear policy on the role of Development Management, at a local authority level, in promoting renewable energy proposals; identifying Strategic Search Areas (SSAs) as being central to success in guiding development of wind farms to the most appropriate locations.

Renewable Energy Road Map for Wales, Consultation Draft February 2008

This document aims to increase the role of renewable energy and place Wales as a global showcase for clean energy production and energy efficiency. Wind energy is identified in this 'Route Map' as a main contributor to successful delivery of this vision and renewable energy targets (20% of Wales' electricity from renewable source by 2020 (7TWhr). The document states that major new offshore wind farm projects could produce at least 3 TWhr annually.

1.4.3 Planning Policy Wales (2002)

Land use planning policy in Wales is contained in 'Planning Policy Wales' (2002). This provides the strategic policy framework for the effective preparation of local authorities' development plans. In particular the National Guidance establishes the principles of sustainability, and the basic economical, environmental, and social principles for achieving this. The promotion of Renewable Energy is identified as a 'Key Objective' stating that;

"Planning policy and proposals should:

Contribute to climate protection by encouraging land uses that result in reduced emissions of greenhouse gases, in particular energy-efficient development, and promoting the use of energy from renewable sources."

In order to achieve this Key Objective this policy document states that all Local Authorities should facilitate development of all forms of renewable energy.

1.4.4 Draft National Policy Statement for Ports – November 2009

A national policy statement relating specifically to port development in Wales has been published in draft and consultation on this is currently underway. As this has yet to be finalised and adopted the specific policies may change, but it is considered that the principles and objectives of this policy statement will remain. Relevant extracts are included below.

'*Port handling needs for energy can be expected to change as the mix of our energy supplies changes and particularly as renewables play an increasingly important part as an energy source. Ensuring security of energy supplies through our ports will however be an important consideration and ports will need to be responsive both to changes in different types of energy supplies needed (and to the need for facilities to support the development and maintenance of offshore renewable sites) and to possible changes in the geographical pattern of demand for fuel, including with the development of power stations fuelled by biomass within port perimeters.*'

'*Government believes that there is a compelling need for substantial additional port capacity over the next 20-30 years, to be met by a combination of development already consented, and development for which applications have yet to be received.'*

'When determining an application for an order granting development consent in relation to ports, the decision-maker should accept the need for future capacity to:

- *cater for long-term forecast growth in volumes of imports and exports by sea for all commodities indicated by the demand forecast figures set out in the MDST forecasting report accepted by Government, taking into account capacity already consented. The Government expects that ultimately all of the demand forecast in the 2006 ports policy review is likely to arise, though in the light of the 2008-09 recession, not necessarily by 2030;*
- *support the development of offshore sources of renewable energy;*
- *offer a sufficiently wide range of facilities at a variety of locations to match existing and expected trade, ship call and inland distribution patterns;*
- *ensure effective competition between ports and provide resilience in the national infrastructure; and*
- *take full account of both the potential contribution port developments might make to regional and local economies*.'

In addition to this, a recent DECC report entitled 'UK Ports for the Offshore Wind Industry: Time to Act (1) highlights the significant lack of UK ports with suitable space (laydown area and storage), berths and suitable quayside crane facilities to serve the burgeoning offshore wind industry in the UK. Mostyn is shown to the leading UK supporting the offshore wind industry supporting 4 of the 10 offshore sites constructed or in construction in the UK. The report also highlights the urgent need for UK ports to take action to improve facilities in order to support the remaining Round 2 and forthcoming very large round 3 offshore wind construction programme that is central to the UK government energy and climate change policies. The proposed quayside development proposed for Mostyn is therefore proposed in this policy context and is complimentary to the aspirations of and goals for the industry as expressed in DECC's report.

1.5 REGIONAL PLANNING POLICY

1.5.1 Adopted Development Plan

The relevant adopted development plan is somewhat dated as the Clwyd Structure Plan was adopted in 1991 and Delyn Local Plan was adopted in 1993. Although a number of general policies remain relevant there is no specific policy or guidance relating to port development.

1.5.2 Emerging Policy

Flintshire Unitary Development Plan Deposit Draft 2003

Policy AC10 of the Flintshire Unitary Development Plan (UDP) relates specifically to Mostyn Docks:

(1) see http://www.ukrenewables.com/documentation/DECC-Report.pdf

"The expansion and enhancement of the water based freight transport facilities will be permitted provided that:

- *consideration has been given to the transfer of freight from road to rail or between river and sea vessels;*
- *the transport infrastructure is adequate to serve the development; and*
- *the development does not harm the ecological integrity and water quality of the Dee Estuary and River Dee."*

There are a number of policies which are also relevant to these proposals at Port of Mostyn, there are highlighted below:

Policy L6 The Coast
"Outside settlement boundaries and allocated sites development on the coast will be permitted only where:
a. it can be demonstrated a coastal location is essential;
b it conserves and enhances the open character of the coast;
c. natural coastal defences are not adversely affected;
d. extensive coastal protection measures are not required; and
e. due regard is paid to the risks of erosion and flooding."

Policy WB2 Sites of International Importance
"Development proposals which are likely to adversely affect the integrity of a Ramsar Site, Special Protection Area (SPA) or Special Area of Conservation (SAC), or potential SPAs and Candidate SACs, will not be granted planning permission unless there are no alternative solutions and there are imperative reasons of over-riding public interest."

Policy SR8 The Dee Estuary Corridor
"Development proposals within and along the Dee Estuary Corridor will be permitted only where the proposal:
a. does not detract from the recreational value of the Estuary Corridor;
b. preserves and enhances nature conservation, landscape assets and any other identified interests;
c. improves access to, from, and around the Corridor; and
d. enhances the attractiveness of the Dee Estuary for the public's enjoyment."

Technical Advice Note (TAN) 18

TAN 18 recognises the positive role that suitable port facilities have in the international transportation of goods into Wales using the sea. It is considered that the proposed works at PoM will be undertaken to improve these facilities, to accommodate suitable freight.

"Coastal shipping in conjunction with the major navigable waterways provides an environmentally friendly means of moving freight. This is dependent on the provision of wharves and harbour facilities able to handle and distribute the goods."

1.5.3 Other Projects Proposed in the Dee Estuary Area

Existing projects/operations in the Dee Estuary that need to be considered in-combination with the proposed berth modification, include the following:

- dredging of the Outer Channel for maintenance of navigation;
- local dredging by Airbus upstream at Broughton;
- shipment of Airbus 380 wings from Broughton;
- aggregate extraction at an offshore site (Area 457) in Liverpool Bay;
- dredging of the River Mersey approach channel;
- an existing dredge license for mineral aggregates at Hilbre Swash; and
- wind farms in Liverpool Bay; and oil and gas production platforms in Liverpool Bay.

Consultation with Flintshire County Council, EAW and CCW indicates that there are no other projects in planning on the Dee Estuary that need to be considered in combination with the berth modification.

1.6 SCOPE OF THE EIA

A scoping study was undertaken by ERM on behalf of PoM to identify and agree with regulators the environmental issues that require detailed assessment as part of the EIA. The results of this study were presented in the Scoping Report dated 1st October 2009 (1). Through consideration of baseline information and using professional judgement, the scoping study found that potential significant impacts were only identified in relation to three issues:

- Coastal Processes;
- Ecology; and
- Socio-economics (potential beneficial impacts).

Due to the scale and nature of the proposed development, all the other topics were scoped out of the EIA, as summarised in *Table 1.1.*

(1) Port of Mostyn Breakwater Quay Development Scoping Report (October 2009) ERM on behalf of the Port of Mostyn Ltd.

Table 1.1 EIA Scope

Topic	Summary	Construction	Operation
Planning Context	Development plans and national policy and guidance relevant to the EIA will be identified within an introductory chapter.	N/A	N/A
Sediment and Water Quality	There is no significant contamination within the project study area. Areas of sand and silt within the development footprint will be disturbed during the construction period, but are not anticipated to result in any significant impacts.	N	N
Coastal Processes	The ES will consider the identified changes and use the extensive recent studies and monitoring to estimate near and far-field extent and duration of the changes. It will consider whether any pathways exist to affect the conservation features of the Dee Estuary to inform the Appropriate Assessment. Mitigation measures would be considered to manage any identified impacts with monitoring plans as appropriate.	Y	Y
Landscape and Visual	It is considered that the proposal will have insignificant impacts on any landscape designations or the local landscape character. It is considered that the construction of a new quay will not result in significant visual impacts. It is recommended therefore that this topic is scoped out of the EIA.	N	N
Ecology	As the proposed development lies within an SPA, cSAC and Ramsar site, sufficient information will be provided to allow an assessment to be conducted under the *Conservation (Natural Habitats &c.) Regulations 1994 as amended,* taking into account the stated conservation objectives of the designated sites. It is proposed that the scope of this assessment is limited to considering the specific impacts described, and how these would affect the conservation objectives of the designated interest features. The assessment will consider in-combination affects, and also take into account any mitigation measures.	Y	Y

Topic	Summary	Construction	Operation
Fish and Fisheries	The area proposed for the development is within the operational port area and is of no functional value as fishery habitat. Given the small area and construction method, very little suspended sediment mobilisations will take place and therefore no adverse impacts on fisheries are predicted from it. No further consideration of impacts is necessary.	N	N
Cultural Heritage	There are no archaeologically important features which could be affected by the proposed works and no significant visual impacts, therefore this issue has been scoped out of the EIA.	N	N
Noise and Vibration	Outline construction noise predictions for the vibro-piling (without mitigation) indicate that the daytime noise will be below the criteria levels recommended in BS 5228 and the baseline noise levels reported in 1994. Vessel and road traffic levels during construction will not result in any significant noise sources and during operation, noise levels will be well below the previous levels experienced during the operation of the Ro-Ro berth. No significant noise impacts are predicted and therefore noise and vibration can be scoped out of the EIA.	N	N
Air Quality	On the whole, due to the fact that this project involves only a modification to an existing port resulting in a decrease in vessel traffic, it is predicted that there will not be any dust nuisance and air quality impacts from both the construction and operation phases. Therefore, dust nuisance and air quality impacts can be scoped out from the EIA and a detailed assessment will not be necessary.	N	N
Traffic and Transportation	Given the low numbers of vehicle movements anticipated for construction and the low volumes of operational road traffic (relative to the Ro-Ro ferry traffic previously travelling to and from the port), there are no traffic impacts predicted and this issue has therefore been scoped out of the EIA.	N	N

Topic	Summary	Construction	Operation
Socio-economics	Modification of the berth to allow for use in offshore wind energy development will help to secure and increase employment at the port. The socio-economic benefits of the project will be described further in the ES.	Y	Y

The scoping report was issued to several consultees:

- Welsh Assembly Government (WAG)
- Marine and Fisheries Agency (MFA)
- Countryside Council for Wales (CCW)
- Natural England (NE)
- Environment Agency Wales (EAW)
- Royal Society for the Protection of Birds (RSPB)
- Centre for Environment, Fisheries and Aquaculture Science (CEFAS)
- Flintshire County Council

The formal Scoping Opinion from MFA is provided in *Annex A*.

1.7 SOURCES OF INFORMATION

A range of information sources has been used to inform this report and to undertake the EIA including:

- existing information from Port of Mostyn including a site plan and project description;

- Ordnance Survey (OS) mapping at 1:25,000 and 1:50,000 scale;
- Information obtained from a site visit in July 2009;

- Specialist studies undertaken to inform this assessment:
  - Bird surveys of the breakwater and surrounding area in November and December 2009
  - Intertidal invertebrate surveys undertaken around the breakwater in November 2009

- Environmental Statements (ESs) that accompanied previous applications for port development and dredging operations, including:
  - *Port of Mostyn Dredging and Disposal Operations for Maintenance of Navigation: Environmental Statement*; 18 October 2007. Environmental Resources Management for Port of Mostyn.
  - *Port of Mostyn Re-development Cumulative Environmental Impact Assessment and Appropriate Assessment for Maintenance Dredging and Disposal;* November 2002. Young Associates for Port of Mostyn.

- *Proposed Deepening of Existing Navigation Channel for Access to Mostyn Docks Environmental Statement;* April 1999 (and addendum July 1999). Young Associates for Port of Mostyn.
- *Port of Mostyn Re-Development Environmental Statement*; December 1994. AERC for Port of Mostyn.

- Specialist studies undertaken to inform previous development applications, including:
  - ABPmer Southampton for Port of Mostyn, 2009. *Mostyn Dredge and Disposal-Ecological Phase 2 Monitoring Work (2009 Spring Equinox Surveys)*.
  - ABPmer Southampton for Port of Mostyn. *Mostyn Dredge and Disposal – Ecological Monitoring Work (2005, 2006 Surveys)*; February 2006 and March 2007.
  - *Port of Mostyn Dredge and Disposal Proposals, Appropriate Assessment of channel dredged to a maximum of 2m to allow an advertised depth of 1.5m;* 2005. Environment Agency.
  - *Dee Estuary Modelling Port of Mostyn EIA 2007 Hydraulic Modelling Studies;* April 2007. HR Wallingford Report EX5514, Release 1.0 (and previous estuary modelling studies).
  - *Maintenance of Navigation Monitoring Report;* March 2007. Shoreline Management Partnership (SMP) for the Port of Mostyn.
  - *Evolution of the Banks and Channels of the Dee Estuary*, April 2008. Shoreline Management Partnership (SMP) for the Port of Mostyn.

- The Flintshire Unitary Development Plan [(1)], and the Flintshire Local Biodiversity Action Plan (LBAP);

- Information on the Dee Estuary European Marine Site, including NE and CCW draft advice given under Regulation 33(2) of the Habitats Directive (Consultation Draft May 2004), and Wetland Bird Survey (WeBS) counts for the area.

- A number of research papers on wading birds and disturbance effects:
  - Austin, G. E., Collier, M.P., Calbrade, N.A., Hall, C. & Musgrove, A. J. 2008. Waterbirds in the UK 2006/07: The Wetland Bird Survey. BTO/WWT/RSPB/JNCC, Thetford.
  - Burton N.H.K. & Armitage M.J.S. 2008. Settlement of Redshank *Tringa totanus* following winter habitat loss: effects of prior knowledge and age. *Ardea* 96(2): 191–205.
  - Burton, N.H.K., Rehfisch, M.M., Clark, N.A, and Dodd, S.G. 2006. Impacts of sudden winter habitat loss on the body condition and survival of redshank *Tringa totanus. Journal of Applied Ecology* **43**, 464–473.

(1) Flintshire Unitary Development Plan 2000-2015 Deposit Draft 2003. Flintshire County Council.

- Goss-Custard, J.D., Triplet, P., Sueur, F & West, A.D. 2006. Critical thresholds of disturbance by people and raptors in foraging wading birds. Biological Conservation **127:**88-97.
- Institute of Estuarine and Coastal Studies University of Hull. 17 October 2008 *Construction and Waterfowl: Defining Sensitivity, Response, Impacts and Guidance* Report to Humber INCA.
- Mayor, R.A., Heubeck, M., Schmidt, S. & Parsons, M. 2008. Seabird numbers and breeding success in Britain and Ireland 2006. Peterborough, Joint Nature Conservation Committee.
- Marine and Fisheries Agency (2008) Port of Mostyn-consents in relation to a -2 metres Chart Datum dredge and associated disposal of material. MFA Ref DC 6835.
- Rehfisch, M, Austin, G.E., Freeman, S. E., Armitage, M.J.S. & Burton, N.H.K. 2004. The possible impact of climate change on the future distributions and numbers of waders on Britain's non-estuarine coast. *Ibis* **146**, 70-81.

- Information supplied by consultees including:
  - Countryside Council for Wales (CCW)
  - Natural England (NE)
  - Royal Society for the Protection of Birds (RSPB)
  - Environment Agency (EA)

1.8 ENVIRONMENTAL IMPACT ASSESSMENT METHODOLOGY

1.8.1 Definitions of Impacts

There are a number of ways that impacts may be described and quantified. The various types of impacts that may arise from project activities are shown in *Box 1.1.*

Box 1.1 Definition of Impacts

1. Nature of Impact

Negative: an impact that is considered to represent an adverse change from the baseline or to introduce a new undesirable factor.

Positive: an impact that is considered to represent an improvement to the baseline or to introduce a new desirable factor.

2. Type of Impact

Direct (or primary): an impact that results from a direct interaction between a planned project activity and the receiving environment (eg, removal of mudflat habitat).

Secondary: an impact that follows on from the primary interactions between the project and the environment as a result of subsequent interactions within the environment (eg, impacts to bird species associated with loss of benthic food source due to loss of mudflat).

Indirect: impacts that result from other activities that are encouraged to happen as a consequence of the project (eg, disturbance to bird species as a result of increasing use of the berth by vessels).

Cumulative: an impact that acts together with another impact or impacts (including repeated impacts over time or those from other concurrent or planned future activities) to affect the same environmental resource or receptor.

3. Duration of Impact

Temporary: an impact that is predicted to be of short duration and intermittent/occasional in nature.

Short-term: an impact that is predicted to last only for a limited period but will cease on completion of the activity, or as a result of mitigation/reinstatement measures and natural recovery.

Long-term: an impact that will continue over an extended period. This will include impacts that may be intermittent or repeated rather than continuous if they occur over an extended time period (eg repeated seasonal disturbance of species as a result of project activities).

Permanent: an impact that occurs during the development of the project and causes a permanent change in the affected receptor or resource (eg the physical loss of a habitat feature) that is permanent or endures substantially beyond the project lifetime.

4. Scale of Impact

Local: an impact that affects locally important environmental resources or receptors or is restricted to a single habitat/biotope, a single administrative area or a single community.

Regional: an impact that affects regionally important environmental resources or is felt at a regional scale as determined by administrative boundaries or habitat type.
National: an impact that affects nationally important environmental resources or affects an area that is nationally important or protected. This scale of impact includes internationally important environmental resources such as areas protected by European Directives and International Conventions.

1.8.2 In-combination and Cumulative Impacts

Article 6(3) of the Habitats Directive requires that the effects of a plan or project on a European site must be considered in-combination with other plans or projects. This requirement is driven as a result of effects associated with one project in isolation may not significantly impact the integrity of a European designation, but in-combination with other projects, impacts may be significant. Therefore when conducting an EIA it is necessary to consider other projects within and adjacent to the study area that have consent or are lodged in the planning system.

1.8.3 Significance of Environmental Impacts

Introduction

Virtually all human activity imposes some disturbance to aspects of the environment because of physical impacts on natural systems or due to interactions with other human activities. Often such impacts are slight or transitory and have an effect that may be regarded as insignificant. The primary purpose of identifying the significant effects of a project is to provide information to the regulators, in this case WAG, and EAW, such that an informed consent decision can be reached.

Definition

There is no statutory definition of significance within the EIA Regulations therefore the determination of significance is necessarily subjective. It is also important to note that different professional and advisory bodies advocate different approaches in the various topic areas covered by EIAs (eg ecology, landscape and visual assessment, noise etc).

General Assessment Criteria

Criteria for assessing the significance of impacts stem from the following key elements.

- Status of compliance with relevant government legislation, policies and plans, and any relevant industry policies, environmental standards or guidelines.

- The magnitude (including nature, scale and duration) of the change to the natural or socioeconomic environment (eg loss of, or damage to, habitats, increase in noise, increase in employment opportunities), expressed, wherever practicable, in quantitative terms.

- The nature of the impact receptors (physical, biological or human). Where the receptor is physical (eg, the seabed or seawater) its quality, sensitivity to change and importance are considered. Where the receptor is biological, its importance (eg, its local, regional, national or international importance) and its sensitivity to the impact are considered.

- The likelihood (probability) that the predicted impact will occur. This is estimated based upon experience and/or evidence that such an outcome has previously occurred. The results of previous monitoring studies are important in informing this.

Picking up from the second and third points above, a combination of predicted impact magnitude and the sensitivity/value of the receptor resource being impacted are key determinants in impact significance.

Where the magnitude of impact is indistinguishable from the background / natural level of environmental change, the resultant significance rating will be *no impact* or *not significant*.

Physical Processes Assessment Criteria

For the purpose of assigning ratings of significance to hydrodynamics and sediment dynamics related impacts the following criteria were applied.

- A significant impact to hydrodynamics is defined as an irreversible change in morphology that is of a magnitude greater than the range of natural fluctuations.

- A significant impact to sediment dynamics is defined as an irreversible change in sediment flux in or out of the Dee Estuary that is of a magnitude greater than the range of reported natural fluctuations.

These criteria are magnitude only. In terms of value and sensitivity the Dee Estuary system is rated as a '*High value / sensitivity receptor or site*'.

These criteria have been adopted for this assessment for two main reasons as follows.

- They allow a ready derivation of magnitude for the modelling studies undertaken for the work and can be linked back to parameters that have been studied in the morphological monitoring.

- A significant impact to hydrodynamics/sediment dynamics would most likely convert into significant potential impacts to natural populations (eg by reducing the area of intertidal habitat).

Ecological Assessment Criteria

The potential for ecological and nature conservation impacts has been assessed in the light of habitats and the species that will be affected by the proposals in line with the latest *Guidelines for Ecological Impact Assessment in the United Kingdom* published by the Institute of Ecology and Environmental Management (IEEM, 2006).

Significant impacts are qualified eg as locally significant, regionally significant or nationally significant. For example the loss of an area of habitat from a SSSI for which it has been designated could be considered nationally significant. Equally, the loss of greater than 1% of a local, regional or national population could be considered significant at a local, regional, national or international level.

1.8.4 Dealing with Uncertainty

Predictions of impacts in EIA are made using varying means ranging from qualitative assessment and expert judgement through to quantitative techniques (eg, direct measurement). Use of these latter techniques allows a reasonable degree of accuracy in predicting changes to the existing environmental conditions. Where assumptions have been made, the nature of any uncertainties which stem from the prediction process are presented.

1.8.5 Overall Assessment Approach

The approach carrying out the EIA is outlined in the following steps.

Stage 1: Identification of Potential Interactions

The first step involved in identifying potential interactions is considering the proposed project activities and how the project might interact with its environmental resources and receptors. Completion of this step requires information on the proposed project activities and an understanding of the main baseline conditions.

In considering the environmental impact of the proposed berth modification it is important to recognise that whilst regular use of the Ro-Ro berth ceased in 2004, this area of the port was designed, operated and remains consented for regular use of Ro-Ro vessels and their associated road traffic.

It should be noted that the port is currently not fully utilised under existing consents within the Statutory Harbour Area. The proposed development represents a change in use of this part of the port area by adding the conventional berth and wind farm support facilities to the existing Ro-Ro berth. Whilst the Ro-Ro facilities will remain, retaining the flexibility of the berth, it will be operationally impossible for regular Ro-Ro ferry services to operate if the wind farm load out berth is to be used. In this way, whilst change in patterns of use, activity and disturbance of the area of the berth are expected to occur, the potential increase in additional or new disturbance from the new development is limited.

The ES will therefore, where appropriate, consider impacts against both the pre-consented levels of activity at the port during the operation of the Ro-Ro ferries in 2004, and the current environmental conditions at the port.

Stage 2: Identification of Significant Impacts

The aim of *Stage 2* is to ensure that the EIA is focused upon the study of potential impacts that are considered to be the most important for decision-making. Identifying the significant impacts requires the expert judgment of relevant specialists working together to systematically go through each activity. For each potentially significant interaction, the nature of the resource/receptor that is likely to be affected was considered along with an assessment of the likelihood of an impact occurring.

Cumulative impact assessment is important for identifying those activities that in themselves may have an impact that is not significant but taken into account with other activities across a wide area or over a period of time may have potentially significant impacts. However it is important to note that the Ro-Ro and wind farm load out berths cannot operate concurrently therefore potential cumulative impact from this source is effectively removed.

For each potentially significant interaction, the nature of the resource/receptor that is likely to be affected will be considered along with an assessment of the likelihood of an impact occurring.

Those interactions between project activities and environmental and socio-economic receptors/resources that are judged to be potentially of moderate or major significance are looked at in more detail. Those potential impacts considered to be minor are likely to be adequately managed by measures built into standard operating practice.

Stage 3: Developing Mitigation Measures

Where significant effects or areas of uncertainty are identified, a description of the measures envisaged to prevent or reduce adverse effects or provide reassurance through monitoring are included in the ES.

Stage 4: Evaluating Residual Impacts

The significance of the potential impact will be reviewed taking into consideration any mitigation and management measures that will be applied to avoid, reduce or remedy the impact. The significance of the residual (1) impact will then be re-evaluated against the criteria established for the assessment and reported in the ES.
Any residual impacts judged still to be 'major' or 'moderate' after the application of mitigation measures would receive ongoing management attention. These impacts would be subject to further sequences of prediction, evaluation and identification of additional mitigation measures.

1.9 STRUCTURE OF THE ENVIRONMENTAL STATEMENT

The remainder of this report is structured as follows:

- *Chapter 2 – Project Description*, summarises the history of the port development, sets out the business case for the berth modification and describes the construction and operation activities proposed.

- *Chapter 3 – Coastal Processes*, discusses the potential impacts from the development on the coastal processes.

(1) A residual impact is the impact predicted to remain once mitigation measures have been designed into the intended activity.

- *Chapter 4 – Ecology*, discusses the potential impacts from the development on marine ecology and ornithology.

- *Chapter 5 – Habitat Regulations Assessment*, discusses the potential impacts from the development on the Dee Estuary European Marine Site.

Annex A – Scoping Opinion

Annex B –Maintenance of Navigation Annual Monitoring Report (Port of Mostyn Ltd November 2009)

Annex C - Dee Estuary Evolution – an expatiation (Shoreline Management Partnership)

Annex D – Dee Estuary Physical Processes Reports

Annex E – Dee Estuary Designated Site Citations

Annex F – Bird Survey Data (ABPMER 2009)

Annex G – Invertebrate Survey Data (ABPMER 2009)

1.10 AVAILABILITY OF THE ENVIRONMENTAL STATEMENT

Copies of the ES are available on request. A charge of £30 including VAT will be made to cover the costs of reproduction. Copies of the Non-Technical Summary (NTS) are available free of charge. Electronic copies of the ES on CD ROM are available for a charge of £10.

Copies of the ES and NTS can be obtained from:
ERM
Norloch House
36 King's Stables Road
Edinburgh
EH1 2EU
0131 478 6000
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The ES may also be viewed during normal working hours at the following addresses:

Port of Mostyn Ltd Mostyn Holywell Flintshire CH8 9HE	Prestatyn Library Nant Hall Road Prestatyn LL19 9LH

2 PROJECT DESCRIPTION

2.1 INTRODUCTION

This chapter provides information on the background and need for the scheme and gives an overview of the proposals for the berth modification at the port. Information on design and construction is indicative, although it is unlikely to change significantly at the detailed design stage. The remainder of this chapter is structured as follows:

- *Section 2.2* – History of the Port Development
- *Section 2.3* – Background and Need for the Scheme
- *Section 2.4* - Site Selection and Alternatives
- *Section 2.5* – Site Description
- *Section 2.6* - Description of the Proposed Scheme

2.2 HISTORY OF THE PORT DEVELOPMENT

Between the early 1800s and the mid 1960s most of the cargo handled at Mostyn was associated with the ironworks and local collieries. The Mostyn Ironworks closed down in 1965, but the port continued to operate commercially handling various cargoes. Prior to 1998, no dredging was carried out and Mostyn operated as a NAABSA (Not Always Afloat, But Safely Aground) Port and relied on flushing of the local approach channel along the seaward flank of the port breakwater, the Mostyn Gutter, by means of flushing lagoons to maintain navigation. The flushing of the channel was supplemented by a small plough attached to the harbour vessel to remove local high-spots and by a bulldozer to maintain a flat bed along the berth to support vessel hulls during low water periods.

In the 1990s most of the shipping traffic which used the port was engaged in short-sea coastal voyages within the Irish Sea, Iberia and around other northern European waters. At that time ships that could be accommodated at Mostyn were typically between 1,000 and 2,000 deadweight tonnes (1). The larger vessels could navigate the channel and narrow dock entrance only over high water on spring tides. There was a change in sea transport by the mid 1990s as ship sizes increased as owners sought economies of scale and unitised traffic was introduced (eg, containers and Roll-on-Roll-off (Ro-Ro) ferries). There was a reduction in the availability of smaller tonnage ships that could use Mostyn and PoM needed to develop riverside berths to meet the requirements of modern shipping.

The more recent port development work has involved significant expansion to accommodate modern shipping. This development was consented following

(1) Weight of cargo, fuel, stores, passengers and crew carried by a ship when loaded to her maximum summer loadline.

a public inquiry in 1995 and was carried out in two phases. Phase 1 in 1998 involved the construction of a new 120 m quay, through the reclamation of 2 hectares (ha) of the foreshore in front of the existing dock.

Phase 2 which commenced in 2001 included the following:

- infill of the old dock and flushing lagoons and completion of the reclamation of the foreshore site of 8.9 ha;
- a 180 m extension of the new quay;
- the construction of a Ro-Ro facility; and
- dredging of the Inner Channel to an advertised depth of 3 m below Chart Datum (CD) linking the port to the seaward end of the port breakwater and Mostyn Deep/Welsh Channel near Point of Ayr.

In addition, a purpose built berth for the Airbus Dee River Craft was constructed in 2004.

Figure 2.1 ***Port of Mostyn Showing the Ro-Ro Facility in use***

The establishment (capital dredging) and maintenance of channels has taken place over a number of consent periods. Two dredging applications were submitted in 2005, one to dredge to 2 m below CD and one to dredge to 4 m below CD. The -2m consent was granted for a two year period, and a "Monitoring Protocol" was requested by the Regulators as part of this consent, to enable a more informed opinion to be given on the -4m application. In 2007 PoM applied to increase the authorised channel depth to achieve a channel dredge depth of 4 m below CD, so that it can maintain a navigable depth and access to port facilities, and to moderate the current tidally restricted access to the port. The -4m dredge application is in the final stages of consideration by WAG.

Ship movements at the Port of Mostyn have developed in two main phases. Following the first phase of the port development, between Oct 1998 and Nov 2001 there were approximately 300 ship movements per annum, some using the Mostyn Gutter channel which ran along the seaward (western) side of the existing breakwater. This access channel was usually only available over periods close to high water.

A second phase of vessel movements commenced with the development of the Ro-Ro berth which facilitated a regular commercial ferry service which operated from Nov 2001 until April 2004. Ship movements increased to around 1,500 per annum.

Since 2004 vessel movements have decreased due to the cessation of the ferry service at which time the Port decided to concentrate on the offshore wind farm and Airbus operations. Whereas the total number of commercial ship movements decreased, significant numbers of jack-up type craft and service boats commenced operating from the port from 2004.

2.3 BACKGROUND AND NEED FOR THE SCHEME

2.3.1 Background

Development of the Port of Mostyn since 1998 has established shore side and berthing facilities with the capacity to service a wide range of shipping sectors including the following.

- Ro-Ro ferry operations.
- Conventional general cargo vessels.
- Airbus vessels.
- Offshore renewable energy construction and support operations.

P&O Irish Sea operated their Mostyn–Dublin ferry service from the Ro-Ro berth between 2001 and 2004. Since this ferry service ceased in 2004 the port is not operating at the Ro-Ro capacity for which it is designed and consented, although it is still has the capacity to do so in the future. Since 2004 the port has focussed its business development into the construction and maintenance

of offshore wind energy developments and the shipping of the Airbus A380 aircraft wings.

When the Ro-Ro berth was used by the ferry operator, there were two ferries per day (a total of four movements) and approximately 440 Ro-Ro heavy goods vehicles (HGV) using the Ro-Ro berth. In addition there were 80 – 100 general cargo (steel, woodchips, cement etc) HGV movements to the port per day. The Ro-Ro facility includes an area of 15 acres, with more than 330 drive through unaccompanied trailer bays and with dedicated driver accompanied parking slots.

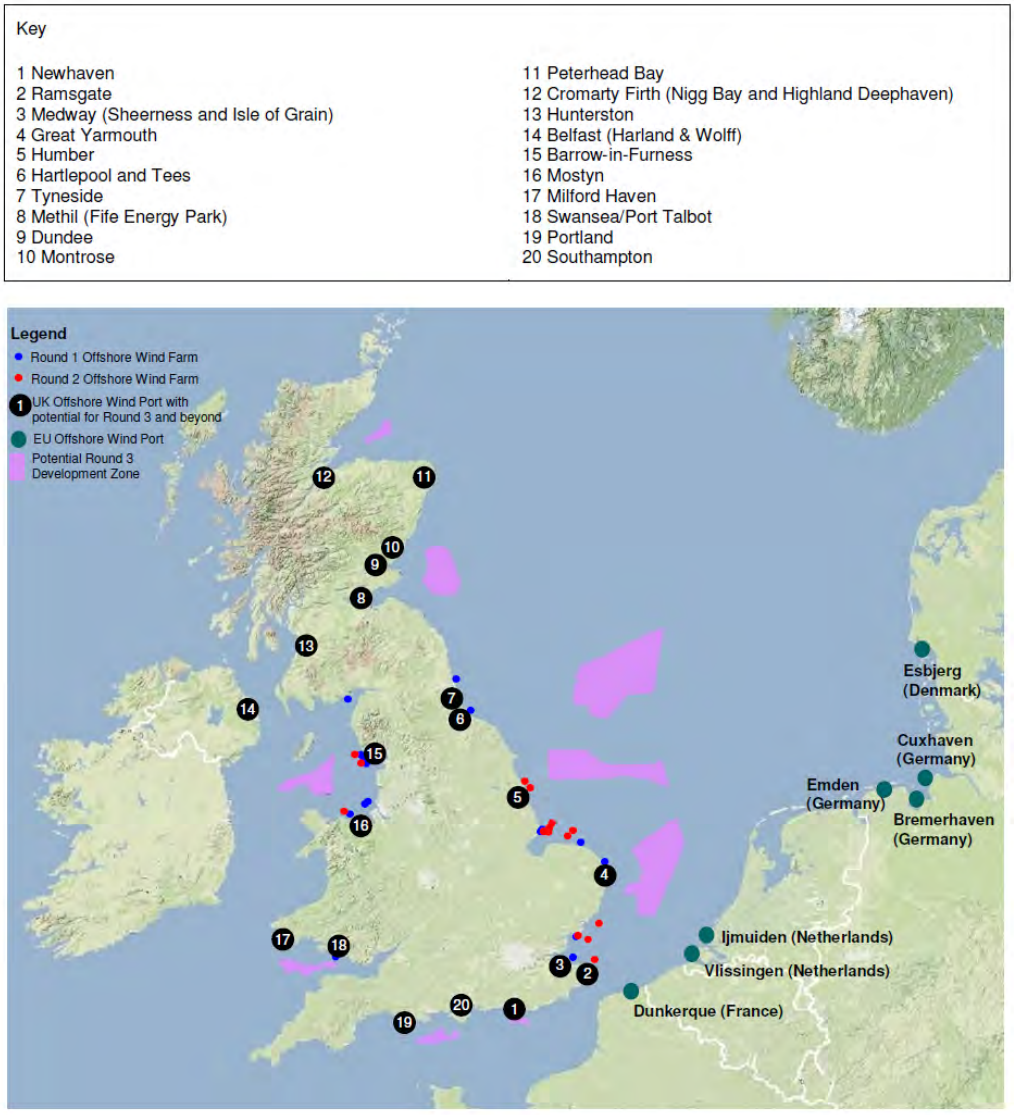
The port propose to modify the four mooring dolphin Ro-Ro berth by creating a new quayside adjoining it which will enable the port to further support the developing offshore renewable energy industry while retaining a Ro-Ro capability for the Airbus A380 aircraft wing exports (see *Section 2.6*). The modified berth cannot be used simultaneously for Ro-Ro and wind farm construction/support operations, (with the exception of the Airbus A380 wing shipments as above) therefore if the port secures offshore renewable energy contracts a regular ferry service could not be operated from the Ro-Ro berth.

2.3.2 Need for the Scheme

With high targets set by the Government for renewable energy production, there is an increasing demand for port facilities that are able to facilitate offshore wind farm construction, including the ability to support adequate very heavy lift craneage, have sufficient lay down area and have sufficient berthing facilities for the jack up barges that transport the turbine components offshore. There are a limited number of ports in the UK that can accommodate this type of development due to specific requirements for the vessels and components involved; the closest other suitable port on the west coast is Barrow-in-Furness (see *Figure 2.2* (1)).

(1) UK Ports for the Offshore Wind Industry: Time to Act Department of Energy and Climate Change. February 2009

Figure 2.2 UK Offshore Wind Farm Sites and UK and Continental Ports



Source: UK Ports for the Offshore Wind Industry: Time to Act Department of Energy and Climate Change. February 2009

Mostyn was the construction base for the UK's first offshore wind farm at North Hoyle. The port has also been involved in three further offshore wind farm projects - Burbo Bank, Rhyl Flats and Robin Rigg in the Solway Firth (see *Table 2.1*), and early in 2010 the work will commence on the Walney Island offshore wind farm project and Gwynt-y-Mor Offshore Wind Farm for which the Port of Mostyn is presently finalising contracts to act as the construction base for installation of the wind farm and also the ongoing operations and maintenance phase for the project.

Table 2.1 Construction Ports Chosen for Offshore Wind Farms

Wind Farm	Completion	Construction Port
Blyth Offshore	2000	Blyth
North Hoyle	2003	Mostyn
Scroby Sands	2004	Lowestoft
Kentish Flats	2005	Felixstowe
Barrow	2006	Belfast
Beatrice Demonstration	2006	Nigg, Cromarty Firth
Burbo Bank	2007	Mostyn
Lynn and Inner Dowsing	2008	Esbjerg
Rhyl Flats	2008	Mostyn
Robin Rigg	2008	Belfast and Mostyn

Source: UK Ports for the Offshore Wind Industry: Time to Act Department of Energy and Climate Change. February 2009

Since this report was published, Mostyn has been confirmed as the construction base for the turbines for the Walney Island OWF due to commence in April 2010.

The Crown Estate's Round 3 Offshore wind farm proposals are set to be announced by the end of 2009 with construction commencing in 2015. The proposed berth modifications at Mostyn will assist in increasing the capacity of the port to accommodate these offshore renewable energy developments by increasing the conventional berth area from three to four berths. Construction and maintenance of renewable energy projects will be the main focus of the port's business for at least the next 25 years.

Port of Mostyn is ideally placed to support the continuing development of the Round 2 wind farms in Liverpool Bay and in any planned extensions of these sites. The port is also ideally placed to support the development, construction, operation and maintenance of the large Irish Sea Round 3 site which extends from Liverpool Bay towards the Isle of Man.

2.3.3 Socio-Economic Benefits

Since the Ro-Ro ferry operations ceased in 2004, the port has adapted its business plan to ensure the future of the port and to sustain the jobs it supports. With government support for the renewable energy industry, there is an opportunity to draw business and investment to this area of North Wales via the port and secure the port jobs.

The Port company presently directly employs 30 people. Other companies who are the port's tenants employ a further 45 – 50 people plus an undisclosed number of UK Border Agency staff.

During the construction phase of a typical 25 turbine offshore wind farm, up to 160 people are employed onshore at Mostyn. The Gwynt-y-Mor wind farm

(250 turbines) will result in the order of 450 – 500 people being employed during the construction phase and 150 during the operation and maintenance period of the windfarm. Of the 450 employees, about 250 will be engaged by the main contractors and the other 200 will be indirect employment of sub-contractors and support services such as ship's stores, oils and fuel supplies, plant and equipment hire, taxi services, hotel accommodation, courier/postal services, food and beverages, electrical, mechanical/hydraulic repairs and servicing. Many of this workforce are from local service provider companies such as plant hire, electrical and mechanical services, steel fabrication and dive support services. Two dive support companies and a steel fabrication company have become established using premises at the Port of Mostyn. The local workforce and suppliers are supported by some specialist contractors from overseas.

In addition to the 160 people employed for the onshore works at the port, a further 80 – 100 people are employed as crew on the vessels carrying out the works at the offshore installation site. Most of these people are foreign nationals who spend 2-3 weeks at a time on board and stay locally for the remaining time. This results in a very considerable benefit to local hotels, taxi firms, laundry services, food, stationary, fuel and similar suppliers.

It is clear that the offshore wind farm industry remains a relatively new and young industry and the Port of Mostyn has played a very major role in the development of the facilities, skills and supply chain to support the load out of offshore wind farm components. The Port is committed to developing new facilities to better support the industry; to build on this experience and expertise; and will continue to provide opportunities to an expanding and maturing supply chain of associated industries and service providers.

2.4 SITE SELECTION AND ALTERNATIVES

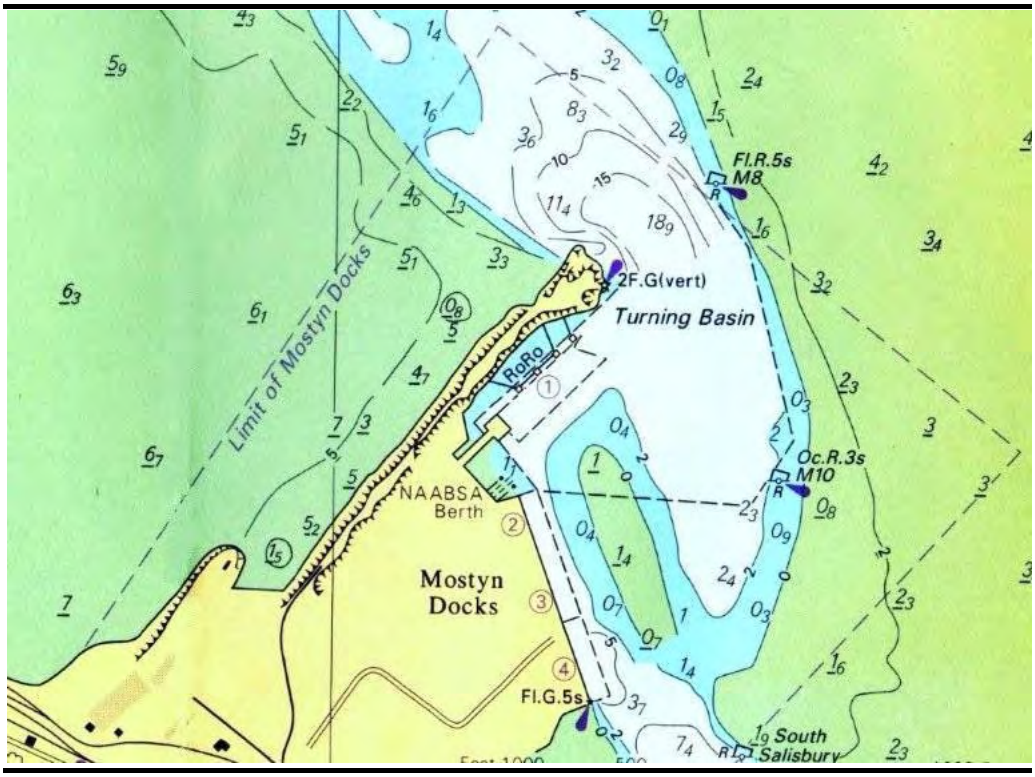
The modifications proposed at Berth No 1 are necessary because it is currently a Ro-Ro berth only and does not have the capability to undertake side loading operations of project cargo vessels or jack-up crane barges essential for offshore wind farm construction. The use of this berth has also decreased significantly since the cessation of the ferry service in 2004, there is adequate capacity for it to be used for the offshore wind construction industry immediately following the modification. All that is required at this location is a modification of an existing berth, minimising construction costs and environmental impacts. The only alternative would be to create an entirely new berth by extending the port; but this is unnecessary and would result in significantly greater cost.

2.5 SITE DESCRIPTION

The Port of Mostyn lies on the Welsh, south west bank of the Dee Estuary in Flintshire, approximately 4 km south east of the Point of Ayr. On the landward side, the Port lies adjacent to the A548 coast road and the main Holyhead to Crewe railway line. Prestatyn is approximately 10 km north west of Mostyn and Flint is approximately 11 km south east of Mostyn. The Dee Estuary provides habitat for a range of wildlife and supports a small shrimp, finfish and cockle fishery.

Figure 2.3 illustrates the Port of Mostyn Statutory Harbour Area (SHA) (shown as a dotted line) and the four numbered berths. It is Berth No1 that is to be modified, which lies parallel to the existing breakwater.

Figure 2.3 Port of Mostyn Statutory Harbour Area



The breakwater, which extends into the estuary, is also within the SHA boundary. The breakwater comprises tipped slag deposits which slope out into the development area. The slag substrate grades into sand and silt closer to the existing line of dolphins (see *Figure 2.4*). The existing line of dolphins represents the approximate proposed line of the modified berth.

Figure 2.4 Breakwater and Catwalk Pier

2.6 DESCRIPTION OF THE PROPOSED SCHEME

2.6.1 Introduction

The existing Ro-Ro berth (Berth No1) is a dolphin berth and is not suitable for conventional (Lo-Lo) vessels. The proposals involve the modification of the berth by constructing a solid quay to allow conventional ships to berth side on and load on and off using a shore side crane. The modification is specifically to accommodate conventional vessels involved in the offshore wind industry to meet the port's business plan; but the Ro-Ro berth facility will be retained for use in the export of Airbus components and other future business.

The development will result in a solid quayside and berth which will be approximately 180 m along the line of the existing mooring dolphins parallel to the breakwater up to the height of the existing catwalks (see *Figure 2.4*). The wall will be 12 m in height above chart datum, 8 m AOD. The infilled area behind the quay wall will result in the reclamation of just under a hectare (9,669 m^2) of estuary below high water including approximately 4,248 m^2 (just under half a hectare) of intertidal area and 5,421 m^2 (just over half a hectare) of subtidal area, although as part of a dynamic system, these areas will change over time. This area has been restricted to the minimum required for the modification to minimise habitat loss. The majority of this area is tipped slag deposits with only a small area of sand and silt substrate. Of the total area of reclamation proposed, about half a hectare is within the area that received development consent as part of the port expansion in 1995; about 50% of this area is intertidal and 50% is subtidal.

In the development of the design the port has been keen to maximise the use of the existing structures and to avoid the need to create new breakwaters or other new structures. The aim is to build within the existing footprint of the dolphin piles in an area that has been regularly disturbed by the action of berthing Ro-Ro ferries. It is important to note that no modification to the dredge channel is required and the fill material required for the new berth will come from a combination of sand which is dredged from the harbour and locally sourced slate waste.

2.6.2 Construction Approach

Following consent being granted, construction is anticipated to start in April 2010 and to take approximately eight months in total, with piling taking place over a four to six month period. Work will commence at the outer (north) end of the breakwater and work southwards. Construction working hours are anticipated to be 0700 – 1900 seven days a week. If consent is granted early in 2010, it is anticipated that the piling period will occur mainly over the summer months thus reducing disturbance of SPA birds. The existing Ro-Ro freight terminal will be used to store the piles. It is anticipated that 5 – 6 people will be engaged in the construction, plus two engineers, all of whom will be accommodated in the office and welfare buildings already on the site.

The new quay will be constructed by importing slate fill into the development area to create a base near high water for a crane to enable the construction of a sheet pile wall along the line of the existing dolphins. A capping beam will be installed along the top of the sheet pile quay wall. Bollard blocks, (foundations for mooring bollards to which a ship's mooring ropes are attached) will also be installed.

A crane, with approximately 140 tonnes capacity, approximately 25 m high will be used for the pile driving operations. The piling will be done using vibration piling, and if necessary finished off using percussion hammer piling. Once the sheet pile wall is in place, the area behind it will be in-filled with a total 90,000 m^3 of dense slate at two tonnes per m^3. 50,000 m^3 of the fill will be material dredged from the harbour area (the current dredge/disposal consent includes for the dredging of this volume from this area) and approximately 40,000 m^3 will be imported by road in covered wagons. The fill material will be then be covered in another layer of imported slate. An excavator (already present on the port) will be used to distribute the slate fill and a roller will be used to flatten and compact it to create a hard slate surface to the quay.

The steel sheet piles will be delivered directly to site by sea in one or two vessels. Concrete for the bollard blocks and concrete capping beam and the balance of the fill will be brought in by road. Each lorry will carry 28 tonnes of slate at two tonnes per m^3. This equates to around 2,850 lorry loads spread over 12 weeks giving around 40 loads per day (six days a week). Approximately 20 concrete mixer loads of concrete for the capping beam and bollard foundations construction will also be required.

As part of the finishing of the new berth the outer (east and north) boundaries of the quayside will be fenced off using standard port security fencing. As well as providing for security the fencing will incorporate mitigation to minimise visibility disturbance to birds using the outer edge of the breakwater from berth activities.

The Ro-Ro berth is currently lit to meet Port lighting standards. The proposed berth will also be lit to meet the relevant standards of the International Labour Organisation's: Code of Practice on Safety and Health in Ports. The lighting chosen will be designed to minimise light spill outside the berth area.

2.6.3 Operations

The modified berth will facilitate wind farm construction vessels and the Airbus vessels calling at the Port about once per week, although these would not be operated at the same time. The main use of this berth will be for offshore wind farm component delivery to the Port, where they will be stored prior to being taken out to the offshore construction site. Due to their size the wind farm components are not road transportable and will therefore be delivered by sea.

Following the first phase of the port development, between Oct 1998 and Nov. 2001 there were about 300 ship movements per annum, some still using the Mostyn Gutter along the seaward (western) side of the breakwater and only over high water periods. The ferry service operated from Nov 2001 until April 2004 when movements increased to around 1,500 per annum. Offshore wind farm and Airbus operations commenced in 2004 and whereas the number of commercial ship movements decreased, significant numbers of jack-up type craft and service boats commenced operating from the port. The anticipated vessel traffic to and from the port for the offshore wind farm business will be less than that during Ro-Ro ferry operations (which was four movements per day of 20,000 tonne vessels), and will typically comprise two movements a week of 8,000 tonne vessels and six movements a week of 2,000 tonne wind farm construction vessels. This level of ship movement remains well below the number of ship movements pre 2004 (approximately 1500pa) associated with the Ro-Ro ferry operations.

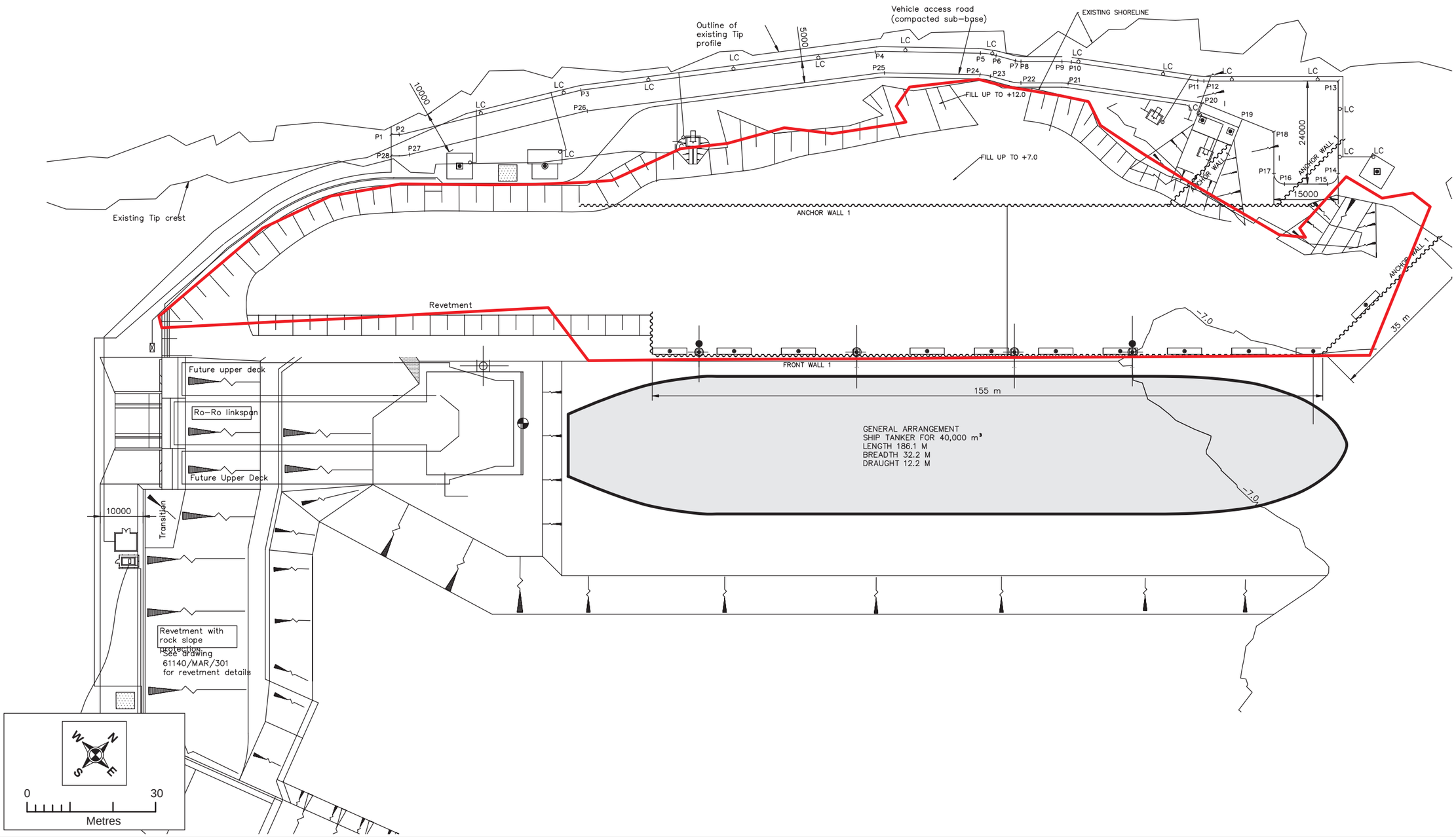
The net result on road transport and vessel movements is that there will be a significant decrease from previous general cargo handling and Ro-Ro ferry operations. The nature of the offshore wind farm industry will generate lower levels of vessel and road traffic than that generated from the ferry operations that used the dolphin berth. There will however be an increase in vessel and traffic movement compared to the current lower levels of use experienced by this area of the port since the cessation of the ferry service.

Turbine components will arrive at Mostyn by ship on a regular basis where they will be discharged by crane and placed in a storage area (the former Ro Ro Terminal) where some final assembly work will take place. The cranes will

be similar to those previously used at the other berths within the port. They will then be reloaded from the new quayside by crane to construction vessels and transported to the offshore site where they will be installed.

It is important to note that the bulk of these personnel will be deployed in the storage areas of the port away from the proposed new berth. During operation it is anticipated that only around 8 – 12 people will be working on or around the modified berth at any time.

It is likely that following the modification proposals, the three existing Lo-Lo berths (see *Figure 2.3*) and the modified fourth Lo-Lo berth will all be used for offshore wind farm construction projects concurrently at various stages and involving a number of different activities. Jack-up barges used for the offshore wind farm construction will be laid up for vessel repair and maintenance within the Port Harbour Authority Area. Airbus vessel movements will also continue.



KEY:

Site boundary

CLIENT: Port of Mostyn

SIZE: A3

TITLE: Figure 2.5: Development Area
Mostyn Quay Development

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Norloch House
36 King's Stables Road
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ERM

DATE: 16.12.09	CHECKED: SO	PROJECT: 0107468
DRAWN: MTC	APPROVED: AD	SCALE: As Scale Bar

SOURCE: Port of Mostyn

DRAWING: 0107468_2 - 16.12.09

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3 COASTAL PROCESSES

3.1 INTRODUCTION

This chapter describes the coastal physical processes of the Dee Estuary, including the hydrodynamics, morphodynamics and sediment transport regime. Reference is made to previous reports which are detailed in *Chapter 1* of this ES. In addition to these reports reference has also been made to the most recent monitoring reports, relevant extracts from which are included in *Annex B*; a recent paper on Dee Estuary Evolution (*Annex C*); and the relevant technical annex from the Environmental Statement 2007 (*Annex D*). A location plan of the estuary showing the site of the Port is provided in *Figure 3.1*.

3.2 BASELINE

3.2.1 *Hydrodynamics*

There is a comparatively short flood tide of varying duration subject to location within the estuary accompanied by strong upstream currents, followed by a longer ebb of complimentary duration with reduced currents to complete each tidal cycle. This tidal regime results in sediments transported into the estuary on the flood tide only being partially removed on the ebb, ie there is a net accretion of sediment within the estuary. Such conditions are likely to persist until, due to natural deposition, the shape and configuration of the estuary change and develop until the input of marine sediments on the flood tide is in balance with output on the ebb.

The tides enter and leave the estuary twice a day and the tidal flows are responsible for the majority of morphological changes to the sea-bed within the estuary. The tidal limit of the river is at Chester, 35 km inland from the estuary mouth. The spring tide range at Hilbre Island is 7.7 m and the neap tide range is 4.1 m. The spring tide range reduces to 4 m at Flint and 2.5 m at Chester.

Mean sea level is 5.15 m above CD (Chart Datum) in the Dee Estuary (measured at Hilbre island) with the following associated tidal levels above CD.

- Mean high water springs: 9 m
- Mean low water springs: 1.3 m
- Mean high water neaps: 7.2 m
- Mean low water neaps: 3.1 m

Flood tidal streams in the Welsh Channel at Point of Ayr are 1.3 ms^{-1} during spring tides and 0.8 ms^{-1} at neap tides. Corresponding spring and neap ebb tides are 1 ms^{-1} and 0.6 ms^{-1} respectively (1).

Storm events occur sporadically and vary from year to year, and when they coincide with strong tidal elevations these storm events can result in morphological changes within the estuary. Such storm events provide significant short term increases in energy which can open up new channels or close existing ones. Interaction of local and offshore waves upstream within the estuary can result in significant wave heights of 1.0 to 1.5 m (HR Wallingford 2004 and Dr P Barber Pers comm) impacting on the shoreline during such storm events.

3.2.2 Estuary Morphology

Overview

The Dee Estuary is roughly rectangular, widening slightly towards its mouth. The bed of the estuary comprises recent deposits of sand and mud in an undulating trough eroded in glacial deposits of boulder clay, silts, sands and gravels deposited by ice that moved south-east from the Irish Sea. The post glacial inundation of the valley by the sea started the process of sediment accretion that is still occurring. The underlying solid geology is now generally overlain by 20 to over 30 metres of subsequently deposited sediment. Rock outcrops are only found in the estuary around Hilbre Island.

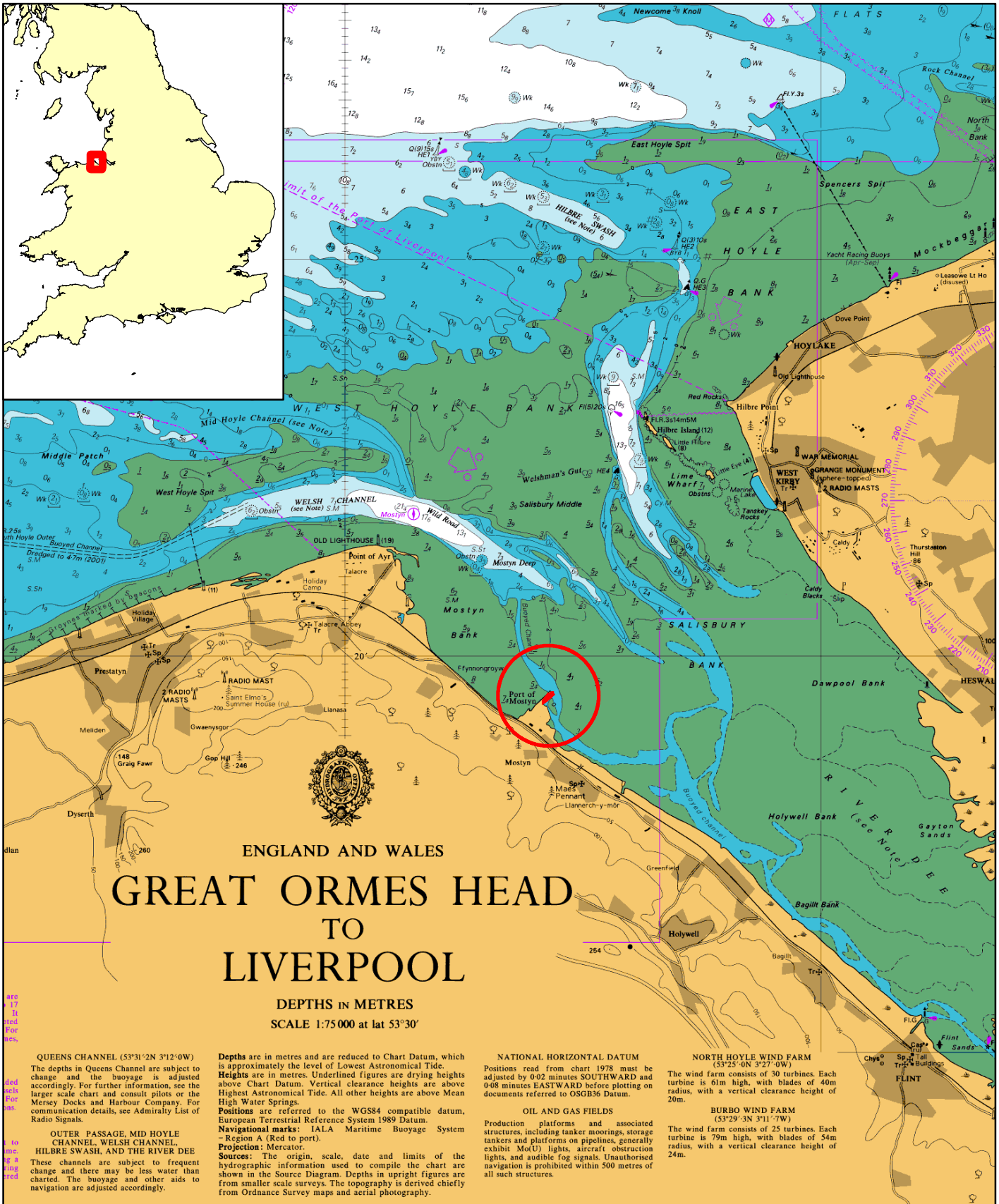
Figure 3.1 presents the 2001 Admiralty Chart with key locations referred to in the text highlighted. The 2003 and 2006 bathymetry charts showing recent changes in channel configuration are shown in *Figures 3.3* to *3.5* (from HR 2007). A more detailed examination of estuary morphology changes and variability between 2003 and 2006 are presented in *Annex D*.

At low water the flow out of the estuary divides into two channels on either side of the West Hoyle Bank. The Welsh Channel on the Western side is over 20 m deep. The other channel, the Hilbre Channel, is more than 10 m deep and extends northward and curves west beyond West Hoyle Bank. Both of the channels can be subject to natural change and are marked with buoys, for example, in the mid 1980s the Welsh Channel altered losing prominence to the Hilbre Channel with Welshman's Gut effectively closing.

Recent Developments

In addition to the long term gradual silting up of the estuary there has been significant human intervention which has influenced the effects of the natural processes. Modifications to the estuary were identified in the Wirral Dee Study by BMT (1990) and the results were presented within the CEIA (Young Associates 2002b). The modifications primarily comprised the following:

(1) EMU Environmental Ltd. 'Hydrographic Survey for Port of Mostyn' (Feb'1999)



KEY: Site Location

N W E S

0 3

Kilometres

CLIENT: Port of Mostyn

SIZE: A4

TITLE: Figure 3.1 Project Area

ERM
Norloch House
36 King's Stables Road
Edinburgh, EH1 2EU
Tel: 0131 478 6000
Fax: 0131 656 5813

DATE: 17/12/2009	CHECKED: SO	PROJECT: 0107468
DRAWN: JJH	APPROVED:AD	SCALE: 1:125,000

PROJECTION: WGS 1984 UTM Zone 30N

DRAWING: ProjectArea.mxd

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File: 0107468_PoM_JH_SMMAPS\ProjectArea.mxd

- Training of the navigation channel from Chester to Connah's Quay and associated land reclamation (late 18th and 19th century).

- Training and plough dredging of the navigation channel to the River Mersey (1911 to 1957).

- Freshwater abstraction from the Dee and associated river regulation works throughout the 20th century.

- Reclamation at Deeside Industrial Estate where 1 Mm^3 of fill material was taken from the upper estuary at White Sands in the 1960s.

These modifications shifted tidal energies further offshore in the 1980s, favouring the Hilbre Channel as the major conduit of flood and ebb energies into and out of the estuary over the Welsh Channel which dominated before that time.

A major review of estuary morphological evolution was carried out in 2008 (Evolution of the Banks and Channels of the Dee Estuary, SMP (Shoreline Management Plan) (2008). This review highlighted the 'cause and effect' linkages of estuary changes providing a robust explanation of present estuary bank and channel changes since 2003 as well as historical behaviour. As a consequence the report included forecasts of future evolution and this was taken-up in a further report to produce Monitoring Protocols (Monitoring Protocols, SMP (December 2008)). This monitoring system has been in operation since the start of 2009 as a continuation of monitoring commenced in 2003. The system includes an annual survey of the estuary sea bed and a re-run of the numerical model to record morphological change and hydrodynamic variations over the period. This survey and modelling work has been completed for 2009 (HR Wallingford Ex 6170, October 2009) (1), see *Annex B*. The results show that the estuary evolution continues in line with forecast regarding the energy adjustments between Welsh and Hilbre Channels, thereby providing increased confidence in the level of understanding now achieved of estuary morphological behaviour. It is important to note that the balance of energy between the Hilbre and Welsh channels is the primary issue for the forecasting of future estuary evolution. These channels represent the main energy corridors linking the estuary with the open sea of Liverpool Bay.

Bathymetric Surveys

In 2006 as part of monitoring for maintenance dredge consents at the Port of Mostyn, a bathymetric survey of the estuary downstream of Greenfield to the estuary mouth (defined as a line joining Point of Ayr to Hilbre Point) was required. The area above 1 m above CD was surveyed using LiDAR and the subtidal areas of the main low water channels were surveyed using swathe bathymetry.

(1) Port of Mostyn Hydraulic Studies 2009. HR Wallingford Ex6170

The LiDAR survey of the estuary was carried out in October 2006 and provided level data on a 1.0 m orthogonal grid over the survey area. The LiDAR survey covered the whole estuary upstream to Saltney (see *Figure 3.2* which is a copy of *Figure 7* from SMP (2007)). The LiDAR survey data and ground-truthing results are provided in SMP 2007, see *Annex D*.

Swathe bathymetry surveys were carried out in May and December 2006 (Pelorus Surveys 2006). The survey reports are provided in SMP 2007, *Annex D*. The swathe bathymetry survey data sets were merged with the LiDAR data and the September and October 2006 estuary transect survey data to provide a comprehensive level survey of the sea bed in the estuary. The combined bathymetric data was compared with data gathered from previous swathe bathymetric surveys in April 2003 to assess changes in bathymetry and morphology between 2003 and 2006 (see *Figures 3.3 to 3.5*). This data was used in the HR (2007) numerical modelling studies and to assist interpretation of other monitoring task results (see SMP 2007).

The results of the seabed level surveys and comparison between the 2003 and 2006 data allowed an analysis of changes to estuary sediment volume and area over this period. For this analysis the estuary was divided into two areas, north and south, either side of Greenfield. The results of this analysis are reported in HR (2007), Tables 1 to 4. Table 4 from HR (2007) provides a summary of the data and is copied here as *Table 3.1*.

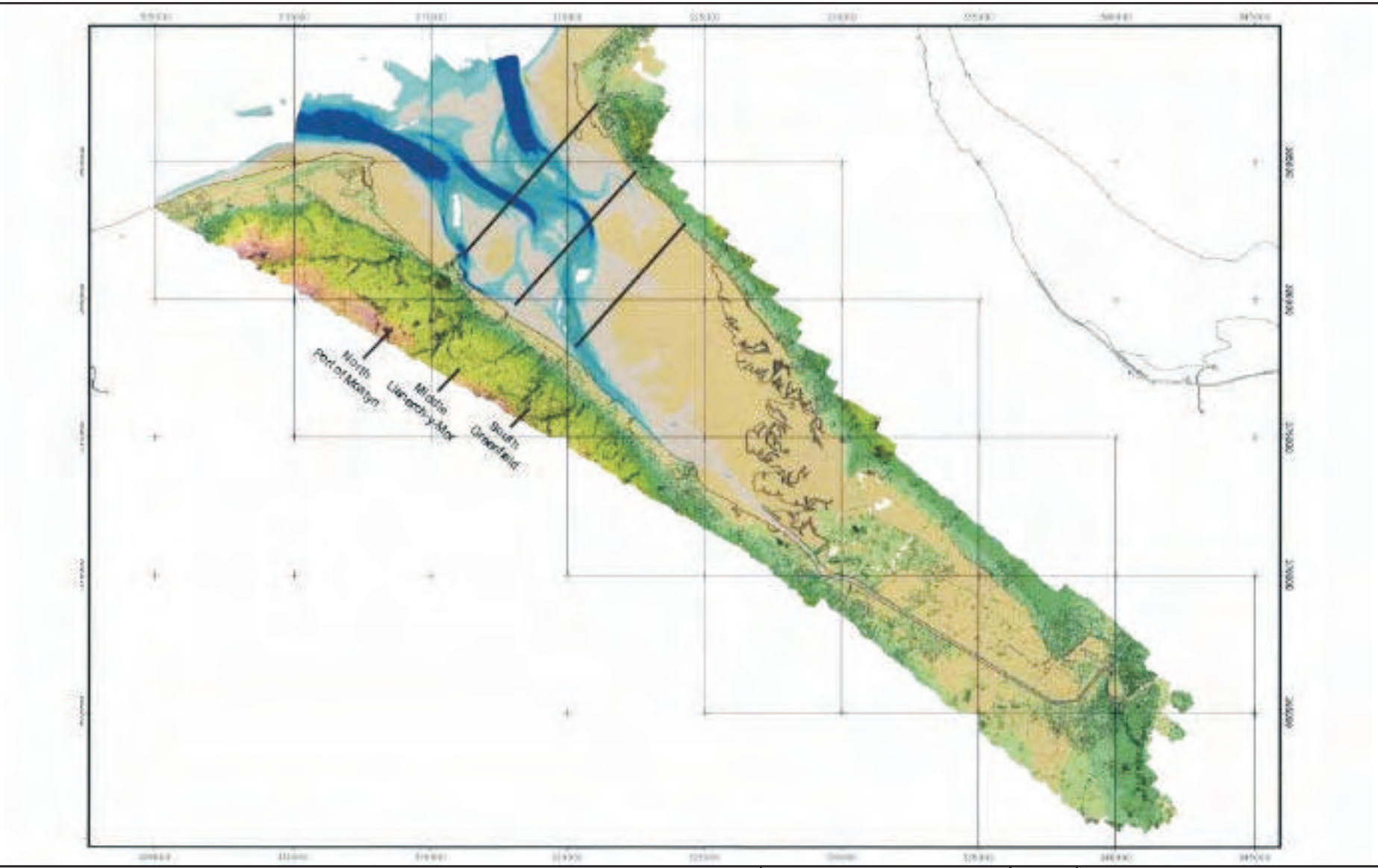
Table 3.1 Sediment Volume and Area Changes Above and Below CD from 2003 to 2006

	Total sediment volume above CD (M m3)			**Total area coverage above CD (M m2)**		
	2003	**2006**	**Change**	**2003**	**2006**	**Change**
Whole Estuary	447.42	452.26	4.84	89.53	89.72	0.18
North	219.74	220.89	1.16	51.91	52.07	0.16
South	227.68	231.37	3.69	37.62	37.64	0.02
	Total sediment volume below CD to 20m below CD(Mm3)			Total area coverage below CD (Mm2)		
Whole Estuary	2019.09	215.33	-3.75	14.00	13.82	0.18
North	1254.73	1250.96	-3.77	13.38	13.21	-0.16
South	764.35	764.38	0.02	0.63	0.61	-0.02

(Source: HR 2007)

Comparison of 2003 and 2006 sea bed level surveys of the estuary showed the following.

- Changes in bathymetry have occurred over much of the estuary.



KEY:

CLIENT: Port of Mostyn

SIZE: A4

TITLE: Figure 3.2: Combined LiDAR / Bathymetry DSM of the Dee Estuary

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- The southern half of the estuary is mainly above CD and there has been accumulation of sediment volume but only a very minor increase in intertidal area between the surveys.

- The northern half of the estuary shows a decrease in sediment below CD, most notably from CD to 6m below CD. There is a minor loss of sub-tidal area and a corresponding increase in intertidal area.

- The large increases in sediment volumes between 3 and 5 m above CD co-incide approximately with mean sea level.

- There were no significant sea bed changes observed in the vicinity if the development site from the survey comparison. However the more frequent channel surveys and estuary transect surveys show the dynamic response of the sea bed in general and around the Port to seasonal and storm influences.

The sea bed level survey in 2009 has been used for a re-run of the numerical model (HR Wallingford Ex 6170, October 2009, see *Annex B*) and the results are summarised in *Figures 2-1 to 2-3; 2-4 to 3-9* extracted from the report and included below. The complete report forms part of the monitoring information provided in *Annex B*. The results show that the proposed modification of Berth No. 1 occupies a low energy area of the estuary and thereby supports the view of minor development effects on estuary physical processes as discussed in *Section 3.3*.

Figure 3.3 *Model Bathymetry 2003 (composite of LiDAR and swath data) with transect locations*

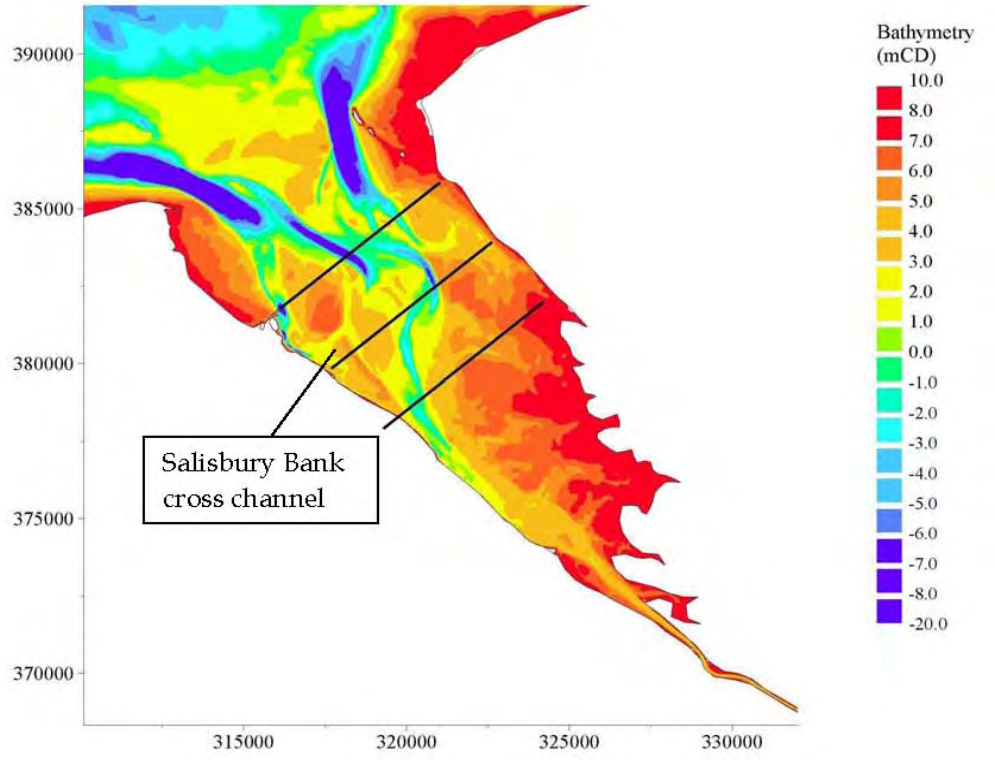


Figure 3.4 *Model Bathymetry 2006 (composite of LiDAR, swathe and 2003 model bathymetry) with transect locations*

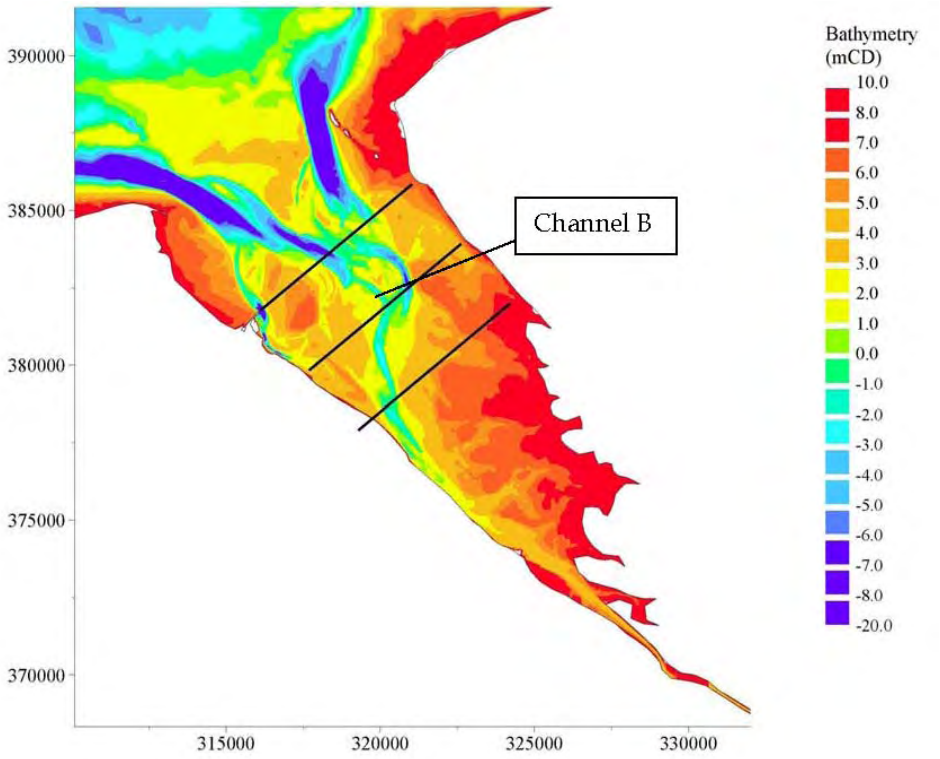
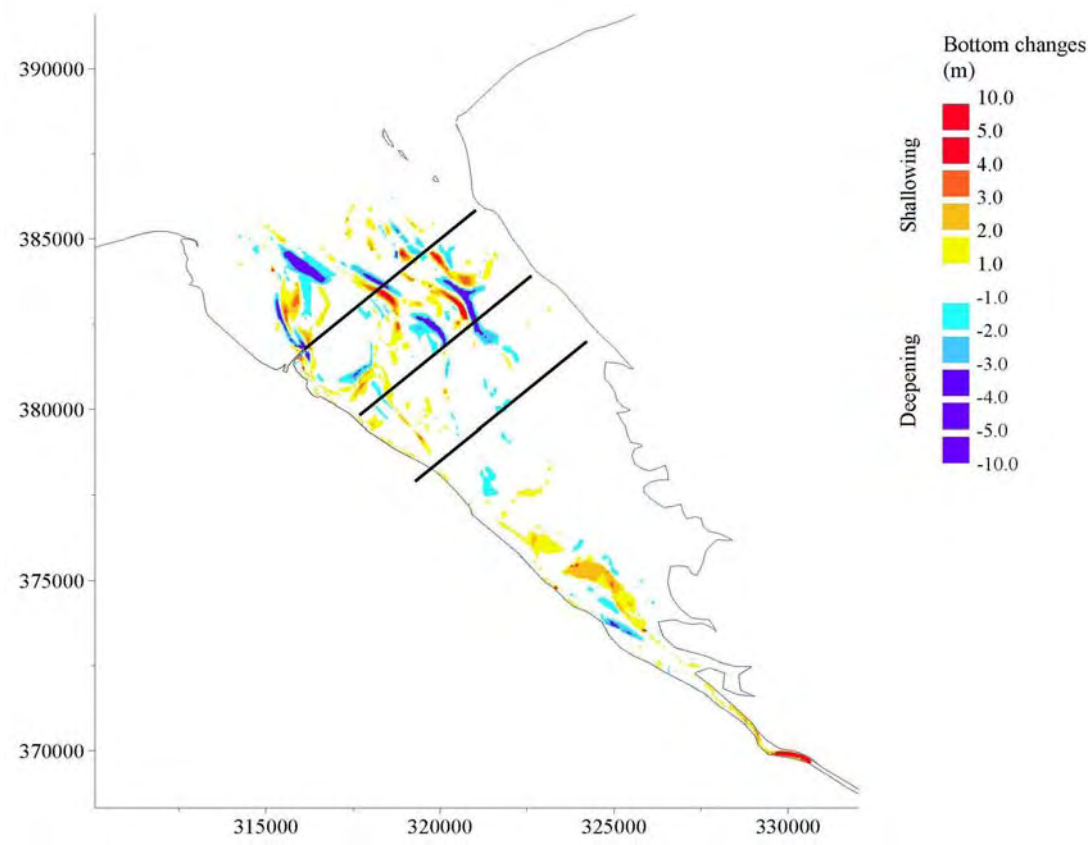


Figure 3.5 ***Differences Between 2003 and 2006 Model Bathymetry (yellow/red show areas of accretion)***



Estuary Transect Surveys

The transect surveys compliment the annual sea bed survey and numerical modelling by providing a time series of bank and channel changes on a fortnightly basis over the year. As a transects show seasonal changes especially sea bed responses to equinoctial tides and the rates of bank and channel change. In combination with the annual comprehensive sea bed level survey and numerical modelling the transect surveys form part of a monitoring package that ensures evolutionary changes contrary to forecast are 'flagged' early thereby safeguarding the integrity of the estuary. This is the rationale of the 'Monitoring Protocols' report which examined the extensive data set now available to determine the appropriate frequency of monitoring to provide early-warning of unforeseen changes.

Three transects were established in the estuary at the beginning of 2003 in order to accurately measure and monitor changes in bathymetry within in the estuary. The transects were named North (Port of Mostyn breakwater), Middle (Llanerch-y-mor) and South (Greenfield) and their locations are shown in *Figure 3.2* on a background of the bathymetry data of 2003. High resolution echosounder surveys were carried out eight times between January and August 2003 and thereafter at approximately monthly intervals. During the period of the consent (Aug '05 to Aug '07) these transects were required to be

surveyed twenty-four times over the two year consent period with some flexibility in timing to coincide with access afforded by spring tide conditions. The surveys recorded significant channel locations, widths and depths and bank locations using the fixed reference plane of distance from shore (chainage) and level with reference to CD. For each transect the main existing channels were identified and given a label (A to F). These are shown in *Figure 3.6* (Figure 6 from SMP 2005) and used in the transect survey figures in SMP (2005 and 2007).

The results of the previous surveys (25 surveys over a 28 month period from January 2003 to May 2005) were reported in the Estuary Transect Monitoring Analysis report (SMP 2005). The report examined annual and seasonal changes and major morphological changes. The results of the surveys were compared with the assessment of the estuary by J Pethick in August 2004 and the HR modelling study results (HR 2005) to develop a hypothesis of forcing and response processes to account for the estuary bed level changes observed.

Forcing and response are equivalent terms to cause and effect. For the estuary the dominant forcing is due to tidal energy and the response is the location, size and rate of physical change of the low water channels and banks that form the estuary sea bed.

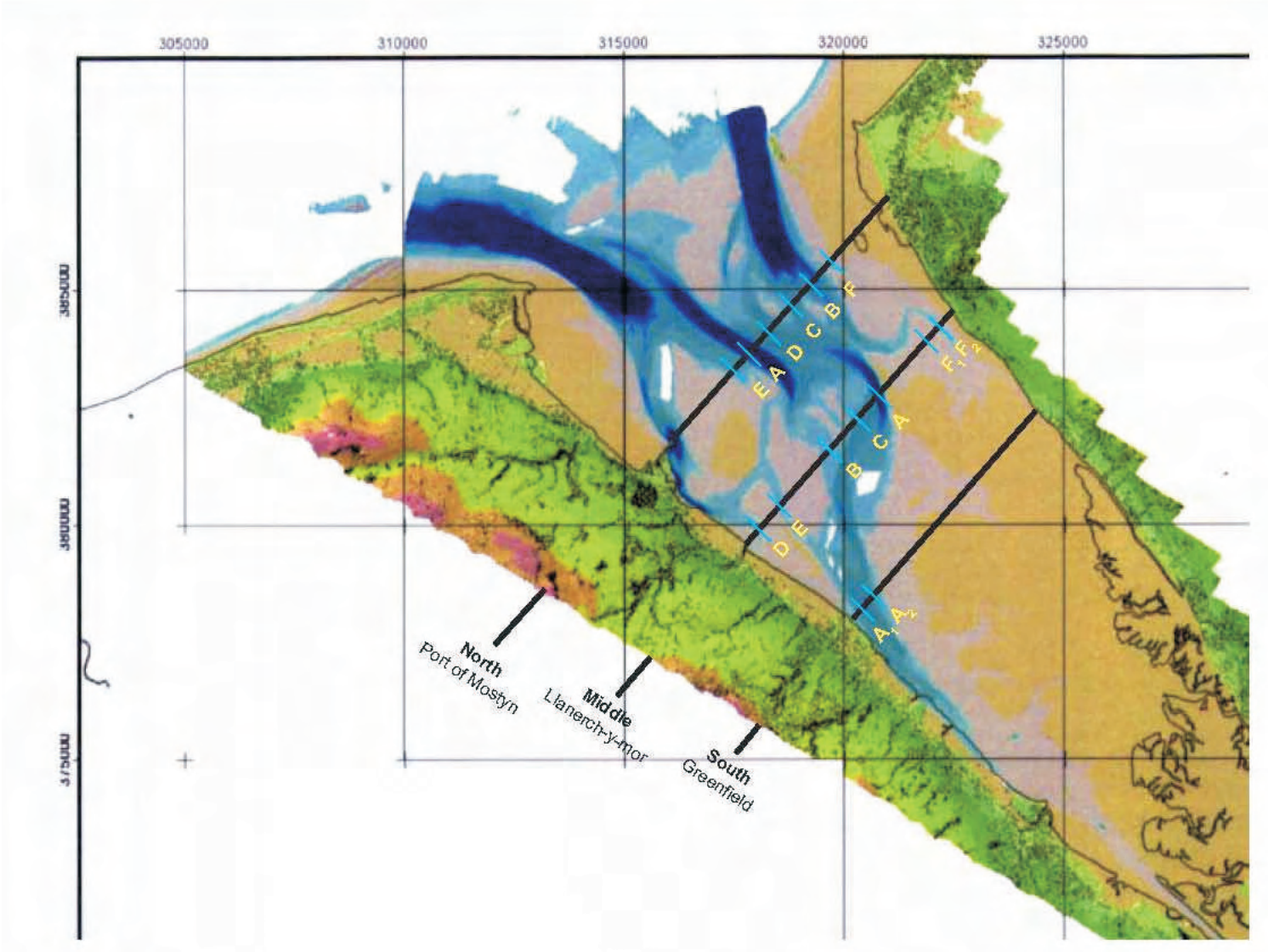
Estuary Morphology Behaviour

The Estuary Morphology Behaviour Model (EMBM) was presented in SMP (2005) and its conclusions are summarised below.

- The observed changes in the confluence area of the Welsh and Hilbre Channels in mid-estuary fit into a morphological model of major high energy channel changes potentially resulting from storm induced initiation, meander development and secondary channel development. The movements of channels have lateral limits controlled on the English side of the estuary by geological constraints.

- As the low water meander develops and moves eastwards from the main channel at Greenfield to the confluence area changes in tidal hydraulic gradient between this channel and the Inner Channel passing the Port, results in the establishment of the Salisbury Bank cross-channel to link with the Welsh Channel downstream of the confluence area.

- The survey data from 2000 to 2005 indicates a period for meander development and bypassing through establishment of secondary channels across the East Salisbury Bank of around three to four years. Daily and seasonal tidal cycles, storm activity and freshwater discharge will all influence the period for meander development.



KEY:

CLIENT: Port of Mostyn

SIZE: A4

TITLE: Figure 3.6: Location Plan for Estuary Transect Channel Locations (from SMP 2005) Mostyn Quay Development

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- Dredging the Inner channel will increase tidal flow and sediment flux using upstream secondary channels but this will be small scale relative to the estuary energy regime.

The Estuary Morphological Behaviour Model (SMP 2005) was reviewed against the four year data set to December 2006 which was analysed using the approach developed in 2005 and the LiDAR data for 2006. In addition the tidal prism characteristics between 2003 and 2006 were examined using the numerical model results to provide a different approach to corroboration of the EMBM. The complete set of transect plots for the three transects is provided in SMP (2007).

Over the survey period (January 2003 to December 2006) the most significant change is the development of Channel B on middle transect by spring/summer 2005 (see *Figure 3.4*). The principle effect of this is that it has provided a more direct route for tidal flows traversing the mid-estuary area. In order to restore the energy balance the estuary has shoaled (made shallow) its main channels and broadened them thereby increasing friction energy losses. In addition the channel at Greenfield has realigned to feed flows more directly into the centre of the estuary and the channel off Dawpool Bank has developed to do the same.

The Inner Channel to the Port showed a tendency to accrete, particularly during equinoctial tides. The rate of accretion decreased with increasing channel depth due to reduction in sediment flux. The Inner Channel continued to tend towards a more sinusoidal plan alignment due to natural processes.

The estuary transect data set now extends from January 2003 to present – a period of nearly seven years. The major alteration to low water channels occurred in the mid-estuary in 2004/05. The forecast future behaviour then of a trend change, rather than a cyclic one, is corroborated by the four years of data collected since that time. In addition the further work reviewing historical and current data on estuary evolution (SMP 2008) has provided a rationale for these central estuary channel and bank changes. This rationale gives the cause of the changes to be derived from the ongoing easterly migration of the Mid-Hoyle low water channel with the Welsh Channel off Talacre Beach in the estuary approaches. An extension of this rationale is that the flow regime past the Port and upstream to Greenfield is not likely to alter in the short-term with the Salisbury Bank cross-channel to remain closed. This rationale is confirmed by monitoring to date (*Annex B*) and provides confidence in the morphological context against which the development may be considered in *Section 3.2.4* below.

3.2.3 Sediment Transport Studies

Sediment Flux

The changes in estuary morphology observed between 2003 and 2006 have had an effect on tidal currents and the sediment transport regime and associated net sediment fluxes within the estuary (HR 2007). The largest sediment fluxes are observed to the east of Salisbury Bank indicating the high dynamics in this area. Between 2003 and 2006 there has been a slight increase in dominance of the Welsh Channel over the Hilbre Channel for tidal discharge and associated sediment transport. Analysis of the tidal discharge at the estuary entrance indicates a reduction in the tidal prism of approximately 1.2% (4.7 M m^3) which is in line with the calculated increase in intertidal sediment volume of 4.84 M m^3 (see *Table 4.1*).

Mostyn Deep Disposal Area Studies

The existing disposal ground at Mostyn Deep (Site A) is 250 m wide and 2,500 m long (625,000 m^2) and is flood dominant. A similar sized area immediately to the north-east of the existing area (Site B) that was part of the original disposal ground was considered to be partially ebb dominant and was removed from the consented disposal ground.

A number of hydrographic surveys have been conducted in Mostyn Deep and the disposal site within it between 2003 and 2007. These are reported on in:

- Trial Dredge Monitoring, Data Interpretation and Analysis (SMP 2003);
- Estuary Transect Analyses (SMP 2005); and
- Monitoring Report (SMP 2007).

These survey data show that sediment can accumulate in Mostyn Deep during the calm summer period but erosion occurs during the spring and autumn equinoctial tides and the area remains in this state, subject to some fluctuation, over the winter period. Bathymetric surveys in Mostyn Deep showed that over 180,000 m^3 of material had eroded in the September 2003 survey with an additional 330,000 m^3 eroded in the October 2003 survey. Bathymetric surveys showed that the 460,000 m^3 of sediment disposed of during the 2005 to 2007 consent period had all dispersed (350,000 m^3 had dispersed between September 2005 and March 2006 and the additional 110,000 m^3 deposited in 2006 to 2007 had dispersed by March 2007.

In July 2009 a dredge campaign was carried out by the Port with the removal of about 90,000 m^3 from the channel and berthing area. This material was all deposited in Site 'A' (Mostyn Deep). A pre and post-dredge deposition area survey were carried out and showed that within two weeks of the last deposition there was no significant detectable evidence of the deposition compared to areas adjacent to the deposition area in Mostyn

Deep. Bearing in mind that this deposition was carried out in the Summer when prevailing conditions are calm, the recorded dispersion is encouraging providing support for revision of annual deposition limits at Site 'A' under future consents.

3.2.4 General Local Regime

There have been extensive studies of the estuary and the local area of the estuary around the Port commencing in 2000 and ongoing. These studies have provided an 'in-depth' understanding of the estuary evolution and how dredging the approach channel to the Port affects that evolution. The Port presently operates under a consent to dredge its approach channel to 2.0 m below CD. There is an extensive programme of physical and biological monitoring being carried out as part of the conditions of this dredging consent. As a consequence, the natural coastal process regime around the Port is well-defined and so allows consideration of impacts arising from the proposed development in the Port at Berth No.1.

As a consequence of the recent studies it is known that the Port breakwater interacts with estuary tidal regime to generate a circulatory flow (gyre) in the harbour area which consequentially gives rise to the 'Bug bank' sandbank within the harbour area. This flow also means that the flow along the Berth No.1 is predominantly in line with the berth and directed towards the north-east. Dispersion studies from the seaward limit of the breakwater (approximately 20 m north-east of the north-eastern limit of the proposed development) show sediment to be transported upstream as far as Greenfield over a seventeen day cycle of Spring and Neap tides.

The sea bed to be covered by the proposed development at Berth No 1 is mainly comprised of industrial waste slag from previous steelwork operations with interspersed patches of indigenous sand and silt. Silt-sized material dominates in these patches with more sand-sized material within the general harbour area. The silt-sized material is disturbed by the strength of natural flow processes on a portion of each tide and is more fully-agitated into suspension during vessel-manoeuvring and berthing operations. Direct exposure to waves is fetch-limited across the relative shallow water of the estuary in a south-easterly direction where typical annual wind energy (and therefore wave energy) is low. The prevailing wind and wave directions are between south-west and north-west. Waves entering the estuary from offshore have been studied and shown to be of secondary importance to tides regarding sediment transport. There is minor wave activity in the harbour area from diffraction of waves around the breakwater from offshore and directly from the south-east when suitable weather conditions occur. The estuary is a net importer of sediment at the present time (2003/2009) but the associated accretion is located upstream towards Flint and Oakenholt with no significant natural morphological changes in the estuary present or predicted around the Port.

3.3 POTENTIAL IMPACTS

From the perspective of physical coastal processes the proposed development will:

- occupy an area in part, of existing sea bed within the intertidal and sub-tidal zone;
- alter the profile and surface roughness of the breakwater over the new berth length; and
- remove 50,000m3 of sand sea bed dredged from the existing harbour area to provide infill to establish the development

As a consequence the development could result in changes to:

- tidal flow regime;
- tidal prism of the estuary;
- local wave field interaction with the berth frontage;
- sedimentary processes - effective removal of intertidal and sub-tidal zone from the estuary; and
- adjacent sea bed level due to changes in the hydrodynamic regime.

During construction of the development there would be:

- increased general activity in the area of the development over a period of six months;
- localised increases in estuary turbidity due to infilling operations; and
- local hydrodynamic and sediment transport affects due to partial completion stages of the development.

During operation of the development there would be:

- vessel manoeuvring on and off the berth; and
- variations in estuary turbidity due to vessel movements.

The potential impacts of the proposed development have been classified above as:

- presence;
- construction; and
- operations.

The evolution of the Dee Estuary is comprehensively presented in 'Evolution of the Banks and Channels of the Dee Estuary, April 2008'. These studies have been carried out over a period from 2003 to 2009 and are summarised in the paper copied in *Annex C*.

This rationale has been accepted by the Regulators in 2007 and the subsequent work up to present has confirmed the forecast of estuary evolution. There is therefore a robust suite of data on which to base the consideration of the potential impacts from the proposed development as presented in *Section 3.2.4* above.

3.3.1 Potential hydrodynamic impacts

Construction

The intermediate stages of development construction will progressively introduce the change in profile but the intermediate situations may be interpolated between 'before and after' conditions. There are no resonance sensitivities for coastal processes from the proposed development. The tidal flow regime and local wave regime will therefore change during construction but in a constantly progressive manner from existing to completion (ie development in-place).

Operation

The development will occupy in total an area of 1.2 hectares comprising 4,423m^2 of intertidal; 5,770m^2 of subtidal and the remainder supra-tidal. The swept boundary of the development will be a hydraulically smooth and vertical profile compared to the present undulating hydraulically rough and sloped profile.

As a consequence there will be local changes to:

- the flow regime;
- the water level; and
- the wave field.

The numerical modelling of the estuary tidal regime, using 2003, 2006 and 2009 sea bed surveys, shows that the tidally-affected area of the proposed development is relatively quiescent throughout the tidal cycle. Tidal flows are below the threshold for sea bed sand movement for over 90% of the tidal cycle (Figure 4-8 of ES (2007) refers). The exceedance of sand threshold of movement velocity for 10% of the tidal cycle means any movement will be local. Silt movement is much more volatile with the estuary water carrying a silt concentration all the time.'

There will therefore be no discernible impact on the ambient tide regime. Locally, the revised profile of the development will result in some minor flow increases along the new sheet pile vertical seaward boundary, due largely to reduced hydraulic roughness. The local changes to water level will be very small (<1.0 cm) caused by the altered flow direction along the new sheet pile development boundary.

The major section of the new sheet piled wall faces towards the south-east (i.e. across the estuary) where within 5.0 km there is vegetated saltmarsh. The south-east is not a prevailing wind direction (which is the south-west) so waves occur infrequently and are fetch-limited. Directly – incident waves are not therefore likely to exceed 0.75 m in height in normal circumstances.

When waves do occur then there will be increased wave reflection off the vertical steel sheet pile wall. However the wall is only 160 m in length so that the length of the wave crest will be similarly limited and wave energy will disperse by diffraction from the crest ends. This process will reduce the reflected wave height to around 15% of its initial value within ten wavelengths of travel or about 300 m from the proposed development, ie before the wave reaches the Salisbury Bank. At this scale of energy dissipation the wave will have no detectable impact on sea bed behaviour over the Salisbury Bank area.

3.3.2 Potential Estuary Morphology Impacts

Presence

The removal of 50,000 m^3 of sand from the berthing area to provide infill to the berth modification will reduce the volume of active sea bed sediment in the estuary. Sea bed levels will be reduced in the harbour area and accretion back to natural levels will divert estuary sediment that would have moved elsewhere. The HR Wallingford studies (2005) included an examination of sea bed dispersion from the seaward limit of the Port breakwater. This work provided results presented on *Figures 10* to *99* from that report (*Annex D)*.

The sediment at the end of the breakwater is transported upstream towards Greenfield some 5.0 km distant from the breakwater. This work confirmed that the sand forming the 'Bug Bank' within the harbour area originated from downstream. The Bug Bank will be the source for the infill of 50,000m^3 to the development. It may also be concluded from this study work that sand accreting on Bug Bank by diversion due to the infill extraction, would otherwise have progressed upstream, potentially as far as Greenfield. It is reasonable therefore to quantify the impact of the infill removal by spreading the effect over the low water channel sea bed area between the breakwater and Greenfield. This calculation shows that the sea bed in the channels would be lowered by an average of 100mm as a consequence of the sea bed level extraction. Other work within the same study shows that low water channel sea bed levels fluctuate by around 500 mm between monthly surveys. This potential impact is not therefore considered to be detectable against natural process fluctuations. The estuary is a nett importer of sediment at the present time with around 1.0 million m3 shown to have entered the estuary and deposited between 2003 and 2006 (HR Wallingford, 2007). As a consequence any lowering of the sea bed will be reinstated from offshore sources and bed reinstatement is likely to occur over the first equinoctial tides occurring after the infill has been extracted. These tides are larger than normal and occur in the spring and autumn of each year.

Construction

There will be small local increases in turbidity during the infilling operation behind the sheet-piled wall but previous work of a similar nature at the same

location showed by measurement, no detectable increases in turbidity 100 m distant from the site.

Operation

Vessels manoeuvring on and off the berth will cause local increases in turbidity due to their propulsion systems. The effects will be limited in extent to typically 100 m from the vessel – this will be affected by the local tidal condition. The effects will be transient only occurring during vessel movement and disappear over one or two hours when vessels are stationary.

3.3.3 Potential Sediment Transport Effects

Construction

There will be no additional potential impacts to those identified above.

Operation

The alterations to the hydrodynamic regime discussed above will have a 'knock-on' effect on sediment transport but bearing in mind that the berth is dredged up to 8.0 m below Chart Datum any effects will not be detectable against dredge changes.

3.4 MITIGATION MEASURES

The potential effects considered above have shown that they will not be detectable against natural process fluctuations and that their extent is generally limited to the harbour berthing area and for a limited period only the low water channels extending upstream towards Greenfield. There are no detectable impacts on the major sandbanks (Salisbury, Mostyn). As a consequence mitigation measures for coastal physical process impacts are not necessary for the proposed development.

4 ECOLOGY

4.1 INTRODUCTION

This chapter presents an account of the baseline ecological and nature conservation interest in the Dee Estuary. It focuses on those species and habitats which could potentially be affected by the proposals. It then assesses what impacts may be anticipated arising from both the construction and operation of the proposed modified berth. If significant impacts are predicted mitigation for these impacts will be proposed and any residual (ie after the application of mitigation) impacts identified.

4.2 BASELINE

4.2.1 General Ecological Context

The Port of Mostyn lies on the shore of the Dee Estuary, which is of European importance for nature conservation (see *Section 4.2.2*). The area to be enclosed to form the quay adjacent to the breakwater is within the Mostyn Dock foreshore area, part of the intertidal sand and muds within the harbour. High tide wader roosts exist on either side of the port (see *Section 4.2.3*), and birds occasionally roost on the breakwater. There are important intertidal feeding areas to the north and west in the areas known as Salisbury Middle and Mostyn Bank.

The sand and mudflats within the estuary cover a large expanse of the estuary at low water, grading into saltmarsh towards the head of the estuary, especially on the northern shore. A number of different saltmarsh communities thrive on the mudflats such as pioneer *Salicornia* communities, with good examples of succession between communities present in places. The large expanses of intertidal areas support a varied and abundant invertebrate population, which together with the saltmarsh supports a large, diverse and internationally important assemblage of water birds. The estuary serves as a spawning ground and nursery for a number of fish species including bass and is important for a number of migratory fish species such as lamprey and salmon. The nearest (Welsh) shore to the project area is heavily urbanised, with the town of Mostyn spreading out from the port development.

4.2.2 European Designated Sites

The Dee Estuary was designated as a Special Protection Area (SPA) in 1985 in accordance with EU Directive 79/409/EEC. At the same time it was designated as a Ramsar Site, under the international convention designed to

protect wetlands. It is also a Site of Community Importance (SCI) [1] under the EC Habitats Directive (92/43/EEC) (Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora). This confers the same level of protection during the process of being considered for Special Area of Conservation status as the area would have if it was fully designated.

The Dee Estuary is also a European Marine Site, the collective term for Natura 2000 Sites (SACs and SPAs) that are covered by tidal water and protect some of our most special marine and coastal habitats and species of European importance.

Under DETR, Welsh Office and National Assembly of Wales guidance and statements[2], Ramsar sites must be given the same consideration as European sites when considering plans and projects which might affect them. This has recently been underlined in the Draft National Policy Statement for Ports (Department for Transport November 2009).

Conservation objectives are set for Natura 2000 sites to ensure that the obligations of the Habitats Directive are met, and particularly to ensure that there should be no deterioration or significant disturbance of the qualifying features from their condition at the time the Natura 2000 status of the site was formally identified.

For each of the interest features of the Dee Estuary European Marine Site, the conservation objective is to maintain the interest feature in good conservation status. Each interest feature has a number of sub-objectives which must be met for good conservation status to be achieved.

Activities in SPA and SAC sites that have the potential to adversely affect the qualifying features of the site are not generally permitted unless there is no reasonable alternative and there are imperative reasons of overriding public interest (IROPI). These reasons can include those of a social or economic nature and all necessary compensatory measures are required to be taken to ensure that the overall coherence of Natura 2000 is protected.

The Dee Estuary Natura 2000 data sheets, the Ramsar information sheet and SSSI citation are all provided in *Annex E*.

4.2.3 Habitats and Species of Note

Ornithological

The Dee Estuary is one of the most important estuaries in Britain for its populations of waders and wildfowl, particularly for wintering populations, and is also important in a European context, supporting internationally

(1) SCIs are SAC sites that have been adopted by the European Commission but not yet formally designated by the government of each country.
(2) DETR *Planning Policy Guidance No.9*, Welsh Office Planning Guidance *Technical Advice Note No. 5*, DETR and National Assembly of Wales statements *Ramsar Sites in England* (November 2001) and *Ramsar Sites in Wales* (February 2001).

important bird populations. The most recently published WeBS counts (2006-2007) place the Dee Estuary as the seventh most important site in the UK in terms of total numbers of waterbirds. The Dee Estuary has a five year average count of 134,002 birds (2002-2007), ranging from a peak of 171,911 (2003/04) to a low of 115,301 (2004/05).

The importance of the estuary stems from, amongst others:

- location, ie on the spring and autumn migration routes of many species of birds;
- from the abundance of food which it provides; and
- from the comparatively warm winter climate of Britain.

Many species of wader and wildfowl are migratory and will stop off on their spring and autumn migrations to build up their energy reserves before continuing their journeys. The large estuaries of Britain provide ideal places for many of these species migrating to or from Scandinavia, Africa or mainland Europe to land and replenish energy reserves. Many other species overwinter in the UK.

The majority of the food utilised by birds in the estuary comes from the abundant invertebrate populations living in the mud and sand flats, as well as from the surrounding saltmarsh and fields.

Of particular importance in conservation terms in the Dee Estuary are those species which have been identified by the Wild Birds Directive and Ramsar Convention as being internationally important. The estuary is designated as a full SPA under the Wild Birds Directive in light of the internationally important populations of *Annex I* species (*Table 4.1*) and regularly occurring migratory species (*Table 4.2*) which use the area. All of these populations use areas of the European Marine Site and are therefore considered as interest features.

Table 4.1 Annex I Bird Species of the Dee Estuary

Species	Population	Population Five Year Mean (2003-2007)
Bar-Tailed Godwit (*Limosa lapponica)*	Wintering Western Palaearctic	397
Common Tern *(Sterna hirundo)*	Breeding (pairs)	362 (1)
Little Tern *(Sterna albifrons)*	Breeding(pairs)	65
Sandwich Tern *(Sterna sandvicensis)*	Passage	893

(Source: JNCC Website 2009, Austen *et al*. 2008)

(1) Common & Little Tern breeding figures based on means for 1986-2006 reported in Mayor et al 2008. Note 2009 figures (reported in Dee Estuary Newsletter) were 0 and 110 pairs respectively.

Table 4.2 ***Internationally Important Populations of Regularly Occurring Migratory Bird Species of the Dee Estuary SPA***

Species	Population	Population Five Year Mean (2003-2007)
Redshank (*Tringa tetanus)*	Eastern Atlantic on passage and Wintering Eastern Atlantic	10731
Shelduck (*Tadorna tadorna)*	Wintering North-western European	11,842
Teal (*Anas crecca*)	Wintering North-western European	3971
Pintail (*Anas acuta*)	Wintering North-western European	5,826
Oystercatcher (*Haematopus ostralegus)*	Wintering European and North-western African	22,049
Grey Plover (*Pluvialis squatarola)*	Wintering Eastern Atlantic	1,2673
Knot (*Calidrus canutus islandica)*	Wintering North-western Canada to North–western Europe	22,505
Dunlin (*Calidrus aplina alpine)*	Wintering Northern Siberia, Europe and Northern Africa	27,105
Black-Tailed Godwit (*Limosa limosa islandica)*	Wintering Icelandic	4,854
Curlew (*Numenius arquata)*	Wintering European	5,313

(Source: JNCC Website 2009, Austin *et al.* 2008)

The site is further recognised as being of international importance under the Wild Birds Directive by regularly supporting over 20,000 waterbirds.

The Ramsar site has been designated for its populations of all of the above regularly occurring migratory species (*Table 4.2*), as well as the winter population of bar tailed godwit (*Table 4.1*) turnstone (*Table 4.3*) and the internationally important assemblage of waterbirds.

Table 4.3 ***Additional Ramsar Site Qualifying Interest Features***

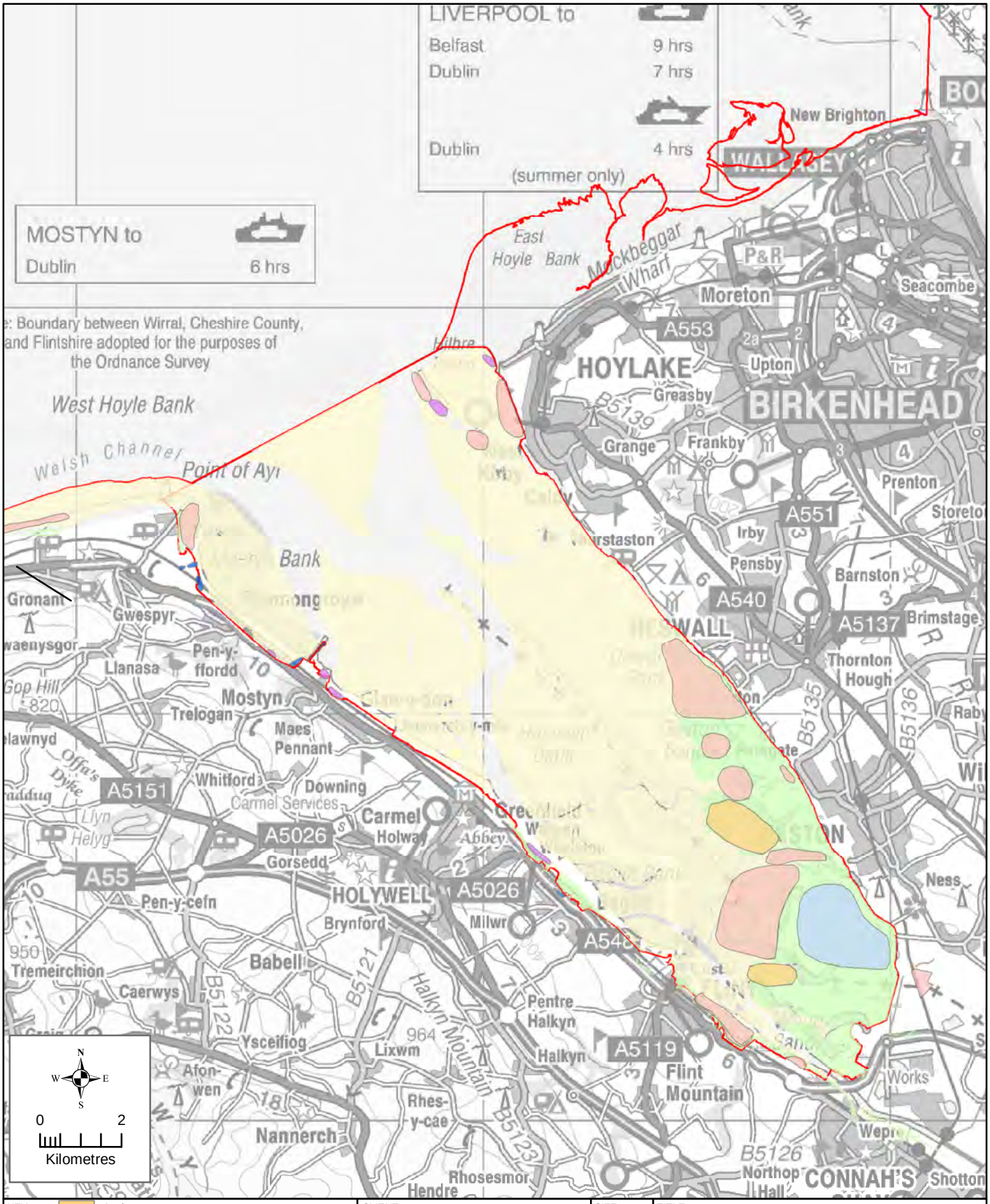
Species	Population	Population five Year Mean (2003-2007)
Turnstone (*Arenaria interpres*)	Wintering North-western Canada, Greenland/ Western Europe and North-western Africa	491

(Source: JNCC website 2009, Austen *et al.* 2008)

Indicative distribution maps of key areas for birds in the estuary were included in the draft Regulation 33(2) Guidance [(1)] produced by EN and CCW (EN & CCW 2004). These show which areas of the Dee Estuary are important

(1) Regulation 33(2) of the Conservation (Natural Habitats &c.) Regulations 1994 requires that the competent authorities (EN and CCW in this case) produce guidance on (a) the conservation objectives and (b) any operations which may cause deterioration of nature

for feeding, roosting and loafing for all qualifying and non-qualifying species in the Dee Estuary. These distribution maps are reproduced in *Figures 4.1-4.4* and discussed in the following sections.



KEY:

- Curlew Roosts
- Redshank Roosts
- Oystercatcher Roosts
- Mixed Wader Roosts (High Tide)
- Mixed Wader Roosts (Medium Tide)
- Saltmarsh
- Sand/Mud
- SPA/pSPA Boundary
- Ramsar Site Boundary (where not coincident with SPA)

CLIENT: Port of Mostyn

SIZE: A4

TITLE: Figure 4.1 Wader Roosts

ERM
Norloch House
36 King's Stables Road
Edinburgh, EH1 2EU
Tel: 0131 478 6000
Fax: 0131 487 3636

DATE: 17/12/2009 | CHECKED: PW | PROJECT: 0107468

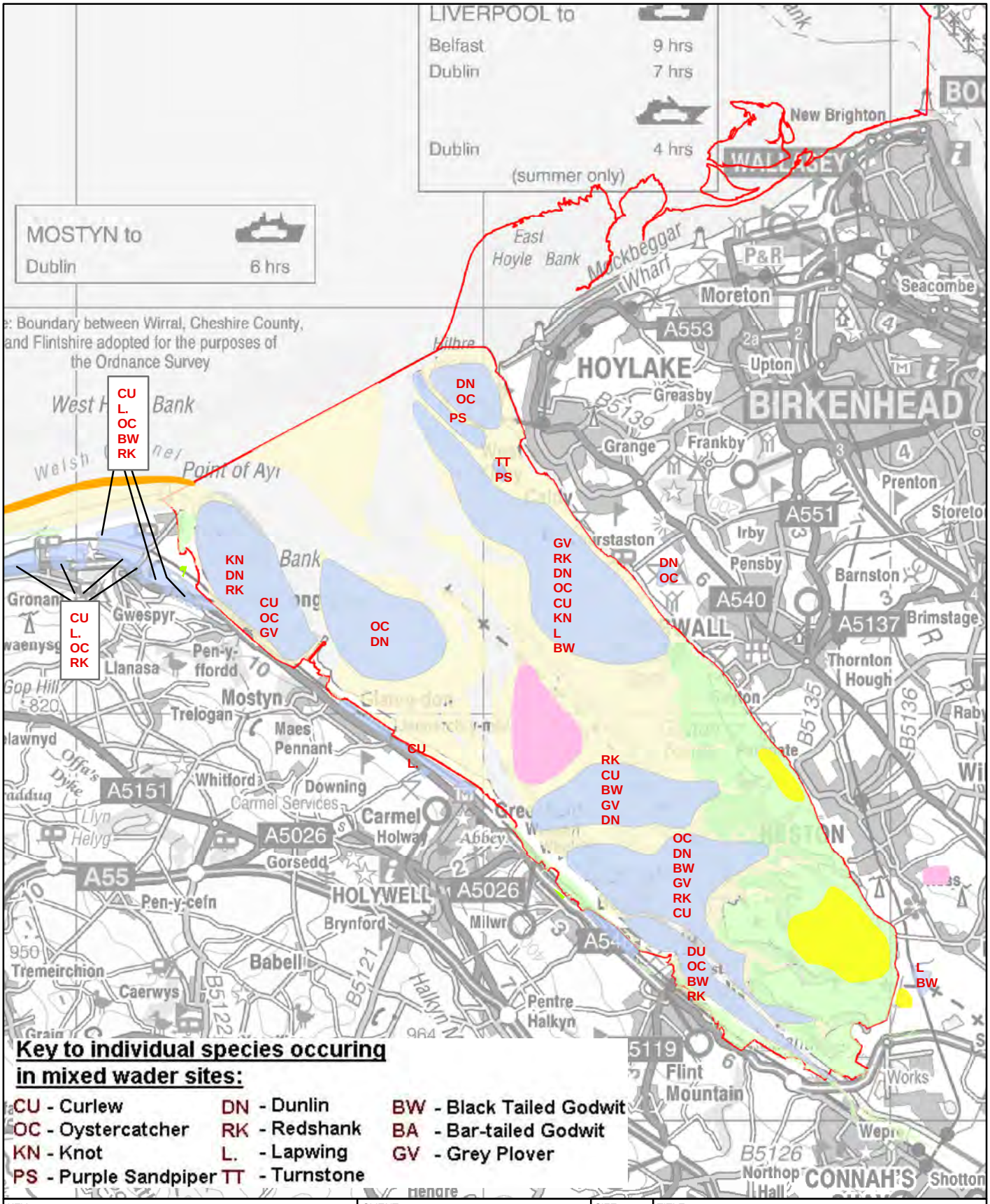
DRAWN: JJH | APPROVED: MSI | SCALE: 1:130,000

PROJECTION: British National Grid

DRAWING: WaderRoosts.mxd

REV: 0

File: 0107468_PoM_JH_SM\MAPS\WaderRoosts.mxd



KEY:

- Redshank
- Lapwing
- Curlew
- Mixed wader
- Sanderling
- Saltmarsh
- Sand/Mud
- SPA/pSPA Boundary
- Ramsar Site Boundary (where not coincident with SPA)

N, W, E, S

0 2
Kilometres

CLIENT: Port of Mostyn

SIZE: A4

TITLE: Figure 4.2 Wader Feeding Areas

ERM
Norloch House
36 King's Stables Road
Edinburgh, EH1 2EU
Tel: 0131 478 6000
Fax: 0131 487 3636

DATE: 17/12/2009 | CHECKED: PW | PROJECT: 0107468

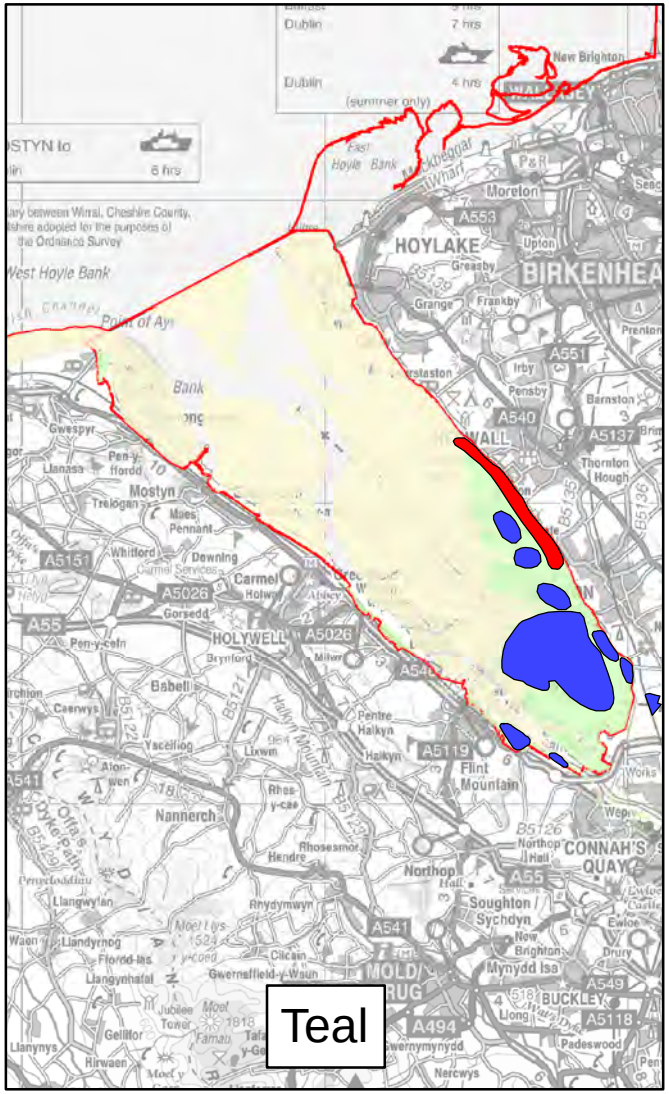
DRAWN: JJH | APPROVED: MSI | SCALE: 1:130,000

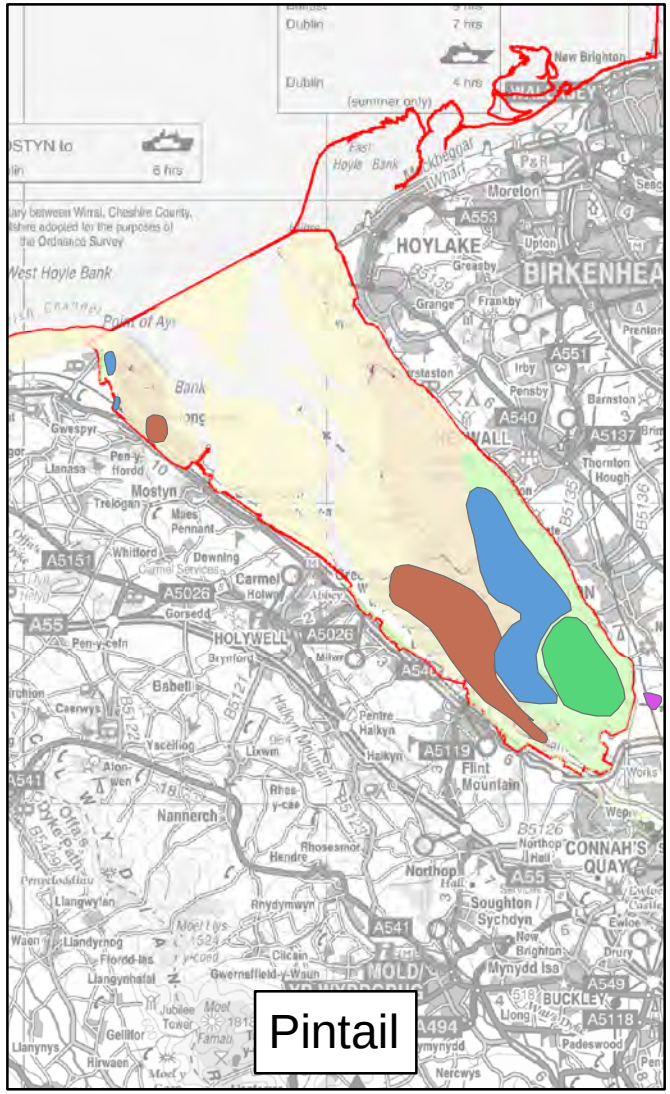
PROJECTION: British National Grid

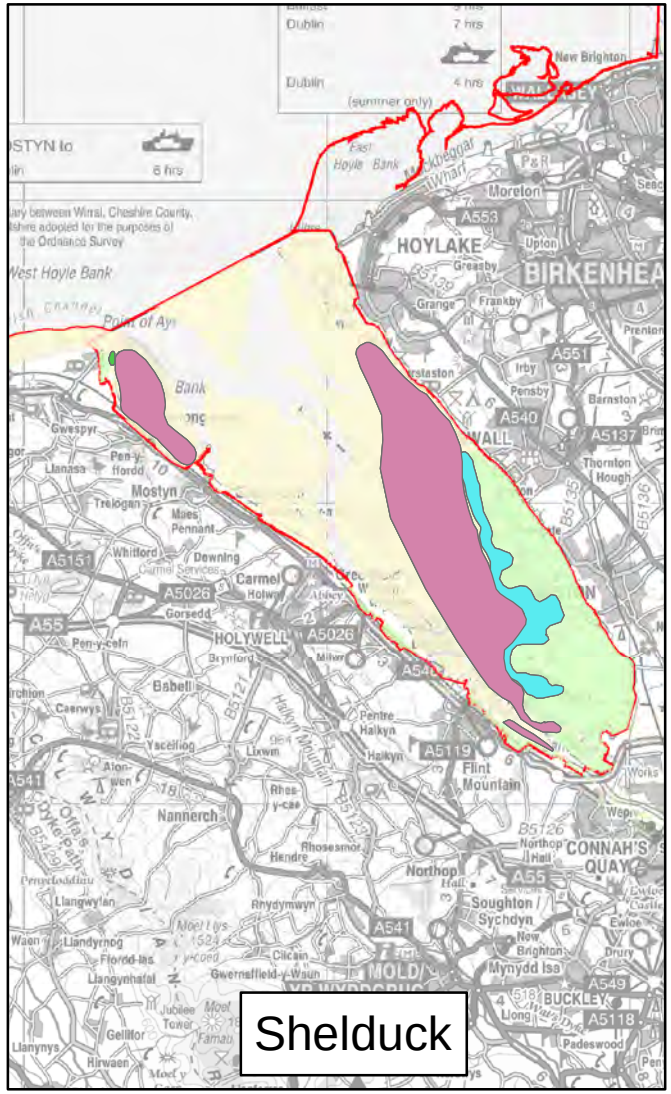
DRAWING: WaderFeeding.mxd

REV: 0

File: 0107468_PoM_JH_SM\MAPS\WaderFeeding.mxd







KEY:

Teal
- Loafing area
- Feeding area

Pintail
- Feeding area when marsh recently inundated
- High water loafing area
- Low water loafing area
- High water feeding area

Shelduck
- High water feeding area
- High water loafing area
- Low water feeding area
- Saltmarsh
- Sand/Mud
- SPA/pSPA Boundary
- Ramsar Site Boundary (where not coincident with SPA)

N W E S

0 5

Kilometres

CLIENT: Port of Mostyn

SIZE: A4

TITLE: Figure 4.3 Wildfowl loafing and feeding areas

ERM
Norloch House
36 King's Stables Road
Edinburgh, EH1 2EU
Tel: 0131 478 6000
Fax: 0131 656 5813

ERM

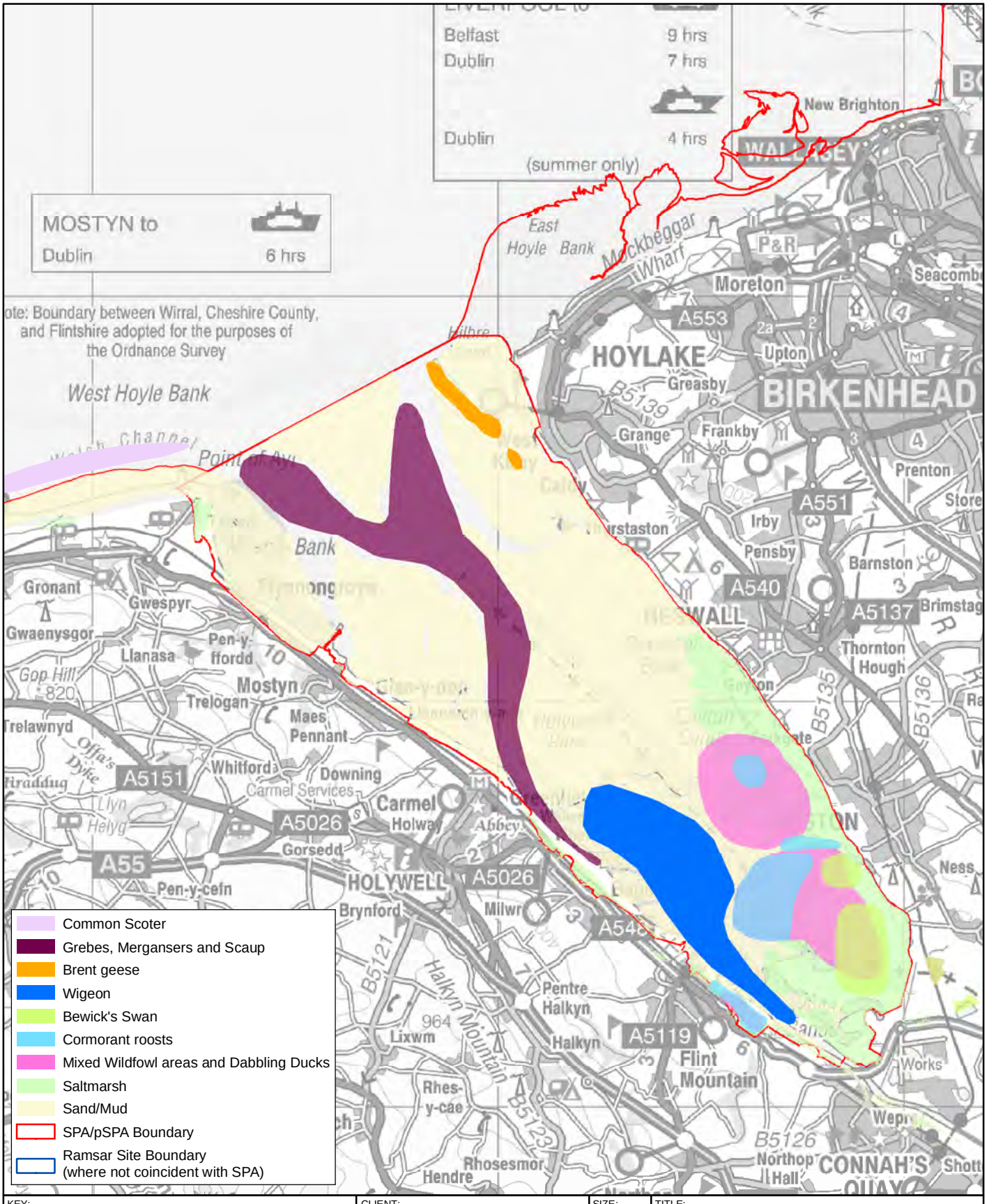
DATE: 17/12/2009 | CHECKED: SO | PROJECT: 0107468

DRAWN: JJH | APPROVED: AD | SCALE: 1:250,000

DRAWING: LoafingFeeding.mxd

REV: 0

File: 0107468_PoM_JH_SMMAPS\LoafingFeeding.mxd



KEY:

CLIENT: Port of Mostyn

SIZE: A4

TITLE: Figure 4.4 Key Areas used by non-qualifying wildfowl

ERM
Norloch House
36 King's Stables Road
Edinburgh, EH1 2EU
Tel: 0131 478 6000
Fax: 0131 487 3636

ERM

DATE: 17/12/2009	CHECKED: PW	PROJECT: 0107468
DRAWN: JJH	APPROVED: MSI	SCALE: 1:130,000

DRAWING: NonQualified.mxd

REV: 0

File: 0107468_PoM_JH_SM\MAPS\NonQualified.mxd

In addition there are a number of species or populations which are features of the Dee Estuary SSSI and which either contribute to the Internationally Important Assemblage of Waterbirds feature of the SPA or occur in nationally important numbers. These are:

- the summering flock of non-breeding black tailed godwit;
- the wintering flock of wigeon (*Anas penelope*);
- ringed plover (*Charadrius hiaticula*) on passage;
- the population of cormorant (*Phalacrocorax carbo*);
- the population of great crested grebe (*Podiceps cristatus*).

4.2.4 Baseline Data on Bird Populations (Annex I Species)

Bar Tailed Godwit

Bar-tailed godwit numbers in the estuary peak around January, with lower numbers in December, February and March but use only a small area of the estuary. Distribution maps suggest that they occupy a high tide roost on the northern side of the estuary beside West Kirby, in association with other waders, but do not forage extensively in the estuary, as shown in *Figure 4.1* and *Figure 4.2*. The population has historically been bigger on the Dee Estuary, however WeBS data suggest that bar-tailed godwit now prefer to forage outside the estuary at Mockbeggar Wharf on the sand and mudflats of the Mersey Narrows and North Wirral Foreshore SPA and tend to roost there, or on the Alt Estuary (Banks *et al* 2006).

The population of bar-tailed godwit is relatively stable in England, but has shown a marked decline in Wales. This may be as a result of birds shifting their wintering areas as a result of warmer winters (Banks *et al.* 2006). The low population on the Dee Estuary compared to historical counts of the 1970s and 1980s, possibly due to a shift to the Mersey Narrows and North Wirral Foreshore SPA, means that a WeBS High Alert has been triggered for the population indicating that a major change in numbers has taken place [(1)] (BTO WeBs Alert Website 2009)[(2)]. The bar-tailed godwit is also an Amber List species [(3)].

Tern Species

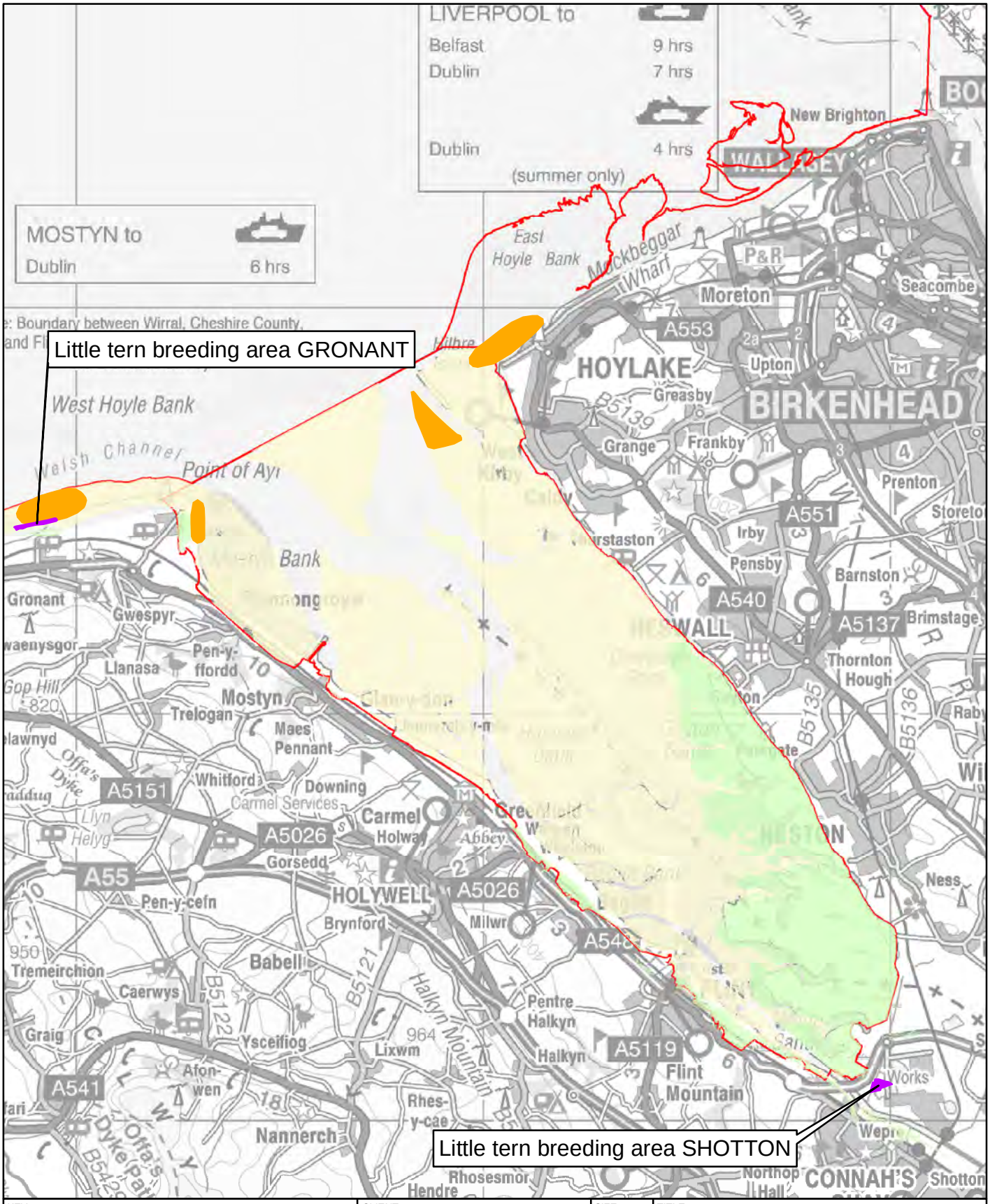
The Dee Estuary supports three tern species. Common and little tern breed at sites around the estuary, and large numbers of sandwich tern use the estuary as a staging post on their autumn migration from their summer breeding colonies in north-western Europe to over wintering areas off west Africa. The

(1) The WeBS Alerts System was developed to provide a standardised method of identifying the direction and magnitude of changes in numbers at a variety of spatial and temporal scales for a range of waterbird species for which sufficient WeBS data are available

(2)http://www.bto.org/webs/alerts/alerts/index.htm

(3) Species whose population is in moderate decline, rare breeders, internationally important and localised species, and those of unfavourable conservation status in Europe. These are listed in Eaton et al 2009. Birds of Conservation Concern 3: the population status of birds in the United Kingdom, Channel Islands and Isle of Man. British Birds **102**: 296-341

distribution of tern roosting and breeding areas around the Dee Estuary is shown in *Figure 4.5*.



KEY:

- Little Tern breeding sites
- Mixed Tern roost sites
- Saltmarsh
- Sand/Mud
- SPA/pSPA Boundary
- Ramsar Site Boundary (where not coincident with SPA)

N W E S

0 2

Kilometres

CLIENT: Port of Mostyn

SIZE: A4

TITLE: Figure 4.5 Key Tern Areas

ERM
Norloch House
36 King's Stables Road
Edinburgh, EH1 2EU
Tel: 0131 478 6000
Fax: 0131 487 3636

ERM

DATE: 17/12/2009 | CHECKED: SO | PROJECT: 0107468

DRAWN: JJH | APPROVED: AD | SCALE: 1:130,000

PROJECTION: British National Grid

DRAWING: TernAreas.mxd

REV: 0

File: 0107468_PoM_JH_SM\MAPS\TernAreas.mxd

All three tern species hunt over expanses of open water and feed on small fish including sprat (*Sprattus sprattus)*, sandeel (*Ammodytes* spp) and the fry of other fish. They will forage over the estuary when the tide is in, but are restricted to feeding in the sub-tidal channels and in Liverpool Bay at low tide. Tern species have relatively small foraging ranges compared to other sea birds, often only foraging within a few kilometres of breeding or roosting sites. Little terns usually only forage within three kilometres of breeding sites although trips of up to six kilometres have been observed (Allcorn *et al* 2003). Common tern generally forages within 10 to 15 km of breeding sites, hunting over a wide range of marine and estuarine habitats. Sandwich tern are more specialised foragers, primarily foraging offshore over habitats such as submerged sandbanks or reefs and tidal rips, and able to forage over much wider areas as they are not tied to breeding colonies (Allcorn *et al* 2003).

The tern species use four different mixed roosts at the mouth of the estuary, especially at high tide, two on the north shore of the estuary at Hoylake and Hilbre Island and two on the south shore on mudflats at Point of Ayr and on the shingle spit at Gronant Dunes. The roost at Point of Ayr is the nearest roost to the project area, approximately four kilometres from Port of Mostyn. Peak counts of sandwich terns using the roosts occur in July when numbers can exceed 1,000 birds.

Common tern numbers at the roosts peak at the end of the breeding season, when it is likely that the breeding population is augmented by juvenile birds and birds from other sites beginning their autumn migration (EN & CCW, 2004).

There are two important tern breeding colonies in the Dee Estuary SPA:

- Burton Marshes SSSI, where common tern breed on specially developed habitats on lagoons at the Shotton Steelworks complex approximately 14 km to the south-east of the project area near the head of the estuary; and

- Gronant Dunes and Talacre Warren SSSI approximately four kilometres to the west of the project area where there is a little tern breeding colony on an un-vegetated shingle spit.

Gronant Dunes supports the second largest population of breeding little tern in the UK, with an average of 80 pairs breeding in the five years 2001-2005 (Dee Estuary Birding Website 2007)(1), with the most recent count (Dee Estuary Birding Website 2009) being 110 pairs

Counts of tern numbers are optional during WeBS counts so numbers recorded are largely dependent on the quality of survey coverage at each site, although the quality of little and sandwich tern counts on the Dee Estuary in the last five years has been good. Breeding little tern numbers appear to be increasing on the Dee Estuary, with 110 pairs noted in 2009. Sandwich tern

(1)http://www.deeestuary.co.uk/

numbers appear to be relatively stable or increasing in the UK, with the 5 year mean count for the Dee being 893 (Austin et al 2008). Number of breeding common terns has been showing strong signs of increase, mainly at the Shotton Pools site, with over 700 pairs since 2006, although the colony deserted in 2009, possibly due to lack of food (Dee Estuary Website 2009). Common, little and sandwich tern are all Amber List species.

4.2.5 Baseline Data on Bird Populations (SPA and Ramsar Internationally Important Migratory Species)

Of the eleven other qualifying SPA and Ramsar species, eight are waders which feed on the large expanses of intertidal habitat and saltmarsh within the estuary, and three are waterfowl. The Dee Estuary is particularly important for three of these wading species, supporting the second largest population of black-tailed godwit and redshank and the third largest population of oystercatcher in the UK. The Dee Estuary is also very important for wildfowl interest, supporting the largest population of pintail and second largest population of shelduck in the UK.

Black-tailed Godwit

Black-tailed godwit have a small feeding range in the estuary and are restricted to Dawpool Bank and Holywell Bank in the mid estuary, and the area around Flint in the upper estuary as shown on *Figure 4.2* where they feed on a variety of invertebrates. They also feed in some of the fields around Gronant Dunes and Talacre Warren. They roost as part of mixed flocks in the inner estuary on areas of saltmarsh as shown in *Figure 4.1* (EN & CCW 2004).

The wintering black-tailed godwit population on the Dee Estuary is increasing, in line with populations across the UK as the Icelandic breeding population continues to overwinter in the UK in increasing numbers. A record high count of 6,452 was recorded for the Dee Estuary in 2004-2005. A number of non-breeding black-tailed godwit also spend the summer on, or close to the Dee Estuary, often at Inner Marsh Farm SSSI which is located at the head of the estuary. Black-tailed godwit is also a Red List species.

Redshank

Redshank feed on benthic invertebrates over large areas of the mud and sand flats on both sides of the estuary, as well as in fields inshore from the Gronant Dunes and Talacre Warren SSSI, as shown on *Figure 4.2*. The nearest feeding site to the project area is Mostyn Bank on the Welsh side of the estuary to the West of the Inner Channel. There are high water roosting sites on the saltmarsh in the inner estuary and at Hilbre Island and West Kirby on the north side of the Dee Estuary as shown in *Figure 4.1* where redshank roost as part of a mixed flock. Redshank also form a single species roosts at Point of Ayr and on the Port of Mostyn breakwater on the south side of the Dee Estuary. Redshank also breed in areas of saltmarsh within the estuary (EN & CCW, 2004).

Nationally wintering numbers of redshank, after a period of slight increase in the early 2000's, now show signs of slight decline, with the count in 2006/07 of 9,384 being slightly below the five year mean. Redshank is an Amber List species.

Oystercatcher

Oystercatcher feed on bivalves such as mussels and cockles on the large expanses of sand and mudflats in the estuary, in similar areas to redshank, with the most important area between West Kirby and Heswall on the English shore as shown on *Figure 4.2*. They also feed on Mostyn Bank and Salisbury Middle Bank, both within one kilometre of the project area and on a small area to the north of Hilbre Island. Oystercatcher occupy high tide roosts at a number of sites on the saltmarsh in the inner estuary and at sites along the Welsh shore at Point of Ayr, Port of Mostyn, and Walwen and on the English side at Hilbre Island as shown in *Figure 4.1*. Those sites closest to the project area are the roost sites at Point of Ayr and Port of Mostyn (EN & CCW 2004).

Oystercatcher numbers usually peak in October, after the breeding season. WeBS counts show that the population on the Dee Estuary has recovered from a low point of 12,506 in 1999-2000, with the 5 year mean for the site currently at 22,049. However, the most recent count in 2006/07 showed a decline to 15,808, and there is evidence of a gentle decline in the national totals. Oystercatcher is an Amber List species.

Dunlin

Dunlin feed on invertebrates at very high densities along the North Wirral Foreshore and in areas throughout the Dee Estuary such as Mostyn Bank and Salisbury Middle Bank, both adjacent to the project area as shown in *Figure 4.2*. Dunlin roost as part of mixed wader flocks on areas of saltmarsh in the inner estuary and at numerous sites along the shore on both English and Welsh shores as shown in *Figure 4.1,* including Point of Ayr (EN & CCW, 2004).

Numbers of dunlin on the Dee Estuary increase from September with peak numbers in December and January. The national trend indicates a decline, although the Dee WeBS count for 2006/07 of 34,834 was higher than the 2002-2007 WeBs peak mean of 27,105.

Curlew

Curlew feed on a variety of invertebrates in areas of mud and sand flats across the estuary, predominantly in the middle and inner estuary as shown on *Figure 4.2*. They use Mostyn Bank and Dawpool Bank where they feed in conjunction with other waders, and also feed on Holywell Bank where they form a single species flock. They roost at the mouth of the estuary at Point of Ayr and Hilbre Island, and in mixed and single species flocks on the saltmarsh near the head of the estuary as shown in *Figure 4.1* (EN & CCW 2004).

The five year peak mean wintering population of curlew in the Dee Estuary is relatively stable with an overall slight increase. Nationally the species appears to be recovering from declines noted early in the decade. It is an amber listed species.

Knot

Knot has a much smaller feeding range in the estuary compared to some other waders, preferring sites along the north Wirral coast inside the Mersey Narrows and North Wirral Foreshore SPA where they feed on a variety of invertebrates. Within the estuary, they feed predominantly on Mostyn Bank on the Welsh side, on Dawpool Bank and Caldy Blacks between West Kirby and Heswall on the English side, with no feeding sites in the inner estuary as shown in *Figure 4.2*. They roost further into the estuary on the saltmarsh, and also at Hilbre Island and at Point of Ayr, forming mixed flocks with other waders at all sites as shown in *Figure 4.1* (EN & CCW, 2004).

Wintering knot numbers tend to fluctuate markedly on the Dee Estuary, for example from 5,672 in 2000-2001, to 56,792 in 2001-2002. The most recent count is 12,937 in 2006/07. However the general trend has been one of decline and a WeBS Medium Alert has been triggered for this species. Knot is an Amber List species.

Grey Plover

The most important area for feeding grey plover is the north Wirral foreshore within the Mersey Narrows and North Wirral Foreshore SPA where they feed on a variety of invertebrates. Within the estuary, grey plover feed on Mostyn and Dawpool Banks in conjunction with other wading species, and to the west of Hilbre Island as shown on *Figure 4.2*. Grey plover roost near the mouth of the estuary in mixed roosts at Gronant and on the English coast near Hilbre Island as shown in *Figure 4.1* (EN & CCW, 2004).

Grey plover numbers usually peak between November and January. Numbers have fallen from a peak in the early 1990s. This decline has triggered a WeBS Medium Alert for this species on the Dee Estuary. This decline is reflected in both the regional and countrywide counts. Grey plover is an Amber List species.

Turnstone

Turnstones feed on invertebrates on rocky shores, which are poorly represented within the Dee Estuary. The main area of this type of habitat within the estuary is at Hilbre Island as shown on *Figure 4.2*. Turnstone will however, feed wherever there is suitable hard substrate habitat, and have been recorded around the Port of Mostyn on the sea wall (EN & CCW, 2004), as confirmed by surveys conducted for this assessment (ABPmer 2009).

As they are primarily birds of rocky coasts, WeBS counts, which focus on estuarine habitats, do not necessarily give a true account of population trends

for this species (Austin *et al,* 2008). However, populations tend to be high from August through to April throughout Great Britain. A general trend of population decline appears to be levelling off and stabilising, however on the Dee numbers have shown a consistent decline between 2002/03, when 726 were counted, to 409 in 2006/07. Turnstone is an Amber List species.

Pintail

Pintail predominantly feed on a variety of plants and invertebrates at sites around the boundary of the saltmarsh and mudflats near the head of the estuary, or on the saltmarsh itself after a high tide, particularly near Neston and Parkgate, as shown on *Figure 4.3*. They also feed on a small area near the Point of Ayr. They use loafing areas on the mudflats at the head of the estuary on the Welsh side, and on a small area of Mostyn Bank. At low water pintail will also use the main estuary channel and intertidal areas near Bagillt as a loafing area (EN & CCW, 2004).

Pintail numbers on the Dee Estuary generally reach a peak in December or January. There has been a slight but steady decline in numbers since the early 1990s but have recovered slightly from a low point in 1999-2000 of 2,356 to 6,172 in 2006/07. This long term decline has triggered a WeBS Medium Alert for this species (BTO WeBs Alert Website, 2009). The UK wintering population after a period of decline also seems to be stabilising. Pintail is an Amber List species.

Shelduck

Shelduck feed on invertebrates in the intertidal mudflats at Mostyn Bank and on Dawpool Bank and Gayton Sands, near to the boundary with the saltmarsh at low water as shown in *Figure 4.3*. At high water they spend their time loafing near to the edge of the saltmarsh, with small numbers of birds loafing at Point of Ayr.

The rolling five year peak mean (11,842) is showing some signs of stability after a period of decline, with the latest count (2006/07) being 10,869. These declines have, however, triggered a WeBS High Alert for this species (BTO WeBs Alert Website, 2009), and is mirrored in the countrywide counts. Shelduck is an Amber List species.

Teal

Teal predominantly feed on the English shore between Heswall and Neston, and loaf on the saltmarsh on the inner estuary as shown in *Figure 4.3*. They are also particularly attracted to small creeks in the upper grazed areas of marsh, where they feed on seeds and invertebrates.

Teal numbers have shown large fluctuations both at a site level and across the UK in the last few years. Only 2,752 birds were counted on the Dee Estuary in 2004-2005, compared with 5,459 over the previous winter. These fluctuations and a levelling off of the population index have triggered a WeBS Medium

Alert for this species (BTO WeBs Alert Website, 2009). Teal is an Amber List species.

Other Annex I Species Not Meeting Threshold for European Importance

A number of other *Annex I* species have been recorded on the Dee Estuary but do not meet the threshold for European importance at this site (ie less than 1% of the Great Britain population occur on the Dee Estuary). These are listed below.

- Leach's petrel (*Oceanodroma leucorhoa*).
- Little egret (*Egretta garzetta*).
- Whooper swan (*Cygnus cygnus*).
- Smew (*Mergellus albellus*).
- Hen harrier (*Circus cyaneus*).
- Merlin (*Falco columbarius*).
- Peregrine falcon (*Falco peregrinus*).
- Golden plover (*Pluvialis apricaria*).
- Ruff (*Philomachus pugnax*).
- Wood sandpiper (*Tringa glareola*).
- Short eared owl (*Asio flammeus*).
- Kingfisher (*Alcedo atthis*).

4.2.6 *Baseline Data on Bird Populations (Nationally Important Populations of Waterbirds)*

Table 4.4 presents other species of wildfowl and wader which are not listed on *Annex I* of the Wild Birds Directive, or do not have internationally important wintering populations, but which have nationally important populations (greater than 1% of the UK population) supported by the Dee Estuary. These populations contribute to the internationally important assemblage of waterbirds which the Dee Estuary supports.

Table 4.4 Other Nationally Important Waterbird Species of the Dee Estuary

Species	Population Five Year Mean 2003-2007
Cormorant (*Phalacrocorax carbo*)	758
Wigeon (*Anas penolope*)	4919
Sanderling (*Calidris alba)*	488
Bewick's swan (*Cygnus columbianus)*	76
Shoveler (*Anas clypeata*)	157 (1)
Light-bellied brent goose (*Branta bernicla hrota)*	91
Common scoter (*Melanitta nigra)*	419
Lapwing (*Vanellus vanellus*)	7482

(1) Based on Banks et al 2006 as no data in Austin et al 2008

Cormorant

The cormorant population of the Dee Estuary has remained fairly stable from 2001 to 2007 at around 700 birds, with birds present in the estuary all year. Roosts sites are situated towards the head of the estuary in areas of saltmarsh, with the majority of birds roosting on the English side and some birds roosting at Flint as shown in *Figure 4.4* (EN & CCW, 2004). Cormorant feed on small fish which they dive for from the surface of the water. The UK breeding population is currently around 9,018 pairs. Cormorant is an Amber List species.

Wigeon

Wigeon overwinter on the Dee Estuary and are generally found on mud and sand flats and saltmarsh towards the head of the estuary (see *Figure 4.4*) where they feed on aquatic and saltmarsh plants and grasses. Wigeon counts on the Dee Estuary have been relatively stable over the last five years at around 4,000 birds. Wigeon is an Amber List species.

Sanderling

Sanderling feed on invertebrates along the tide line of the shore at Gronant Dunes to the west of the mouth of the Dee Estuary, shown in *Figure 4.2*. The UK wintering population has been declining, with the population on the Dee in decline since the 1990s, although the decline does now show signs of levelling off at around 300 birds, although there was an exceptional count of 1020 in 2005/06. (Austin *et al.* 2008, BTO WeBs Alert Website, 2009). Due to this decline a WeBS High Alert has been triggered for sanderling.

Bewick's Swan

Bewick's swans loaf at the head of the Dee Estuary in areas of saltmarsh on the English side, and feed in nearby fields (see *Figure 4.4*) (EN & CCW, 2004). The UK wintering population of Bewick's swan has recently begun to stabilise at around 7,000-8,000 birds after a long term slight decline (RSPB website). The population on the Dee Estuary has fluctuated between 70 and 55 birds in the last five years, below the qualifying levels. Bewick's swan is an Amber List species.

Shoveler

Shovelers are known to use fields near to the head of the estuary, and feed in areas of open water at high tide, sifting food from the surface of the water. Shoveler numbers in the UK are steadily increasing with around 15,000 birds now over-wintering, although the population on the Dee Estuary has decreased and there have been issues with incomplete counts. As a consequence the species was not listed in the most recent Waterbirds in the UK report (Austin *et al*, 2008), and the most recent record is of 105 in 2004/05 (Banks *et al*, 2006). Shoveler is an Amber List species.

Light-bellied Brent Goose

Light-bellied brent geese over-winter in small numbers on the Dee Estuary. The geese feed around Hilbre Island on plants, especially green algae, and in fields at the head of the Dee Estuary shown in *Figure 4.4* (EN & CCW, 2004). The population on the Dee Estuary is increasing, with a high count of 138 birds recorded in 2005-2006. Brent goose is an Amber List species.

Common Scoter

Common scoter overwinter in UK coastal waters and have been recorded from inside the Dee Estuary in small numbers (range 5-40 between 2003-2005, but exceptionally 2,009 in 2006/07), and also outside the Dee Estuary off the coast of Prestatyn, where up to 4,000 have been recorded (Banks *et al,* 2006). The main feeding off the coast is from Prestatyn and Gronant Dunes shown in *Figure 4.4* where birds dive for various molluscs (EN & CCW, 2004). Common scoter are more abundant off shore, and land based counts at best only partially record populations (Banks *et al,* 2006). Understanding of scoter populations in the UK is improving with offshore surveys over recent years recording many more birds than previously, and greatly increasing population estimates. The wintering population in Liverpool bay alone is now known to be around 80,000 birds (Cranswick, Hall & Smith 2004). Common scoter is a Red List species and also a UKBAP species.

Lapwing

Lapwings are found throughout the year towards the head of the estuary, where they feed on invertebrates in the saltmarsh, and roost near the top of the saltmarsh and in nearby fields shown in *Figure 4.2*. The UK wintering population is currently around two million birds (RSPB Website, 2009). The winter population on the Dee Estuary has remained relatively constant over the last five years at around 7,000 birds (Banks *et al,* 2006). Lapwing is an Amber List species.

Other Bird Populations Contributing to the Internationally Important Assemblage of Waterbirds

The Dee Estuary supports other bird species which are not present in internationally or nationally important numbers but contribute to the internationally important assemblage of waterbirds. Scaup (*Aythya marila*), great-crested grebe (*Podiceps cristatus*) and red breasted merganser (*Mergus serrator*) all use the low water channels in the middle of the Dee Estuary to loaf and feed as shown in *Figure 4.4*. Scaup is an Amber List species.

Mallards (*Anas platyrhynchos*) feed and loaf in the saltmarsh at the head of the Dee Estuary, as shown in *Figure 4.4* where they form mixed flocks with wigeon (EN & CCW, 2004). The mallard population on the Dee Estuary has been in decline since the 1980s, and a WeBS High Alert has been triggered for this species (WeBs Alert Website 2009). Purple sandpiper (*Calidris melanotos*) also occur in the Dee Estuary in small numbers, feeding on rocky substrates

around Hilbre Island, and are an Amber List species. Ringed plover, another Amber List species, occur on the Dee Estuary during passage and to a lesser extent over winter. They tend to favour the North Wirral Foreshore, but within the estuary they favour sand banks at the mouth of the estuary and Mostyn Bank.

4.2.7 Baseline Data Relating to Count Sector W3

Sector W3 is the WeBS area that covers the main roost and feeding areas surrounding the proposed development. In order to properly assess the impacts of the proposed development it is important to understand how bird populations use this area, and in what numbers.

KEY: WeBS count sectors

N
W E
S
0 1
Kilometres

CLIENT: Port of Mostyn

SIZE: A4

TITLE: Figure 4.6
WeBS count sectors
(Mostyn Dock and Ffynnongroyw)

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DATE: 17/12/2009	CHECKED: SO	PROJECT: 0107468
DRAWN: JJH	APPROVED:AD	SCALE: 1:35,000

SOURCE: Reproduced from Ordnance Survey digital map data. © Crown copyright, All rights reserved. 2009 License number 0100031673. WeBS Site Boundary Display
PROJECTION: British National Grid

DRAWING: WeBS.mxd

REV: 0

File: 0107468_PoM_JH_SM\MAPS\WeBS.mxd

The main sources of data on which the assessment is based are;

WeBS Counts and WeBS Sector Counts (1)

- WeBS Low Water Counts;
- previous survey work undertaken by Young Associates between 1997-2003; and
- surveys undertaken for this EIA by ABPMer in November and December 2009;

Data taken from the most recent WeBS counts (2004/05 to 2008/09) indicate that the sector W3 (see *Table 4.5* below; held an average of 118 redshank, 2,388 oystercatcher and 22 turnstone at high water. As a proportion of the SPA average peak population between 2004-2009, this equates to 1.5% of redshank, 9.5% of oystercatcher and 4.4% of turnstone. For passage counts over the same period the percentages are 19.7% redshank, 8.3% oystercatcher and 2.8% of turnstone (2).

Table 4.5 Peak Counts 2004/05-2008/09

Winter data	2004/05	2005/06	2006/07	2007/08	2008/09	Average
Oystercatcher	2430	1000	1000	3100	4410	2388
Redshank	93	*	50	70	260	188
Turnstone	40	10	2	2	55	22
Passage data						
Oystercatcher	392	440	1045	6514	865	1851
Redshank	1445	2850	*	1840	860	2120
Turnstone	36	0	10	14	8	14

The comparable data for 1997-2002, drawn from the Young Associates reports indicated that the percentage of winter SPA population for oystercatcher was 6.3%, redshank 1.2% and turnstone 1.8%, all three species therefore having increased in the local area during 2004-2009.

No obvious correlation between shipping movements and bird numbers can be found, with strong monthly and annual variation possibly driven by food resources and weather patterns. Data for key qualifying species for the W3 sector (Ffynongroyw) are presented below in relation to the three key changes in ship movements;

- 1998-Oct. 01 300 ship movements per annum,
- Nov. 01-Apr. 04 Ro-Ro Ferry 1500 ship movements per annum.
- May 04-June 08 Cessation of ferry, advent of Airbus shipments

(1) This is Sector W3, comprising the two sub sectors Mostyn Dock Shore and Ffynongroyw
(2) Only these three species occurred in sufficient numbers to make analysis and discussion relevant

Table 4.6 ***Annual Averages of Qualifying Species for W3 (Ffynongroyw) in Relation to Key Changes in Shipping Movements at Port of Mostyn***

	98-01	01-04	04-08	Peak	Date of Peak Count
Black-tailed Godwit	0	25	1	640	Nov-03
Curlew	0	11	1	196	Nov-03
Dunlin	0	5	1	70	Feb-03
Knot	0	0	2	70	Feb-06
Oystercatcher	149	503	812	4832	Nov-03
Redshank	105	131	63	1820	Sep-00
Shelduck	40	35	53	534	Sep-05
Turnstone	0	0	0	3	Oct-07

As can be seen from the above table a number of species had their highest averages during the period of the Ro-Ro ferry operating, with three (black-tailed godwit, curlew and oystercatcher) all having peak counts in November 2003. Oystercatcher numbers continued to increase after the cessation of the ferry, but this is probably linked to the recovery in cockle stocks (MFA 2008).

The RSPB has made the most recent winter low water count data for the W3 sector available for November 2008 to January 2009. This is presented in table 4.7 below;

Table 4.7 ***Low Water Counts Nov.08-Jan 09.***

Species	*Nov 08*	*Dec 08*	*Jan 09*	*Winter Average 08/09*	*% of winter SPA/ Ramsar Population*
Oystercatcher	6,000	6,000	12,000	8,000	36.2%
Knot	0	200	2,000	733	3.2%
Dunlin	0	0	1,000	333	1.2%
Curlew	500	450	1,000	650	12.2%
Redshank	0	100	0	33	0.3%
Turnstone	50	0	0	17	3.4%

(Source: RSPB data, 2009)

Overall it can be seen that substantial proportions of the SPA/ Ramsar qualifying interests occur within the W3 sector area, using it for both roosting and feeding.

The ABPmer studies have further refined these counts and indicate that around the immediate vicinity of the breakwater small flocks of turnstone (2-9 birds) representing up to 1.8% of the Ramsar qualifying population feed in Area 4 of the breakwater (see *Figure 4.7-4.9* below).

KEY: Breakwater Count Sections

N
W E
S
0 50
Metres

CLIENT: Port of Mostyn

SIZE: A4

TITLE: Figure 4.7
ABP MER Count Areas

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ERM

DATE: 17/12/2009	CHECKED: SO	PROJECT: 0107468
DRAWN: JJH	APPROVED:AD	SCALE: 1:2,000

SOURCE: © 2009 Google, Bluesky, Infoterra Ltd and COWI A/S
PROJECTION: British National Grid

DRAWING: BreakwaterCount.mxd

REV: 0

File: 0107468_PoM_JH_SMMAPS\BreakwaterCount.mxd

KEY: November Observations

N W E S

0 50

Metres

CLIENT: Port of Mostyn

SIZE: A4

TITLE: Figure 4.8 Main bird observations recorded on the 17/11/09 and 19/11/09

ERM
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ERM

DATE: 17/12/2009 | CHECKED: SO | PROJECT: 0107468

DRAWN: JJH | APPROVED:AD | SCALE: 1:2,000

SOURCE: © 2009 Google, Bluesky, Infoterra Ltd and COWI A/S
PROJECTION: British National Grid

DRAWING: Breakwater_Nov.mxd

REV: 0

File: 0107468_PoM_JH_SMMAPS\Breakwater_Nov.mxd

KEY:
December Observations

N
W E
S
0 50
Metres

CLIENT: Port of Mostyn

SIZE: A4

TITLE: Figure 4.9
Main bird observations recorded on the 01/12/09 and 02/12/09

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ERM

DATE: 17/12/2009	CHECKED: SO	PROJECT: 0107468
DRAWN: JJH	APPROVED:AD	SCALE: 1:2,000

SOURCE:
PROJECTION: British National Grid

DRAWING: Breakwater_Dec.mxd

REV: 0

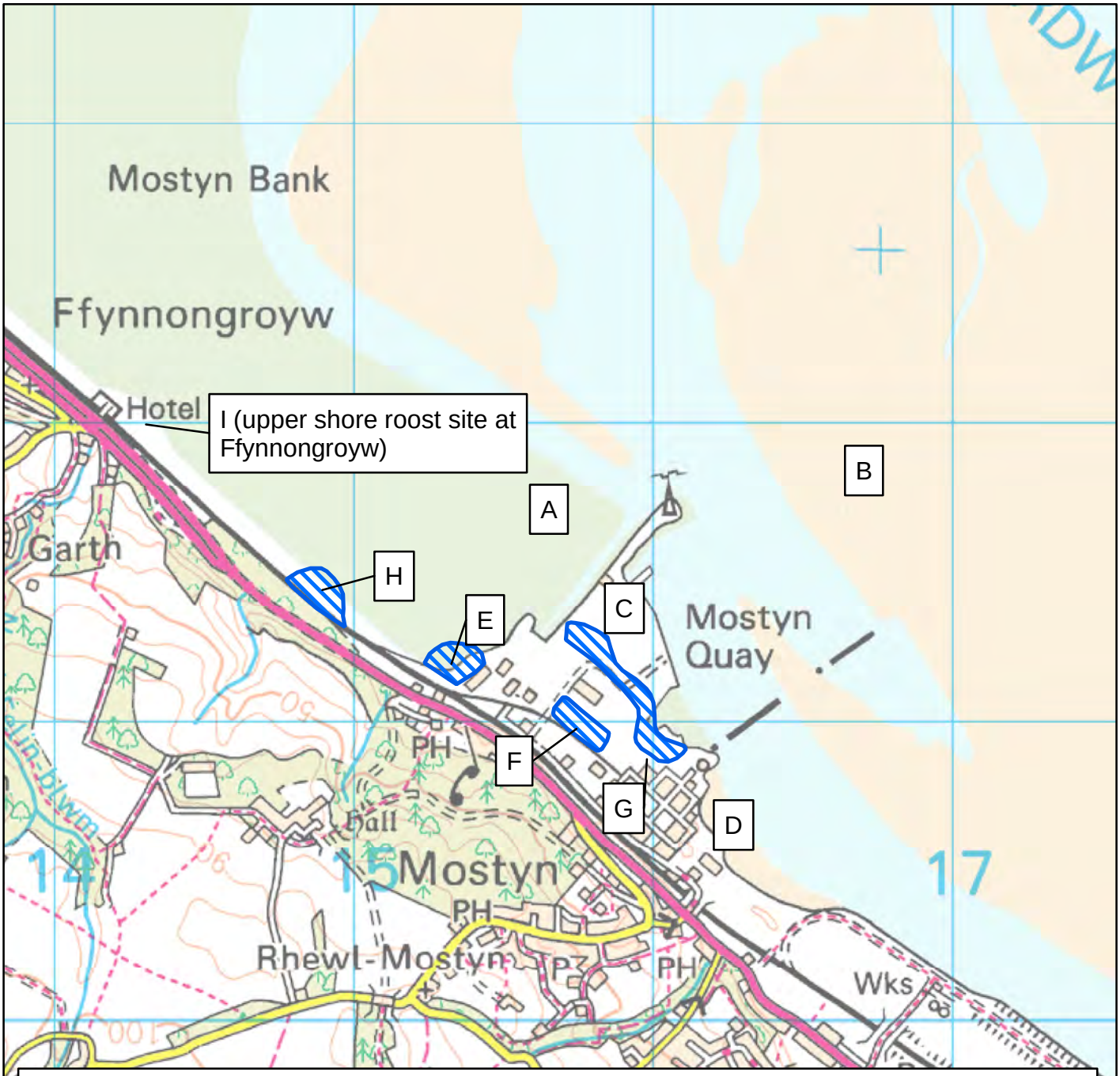
File: 0107468_PoM_JH_SMMAPS\Breakwater_Dec.mxd

In addition, between low water +/- four hours the Mostyn Gutter area (Area 6) supported modest flocks of redshank which were found feeding close to the breakwater (peak 120, 1.1% of the SPA qualifying population) in scattered groups, often with low numbers of other species, but including up to 270 Oystercatcher (1.2% of qualifying population) on the 2/12/09. The peak count of turnstone on the 19/11/09 occurred at low water with 25 birds feeding in Area 2 and six feeding in Area 4, this being 6.3% of the Ramsar population. Peak counts around the breakwater are summarised in *Table 4.8* below, with the complete data available in *Annex F*.

Table 4.8 Peak Counts of Qualifying Species by Breakwater (See Figure 4.7-4.9)

	17/11/2009	**19/11/2009**	**01/12/2009**	**02/12/2009**
Redshank	66	80	120	25
Oystercatcher	16	85	250	270
Curlew	3	1	1	2
Dunlin			50	
Black-tailed Godwit			6	
Turnstone	9	31	6	
Shelduck	1			

Counts were also undertaken by ABPmer on the 1st and 2nd December to replicate the count areas used in the original Young Associates (YA) investigation. This covered the main high water roosts (see *Figure 4.10* below for details of count area).



Areas A, B & C are intertidal feeding areas

Areas E, F, G, H & I are high tide roosting areas

Area D is both a feeding area when the intertidal habitats are exposed and a roost area at high water

NB - Following Phases 1 and 2 of the dock development areas C and G were reduced in size and presently cover the south end of the Mostyn Dock foreshore only (i.e. outwith the un reclaimed area). Also area F was lost during the Phase 2 development.

KEY: Ornithological Survey Areas

N W E S

0 500

Metres

CLIENT: Port of Mostyn

SIZE: A4

TITLE: Figure 4.10 YA Count Areas

ERM
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ERM

DATE: 17/12/2009	CHECKED: SO	PROJECT: 0107468
DRAWN: JJH	APPROVED:AD	SCALE: 1:20,000

SOURCE: Reproduced from Ordnance Survey digital map data.
PROJECTION: British National Grid

DRAWING: YACountAreas.mxd

REV: 0

File: 0107468_PoM_JH_SMMAPS\YACountAreas.mxd

As can be seen from *Table 4.9* below significant numbers of redshank, oystercatcher and turnstone were found. Oystercatcher and turnstone roosted primarily at Warwick International Foreshore (YA Area D), while redshank were more dispersed, with some roosting at Warwick International Foreshore (YA Area D) and close to the base of the breakwater protecting Mostyn Gutter (YA Area E), with the majority roosting at YA area H approximately 400 metres west of this area.

Table 4.9 Peak Roost Counts 1/12/09-2/12/09

	C	G	E	H	D	Total	% of SPA Population
Redshank		18	225	1200	250	1693	15.7
Oystercatcher			6		6000	6006	27.2
Curlew				11	2	13	0.2
Turnstone					30	30	6.1
Shelduck		2				2	0.01

YA Area E lies on the edge of a 95 m stone bund created by the Port to protect the closed dock and flushing lagoon associated with Mostyn Gutter, this artificial rocky shore habitat providing new roosting and feeding opportunities for birds. The cessation of ploughing and dredging of the gutter after 2000, has promoted the accretion of additional intertidal mudflat within the gutter. This has provided new feeding resources for species such as redshank.

Table 4.10 Peak Low Water Counts (with % of SPA population) by Count Sector for 1/12/09 & 2/12/09

	Ffynongroyw	%	Mostyn Dock Shore	%
Redshank	412	3.8	52	0.4
Oystercatcher	2000	9	4400	19.9
Curlew	220	4.1	127	2.3
Knot	1560	6.9	1000	4.4
Dunlin	130	0.4	9	0.03
Black-tailed Godwit	720	14.8	0	0
Bar-tailed Godwit	6	1.5	0	0
Turnstone	0	0	30	6.1
Shelduck	45	0.38	6	0.05

The counts indicate significant proportions of the qualifying populations of redshank, oystercatcher, curlew, knot, black-tailed godwit and bar-tailed godwit were found in the Ffynongroyw sector (Mostyn bank), whilst Mostyn Dock sector (covering the important cockle beds at Salisbury Middle) supported significant percentages of oystercatcher, curlew, knot and turnstone.

4.2.8 Site of Community Interest (SCI) Ecological Interest

In addition to its ornithological interest, the Dee Estuary has been proposed as an SAC as it supports the habitats and species listed in *Table 4.11* below

Table 4.11 Features Listed As Reasons for Recommendation

- Fixed Dunes with herbaceous vegetation (grey dunes)
- Annual vegetation of drift lines
- Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)
- Embryonic shifting dunes
- Humid dune slacks
- *Lampetra fuviatilis* (River Lamprey)
- Intertidal mudflats and sandflats not covered by seawater at low tide
- *Petalophylum ralfsii* (Petalwort)
- *Petromyzon marinus* (Sea lamprey)
- *Salicornia* and other annuals colonising mud and sand
- Shifting dunes along the shoreline with *Ammophila arenaria* (Marram) (white dunes)
- Vegetated sea cliffs of the Atlantic and Baltic coasts
- Estuaries

(Source: EN & CCW 2004)

Those features of the SCI (an area proposed as an SAC and adopted by the European Commission but not yet formally designated by the government of each country) which contribute to the European Marine Site (EMS) and could potentially be affected by the proposals are listed below.

- Estuaries.
- Intertidal mudflats and sand flats not covered by seawater at low tide.
- *Salicornia* and other annuals colonising mud and sand.
- Atlantic salt meadows *(Glauco-Puccinellietalia maritimae).*
- Annual vegetation of driftlines.
- The lamprey species *Lampetra fluviatilis* and *Petromyzon marinus.*

Baseline information on these features is discussed in the following sections.

Estuaries Feature – Subtidal Sediment Communities Subfeature

Benthic(1) fauna form an important part of the marine ecosystem, providing a food source for invertebrates, fish, birds and mammals as well as providing essential ecosystem services such as cycling nutrients and materials between the underlying sediments and overlaying water column. The benthos comprises diverse assemblages, including species which are relatively long-lived and sedentary, and which exhibit different tolerances to stress, making them useful indicators to assess environmental conditions. According to the draft Regulation 33 advice for the Dee EMS, no specific areas of the subtidal sediment communities of the Estuary have been identified as being of sub feature status (EN &CCW, 2004). However the subtidal habitats form an important component of the estuarine system and are described here.

The results of survey work carried out in the Welsh Channel, Mostyn Deep and the mouth of the Inner Channel by Hydrosurveys (August 2002), CEFAS (September 2003), and Pelorus Surveys (August 2005), have been summarised

(1) Benthic fauna or benthos is a term applied to organisms living on or in the seabed and benthic fauna communities predominantly comprise invertebrates, though a few fish species may also be considered benthic.

in a report by Unicomarine Ltd (2007) which provides information on the distribution of habitats and species within the project area (see *ERM 2007 ES for Port of Mostyn dredging application Annex C2)* The surveys included grab samples for benthic infauna (animals living within the sediment), trawls were used to sample the epibenthic fauna (animals living on or just above the seabed) and sediments were sampled using grabs, for particle size analysis (PSA).

The benthic data from the CEFAS survey was most comprehensive, with only basic benthic data recorded from the other surveys. The CEFAS survey included sediment description but not detailed PSA, however PSA data from the Hydrosurveys and Pelorus Surveys samples were considered to be representative of the CEFAS sample locations.

Benthic infaunal diversity and species richness of the CEFAS sampling station was generally very low, and this is reflected in biotic diversity indices calculated for each sample (Margalef's richness index, Pieliou's evenness index and Shannon – Weiner diversity index). Species richness of all of the faunal samples from the surveys was also very low with the number of species recorded from each grab sample ranging from 2 to 16, with a mean of 6.6. Abundances were highly variable with the number of individuals in each of these species ranging from 20 to 68,490 individuals per m^2.

The species assemblages included mostly species associated with marine habitats, and a smaller number of estuarine associated species (such as the polychaete worm *Eteone flava*). Some of the taxa were ubiquitous (found at all sampling stations), these were: *Lagis koreni* (a tube – building polychaete), and *Nephtys sp.* (which are predatory polychaetes). The trawl samples also contained some ubiquitous species: *Pleuronectes platessa* (plaice), *Limanda limanda* (dab), *Carcinus maenas* (shore crab) and *Crangon crangon* (brown shrimp). Despite the small area sampled, the number of ubiquitous species and the low diversity reflects the relatively homogenous sediment types recorded.

Despite the low diversity, three infaunal assemblages (A, B and C) were identified using statistical analysis (Cluster analysis). These were tentatively assigned to MNCR biotopes (according to Connor *et al,* 2004). The species composition of each assemblage is shown in *Table 4.12*, as well as the MNCR biotope codes and mean density (individuals per m^2). Distributions for these biotopes within the Dee Estuary are shown in the *ERM 2007 ES for Port of Mostyn dredging application Annex C2 Figure 12*.

Assemblage group A is found only in the Welsh Channel, while assemblage groups B and C are found in Mostyn Deep only. The samples in the Welsh Channel and Mostyn Deep that did not fit in the three identified assemblages correspond to a fourth biotope (described as infralittoral mobile clean sand with sparse fauna). Assemblage group A had the highest diversity of three identified assemblages (highest number of taxa and highest abundances).

Assemblage group A is a sublittoral cohesive mud and sandy mud community, which is generally found in deeper areas of bays and marine inlets. The *Lagis koreni / Phaxas pellucidus* subcommunity which this assemblage has been assigned to, is distributed around much of the north-west Welsh coast (JNCC Marine Biotopes Website, 2007). Although no specific intolerance, sensitivity and recoverability exists for this biotope, as a group sublittoral cohesive mud and sandy mud communities exhibit low to intermediate intolerance, high recoverability and low sensitivity (Tyler-Walters *et al,* 2004).

Assemblage group B (which has been assigned to *Hesionura elongata* and *Microphalmus similes* with other interstitial polychaetes in infralittoral mobile gravel and sand) is a sublittoral coarse sediment community on mobile medium coarse sand. In the UK this assemblage is found primarily in the large estuaries of the Severn, the Wash and the Solway. In common with assemblage B no specific intolerance, sensitivity and recoverability exists for this biotope however the infralittoral coarse sediments which have been assessed show intermediate to high intolerance but with high recoverability, and low to moderate sensitivity (Tyler-Walters *et al,* 2004).

Assemblage group C has been assigned to the *Nephtys cirrhosa* and *Bathyporeia* spp. in infrallitoral sand biotope. This biotope has a wide distribution around the coast of the UK in medium to fine sands subject to physical disturbance due to wave action. It has a low intolerance, very high recoverability and very low sensitivity (Tyler-Walters *et al,* 2004).

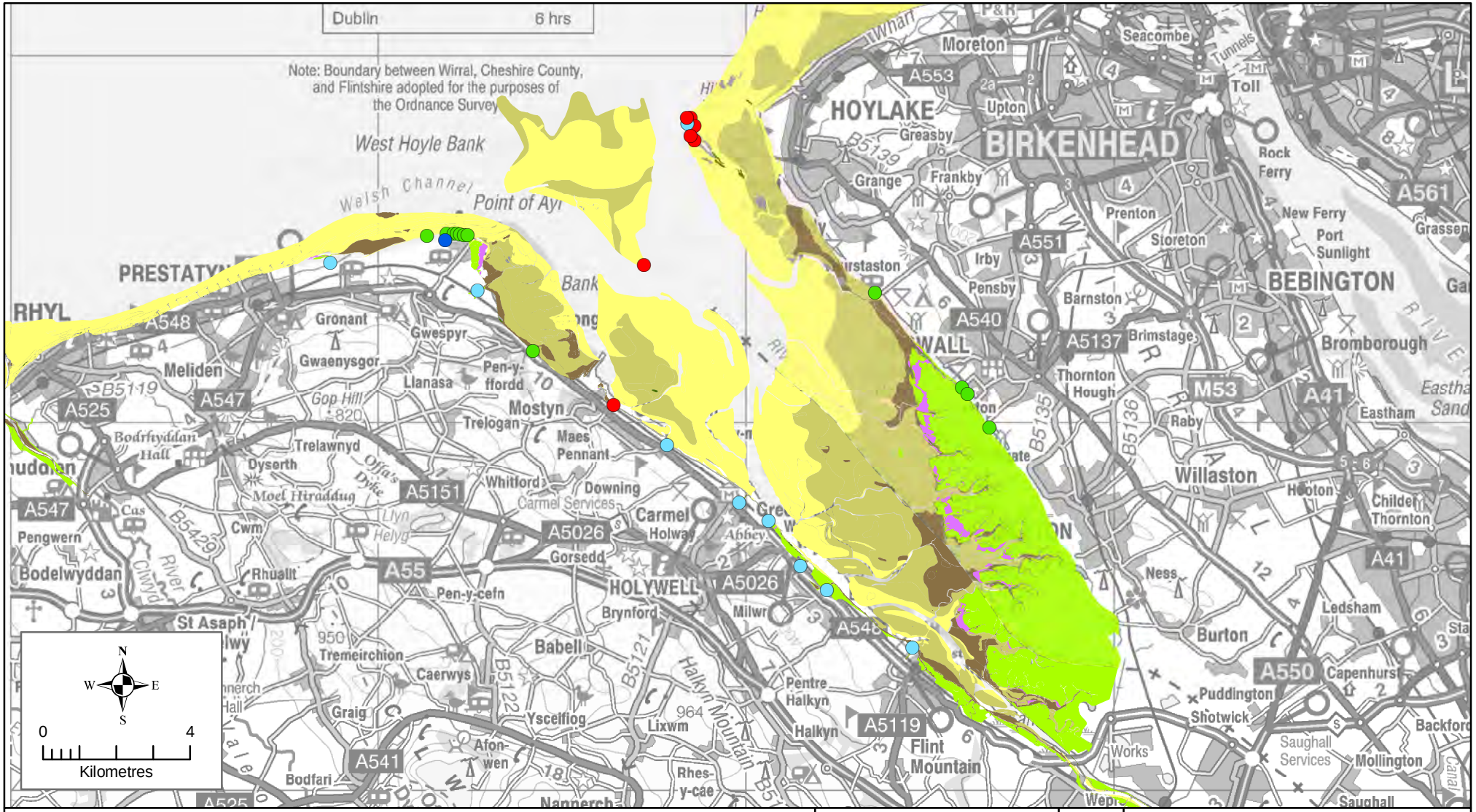
These biotopes are all representative of mobile sandy/muddy habitats found in dynamic estuaries and exhibit characteristics such as low sensitivity and high recoverability as a factor of the environment in which they are found.

None of the species or communities found in the surveys was considered to be especially rare or unusual.

The beam trawl samples collected CEFAS showed a distinction between the Welsh Channel sites and those from the Mostyn Deep. Certain fish, such as plaice, sole (*Solea solea*) and dab were more common in the Welsh Channel, while Mostyn Deep had a greater variety of some of the less common fish species such as lesser weever (*Eciicthys vipera*), whiting (*Merlangus merlangus*) and other gadoids (cod family). Brown shrimp and shore crabs were found in all areas.

Estuaries Feature - Intertidal Hard Substrate Communities

The intertidal hard substrate communities recorded in the Dee Estuary are all small in extent but form important sub-features of the estuary qualifying interest feature for the SCI due to the rarity of hard substrate habitats within the Dee Estuary. Three areas of particular interest of this type of habitat have been identified in the estuary (EN & CCW, 2004) and are shown as red dots in *Figure 4.11*



KEY:

Notable Features

- Annual Vegetation of Driftlines
- Ephemeral Saltmarsh Vegetation
- Notable Hard Substrate Communities
- Undiferentiated Atlantic Salt Meadow

Biotopes of Dee Estuary

- Algal turf
- Hard Intertidal Substrate
- Mud
- Muddy sandy shore
- Atlantic Salt Meadow
- Sand
- Mixed Sediment
- Salicornia and other annuals

CLIENT: Port of Mostyn

SIZE: A4

TITLE: Figure 4.11 Dee Estuary Biotopes

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ERM

DATE: 17/12/2009 | CHECKED: SO | PROJECT: 0107468

DRAWN: JJH | APPROVED: AD | SCALE: 1:150,000

PROJECTION: British National Grid

DRAWING: Biotopes.mxd

REV: 0

File: 0107468_PoM_JH_SMMAPS\Biotopes.mxd

- Holocene clay deposits on Salisbury Bank supporting the nationally important biotope Mytilus edulis (common mussel) and piddocks on eulittoral (1) firm clay approximately 3.5 km from the project area.

- An area of the specialised biotope community hydroids, ephemeral seaweeds and *Littorina littorea* (common periwinkle) in shallow eulittoral mixed substrata pools, within a mussel bed to the east of the port approximately 1 km from the project area.

- UK Biodiversity Action Plan habitat *Sabellaria alveolata* (honeycomb worm) reef on sand-abraded eulittoral rock on the north-west, east and south-west shores of Hilbre Island approximately 6 km from the project area.

Table 4.12 Species Assemblages of Subtidal Biotopes from CEFAS (2003) Survey in the Welsh Channel and Mostyn Deep

	Assemblage A MNCR biotope code SS.SMu.CSaMu.LkorPpel	mean /m²	Assemblage B MNCR biotope code SS.SCS.ICS.HeloMsim	mean/m²	Assemblage C MNCR biotope code SS.SSa.IFiSa.NcirBat	mean /m²
1	*Lagis koreni*	54,810	*Microphthalmus similis*	145.0	*Nephtys cirrosa*	61.5
2	*Abra alba*	3,783	*Eteone longa*	52.5	*Bathyporeia guilliamsoniana*	50.0
3	*Pholoe inornata*	2,087	*Lagis koreni*	42.5	*Lagis koreni*	20.0
4	*Mytilus edulis (juv.)*	680	*Mytilus edulis (juv.)*	35.0	*Magelona mirabilis*	10.0
5	*Eteone longa*	607	*Nephtys cirrosa*	20.0	*Eteone longa*	3.1
6	*Cerastoderma edule*	607	*Gastrosaccus spinifer*	20.0	*Glycera alba*	3.1
7	*Macoma balthica*	363	*Anaitides mucosa*	15.0	*Pholoe inornata*	2.3
8	*Nephtys hombergii*	137	*Ophelia borealis*	12.5	*Gastrosaccus spinifer*	2.3
9	*Anaitides mucosa*	100	*Pariambus typicus*	7.5	*Spio martinensis*	1.5
10	*Liocarcinus (juv.)*	20	Harmothoe	5.0	*Mytilus edulis (juv.)*	1.5
11	*Tubificoides*	13	*Mysella bidentata*	5.0	*Abra alba*	1.5
12	*Owenia fusiformis*	10	Pholoe inornata	2.5	*Anaitides mucosa*	0.8
13	*Glycera alba*	7	Eumida	2.5	*Nephtys hombergii*	0.8
14	*Nephtys cirrosa*	7	Nephtys (juv.)	2.5	*Pontocrates arenarius*	0.8
15	*Liocarcinus holsatus*	7	*Tryphosella sarsi*	2.5	*Haustorius arenarius*	0.8
16	*Fabulina fabula*	7	PLEURONECTIFORMES	2.5	Liocarcinus (juv.)	0.8
17	NEMERTEA	3			*Mysella bidentata*	0.8
18	*Nereis longissima*	3			*Macoma balthica*	0.8
19	*Nephtys* (juv.)	3			*Ophiura affinis*	0.8
20	*Scopelocheirus hopei*	3				
	Average number of taxa	22	Average number of taxa	8	Average number of taxa	4
	Average individuals/m²	63,263	Average individuals/m²	373	Average individuals/m²	163

(Source: Unicomarine, 2007)

The clay bank on Salisbury Middle appears to erode when not covered by sand, and is re-colonised by piddocks when it is exposed, the burrowing activity of which may speed up the erosion (Pinn *et al* 2005). The review of survey work from 1999 to 2007 suggests that the environment around the clay bank is very complex, and the changes observed are likely to have occurred

(1) An area within the marine intertidal zone subject to wave action

from the easterly migration of the Mid-Hoyle channel altering flows through the Mostyn Deep and across West Hoyle, in combination with less influential effects of storm-driven wave climate changes. It also concludes that the shallow layers of sand overlying a clay substratum is naturally unstable and highly vulnerable to changes in the hydrodynamic environment, and could be expected to continue to be highly dynamic over varying timescales (ABPmer, 2007 see *Annex C1*).

Intertidal Mudflats and Sandflats not Covered by Seawater at Low Tide

The intertidal areas of the Dee Estuary cover over 10,000 ha accounting for approximately 3% of the UK total area for this habitat. Large cockle beds cover part of the intertidal area. Other sections of the intertidal area provide a habitat for a variety of sedimentary invertebrate species. Natural England (Allen & Hemingway, 2005) and CCW (Jones *et al,* 2002) have undertaken intertidal surveys of the Dee Estuary; the results of these surveys are shown in *Figure 4.11.* The English Lifeform codes have been used for the purposes of the biotope mapping.

The Allen and Hemingway (2005) survey illustrates that three main biotopes dominate the Dee Estuary; sand, muddy sandy shore and mud. The higher energy lower intertidal areas are dominated by sand, grading to muddy sandy shore and then to mud higher up the shore. Mud communities are also more common towards the head of the estuary, where they begin to be colonised by saltmarsh communities.

The sand biotope dominates in the vicinity of the project area, on the lower reaches of Salisbury and Mostyn Banks, with muddy sandy shore biotopes higher up on the banks.

The Jones *et al* (2002) survey of the Welsh coast of the estuary divided the intertidal habitat into gravel and clean sand communities, muddy sand communities or mud communities.

Gravel and clean sand communities are associated with higher energy reaches of the estuary which prevent the deposition of finer sediments. These communities are extensive within the estuary, with large areas of moderately exposed sands on Salisbury Middle and Salisbury Bank. The sediment here is extremely mobile due to the moderately strong tidal streams found in this part of the estuary, with large sand waves forming. The nationally scarce species *Thia scutellata* (thumbnail crab) has been recorded on sandbanks in the outer estuary. The gravel and clean sand biotopes recorded within the European Marine Site (Jones *et al*, 2002) are:

- barren coarse sand shores;
- burrowing amphipods and *Eurydice pulchra* (isopod) in well drained clean sand shores;
- burrowing amphipods and polychaetes in clean sand shores;
- talitrid amphipods in decomposing seaweed on the strandline;

- dense *Lanice conchilega* (worm) in tide swept lower shore sand; and
- barren shingle or gravel shores.

Muddy sand communities exist in areas which are moderately sheltered, including sections of the outer estuary and large areas of the mid estuary. These sediments support a wide range of species such as the lugworm *Arenicola marina*. Muddy sand communities support the large cockle beds in the Dee Estuary, with important beds found on Mostyn Bank and Salisbury Bank. The nationally rare worm species *Ophelia bicomis* has been recorded from muddy sand communities near Mostyn Bank. The muddy sand community biotopes recorded within the EMS (Jones *et al,* 2002) are:

- polychaetes and *Cerastoderma edule* (common cockle) in fine sand or muddy sand shores;
- *Bathyporeia pilosa* and *Corophium* spp. in upper shore slightly muddy fine sand shores;
- *Macoma balthica* (Baltic tellin) and *Arenicola marina* in muddy sand shores;
- *Arenicola marina, Macoma balthica* (bivalve) and *Mya arenaria* in muddy sandy shores; and
- *Echinocardium cordatum,* and *Ensis* sp. (bivalve) in lower shore or shallow sublittoral muddy fine sand.

Mud communities form in the Dee Estuary in sheltered areas where fine sediments can drop out of suspension at the head of the estuary and along the border with areas of salt marsh. Mud communities are often relatively stable and support certain species in high numbers. These include *Hediste diversicolor* (ragworm), *Arenicola marina* and bivalve molluscs such as the *Scrobicularia plana* (peppery furrow shell) and *Macoma balthica,* and high densities of *Hydrobia ulvae*. These species provide a rich food source for populations of estuary fish, waders and waterfowl (EN & CCW, 2004). The mud community biotopes recorded within the European Marine Site (Jones *et al,* 2002) are:

- *Hediste diversicolour* and *Macoma balthica* in sandy mud shores;
- *Hediste diversicolour, Macoma balthica*, and *Arenicola marina* in muddy sand or sandy mud shores;
- *Hediste diversicolour, Macoma balthica*, and *Mya arenaria* in sandy mud shores;
- *Hediste diversicolour* and *Scrobicularia plana* in reduced salinity mud shores; and
- *Hediste diversicolour* and oligochaetes in low salinity mud shores.

The Natural England survey of the English side of the estuary (Allen & Hemingway, 2005) recorded 34 different biotopes, and eleven Lifeforms. The results for the gravel and clean sand, muddy sand and mud communities are very similar, with only two communities found on the Welsh side missing from the English side of the estuary, namely Talitrid amphipods in decomposing seaweed on the strandline, and *Echinocardium cordatum* and *Ensis* sp. in lower shore or shallow sublittoral muddy fine sand.

In addition, another seven intertidal mud and sandflat biotopes were recorded:

- littoral muddy sands;
- littoral muds;
- littoral mixed sediments;
- fucoids, barnacles or mixed seaweeds (mixed substrata);
- barnacles and *Littorina littorea* on unstable eulittoral mixed substrata;
- ephemeral green and red seaweeds on variable salinity or disturbed eulittoral mixed substrata;
- *Fucus vesiculosus* on mid eulittoral mixed substrata; and
- *Mytilus edulis* beds on eulittoral mixed substrata.

As part of the EIA for the first phase of work at the Port of Mostyn (AERC 1994), an invertebrate survey was undertaken for the intertidal areas around the port. Five samples stations were selected, with two samples taken at each station, all on the Welsh shore of the estuary from the port foreshore up to the lower shore off the coast of Talacre, over three kilometres away.

The most widespread species in the survey were the bivalve *Macoma balthica,* the polychaete worm *Eteone flava* and Enchytraeids, found at all five of the survey stations. *Corophium volutator* and Enchytraeids were the most abundant species found, with some samples containing over 200,000 per m^2 of *Corophium volutator*. Areas of upper shore contained greater densities of species than areas of lower shore, possibly because of higher levels of organic matter (AERC, 1994).

The highest species diversity was found midshore just to the west of the port with 14 species recorded from the site. Ten species were found on the lower shore at Mostyn Bank, which contained very high abundance of the amphipod *Corophium volutator.* This work supports other studies (AERC, 1994; YA, 2002b) which suggest that the area of flats between the Port of Mostyn and Point of Ayr contains one of the largest concentrations of invertebrates in the estuary. The common cockle *Cerastoderma edule* was recorded from three sites including Mostyn Bank and is considered an important species in the estuary. EAW undertake annual monitoring to assess the cockle stocks in the Dee Estuary and in 2008 the Dee Estuary Cockle Fishery Order was introduced allowing limited licensed cockle fishing, with some evidence that such regulation is allowing stocks to increase (Wirrel News July 15th 2009). Monitoring suggests that cockle beds are widely distributed across the estuary, including beds at Mostyn Bank and Salisbury Bank, but that densities of cockles within the beds are low.

Further monitoring was carried out on Mostyn Bank and at Warwick Foreshore, to the south east of Mostyn Dock in 2001 (YA, 2001). The results are given in *Table 4.13* showing high abundances of oligochaete worms, amphipods *(Gammarus* and *Corophium)* and gastropod molluscs *(Hydrobia).*

Table 4.13 Intertidal Infaunal Sampling on Mostyn Bank and Warwick Foreshore (individuals per m²)

Species	Mostyn Bank		Warwick Foreshore	
	Upper shore	Middle shore	Upper shore	Lower shore
Eteone longa	77	0	26	51
Hediste diversicolor	357	204	740	
Pygospio elegans	51	332	638	281
Streblospio shrubsolii	0	26	0	0
Oligochaeta spp.	12,674	99,833	92,285	791
Corophium volutator	128	2,066	2,882	51
Gammarus zaddachi	1,046	230	765	944
Hydrobia ulvae	20,349	8,696	10,073	77
Macoma balthica	357	204	26	0
Mytilus edulis	77	153	332	26
Mysella bidentata	0	153	102	0
Scrobicularia plana	77	714	102	0
Tellinacea spp.	26	0	434	0
Total Macroinfauna	**35,445**	**112,710**	**108,503**	**2,219**

(Source: YA, 2001)

A recent survey of the intertidal sand and mud flats was undertaken by ABPmer as part of Monitoring Plan (ABPmer, 2007) for the 2005 to 2007 dredging consent. Sampling was carried out at 41 sites along five transects in the estuary, and counts were made of species diversity and abundance. The presence and size of cockles in any samples was also recorded. These results present a similar picture to the previous monitoring work described above, with high levels of *Hydrobia ulvae* and *Corophium volutator* found on Mostyn Bank. Although the species diversity is not especially high, species abundances can be very high. These high abundances of invertebrates provide a rich source of food for many bird species.

As part of the surveys undertaken by ABPmer in 2005 and 2006, particle size analysis was carried out for each sample. Results from the 2006 survey were compared with the 2005 results. Results showed that the broad surface sediment characteristics across the survey sites were the same in 2006 as they had been in 2005. The most notable change was that the upper and middle shores of Mostyn Bank and the western section of Salisbury Bank were coarser in 2006 than in 2005, and that some samples from Salisbury Bank which had been composed of sand in 2005 now had some silt. However there were no visible changes in the substratum and there was no evidence of any adverse ecological change (ABPmer 2007).

As part of the ongoing monitoring of dredging ABPmer recently produced a report of survey work undertaken in May 2009. The findings indicate few changes in the distribution, composition and densities of invertebrates, and across the sample area benthic communities remain high, although on the Mostyn Bank density tends to be at the expense of diversity.

Table 4.11 ABPmer Survey of Area to be Infilled

TAXON	TAXON Qualifier	001	002	003	004	005	006	007
NEMATODA			1		1	1	20	816
Pholoe inornata					1			
Eteone flava	sp. aggregate							2
Anaitides mucosa								1
Nephtys	juv.			2		1	2	
Nephtys hombergii		7		13	17	1	13	
Streblospio shrubsolii				3	5		3	1
Tharyx	sp. A	1		1				
Capitella capitata			3				1	197
Heterochaeta costata								26
Tubificoides benedii			2		2		4	215
Tubificoides pseudogaster	sp. aggregate							19
Enchytraeidae								181
Elminius modestus								5
Corophium volutator							1	92
Anurida maritima		2	2	3		2		
DIPTERA	Larvae							1
Chironomidae	Larvae					1		
Hydrobia ulvae		1		1				1
Mytilus edulis	juv.	14	1	4	12	8	4	6
Mysella bidentata		1						
Semelidae	juv.			3		1		3
Pholadinae	juv.	1						
	Total Abundance	27	9	30	38	15	48	1566
	Number of Species	7	5	8	6	7	8	15

Samples 1-6 were undertaken from a RIB using a trawl, whilst station 7 was the nearest to the breakwater (station 1 being the furthest) and a core sample was used (1) (See *Annex G* for details).

Although limited in nature the benthic survey undertaken by ABPmer confirms previous sampling (see Annex C2 in ERM 2007), and is reflected in the low numbers of birds counted in the harbour area both during the Young Associates study and subsequently. The regular disturbance to sediments from ship movements will make this a challenging environment for benthic fauna.

Saltmarsh Habitats - Salicornia and Other Annuals and Atlantic Saltmeadow

Saltmarsh accounts for approximately 2,480 ha of habitat in the Dee Estuary, which is approximately 7% of the UK total for this habitat (EN & CCW, 2004). The pioneer saltmarsh community is dominated by *Salicornia sp.* (glasswort) and other colonising annuals such as annual *Suaeda maritima* (sea-blite) and accounts for over 4% of the British total of this habitat. Typical saltmarsh zonation in the estuary runs from *Salicornia* to a low saltmarsh common cord grass *Spartina anglica* (common cord grass) zone to a *Puccinellia maritima* (saltmarsh grass) low-mid marsh zone, with a *Festuca rubra* (red fescue) dominated mid-to-upper marsh vegetation zone. *Aster tripolium* (sea aster)

(1) Using a 0.007m2 hand core and Van Veen grab with a volume of 0.0038m2 and a surface area of 0.044m2

forms an important component of most of the habitat subdivisions in the middle and upper zones. Most areas of saltmarsh are grazed although some parts of the northern (English) shore of the estuary remain ungrazed. These areas of saltmarsh are structurally complex and contain a number of rare and scarce plant species, such as the nationally rare *Bupleurum tenuissimum (s*lender hare's ear).

The majority of the salmarsh is found towards the head of the Dee Estuary, and is more prevalent on the English shore, away from the main channel, although small areas exist along the Welsh shore up to Greenfield, with an isolated area at Point of Ayr

Although not especially species rich, the saltmarsh provides an important habitat for roosting waders and other birds due in part to its isolation and also because it provides unrestricted views of any approaching threat. The saltmarsh vegetation also provides an important food source for birds, with vegetation and seeds being taken.

Within the SCI, saltmarsh is divided up into two main community types, the *Salicornia* and other annuals colonising mud and sand pioneer community and the Atlantic salt meadow (*Glauco-Puccinellietalia maritima*) community.

Salicornia and other annuals colonising mud and sand. This habitat forms as the pioneer saltmarsh vegetation colonising intertidal mud and sand flats in areas protected from strong wave action, with frequent inundation by sea water. On the Dee Estuary the annual glasswort *Salicornia* (SM8)(1) community is the dominant pioneer salt marsh community. *Salicornia sp.* is the dominant plants with other important components of the community being *Spartina anglica*, and *Puccinella maritime.* The majority of the *Salicornia* community in the Dee Estuary is found on high intertidal mud towards the head of the estuary on the English shore, shown in *Figure 4.11.*

A count of saltmarsh community types in 2000 recorded 105 ha of *Salicornia* habitat in the Dee Estuary. This represents around 4% of the national UK resource for this feature (Dargie, 2001; EN & CCW, 2004). The pioneering nature of this habitat and the accreting behaviour of the Dee Estuary mean that the distribution of this habitat is increasing as new areas of mud and sand flats develop and are colonised as evidenced by repeated surveys of sea bed levels in 2003, 2006 and 2009 (see *Chapter 3* for details).

Atlantic salt meadows (*Glauco-Puccinellia maritima*) community. This vegetation community forms the middle and upper reaches of saltmarshes, in areas which receive less frequent inundation by the sea. The Atlantic salt meadow habitat in the Dee Estuary can be divided into three subfeatures. A low to mid marsh community exists typified by *Puccinellia maritima* (common saltmarsh grass) and *Atriplex portulacoides* (sea purslane), a mid to upper

(1) National Vegetation Community (NVC) type from British Plant Communities Volume 5 Maritime Communities and vegetation of open habitats edited by J.S.Rowell

marsh community dominated by *Festuca rubra* (red fescue), *Puccinellia maritima* and *Glaux maritima (*sea milkwort), and a transitional community between saltmarsh and freshwater marsh featuring *Bolboshoenus maritimus* (sea club-rush) and *Elytrigia atherica* (sea couch). In total 31 saltmarsh sub-communities have been recorded within the Atlantic salt meadow habitat, accounting for approximately 2,040 ha of Atlantic salt meadow in the Dee Estuary.

Two nationally scarce species occur within the transitional communities, *Bupleurum tenuissimum* and seaside centaury *Centaurium littorale* (seaside centaury) (Dargie, 2001; EN & CCW, 2004). Atlantic saltmeadow forms higher in the saltmarsh in areas of less frequent inundation near the head of the Dee Estuary, shown in *Figure 4.11*.

Annual Vegetation of Drift Lines

The annual vegetation of drift lines communities (NVC communities SD2 and SD3) are made up of annuals or annuals and perennials growing on gravel rich in nitrogenous organic matter derived from drift material. Typical species of this type of plant community are *Honkenya peloides* (sea sandwort), *Matricaria maritime* (scentless chamomile) and *Cakile maritima (*sea rocket). The dynamic nature of the substrate on which this community type grows means that although widespread, persistent areas of it are rare (EN & CCW, 2004).

In the Dee Estuary there are approximately 1.3 ha of strandline vegetation, the majority found on the coast at Gronant, (approximately 5 km from the project area), with small sections at Pen-y-ffordd on the Welsh shore (approximately 1.5 km from the project area) and on the English shore by Heswall (approximately 8 km away).

Lamprey Species – Sea Lamprey and River Lamprey

Lamprey is a very primitive type of jawless fish. All UK species of lamprey are protected under *Annex II* of the Habitats Directive. Two species of lamprey, the river lamprey *Lampetra fluviatilis* and the sea lamprey *Petromyzon marinus* are found in the River Dee and Dee Estuary (Aquatic Management Services, 2002a and 2002b). Both species spawn in gravel beds in the River Dee. The larvae, known as ammocoetes, develop and grow in sediment banks in fresh water rivers before migrating down stream. Both species are parasitic, attaching themselves to other fish and feeding on their host's blood and muscle tissue.

River lamprey is known to congregate in estuaries and feed on estuarine fish. Sea lamprey migrate further out to sea and grow to maturity offshore before returning to freshwater to spawn. Sea lamprey primarily migrate back to spawning grounds in May and June, while river lamprey can be found in the estuary all year and migrate upstream in either March-April or August-November.

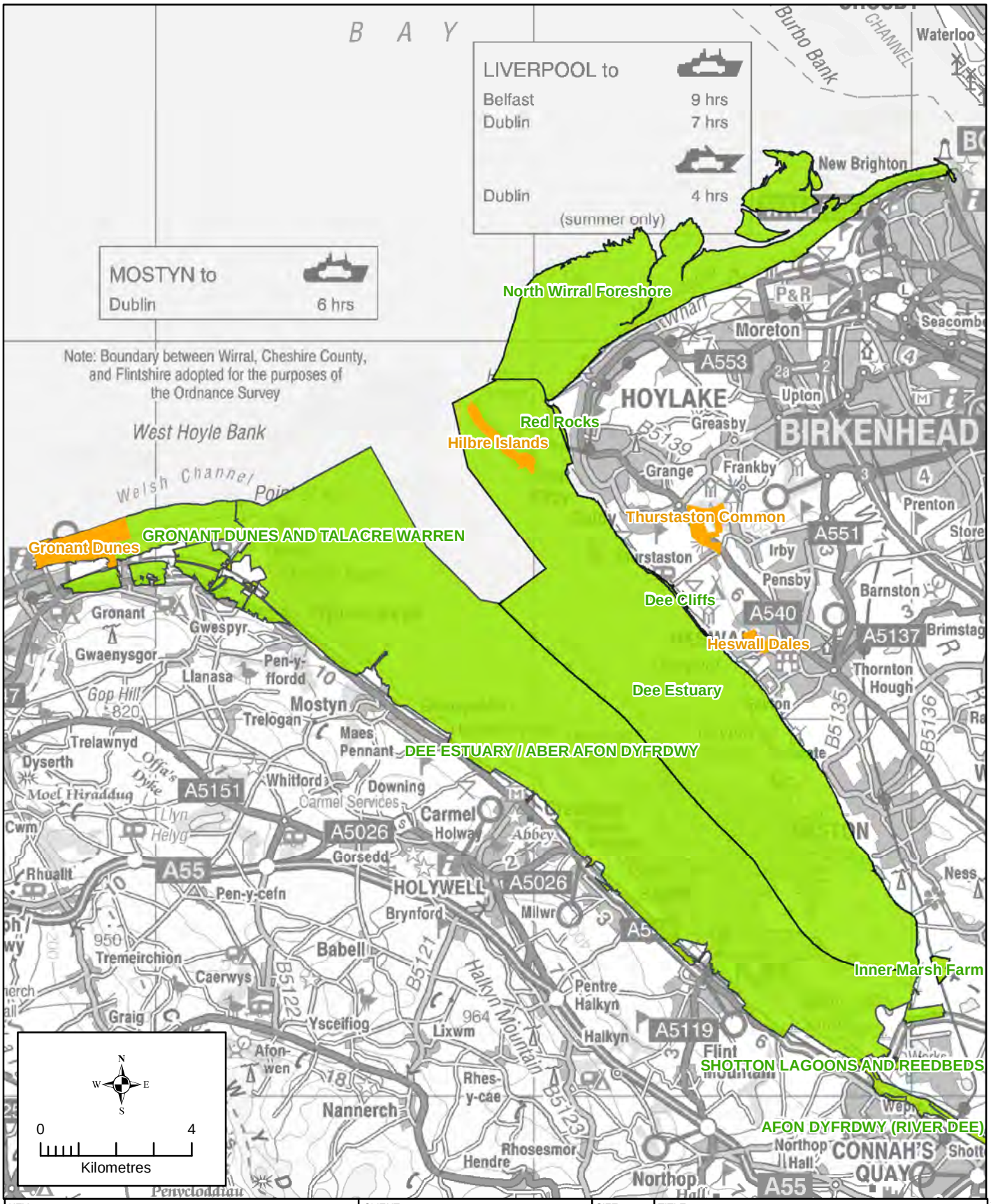
Counts of the two lamprey species are made each year at the Chester weir fish trap on the Dee Estuary. Five year mean counts (2002-2006) for river lamprey are 385.2 and for sea lamprey are 36 (*pers comm.* Richard Cove EAW, 2007).

The Dee Estuary SSSI

The Dee Estuary SSSI is shown in *Figure 4.12.* It has been designated for the following interest features (see *Annex E* for full citation):

- total populations of internationally important wintering wildfowl;
- populations of individual waterfowl and tern species whose numbers reach nationally/internationally important levels;
- areas of intertidal mud and sandflats;
- saltmarsh and transitional habitats including swamp vegetation;
- the hard rocky sandstone cliffs of Hilbre Island and Middle Eye and associated vegetation communities;
- assemblage of nationally scare plants including *Euphorbia portlandica* (Portland spurge), *Marrubium vulgare* (white horehound) and *Verbascum lychnitis* (white mullein), *Bupleurum tenuissimum* and *Blysmus rufus* (saltmarsh flat-sedge);
- large herd of grey seal which haul out at West Hoyle Bank;
- the population of the anadromous fish smelt (*Osmerus eperlanus*); and
- a population of sandhill rustic moth (*Luperina nickerlii gueneei*).

Condition monitoring of the Dee Estuary SSSI shows that 30% of the site is in favourable condition, with 70% in unfavourable condition but recovering (NE Website, 2007).



KEY:
- Local Nature Reserve
- SSSI

CLIENT: Port of Mostyn

SIZE: A4

TITLE: Figure 4.12 National Designations in and around the Dee Estuary

ERM
Norloch House
36 King's Stables Road
Edinburgh, EH1 2EU
Tel: 0131 478 6000
Fax: 0131 487 3636

DATE: 17/12/2009 | CHECKED: SO | PROJECT: 0107468

DRAWN: JJH | APPROVED: AD | SCALE: 1:140,000

PROJECTION: British National Grid

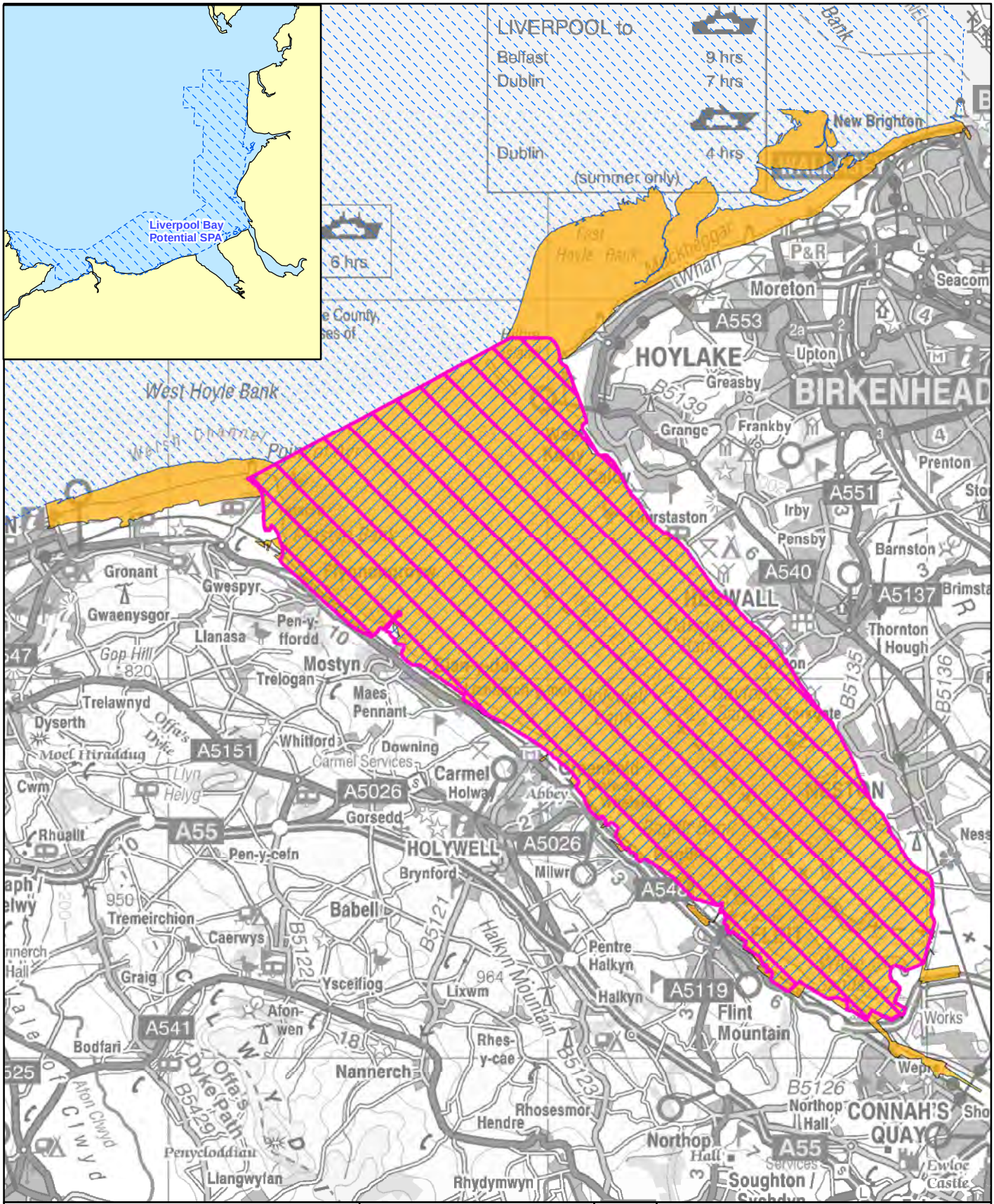
DRAWING: National_Designations.mxd

REV: 0

File: 0107468_PoM_JH_SM\MAPS\National_Designations.mxd

Statutory Designated Sites around the Dee Estuary

Ten other sites around the Dee Estuary are designated for their nature conservation interest. These are shown in *Table 4.15* and in *Figure 4.13.*



KEY:

- Ramsar
- Potential Special Protection Area
- Special Protection Area
- Special Area of Conservation

CLIENT: Port of Mostyn

SIZE: A4

TITLE: Figure 4.13
International Designations in and around the Dee Estuary

ERM
Norloch House
36 King's Stables Road
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Tel: 0131 478 6000
Fax: 0131 656 5813

ERM

DATE: 17/12/2009	CHECKED: SO	PROJECT: 0107468
DRAWN: JJH	APPROVED: AD	SCALE: 1:140,000

PROJECTION: British National Grid

DRAWING: IntDesignations.mxd

REV: 0

File: 0107468_PoM_JH_SMMAPS\IntDesignations.mxd

Table 4.15 Other Designated Sites in the Vicinity of the Project Area

Site	Grid Reference	Distance from project area (km)
River Dee and Bala Lake (SAC & SSSI). The River Dee and Bala Lake SAC extends from Shotton near the head of the Dee Estuary up to the head waters of the river in the South Clwyd Mountains. The SAC has been designated primarily for its *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation and its populations of Atlantic salmon (*Salmo salar*) and floating water plantain, as well as populations of lamprey, bullhead (*Cotus gobio*) and otter (*Lutra lutra*). Both salmon and lamprey are migratory and depend on the Dee Estuary for access to the sea.	SJ 423 503	12
Liverpool Bay Potential Marine SPA. The Liverpool Bay Proposed Marine SPA abuts the Dee Estuary SPA at the mouth of the estuary, and covers most of Liverpool Bay. The site has been proposed as a Marine SPA because it regularly supports nationally important populations (greater than 1% of the Great Britain population) of red throated diver (*Gavia stellata*) and common scoter (*Melanitta nigra*).	SJ 123 922	4.5
Mersey Narrows and North Wirral Foreshore (potential SPA). The Mersey Narrows and North Wirral Foreshore SPA lies adjacent to the Dee Estuary SPA at the mouth of the estuary and continues along the North Wirral coast and into the Mersey Narrows, over lapping the Dee Estuary pSAC on the North Wirral foreshore, and containing the North Wirral Foreshore SSSI. It has been designated as an SPA because of its internationally important populations of redshank and turnstone, and because it regularly supports an assemblage of more than 20,000 waterfowl.	SJ 250 920	6
Gronant Dunes and Talacre Warren (SSSI & LNR). Gronant Dunes was designated as a SSSI due to its high quality dune habitat and breeding colony of little tern. Pools in dune slacks also support a breeding population of natterjack toad (1).	SJ 100 847	6
North Wirral Foreshore (SSSI). The North Wirral Foreshore SSSI lies adjacent the Dee Estuary SSSI, extending around onto the Wirral coast to the north east. The site consists of large expanses of mud and sand flats and provides feeding and roosting sites for large assemblages of wintering birds.	SJ 250 920	6
Red Rocks (SSSI). The Red Rocks site has been designated as a SSSI because it contains a typical example of a sand dune system, including brackish dune slacks and a reedbed. This type of habitat is especially uncommon on this stretch of coast. The site is also important for wintering birds, with over 200 species recorded from the site, and provides a breeding ground for natterjack toad.	SJ 207 878	8
Dee Cliffs (SSSI). Dee Cliffs has been designated as a SSSI for its varied flora and fauna and because it represents the best example of clay cliff and bank habitat in Merseyside.	SJ 238 832	9

(1) This species is protected under *Schedule 5* of the *Wildlife and Countryside Act, 1981* as amended.

Inner Marsh Farm SSSI. Inner Marsh Farm SSSI was designated in 1998 for its ornithological interest, especially for its wintering and summering birds. It provides an important area for birds from the nearby Dee Estuary to roost and feed at high tide and is run by the RSPB as a nature reserve.	SJ290750	15
Shotton Lagoons and Reedbed (SSSI) Shotton Lagoons and Reedbed were designated as a SSSI in 1999 because of their internationally important breeding colony of common tern and *Phragmites* swamp vegetation. The site lies to the south east of the head of the estuary but forms a part of the SPA.	SJ298709	15
Hilbre Islands (LNR). The Hilbre Islands at the east side of the mouth of the estuary are included in the Dee Estuary SSSI but are also designated as a LNR. Hilbre Islands LNR was designated in 1983 and is an important site for migrating birds, its seal colony and its cliff top flora which is scarce in the Mersey area.	SJ 187 879	6

Sensitive Marine Areas (SMAs) are non-statutory marine areas, identified by Natural England, notable for their marine animal and plant communities or which provide ecological support to adjacent statutory sites (JNCC, Website) (1). The Dee Estuary and North Wirral Foreshore are designated as one of 27 SMAs in the UK. The status of an SMA does not incur any specific protection to a site but is aimed at raising awareness of the importance of the sites and promoting dissemination of information to be used in estuarine and coastal management planning.

Other Species and Habitats of Note

The Cheshire Region and Flintshire Biodiversity Partnerships have prepared action plans to reflect the aims and objectives of national plans for habitats and species found in the Dee Estuary.

Local Biodiversity Action Plans (LBAPs) have been included in the Cheshire Region Biodiversity Action Plan (BAP) for the following species found in the Dee Estuary:

- natterjack toad;
- allis and twaite shad;
- Atlantic grey seal; and
- small cetaceans including harbour porpoise.

LBAPs have been included in the Cheshire Region BAP for the following habitats found in the Dee Estuary:

- coastal floodplain and grazing marsh;
- coastal saltmarsh;

(1)http://www.jncc.gov.uk/page-4

- coastal sand dune; and
- mudflats.

LBAPs have been included in the Flintshire BAP for the following species found in the Dee Estuary:

- sandhill rustic moth.

LBAPs have been included in the Flintshire BAP for the following habitat found in the Dee Estuary:

- sand dunes and strandlines.

Eight coastal UK or Welsh BAP habitats have been identified in the Port of Mostyn area as follows:

- coastal and flood plain grazing marsh;
- coastal saltmarsh;
- coastal sand dunes;
- coastal vegetated shingle;
- estuarine rocky habitats;
- intertidal mudflats;
- *Sabellaria alveolata* reefs; and
- subtidal sands and gravels.

Coastal and flood plain grazing marsh is unlikely to be affected by the proposal and so has not been considered further in this baseline. Many of the habitats and species have already been addressed earlier in this chapter and only those that have not been are discussed below.

Coastal sand dune habitats of ecological or nature conservation value around the Dee Estuary include two dune systems of note, contained within Red Rocks SSSI, and Gronant Dunes and Talacre Warren SSSI.

Red Rocks SSSI and Gronant Dunes and Talacre Warren SSSI occupy positions on the north and south banks respectively at the mouth of the estuary. Red Rocks SSSI is noted for its populations of the endangered natterjack toad and its reedbed habitat. Gronant Dunes and Talacre Warren SSSI is important for its populations of rare and Red Data Book species of invertebrates as well as for its botanical and ornithological interest, with shingle spits at Gronant supporting nationally important numbers of breeding little tern.

A list of the UK or Welsh BAP priority species listed in the UKBAP website that that are found in the Dee Estuary and may be affected by the proposals is given in *Table 4.16*.

Table 4.16 UKBAP Priority Species Found in the Dee Estuary

UKBAP Species	Common Name	Comments
Migratory Fish		
Alosa alosa	Allis shad	Occurs along the west coast of Europe, and in the lower reaches of a few large UK rivers.
Alosa fallax	Twaite shad	Occurs along west coast of Europe, and in the lower reaches of a few large UK rivers.
Lampetra fluviatilis	River lamprey	Records from fish trap at Chester Weir, feature of pSAC.
Osmerus eperlanus	Smelt	Diadromous fish, know to be present in the Dee Estuary, feature of SSSI.
Petromyxon narinus	Sea lamprey	Records from fish trap at Chester Weir, feature of pSAC.
Salmo salar	Atlantic salmon	Known to migrate through the Dee Estuary to spawning grounds in River Dee.
Marine Fish		
Clupea harengus	Herring	Spawn in Liverpool Bay and use the Dee Estuary as a nursery.
Dipturis batis	Common skate	Widespread but rare species found in coastal waters.
Gadus morhua	Cod	Spawns in Liverpool Bay, some fish known to occur in the Dee Estuary.
Galeorhinus galeus	Tope shark	A widespread species of shark found in continental shelf and coastal waters.
Merlanguis merlangus	Whiting	Spawn in the Liverpool Bay area and found in the Dee Estuary.
Pleuronectes pletassa	Plaice	Some localised UK stocks are in danger of collapse from overfishing. Use Dee Estuary as a nursery.
Scomber scombrus	Mackerel	Found in Liverpool Bay.
Solea solea	Sole	Spawn in Liverpool Bay and use the Dee Estuary as a nursery.
Marine Mammals		
Phocoena phocoena	Harbour porpoise	Evidence of decline since 1940, records of sightings from Hilbre Island.
Birds		
Aythya marila	Greater scaup	Over winters in the outer Dee Estuary
Cygnus collumbianus subsp. bewickii	Tundra (Bewick's) swan	Over winters in the Dee Estuary
Larus agentus susp. argentus	Herring gull	Found in the Dee Estuary all year.
Limosa limosa subsp. limosa	Black-tailed godwit	Overwinters in large numbers, as well as resident summer population.
Melanita nigra	Common scoter	Over winters in the outer Dee Estuary
Numenius arquata	Eurasian curlew	Returns to Dee Estuary to moult from breeding areas in the Autumn.
Vanellus vanellus	Lapwing	Found predominantly in the saltmarsh areas of the Dee Estuary.
Plants		
Bupuleurum tenuissimum	Slender hare's ear	Recorded from areas of saltmarsh in the Dee Estuary.

Marine Mammals

The harbour porpoise is protected under the *Wildlife and Countryside Act 1981* (as amended) and the *Conservation (Natural Habitats, &c) Regulations 1994* (as amended), which make it an offence to take, injure or kill this species.

Additionally, it is an offence to disturb them in their place of rest, shelter or protection. Harbour porpoise is also an UKBAP species. Grey and harbour seals are listed in *Annex II* of the Habitats Directive and are therefore protected from disturbance within sites designated for their protection.

The harbour porpoise is the most widespread and abundant cetacean within UK waters. It is a largely coastal species, more abundant in near shore waters during summer, and usually seen singly or in groups of two to five. Small numbers have been recorded close to Hilbre Island (Reid *et al,* 2003).

Hilbre Island and West Hoyle Bank, both located at the mouth of the estuary off the English shore, support a large colony of over 500 grey seals. Grey seals do not breed at these sites however, returning to breeding rookeries either off the Pembrokeshire or south-west coast of Scotland. Radar tagging studies have shown that outside of the breeding season however seals from the Hilbre Island and West Hoyle Bank colony forage almost exclusively within the Irish Sea area, occasionally entering the Dee Estuary (Hammond *et al,* 2005).

Harbour seals are less common in the Irish Sea than grey seals and there are no known haul out spots from the southern Irish Sea or the Dee Estuary, although they may occasionally be present in the area.

4.3 POTENTIAL IMPACTS

Full details of the proposal are given in *Chapter 2*, and interactions with environmental receptors are anticipated both during the construction of the berth and its operation.

The scoping report identified the following potential impacts that may occur as a result of the proposals:

- direct loss of estuary habitat;
- loss of bird feeding habitat and bird food resource;
- disturbance during construction to waders roosting / loafing on the breakwater, and using the adjacent mudflats predominantly for feeding; disturbance could be caused by visual and noise effects including:
  - people on site and on mudflats;
  - plant movements;
  - lighting; and
  - piling activity.
- disturbance to waders using the breakwater and adjacent mudflats during operation of the new berth; for example;
  - loading and unloading of vessels;
  - crane movements and stacking of turbines vertically;
  - use of trailer park as a laydown area for turbine components;

- intermittent movements of very large structures and people;
- vehicle and plant movement including maintenance works; and
- vessel movements.

- cumulative impacts of the development with other port activities including dredging of the port approach channel.

In addition to the above formal responses to the scoping report, the Marine and Fisheries Agency (MFA) and the Royal Society for the Protection of Birds (RSPB) suggested that the following issues be addressed:

- permanent loss of 50,000 m^3 of sediment from the estuary through use as infill and potential impact this may have on coastal processes, cockle beds and other intertidal habitats; and
- cumulative impacts with none port related developments (*eg* coastal path/ cycle route proposals, wildfowling).

4.4 PERMANENT IMPACTS

4.4.1 Direct Loss of Estuary Habitat

The infilled area behind the quay wall will result in the reclamation of just under a hectare (9,669 m^2) of estuary below high water including approximately 4,248 m^2 (just under half a hectare) of intertidal area and 5,421 m^2 (just over half a hectare) of subtidal area, although as part of a dynamic system, these areas will change over time. This area has been restricted to the minimum required for the modification to minimise habitat loss. The majority of this area is tipped slag deposits with only a small area of sand and silt substrate. Of the total area of reclamation proposed, about half a hectare is within the area that received development consent as part of the port expansion in 1995; about 50% of this area is intertidal and 50% is subtidal. The loss of this habitat should be considered in the context of an accreting estuary taking in approximately 1.0 million m^3 between 2003 and 2006 and 800,000 m3 between 2006 and 2009 (see *Chapter 3*; ERM, 2007 and HR Wallingford, 2007 and 2009). It is also relevant to point out that the change in Port operations since 2000 (closure of the NAABSA berth) has resulted in accretion of the Mostyn Gutter providing approximately 5000 m^2 of additional inter-tidal zone.

Data from the benthic surveys indicates that the habitat in the area to be infilled is species poor compared with surrounding areas. This is probably due to long usage of the area as a port and the associated physical disturbance from vessel movements and propwash. The species which will be lost are also abundant and commonly distributed throughout the estuary. Repeated ornithological surveys between 1997 and 2003 (Young Associates, 2003) recorded little use of the areas to be lost by feeding birds.

However, more recent surveys by ABPmer (2009) commissioned for this study did find small numbers of turnstone (range 2-9 birds) and oystercatcher (range 6-10) occasionally feeding and loafing in Area 4 of the breakwater (see *Photograph 4.1* below), but there was no evidence of usage of Area 5 being used by anything other than the occasional herring gull. Additional birds were found feeding in Area 6 and in Area 2, but these areas will not be directly affected by the proposals, and disturbance impacts on these birds is assessed in *Section 4.7*.

Photo 4.1 Habitat Around Breakwater Showing Feeding Turnstones

Observations during the surveys indicated that the turnstones and oystercatchers in Area 4 were only feeding on the rocks (and not the mudflats) at lower tidal states on mussels, barnacles and fucoid seaweeds (brown seaweeds), which have established on the artificially created rocky substrate created by the breakwater.

The number of oystercatcher involved is insignificant (0.045% of the SPA population), and as the MFA report (MFA Ref DC 6835) indicates, cockle stocks >15 mm are significantly higher (23.500 tonnes) than the estimated requirements of the SPA oystercatcher population (estimated as requiring 4,600 tonnes to be maintained). Therefore displacement of such small numbers of oystercatchers is unlikely to lead to increased mortality.

Although the number of turnstone involved is low, it still represents up to 1.8% of the Dee Estuary Ramsar population feeding within the area to be permanently lost. Turnstone are not cited as an SPA qualifying species, but are listed specifically on the Ramsar citation [(1)] . Port of Mostyn is also the best site for turnstone on the Welsh side of the Dee Estuary (CCW *in litt)*. WeBS data has shown that both nationally and on the Dee Estuary, populations of turnstones have declined. It has been suggested that these declines may be in

(1) http://www.jncc.gov.uk/pdf/RIS/UK11082.pdf

response to climate factors, and that populations are likely to continue to fall in the medium to long term (Rehfisch *et al*, 2004).

There is similar habitat both on the north western part of the breakwater and along the Mostyn Dock foreshore area, that has in recent history supported higher numbers of turnstones than are currently present. However, there remains some uncertainty about why numbers have declined in these areas. As the mussels, barnacles and scattered fucoids have established on man made structures, it would be possible to recreate similar habitat in the vicinity. So although alternative habitat is available and appears to be underutilised, the Port will create additional habitat similar to that which will be lost to address the uncertainty (see *Section 4.8 Mitigation Measures)*. Significant impacts from the displacement of turnstones of the Dee Estuary Ramsar site are therefore, not predicted from the proposals.

The Young Associates study concluded that the loss of the intertidal area during Phase 1 and Phase 2 of the previous port expansion had no significant impact on the qualifying species within the Dee Estuary as a whole, and that sufficient 'spare' capacity to absorb any birds displaced existed. Given the low usage of the small area mudflats to be lost and the paucity of benthic species, no significant impact on either invertebrate or bird populations is predicted.

4.4.2 Loss of Estuary Sediment to the Wider Estuary

The proposals will use 50,000 m^3 of sediment extracted from the estuary as infill material for the berth construction. This will result in the permanent loss of this material from the wider estuary, which could affect coastal processes, cockle beds and other intertidal habitats. The Dee Estuary is, however, a net importer of sediment taking in approximately 1.0 million m^3 between 2003 and 2006 (see *Chapter 3*; ERM, 2007 and HR Wallingford, 2007 and 2009). The removal of 50,000 m^3 for infill material will not be detectable against natural background fluctuations.

4.5 SHORT-TERM CONSTRUCTION IMPACTS

4.5.1 Construction Disturbance to Roosting and Feeding Waders

The construction of the new berths will take place over an eight month period and will entail a number of activities that have the potential to disturb birds as highlighted in *Section 4.4*.

The available information including surveys in November and December 2009 show that the habitats in areas surrounding the breakwater support important populations of feeding, roosting and loafing bird species (see *Section 4.27*) and could be subject to disturbance. For example the roost sites on or adjacent to the breakwater, identified in the Regulation 33 advice (EN & CCW, 2004) and WeBS sector counts, all support qualifying interest species of the SPA/

Ramsar site, including redshank, oystercatcher and turnstone. The Regulation 33 maps also indicate that pintail ducks (a qualifying SPA feature) have a high water loafing area between Mostyn Dock and Point of Ayr. Shelduck, knot, dunlin, redshank, curlew, oystercatcher and grey plover, all qualifying species, use Mostyn Bank and Salisbury Middle for feeding. The outer channel (Wild Road) is used by non-qualifying species that contribute to the overall assemblage (scaup, red-breasted merganser, and great crested grebe).

The effects of disturbance on birds is known to vary between species, with the type and intensity of the disturbance, and the extent to which the birds have become habituated to the disturbance source (*eg* passage birds are less likely to be habituated than overwintering birds), or during periods of severe weather when energy demands are highest. Evidence from other construction projects such as Cardiff Bay indicates that disturbance impacts some distance from the point source of the disturbance can be anticipated (Burton *et al* 2002, *pers comm* Nigel Clark, 2009). A review of studies on the effects of construction disturbance on birds provides more specific, empirically derived disturbance distances (IECS, 2008) [(1)]. The findings show that larger birds are more affected by disturbance, with unhabituated curlew being the most sensitive species, with alert effects exhibited at distance of approximately 275 m from the source of the disturbance.

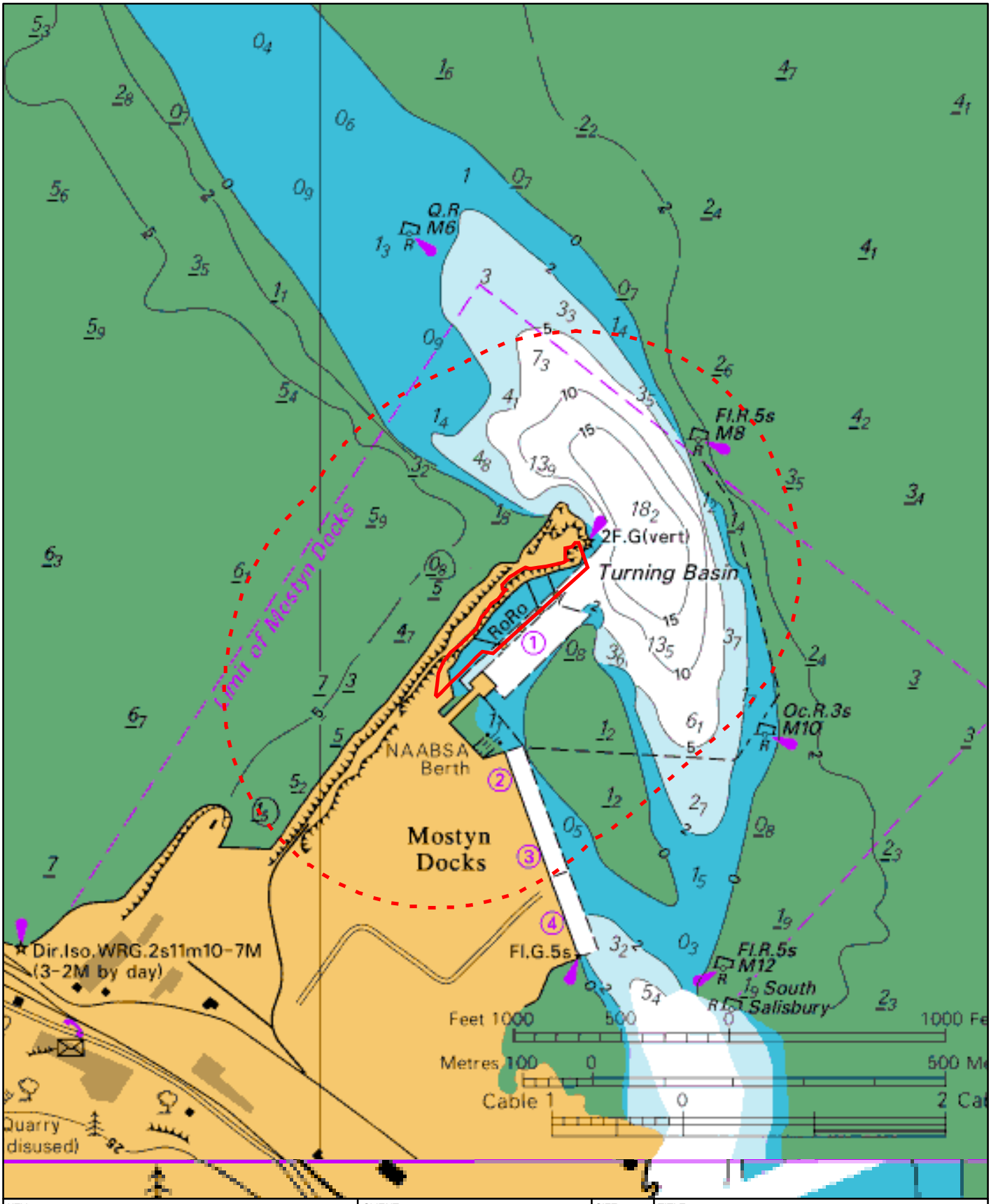
If birds are displaced by the construction works into habitats in the surrounding area, there is a risk that such displacement increases competition for food and roost space elsewhere within the Dee Estuary. However, evidence from research on redshanks displaced from Cardiff Bay, indicates it is the displaced population that bears these costs through decreased survival rates and poorer body condition (Burton *et al* 2006; Burton & Armitage, 2008). Hence the main effects of any displacement of birds due to due to disturbance are still on those birds displaced, and that is where this assessment is focused.

We have adopted a precautionary approach and have assessed impacts within 300 m zone of influence around the proposed work area (see *Figure 4.15*) within which qualifying species using these areas may be subject to disturbance. This zone of influence will include the full length of the breakwater and trailer park, and therefore there will already be disturbance from the existing port operations with this area; however, we have only reported those impacts over and above those resulting from existing port operations.

The 300 m zone of influence encompasses birds feeding and roosting on the breakwater and associated Mostyn Gutter (see *Section 4.2.7* and *Table 4.7*). In addition the small redshank roost (referred to the Young Associates report as Area E, see *Figure 4.10*) would also fall within the impact zone. This supports a roost of 225 redshanks (2.1%), probably including birds which were recorded at other times feeding in the Mostyn Gutter area. The roosts at the

(1) Cutts N, Phelps A &Burdon D (2008) *Construction and Waterfowl: Defining Sensitivity, Response, Impacts and Guidance.* Report to Humber INCA. IECS

disused tip to the west (YA Area H), and at Warwick International Foreshore (YA Area D), are unlikely to be affected as they lie outside the impact zone.



KEY:

Development Area

Development Area 300m Buffer

N
W E
S

0 200

Metres

CLIENT: Port of Mostyn

SIZE: A4

TITLE: Figure 4.14
Impact Zone

ERM
Norloch House
36 King's Stables Road
Edinburgh, EH1 2EU
Tel: 0131 478 6000
Fax: 0131 656 5813

ERM

DATE: 17/12/2009	CHECKED: SO	PROJECT: 0107468
DRAWN: JJH	APPROVED:AD	SCALE: 1:7,500

PROJECTION: WGS 1984 UTM Zone 30N

DRAWING: ImpactZone.mxd

REV: 0

File: 0107468_PoM_JH_SMMAPS\ImpactZone.mxd

Low water counts (RSPB WeBS data and APBMer, 2009) relating to the development site indicate significant proportions of some qualifying bird populations present (see *Section 4.2.7)* but those noted for the Mostyn Dock Shore area also feed on the opposite shore on the extensive cockle beds at Salisbury Middle. As noted previously, cockle populations are believed to be well above the level necessary to sustain existing the populations of oystercatchers, and food is not believed to a be a limiting factor for knot populations (MFA, 2008), a species which has been recorded in important in WeBS Sector W3, although not on or adjacent to the proposed development site.

Only a small proportion of Salisbury Middle lies within the disturbance zone. The presence of the river channel, separating the bird populations from disturbance at the proposed development site is likely to reduce such impacts further (IECS, 2008). In addition birds are habituated to regular vessel movements in this channel (Young Associates, 2003) and consequently no impact on Salisbury Middle is predicted.

Birds feeding on Mostyn Bank (WeBS count section Ffynongroyw) include some of those recorded around Mostyn Gutter, and discussions with field surveyors indicate that at low water birds are spread along the tide line. At low water there is a movement of some birds from Mostyn Bank onto Salisbury Middle. However, it is likely that the populations of birds observed using the breakwater and Mostyn Gutter are those most at risk of disturbance effects. Surveys have shown that the Mostyn Gutter supports 1.1% of the SPA redshank, 1.2% of oystercatcher and up to 6.3% of turnstone.

The elements of construction that may have disturbance impacts were identified in *Section 4.4* and are effects are discussed below.

Piling

Piling is anticipated for approximately 12 weeks of the construction phase. This will have an effect on the benthic fauna due to trauma through shock resulting from the pressure generated by driving in the sheet piles, and settling out of disturbed sediment. *Chapter 3* demonstrates that sediment is unlikely to have an effect beyond 100 m. Trauma impacts will occur in an area of low invertebrate diversity and density. The benthic communities impacted are common, widespread and quick to recover. The piling will retain the sediment and slate infill thereby preventing any significant impacts arising from the fill material. Impacts will therefore be localised and not significant.

Disturbance effects on birds can be anticipated within the impact zone, with the greatest disturbance effects arising from intermittent and loud (greater than 70 dB) piling operations. Piling is likely to displace bird populations within the impact zone, although studies indicate progressive habituation by the birds to the piling can occur (ICES, 2008). The use of vibro-piling for over 50% of the operation will assist in reducing noise impacts.

People

The presence of people can be one of the main sources of disturbance to birds. However, the numbers of construction workers will be low, with a construction workforce of only eight people. Most construction activities will take place along the berth line rather than the breakwater. The sequence of piling will be to commence at the North end of the Breakwater and work inwards to minimise, and possibly avoid altogether, disturbance during Winter months The programme will show substantial completion of the works by the end of October (assuming a consent in time for an April start).

Birds within the areas to be permanently lost will be displaced by the works. Some disturbance to bird species using the adjacent habitats including mudflats to the west will result, although avoiding non-essential human activity on the western side of the breakwater will assist in reducing such impacts (see *Section 4.8 Mitigation Measures*). Existing construction offices and other facilities already located inland in the Port will be used, and no new facilities will be required. Hence no disturbance to birds will occur.

Plant Movement

Large vehicle movements have been shown to have limited disturbance impacts (IECS, 2008), and these are likely to be the least disturbing element of the construction process. There is some evidence that tall crane operations can cause limited disturbance to birds in the upper shore zone (IECS, 1999).

Lighting

The Port is already lit including on the proposed development site. Any additional lighting of the construction works areas will be controlled and directed to avoid excessive spillage onto the adjacent mudflats. No significant impacts are predicted.

Summary of Construction Impacts

There is potential for construction to temporarily displace 1.1% of redshank, 1.2% of oystercatcher and up to 6.3% of the Dee Estuary's turnstone population and these are significant numbers. Some of the species involved, most notably turnstone and oystercatcher have higher tolerance limits of disturbance, with turnstone alert[1] distance at 47 m, and oystercatcher at about 115 m (IECS, 2008). The availability of safe alternative roosts sites nearby and the abundance of the food supply may also reduce the risk of impacts. There are alternative roost sites within 1 km of the impact zone for all three species. Continued invertebrate sampling (ABPmer, 2009), and data from the MFA all indicate healthy stocks of widely distributed prey items. The total extent of intertidal area available for feeding has also increased through a process of natural growth (APBmer 2003, 2006, 2009). Previous studies (Young

(1) [1] Distance at which more than 50% of the flock cease to feed and become alert.

Associates 2003) of construction and port operations also indicate that the bird populations are resistant to disturbance impacts.

4.6 *LONG TERM OPERATIONAL IMPACTS*

This section reports those impacts that are additional to the existing port operations, and it should be noted that the significant bird populations associated with the port rely to some extent on the habitats, particularly rocky shore surrogates, created by the port.

Port of Mostyn is currently involved, under its existing consents, in servicing the offshore wind farm industry. Consequently many of the operational impacts reported below (eg stacking and loading of turbines) already take place. The creation of the modified berth will allow an increase in the volume of such work and better utilisation of the Ro-Ro area. Therefore the impacts reported below largely relate to the increase in port activities that birds are already familiar with, in areas previously utilised for Ro-Ro operations and currently for servicing Airbus transport.

4.6.1 *Impacts on Birds*

Operational impacts may arise from harbour operations to service the renewables offshore wind industry, and in particular the construction of the Gwynt y Môr Offshore Wind Farm. Activities which could result in disturbance to birds are described in *Section 4.4*.

Lighting

Operational lighting at the new berths will be on a similar scale to that which currently exists, and there will be no change in the disturbance effects on birds. Hence this has not been considered further.

Turbine Handling

The stacking of sections of turbine towers both horizontally and vertically, and the loading of these items on and off vessels, necessitating the use of very large plant and cranes, will be a regular part of operations. They could, however, occur intermittently if poor weather restricts construction activities at sea on the wind farm. Impacts will be similar to those discussed in *Section 4.6* above. It should be noted that crane work and turbines movements all take place beyond the disturbance distance of any of the roosts. Variable responses to birds from crane activities have been reported (IECS, 1999 and 2008) with some effects to birds in the upper zone.

Shipping

Impacts at high water from shipping are likely to be limited to the new berth and approach, although it is possible that some maintenance work may occur to jack-up barges in the Mostyn Gutter area(see *Section 4.7.2),* and this may

disturb any birds roosting on the breakwater and at YA Area E). During the passage and particularly the winter period, regular disruption to high water roosts involving significant (ie over 1% of the qualifying feature) numbers of birds is therefore, possible. It is possible that the impacts may be reduced as a result of habituation by the birds (particularly turnstone), and from the fact that most shipping operations will take place further than the 47 m alert distance for this species. In addition the recent surveys by ABPMer recorded little response of the birds to boat movements.

Boats will not be present within the 250 m disturbance zone for redshank (IECS, 2008) using the roost at YA Area E (see *Section 4.8 Mitigation Measures*). Disturbance effects on this species may also be reduced by topographical features (ie the birds roost more at the base of the artificial habitat created) which provides some protection from visual stimulus. The extreme response of birds flying away usually requires close approach and high levels of perceived threat. It is unlikely therefore that redshank will leave the Young Associates Area E roost

Impacts at low water could be caused by disturbance to feeding waders and wildfowl on Mostyn Bank and Salisbury Middle by the passage of medium sized vessels. Work on the Orwell and Stour Estuaries (Ravenscroft *et al*, 2007) indicates that some disturbance is caused by vessels passing at low water, but this appears to be primarily due to the wash disturbing feeding birds. Such disturbance is likely to be short term and infrequent and Ravenscroft *et al* did not regard it has having a significant impact. Mostyn Gutter is a favoured feeding area for redshank in particular with up to 120 (1.1% of the SPA population) with lesser numbers of oystercatcher (APBMer, 2009). Birds may be disturbed by work around the new berth (although mapping shows that the main foraging area is on the low to mid shore).

Summary of Operational Impacts

Previous survey work on construction and operations during the period 1997/98 to 2002/03 (Young Associates, 2003) found no significant impact on wader numbers, indeed an increase in numbers of most species was reported, particularly oystercatchers. Shelduck did decline at the local level (although not at the SPA level), and this was attributed to the loss of feeding ground at Mostyn Dock foreshore through reclamation. This evidence tends to suggest populations are more resistant to disturbance effects, and this may be as a result of buffering due to high levels of prey abundance (Goss-Custard *et al*, 2006) and alternative roost options in the near vicinity. Observations by surveyors during the noisy docking of an airbus ship found no response by birds feeding and roosting in its immediate vicinity (ABPMer, 2009). Some additional mitigation is proposed (see *Section 4.8*) to ensure no significant effects on the redshank, oystercatcher and turnstone populations that roost and feed in areas supporting in excess of 1% or their respective Dee Estuary populations.

4.6.2 *Cumulative and In-combination Impacts from Port and Other Proposals and Plans*

Introduction

The scoping report and subsequent responses by consultees identified these as dredging by the Port of Mostyn, wildfowling, and recreational access initiatives. In addition the following projects and plans have been considered for potential cumulative and in-combination effects.

- dredging of the Outer Channel for maintenance of navigation;
- local dredging by Airbus upstream at Broughton;
- shipment of Airbus 380 wings from Broughton;
- aggregate extraction at an offshore site (Area 457) in Liverpool Bay;
- dredging of the River Mersey approach channel;
- an existing dredge license for mineral aggregates at Hilbre Swash; and
- wind farms in Liverpool Bay; and oil and gas production platforms in Liverpool Bay.

Wildfowling

Wildfowling is concentrated in areas well away from the location of the berth development, primarily in the saltmarshes at the head of the estuary around Burton, and is understood to be well regulated (*pers comm.* Geoff Robinson RSPB, 2009). Quarry species are primarily duck and geese, as with the exception of golden plover, snipe and woodcock, all waders were removed from the quarry list by the *Wildlife and Countryside Act 1981* as amended. Shooting is controlled by the Dee Valley Wildfowlers and Wetland Management Club, who operate a probation system for new wildfowlers, including an initial period of accompanied visits with experienced wildfowlers. As a consequence of good self regulation, the location of shooting areas, and the fact that none of the species associated with the berth are quarry species significant cumulative impacts are not predicted.

Recreation Initiatives

A number of initiatives are being developed relating to improving recreational access around the Dee Estuary, however, full details are not yet available. CCW has indicated that development of any such recreational initiatives will ensure that they do not have a detrimental impact on habitats and species of nature conservation importance including Natura 2000 sites. Therefore cumulative or in-combination effects are unlikely to arise.

Port of Mostyn Application for Dredging and Disposal Operations for Maintenance of Navigation

The ES for the dredging reported no significant impacts with only the smothering and loss of some areas of subtidal communities that were impoverished and species poor (ERM, 2007) and no impacts were anticipated on other qualifying features. The dredging in 2003 associated with Phase 2 of

the harbour redevelopment was monitored by Young Associates. There was no apparent decline in bird numbers, and declines immediately post dredging in March 2003 could largely be explained by natural migration from wintering grounds to breeding grounds. Subsequent WeBS counts for the area indicate that numbers are highly variable (see *Table 4.5* above), and winter numbers in the last two count years (2007/08 & 2008/09) are above the 5 year rolling means for the sector. No cumulative impacts with the berth proposals will result.

Dredging of the Outer Channel

The outer channel lies outside the Dee Estuary EMS, and the impact for the initial deepening of the outer channel was considered by Young Associates as part of the Cumulative EIA (2002). The EIA and the HR Wallingford modelling studies (HR Wallingford, 1999) predicted that there would be no impacts on the qualifying interest features of the designated areas within the Dee Estuary. Any future application for maintenance dredging of the outer channel would require the consideration of environmental effects. From the available information no significant impacts on the qualifying features of the EMS or other resources from maintenance dredging of the outer channel are expected.

Other Port Related Activities including Maintenance of Jack-up Barges

The port currently provides space within the Harbour's statutory boundary for the maintenance of jack-up barges which have been used in the construction work on the offshore wind farms. If the berth development which is the subject of this ES is approved, then this will provide additional space dedicated to the offshore wind farm construction works. Ideally these barges are located at one of the berths in the Port to allow easy land access, or in the more sheltered locations to the east of the breakwater, where they would have little or no impacts on bird species and populations. It is possible, however, that if all the berths and other Port areas are in use, that the barges could be located temporarily in the more exposed waters to the west of the breakwater, in the area of the Mostyn Gutter. However, if they are located in this area, they will be sited over 250 m from the important redshank roost site (at YA Site E) to avoid significant impacts to the roost. The WeBS counts and other surveys recorded a significant number of foraging bird species along Mostyn Gutter and on Mostyn Bank, including over 1% of the SPA redshank population. The combination of the presence of the barge, and people in fluorescent jackets working on them (moving regularly across connecting gangways to and from the breakwater), will displace birds from the footprint of the barge and in a radius of approximately 300 m in the surrounding area. However there is considerable foraging habitat across the mudflats, and evidence from seabed surveys in 2003, 2006 and 2009 of the whole estuary of growth in intertidal habitat, and hence the temporary displacement, even of such numbers, is not predicated to be significant or adversely affect the integrity of the SPA.

Dredging by Airbus Upstream at Broughton

Dredging has been undertaken by Airbus to allow shipment of wing sets from Broughton up to the port of Mostyn for onward transport. A study has been undertaken to assess the impacts of the dredging work which concluded that sedimentation and hydrodynamic affects would be localised and within the limits of natural variation and that there would be no net loss or gain of sediment to the estuary. There is therefore not predicted to be any in-combination affect with the proposed dredging operations at Mostyn.

Shipment of Airbus Wings

The movement of vessels into the port has been considered as part of the impact assessment for the proposed operations and it has been concluded that there would be no disturbance to birds in the estuary from these movements. In addition it is understood that monitoring work has been undertaken to assess the disturbance impact on birds of vessel movements through the inner reaches of the Dee Estuary from Broughton to Mostyn, and that no significant impact was reported, although low water relocation of navigation marker-buoys by dinghy was discontinued when this was shown to cause disturbance (Airbus UK Ltd. Broughton Wing Transportation Facility - First interim Monitoring Report', SMP (September 2006). As noted above the WeBS sector bird counts for the port area are currently above the 5 year rolling mean, and there is no evidence that ship movements are depressing population levels, as these appear to be more closely linked to food resources such as cockle stocks.

Dredging in Liverpool Bay

Area 457, the site of an aggregate extraction licence application in Liverpool Bay, lies 29 km from the Dee Estuary. No impact outside the immediate vicinity of the dredging areas has been predicted. Given the distance from the Dee Estuary and the absence of sediment transport linkages between the two areas no impacts on the Dee Estuary from the proposed dredging activities in this area are predicted.

Dredging of the River Mersey Approach Channel

The River Mersey approach channel is over 15 km from the proposed project area. The Mersey Estuary is an accreting system similar to the Dee Estuary and any sediment disturbed by dredging will be retained within the estuary and will not affect the Dee Estuary.

Dredging License for Mineral Aggregates at Hilbre Swash

Hilbre Swash lies over 6 km from the mouth of the Dee Estuary. It is not considered likely that any impacts from aggregate extraction at this site will affect the Dee Estuary.

Wind Farms in Liverpool Bay

There are a number of existing and proposed offshore wind farms in Liverpool Bay, namely, North Hoyle, Rhyl Flats, Burbo Bank and Gwynt-y-Môr. The nearest of theses sites, North Hoyle, is approximately 6 km away from the Dee Estuary. Vessels supporting the construction and maintenance of these wind farms have used the facilities at Port of Mostyn and providing these services is a major stimulus for the current proposal for the berth modification. Apart from the increased vessel movements associated with servicing the wind farms no direct or secondary impacts from the wind farms operations are considered likely to affect the Dee Estuary. Studies to date (Ravenscroft *et al,* 2007) and analysis of shipping movements in relation to bird numbers on the Dee indicate no significant impacts would be anticipated from the change in shipping movements.

Oil and Gas Platforms in Liverpool Bay

A number of oil and gas platforms are present in Liverpool Bay although these are predominantly over 25 km from the Dee Estuary and it is not considered likely that they will affect the Dee Estuary.

Port Full-utilisation Potential Impacts.

Under existing consents full-utilisation of the Port could include a ro-ro ferry service however the use of the proposed modified berth precludes the operation of such a service hence reducing of the risk of cumulative disturbance from Port operations.

4.7 MITIGATION MEASURES

4.7.1 Permanent Impacts

- In the YA Area E (see *Figure 2.10*) where it meets the land, the exisiting habitat will be augmented with scattered rip rap (small stones <15 cm long similar to that used in gabion baskets) at the intergrade between intertidal flats and drift sand over an area not exceeding 20 m long and 3 m wide at a density of no more than 5 % rocks per square metre. This will allow purchase for fucoids, mussels and barnacles thereby increasing the potential feeding habitat for turnstones (and other species) that may be displaced from the modified berth area. The limited area and low density of rip rap will prevent significant loss of intertidal habitat and is highly reversible (ie the rocks can be easily removed

4.7.2 Construction

- The works will be programmed to begin in April and finish in October (early November if there are project overruns) to ensure that the bulk of the work, particularly piling, is carried out when SPA populations are largely absent. There is some overlap with the latter part of the spring

migration and the main period of autumn migration. Birds tend to be less habituated during these periods but cold and food stress is less likely than if works took place over the winter.

- A narrow mesh screening to a height of 2 m will be erected prior to construction work commencing, along the breakwater, to protect feeding and roosting birds from visual stimulus. The efficacy of this screening should be monitored to ensure birds are not disturbed by the screening itself.

- Lighting will be directed away from the mudflats west of the breakwater and any roost sites.

- Non-essential presence of the workforce along the western edge of the breakwater will be avoided.

4.7.3 Operational Impacts

Jack up barges that are required to be stationed in Mostyn Gutter on the western side of the breakwater, will be sited at least 250 m from the redshank roost at YA Area E (Grid ref 315320 381185), where the permanent impact mitigation is proposed

4.8 SUMMARY OF RESIDUAL IMPACTS

Significant impacts on the Dee Estuary SCI features such as lamprey species, intertidal and estuarine habitats and invertebrate communities are not expected to occur, although there will be permanent loss of 0.006% of the SCI. No loss of function or site integrity is predicted.

The area likely to be impacted contains significant (ie more than 1%) numbers of some SPA/ Ramsar qualifying species, most notably redshank, oystercatcher and turnstone. Current observations and previous monitoring indicates that these populations are resistant to disturbance, and this is likely to be due to an element of habituation to an artificially created industrial landscape, high levels of food abundance, and a range of suitable alternative roosting sites. New foraging habitat will be created adjacent to the existing roost site at YA Area E to replace that which will be lost.

Mitigation will be implemented to avoid impacts from activities such as piling, visual impacts and disturbance from maintenance works.

5 HABITATS REGULATIONS ASSESSMENT (HRA)

5.1 INTRODUCTION

Under the *Conservation (Natural Habitats &c.) Regulations 1994* (the Habitats Regulations), the Competent Authorities (in this case WAG, MFA and the EA), must undertake an Appropriate Assessment of proposals which may have significant impacts on the integrity of the European Marine Site in view of the conservation objectives for which the SPA and SCI have been designated. The purpose of this chapter is to summarise the information available to assist the Regulators in fulfilling the requirements of the Habitats Regulations.

As the effects of the project have been shown to be limited to within the Dee Estuary, the qualifying interests of the Liverpool Bay proposed Marine SPA have not been considered. The Atlantic salmon qualifying interest feature of the River Dee and Bala Lake SAC use the Dee Estuary to travel between their spawning grounds in the River Dee and the sea. However since no significant impacts on salmon in the Dee Estuary are predicted, the qualifying interests of the River Dee and Bala Lake SAC have not been considered.

5.2 THE HABITATS DIRECTIVE PROCESS

5.2.1 *Need for Appropriate Assessment*

European guidance(1) on Appropriate Assessment includes the following staged process.

- Stage 1 Define the proposal.
- Stage 2 Establish that the proposal is not necessary to the management of the site for nature conservation purposes.
- Stage 3 Determine whether it can be concluded that the proposal will have no likely significant effect on the site (ie – the Screening Stage).
- Stage 4 If a project is likely to have a significant effect, or it cannot be concluded that it will not, assess the implications of the proposal for the site's Conservation Objectives so as to answer the question *"can it be demonstrated that the proposal will not adversely affect the integrity of the site?"*. This is referred to as the Appropriate Assessment.
- Stage 5 If the Appropriate Assessment indicates that no adverse effect will occur the competent authority may proceed to grant consent; if not,

(1) European Commission Environment Division 2001; Assessment of plans and projects significantly affecting Natura 2000 sites.

further steps are required to demonstrate that specific reasons why the development should be permitted apply, before consent may be granted.

5.2.2 Stages 1 and 2

Chapter 2 Project Description within this ES defines the project (Stage 1) and demonstrates that it is not necessary to the management of the Dee Estuary EMS for nature conservation purposes (Stage 2). Therefore fuller consideration was given to the proposals and whether they were likely to have a significant effect, and if so, what the implications would be to the sites Conservation Objectives.

5.2.3 Stage 3 - Screening - Process of Determining Whether No Likely Significant Effect can be Concluded

To determine if the effects of the modified berth development is likely to have significant effects on any of the designated site the following issues have been considered.

- could the proposals affect the qualifying interest and are they sensitive to the effect?
- what is the probability of the effect happening?
- what are the likely consequences for the site's Conservation Objectives if the effect occurred?
- what are the magnitude, duration and reversibility of the effects? and
- what mitigation is effective and can be included?

European Commission guidance on the screening process recommends that the determination of likely significant should be undertaken in the absence of any mitigation measures (1). Our assessment will however, consider mitigation following a recent legal decision in the UK, which has indicated that there is no reason why a screening assessment must be carried out in the absence of any mitigation, and a competent authority should take account of such measures (2) (see *Box 5.1*).

(1) European Commission Environment DG (2001) Assessment of Plans and Projects Significantly Affecting Natura 2000 Sites. EC

(2) Dilley Lane Judgement - Hart District Council v The Secretary of State for Communities and Local Government, Luckmore Limited and Barratt Homes Limited (CO/7623/2007) 1st May 2008

Box 5.1 The Dilley Lane High Court Judgement

The Dilley Lane High Court Judgement concluded no legal requirement that a screening assessment under Regulation 48(1) must be carried out in the absence of any mitigation measure that form part of a plan or project. On the contrary, the competent authority is required to consider whether the project as a whole, including such measures, if they are part of the project, is likely to have a significant effect on the SPA.

This judgement makes clear that committed mitigation should be considered for any proposal, and can include a range of appropriate measures both on and off site that avoid or minimise the adverse impact of a plan or project on a Natura 2000 site.

With respect to this screening assessment it has not been possible to explore potential mitigation measures in any depth due to the lack of information about specific sites or waste facilities. However mitigation should be fully considered during the next planning phase to help inform site selection.

5.2.4 Stage 4 - Appropriate Assessment

The aim of the Appropriate Assessment process is to demonstrate that the proposals will not have an adverse effect on the integrity of the site. Site integrity is not legally defined, but an accepted definition is as follows:

"*the coherence of its structure and function across its whole area that enables it to sustain the habitat, complex of habitats and/or the levels of populations of the species for which it was classified*"(1).

The decision as to whether the site integrity could be adversely affected should focus on and be limited to the site's Conservation Objectives.

The following information, which has drawn largely on information provided in *Chapters 2 -4* of the ES, has been used in the assessment:

- a description of the Dee Estuary European Marine Site (EMS) and the qualifying marine interest features for which the SPA and SCI were designated, and which may be affected by the proposed project;
- information on the proposed project, highlighting possible effects on the qualifying interest features of the EMS;
- information available about the current status and distribution of the qualifying interests in relation to the proposals;
- identification of impacts on the ecology and nature conservation value of the EMS and an evaluation of their significance; and
- effects which have been identified when considering the modified berth proposals in-combination with existing and proposed schemes.

(1) European Communities (2000) *Managing Natura 2000 sites* - The provisions of Article 6 of the 'Habitats' Directive 92/43/CEE. EC

5.3 THE DEE ESTUARY EUROPEAN MARINE SITE (EMS)

5.3.1 Baseline Characteristics

Information on the ecological baseline characteristics of the Dee Estuary and its qualifying interest features is provided in *Chapter 4: Ecology and Nature Conservation*

5.3.2 Conservation Objectives for EMS Qualifying Interest Features

NE and CCW have Conservation Objectives for all the Natura 2000 sites in England and Wales respectively. Conservation Objectives are set to ensure that the obligations of the Habitats Directive are met, particularly to ensure that there should be no deterioration of, or significant disturbance to, the qualifying features from their condition at the time the Natura status of the site was formally identified. The Conservation Objectives are also essential in determining whether a project is likely to have a significant effect(1).

The Conservation Objective for each of the qualifying interest features of the EMS is to maintain that feature in favourable condition. Each feature has a number of conditions which must be met to achieve this. The conditions required to maintain the site in a favourable status are contained in *Table 5.1*.

5.4 PROPOSED WORKS

5.4.1 Possible Effects

The effects which may result from the proposed construction and operation of the modified berth to service offshore wind farm construction are listed below.

- Reclamation of just under a hectare (9,669 m^2) of estuary below high water including approximately 4,248 m^2 (just under half a hectare) of intertidal area and 5,421 m^2 (just over half a hectare) of subtidal area, although as part of a dynamic system, these areas will change over time. The majority of this area is tipped slag deposits with only a small area of sand and silt substrate.
- Permanent loss of 50,000 m^3 of sediment from the estuary through use as infill and potential impact this may have on coastal processes, cockle beds and other intertidal habitats.
- Permanent loss of feeding habitat for birds through reclamation.
- Construction disturbance to roosting and feeding waders.
- Disturbance impacts on waders using the breakwater and adjacent mudflats during operation of the modified berth.

The assessment of impacts of proposals on birds defines a zone of influence around the proposed development of 300 m (see *Chapter 4*). This is based on

(1) Article 6.2 of the Habitats Directive.

empirically derived disturbance data established through monitoring work, including on the Humber Estuary by IECS and ERM (IECS, 2008). This approach precludes impacts on most of the qualifying features which occur beyond this limit. Where there is a risk of an impact beyond this zone, the risk has been identified and assessed either within the relevant assessment chapter, or in *Table 5.1* below. A similar approach has been adopted to the assessment of impacts on coastal processes.

5.5 STATUS AND DISTRIBUTION OF QUALIFYING INTERESTS

5.5.1 Previous Appropriate Assessments 2005 & 2008

Capital and maintenance dredging of the Port of Mostyn inner channel and berthing area to -2 m below chart datum (CD) has been the subject of Appropriate Assessments by the Regulators(1). Dredging effects were identified as having the following potential impacts:

- local/estuary wide morphological change;
- habitat loss and physical damage; and
- increased siltation/suspended solids.

As a result of these effects, the Regulators concluded that the qualifying interest features that were affected comprised those listed below.

- The Estuary interest feature.
- The intertidal mud and sand flats not covered by water at low tide feature.
- The *Salicornia* and other annuals colonising sand and mud feature.
- The Atlantic salt meadow feature.
- The wintering knot population as a result of changes to intertidal areas.
- The wintering oystercatcher population as a result of changes to intertidal areas.

The previous Appropriate Assessments (WAG, DfT, EA (2005); MFA, WAG, EA (2008)) came to the following conclusions.

- The contribution to estuary wide morphological change although measurable, is likely to be small in comparison to the effect of natural processes, with a negligible effect at the estuary site within the period of the consent.

- Dredging and disposal sites are not in the vicinity of important areas for bird feeding, therefore there is no risk of adverse impacts on oystercatcher and knot or their prey species arising from direct physical impacts.

(1) Appropriate Assessment of Channel Dredged to maximum of 2m to allow an advertised depth of 1.5m (below chart datum)

- The movement of a cross bank channel would not lead to a decrease in the abundance of prey species for oystercatcher and knot, and the management of the cockle fishery in the estuary precludes any cumulative effects on the cockle resource available for oystercatcher and knot.

- There is a massive surplus of cockle in the estuary for feeding of oystercatcher, and this likely to remain the case for at least two years (ie to at least 2010)

- The Atlantic salt meadows and *Salicornia* features are only at risk if deposition rates are in excess of 10 cm per annum. Rates of deposition resulting from dredging are predicted to be less than 3 mm, ruling out any risk to the Atlantic salt marsh and *Salicornia* features.

In light of these findings, the previous assessments under the Habitat Regulations demonstrated that dredging to 2 m below CD would not have an adverse affect on the integrity of the Dee Estuary EMS (see *Chapter 4*).

5.5.2 Monitoring of Bird Numbers

Data from WeBS counts, from RSPB, monitoring surveys by Young Associates (2003), and surveys commissioned as part of this EIA, have demonstrated high inter-annual variation in numbers that appears to be independent of changes in Port operations. In addition Phase 1 and Phase 2 of the port development between 1998-2003 with its associated dredging, has had no discernable impact on species numbers, most of which have increased.

The review of previous work on the Dee estuary suggests some key conclusions which are relevant as context to the proposed berth modification development as follows:

1. the Dee Estuary is a highly dynamic, accreting estuary;
2. the estuary supports a large and variable intertidal invertebrate biomass which is available to a range of wildfowl and waders; and
3. it appears that the bird numbers around the port are highly variable and this variation is broadly independent to port activity levels.

5.6 ASSESSMENT

5.6.1 Introduction

As discussed in *Section 5.2.3*, the aim of an Appropriate Assessment is to seek to conclude that the proposals will not adversely affect the integrity of the qualifying interests for the site and, if so, that there are special reasons why the development should be permitted to proceed. This section describes the potential impacts on the qualifying interest features of the Dee Estuary EMS from the proposals, and is intended to provide information to assist the competent authorities in undertaking the Appropriate Assessment.

5.6.2 Assessment Methodology

The assessment was undertaken in a number of stages, as listed below.

- The likely effects on the interest features of the EMS were established.
- The baseline for each of the qualifying interest features of the EMS was established.
- The most recent monitoring data, information from previous Appropriate Assessments, and the Dee Estuary predictive modelling were used to assess the likely magnitude of the effects for each interest feature.
- The significance of the impacts on the qualifying interest features was identified, and effects on the integrity of the EMS considered.

The impacts on each condition from the proposed operations have been presented in *Table 5.1*. Cross references are provided to other sections within the ES which contain information supporting the assessment made.

Table 5.1 Assessment of Impacts on European Marine Site Favourable Condition Targets

Qualifying Interest Feature of European Marine Site	Favourable Condition Target (subject to natural processes) (EN and CCW 2004)	Assessment
Estuary Feature	The aggregate total extent of all estuarine communities within the site is maintained.	The berth modifications will result in the loss of less than 0.5 ha of intertidal habitats comprising largely tipped slag material with only small areas of sand and silt in a habitat where there is continual accretion. No impacts are predicted on the function of individual habitat features as a result of the proposed berth modification (see *Chapter 3 Section 3.4* and *Chapter 4 Section 4.4*). It is considered that this loss is de-minimis in the context of the SCI.
	The spatial distribution of estuarine communities within the site is maintained.	No impacts on the physical processes governing spatial distribution of habitats are predicted as a result of the proposed berth modification (see *Chapter 3 Section 3.4*).
	The extent of individual estuarine habitat features within the estuary is maintained.	No impacts are predicted on the function of individual habitat features as a result of the proposed berth modification (see C*hapter 4 Section 4.4*)
	The variety and relative proportions of sediment and rocky substrates within the estuary is maintained.	No impacts are predicted on the distribution or extent of habitats within the estuary as a result of the proposed berth modifications (see *Chapter 3 Section 3.4*).

Qualifying Interest Feature of European Marine Site	Favourable Condition Target (subject to natural processes) (EN and CCW 2004)	Assessment
	The variety and extent of any notable subtidal sediment communities is maintained.	The berth modifications will result in the loss of less than 0.5 ha of intertidal habitats comprising largely tipped slag material with only small areas of sand and silt in a habitat where there is continual accretion. No impacts are predicted on the function of individual habitat features as a result of the proposed berth modification (see *Chapter 3 Section 3.4* and *Chapter 4 Section 4.4*). It is considered that this loss is de-minimis in the context of the SCI.
	The variety and extent of notable intertidal hard substrata communities is maintained.	No impacts are predicted on notable intertidal hard substrata communities, as these lie outside the impact zone (See *Chapter 3 Section 3.4*)
	The spatial and temporal patterns of salinity, suspended sediments and nutrients concentrations are maintained within limits sufficient to satisfy the requirements of the statements above.	No impacts on salinity, suspended sediments and nutrient concentration are predicted above background levels as a result of the proposed berth modifications (See *Chapter 3 Section 3.4*)
Mudflats and Sandflats not covered by seawater at low tide	The total extent of mudflat and sandflat communities within the site is maintained.	The berth modifications will result in the loss of just under 0.5 ha of intertidal habitats comprising largely tipped slag material with only small areas of sand and silt in a habitat where there is continual accretion. No impacts are predicted on the function of individual habitat features as a result of the proposed berth modification (see *Chapter 3 Section 3.4* and *Chapter 4 Section 4.4*). It is considered that this loss is de-minimis in the context of the SCI.
	The proportions of individual mudflat and sandflat communities within the site are maintained.	As above

Qualifying Interest Feature of European Marine Site	Favourable Condition Target (subject to natural processes) (EN and CCW 2004)	Assessment
	The topography of the intertidal flats and the dynamic process of channel migration and sinuosity across the flats is maintained.	No changes resulting from the proposals are predicted. (see *Chapter 3 Section 3.4*)
	The abundance of typical species of the mudflat and sandflat feature within the site is maintained.	The abundance of typical species of the mudflat and sandflat features will be maintained (see *Chapter 3 Section 3.4* and Chapter 4 *Sections 4.5 – 4.7*)
Salicornia and other annuals colonising mud and sand	The total extent of pioneer saltmarsh vegetation communities within the site is maintained.	No impacts are predicted on *Salicornia* and other annuals colonising mud and sand as a result of the proposed berth modifications (see *Chapter 3 Section 3.4*)
	The presence of pioneer saltmarsh vegetation communities as part of transitions from intertidal sediment communities to higher saltmarsh are maintained.	As above
	The abundance of the typical species of the pioneer saltmarsh vegetation communities is maintained.	As above
	The abundance of the notable species of the pioneer saltmarsh vegetation communities is maintained.	As above
	The overall extent and abundance of common cord grass *Spartina anglica* is not increasing within the pioneer saltmarsh zone.	As above
Atlantic salt meadow	The total extent of Atlantic salt meadow vegetation communities within the site is maintained.	No impacts are predicted on Atlantic salt meadow as a result of the proposed berth modifications (see *Chapter 3 Section 3.4*)
	The proportions of individual Atlantic salt meadow vegetation communities within the site are maintained.	As above

Qualifying Interest Feature of European Marine Site	Favourable Condition Target (subject to natural processes) (EN and CCW 2004)	Assessment
	The zonation of Atlantic salt meadow vegetation communities and their transitions to freshwater and terrestrial vegetation are maintained.	As above
	The extent of ungrazed areas of salt meadow within the estuary is maintained and there is no increase in the grazing intensity of the rest of the salt meadow.	As above
	The relative abundance of the typical species of the Atlantic salt meadow vegetation is maintained.	As above
	The abundance of the notable species of the Atlantic salt meadow vegetation communities is maintained.	As above
Annual Vegetation of Driftlines	The extent of coarse sediment /shingle formations capable of supporting drift line vegetation communities within the site is maintained.	No impacts are predicted on annual vegetation of driftlines as a result of the proposed berth modification (see *Chapter 3 Section 3.4*)
	The presence of annual drift line vegetation communities within the site is maintained.	As above
	The presence of typical species of annual drift line vegetation communities is maintained.	As above
River Lamprey	The migratory passage of both adult and juvenile river lamprey through the Dee Estuary between Liverpool Bay and the River Dee is unobstructed by physical barriers and/or poor water quality.	No impacts are predicted on river lamprey as a result of the proposed development (see *Chapter 3 Section 3.4*)

Qualifying Interest Feature of European Marine Site	Favourable Condition Target (subject to natural processes) (EN and CCW 2004)	Assessment
	The five year mean count of river lampreys recorded at the Chester Weir Fish trap does not decrease.	As above
	The abundance of prey species forming the river lamprey's food resources within the estuary is maintained.	As above
Sea lamprey	The migratory passage of both adult and juvenile sea lamprey through the Dee Estuary between Liverpool Bay and the River Dee is unobstructed by physical barriers and/or poor water quality.	No impacts are predicted on sea lamprey as a result of the proposed development (see *Chapter 3 Section 3.4*)
	The five year mean count of sea lampreys recorded at the Chester Weir Fish trap does not decrease.	As above
Bar-tailed godwit	The five year peak mean population size for the wintering bar-tailed godwit population does not decrease.	No significant impacts are predicted on the population of bar-tailed godwit as a result of the proposed berth modifications (see *Chapter 4 Sections 4.2, 4.4 – 4.7*).
	The extent of intertidal flats and the spatial distribution of their constituent sediment community types is maintained.	Less than 0.5 ha of intertidal area will be lost and the majority of this is tipped slag material, with only a small area of silt and sand (see *Chapter 3 Section 3.4, Chapter 4 Section 4.4.1*). It is considered that this loss is de-minimis in the context of the SCI.
	The extent and spatial distribution of vegetation less than 10cm in height across the saltmarsh is maintained.	No saltmarsh will be affected by the proposals (see *Chapter 4 Section 4.4*)
	Existing unrestricted bird sightlines of at least 200 m are maintained in every direction around both roosting sites and feeding areas.	Current sightlines will not be affected (see *Section 4.5* and *4.6*).

Qualifying Interest Feature of European Marine Site	Favourable Condition Target (subject to natural processes) (EN and CCW 2004)	Assessment
	Aggregations of bar-tailed godwit roosting or feeding or on the intertidal flats or saltmarsh are not subject to significant disturbance.	Known aggregations of bar-tailed godwits will not be affected. (see *Chapter 4 Section 4.2,4.5* - 4.*7)*
Common tern	The 5 year mean population size for the breeding common tern population does not decrease.	Common tern populations will not be affected (see *Chapter 4 Sections 4.2, 4.4 – 4.7)*
	The five year mean productivity of the breeding common tern population is no less than 1.34 chicks fledging per breeding pair per year [*i.e. the 5 year mean between 1995-1999*].	The modified berth will not affect fledging rates of common terns (see *Chapter 4 Sections 4.2, 4.4 – 4.7.)*
	The abundance of common tern prey species within the estuary is maintained.	No impacts are predicted on common tern prey species as a result of the proposed berth modification (see *Chapter 4 Sections 4.2, 4.4 – 4.7)*
	Common terns are able to pass freely between the Dee Estuary and their breeding site at Shotton Lagoons and Reedbeds without obstruction.	No impacts are predicted on the movements of common tern as a result of the proposed berth modification (see *Chapter 4 Sections 4.2, 4.4 – 4.7)*
	Aggregations of common terns roosting on the upper shore over high tide are not subject to significant disturbance.	No disturbance impacts are predicted to aggregations of common tern as a result of the proposed berth modification (see *Chapter 4 Sections 4.2, 4.4 – 4.7)*
Little tern	The 5 year mean population size for the breeding little tern population does not decrease.	The population of little tern will not be affected as a result of the proposed berth modification (see *Chapter 4 Sections 4.2, 4.4 – 4.7)*

Qualifying Interest Feature of European Marine Site	Favourable Condition Target (subject to natural processes) (EN and CCW 2004)	Assessment
	The five year mean productivity of the breeding little tern population is no less than 0.80 chicks fledging per breeding pair per year [*i.e. the 5 year mean between 1995-1999*].	No impacts are predicted on the breeding productivity of the little tern population as a result of the berth modification (see *Chapter 4 Sections 4.2, 4.4 – 4.7)*
	The breeding site is not subject to significant disturbance.	No disturbance to little terns is predicted as a result of the proposed berth modification (see *Chapter 4 Sections 4.2, 4.4 – 4.7)*
	The extent of shingle habitat at Gronant, which is suitable for nesting little terns is maintained.	The shingle habitat at Gronant will not be affected by the proposed berth modification (see *Chapter 4 Section 4.4*).
	Aggregations of little terns roosting on the beach at Gronant or Point of Ayr over high tide are not subject to significant disturbance.	Little terns at Gronant and Point of Ayr will not be disturbed by the berth modifications (see *Chapter 4 Section 4.5)*
Sandwich tern	The 5 year mean peak population size for the autumn passage Sandwich tern population does not decrease.	The population size of sandwich tern will not be affected (see *Chapter 4 Sections* 4.2 and 4.4 – *4.7)*
	Aggregations of Sandwich terns roosting on the upper shore over high tide are not subject to significant disturbance.	No roosting sandwich terns will be affected (see *Chapter 4 Sections* 4.2 and 4.4 – *4.7)*

Qualifying Interest Feature of European Marine Site	Favourable Condition Target (subject to natural processes) (EN and CCW 2004)	Assessment
Passage Redshank	The 5 year peak mean population size for the passage redshank population does not decrease.	Some disturbance to feeding and possible roosting redshank is likely, but impacts will not be significant as: • alternative feeding and roosting opportunities exist elsewhere; • an additional roosting area will be created; • previous studies indicate populations have been unaffected by previous developments and port operations See *Chapter 4 Sections 4.2* and *4.4-4.7.*
	The extent of intertidal flats and the spatial distribution of their constituent sediment community types is maintained.	Less than 0.5 ha of intertidal area will be lost and the majority of this is tipped slag material, with only a small area of silt and sand (see *Chapter 3 Section 3.4, Chapter 4 Section 4.4.1*). It is considered that this loss is de-minimis in the context of the SPA/Ramsar.
	The abundance and dispersion of redshank prey species are maintained at levels sufficient to support the population size above.	No significant impacts are predicted on redshank prey species as a result of the proposed berth modification (see *Chapter 4 Sections 4.2, 4.4 – 4.7).*
	The extent and spatial distribution of saltmarsh vegetation less than 10 cm in height is maintained.	No saltmarsh will be affected (see *Chapter 4 Section 4.4)*
	Existing unrestricted bird sightlines of at least 200 m are maintained in every direction around both roosting sites and feeding areas**.**	Current sightlines will not be affected (see *Section 4.5* and *4.6*).

Qualifying Interest Feature of European Marine Site	Favourable Condition Target (subject to natural processes) (EN and CCW 2004)	Assessment
	Aggregations of roosting or feeding redshank are not subject to significant disturbance.	Some disturbance to feeding and possible roosting redshank is likely, but impacts will not be significant as: • alternative feeding and roosting opportunities exist elsewhere; • an additional roosting area will be created; • previous studies indicate populations have been unaffected by previous developments and port operations See *Chapter 4 Sections 4.2* and *4.4-4.7.*
Wintering Shelduck	The 5 year peak mean population size for the wintering shelduck population does not decrease.	The mean population size of shelduck populations will not be affected (see *Chapter 4 Section 4.2, 4.4 – 4.7).*
	The extent of intertidal flats and the spatial distribution of their constituent sediment community types is maintained.	Less than 0.5 ha of intertidal area will be lost and the majority of this is tipped slag material, with only a small area of silt and sand (see *Chapter 3 Section 3.4, Chapter 4 Section 4.4.1*). It is considered that this loss is de-minimis in the context of the SPA/Ramsar.
	The abundance and dispersion of shelduck prey species are maintained at levels sufficient to support the population size above.	No significant impacts are predicted on shelduck prey species as a result of the proposed berth modification (see *Chapter 4 Sections 4.2, 4.4 – 4.7).*
	Existing unrestricted bird sightlines of at least 200 m are maintained in every direction around both roosting sites and feeding areas.	Current sightlines will not be affected (see *Section 4.5* and *4.6*).

Qualifying Interest Feature of European Marine Site	Favourable Condition Target (subject to natural processes) (EN and CCW 2004)	Assessment
	Aggregations of loafing or feeding shelduck are not subject to significant disturbance.	Some disturbance to loafing and feeding shelduck is likely, but impacts will not be significant as: • alternative feeding and roosting opportunities exist elsewhere; • an additional roosting area will be created; • previous studies indicate populations have been unaffected by previous developments and port operations See *Chapter 4 Sections 4.2* and *4.4-4.7.*
Wintering teal	The 5 year peak mean population size for the wintering teal population does not decrease.	The mean population size of teal populations will not be affected (see *Chapter 4 Section 4.2, 4.4 – 4.7).*
	The extent of intertidal flats and the spatial distribution of their constituent sediment community types is maintained.	Less than 0.5 ha of intertidal area will be lost and the majority of this is tipped slag material, with only a small area of silt and sand (see *Chapter 3 Section 3.4, Chapter 4 Section 4.4.1*). It is considered that this loss is de-minimis in the context of the SPA/Ramsar.
	The extent of saltmarsh and the spatial distribution of its constituent vegetation community types is maintained.	No saltmarsh will be affected by the proposals (see *Chapter 4 Section 4.4*)
	Greater than 25% cover of seed bearing plants is maintained during winter across the Saltmarsh.	No saltmarsh will be affected by the proposals (see *Chapter 4 Section 4.4*)
	The extent of standing water pools or 'flashes' in the saltmarsh is maintained.	No saltmarsh will be affected by the proposals (see *Chapter 4 Section 4.4*)

Qualifying Interest Feature of European Marine Site	Favourable Condition Target (subject to natural processes) (EN and CCW 2004)	Assessment
	Existing unrestricted bird sightlines of at least 200m are maintained in every direction around both roosting sites and feeding areas.	Current sightlines will not be affected (see *Section 4.5* and *4.6*)..
	Aggregations of loafing or feeding teal are not subject to significant disturbance.	Loafing and feeding teal will not be affected by the proposed berthing modifications (see *Chapter 4 Sections 4.2* and *4.4-4.7.*.
Wintering pintail	The 5 year peak mean population size for the wintering pintail population does not decrease.	The mean population size of pintail populations will not be affected (see *Chapter 4 Section 4.2, 4.4 – 4.7).*
	The extent of intertidal flats and the spatial distribution of their constituent sediment community types is maintained.	Less than 0.5 ha of intertidal area will be lost and the majority of this is tipped slag material, with only a small area of silt and sand (see *Chapter 3 Section 3.4, Chapter 4 Section 4.4.1*). It is considered that this loss is de-minimis in the context of the SPA/Ramsar.
	The extent of saltmarsh and the spatial distribution of its constituent vegetation community types is maintained.	No saltmarsh will be affected by the proposals (see *Chapter 4 Section 4.4*)
	The abundance and dispersion of pintail prey species is maintained at levels required to support the population size above.	No significant impacts are predicted on shelduck prey species as a result of the proposed berth modification (see *Chapter 4 Sections 4.2, 4.4 – 4.7).*
	Greater than 25% cover of soft leaved herbs and grasses is maintained during winter across the saltmarsh.	No saltmarsh will be affected by the proposals (see *Chapter 4 Section 4.4*)
	Existing unrestricted bird sightlines of at least 200m are maintained in every direction around loafing areas, and feeding areas.	Current sightlines will not be affected (see *Section 4.5* and *4.6*)

Qualifying Interest Feature of European Marine Site	Favourable Condition Target (subject to natural processes) (EN and CCW 2004)	Assessment
	Aggregations of loafing or feeding pintail are not subject to significant disturbance.	No disturbance impacts are predicted. WeBS data indicate high inter-annual variability, and there is no correlation between changes in shipping movements and peak counts. (See *Chapter 4 Section 4.2* and *4.5 – 4.7).*
Wintering oystercatcher	The 5 year peak mean population size for the wintering oystercatcher population does not decrease.	The mean population size of oystercatcher populations will not be affected (see *Chapter 4 Section 4.2, 4.4 – 4.7).* .
	The extent of intertidal flats and the spatial distribution of their constituent sediment community types is maintained.	Less than 0.5 ha of intertidal area will be lost and the majority of this is tipped slag material, with only a small area of silt and sand (see *Chapter 3 Section 3.4, Chapter 4 Section 4.4.1*). It is considered that this loss is de-minimis in the context of the SPA/Ramsar.
	The abundance and dispersion of oystercatcher prey species are maintained at levels sufficient to support the population size above.	No significant impacts are predicted on oystercatcher prey species as a result of the proposed berth modification (see *Chapter 4 Sections 4.2, 4.4 – 4.7).*
	The extent and spatial distribution of saltmarsh vegetation less than 10cm in height is maintained.	No saltmarsh will be affected by the proposals (see *Chapter 4 Section 4.4*)
	The extent of rocky shore at Hilbre Island, Middle Eye, Little Eye and Tanskey rocks is maintained.	No impacts are predicted on these rocky shore communities (see *Chapter 3* and *Chapter 4 Section 4.4).*
	The extent and height of the shingle spit at Point of Ayr is maintained.	No impacts are predicted on the shingle spit (see *Chapter 3* and *Chapter 4 Section 4.4).*
	Existing unrestricted bird sightlines of at least 200 m are maintained in every direction around both roosting sites and feeding areas.	Current sightlines will not be affected (see *Section 4.5* and *4.6*)

Qualifying Interest Feature of European Marine Site	Favourable Condition Target (subject to natural processes) (EN and CCW 2004)	Assessment
	Aggregations of roosting or feeding oystercatcher are not subject to significant disturbance.	Some disturbance to feeding and roosting oystercatcher is likely, but impacts will not be significant as: • alternative feeding and roosting opportunities exist elsewhere; • an additional roosting area will be created; • previous studies indicate populations have been unaffected by previous developments and port operations See *Chapter 4 Sections 4.2* and *4.4-4.7.*
Wintering grey plover	The 5 year peak mean population size for the wintering grey plover population does not decrease.	The mean population size of grey plover populations will not be affected (see *Chapter 4 Section 4.2, 4.4 – 4.7).*
	The extent of intertidal flats and the spatial distribution of their constituent sediment community types is maintained.	Less than 0.5 ha of intertidal area will be lost and the majority of this is tipped slag material, with only a small area of silt and sand (see *Chapter 3 Section 3.4, Chapter 4 Section 4.4.1*). It is considered that this loss is de-minimis in the context of the SPA/Ramsar.
	The abundance and dispersion of grey plover prey species are maintained at levels sufficient to support the population size above.	No significant impacts are predicted on oystercatcher prey species as a result of the proposed berth modification (see *Chapter 4 Sections 4.2, 4.4 – 4.7).*
	The extent and spatial distribution of saltmarsh vegetation less than 10 cm in height is maintained.	No saltmarsh will be affected by the proposals (see *Chapter 4 Section 4.4*)
	Existing unrestricted bird sightlines of at least 200 m are maintained in every direction around both roosting sites and feeding areas**.**	Current sightlines will not be affected (see *Section 4.5* and *4.6*)

Qualifying Interest Feature of European Marine Site	Favourable Condition Target (subject to natural processes) (EN and CCW 2004)	Assessment
	Aggregations of roosting or feeding grey plover are not subject to significant disturbance.	No disturbance impacts are predicted to foraging or roosting grey plover (see *Chapter 4 Sections 4.2 and Section 4.5 – 4.7).*
Wintering knot	The 5 year peak mean population size for the wintering knot population does not decrease.	The mean population size of knot populations will not be affected (see *Chapter 4 Section 4.2, 4.4 – 4.7).*
	The extent of intertidal flats and the spatial distribution of their constituent sediment community types is maintained.	Less than 0.5 ha of intertidal area will be lost and the majority of this is tipped slag material, with only a small area of silt and sand (see *Chapter 3 Section 3.4, Chapter 4 Section 4.4.1*). It is considered that this loss is de-minimis in the context of the SPA/Ramsar.
	The abundance and dispersion of knot prey species are maintained at levels sufficient to support the population size above.	No significant impacts are predicted on knot prey species as a result of the proposed berth modification (see *Chapter 4 Sections 4.2, 4.4 – 4.7).*
	The extent and spatial distribution of saltmarsh vegetation less than 10cm in height is maintained.	No saltmarsh will be affected by the proposals (see *Chapter 4 Section 4.4*)
	Existing unrestricted bird sightlines of at least 200 m are maintained in every direction around both roosting sites and feeding areas**.**	Current sightlines will not be affected (see *Section 4.5* and *4.6*)
	Aggregations of roosting or feeding knot are not subject to significant disturbance.	Some disturbance to feeding knot is likely, but impacts will not be significant as: • alternative feeding opportunities exist elsewhere; • previous studies indicate populations have been unaffected by previous developments and port operations See *Chapter 4 Sections 4.2* and *4.4-4.7.*

Qualifying Interest Feature of European Marine Site	Favourable Condition Target (subject to natural processes) (EN and CCW 2004)	Assessment
Wintering dunlin	The 5 year peak mean population size for the wintering dunlin population does not decrease.	The mean population size of dunlin populations will not be affected (see *Chapter 4 Section 4.2, 4.4 – 4.7).*
	The extent of intertidal flats and the spatial distribution of their constituent sediment community types are maintained.	Less than 0.5 ha of intertidal area will be lost and the majority of this is tipped slag material, with only a small area of silt and sand (see *Chapter 3 Section 3.4, Chapter 4 Section 4.4.1*). It is considered that this loss is de-minimis in the context of the SPA/Ramsar.
	The abundance and dispersion of dunlin prey species are maintained at levels sufficient to support the population size above.	No significant impacts are predicted on dunlin prey species as a result of the proposed berth modification (see *Chapter 4 Sections 4.2, 4.4 – 4.7).*
	The extent and spatial distribution of saltmarsh vegetation less than 10 cm in height is maintained.	No saltmarsh will be affected by the proposals (see *Chapter 4 Section 4.4*)
	Existing unrestricted bird sightlines of at least 200 m are maintained in every direction around both roosting sites and feeding areas**.**	Current sightlines will not be affected (see *Section 4.5* and *4.6*)
	Aggregations of roosting or feeding dunlin are not subject to significant disturbance.	Some disturbance to feeding dunlin is likely, but impacts will not be significant as: • alternative feeding opportunities exist elsewhere; • previous studies indicate populations have been unaffected by previous developments and port operations See *Chapter 4 Sections 4.2* and *4.4-4.7.*

Qualifying Interest Feature of European Marine Site	Favourable Condition Target (subject to natural processes) (EN and CCW 2004)	Assessment
Wintering black-tailed godwit	The 5 year peak mean population size for the wintering black-tailed godwit population does not decrease.	The mean population size of black-tailed godwit populations will not be affected (see *Chapter 4 Section 4.2, 4.4 – 4.7).*
	The extent of intertidal flats and the spatial distribution of their constituent sediment community types is maintained.	Less than 0.5 ha of intertidal area will be lost and the majority of this is tipped slag material, with only a small area of silt and sand (see *Chapter 3 Section 3.4, Chapter 4 Section 4.4.1*). It is considered that this loss is de-minimis in the context of the SPA/Ramsar.
	The abundance and dispersion of black-tailed godwit prey species are maintained at levels sufficient to support the population size above.	No significant impacts are predicted on black-tailed godwit prey species as a result of the proposed berth modification (see *Chapter 4 Sections 4.2, 4.4 – 4.7).*
	The extent and spatial distribution of saltmarsh vegetation less than 10 cm in height is maintained.	No saltmarsh will be affected by the proposals (see *Chapter 4 Section 4.4*)
	Existing unrestricted bird sightlines of at least 200 m are maintained in every direction around both roosting sites and feeding areas**.**	Current sightlines will not be affected (see *Section 4.5* and *4.6*)
	Aggregations of roosting and feeding black-tailed godwit are not subject to significant disturbance.	Some disturbance to feeding black-tailed godwit is likely, but impacts will not be significant as: • alternative feeding opportunities exist elsewhere; • previous studies indicate populations have been unaffected by previous developments and port operations See *Chapter 4 Sections 4.2* and *4.4-4.7.*

Qualifying Interest Feature of European Marine Site	Favourable Condition Target (subject to natural processes) (EN and CCW 2004)	Assessment
Wintering curlew	The 5 year peak mean population size for the wintering curlew population does not decrease.	The mean population size of curlew populations will not be affected (see *Chapter 4 Section 4.2, 4.4 – 4.7).*
	The extent of intertidal flats and the spatial distribution of their constituent sediment community types is maintained.	Less than 0.5 ha of intertidal area will be lost and the majority of this is tipped slag material, with only a small area of silt and sand (see *Chapter 3 Section 3.4, Chapter 4 Section 4.4.1*). It is considered that this loss is de-minimis in the context of the SPA/Ramsar.
	The abundance and dispersion of curlew prey species are maintained at levels sufficient to support the population size above.	No significant impacts are predicted on curlew prey species as a result of the proposed berth modification (see *Chapter 4 Sections 4.2, 4.4 – 4.7).*
	The extent and spatial distribution of saltmarsh vegetation less than 10 cm in height is maintained.	No saltmarsh will be affected by the proposals (see *Chapter 4 Section 4.4*)
	Existing unrestricted bird sightlines of at least 200 m are maintained in every direction around both roosting sites and feeding areas**.**	Current sightlines will not be affected (see *Section 4.5* and *4.6*)
	Aggregations of roosting or feeding curlew are not subject to significant disturbance.	Some disturbance to feeding and roosting curlew is likely, but impacts will not be significant as: • alternative feeding and roosting opportunities exist elsewhere; • an additional roosting area will be created; • previous studies indicate populations have been unaffected by previous developments and port operations See *Chapter 4 Sections 4.2* and *4.4-4.7.*

Qualifying Interest Feature of European Marine Site	Favourable Condition Target (subject to natural processes) (EN and CCW 2004)	Assessment
Wintering redshank	The 5 year peak mean population size for the wintering redshank population does not decrease.	The mean population size of redshank populations will not be affected (see *Chapter 4 Section 4.2, 4.4 – 4.7).*
	The extent of intertidal flats and the spatial distribution of their constituent sediment community types is maintained.	Less than 0.5 ha of intertidal area will be lost and the majority of this is tipped slag material, with only a small area of silt and sand (see *Chapter 3 Section 3.4, Chapter 4 Section 4.4.1*). It is considered that this loss is de-minimis in the context of the SPA/Ramsar.
	The abundance and dispersion of redshank prey species are maintained at levels sufficient to support the population size above.	No significant impacts are predicted on redshank prey species as a result of the proposed berth modification (see *Chapter 4 Sections 4.2, 4.4 – 4.7).*
	The extent and spatial distribution of saltmarsh vegetation less than 10 cm is maintained.	No saltmarsh will be affected by the proposals (see *Chapter 4 Section 4.4*)
	Existing unrestricted bird sightlines of at least 200 m are maintained in every direction around both roosting sites and feeding areas**.**	Current sightlines will not be affected (see *Section 4.5* and *4.6*)
	Aggregations of roosting or feeding redshank are not subject to significant disturbance.	Some disturbance to feeding and roosting redshank is likely, but impacts will not be significant as: • alternative feeding and roosting opportunities exist elsewhere; • an additional roosting area will be created; • previous studies indicate populations have been unaffected by previous developments and port operations See *Chapter 4 Sections 4.2* and *4.4-4.7.*

Qualifying Interest Feature of European Marine Site	Favourable Condition Target (subject to natural processes) (EN and CCW 2004)	Assessment
Internationally important assemblage of regularly occurring waterbirds	The 5 year peak mean population size for the wintering waterbird assemblage does not decrease.	The mean population size of the waterbird assemblage will not be affected by the proposed berth modifications (see *Chapter 4 Section 4.2, 4.4 – 4.7).*
	The relative proportions of waders and wildfowl comprising the wintering waterbird assemblage is maintained.	The proportions of waterbirds making up the assemblage will be maintained (see *Sections 4.2* and *Sections 4.4 – 4.7*).
	The extent of intertidal flats and the spatial distribution of their constituent sediment community types is maintained.	Less than 0.5 ha of intertidal area will be lost and the majority of this is tipped slag material, with only a small area of silt and sand (see *Chapter 3 Section 3.4, Chapter 4 Section 4.4.1*). It is considered that this loss is de-minimis in the context of the SPA/Ramsar.
	The extent of saltmarsh and the spatial distribution of its constituent vegetation community types is maintained.	No saltmarsh will be affected by the proposals (see *Chapter 4 Section 4.4*)
	The extent and spatial distribution of saltmarsh vegetation less than 10 cm in height is maintained.	No saltmarsh will be affected by the proposals (see *Chapter 4 Section 4.4*)
	The extent of rocky shore at Hilbre Island, Middle Eye Little Eye and Tanskey rocks is maintained.	No impacts are predicted on these rocky shore communities (see *Chapter 3* and *Chapter 4 Section 4.4).*
	The extent and height of the shingle spit at Point of Ayr is maintained.	No impacts are predicted on the shingle spit (see *Chapter 3* and *Chapter 4 Section 4.4).*
	The abundance of waterbird prey species are maintained at levels sufficient to support the population size above.	No significant impacts are predicted on waterbird prey species (see *Chapter 4 Section 4.4).*.

Qualifying Interest Feature of European Marine Site	Favourable Condition Target (subject to natural processes) (EN and CCW 2004)	Assessment
	Greater than 25% cover of both seed bearing plants and soft leaved herbs and grasses is maintained during winter across the saltmarsh.	No saltmarsh will be affected by the proposals (see *Chapter 4 Section 4.4*)
	Existing unrestricted bird sightlines of at least 200 m are maintained in every direction around roosting sites, loafing and feeding areas.	Current sightlines will not be affected (see *Section 4.5* and *4.6*)
	Aggregations of roosting, loafing or feeding waterbirds are not subject to significant disturbance.	Some disturbance to feeding, loafing and roosting waterbirds is likely, but impacts will not be significant as: • alternative feeding and roosting opportunities exist elsewhere; • an additional roosting area will be created; • previous studies indicate populations have been unaffected by previous developments and port operations See *Chapter 4 Sections 4.2* and *4.4-4.7.*

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