7 SHIPPING AND NAVIGATION

Introduction

7.1.1 This chapter addresses the impacts of the construction and operation of the Pembroke Dock Infrastructure (PDI) project on shipping and navigation receptors. Specifically, this chapter considers the potential impact of PDI seaward of Mean High Water Springs (MHWS) during the construction and operation phases.

7.1.2 The assessment presented is informed by the following technical appendix:

- Appendix 7.1: Navigational Risk Assessment (NRA).

Assessment Methodology

Planning Policy Context

7.1.3 Chapter 5: Planning Policy describes the overarching legislation and policies relevant to PDI. This section specifically addresses legislation and policy relevant to shipping and navigation.

7.1.4 Welsh policy to protect and safeguard the marine environment has been prepared in line with national policy (Marine and Coastal Access Act, 2009) and delivered under the Well-being of Future Generations (Wales) Act 2015 and Environment (Wales) Act 2016. The overarching aim is to support the sustainable development of the Welsh marine area by taking account of the cumulative effects of all uses of the marine environment.

Planning Policy Wales

7.1.5 The Welsh Government (WG) published Planning Policy Wales Edition 10 (PPW) in December 2018, which aims for adjacent local planning authorities to collaborate to deliver an effective and integrated approach to natural resource management over the long term. PPW specifies the following in relation to Ports, Harbours, Marinas and Inland Waterways (Welsh Government, 2018):

"Functional and attractive ports, harbours, marinas and inland waterways, which meet current and future demand, make Wales an attractive location for businesses, visitors and freight transportation. Support and investment in these facilities unlocks potential to boost the economy both directly, from the greater use of the facilities, and indirectly through the opportunities that improved maritime transport infrastructure provide for other sectors (both nationally and internationally)";

"The Welsh National Marine Plan (WNMP) provides a vision within which ports, harbours, marinas and inland waterways can plan their current and future operations, including options for expansion and diversification. Planning authorities must consider the land use implications of the WNMP"; and

"Planning authorities should seek to promote the use of ports, harbours, marinas and inland waterways by the protection or provision of access to them and by the retention or provision of appropriate wharf, dock, harbour and rail transfer facilities to support economic activities in a way that minimises any adverse impacts on the environment. Planning authorities should also consider and, where appropriate, promote ports, and their surrounding area, for inter-modal freight interchanges and strategic employment sites".

Welsh National Marine Plan

7.1.6 The Welsh National Marine Plan (WNMP) area covers an area of 32,000 square kilometres of sea and 2,120 km of coastline. The WNMP was developed to provide a framework to support sustainable decision-making for the marine environment.

7.1.7 In order to describe the distribution of natural resources that could support future sector development, the WNMP plan identifies Resource Areas (RAs) for certain sectors. These are broad areas that describe the distribution of a particular resource that has the potential to be used or is used by certain marine sectors, e.g. aggregates, aquaculture or marine energy.

7.1.8 In order to allocate space and focus future use, the WNMP identifies Strategic Resource Areas (SRAs) for certain sectors. These are areas of good opportunity for future use over the plan period and beyond. SRAs lie within the related RA and are considered to have the greatest potential to support the growth of a sector.

7.1.9 The plan includes policies specific to the ports sector and to dredging and disposal of sediments and highlights the potential impacts that could occur in relation to ports.

7.1.10 Pembroke Port is located within a Strategic Resource Area (SRA). In order to describe the distribution of natural resources that could support future sector development, this plan identifies:

7.1.11 Policy P&S_01 specifies the following:

"Proposals for ports, harbours and shipping activities in Strategic Resource Areas (SRAs) are encouraged. Relevant public authorities should, in liaison with the sector and other interested parties, collaborate to understand opportunities for the sustainable use of port and shipping Strategic Resource Areas in order to support the sustainable growth of the ports and shipping sector through marine planning".

7.1.12 Policy P&S_02 specifies the following:

"Proposals that provide for the maintenance, repair, development and diversification of port and harbour facilities are encouraged".

7.1.13 The plan also sets out a safeguarding policy in relation to proposals with the potential to impact upon existing ports and shipping activities within SRAs. Policy P&S_03 specifies the following:

"Proposals potentially affecting Strategic Resource Areas for:

- *established commercial navigation routes;*
- *pilot boarding areas and commercial anchorages; or*
- *existing port, harbour and marina activities and their potential for future expansion;*

including where a consent or authorisation has been granted or formally applied for, should not be authorised except where compatibility with the existing, authorised or proposed activity can be satisfactorily demonstrated or there are exceptional circumstances. Compatibility should be achieved, in order of preference, through:

a) avoiding adverse impacts on those activities; and/or

b) *minimising impacts where they cannot be avoided; and/or*

c) *mitigating impacts where they cannot be minimised.*

If adequate compatibility cannot be achieved, proposals should present a clear and convincing justification for proceeding".

Technical Advice Note 18: Transport

7.1.14 Technical Advice Note (TAN) 18 was issued by the Welsh Assembly Government in 2007 and provides advice for local planning authorities on planning for transport infrastructure. In relation to port redevelopments, TAN18 specifies the following (Welsh Assembly Government, 2007):

"Local authorities should take care to ensure that developments intended to regenerate ports are not incompatible with any nearby port operations".

Local Planning Policy

7.1.15 The Pembrokeshire Local Development Plan (LDP) adopted in February 2013 is the Development Plan for the purposes of Section 38(6) of the Planning and Compulsory Purchase Act 2004.

7.1.16 The LDP specifies the following in relation to Pembroke Port (Pembrokeshire County Council, 2013):

"The port at Pembroke Dock connects the area to international trade and is developing as a centre of excellence for marine engineering related employment activity. Developments that seek to draw benefits to Pembrokeshire from these ports are to be welcomed".

Relevant Guidance

7.1.17 The assessments provided within this chapter and Appendix 7.1: Navigational Risk Assessment (NRA) have been guided by the Maritime and Coastguard Agency's (MCA's) Marine Guidance Note (MGN) 543 standard for assessing Offshore Renewable Energy Installations (OREIs) as this provides best practice advice. In addition, advice given within "A Guide to Good Practice on Port Marine Operations (Prepared in conjunction with the Port Marine Safety Code)" (DfT, February 2018) has been followed as appropriate.

7.1.18 The following relevant guidance has therefore been referenced during the assessment:

- Port Marine Safety Code: Sets out a national standard for every aspect of port marine safety;
- A Guide to Good Practice on Port Marine Operations (Prepared in conjunction with the Port Marine Safety Code): Supplements the Port Marine Safety Code. Contains useful information and additional guidance relevant to the management of ports and other marine facilities;
- MGN 543 Guidance on UK Navigational Practice, Safety and Emergency Response Issues; and
- International Maritime Organisation (IMO) (2018) Formal Safety Assessment: Sets out the process for undertaking marine navigation risk assessments.

Study Area

7.1.19 The Study Area is presented in Figure 7.1. The Study Area encompasses the PDI project area, within the Milford Haven Waterway (MHW), and extends to include the context of the immediate approaches to Pembroke Port including "Dockyard Bank" and the two approach channels.

7.1.20 The marine components assessed for navigational safety impacts are the Carr Jetty area and general approaches to the Port.

7.1.21 It is noted that most commercial traffic approaches from the west and passes to the north of Dockyard Bank before turning south at the eastern end of the Bank. However, some shallow draft vessels do use the channel to the west of Dockyard Bank.

Baseline Methodology

7.1.22 Information on shipping and navigation within the Study Area was collected through a detailed desktop review of existing studies and datasets. These are summarised in Table 7.1 and further information can also be found in Appendix 1.1: Navigational Risk Assessment (NRA).

Table 7.1: Summary of Key Desktop Datasets

Title	Source	Year	Author
Automatic Identification System (AIS) data	Marine Traffic	2018	Marine Traffic
Milford Haven Port Authority (MHPA) commercial traffic data	MHPA	2014-2019	-
Royal Yachting Association (RYA) leisure user intensity mapping	Wales Marine Planning Portal	2016	Welsh Government
MHPA incident datasets	MHPA	2013-2018	MHPA
Marine Accident Investigation Branch (MAIB) incident datasets	MAIB	1997 - 2017	MAIB
United Kingdom Hydrographic Office (UKHO) Publication NP37 – Admiralty Sailing Directions – West Coasts of England and Wales Pilot	UKHO	2014	UKHO

7.1.23 Vessel tracking data containing vessel-type and vessel tracks is available for vessels fitted with AIS transponders. Recent AIS data was obtained for the Study Area covering the following winter and summer periods:

- 01 to 28 February 2018; and
- 01 to 28 August 2018.

7.1.24 MCA's MGN 543 and the Port Marine Safety Code (PMSC) advise that an NRA should be based on the best available data that accounts for all marine users, not just those equipped with AIS. Typically, this is achieved through a radar and visual traffic survey. Given the scale of the PDI project and its location entirely within the MHPA Statutory Harbour Authority (SHA) area, this approach is not considered proportional for this project. Following advice from the MCA (see Table 7.2) it has been considered sufficient to obtain and analyse suitable AIS data and support the analysis of that data with wide stakeholder consultation to establish the status of non-AIS equipped traffic.

7.1.25 Recognising that AIS data cannot capture all vessel movements, and in order to verify AIS data sets, additional data regarding commercial vessel traffic was obtained from MHPA covering a five-year period (2014-2019) including the periods covered by AIS data.

7.1.26 A stakeholder workshop was held in January 2019 with a number of key navigation stakeholders including MHPA and other commercial and recreational operators within MHW, to gain local

knowledge and insight on navigation. A description of the consultation carried out is presented in Table 7.2.

Consultation

7.1.27 A summary of the key issues raised during consultation specific to shipping and navigation is outlined in Table 7.2, together with how these issues have been considered in the production of this chapter.

Table 7.2: Consultation Responses Relevant to Shipping and Navigation.

Date	Consultee	Issues raised	How/ Where Addressed
4 October 2018	National Resources Wales (NRW Scoping Opinion)	The Environmental Statement must include a Navigational Risk Assessment and show how the works – both during construction and subsequent operation – will be incorporated within MHPA's Safety Management System as described under the Port Marine Safety Code. Natural Resources Wales Permitting Service (NRW PS) advise the developer fully engages with local Royal National Lifeboat Institution (RNLI) and Her Majesty's Coastguard (HMCG), so that any impacts on Search and Rescue operations and access can be considered. The local Marine and Coast Guard Agency Marine Office should also be engaged with early on, so that local Survey & Inspection operations can be informed. The sections that cover navigational safety under the PMSC and its Guide to Good Practice are within section 7 of the guide which can be found at the following link. https://www.gov.uk/government/publications/a-guide-to-good-practice-on-port-marine-operations Section 7.8 of the above report relates to Regulating Harbour Works. NRW PS note that any Aids to Navigation (AtoNs) required will be agreed between Trinity House and Milford Haven Port Authority as the local lighthouse authority for the Area.	The NRA is presented in Appendix 7.1. RNLI and MCA have been consulted on the proposed works. It is recommended that the outcome of the NRA process feeds into the port's Navigation (Marine) Safety Management System (see Table 7.6), which is used to manage navigational risk.
22 January 2019	Telecon with MCA	MCA confirmed that radar data and visual data was not required to inform the NRA, providing that robust alternatives are demonstrated in the form of wide consultation.	The NRA is presented in Appendix 7.1. A stakeholder workshop was held in January 2019 with a number of key navigation stakeholders including MHPA and other commercial and recreational operators within MHW, to gain local knowledge and insight on navigation.
24 January 2019	Email from Irish Ferries	Effects on ferry schedule and services with the twice daily sailings from Pembroke Dock Ferry Terminal. Main issues: Restricted access to Pembroke Dock Ferry Terminal;	Potential impacts on the Irish Ferry are considered within Section 6.6

Date	Consultee	Issues raised	How/ Where Addressed
		The narrow Navigable Channel which the ferry transits, and no other vessel movements permitted during her transit to the berth; Increased activity around Pembroke Dock Waterway, which could incur slow passing of berths, causing delays; Delays to ferry service due weather and the impact any activity would have with this project.	and 6.7 and Appendix 7.1.
24 January 2019	Email from Trinity House Lighthouse Service (THLS)	Any existing aids to navigation in the areas being considered for development should be maintained or fully risk assessed with the Harbour Authority before removal or relocation. If any additional aids to navigation are considered, THLS will need to be consulted and can provide specific advice. THLS would stipulate any aids to navigation in their advice to NRW during the licencing process.	Aids to Navigation will be discussed and agreed with MHPA and THLS. See Table 7.6.
30 January 2019	Stakeholder (Navigation) Workshop	Hobbs Point to East of Cleddau Bridge There is an activity centre at Warrior Way [the Pembrokeshire Performance Sailing Academy, offering dinghy sailing, power boat and shore-based courses], meaning there will be a lot of small vessel activity. Yacht racing occurs at Neyland and Pembroke Yacht Club at Hobbs Point – Wednesday nights and Sunday. Start line uses entire width of MHW at Hobbs Point [these races go downstream from the start line which is in line with Neyland marina entrance]. Cruiser racing predominately occurs in daylight hours, 12-20 boats maximum, of 29-35 foot. Kids jumping/swimming across from Hobbs Point Jetty [unofficially]. Small craft training occurs at Warrior Way, and several children may use the slipway at any one time during the Spring/Summer. A dedicated safety boat recovers people (including children) from the water following practice capsize events. Some potting activity and line fishing also occur (predominately recreational).	Existing vessel traffic in the Study Area is identified in Section 6.3 from review of available data and as advised through consultation. Potential impacts on navigational issues for commercial and recreational vessels are assessed in Section 6.6 and 6.7.
30 January 2019	Stakeholder (Navigation) Workshop	Other general points raised: The MHPA regularly patrol the waters May-September. It was noted that there is good management and relationships between recreational users and MHPA, with a designated officer. Activities are generally away from the Port and there is well-established interaction.	Existing port traffic management measures are outlined within Section 6.3.
22 February 2019	Email from Pembrokeshire Performance Sailing Academy (PPSA)	AIS and RYA data sources are unreliable for the area. Many members of the public use the slipway seasonally at Warrior Way/Cleddau Reach to launch/recover craft (sailing dinghies, powerboats/sportboats, water ski/wakeboard users and personal watercraft). In addition, PPSA, Llanion Cove and other paddle sports and multi-activity users use the slipway throughout the year. The area is used to train novice sailors and powerboat users.	Recreational activities in the Study Area have been identified in Section 6.3 from review of available data and as advised through consultation. Potential impacts on recreational receptors are assessed in Section 6.6 and 6.7.

Assessment Criteria and Assignment of Significance

Navigational Risk Assessment

7.1.28 Potential impacts on shipping and navigation receptors are assessed primarily in accordance with guidance provided by the MCA. The MCA require that their methodology is used as a template for undertaking impact assessments (see MCA, 2013). This template is centred on risk management and requires a submission that shows that sufficient controls are, or will be, in place in order for the assessed risk to be judged as Acceptable or As Low as Reasonably Practicable (ALARP).

7.1.29 Appendix 7.1: Navigational Risk Assessment (NRA) presents the results of this assessment, including a description of the assessment methodology. In summary, the NRA process starts with the identification of all potential hazards. It then assesses the likelihood (frequency) of a hazard causing an incident and considers the possible consequences of that incident for two scenarios, namely the "most likely" and the "worst credible". Consequence and frequency are combined using a risk matrix which enables hazards to be ranked and a risk score assigned (taking into account the existing mitigation measures as set out in Table 7.6). The risk score is divided into three general categories:

- Acceptable;
- ALARP; and
- Intolerable.

7.1.30 The methodology used in the NRA determines where to prioritise risk control options for the navigational aspects of a project site. It is recommended that the outcome of this risk assessment process feeds into the Port's Navigation (Marine) Safety Management System (see Table 7.6), which is used to manage navigational risk.

7.1.31 The Environmental Impact Assessment (EIA) for shipping and navigation has interpreted the NRA to inform the assessment by considering risk within the assessment of magnitude (see Table 7.3).

Impact Assessment Criteria

7.1.32 The process for determining the significance of effects is two-stage which involves defining the magnitude of the impact and defining the sensitivity of the receptor. This section describes the criteria applied in this chapter to assign values to the magnitude of the impact and the sensitivity of receptor.

7.1.33 The criteria for defining magnitude in this chapter are outlined in Table 7.3 below.

Table 7.3: Definition of terms relating to the Magnitude of an Impact.

Magnitude of impact	Definition
Major	Loss or alteration to large portion or all of key components of current activity and/or impact is of extended physical extent and/or long-term duration and/or the frequency or risk of occurrence is continuous and/or effect is not reversible for project design life and/or risk is Intolerable.
Moderate	Loss or alteration to significant proportions of key components of current activity and/or physical extent of impact is moderate and/or medium-term duration and/or the frequency

Magnitude of impact	Definition
	or risk of occurrence is medium to continuous and/or effect is not reversible for project phase and/or risk is ALARP.
Minor	Minor shift away from baseline, leading to reduction in level of activity that may be undertaken and/or physical extent of impact is low and/or short to medium term and/or the frequency or risk of occurrence is low to continuous and/or effect is not reversible for project phase and/or risk is Acceptable or ALARP.
Negligible	Very slight change from baseline conditions and/or physical extent of impact is negligible and/or short-term duration and/or the frequency or risk of occurrence is negligible to continuous and/or effect is reversible and/or risk is Acceptable.
No change	No change from baseline conditions.

7.1.34 The criteria for defining sensitivity in this chapter are outlined in Table 7.4 below.

Table 7.4: Definition of terms relating to the Sensitivity of the Receptor.

Sensitivity	Definition
Very High	Receptor is of critical importance to the local, regional or national economy and/or the receptor is highly vulnerable to impacts with regard to navigation safety that may arise from the project and/or recoverability is long-term or not possible.
High	Receptor is of high value to the local, regional or national economy and/or the receptor is generally vulnerable to impacts with regard to navigational safety that may arise from the project and/or recoverability is slow and/or costly.
Medium	Receptor is of medium value to the local, regional or national economy and/or the receptor is somewhat vulnerable to impacts with regard to navigational safety that may arise from the project and/or has medium to high levels of recoverability.
Low	Receptor is of low value to the local, regional or national economy and/or the receptor is not generally vulnerable to impacts with regard to navigational safety that may arise from the project and/or has high recoverability.
Negligible	Receptor is of negligible value to the local, regional or national economy and/or the receptor is not vulnerable to impacts with regard to navigational safety that may arise from the project and/or has high recoverability.

Significance of Effects

7.1.35 The significance of the effect upon shipping and navigation is determined by correlating the magnitude of the impact and the sensitivity of the receptor. The particular method employed for this assessment is presented in Table 7.5. Where a range of significance of effect is presented in Table 7.5, the final assessment for each effect is based upon expert judgement.

7.1.36 For the purposes of this assessment, any effects with a significance level of minor or less have been concluded to be not significant in terms of the EIA Regulations.

Table 7.5: Assessment Matrix for determining the Significance of the Effect.

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

High	No change	Minor	Minor or Moderate	Moderate or Major	Major or Substantial
Very high	No change	Minor	Moderate or Major	Major or Substantial	Substantial

Limitations of the Assessment

7.1.37 The data sources used in this chapter are detailed in Section 6 of Appendix 7.1. The data used are the most up to date publicly available information which can be obtained from the applicable data sources as cited, supplemented (following advice from MCA) through wide consultation with local stakeholders as detailed in Table 7.2. The data are therefore limited by what is available and by what has been made available, at the time of writing the ES.

7.1.38 Notwithstanding this, it is considered that the data employed in the assessment are of a robust nature and are sufficient for the purposes of the impact assessment presented.

Baseline Description

Overview

7.1.39 The following sections provide a description of the baseline environment. Further information can be found in Appendix 7.1: Navigational Risk Assessment (NRA).

Navigational Features

7.1.40 The Port of Milford Haven is a leading UK shipping gateway handling liquid bulk, break bulk, dry bulk and project cargoes. It is the UK's largest energy port and is capable of delivering 30% of the UK gas demand. The Port of Milford Haven currently serves Valero Refinery and Valero Pembrokeshire Oil Terminal, Puma Energy, South Hook LNG and Dragon LNG. Cargoes are received from the North Sea, North and West Africa, the Middle East, Asia, and Europe, and processed materials are transported domestically and internationally. MHW is also home to Europe’s largest gas-fired power station, Pembroke Power Station. Additionally, Milford Haven Docks are home to a fishing fleet as well as handling fish from visiting trawlers, and MHW also includes a number of smaller harbours and marinas and is popular with leisure mariners.

7.1.41 The PDI project is located within Pembroke Port in the MHW. It is owned and operated by MHPA which is responsible for pilotage and conservancy on MHW. The Port is located within the Milford Haven SHA and Competent Harbour Authority (CHA) areas which are managed by MHPA. The Port operates on a 24-hour basis and has an established reputation for cargo and ferry services. Cargo operations include heavy lifts and environmentally managed cargo, as well as aggregates, animal feed, timber and fertiliser. The Ferry Terminal accommodates a twice daily freight and passenger service to Ireland with capacity to expand. Onsite facilities include storage, laydown and commercial properties.

7.1.42 MHPA periodically carries out maintenance dredging in several areas of MHW, predominantly in the main deep-water channel and approaches to the main hydrocarbon jetties. There is a licensed maintenance dredge area covering the principal berths in Pembroke Port and their approaches (see Appendix 7.1). There are also two licensed disposal sites in MHW and adjacent waters, the principal

site being outside the entrance of MHW (Milford Haven/St Ann's Head), while a small area also exists closer to Pembroke Port towards the Cleddau Bridge.

7.1.43 There are numerous subsea cables and pipelines within MHW. While no subsea cables are charted immediately adjacent to the Port area, chart 3275 (A) does show a "Numerous Disused Cables" annotation in the vicinity of Carr Spit.

7.1.44 There are no formal anchorages in the immediate vicinity of Pembroke Port. There are explicit anchoring prohibited areas around the wreck north east of the ferry berth. Anchoring is regulated and managed by MHPA port control.

Vessel Traffic Management

7.1.45 MHPA provides a Vessel Traffic Service (VTS) which actively monitors MHW below the Cleddau Bridge. Existing risk control measures within the SHA area include the following:

- Traffic management procedures (VTS/berth allocation);
- Lighting and marking of obstructions (AtoN);
- Charting of sites and obstructions;
- Competence and training of marine personnel;
- Operational procedures;
- Regulations (e.g. Collision Regulations, local byelaws);
- Pilotage;
- Dredging and surveying of the harbour and approaches;
- Waterway management with identified zones for different activities; and
- Dissemination of information via Notices to Mariners, Website, Year book etc.

Metocean Conditions

7.1.46 MHW provides deep water berths and most vessels have 24-hour tidal access. MHW experiences prevailing south-westerly winds, though winds from the north west and south east are not uncommon, with south-easterly winds being more common in the mornings from March to June inclusive (see Appendix 7.1). Pembroke Port is very sheltered, especially from the prevailing south-westerly winds.

Existing Vessel Traffic

7.1.47 MHPA data indicate that there are approximately 182 departures/arrivals from Pembroke Port per month during the winter months and 166 during the summer months (see Appendix 7.1), and this excludes tug movements. There is no significant difference between winter and summer traffic levels, with the Irish ferry making up the majority of movements, along with departures from Berths 1 and 2 on the eastern side of the Port, away from the project site.

7.1.48 Figure 7.2 and Figure 7.3 present an overview of AIS reported vessel traffic in MHW during the summer and winter of 2018 respectively.

7.1.49 The intensity of traffic bound for the main commercial berths is consistent in both summer and winter, with the routes to the main hydrocarbon berths (South Hook LNG, Valero refinery on the south bank, and Valero Oil Terminal and Dragon LNG), Milford Haven Dock and Pembroke Port being clearly visible. Consultation has also advised that commercial traffic is relatively consistent throughout the year, while leisure traffic is very seasonal in nature (predominantly during summer months).

7.1.50 Much more of MHW (i.e. in terms of area) is used in the summer by those vessels transmitting AIS data than is the case during the winter, particularly the margins of MHW including the approaches to Dale and the reaches above the Cleddau Bridge.

7.1.51 In the vicinity of the proposed development, consultation has advised that most traffic is commercial, although leisure use and other non-port-related traffic is significant in the approaches to the Port, especially during the summer months. The MHPA Leisure User Guide identifies three specific areas where traffic density is high, and in which there is a high incidence of "close quarters situations". One such caution area is to the north of Dockyard Bank close to the proposed development.

7.1.52 The following sections summarise the existing vessel traffic in the Study Area by vessel category (i.e. commercial, passenger, fishing, recreational, high-speed craft, and tugs and other vessels), based on analysis of the AIS data as supplemented by consultation advice where appropriate. Further information can be found in Appendix 7.1.

Commercial Vessel Activity

7.1.53 Commercial vessels include tankers and cargo vessels. Generally, these vessels were recorded transiting to the eastern berths POP1 and POP2 and approaching from the north around Dockyard Bank (Figure 7.4 and Figure 7.5).

Passenger Vessel Activity

7.1.54 Pembroke Port is an important ferry port for southern Irish Sea passenger and freight traffic. The Irish Sea ferry routinely makes two departures/arrivals per day from Pembroke Port, with the normal route taken (north of Dockyard Bank and on the berth at Pembroke Dock Ferry Terminal (PDFT)) shown in Figure 7.6 and Figure 7.7.

7.1.55 Other passenger ferry tracks were recorded, including to and from Neyland during both seasons, and towards the upper MHW and some further south during the summer, however there are few movements close to the PDI project area.

Fishing Vessel Activity

7.1.56 There were minimal fishing vessel movements recorded in the Study Area, with a small number of tracks recorded in the winter period only (Figure 7.8). This aligns with feedback from stakeholder consultation. The main fishing port in MHW is at Milford Haven Docks.

Recreational Vessel Activity

7.1.57 MHW is an important and well used area for water-based leisure activities, including sailing and motorboat cruising. There are also a wide variety of other activities including paddle sports, sail training, swimming, diving and coasteering. Overall these are well regulated by MHPA in conjunction with the Pembrokeshire Coast National Park Authority (PCNPA), and compliance with rules and

regulations is enforced through the year-round presence of the MHPA Water Ranger (particularly during the summer). Leisure and other uses of MHW are zoned, and clear information is given in the annual Tide Tables and Leisure User Guide.

7.1.58 While leisure users do not use the Port itself as a base, leisure use of MHW in the immediate approaches to the Port can be intensive, and includes leisure sailing, paddle sports, power boating, organised racing and dinghy training. Consultation has advised that leisure navigation close to the project area and existing Pembroke Port berths is very limited, with leisure mariners choosing to avoid conflict with larger commercial traffic. The Port is not within the Pembrokeshire Coast National Park, but the upper and lower reaches of MHW are within the National Park boundaries, encouraging leisure activities and visitors to the whole of MHW.

7.1.59 Although most leisure vessels in MHW are unlikely to transmit AIS data, numerous tracks were recorded in the summer, likely to be larger vessels, mainly transiting between Neyland and the seaward end of MHW (Figure 7.9).

High Speed Craft

7.1.60 High-speed craft (likely to be commercial vessels as well as some motorised leisure vessels) were recorded in both the summer and winter AIS datasets as show in in Figure 7.10 and Figure 7.11 respectively. These were generally recorded between Neyland and the seaward approaches of MHW. None of the recorded tracks appear to indicate Pembroke Port as a destination, although it is understood that occasional wind farm crew transfer vessels visit the port for maintenance and other purposes. However, on such voyages they will be subject to port control directions and are unlikely to be travelling at operational speeds.

Tugs and Other Service Vessels

7.1.61 Tugs and other service vessels include harbour towage tugs which make regular movements escorting vessels in and out of the Port. This category of vessel was the most commonly recorded in close proximity to the proposed development (see Figure 7.12 and Figure 7.13). These vessels are highly manoeuvrable and have very experienced crews with excellent local knowledge. These vessels are shown to use either of the two existing routes into the Port (east and west of the Dockyard Bank).

Search and Rescue

7.1.62 RNLI lifeboats are stationed at Angle on the southern shore of MHW. Her Majesty's Coast Guard (HMCG) helicopter assets are based at St Athan near Cardiff, and Newquay in Cornwall. Milford Haven Coastguard Operations Centre (CGOC) is the local coastguard base for the region and co-located with the MHPA offices and VTS centre.

Maritime Accidents and Incidents

7.1.63 Analysis of MAIB data has identified some 183 incidents in the vicinity of MHW over a period of 20 years (between 1997 and 2017). The most common causes were identified as accident to person, mechanical failure/loss of control, contact and grounding. The majority of incidents have been reported as "less serious" or "marine incidents" (near misses) since recording of incident severity began (in 2012). Most of these statistics will relate to large commercial vessel movements. Incidents

involving small vessels (only), especially leisure craft, are unlikely to be represented in MAIB statistics. However, stakeholder consultation confirmed that incidents involving small craft rarely resulted in significant damage or injuries.

7.1.64 In general, more incident and near miss reports were recorded in the summer than the winter period, which reflects the greater traffic densities during this period (see paragraph 6.3.12). In terms of incident category (e.g. contact, grounding), review of the data supplied for 2018 corresponded with the evidence provided in the MAIB data.

Future Baseline Conditions

7.1.65 While both Pembroke Port and MHPA are actively looking to increase business and, therefore, vessel traffic within the wider MHW, there are currently no firm commitments to new services, and with the exception of possible growth in marine renewable energy related traffic, it is not expected that traffic profiles will be dissimilar from those presented above. The number of vessels servicing the marine renewable energy industry, and in particular the local proposed Marine Energy Test Area (META) project test sites, will become greater and increase the current traffic density. Such vessels may typically comprise small to medium work boats, occasional jack up barges, high speed crew transfer vessels and survey craft. These projects are further considered in the cumulative effects assessment (CEA) presented in Section 6.11.

Mitigation Measures Adopted as Part of the Project

7.1.66 As part of the project design process, a number of designed-in measures have been proposed to reduce the potential for impacts on shipping and navigation (see Table 7.6). As there is a commitment to implementing these measures, they are considered inherently part of the design of the PDI project and have therefore been considered in the assessment presented in Section 6.6 and 6.7 below (i.e. the determination of significance assumes implementation of these measures), along with the existing port traffic management measures discussed above in Section 6.3. These measures are considered standard industry practice for this type of development.

Table 7.6: Designed-in Mitigation Measures

Measures adopted	Justification
Promulgation of information including Notices to Mariners during the construction phase, advising on the location, nature and timing of the works.	To help ensure that other mariners and interested parties are aware of the presence of the works and the need to avoid the area during this period. Stakeholder engagement is already well established and managed by the MHPA. The PDI project will consider forming additional stakeholder groups or add new invitees to existing meetings after construction is complete.
Aids to Navigation.	The PDI project will liaise with MHPA and/or THLS to ensure construction areas and new infrastructure are appropriately marked for navigational safety.
Marine charting.	Update nautical charts and publications and add suitable chart notes after construction is complete, to ensure other mariners and interested parties are aware of the location of the works.
Advisory clearance distances are likely to be recommended around vessels undertaking construction activities. The nature of the	Advisory clearance distances are recommended in the interests of navigational safety.

Measures adopted	Justification
advisory clearance distances will be discussed and agreed with the MHPA on a case-by-case basis.	
The PDI project will consider the use of safety vessels/guard boats during construction activities.	To ensure other traffic does not encroach on the construction area.
Compliance with International Maritime Organisation Conventions including COLREGs and SOLAS.	To ensure that standard levels of navigation and vessel safety are adhered to by all project related vessels.
Update to Navigation (Marine) Safety Management System.	It is recommended that the outcome of the NRA process (see Appendix 7.1) feeds into the Port's Navigation (Marine) Safety Management System, which is used to manage navigational risk.
Review of Port Emergency Plan.	Consideration will be given to reviewing the Port Emergency Plan in light of the changed use of the Port infrastructure during construction and operation. Consideration will also be given to providing a safety boat during construction.

Description of Works

7.1.67 A detailed description of the proposed construction and operational activities is provided in Chapter 2: Project Description. A summary of the marine elements of the proposed development is provided in Table 7.7. It is anticipated that construction works for the marine components will be over a period of 12 months. The construction of the new slipway is likely to be undertaken in phases to ensure that an operational slipway always remains available.

Table 7.7: Summary of Proposed Marine Works.

Proposed works	Description of works
Capital dredging around the slipways and within the Graving Dock	Pre-construction dredging within the footprint of the new slipway. Excavation above tide level by backhoe excavator or hydraulic breaker. Below tide level the excavator will be positioned on a barge. Dredging of silt and debris from existing Graving Dock. Likely method using a temporary cofferdam installed across entrance to dock and material removed via sludge pump and excavator in the dry. Dredged material will be disposed of at an authorised dredging disposal site.
Creation of a single large slipway by combining the two existing westernmost slipways and extending the slipway into the MHW into deeper water.	Installation of 250 m of temporary sheet piling and removal of the central section between two existing slipways and installation. A clean stone base will provide the base for the pre-cast concrete slipway which will extend to approximately 8 m below chart datum and cover an area of approximately 75 m by 85 m. It is proposed to increase the gradient from 1 in 17 (at the existing slipways) to 1 in 12 and move the slipway crest landward by approximately 36 m. As the gradient of the new slipway has been increased and the crest moved landward, the new slab level will be below the foundation level of the existing flank walls. These walls will, therefore, be underpinned, which will be carefully organised and executed to maintain the integrity of the existing walls and to undertake the work tidally 'in the dry'. It is likely that a new reinforced concrete boundary wall will be constructed below the existing wall.
Infilling of the Graving Dock	Graving Dock dewatered and infilled with crushed stone over a layer of sand. Stone revetment installed across entrance to the Graving Dock.
Infilling of Timber Pond	Decommissioning/plugging of the intake and outfall pipes (e.g. by installing sheet piles) followed by dewatering of the Timber Pond and either treatment/removal of sediment. Infill of sand and granular material will be up to existing ground level.

7.1.68 During the construction phase there is likely to be a temporary and minor increase in traffic density within and adjacent to the work area (compared with current traffic levels). This is expected to include:

- Small dredgers and possibly spoil barges (self-propelled or with tugs);
- Survey vessels; and
- Small general work boats/crew boats.

7.1.69 Some of the works may be carried out from the shore at low tide, bringing land-based equipment (long reach excavators for example) close to navigational areas of the Port.

7.1.70 Construction vessel movements anticipated in relation to the slipway works are presented in Table 7.8. There will be no construction vessel movements associated with the works at the Timber Pond or Graving Dock.

Table 7.8: Possible Construction Vessel Movements – Slipway.

Project Activity	Dredger	JUB/ Barge and Crane	Barge Movements
Dredging Operation	1		22
Stone Bedding		1	4
Precast Slabs			5

7.1.71 During its operational phase, the PDI project will generate additional movements of vessels which are most likely to be in the “tugs and other service vessel” category. These vessels are likely to be able to use either of the two existing routes into the Port (east and west of the Dockyard Bank). The PDI project has been designed to accommodate an additional 30 vessel movements per month during the operational phase.

Assessment of Construction Effects

Presence of construction activities and associated vessels may deviate vessel routes leading to a loss of navigable space

Magnitude of Impact

7.1.72 The presence of construction activities and associated vessels in the vicinity of the project may deviate vessel routes leading to a loss of navigable space. There may be up to 31 construction vessel movements associated with the slipway works over the construction period and there may be temporary advisory clearance distances around construction/dredging vessels.

7.1.73 Vessels transiting in the vicinity of the works are most likely to be commercial vessels, the Irish Sea Ferry, and tugs and other service vessels, although leisure traffic can be intensive in the approaches to the Port during the summer.

7.1.74 Commercial vessels and the Irish Sea Ferry generally approach the Port from the north around Dockyard Bank, to the berths on the eastern side of the Port. This route is unlikely to be affected by construction vessels which will be operating in close proximity to the western side of the Port.

7.1.75 Tugs and other service vessels were the most commonly recorded vessel type in close proximity to the project and these vessels use either of the two existing routes into the Port (east and west of the Dockyard Bank). Access via the west of Dockyard Bank is likely to be restricted during the construction phase (although the intention is for at least one operational slipway to always remain available), which may increase traffic along the eastern route and associated vessel movements to/from the berths on the eastern side.

7.1.76 There are approximately 182 departures/arrivals from Pembroke Port berths per month during the winter months and 166 during the summer months, excluding tug movements, with most of the movements on the eastern side of the Port, away from the project site. The number of construction vessel movements across the 12-month construction period is therefore relatively low in comparison to the baseline level of port-related traffic. All traffic will continue to be managed by means of VTS traffic management. Construction works will take place in close proximity to the western side of the Port which will minimise potential disturbance to existing operations on the eastern side.

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

Sensitivity of Receptor

7.1.78 Consultation with Irish Ferries identified that the ferry transits through a narrow navigable channel and ideally no other vessel movements should be permitted during the transit to the berth. Irish Ferries also raised concern over potential delays to the ferry service.

7.1.79 It is anticipated that vessels using the eastern approach route (i.e. commercial vessels, the Irish Sea Ferry, tugs and other service vessels) will be able to continue to use the eastern approach route during construction activities. Vessels using the western approach route (i.e. tugs and other service vessels) may experience restricted access. Construction activities and any associated temporary advisory clearance distances would be communicated in advance via Notices to Mariners as described in Table 7.6, ensuring that vessels can plan their approach accordingly. Pembroke Port is subject to existing port traffic management measures and all traffic is managed by means of VTS traffic management reducing the potential for congestion and delays.

7.1.80 This receptor is deemed to be of low vulnerability, high recoverability and medium value. The sensitivity of the receptor is therefore, considered to be low.

Significance of Effect

7.1.81 Overall, the sensitivity of the receptor is considered to be low and the magnitude of the impact is deemed to be low. The effect will, therefore, be of minor adverse significance, which is not significant in EIA terms.

Vessel to vessel collision risk during construction

Magnitude of Impact

7.1.82 The presence of construction activities and associated vessels in the vicinity of the PDI project may lead to increased vessel to vessel collision risk. There may be up to 31 construction vessel movements associated with the slipway works over the construction period, and any restrictions on access via the west of Dockyard Bank may also increase traffic along the eastern route and associated vessel movements to/from the berths on the eastern side.

7.1.83 Vessels transiting in the vicinity of the project activities are most likely to be commercial vessels, the Irish Sea Ferry, and tugs and other service vessels, although leisure traffic can be intensive in the approaches to the Port during the summer.

7.1.84 This potential impact is considered within the NRA (see Annex B within Appendix 7.1) under the hazard “Collision” which considers the potential for vessel to vessel collisions due to a range of possible causes including a vessel altering course to avoid works and traffic density. Considering a combination of consequence and frequency, the overall risk rating was considered to be low (Acceptable) for collision between tugs/service craft and recreational vessels, tugs/service craft and commercial vessels, and tugs/service craft and passenger vessels; and ALARP for collision between recreational vessels and passenger vessels, recreational vessels and commercial vessels and commercial vessels and passenger vessels. As described in the NRA, the highest risks assessed are associated with existing traffic and conditions, albeit the assessment has considered the higher traffic densities and operational patterns of traffic connected with the construction and operation of the new facility.

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

Sensitivity of Receptor

7.1.86 The designed-in measures including promulgation of information through Notices to Mariners and appropriate navigational marking will ensure that mariners are aware of the location of the construction works and can plan accordingly. Existing port traffic management measures will also remain effective, including clear channel marking, proactive VTS traffic management and zoning of MHW. It is recommended that MHPA review minimum levels of competence and local knowledge for all commercial vessel masters using the port, even if vessel sizes are small and masters may not require Standards of Training Certification and Watchkeeping (STCW) certification.

7.1.87 The receptor is deemed to be of medium vulnerability, medium recoverability and medium value. The sensitivity of the receptor is therefore, considered to be medium.

Significance of Effect

7.1.88 Overall, the sensitivity of the receptor is considered to be medium and the magnitude of the impact is deemed to be low. The effect will, therefore, be of minor adverse significance, which is not significant in EIA terms.

Vessel to structure allision risk during construction

Magnitude of Impact

7.1.89 The presence of construction activities and associated vessels in the vicinity of the PDI project may lead to increased vessel to structure contact ('allision') risk, whereby a vessel may make contact with a fixed structure (e.g. jetty structure or temporary construction works).

7.1.90 Vessels transiting in the vicinity of the project activities are most likely to be commercial vessels, the Irish Sea Ferry, and tugs and other service vessels, although leisure traffic can be intensive in the approaches to the port during the summer.

7.1.91 This potential impact is considered within the NRA under the hazard "Contact" which considers the potential for contact/allision with a fixed structure due to a range of possible causes including ineffective aids to navigation or promulgation of information. Considering a combination of consequence and frequency, the overall risk rating was considered to be low (Acceptable) for passenger vessels, recreational vessels, and tugs/service craft; and ALARP for commercial vessels. As described in the NRA, the highest risks assessed are associated with existing traffic and conditions, albeit the assessment has considered the higher traffic densities and operational patterns of traffic connected with the construction and operation of the new facility.

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

Sensitivity of Receptor

7.1.93 The designed-in measures including promulgation of information through Notices to Mariners and appropriate navigational marking will ensure that mariners are aware of the location of the construction works and can plan accordingly. Existing port traffic management measures will also remain effective, including clear channel marking, proactive VTS traffic management and zoning of MHW. It is recommended that MHPA review minimum levels of competence and local knowledge for all commercial vessel masters using the Port, even if vessel sizes are small and masters may not require STCW certification.

7.1.94 The receptor is deemed to be of low vulnerability, medium recoverability and medium value. The sensitivity of the receptor is therefore, considered to be low.

Significance of Effect

7.1.95 Overall, the sensitivity of the receptor is considered to be low and the magnitude of the impact is deemed to be low. The effect will, therefore, be of minor adverse significance, which is not significant in EIA terms.

Presence of construction activities may reduce Search and Rescue (SAR) and pollution response capabilities

Magnitude of Impact

7.1.96 RNLI lifeboats are stationed at Angle on the southern shore of MHW and HMCG helicopter assets are based at St Athan near Cardiff, and Newquay in Cornwall. The construction phase is likely to have minimal impact on SAR response, though consideration will need to be given during this phase to access to vessels and the shore for lifeboats and helicopters while construction is underway (i.e. provision of safe access/landing sites).

7.1.97 Consideration will be given to reviewing the Port Emergency Plan in light of the changed use of the port infrastructure during construction and operation. Consideration will also be given to providing a safety boat during construction (see Table 7.6).

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

Sensitivity of Receptor

7.1.99 Considering the designed-in measure to review the Port Emergency Plan, SAR resources are deemed to be of low vulnerability, high recoverability and high value. The sensitivity of the receptor is therefore, considered to be medium.

Significance of Effect

7.1.100 Overall, the sensitivity of the receptor is considered to be medium and the magnitude of the impact is deemed to be low. The effect will, therefore, be of minor adverse significance, which is not significant in EIA terms.

Assessment of Operational Effects

Presence of additional vessels may deviate vessel routes leading to a loss of navigable space

Magnitude of impact

7.1.101 The presence of additional vessels using the PDI project facilities may increase traffic density and deviate vessel routes leading to a loss of navigable space. The project has been designed to accommodate up to 1 additional vessel per day.

7.1.102 Vessels transiting in the vicinity of the redevelopment are most likely to be commercial vessels, the Irish Sea Ferry, tugs and other service vessels, although leisure traffic can be intensive in the approaches to the port during the summer months. The additional movements of vessels are most likely to be in the “tugs and other service vessel” category.

7.1.103 Commercial vessels and the Irish Sea Ferry generally approach the Port from the north around Dockyard Bank, to the berths on the eastern side of the Port. Tugs and other service vessels use either of the two existing routes into the Port (east and west of the Dockyard Bank). Following

completion of construction, both routes will remain available, with the additional tugs/service vessels likely to be able to use either route. Operations from the re-configured slipways may be tidally constrained and working within tidal windows may need to be considered in traffic management planning, especially if such windows coincide with other vessel (e.g. ferry) movements.

7.1.104 There are approximately 182 departures/arrivals from Pembroke Port berths per month during the winter months and 166 during the summer months, excluding tug movements. The number of additional vessel movements is therefore relatively low in comparison to the baseline level of port related traffic and all traffic will continue to be managed by means of VTS traffic management.

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

Sensitivity of Receptor

7.1.106 Consultation with Irish Ferries identified that the ferry transits through a narrow navigable channel and ideally no other vessel movements should be permitted during the transit to the berth. Irish Ferries also raised concern over potential delays to the ferry service. Pembroke Port is subject to existing port traffic management measures and all traffic is managed by means of VTS traffic management reducing the potential for congestion and delays. The additional tugs/service vessels are likely to be able to use either approach channel and therefore avoid conflict with larger vessels required to use the eastern route.

7.1.107 The receptor is deemed to be of low vulnerability, high recoverability and medium value. The sensitivity of the receptor is therefore, considered to be low.

Significance of Effect

7.1.108 Overall, the sensitivity of the receptor is considered to be low and the magnitude of the impact is deemed to be low. The effect will, therefore, be of minor adverse significance, which is not significant in EIA terms.

Increased traffic density may lead to increased vessel to vessel collision risk

Magnitude of impact

7.1.109 The presence of additional vessels in the vicinity of the project may lead to increased vessel to vessel collision risk. The project has been designed to accommodate up to 1 additional vessel movement per day.

7.1.110 Vessels transiting in the vicinity of the project are most likely to be commercial vessels, the Irish Sea Ferry, tugs and other service vessels, although leisure traffic can be intensive in the approaches to the port during the summer months. The additional movements of vessels are most likely to be in the “tugs and other service vessel” category.

7.1.111 This potential impact is considered within the NRA under the hazard “Collision” which considers the potential for vessel to vessel collisions due to a range of possible causes including traffic density.

Considering a combination of consequence and frequency, the overall risk rating was considered to be low (Acceptable) for collision between:

- Tugs/service craft and recreational vessels;
- Tugs/service craft and commercial vessels; and
- Tugs/service craft and passenger vessels.

7.1.112 The risk rating was considered to be ALARP for collision between:

- Recreational vessels and passenger vessels;
- Recreational vessels and commercial vessels; and
- Commercial vessels and passenger vessels

7.1.113 As described in the NRA, the highest risks assessed are associated with existing traffic and conditions, albeit the assessment has considered the higher traffic densities and operational patterns of traffic connected with the construction and operation of the new facility.

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

Sensitivity of Receptor

7.1.115 Existing port traffic management measures will remain effective, including clear channel marking, proactive VTS traffic management and zoning of MHW. It is recommended that MHPA review minimum levels of competence and local knowledge for all commercial vessel masters using the port, even if vessel sizes are small and masters may not require STCW certification.

7.1.116 The receptor is therefore deemed to be of low vulnerability, medium recoverability and medium value. The sensitivity of the receptor is therefore, considered to be low.

Significance of Effect

7.1.117 Overall, the sensitivity of the receptor is considered to be low and the magnitude of the impact is deemed to be low. The effect will, therefore, be of minor adverse significance, which is not significant in EIA terms.

Increased traffic density may increase vessel to structure allision risk

Magnitude of Impact

7.1.118 The presence of additional vessels in the vicinity of the project may lead to increased vessel to structure allision risk, whereby a vessel may make contact with a fixed structure (e.g. jetty).

7.1.119 Vessels transiting in the vicinity of the project are most likely to be commercial vessels, the Irish Sea Ferry, tugs and other service vessels, although leisure traffic can be intensive in the approaches to

the port during the summer months. The additional movements of vessels are most likely to be in the “tugs and other service vessel” category.

7.1.120 This potential impact is considered within the NRA under the hazard “Contact” which considers the potential for contact/allision with a fixed structure due to a range of possible causes including ineffective aids to navigation or promulgation of information. Considering a combination of consequence and frequency, the overall risk rating was considered to be low (Acceptable) for passenger vessels, recreational vessels, and tugs/service craft; and ALARP for commercial vessels. As described in the NRA, the highest risks assessed are associated with existing traffic and conditions, albeit the assessment has considered the higher traffic densities and operational patterns of traffic connected with the construction and operation of the new facility.

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

Sensitivity of Receptor

7.1.122 The designed-in measures including promulgation of information through Notices to Mariners and appropriate navigational marking and charting will ensure that mariners are aware of the configuration of the new facility and can plan accordingly. Existing port traffic management measures will also remain effective, including clear channel marking, proactive VTS traffic management and zoning of MHW. It is recommended that MHPA review minimum levels of competence and local knowledge for all commercial vessel masters using the port, even if vessel sizes are small and masters may not require STCW certification.

7.1.123 The receptor is deemed to be of low vulnerability, medium recoverability and medium value. The sensitivity of the receptor is therefore, considered to be low.

Significance of Effect

7.1.124 Overall, the sensitivity of the receptor is considered to be low and the magnitude of the impact is deemed to be low. The effect will, therefore, be of minor adverse significance, which is not significant in EIA terms.

Operational impacts on SAR and pollution response capabilities

Magnitude of Impact

7.1.125 The project has been designed to accommodate an additional 1 vessel movement per day during operation phase. These vessels are most likely to be tugs and other service vessels which are likely to be able to use either of the two existing routes into the Port (east and west of the Dockyard Bank).

7.1.126 RNLI lifeboats are stationed at Angle on the southern shore of MHW and HMCG helicopter assets are based at St Athan near Cardiff, and Newquay in Cornwall. Consideration will be given to reviewing the Port Emergency Plan in light of the changed use of the port infrastructure during operation to ensure access.

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

Sensitivity of Receptor

7.1.128 Considering the designed-in measure to review the Port Emergency Plan, SAR resources are deemed to be of low vulnerability, high recoverability and high value. The sensitivity of the receptor is therefore, considered to be medium.

Significance of Effect

7.1.129 Overall, the sensitivity of the receptor is considered to be medium and the magnitude of the impact is deemed to be low. The effect will, therefore, be of minor adverse significance, which is not significant in EIA terms.

Further Mitigation

7.1.130 No further mitigation has been identified as being required in relation to shipping and navigation.

Accidents and/or Disasters

7.1.131 The NRA considers the potential for a fire or explosion to occur on a vessel in the assessment area, including a fire aboard a vessel engaged in the project. The hazard “Fire/Explosion” considers a range of possible causes including machinery or system failure, failure to follow procedure, or onboard operations (e.g. welding). Considering a combination of consequence and frequency, the overall risk rating was considered to be ALARP for passenger vessels, recreational vessels, commercial vessels and tugs/service vessels. As described in the NRA, the highest risks assessed are associated with existing traffic and conditions, albeit the assessment has considered the higher traffic densities and operational patterns of traffic connected with the construction and operation of the new facility.

7.1.132 As this project is taking place in a well-established port within a larger PMSC compliant SHA area, all of the identified hazards have previously been risk assessed and risk reduced to ALARP through the introduction of a range of appropriate risk controls. These controls will continue to apply during the construction and operation phases of the redevelopment and have been considered during this assessment.

Potential Changes to the Assessment as a Result of Climate Change

7.1.133 Taking into account the information identified in the baseline section above, it is considered unlikely that any potential future changes to baseline conditions as a result of climate change would affect any of the assessments presented for shipping and navigation.

Assessment of Cumulative Effects

7.1.134 The cumulative effects of the PDI project have been considered with other plans or projects within a pre-defined geographical area as part of a cumulative effects assessment (CEA). The assessment has considered developments that are at the Scoping stage or later in the consenting process. Developments that are built and operational at the time of assessment have been considered as part of the baseline. These developments are described in Table 7.9 and are presented in Figure 7.14.

Table 7.9: Projects and Activities Considered for Assessment of Cumulative Effects.

Project (Developer)	Spatial Overlap	Temporal Overlap	Description and proposed development activities	Further Assessment required?	Justification
Dredging sites	Partly (see next column in bold)	Yes	DML1743 – Dredge and disposal from Neyland Marina, 2017-2020 (Neyland Yacht Haven ltd.) – annual volume 5,500 m^3, **spatial overlap**; DML1646 – Milford Haven maintenance dredging, 2017-2022 (MHPA). Annual volume 362,500 m3, spatial overlap, see Figure 7.14. RML1462 - Dredging a 32 m x 20 m approach channel in relation to the construction of a new lock structure in relation to the proposed Martello Quays sites, 2017-2022 (The Conygar Investment Company plc). Annual volume 9500 m^3. **No spatial overlap**	No	DML 1743 and DML 1646 included as part of the topic baseline and hence not considered within the CEA. There is a high level of uncertainty with regards to the Martello Quays project (see below). As a result, this project has been scoped out.
Disposal sites	No	Yes	Neyland dredge disposal site - LU190: South of Neyland within the central channel of the Milford Haven, 0.22 NM diameter x 5 m depth. Status: Open Milford Haven Two dredge disposal site - LU169: To the south of Milford Haven dredge disposal grounds, unknown diameter x 50 m depth. Status: Open Milford Haven Three dredge disposal site - LU169: To the west of Milford Haven dredge disposal grounds, 1 nm diameter x unknown depth. Status: Open	No	Included as part of the topic baseline and hence not considered within the cumulative impact assessment.
Deployment of scientific equipment and marker buoys (University College of Swansea) - DEML1845	No	Yes	Deposition and subsequent removal of marker buoys with environmental monitoring and mid-water settlement plates, 2018-2019	No	Screened out due to no spatial overlap.
Martello Quay (Martello Quays Ltd.) - LPA Ref: 07/0020/CA	Yes	No	Planning permission was approved by PCC in February 2008. The project will include up to 260 marina berths and associated car parking; marine workshops and a chandlery; 450 houses and apartments; a new public promenade; shops; a pub and restaurant; a hotel; and a five-screen multiplex cinema.	No	There is a high level of uncertainty with regards to timescales, EIA and project construction works, considering no progress has been made since the permission was

Project (Developer)	Spatial Overlap	Temporal Overlap	Description and proposed development activities	Further Assessment required?	Justification
					granted in 2008. As a result, this project has been scoped out.
Marine Energy Test Area 1 (Pembrokeshire Coastal Forum)	Yes	Yes	The project will provide five testing sites located within Pembroke Port to support testing and monitoring of marine energy components and subassemblies. Testing activities includes mobilisation and demobilisation of vessels, deployment and monitoring of components/subassemblies. Components and sub-assemblies will be deployed to the seabed, on the surface or within water column.	Yes	Testing and monitoring activities are likely to be undertaken during construction and operation phase of the PDI project. Potential for service craft to use PDI project facilities.
Marine Energy Test Area 2 (Pembrokeshire Coastal Forum)	No	Yes	The project will provide three testing sites located within or near MHW to support testing and monitoring of marine energy devices. Testing activities includes mobilisation and demobilisation of vessels, deployment wave and tidal energy devices. Devices will be deployed to the seabed, on the surface or within water column.	Yes	Testing activities are likely to be undertaken during construction and operation phase of the PDI project. Potential for service craft to use PDI project facilities.
Pembrokeshire Wave Energy Demonstration Zone (Wave Hub Ltd.)	No	Yes	The project entails the development of 90 km^2 of seabed with water depths of approximately 50 metres and a wave resource of approximately 19 kW/m; to support the demonstration of wave arrays with a generating capacity of up to 30MW for each project. Consent for this project could be achieved in 2022, infrastructure could be built by 2024 and the first technology could be installed in 2025.	Yes	Testing activities are likely to be undertaken during construction and operation phase of the PDI project. Potential for service craft to use PDI project facilities.
Mixed used development (MHPA) - LPA reference: 14/0158/PA	No	Yes	Demolition of several existing buildings and the mixed-use redevelopment of Milford Waterfront comprising up to 26,266 m^2 of commercial, hotel, leisure, retail and fishery related floorspace. Up to 190 residential properties, up to 70 additional marina berths, replacement boat yards, landscaping, public realm enhancements, access and ancillary works. A decision on this application is yet to be made by the local planning authority.	No	This project is to be excluded from the CEA on the grounds that there is no spatial overlap with the PDI project.
Cable Interconnector (Greenlink) - Welsh Government reference: qA1296053	No	Yes	The project is a 500 MW subsea electricity interconnector linking the power markets in Ireland and Great Britain and is planned for commissioning in 2023. As an EU Project of Common Interest, it is one of Europe's most important energy infrastructure projects. The interconnector is planned to make	No	This project is to be excluded from the CEA on the grounds that there is no spatial overlap with the PDI project.

Project (Developer)	Spatial Overlap	Temporal Overlap	Description and proposed development activities	Further Assessment required?	Justification
Ground investigations - RML1827			Landfall at Freshwater West beach to the south of the mouth of the MHW. A marine licence application has been submitted in 2018, pending decision, for marine ground =investigations and for the Interconnector.		
Combined Heat and Power (CHP) Cogeneration Unit at Pembroke Refinery Welsh Government reference: qA1312073	No	Yes	The project is to provide the refinery's electrical power and support its steam demands. Valero has configured the project to efficiently generate electricity whilst using the waste heat arising from this combustion process to produce super-heated steam for use within the refinery. The use of waste heat and the production of steam usefully increases the overall efficiency of the electrical generation plant.	No	This project is to be excluded from the CEA on the grounds that there is no spatial overlap with the PDI project and no impact pathway to identified shipping and navigation receptors.

7.1.135 The following projects and their associated activities have been screened in for cumulative assessment:

- Marine Energy Test Area (META) Phase 1 and Phase 2; and
- Pembrokeshire Wave Energy Demonstration Zone.

7.1.136 The PDI project is closely associated with the META Phase 1 and META Phase 2 projects. The META Phase 1 project consists of five sites for the testing of wave and tidal energy devices at Pembroke Port, specifically at Carr Jetty (, Mainstay Quay, Ferryside, Quay 1 and Criterion Jetty. Due to the location of the Carr Jetty test site within the PDI project area, this site will only be available for testing prior to the commencement of the project construction activities (RPS, 2019) and therefore there is no potential for cumulative effects with this site. For the other sites there is potential for the presence of components and subassemblies in the water column, on the seabed and surface, for a maximum period of six months per deployment. The META Phase 2 project consists of an additional three sites within and/or in close proximity to MHW however the closest site, Warrior Way, is 2 km from Pembroke Port (see Figure 7.14).

7.1.137 The META Phase 1 and META Phase 2 projects are likely to result in additional vessel movements in MHW to support the testing activities. For the META Phase 1 project, there may be up to five vessels carrying out deployment and retrieval activities up to once per month and up to five vessels carrying out operation and maintenance activities up to twice per week. For the META Phase 2 project site at Warrior Way, there may be up to 40 vessel movements associated with deployment and retrieval operations in a 12-month period and up to 104 vessel visits to the devices in a 12-month period. Activities associated with the Pembrokeshire Wave Energy Demonstration Zone may also lead to increased vessel movements within MHW, if such vessels use Pembroke Port facilities.

7.1.138 As the PDI project has been designed to accommodate the additional marine traffic which will be required to service the META devices, and potentially additional marine renewable energy developments in the future, operational traffic levels associated with such projects have already been assessed in Section 6.6 and 6.7 and within the NRA through review of potential incident frequency. Accordingly, the cumulative assessment presented below does not include consideration of operational vessel movements to avoid double counting effects. The cumulative assessment therefore focuses on the installation, deployment and maintenance activities associated with the META Phase 1 project located at Pembroke Port.

Cumulative effects on navigable space

Magnitude of Impact

7.1.139 The presence of construction and operational activities and associated vessels in the vicinity of the of the PDI project, alongside installation and deployment activities associated with the META Phase 1 project, may deviate vessel routes leading to a loss of navigable space.

7.1.140 The META Phase 1 Mainstay Quay site is located within Pembroke Port adjacent to existing quayside operations at Mainstay Quay. The Ferryside test site will require the installation of a pontoon on the south side of the Ferry Terminal Roll-On Roll-Off (Ro-Ro) berthing area, which will

cover an area of approximately 278 m^2. The Ro-Ro berth will remain operational and therefore no restrictions are anticipated. The Quay 1 site is located within Pembroke Port which is in use for general cargo/offloading. The Criterion Jetty site is located adjacent to the existing jetty, which is not currently operational.

7.1.141 Vessels transiting in the vicinity of Pembroke Port are most likely to be commercial vessels, the Irish Sea Ferry, tugs and other service vessels, with intensive leisure traffic in the approaches to the Port during the summer months. Existing port traffic management measures will remain effective, including clear channel marking, proactive VTS traffic management and zoning of MHW. The META Phase 1 sites have been selected through engagement with MHPA in order to ensure that the proposed sites and activities have minimal impact on ongoing port activities and recreational vessel activity.

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

Sensitivity of Receptor

7.1.143 Notices to Mariners will be promulgated during the construction or installation and maintenance phases of the PDI project and META Phase 1 projects, ensuring that mariners are aware of the nature, location and timing of the operations. Existing port traffic management measures will remain effective, including clear channel marking, proactive VTS traffic management and zoning of MHW. During the META Phase 1 deployment and retrieval activities, permission will be sought from MHPA prior to component/subassembly deployment to ensure that proposed activities will not impact on ongoing port activities.

7.1.144 The receptor is deemed to be of low vulnerability, high recoverability and medium value. The sensitivity of the receptor is therefore, considered to be low.

Significance of Effect

7.1.145 Overall, the sensitivity of the receptor is considered to be low and the magnitude of the impact is deemed to be low. The cumulative effect will, therefore, be of minor adverse significance, which is not significant in EIA terms.

Cumulative effects on allision risk

7.1.146 The presence of construction and operational activities and associated vessels in the vicinity of the PDI project area, alongside installation and deployment activities associated with the META Phase 1 project, may lead to increased vessel to structure allision risk, whereby a vessel may make contact with a fixed or floating structure, e.g. temporary construction works or META test device.

7.1.147 Vessels transiting in the vicinity of Pembroke Port are most likely to be commercial vessels, the Irish Sea Ferry, and tugs and other service vessels, with intensive leisure traffic in the approaches to the port during the summer months. Notices to Mariners will be promulgated during the construction or installation and maintenance phases of the project and META Phase 1 project, ensuring that mariners are aware of the nature, location and timing of the operations. Existing port traffic

management measures will remain effective, including clear channel marking, proactive VTS traffic management and zoning of MHW. The META Phase 1 sites have been selected through engagement with MHPA in order to ensure that the proposed sites and activities have minimal impact on ongoing port activities and recreational vessel activity.

7.1.148 Overall, the cumulative effect is considered to be of minor adverse significance, which is not significant in EIA terms.

Cumulative effects on SAR and pollution response capabilities

7.1.149 RNLI lifeboats are stationed at Angle on the southern shore of MHW and HMCG helicopter assets are based at St Athan near Cardiff, and Newquay in Cornwall. Consideration will need to be given to access to vessels and the shore for lifeboats and helicopters (i.e. provision of safe access/landing sites). On the basis that the Port Emergency Plan will be reviewed and updated to reflect the proposed works, the cumulative effect is considered to be of minor adverse significance, which is not significant in EIA terms.

Inter-relationships

7.1.150 Across the project lifetime, the effects on shipping and navigation receptors are not anticipated to interact in such a way as to result in combined effects of greater significance than the assessments presented for each individual phase. Any receptor-led effects are predicted to be no greater than the individual effects assessed in isolation.

Summary of Effects

7.1.151 The proposed project was assessed with respect to impacts on shipping and navigation receptors. Potential impacts were identified including loss of navigational space, collision risk, allision risk and effects on SAR resources. All impacts have been assessed to be of minor adverse significance, which is not significant in EIA terms.

7.1.152 A summary of the of the likely environmental effects is provided in Table 7.10.

Table 7.10: Summary of Likely Environmental Effects on Shipping and Navigation.

Receptor	Sensitivity of receptor	Description of impact	Short / medium / long term	Magnitude of impact	Significance of effect	Significant / Not significant	Notes
Construction phase							
Shipping and Navigation receptors	Low	Presence of construction activities and associated vessels may deviate vessel routes leading to a loss of navigable space	Short term	Low	Minor adverse significance	Not significant	
Shipping and Navigation receptors	Medium	Presence of construction activities may lead to increased vessel to vessel collision risk	Short term	Low	Minor adverse significance	Not significant	
Shipping and Navigation receptors	Medium	Physical presence of construction activities may increase vessel to structure allision risk	Short term	Low	Minor adverse significance	Not significant	
Shipping and Navigation receptors	Medium	Presence of construction activities may reduce SAR and pollution response capabilities	Short term	Low	Minor adverse significance	Not significant	
Operational phase							
Shipping and Navigation receptors	Low	Presence of additional vessels may deviate vessel routes leading to a	Long-term	Low	Minor adverse significance	Not significant	

Receptor	Sensitivity of receptor	Description of impact	Short / medium / long term	Magnitude of impact	Significance of effect	Significant / Not significant	Notes
		loss of navigable space					
Shipping and Navigation receptors	Low	Increased traffic density may lead to increased vessel to vessel collision risk	Long-term	Low	Minor adverse significance	Not significant	
Shipping and Navigation receptors	Low	Increased traffic density may increase vessel to structure allision risk	Long-term	Low	Minor adverse significance	Not significant	
Shipping and Navigation receptors	Medium	Operational impacts on SAR and pollution response capabilities	Long-term	Low	Minor adverse significance	Not significant	

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Non-Technical Summary

7.1.153 The Port of Milford Haven is a leading UK shipping gateway handling liquid bulk, break bulk, dry bulk and project cargoes. It is the UK's largest energy port and is capable of delivering 30% of the UK gas demand. The PDI project is located within Pembroke Port in the MHW. It is owned and operated by MHPA which is responsible for pilotage and conservancy on MHW. The Port operates on a 24-hour basis and has an established reputation for cargo and ferry services. There are no formal anchorages in the immediate vicinity of Pembroke Port. There are explicit anchoring prohibited areas around the wreck north east of the ferry berth. Anchoring is regulated and managed by MHPA port control.

7.1.154 MHPA provides a Vessel Traffic Service (VTS) which actively monitors MHW below the Cleddau Bridge. MHPA data indicate that there are approximately 182 departures/arrivals from Pembroke Port per month during the winter months and 166 during the summer months. There is no significant difference between winter and summer traffic levels, with the Irish ferry making up the majority of movements, along with departures from Berths 1 and 2 on the eastern side of the Port, away from the project site.

7.1.155 Commercial vessels include tankers and cargo vessels. Generally, these vessels were recorded transiting to the eastern berths POP1 and POP2 and approaching from the north around Dockyard Bank.

7.1.156 Pembroke Port is an important ferry port for southern Irish Sea passenger and freight traffic. The Irish Sea ferry routinely makes two departures/arrivals per day from Pembroke Port, with the normal route taken (north of Dockyard Bank and on the berth at Pembroke Dock Ferry Terminal (PDFT).

7.1.157 There were minimal fishing vessel movements recorded in the Study Area, with a small number of tracks recorded in the winter period only.

7.1.158 MHW is an important and well used area for water-based leisure activities, including sailing and motorboat cruising. There are also a wide variety of other activities including paddle sports, sail training, swimming, diving and coasteering.

7.1.159 183 incidents in the vicinity of MHW have occurred over a period of 20 years (between 1997 and 2017). The most common causes were accident to person, mechanical failure/loss of control, contact and grounding.

7.1.160 Several mitigation measures have been considered as part of the intrinsic project design to reduce the potential for impacts on shipping and navigation. These measures are considered to be standard industry practice for this type of development and include the following:

- Promulgation of information including Notices to Mariners during the construction phase, advising on the location, nature and timing of the works.
- Aids to Navigation.
- Marine charting.

- Advisory clearance distances are likely to be recommended around vessels undertaking construction activities. The nature of the advisory clearance distances will be discussed and agreed with the MHPA on a case-by-case basis.
- The PDI project will consider the use of safety vessels/guard boats during construction activities.
- Compliance with International Maritime Organisation Conventions including COLREGs and SOLAS.
- Update to Navigation (Marine) Safety Management System.
- Review of Port Emergency Plan.

7.1.161 The presence of construction activities and associated vessels in the vicinity of the project may deviate vessel routes leading to a loss of navigable space. There may be up to 31 construction vessel movements associated with the slipway works over the construction period and there may be temporary advisory clearance distances around construction/dredging vessels. The number of construction vessel movements across the 12-month construction period is therefore relatively low in comparison to the baseline level of port-related traffic. It is anticipated that vessels using the eastern approach route (i.e. commercial vessels, the Irish Sea Ferry, tugs and other service vessels) will be able to continue to use the eastern approach route during construction activities. Vessels using the western approach route (i.e. tugs and other service vessels) may experience restricted access.

7.1.162 The presence of construction activities and associated vessels in the vicinity of the PDI project may lead to increased vessel to vessel collision risk. The overall risk rating was considered to be low (Acceptable) and as low as reasonable possible for various vessel types. The designed-in measures including promulgation of information through Notices to Mariners and appropriate navigational marking will ensure that mariners are aware of the location of the construction works and can plan accordingly. Existing port traffic management measures will also remain effective, including clear channel marking, proactive VTS traffic management and zoning of MHW.

7.1.163 Presence of construction activities and associated vessels in the vicinity of the PDI project may lead to increased vessel to structure contact ('allision') risk. This impact considers the potential for contact/allision with a fixed structure due to a range of possible causes including ineffective aids to navigation or promulgation of information. The overall risk rating was considered to be low (Acceptable) for passenger vessels, recreational vessels, and tugs/service craft; and ALARP for commercial vessels. The designed-in measures including promulgation of information through Notices to Mariners and appropriate navigational marking will ensure that mariners are aware of the location of the construction works and can plan accordingly.

7.1.164 During operation phase of the project the presence of additional vessels using the PDI project facilities may increase traffic density and deviate vessel routes leading to a loss of navigable space. The project has been designed to accommodate up to 1 additional vessel per day. Operations from the re-configured slipways may be tidally constrained and working within tidal windows may need to be considered in traffic management planning, especially if such windows coincide with other vessel (e.g. ferry) movements. The number of additional vessel movements was considered

relatively low in comparison to the baseline level of port related traffic and all traffic will continue to be managed by means of VTS traffic management. Considering the designed-in measures the overall impact was not considered to be significant in EIA terms

7.1.165 The presence of additional vessels in the vicinity of the project may lead to increased vessel to vessel collision risk. The project has been designed to accommodate up to 1 additional vessel movement per day. This potential magnitude is considered to be low (Acceptable) for tugs and all other vessels and as low as reasonably possible with commercial, passenger and recreational vessels. Considering the designed-in measures the overall impact was not considered to be significant in EIA terms

7.1.166 The presence of additional vessels in the vicinity of the project may lead to increased vessel to structure allision risk, whereby a vessel may make contact with a fixed structure (e.g. jetty). The overall risk rating was considered to be low (Acceptable) for passenger vessels, recreational vessels, and tugs/service craft; and ALARP for commercial vessels. Considering the designed-in measures the overall impact was considered to be significant in EIA terms.

7.1.167 RNLI lifeboats are stationed at Angle on the southern shore of MHW and HMCG helicopter assets are based at St Athan near Cardiff, and Newquay in Cornwall. The construction and operation phase is likely to have minimal impact on SAR response, though consideration will need to be given during the construction phase to access to vessels and the shore for lifeboats and helicopters while construction is underway (i.e. provision of safe access/landing sites). During operation consideration will be given to reviewing the Port Emergency Plan in light of the changed use of the port infrastructure to ensure access.

7.1.168 The Marine Energy Test Area (META) Phase 1 and Phase 2; and Pembrokeshire Wave Energy Demonstration Zone were considered to assess cumulative impacts from the project on shipping and navigation impacts in terms of impacts on navigable space, allision risk, SAR and pollution response capabilities. It was found that the level of impact were not significant in EIA terms for all impact pathways assessed.