

10 Commercial and Recreational Navigation

Introduction

- 10.1 This chapter of the PEIR addresses the navigation (commercial and recreational) impacts of the proposed OMSSD project and has been produced by ABPmer. In advance of receiving the latest available baseline navigational data from the PLA, this PEIR chapter provides information on the methodology that has been applied and the anticipated impacts of the scheme on the navigational environment, based on navigational data that is available. This chapter has been informed by the draft Navigational Risk Assessment (NRA) provided in Appendix 10.1. A full assessment, including a final NRA will be included in the ES.
- 10.2 As discussed in the Water Environment preliminary assessment (Chapter 8), the final dredge and disposal method has not yet been confirmed. For preliminary assessment purposes, therefore, it has been assumed as a worst-case that the capital dredge will be undertaken by Trailer Suction Hopper Dredging (TSHD) and the arisings will be deposited at an existing licensed marine disposal site, subject to the Waste Hierarchy Assessment (WHA). The closest open licensed marine disposal site is the North Edinburgh Channel (TH080) in the Outer Thames and for the purposes of this PEIR, it is this site which has been assumed to be the disposal location (if required).
- 10.3 Further considerations, however, are ongoing into the potential disposal of the dredged arisings at an existing licensed land based facility. Discussions are being undertaken with relevant operators of such facilities. Should a land site be viable such disposal will not affect the water environment.
- 10.4 Although Water Injection Dredging (WID) is considered not to be viable for much of the capital dredged material due to the relatively high proportion of gravel, it is likely to be the optimal method for any maintenance dredging during operation of the Jetty 2 berth pocket. This method has been assessed for the operational phase as a realistic worst case. WID will not require the disposal of any dredge arisings and therefore the potential impacts at the marine disposal site (as outlined above) have only been assessed for the capital dredge during construction.

Definition of the Study Area

- 10.5 The study area for the assessment comprises the Thames Estuary from Southend Pier in the east to the London Gateway port facility to the west of the OMSSD site. The area selected covers principal marine traffic patterns and activities associated with the wider area that have the potential to impact on the operation of the facility and planned construction works. The study area, therefore, encompasses the Holehaven and Benfleet Creeks and the immediate

area around the Oikos facility. The wider area is known as Sea Reach and is covered by UKHO Admiralty chart 1185, SC5606 (UKHO, 2014) (see Appendix 10.1).

Assessment Methodology

Data and Information Sources

Automatic identification system data

- 10.6 The most recent national dataset of Automatic Identification System (AIS) data published by the Marine Management Organisation (MMO) for the year 2015 has been utilised to inform the NRA. The data have been decoded to create a geodatabase of anonymised vessel transits. The data were collected by the Marine and Coastguard Agency (MCA) using their network of AIS receivers. The data set represents a composite of 84 days of AIS data collected in 2015. Data from the first week of each month of the year was sought, to provide a representative set of vessel traffic information that would take seasonal variations into account. If the first week of each month has not been available due to incomplete data, a one week period as close as practicable to the first week of the month has been utilised. The full data set is comprised of information from the following time periods:
- Days 1 to 7 from each of the following: January, February, March, April, May, June, July, August, and November 2015;
 - Days 8 to 14 of October 2015;
 - Days 29 August to 4 September 2015; and
 - Days 3 to 9 December 2015.
- 10.7 AIS signals are broadly classified as 'Class A' and 'Class B', where AIS-A is carried by international voyaging ships with C(GT) of 300 or more tonnes, and all passenger ships regardless of size. AIS-B is carried by smaller vessels and is aimed at smaller commercial craft, the fishing sector and recreational vessel users. However, the use of AIS-B is not compulsory. Both AIS-A and AIS-B data have been used within this study.
- 10.8 The AIS data has been analysed and classified into the following vessel categories, which are taken directly from the AIS data transmissions:
- Non-Port service craft;
 - Port service craft;
 - Vessels engaged in dredging or underwater operations;
 - High Speed Craft;
 - Military or law enforcement vessels;
 - Passenger vessels;
 - Cargo vessels;

- Tankers;
- Fishing; and
- Recreational.

Recreational activity

10.9 Information on recreational activity in the study area has been collated using a variety of methods. Quantitative data has been derived from AIS-B records although it is recognised that only a small percentage of recreational craft carry AIS transceivers, since the use of AIS-B is not mandatory. Therefore, patterns of activity related to recreational craft have also been collected from anecdotal sources, including port staff, recreational users and yachting guides.

Port statistics

10.10 Statistics for port freight and vessel movements at major ports is recorded by the Department for Transport (DfT). This data is collected by annual returns provided by the ports and made available online (DfT 2021)³⁰¹. The method used for collation of vessel movements at major ports was altered in 2017, resulting in comparison with previous years becoming untenable.

Navigational features

10.11 Navigational features have been considered in this assessment and have been identified using information from UK Hydrographic Office (UKHO) Admiralty chart 1185, SC5606 (UKHO, 2014). This chart is used by mariners as part of the passage planning process and to plot progress during a passage and so contains all relevant navigational information.

Maritime incidents

10.12 To characterise maritime incidents occurring within the study area, available data has been pooled from two sources. These included records held by the Royal National Lifeboat Institution (RNLI) call out data and data from the Marine Accident Investigation Branch (MAIB) reported incidents database. Data from the RNLI callout database and the MAIB database has been obtained for the following timescales:

- MAIB: information includes all marine accidents/incidents reportable under the Merchant Shipping (accident reporting and investigation) regulations 2012 to the MAIB. This data set covers the period of 2015 to 2019 inclusive.
- RNLI: complete dataset of all callouts from 2015 to 2019 inclusive.

³⁰¹ DfT (2021) Port and domestic waterborne freight statistics, Department for Transport (DfT). [Available online at <https://www.gov.uk/government/collections/maritime-and-shipping-statistics>] [Accessed Feb 2021].

Determining Significance of Effects

- 10.13 In order to assess the potential effects upon commercial shipping and recreational navigation, relative to the existing baseline, a combination of analytical methods and expert judgement have been used. This has included qualitative assessments of data obtained from the Oikos Facility, consideration of the existing evidence base and empirical evaluation.
- 10.14 The assessment methodology has followed the source-pathway-receptor model and the findings have been used to establish the potential magnitude of the predicted changes to the levels of marine risk and the overall significance of the likely effect of those changes. A receptor can only be exposed to a change if a pathway exists through which an effect can be transmitted between the source activity and the receptor. The effects have been initially assessed through expert opinion and by undertaking a draft NRA (Appendix 10.1). From the draft NRA process, a set of initial mitigation measures have been identified. These will be finalised and confirmed as part of the final NRA that will be undertaken and presented in the ES. These final mitigation measures, will be implemented either directly into the scheme design, or via management practices. The overall object is to maintain risk within a limit that is deemed 'as low as responsibly practicable' (ALARP) (DfT, 2016)³⁰².
- 10.15 Following the preparation of the draft NRA (Appendix 10.1), an evaluation of the significance of potential impacts identified has been undertaken based on the following methodology.

Significance criteria

- 10.16 Potential impacts on shipping and navigation receptors, identified as part of the NRA process, have been assessed in terms of the EIA using a consistent scale of sensitivity and magnitude, as described in the following section.

Sensitivity of Receptor

- 10.17 When a receptor is exposed to an impact, the overall sensitivity of the receptor to that impact needs to be considered. This process incorporates a degree of subjectivity. The sensitivity assessments for shipping and navigation receptors have applied expert opinion and have had regard to the following:
- Outputs of the NRA;
 - Number of transits of specific vessels and/or vessel type; and
 - Level of risk established through assessment of the accident-incident rate.
- 10.18 For the purposes of assessing the impact on shipping and navigation receptors, the level of sensitivity covers a range from neutral to very high. The greater the safety impact and/or the lower the ability for the receptor to adapt to the impact, the greater the level of sensitivity. A

³⁰² Department for Transport (2016) Port Marine Safety Code.

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/415007/Port_marine_Safety_Code.pdf Website accessed 07 December 2020.

safety impact is classified as any impact that may influence the navigational safety of the shipping and navigation receptor.

10.19 Table 10.1 presents the definitions of sensitivity that have been applied in the assessment.

Table 10.1: Sensitivity of receptor definitions

Sensitivity	Definition
Very High	Very high level of safety impact for shipping and navigation receptors. Very limited ability to adapt to impact.
High	High level of safety impact for shipping and navigation receptors. Limited ability to adapt to impact.
Medium	Medium level of safety impact for shipping and navigation receptors. Some ability to adapt to impact.
Low	Low level of safety impact for shipping and navigation receptors. Ability to adapt to majority of impact.
Negligible	Negligible level of safety impact for shipping and navigation receptors. Ability to adapt to all of impact.
Neutral	No impact for shipping and navigation receptors.

Magnitude of Impact

10.20 Once the sensitivity of the receptor has been defined, an assessment is undertaken of the magnitude of the impact as defined by its geographical extent, frequency of occurrence and duration. Determining the overall magnitude of shipping and navigation impacts also incorporates a degree of subjectivity as decisions are based on expert opinion in combination with baseline data and information from the Statutory Harbour Authority (SHA).

10.21 Table 10.2 presents the definitions of impact magnitude that have been applied in this assessment.

Table 10.2: Impact magnitude definitions

Magnitude	Definition
Major Negative	Impact geographical area beyond the extent of the study area. Impact present on a permanent basis throughout the operation of the terminal. Impact occurs very frequently to constantly/permanently.
Moderate Negative	Impact localised to geographical extent of the study area. Impact present on a permanent basis throughout the operation of the terminal. Impact occurs frequently.
Minor Negative	Impact localised to geographical extent of the study area. Impact present on a temporary basis. Impact relatively infrequent.
Neutral	No impact on shipping and navigation receptors.
Positive	Shipping and navigation receptors benefit as a result of the scheme/development.

Effect significance

- 10.22 The outcomes of the assessment of the sensitivity of the receptor and the magnitude of the potential impact are applied to a matrix to define the significance of the resulting effect.
- 10.23 Table 10.3 presents the matrix that has been used to define the significance of effects in this assessment.

Table 10.3: Significance of effect matrix

		Magnitude				
		Major Negative	Moderate Negative	Minor Negative	Neutral	Positive
Sensitivity	Very High	Major Adverse	Major Adverse	Moderate to Minor Adverse	No Impact	Major to minor beneficial
	High	Major Adverse	Major to Moderate Adverse	Minor Adverse	No Impact	Major to minor beneficial
	Medium	Moderate Adverse	Moderate to Minor Adverse	Minor Adverse	No Impact	Moderate beneficial
	Low	Minor Adverse	Minor Adverse	Insignificant	No Impact	Minor beneficial
	Negligible	Minor/ Insignificant	Insignificant	Insignificant	No Impact	Insignificant
	Neutral	No impact	No impact	No impact	No impact	No impact

Consultation

- 10.24 Initial discussions with the PLA in respect of the OMSSD project have taken place. Statutory Consultation has been undertaken with the PLA in its capacity as the SHA and Competent Harbour Authority (CHA) to establish available navigational information. In respect of detailed navigational considerations, consultation has been undertaken with the following PLA officers:
 - Senior Harbour Master; and
 - VTS Manager.
- 10.25 Recreational clubs, marinas and boat yards within the study area have also been consulted including:
 - Island Yacht Club (Sailing Yachts);
 - Alexandra Yacht Club (Dinghies);
 - Benfleet Yacht Club (Keelboats and Sailing Yachts);
 - Leigh Motor Boat Club (Motorboats);

- Leigh-on-Sea Sailing Club (Dinghies);
- Essex Yacht Club (Sailing Yachts and Dinghies);
- Thames Estuary Yacht Club (Sailing Yachts);
- Halcon Marine (Small Gains Creek); and
- Dauntless Boatyard.

10.26 The consultation that has been undertaken, along with the outcome of such consultation and how it has influenced the navigational risk assessment is presented in Table 10.4.

Table 10.4: Summary of consultation to date

Consultee	Reference, Date	Summary of Response	How comments have been addressed in this Chapter
PINS	Scoping Opinion, May 2020	Displacement, swamping and grounding of vessels, deviation and snagging of gear and anchors impacts: The Scoping Report does not include these potential impacts in the Initial Assessment of Likely Effects in paragraphs 9.30 and 9.31. The Inspectorate cannot agree to scope out these potential impacts due to the potential change in volume and movement patterns of vessels throughout the year as a result of the Proposed Development during the construction, operation and decommissioning phases. The ES should include an assessment of any significant effects where they are likely to occur.	Swamping and Grounding have been scoped into this PEIR chapter and draft NRA, with relevant scenarios produced (Appendix 10.1). This PEIR chapter and the NRA process has assessed the effects of swamping and grounding. The operations which constitute the marine works and the planned vessel usage during the operational phase of the project will not change the potential risk of displacement, deviation, snagging or anchor impacts compared with the current baseline situation.
PINS	Scoping Opinion, May 2020	Delays in marine traffic during Operation: The Scoping Report does not consider potential impacts from delays at ports caused by adverse weather and industrial related issues. The exclusion of these impacts is not justified and considering the industrial nature of the Proposed Development, the Inspectorate cannot agree to scope out these matters. The ES should include an assessment of any significant effects where they are likely to occur.	This PEIR chapter and the NRA process has assessed the effect of delays to marine operations for each of the identified hazard scenarios. This method follows recommendations of Marine Guidance Note 543, Offshore Renewable Energy Installations Safety Response (MCA, 2016) and the Guide to Good Practice on Port Marine

Consultee	Reference, Date	Summary of Response	How comments have been addressed in this Chapter
			Operations (DfT/MCA, 2018 ³⁰³). As the facility is located within a Statutory Harbour area and the change to the baseline condition only improves access to the facility, the effects of delay to marine traffic during operation is not considered to require further assessment.
PINS	Scoping Opinion, May 2020	Frequency definition: The methodology proposes to use frequency of impact as relevant factor in determining magnitude. Accordingly, the ES should ensure that the 'frequency' is defined and quantified in order to aid understanding.	The definitions of frequency used have been included in the PEIR chapter and the draft NRA (Appendix 10.1).
PINS	Scoping Opinion, May 2020	Baseline and vessels related to the operation of the Proposed Development: The Scoping Report does not define the type, size, routing or volumes of recreational and commercial vessels in the baseline or in the anticipated operational phase of the development; this should be described in the ES. This should include consideration of all anticipated vessel movements regardless of their port of origin.	The type, size, routing and volumes of recreational and commercial vessels have been defined in the PEIR chapter and draft NRA (Appendix 10.1).
Port of London Authority	Scoping Opinion, May 2020	The PLA note that the redline boundary for the proposed development extends beyond the physical aspects of the development and into the River Thames itself, including the proposed dredging area at jetty two and parts of the river around jetties one and three. It is questioned, particularly for jetties one and three that if there are no works proposed in the river around these 2 sites, whether the red line boundary	The larger boundary is required for the assessment of traffic patterns in the area which may be affected or could have a potential effect on the construction and operational phases of the project.

³⁰³ DfT/MCA, (2018) Port Marine Safety Code – A Guide to Good Practice on Port Marine Operation. Department for Transport (DfT) and Maritime Coastguard Agency (MCA), published February 2018.

Consultee	Reference, Date	Summary of Response	How comments have been addressed in this Chapter
		should just extend around the jetties themselves rather than include parts of the riverbed where no works are proposed.	
Port of London Authority	Scoping Opinion, May 2020	It needs to be made clear as the scheme develops on any impacts as a result of the increased river traffic, particularly once the facility is operational.	This PEIR chapter and draft NRA (Appendix 10.1) provides an assessment of the baseline condition and the effects of the project on river traffic.
Port of London Authority	Scoping Opinion, May 2020	The expected number of additional vessels that will be expected to visit the facility annually should be displayed.	The PEIR chapter and draft NRA (Appendix 10.1) assess the expected number of additional vessels in the operational phase due to the proposed works.
Port of London Authority	Scoping Opinion, May 2020	It is considered that the PLA must be consulted as part of each section within the ES where the PLA have made comments in this response.	The PLA has been consulted with regards to the PEIR chapter and draft NRA (Appendix 10.1).
Port of London Authority	Scoping Opinion, May 2020	Details of vessels sizes must be provided as part of the ES.	The PEIR chapter and draft NRA (Appendix 10.1) have provided details of the current, expected and maximum vessel sizes for the operational jetties.
Port of London Authority	Scoping Opinion, May 2020	It is essential that a Navigational Risk Assessment (NRA) is completed as part of the Environmental Statement, and that this covers impacts during both the construction and operation stages of the proposed development, particularly to assess any potential risks / impacts for vessels that currently use the facility, including during the construction phase.	A draft NRA (Appendix 10.1) has been produced covering all of the aspects mentioned. This document will be finalised and included in the ES.
Port of London Authority	Scoping Opinion, May 2020	Welcome reference to the need to continue consultation with the PLA on this topic as well as the need to consult nearby recreational clubs, marinas and boatyards. Any nearby small-scale commercial operations should also be included in this section as well.	The consultees that have been approached are listed in the PEIR chapter. The PLA has been consulted throughout with the main point of contact being the senior harbour master.

Consultee	Reference, Date	Summary of Response	How comments have been addressed in this Chapter
Port of London Authority	Scoping Opinion, May 2020	Under the initial assessment of likely effects section, it is considered that the effects must also include swamping of craft during the construction phase and grounding of construction craft in the approaches to jetty one.	The risks of swamping and grounding have been included in this PEIR chapter and NRA (Appendix 10.1).
Port of London Authority	Scoping Opinion, May 2020	Paragraph 9.33 (of the Scoping Report) lists the mitigation measures or mitigation controls which will be identified through the NRA process for adoption/implementation as appropriate. However, all the controls listed are already in place. The ES must confirm this and confirm if this is appropriate or if any additional measures will also be required.	Current and future control measures have been identified in the PEIR chapter and NRA (Appendix 10.1).

10.27 The following stakeholders have been consulted with no response yet received at the time of writing:

- Island Yacht Club
- Alexandra Yacht Club
- Benfleet Yacht Club
- Leigh Motor Boat Club
- Essex Yacht Club
- Thames Estuary Yacht Club
- Halcon Marine
- Dauntless Boatyard
- Thorpe Bay Yacht Club

Implications of Legislation, Policy and Guidance

10.28 The following section identifies relevant key legislation and/or policy relating to navigational issues for marine developments. It is structured according to primary and secondary guidance as per the established standard approach that is followed for NRAs.

Primary Guidance

- 10.29 Primary guidance includes legislation and top level policy documents which relate directly to the assessment of marine navigation, including the impact of marine works on commercial and recreational navigation.
- 10.30 The National Policy Statement for Ports (NPSfP) (2012) presents, amongst other things, the requirements for EIAs regarding port developments. Detail on the requirement for a NRA is not provided, however, it does refer to the need for determining the impact of works on traffic and transport including marine transport. The NPSfP provides the overarching policy against which the OMSSD project will be determined. Paragraph 5.6.2 recognises that there could be an increased risk of spills and leaks of pollutants as a result of infrastructure development. It recommends that the ES should describe the existing physical characteristics of the water environment affected by the proposed development and any impact of physical modification to these characteristics. Furthermore, the NPSfP recognises that the risks of impacts to the water environment can be reduced through the careful design to facilitate adherence to good pollution control practice.
- 10.31 Sea ports and harbours provide the interface between the land, near shore and open sea. The UK Marine Policy Statement (2011) identifies in relation to port developments and marine safety that: *“Marine plan authorities and decision makers should take into account and seek to minimise any negative impacts on shipping activity, freedom of navigation and navigational safety; and ensure that their decisions are in compliance with international maritime law”*.
- 10.32 The majority of port operations are administered by a Statutory Harbour Authority (SHA). Every SHA is self-governed with specific legislation (normally Acts of Parliament) creating the SHA as an entity, with further powers and amendments (Special Acts) made over time in response to the changing scope and remit of the SHA. Underpinning the powers of a SHA is a range of national legislation providing the Harbour Master with powers to issue directions to ensure navigation and safety within the harbour limits. Under such legislation, the Harbour Master may issue specific directions to control movements of vessels within their SHA area in order to ensure safety. Harbour Authorities who have the power to issue Work Orders under provisions in their Special Act(s) may choose to apply conditions including the completion of a NRA for developments within their SHA areas. This is the case for the PLA in its capacity as SHA who routinely carry out NRAs to evaluate marine developments that have the potential to affect marine safety within the River Thames.
- 10.33 The Port of London Act 1968 (as amended) makes it the duty of the PLA to take such action which is 'necessary or desirable for the improvement and conservancy of the Thames and gives the PLA power to provide, maintain, operate and improve such port services and facilities'. Furthermore, Section 6 of the Port of London Act 1968 (as amended), taking its lead from the Harbours, Docks and Piers Clauses Act 1847, requires that *“the port premises shall be open to all persons for the shipping and unshipping of goods, and the embarking and landing of passengers”*. The Port of London Act 1968 (as amended) thereby provides the powers and duties for the PLA to manage the safety of navigation, and therefore for the purposes of this study, is the relevant navigational authority (PLA, 2020).

Secondary Guidance

- 10.34 Secondary guidance includes codes, related policy documents and other guidance materials that relate to the assessment of marine navigation, including the impact of marine works on commercial and recreational navigation.
- 10.35 In the absence of specific government guidance relating to navigational risk for developments in port areas, the following documents have been considered in the preparation of the NRA for the OMSSD project. These documents provide information regarding the issues that should be taken into consideration when assessing the effect on navigational safety:
- International Maritime Organization (IMO) Revised Guidelines for Formal Safety Assessment (FSA) for use in the IMO rule making process (IMO, 2018);
 - Maritime and Coastguard Agency (MCA), Marine Guidance Notice 543 (MGN 543 Merchant + Fishing) Offshore Renewable Energy Installations (OREIs) - Guidance on UK Navigational Practice, Safety and Emergency Response (MCA, 2016)³⁰⁴;
 - DfT Port Marine Safety Code (DfT, 2016);
 - A Guide to Good Practice on Port Marine Operations (DfT/MCA, 2018); and
 - Marine safety guidance and advice from the PLA as the SHA.
- 10.36 Within the DfT's Port Marine Safety Code (PMSC), the term 'as low as reasonably practicable' (ALARP) is an industry wide concept applying to both health and safety and port marine safety. The core concept is that of 'reasonably practicable' which involves weighing up risk against the effort, time and money needed to control it. The PMSC specifically references ALARP in respect of the Marine Safety Management System (MSMS) and NRAs.

Preliminary Description of the Existing Environment

- 10.37 The Oikos facility is located on Canvey Island, adjacent to the Yantlet channel within the Sea Reach section of the lower Thames. The sites marine facilities include two operational jetties and a third jetty which is not currently in use. The marine facilities are on the north bank of the Thames designed for the handling of Oil and Product cargoes. Benfleet and Holehaven creeks, either side of Canvey island, are within the study area and support recreational activity.
- 10.38 The PLA is the Local Lighthouse Authority (LLA) within the meaning of the Merchant Shipping Act 1995, which provides the responsibility to monitor the reliability and availability

³⁰⁴ DfT/MCA (2013) Methodology for Assessing the Marine Navigational Safety and Emergency Response Risks of Offshore Renewable Energy Installations (OREI). Department for Transport (DfT) and Maritime Coastguard Agency (MCA), published 2013.

of aids to navigation (AtoN) within its SHA³⁰⁵. Any defects to AtoN are reported to Trinity House as the General Lighthouse Authority (GLA) for England and Wales. Whilst the PLA is responsible for the provision and maintenance of navigational buoys and lighthouses between Sea Reach and Teddington, maintenance of other aids to navigation including lights on berths, is the responsibility of other undertakers. Trinity House is responsible for the maintenance of aids to navigation within port limits to the east of Sea Reach.

- 10.39 Visual aids to navigation within the study area conform to the standards of the International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA). Lateral markers are used to denote the navigable section of the river, the main navigable channel, 'Yantlet' and smaller channels within the creeks. Miscellaneous marks are used for denoting significant navigational features such as the Chapman Shoal which lies across the Yantlet westbound secondary channel and outfalls to the east of the study area. Northern cardinal marks on the south side of the river indicate the extent of the Blyth bank, these marks are used to assist mariners of larger vessels to differentiate between the river bank and the secondary bank located over the Yantlet eastbound secondary channel.
- 10.40 Aids to navigation surrounding the facility include jetty lights, which in accordance with the IALA zone 'A' system are coloured green. General mooring buoys are used around Jetty 1 to provide additional securing for larger vessels.
- 10.41 The principal responsibility for navigational safety and the safe operation of the harbour lies with the Harbour Master who is empowered to regulate shipping by virtue of Section 52 and 53 of the Harbours, Docks and Piers Clauses Act 1847, and Section 112 of the Port of London Act 1968 (as amended). For the purposes of these clauses, the most important aspect is the power to give direction, generally referred to as special directions. This level of control enables the Harbour Master to regulate the movements of traffic within the harbour area to minimise the risk of collision and ensure the safe and timely movement of vessels. The PLA's MSMS provides a tabulated list of 'Statutory and Regulatory Delegations' and identifies all harbour staff with delegated powers of direction.
- 10.42 Routing within the study area includes a primary channel, dredged to a minimum depth of 14 m below chart datum. Secondary omni-directional routing is given either side of this main channel for use by smaller vessels, capable of safe navigation outside of the main channel. This routing measure separates larger commercial vessels that are constrained in their navigation due to the availability of water from the smaller commercial or recreational vessels which can safely navigate within the secondary channels. The layout of this routing measure follows the standard practice of marine navigation in narrow channels as laid out in the International Regulations for Preventing Collisions at Sea (COLREGS) and the IALA system of buoyage zone 'A'. This arrangement allows vessels arriving or departing from the facility to plan and execute manoeuvres more effectively as the movement of vessels within the channel is governed by the scheme.

³⁰⁵ PLA (2021)(1), Navigation aids, Port of London Authority. [Available online at <http://www.pla.co.uk/About-Us/Navigational-Aids>] [Accessed February 2021].

- 10.43 The navigation of small craft is managed by recommended routes shown on the routing guidance provided by the PLA and admiralty charts. These routes keep vessels away from the facilities on the north bank of the river via a two-way route to the south. In the vicinity of Benfleet creek, small boat traffic is separated into east and westbound flows either side of the main channel, with specific crossing points denoted in order to limit and control the interaction between traffic types.
- 10.44 Recreational vessel movements are further controlled by routing guides provided by the Royal Yachting Association (RYA) and local sailing centres/marinas³⁰⁶. Recreational vessel routes, designated areas of activity and seasonal racing are, in conjunction with the PLA, designated for the area of Benfleet creek and to the east of the facility.
- 10.45 Marine spatial management includes the designation of areas for specific marine related activity in order to provide for the needs of mariners and manage the interaction of vessels. Within the study area, anchorages are provided for commercial, small ship and recreational/small craft outside of the main navigable channels and designated routes. Use of commercial and small ship anchorages adjacent to the main channel are directly controlled by the PLA and used to control the flow and deconflict traffic movements within the area.
- 10.46 Operational jetties, including those at the Oikos facility, are surrounded by prohibited areas, where only authorised vessels may enter. These areas assist in preventing the uncontrolled movement of vessels around areas of high risk including both infrastructure and vessels. Other designated areas include; recreation vessel facilities, wildlife habitats, a firing practice area and sub surface cables/pipelines.
- 10.47 The PLA is the Competent Harbour Authority (CHA) for the area and provides Pilotage services by virtue of the Pilotage Act 1987. The PLA Pilotage Directions defines the London Pilotage District and the requirements for compulsory pilotage within it. The directions also lay down regulations under which Pilotage Exemption Certificates (PECs) are issued and administered in that District³⁰⁷.
- 10.48 Vessels subject to compulsory pilotage within the study area include:
- Vessels or tugs and tows of 80 m or more in Length Overall (LOA);
 - Vessels or tugs and tows of 50 m or more in LOA that are specified vessels, passenger vessels and vessels carrying marine pollutants in bulk;
 - Vessels or tugs and tows of 50 m or more in LOA with an operating draught of 5 m or more; and

³⁰⁶ RYA (2021)(2), Identifying recreational Cruising Routes, Sailing and Racing areas within the SEA 8 Area, Royal Yachting Association. [Available online at <https://www.rya.org.uk/sitecollectiondocuments/legal/Web%20Documents/Environment/SEA%208%20recreation%20boating%20compressed.pdf>] [Accessed February 2021].

³⁰⁷ PLA (2021)(3), Pilotage Exemption Certificates (PEC's), Port of London Authority. [Available online at <https://www.pla.co.uk/Pilotage/Pilotage-Exemption-Certificates-PECs>] [Accessed February 2021].

- Vessels or tugs and tows of 50 m in length or more overall with an operating draught of 4 m or more when restricted visibility exists within that part of the London Pilotage District to the west of Sea Reach No.1 Buoy (to the east of the study area) where the vessel is planning to navigate.
- 10.49 The PLA operate a Vessel Traffic Service (VTS)³⁰⁸ which manages and oversees safety covering an area of some 600 square miles of waterway spanning 95 miles from Teddington to the North Sea.
- 10.50 Port of London VTS operates from two centres located at the Port Control Centre in Gravesend and at the Thames Barrier Navigation Centre in Woolwich. A team of 44 VTS personnel oversee the Port of London's VTS area on a 24/7, 365 days a year basis. Each VTS Centre is led by a VTS Supervisor with the delegated powers of the Harbour Master and is supported by a team of VTS Officers and Shipping Coordinators.
- 10.51 London VTS provides three types of service to vessels navigating in the port:
- Traffic Information Service - providing essential and timely information to assist the on-board decision making process;
 - Traffic Organisation Service - preventing the occurrence of dangerous maritime situations; and
 - Navigation Assistance Service - assisting in the on-board decision making process.
- 10.52 All vessels over 40 m in length or 50 gross tons must report their arrival, departure and passage through the port at the designated reporting points within the area to VTS. The vessel is identified, tagged and logged on the radar and its progress monitored. The vessel can then be advised of other vessels in the vicinity or of potential conflicts and dangers. Vessels navigating in Harbour Authority's jurisdiction become the subject of the Harbour Master's Powers of Direction. Under certain circumstances the vessel can, if required, be directed to take particular actions.
- 10.53 The Oikos facility has two operational marine jetties for the handling of bulk liquid cargoes, providing a ship/shore interface for product tankers. Jetty 1 is located to the west of the site, close to Holehaven creek, which handles Medium Range (MR)/Handy size vessels. Jetty 2 has been extended from its original line to project further out into the channel and can accommodate larger vessels, including Long Range 2 (LR2)/Aframax/Suezmax sizes. The jetties are provided with Marine Loading Arms (MLAs), pipework and safety systems for the handling of bulk liquid products. Limitations for marine vessels is governed by the availability of water/tidal windows, the transfer rate of MLAs, pipework and the availability of appropriate landside storage facilities.
- 10.54 Jetty 1 is situated to the west of the facility, adjacent to Holehaven creek and has a limited depth of water available for vessels, a dredge pocket and channel has been created to allow

³⁰⁸ PLA (2021)(4), Vessel Traffic Services (VTS), Port of London Authority. [Available online at <https://www.pla.co.uk/Safety/Vessel-Traffic-Services-VTS>] [Accessed February 2021].

access for vessels up to 12m draught. The jetty can accommodate vessels with a maximum length overall of 211 m.

- 10.55 The extension of Jetty 2 provides a manifold section and connected dolphins capable of accepting vessels up to 277 m length overall. The current dredge pocket provides 14.5 m of water at chart datum. Loading draft for LR2 tankers is possible between 12-16 m (depending on tidal window) but is typically limited to no more than 14m.
- 10.56 Data provided from the terminal’s records indicated that a total of 85 vessel movements were recorded for 2019 with an average period alongside for each vessel being 36 hours. The first annual figure of movements available for Jetty 2 is 2019 due to the completion of its extension being in 2018. Vessel activity for 2020 has not been included due to the potentially misleading information caused by the Covid-19 pandemic. Theoretical maximum annual movement figures for post-project operation have been provided by Oikos and included in Table 10.5.

Table 10.5: Jetty 1 and 2 vessel movements

Facility/Year	2017	2018	2019	Predicted
Jetty 1	27	58	43	136
Jetty 2	NA	NA	42	149
Average time alongside, per vessel 36 Hours				

Table 10.6: Jetty 1 and 2 accepted vessel dimensions

Facility	Maximum deadweight	Typical draught	Maximum Length overall	Typical Beam
Jetty 1	55,000 (GT)	12 m	211 (m)	32.2
Jetty 2	120,000 (GT)	14 m	277 (m)	42

Statutory Authorities

- 10.57 The PLA is the SHA for the Thames Estuary and Tidal River Thames. The whole study area falls within the PLA’s jurisdiction as both the SHA and the CHA in respect of pilotage.
- 10.58 In its role as SHA, the PLA has responsibility for navigational safety and control of vessel movements. This is achieved through a number of methods, not least is the ability to manage traffic through Direction, including the issuing of General Directions (general rules) and through Byelaws (PLA, 2012). The proposed development area of the OMSSD and adjacent river is covered by the London Vessel Traffic System (VTS) operated by the PLA, which provides a Traffic Management and Monitoring service.

Vessel Activity

- 10.59 Automatic Identification System (AIS) data shows that within the area surrounding the site of the proposed OMSSD project is actively used by port service craft (tugs, pilot boats, survey, line handling vessels etc.) with a range of tracks close to jetty facilities. This is expected as the function of port service craft is to assist and manage the safe berthing of commercial

vessels. The area of the development also has evidence of vessel movements from dredge and sub-surface work craft; again, this is expected as the current jetty facilities require periodic maintenance dredging.

- 10.60 There is little fishing vessel transits in the study area with only one transit in the AIS dataset.
- 10.61 There have been no cargo vessel transits using the jetty facilities in the vicinity of the proposed works during the AIS data survey period. The majority of vessel moves, especially those passing in the vicinity of the development site are within the main Yantlet navigation channel. Tanker traffic is shown transiting between the main channel and facilities on the north bank of the river, including the Oikos jetties.
- 10.62 Other transits within the study area relate to High Speed Craft which pass the development site, with a number of transits navigating within Holehaven creek. Recreational vessel transits also pass through and around the site of the proposed development as these types of vessel navigate predominantly outside of the main shipping channels and are discussed in the next section. There are several passenger vessel transits from the Southend-Pier that move past the facility.
- 10.63 The number of vessels passing the development site is shown in Table 10.7 which gives annualised data of vessel calls and tonnages visiting the Port of London.

Table 10.7: Number of vessel calls (cargo only) and tonnage for London 2017 to 2019

Year	Total calls	Tonnage (thousand tonnes)
2019	8,440	54.03
2018	8,464	53.20
2017	8,114	49.87

Source: DfT (2021)

- 10.64 The study area from a recreational navigation context is known as the 'Canvey Area' (the area includes Southend, Leigh on Sea, Benfleet, and Holehaven)³⁰⁹. The area comprises the usage of approximately 2,000 shallow draughted yachts and other smaller craft. Moorings are mostly drying moorings and tend to be located in tidal creeks or the foreshore with the exception of a few fishing boats that are moored at Holehaven and Ray Gut.
- 10.65 The Royal Yachting Association (RYA) information for the study area shows racing and sailing areas lying to the east of Canvey Island in an area from the centre of the Yantlet Channel northwards to the north bank of the estuary. General sailing areas are defined by the RYA as: 'Areas in extensive use for general day-sailing by all types of recreational craft but particularly smaller craft such as small cruisers, day-boats, dinghies, sailboards and personal watercraft. Such craft will not normally be undertaking point-to-point passages but will be on out and return activities and may appear to be sailing in random directions as they take advantage of wind and tide to make progress'. RYA racing areas are considered to be:

³⁰⁹ Visitmyharbour.com (2021), Canvey area (inc Southend, Leigh on sea, Benfleet, and Holehaven, Visit myharbour.com, [Available online at <https://www.visitmyharbour.com/harbours/thames-estuary/canvey-area/>] [Accessed February 2021].

'Areas in frequent use, particularly at week-ends and holiday periods, by large numbers of racing craft normally under sail but also power. Such areas are generally under the control of nearby Sailing Clubs and may contain temporary or permanent race course marking buoys. Detailed routes will normally only be determined on the day of the race although certain longer-distance races may have routes published in advance. Racing craft will obey the specialised racing rules between themselves but will follow the conventional Collision Regulations when other vessels are in conflict'.

- 10.66 There are also RYA defined 'heavy recreational use cruising routes' in the study area, to the south of the Yantlet Channel and to the north/ east of Canvey Island. The RYA defines 'heavy use' routes as those which are: 'very popular routes, on which a minimum of 6 or more recreational vessels will probably be seen at all times during summer daylight hours'.
- 10.67 Neither the RYA sailing, racing or cruising routes overlap the area of the proposed OMSSD project. However, vessels navigating along the main deep water access channel (the Yantlet Channel) will cross through these areas and routes.
- 10.68 In the vicinity of the proposed OMSSD project both inbound and outbound recreational vessels are recommended to navigate on the south side of the Thames outside of the main channel.
- 10.69 There are nine recreational clubs in the study area; eight on the northern side of the Thames Estuary and one on the south. There are seven RYA registered training centres, six on the northern side and one on the south side of the Thames Estuary. In addition, there is one marina and one boatyard within the study area.
- 10.70 The clubs on the northern side of the Thames Estuary are:
- Island Yacht Club (Sailing Yachts);
 - Alexandra Yacht Club (Dinghies);
 - Chapman Sands Yacht Club (Dinghies and PWCs) (Closed 2019);
 - Benfleet Yacht Club (Keelboats and Sailing yachts);
 - Leigh Motor Boat Club (Motorboats);
 - Leigh-on-Sea Sailing Club (Dinghies);
 - Essex Yacht Club (Sailing Yachts and Dinghies); and
 - Thames Estuary Yacht Club (Sailing Yachts).
- 10.71 The marina and boatyards are:
- Halcon Marine (Small Gains Creek); and
 - Dauntless Boatyard.
- 10.72 Recreational vessel transits and race routes tend to be in the coastal regions adjacent to the respective club, marina or boatyard and within the PLA designated recreational areas. The Chapman sailing club was the closest to the proposed OMSSD project, members had both

dinghies and Personal Water Craft (PWCs). However, it is understood that this club closed in 2019 and is no longer a source of recreational activity. The Island yacht club, situated East of the former Chapman sailing club on Canvey Island is now the closest operating centre for recreational craft to the OMSSD project.

- 10.73 Vessel traffic density has been mapped for the study area through the use of AIS data, with an inherent bias towards commercial vessels. The majority of vessels transiting the study area do so within the Yantlet channel. It can be expected that recreational craft that do not carry AIS are likely to increase vessels density within the secondary channels, recommended recreation routes and within recreational activity areas.
- 10.74 The RNLi and MAIB national datasets hold the details of all reported marine safety incidents and other occurrences which have potential significance to the maintenance of navigational safety. The dataset has been used to identify accidents/incidents for the study area between 2015 and 2019, this data is presented in Table 10.8.

Table 10.8: RNLi and MAIB recorded accident/incidents for the study area 2015-2019

Incident type	2015	2016	2017	2018	2019	Total	Annual frequency
Capsize/Sinking	3	1	0	0	0	4	0.8
Collision	0	0	2	2	0	4	0.8
Equipment failure	5	11	0	0	0	16	3.2
Fire/Explosion	0	4	0	0	0	4	0.8
Grounding	5	14	0	1	0	20	4.0
Leaks/Swamping	0	1	0	0	0	1	0.2
Person in distress	16	8	2	0	1	27	5.4
Person(s) in the water	2	9	9	10	3	33	6.6
Other nautical safety	19	16	26	25	15	101	20.2

- 10.75 From Table 10.8 it can be seen that there were 211 incidents in the study area during the 5 year data period. The most frequent incident type was ‘other nautical safety’ with an annual frequency of 20.2, this category is indicative of less serious marine events, with the majority not having a specific nautical hazard identified. The following two most common accidents/incidents are categorised as ‘Persons in distress’ and ‘Person(s) in the water’ with annual frequencies of 6.6 and 5.4 respectively. These types on incident either occur in the water or on vessels and do not specifically relate to the actions of vessel traffic.
- 10.76 Of the four reported collisions the most serious occurred in 2018 and involved a commercial Ro-Ro cargo vessel. The vessel was manoeuvring to its berth upstream of the Oikos facility when it collided with another Ro-Ro cargo vessel that was already alongside. The vessel subsequently manoeuvred across the river and allided with a marine structure. Given that both vessels involved in this collision were Ro-Ro cargo vessels it is likely that this accident did not occur at the Oikos Facility. All other collisions involved recreational sailing vessels.

Environmental Change without the OMSSD Project

- 10.77 In the absence of the OMSSD project, the Oikos facility would continue to operate in its current capacity with product being delivered to the facility via Jetties 1 and 2. There are unlikely to be any short term changes in conditions within the navigational environment regarding risk receptors, such as, traffic pattern vessel size, traffic density or cargo operations. Regular maintenance dredging will continue at Jetty 1 with no consistent maintenance dredge requirement at the Jetty 2.

Preliminary Consideration of Likely Impacts and Effects

- 10.78 This section identifies preliminary potential likely effects on the commercial and recreational navigation receptors as a result of the construction (dredge and disposal) and subsequent operation of the OMSSD project.

Construction Phase

- 10.79 Based on the existing understanding of the scale of the marine works, together with the navigational baseline and stakeholder comments from the Scoping Opinion, the potential effects during the construction phase that are considered to be potentially relevant and require further assessment are reviewed in Table 10.9.

Table 10.9: Potential effects during construction scoped in and out of further assessment

Receptor	Impact Pathways/Potential Effects	Marine works	
		Requires further assessment?	Justification
Commercial and recreational navigation	Contact of construction or dredging craft with Oikos jetties: manoeuvring of construction or dredging craft in close proximity to the Oikos jetties has the potential for heavy contact with infrastructure during site construction	Yes	The presence of dredging or construction craft operating in the vicinity of the facilities marine infrastructure incorporates an inherent risk in the potential for these craft to collide or make contact. The risk associated with the manoeuvring of vessels on the water provides may be exacerbated by external forces such as; tide/current, wind, restricted visibility or the hours of darkness. This pathway has therefore been scoped in to the assessment.
	Collision of passing vessels with construction or dredging craft: as passing vessels (commercial, recreational or fishing) are manoeuvring around or in close proximity to the jetties there is potential for collision with construction or dredging craft as they are used for works on the existing jetties.	Yes	The presence of dredging or construction craft operating adjacent or near the facilities marine infrastructure incorporates an inherent risk that collision may occur with other vessels in the vicinity. Collision may occur between works craft/dredgers and commercial/recreational/fishing vessels passing or manoeuvring between the channel and marine facilities. This pathway has therefore been scoped in to the assessment.
	Collision during navigation: vessel collision (commercial or recreational or fishing) with the construction or dredging craft whilst transiting to/from the site or during activities within the disposal site.	Yes	The presence of additional vessels within the navigational environment provides the potential for collision which would otherwise not be present. This pathway has therefore been scoped in to the assessment.
	Swamping by passing vessels to construction or dredging craft: as passing vessels (commercial, recreational or fishing) are manoeuvring around or in close proximity to the jetties there is potential for collision with construction or dredging craft as they are used for works on the existing jetties.	Yes	It is possible that vessels transiting near the marine facility may cause excessive wake leading to the swamping of susceptible work/dredge craft. This pathway has therefore been scoped in to the assessment.

10.80 The following potential impacts have been identified as part of the construction phase:

- Contact of construction or dredging craft with Oikos jetties: manoeuvring of construction or dredging craft in close proximity to the Oikos jetties has the potential for heavy contact with infrastructure during site construction;
- Collision of passing vessels with construction or dredging craft: as passing vessels (commercial, recreational or fishing) are manoeuvring around or in close proximity to the jetties there is potential for collision with construction or dredging craft as they are used for works on the existing jetties; and
- Collision during navigation: vessel collision (commercial or recreational or fishing) with the construction or dredging craft whilst transiting to/from the site or during activities within the disposal site.
- Swamping by passing vessels to construction or dredging craft: as passing vessels (commercial, recreational or fishing) are manoeuvring around or in close proximity to the jetties there is potential for collision with construction or dredging craft as they are used for works on the existing jetties.

Contact of construction or dredging craft with Oikos jetties: manoeuvring of construction or dredging craft in close proximity to the Oikos jetties has the potential for heavy contact with infrastructure during site construction

General Context

10.81 The presence of craft associated with the marine works means that there is potential for them to make contact with the marine infrastructure at the project location. The potential for this to occur increases when the craft are manoeuvring in close proximity to the infrastructure during construction or dredging operations.

10.82 This impact is affected by adverse weather conditions, particularly where strong winds act to push the vessel towards infrastructure or during periods of restricted visibility which can affect the situational awareness of the vessel's crew.

Project Impact Assessment

10.83 The location of the marine works to be undertaken and commercial vessel operations is well regulated with a large number of embedded mitigation measures regulating vessel movements and safety procedures. There is international and national level legislation which provides requirements on the equipment required on vessels dependent on size and training requirements for crew. This includes emergency plans and exercises for a range of situations which must be undertaken on a regular basis.

10.84 The PLA operate a VTS in this area which in terms of this pathway is able to provide up to date weather and vessel movements information as well as coordinate an emergency response if required. In addition, the construction contractor will need to prepare a set of Risk Assessment Method Statements (RAMS) for all marine construction activities which will be approved by the PLA.

- 10.85 If a contact between construction craft and marine infrastructure occurs, there is potential for injuries for personnel on the vessel, damage to both the vessel and infrastructure, marine pollution proportionate to the level of damage and a delay to the construction operations.
- 10.86 Given the potential consequences for this pathway and the level of embedded mitigation in this area, the sensitivity is determined to be medium. The impact is limited to the extent of the construction works and may occur frequently, so the magnitude is moderate negative which leads to an assessed significance of Moderate Adverse.

Collision of passing vessels with construction or dredging craft: as passing vessels (commercial, recreational or fishing) are manoeuvring around or in close proximity to the jetties there is potential for collision with construction or dredging craft as they are used for works on the existing jetties

General Context

- 10.87 The presence of dredging or construction craft operating adjacent or near the facilities marine infrastructure incorporates an inherent risk that collision may occur with other vessels in the vicinity. Collision may occur between works craft/dredgers and commercial/recreational/fishing vessels passing or manoeuvring between the channel and marine facilities.
- 10.88 The risk associated with the manoeuvring of vessels on the water may be exacerbated by external forces such as; tide/current, wind, restricted visibility or the hours of darkness.

Project Impact Assessment

- 10.89 The location for the marine works to be undertaken and commercial vessel operations is well regulated with a large number of embedded mitigation measures regulating vessel movements and safety procedures. There is international and national level legislation which provides requirements on the equipment required on vessels dependent on size and training requirements for crew. This includes emergency plans and exercises for a range of situations which must be undertaken on a regular basis.
- 10.90 The PLA operate a VTS in this area which in terms of this pathway is able to provide up to date weather and vessel movements information as well as coordinate an emergency response if required. In addition, the construction contractor will need to prepare a set of Risk Assessment Method Statements (RAMS) for all marine construction activities which will be approved by the PLA.
- 10.91 The PLA provide a marine spatial policy separating marine traffic and activities. The main channel is separated from the marine works by omni-directional secondary channel providing a manageable flow of traffic. This traffic is in addition managed by VTS further controlling the movement of vessels in the area. A small craft channel is provided on the South bank of the river as a means of separating smaller recreational traffic with that of the commercial traffic associated with Jetties 1 and 2.

- 10.92 An exclusion zone is provided around the Oikos facility which will encompass the marine works during the construction phase. This will reduce the likelihood of vessels passing close to construction/dredging craft.
- 10.93 Given the potential consequences for this pathway and the level of embedded mitigation in this area, the sensitivity is determined to be medium. The impact is present for the area which dredge vessels will be transiting between the dredge area and location for disposal. The impact is only present during construction operations but can occur frequently, so the magnitude is moderate negative which leads to an assessed significance of Moderate Adverse.

Collision during navigation: vessel collision (commercial or recreational or fishing) with the construction or dredging craft whilst transiting to/from the site or during activities within the disposal site.

General Context

- 10.94 The presence of additional vessels within the navigational environment provides the opportunity for collision which would otherwise not be present. The location of vessel activity or transiting areas with that of other vessels in the baseline condition provides for assessment.
- 10.95 The risk associated with the manoeuvring of vessels on the water provides may be exacerbated by external forces such as; tide/current, wind, restricted visibility or the hours of darkness.

Project Impact Assessment

- 10.96 The location for the marine works to be undertaken and commercial vessel operations is well regulated with a large number of embedded mitigation measures regulating vessel movements and safety procedures. There is international and national level legislation which provides requirements on the equipment required on vessels dependent on size and training requirements for crew. This includes emergency plans and exercises for a range of situations which must be undertaken on a regular basis.
- 10.97 The PLA operate a VTS in this area which in terms of this pathway is able to provide up to date weather and vessel movements information as well as coordinate an emergency response if required. In addition, the construction contractor will need to prepare a set of Risk Assessment Method Statements (RAMS) for all marine construction activities which will be approved by the PLA.
- 10.98 The PLA provide a marine spatial policy separating marine traffic and activities. The main channel is separated from the marine works by omni-directional secondary channel providing a manageable flow of traffic. This traffic is in addition managed by VTS further controlling the movement of vessels in the area. A small craft channel is on the South bank of the river as a means of separating smaller recreational traffic with that of the commercial traffic associated with Jetties 1 and 2.

- 10.99 An exclusion zone is provided around the Oikos facility which will encompass the marine works during the construction phase. This will reduce the likelihood of vessels passing close to construction/dredging craft.
- 10.100 Given the potential consequences for this pathway and the level of embedded mitigation in this area, the sensitivity is determined to be medium. The impact is limited to the extent of the construction works and is only present during construction operations, so the magnitude is minor negative which leads to an assessed significance of Minor Adverse.

Swamping by passing vessels to construction or dredging craft: as passing vessels (commercial, recreational or fishing) are manoeuvring around or in close proximity to the jetties there is potential for collision with construction or dredging craft as they are used for works on the existing jetties.

General Context

- 10.101 It is possible that should a vessel transit near the marine facility the wake produced may cause excessive wake leading to the swamping of susceptible work/dredge craft. The larger and faster a vessel is the greater the wake produced, should this be in the proximity of other vessels the risk of swamping exists.
- 10.102 The risk associated with the manoeuvring of vessels on the water provides may be exacerbated by external forces such as tide/current, wind, restricted visibility or the hours of darkness.

Project Impact Assessment

- 10.103 The location for the marine works to be undertaken and commercial vessel operations is well regulated with a large number of embedded mitigation measures regulating vessel movements and safety procedures. There is international and national level legislation which provides requirements on the equipment required on vessels dependent on size and training requirements for crew. This includes emergency plans and exercises for a range of situations which must be undertaken on a regular basis.
- 10.104 The PLA operate a VTS in this area which in terms of this pathway is able to provide up to date weather and vessel movements information as well as coordinate an emergency response if required.
- 10.105 The PLA provide a marine spatial policy separating marine traffic and activities. The main channel is separated from the marine works by omni-directional secondary channel providing a manageable flow of traffic. This traffic is in addition managed by VTS further controlling the movement of vessels in the area. A small craft channel is on the South bank of the river as a means of separating smaller recreational traffic with that of the commercial traffic associated with Jetties 1 and 2.
- 10.106 An exclusion zone is provided around the Oikos facility which will encompass the marine works during the construction phase. This will reduce the likelihood of vessels passing close to construction/dredging craft.

- 10.107 Given the potential consequences for this pathway and the level of embedded mitigation in this area, the sensitivity is determined to be medium. The impact is limited to the extent of the construction works and is only present during construction operations, so the magnitude is minor negative which leads to an assessed significance of Minor Adverse.

Operational Phase

- 10.108 Based on the existing understanding of the scale of the dredging works, together with the environmental baseline and stakeholder comments from the Scoping Opinion, the potential effects during the operational phase that are considered to be potentially relevant and require further assessment are reviewed in Table 10.10.

Table 10.10: Potential effects during the operational phase scoped in and out of further assessment

Receptor	Impact Pathways/Potential Effects	Maintenance dredging and jetty vessel movements	
		Requires further assessment?	Justification
Commercial and recreational navigation	Collision due to increased commercial vessel movements: tankers on transit to the berth in collision with other river traffic (commercial, dredging, recreational or fishing);	Yes	The presence of additional vessels to the current baseline condition increases the likelihood of interactions between vessels that there would otherwise not be. This pathway has therefore been scoped in to the assessment.
	Collision due to increased maintenance dredging movements: dredging vessels on transit to/from the jetty or during conduct of dredging operation in collision with other marine traffic (commercial, recreational or fishing);	Yes	The presence of additional vessels to the current baseline condition increases the likelihood of interactions between vessels that there would otherwise not be. This pathway has therefore been scoped in to the assessment.
	Collision with passing traffic: vessel (including any assisting tugs) manoeuvring at the berth in collision with passing traffic (commercial, recreational or fishing);	Yes	The presence of additional vessels to the current baseline condition increases the likelihood of interactions between vessels that there would otherwise not be. This pathway has therefore been scoped in to the assessment.
	Contact with Oikos jetty: manoeuvring vessel, dredging vessel or tug in contact with the jetty as a result of collision avoidance, adverse weather, nature of the operation or interaction with a passing vessel;	Yes	The presence of additional vessels to the current baseline condition increases the likelihood of interactions between vessels or infrastructure that there would otherwise not be. This pathway has therefore been scoped in to the assessment.
	Oil Spill from increased vessel visits: the increase in vessel moves and vessel size will increase the potential for oil spills and the capacity in which they are required to be dealt with;	Yes	An increase in the number of separate cargo transfer operations conducted and the volume of cargo per operation increases the likelihood and consequence above the current level. This pathway has therefore been scoped in to the assessment.
	Mooring breakout with vessel alongside or rafted: mooring breakout (where a vessel breaks its moorings and leaves the berth or adjoining vessel due to stress of weather, passing vessel or mooring equipment failure); and	Yes	The use of the jetty throughout a complete tidal cycle increase the likelihood of stresses on mooring lines. The combined strain of an increased freeboard, tidal effect increases the likelihood of this risk. This pathway has therefore been scoped in to the assessment.
	Parted moorings with vessel alongside: - parted moorings and/or cargo line (where some of the vessel's moorings break, resulting in movement of the vessel and loss of cargo).	Yes	The use of the jetty throughout a complete tidal cycle increase the likelihood of stresses on mooring and cargo lines. The combined strain of an increased freeboard, tidal effect increases the likelihood of this risk. This pathway has therefore been scoped in to the assessment.

Collision due to increased commercial vessel movements: tankers on transit to the berth in collision with other river traffic (commercial, dredging, recreational or fishing)

General Context

- 10.109 The presence of additional vessels to the current baseline condition increases the likelihood of interactions between vessels that there would otherwise not be. The risk associated with the manoeuvring of vessels on the water provides may be exacerbated by external forces such as; tide/current, wind, restricted visibility or the hours of darkness.

Project Impact Assessment

- 10.110 The location of the facility and its associated commercial vessel operations during the operational phase will be well regulated with a large number of embedded mitigation measures regulating vessel movements and safety procedures. There is international and national level legislation which provides requirements on the equipment required on vessels dependent on size and training requirements for crew. This includes emergency plans and exercises for a range of situations which must be undertaken on a regular basis.
- 10.111 The PLA provide a marine spatial policy separating marine traffic and activities. The main channel is separated from the marine works by omni-directional secondary channel providing a manageable flow of traffic. This traffic is in addition managed by VTS further controlling the movement of vessels in the area. A small craft channel is provided on the South bank of the river as a means of separating smaller recreational traffic with that of the commercial traffic associated with Jetties 1 and 2.
- 10.112 An exclusion zone is provided around the Oikos facility which will encompass the vessel activity during the operational phase. This will reduce the likelihood of vessels passing close to construction/dredging craft.
- 10.113 Given the potential consequences for this pathway and the level of embedded mitigation in this area, the sensitivity is determined to be medium. The impact is mitigate by the Port of London Authority vessel management controls, so the magnitude is minor negative which leads to an assessed significance of Minor Adverse.

Collision due to increased maintenance dredging movements: dredging vessels on transit to/from the jetty or during conduct of dredging operation in collision with other marine traffic (commercial, recreational or fishing)

General Context

- 10.114 The presence of additional vessels to the current baseline condition increases the likelihood of interactions between vessels that there would otherwise not be. The risk associated with the manoeuvring of vessels on the water provides may be exacerbated by external forces such as; tide/current, wind, restricted visibility or the hours of darkness.

Project Impact Assessment

- 10.115 The location of the facility and its associated commercial vessel operations during the operational phase will be well regulated with a large number of embedded mitigation measures regulating vessel movements and safety procedures. There is international and national level legislation which provides requirements on the equipment required on vessels dependent on size and training requirements for crew. This includes emergency plans and exercises for a range of situations which must be undertaken on a regular basis.
- 10.116 The PLA operate a VTS in this area which in terms of this pathway is able to provide up to date weather and vessel movements information as well as coordinate an emergency response if required. In addition, maintenance dredging will be conducted using a set of Risk Assessment Method Statements (RAMS) which will be approved by the PLA.
- 10.117 The PLA provide a marine spatial policy separating marine traffic and activities. The main channel is separated from the marine works by omni-directional secondary channel providing a manageable flow of traffic. This traffic is in addition managed by VTS further controlling the movement of vessels in the area. A small craft channel is provided on the South bank of the river as a means of separating smaller recreational traffic with that of the commercial traffic associated with Jetties 1 and 2.
- 10.118 An exclusion zone is provided around the Oikos facility which will encompass dredging activity during the operational phase. This will reduce the likelihood of vessels passing close to construction/dredging craft.
- 10.119 Given the potential consequences for this pathway and the level of embedded mitigation in this area, the sensitivity is determined to be medium. The impact is limited to the extent of the dredging activity, so the magnitude is minor negative which leads to an assessed significance of Minor Adverse.

Collision with passing traffic: vessel (including any assisting tugs) manoeuvring at the berth in collision with passing traffic (commercial, recreational or fishing)*General Context*

- 10.120 The presence of additional vessels to the current baseline condition increases the likelihood of interactions between vessels that there would otherwise not be. The risk associated with the manoeuvring of vessels on the water provides may be exacerbated by external forces such as; tide/current, wind, restricted visibility or the hours of darkness.

Project Impact Assessment

- 10.121 The location of the facility and its associated commercial vessel operations during the operational phase will be well regulated with a large number of embedded mitigation measures regulating vessel movements and safety procedures. There is international and national level legislation which provides requirements on the equipment required on vessels dependent on size and training requirements for crew. This includes emergency plans and exercises for a range of situations which must be undertaken on a regular basis.

- 10.122 The PLA operate a VTS in this area which in terms of this pathway is able to provide up to date weather and vessel movements information as well as coordinate an emergency response if required. In addition, tug operations will be licensed and conducted using a set of Risk Assessment Method Statements (RAMS) which will be approved by the PLA.
- 10.123 The PLA provide a marine spatial policy separating marine traffic and activities. The main channel is separated from the marine works by omni-directional secondary channel providing a manageable flow of traffic. This traffic is in addition managed by VTS further controlling the movement of vessels in the area. A small craft channel is provided on the South bank of the river as a means of separating smaller recreational traffic with that of the commercial traffic associated with Jetties 1 and 2.
- 10.124 An exclusion zone is provided around the Oikos facility which will encompass vessel activity close to the Jetties in the operational phase. This will reduce the likelihood of vessels passing close to construction/dredging craft.
- 10.125 Given the potential consequences for this pathway and the level of embedded mitigation in this area, the sensitivity is determined to be medium. The impact is limited to the extent of the vessels activity near the Jetties during the operational phase, so the magnitude is minor negative which leads to an assessed significance of Minor Adverse.

Contact with Oikos jetty: manoeuvring vessel, dredging vessel or tug in contact with the jetty as a result of collision avoidance, adverse weather, nature of the operation or interaction with a passing vessel

General Context

- 10.126 The presence of additional vessels to the current baseline condition increases the likelihood of interactions between vessels or infrastructure that there would otherwise not be. The risk associated with the manoeuvring of vessels on the water may be exacerbated by external forces such as; tide/current, wind, restricted visibility or the hours of darkness.

Project Impact Assessment

- 10.127 The location of the facility and its associated commercial vessel operations during the operational phase will be well regulated with a large number of embedded mitigation measures regulating vessel movements and safety procedures. There is international and national level legislation which provides requirements on the equipment required on vessels dependent on size and training requirements for crew. This includes emergency plans and exercises for a range of situations which must be undertaken on a regular basis.
- 10.128 The PLA operate a VTS in this area which in terms of this pathway is able to provide up to date weather and vessel movements information as well as coordinate an emergency response if required. In addition, tug operations will be licensed and conducted using a set of Risk Assessment Method Statements (RAMS) which will be approved by the PLA.
- 10.129 The PLA provide a marine spatial policy separating marine traffic and activities. The main channel is separated from the marine works by omni-directional secondary channel providing

a manageable flow of traffic. This traffic is in addition managed by VTS further controlling the movement of vessels in the area. A small craft channel is provided on the South bank of the river as a means of separating smaller recreational traffic with that of the commercial traffic associated with Jetties 1 and 2.

- 10.130 An exclusion zone is provided around the Oikos facility which will encompass the vessel activity during the operational phase. This will reduce the likelihood of vessels passing close to construction/dredging craft.
- 10.131 Given the potential consequences for this pathway and the level of embedded mitigation in this area, the sensitivity is determined to be medium. The impact is limited to the extent of each Jetty and its approaches so the magnitude is minor negative which leads to an assessed significance of Minor Adverse.

Oil Spill from increased vessel visits: the increase in vessel moves and vessel size will increase the potential for oil spills and the capacity in which they are required to be dealt with

General Context

- 10.132 An increase in the number of separate cargo transfer operations conducted and the volume of cargo per operation increases the likelihood and consequence above the current level.

Project Impact Assessment

- 10.133 The location of the facility and its associated commercial vessel operations during the operational phase will be well regulated with a large number of embedded mitigation measures regulating vessel movements and safety procedures. There is international and national level legislation which provides requirements on the equipment required on vessels dependent on size and training requirements for crew. This includes emergency plans and exercises for a range of situations which must be undertaken on a regular basis.
- 10.134 The PLA operate a VTS in this area which in terms of this pathway is able to provide up to date weather and vessel movements information as well as coordinate an emergency response if required. In addition, cargo operations will be conducted using industry standard protocol and be provided with a Marine Terminal Information Booklet (MTIB) detailing pre-determined oil spill response which will be approved by the PLA.
- 10.135 Given the potential consequences for this pathway and the level of embedded mitigation in this area, the sensitivity is determined to be medium. The impact is limited to the extent of the Jetty berths and is only present during cargo operations, so the magnitude is minor negative which leads to an assessed significance of Minor Adverse.

Mooring breakout with vessel alongside or rafted: mooring breakout (where a vessel breaks its moorings and leaves the berth or adjoining vessel due to stress of weather, passing vessel or mooring equipment failure)

General Scientific Context

- 10.136 The use of the jetty throughout a complete tidal cycle increases the likelihood of stresses on mooring lines. The combined strain of an increased freeboard, tidal effect increases the likelihood of this risk.

Project Impact Assessment

- 10.137 The location of the facility and its associated commercial vessel operations during the operational phase will be well regulated with a large number of embedded mitigation measures regulating vessel movements and safety procedures. There is international and national level legislation which provides requirements on the equipment required on vessels dependent on size and training requirements for crew. This includes emergency plans and exercises for a range of situations which must be undertaken on a regular basis.
- 10.138 The PLA operate a VTS in this area which in terms of this pathway is able to provide up to date weather and vessel movements information as well as coordinate an emergency response if required.
- 10.139 An exclusion zone and segregated navigational channels control the distance at which transiting traffic can pass Jetties 1 and 2. This reduces the likelihood of vessel wake impinging on the moorings of vessels alongside.
- 10.140 Given the potential consequences for this pathway and the level of embedded mitigation in this area, the sensitivity is determined to be medium. The impact is limited to the extent of the construction works and is only present during construction operations so the magnitude is minor negative which leads to an assessed significance of Minor Adverse.

Parted moorings with vessel alongside: - parted moorings and/or cargo line (where some of the vessel's moorings break, resulting in movement of the vessel and loss of cargo).

General Scientific Context

- 10.141 The use of the jetty throughout a complete tidal cycle increases the likelihood of stresses on mooring and cargo lines. The combined strain of an increased freeboard, tidal effect increases the likelihood of this risk.

Project Impact Assessment

- 10.142 The location of the facility and its associated commercial vessel operations during the operational phase will be well regulated with a large number of embedded mitigation measures regulating vessel movements and safety procedures. There is international and national level legislation which provides requirements on the equipment required on vessels

dependent on size and training requirements for crew. This includes emergency plans and exercises for a range of situations which must be undertaken on a regular basis.

- 10.143 The PLA operate a VTS in this area which in terms of this pathway is able to provide up to date weather and vessel movements information as well as coordinate an emergency response if required.
- 10.144 An exclusion zone and segregated navigational channels control the distance at which transiting traffic can pass Jetties 1 and 2. This reduces the likelihood of vessel wake impinging on the moorings of vessels alongside.
- 10.145 Given the potential consequences for this pathway and the level of embedded mitigation in this area, the sensitivity is determined to be medium. The impact is limited to the extent of the construction works and is only present during construction operations so the magnitude is minor negative which leads to an assessed significance of Minor Adverse.

Human health

- 10.146 The impacts of the project on commercial and recreational navigation have no direct effect on human health, other than the risks associated with marine accidents and incidents. The hazards presented by the OMSSD project to the navigational environment have been assessed with regards to the level of risk to human health. The current embedded and future control measures identified from the NRA process provide appropriate mitigation to avoid a significant impact on human health.

Climate change

- 10.147 The impact of the OMSSD project on commercial navigation is expected to increase vessel traffic associated with Jetties 1 and 2. Impact pathways deriving from vessel emissions is explored in the air quality chapter and will not be assessed in detail here. National and international requirement placed on commercial vessels regarding the use of fuels and the emissions standards within Emission Control Areas (ECAs) reduces the effect of Nitrogen oxide (NO_x) and Sulphur oxides (Sox) from vessel discharge. The effect of the works on recreational navigation will have no consequent impact on climate change.

Mitigation Measures

- 10.148 Where impacts on commercial and recreational navigation are identified as a result of the OMSSD project, appropriate mitigation measures or mitigation controls have been identified as part of the NRA process. By virtue of the marine environment, these controls are embedded within the background navigational environment, and include:
- Informing mariners through notices to mariners;
 - Unexploded ordinance investigation and reported risk levels;
 - Regular local weather forecasting;

- The use a stand-by/safety boat;
 - Use of direct lighting to areas of activity, appropriate to the prevailing conditions;
 - Providing a nominated point of contact between the PLA and works; and
 - A hydrographic surveying program to monitor siltation.
- 10.149 The NRA process specifically follows the concept of 'ALARP' which requires that marine risk is reduced to its lowest achievable level (within the constraints of practicality). All harbour authorities who are applying the requirements of the Port Marine Safety Code through the operation of a MSMS require developers to apply the principles of ALARP (typically by following an NRA process).
- 10.150 The OMSSD ES will confirm the final risk controls (mitigation) considered to be necessary through the NRA process and which will be put in place as appropriate during the construction and operation phases of the OMSSD project.

Limitations

- 10.151 The information detailed in the chapter provides for the intended scope and conduct of the NRA and is based on the following assumptions:
- Dredging is undertaken by TSHD with disposal at the North Edinburgh Channel (TH080) disposal site (if required);
 - Any maintenance dredging requirement will be undertaken by WID; and
 - Vessel numbers will increase due to the additional availability of infrastructure afforded by the OMSSD.

Preliminary Conclusions on Residual Effects

- 10.152 Following the implementation of mitigation measures and incorporation of the controls into operating procedures, the residual effects are likely to be reduced to Minor Adverse or Insignificant, which equates to ALARP as defined, applied within the context of the Port Marine Safety Code (see paragraph 10.20).