DECARBONISATION

ENVIRONMENTAL STATEMENT: 6.1 CHAPTER 19: MARINE NAVIGATION

Cory Decarbonisation Project

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Revision A

The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations (2009) - Regulation 5(2)(a)

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19. MARINE NAVIGATION

19.1. INTRODUCTION

19.1.1. This chapter reports the baseline analysis and findings of the hazards related to the Proposed Scheme on marine navigation, based on the Preliminary Navigational Risk Assessment (pNRA) (**Appendix 19-1: Preliminary Navigational Risk Assessment (Volume 3)**), undertaken by NASH Maritime, as well as the risks associated with these hazards and the mitigation measures identified. This chapter describes:

- relevant policy, legislation, and guidance;
- consultation undertaken to date;
- the methodology for assessment;
- potential effects of the construction phase; and
- potential effects of the operation phase.

19.1.2. **Appendix 19-1: Preliminary Navigational Risk Assessment (Volume 3)** incorporates and expands upon the findings of the Preliminary Navigation Hazard Analysis (pNHA) which was presented as Appendix 19-1 of the PEIR[1].

19.2. POLICY, LEGISLATION AND GUIDANCE

19.2.1. The policy, legislation, and guidance relevant to the assessment of marine navigation for the Proposed Scheme is detailed in **Table 19-1**.

19.2.2. The following have been excluded from **Table 19-1** due to a lack of specific policies and guidance relating to marine navigation:

- National Planning Policy Framework (NPPF) 2023[2]; and
- Planning Practice Guidance (2021)[3].

Table 19-1: Marine Navigation Summary of Key Policy, Legislation and Guidance

Policy, Legislation or Guidance	Description
Policy	
The Overarching NPS for Energy EN-1 2024[4]	This Overarching National Policy Statement for Energy (EN-1) is part of a suite of NPS designated by the Secretary of State of DESNZ in January 2024. The UK Government has concluded that there is a Critical National Priority (CNP) for the provision of nationally significant low carbon infrastructure. Furthermore, pursuant to Paragraphs 3.5.8 and 4.2.5, it is considered that the Proposed Scheme constitutes a scheme of CNP. Thus, the implications of this as set out in Section 4.2 of NPS EN-1 will

Policy, Legislation or Guidance	Description
	be applied to the Proposed Scheme. Once operational the Carbon Capture Facility will contribute to the UK Government's Net Zero Strategy. Paragraph 4.2.15 also states that unless the Proposed Scheme presents an unacceptable risk or interference offshore to navigation, is it unlikely that the residual impacts relating to this will outweigh the need for this type of infrastructure, in this case, the Proposed Jetty. It is therefore essential that any residual risks are not deemed unacceptable.
NPS for Ports (2012)[5]	Sets out the Department for Transport's policy, and framework for decisions, for new port developments. The NPS for Ports seeks to encourage sustainable port development. Whilst the Proposed Jetty for Proposed Scheme will not have annual capacities above those set out in the NPS for Ports, the Proposed Jetty will add beneficial infrastructure into the Port of London.
The London Plan 2021[6]	The Spatial Development Strategy for Greater London sets out a framework for how London will develop over the next 20-25 years and the Mayor's vision for Good Growth. Policies SI14 to SI16 of the London Plan are the key policies specific to marine navigation within Greater London. • Policy SI 14 Waterways – Strategic Role; • Policy SI 15 Water Transport; and • Policy SI 16 Waterways – Use and Enjoyment.
The Bexley Local Plan 2023[7]	The Local Plan, adopted on 26 April 2023, positively plans for sustainable development within the Borough. It is essential to the delivery of the Council's other key plans and strategies, including the Bexley Plan, the Growth Strategy and the Connected Communities Strategy. The following are the key policies specific to marine navigation: • Policy DP18: Waterfront Development and Development including, or close to, flood defences; • Policy DP19: The River Thames and the Thames Policy Area); and

Policy, Legislation or Guidance	Description
	• Policy DP31: Energy Infrastructure.
London Environment Strategy 2018[8]	The London Environment Strategy seeks to ensure that emissions from marine based transportation services are reduced, whilst increasing usage of River Thames based transportation systems.
International Maritime Organisation (IMO) Guidelines and Policy 2023[9]	Guidelines and policies governing international shipping which cover a range of areas. The IMO has developed and adopted international collision regulations and global standards for seafarers, as well as international conventions and codes relating to search and rescue, the facilitation of international maritime traffic, load lines, the carriage of dangerous goods and tonnage measurement.
Pilotage Directions 2017[10]	Document produced by the Port of London Authority (PLA) to inform all masters, pilots, and crew operating within the Port of London of the rules, regulations, standards, and protocols for doing so.
South East Inshore Marine Plan 2021[11]	The South East Inshore Marine Plan provides a framework that will shape and inform decisions over how the area's waters are developed, protected, and improved over the next 20 years. The following South East Inshore Marine Plan policies relate to Marine Navigation: • SE-PS-1; • SE-PS-2; and • SE-PS-3.
Legislation	
Pilotage Act 1987[12]	An Act of Parliament that governs the operation of maritime pilotage. The Act established "competent harbour authorities" and confers various duties and obligations on them relating to the regulation of shipping movements and the safety of navigation.
Merchant Shipping Act 1995[13]	An Act of Parliament to consolidate the Merchant Shipping Acts 1894 to 1994 and other enactments relating to merchant shipping.
Port of London Act (1968)[14]	Last updated in 2014, this is an overarching document that sets out the constitution, rule and powers, and finances of the port authority, and details who and what can use the

Policy, Legislation or Guidance	Description
	River Thames, including the laws and penalties which apply and other provisions.
Guidance	
Port Marine Safety Code 2016[15]	Document outlining the safety rules and guidance for harbour authorities, marine facilities, berths and terminals, as well as the general and specific duties and powers relating to them.
Navigational Risk Assessment – Guidance to Owners and Operators[16]	Produced by the Port of London Authority (PLA) to showcase high level initial overview of the risk assessment process and example of how such risk assessment can be undertaken.
Marine Guidance Note (MGN) 654 Offshore Renewable Energy Installations (OREIs) – Guidance on UK Navigational Practice, Safety and Emergency Response 2021[17]	This MGN highlights matters to be taken into consideration when assessing the potential for effects on navigational safety and emergency response. It applies in UK Internal Waters, Territorial Sea and Exclusive Economic Zone. Whilst this document does not directly relate to the scope of the Proposed Scheme, the information, principles, best practices, and recommendations are relevant to the marine navigation of the Proposed Scheme.
Revised Guidelines for Formal Safety Assessment (FSA) for use in the International Maritime Organisation (IMO) Rule-Making Process 2018[23]	Guidelines and policies produced by the IMO, the FSA can be used as a tool to help in the evaluation of new regulations for maritime safety and protection of the marine environment.
Thames Vision 2050 (2023)[27]	Produced by the PLA to showcase action plans, and highlight the methods, actions and initiatives that the Authority will be taking as it moves into the future.

Policy, Legislation or Guidance	Description
Future Trade through the Port of London (2021)[28]	Report produced by Oxford Economics for the PLA that forecasts future cargo expected to be handled in the Port of London up to 2050 and identifies opportunities and challenges for the PLA and stakeholders.
A Safer Riverside (2020)[30]	Guidance, produced by the PLA and supported by a range of stakeholders including Transport for London and the Metropolitan Police, relating to development alongside and on the tidal River Thames.
Methodology for Assessing the Marine Navigational Safety Risks and Emergency Response of Offshore Renewable Energy Installations (2021)[18]	Produced by the Maritime & Coastguard Agency (MCA) with the co-operation of key stakeholders as a methodology for assessing the marine navigational safety and emergency response risks of offshore renewable energy installations. Whilst this document does not directly relate to the scope of the Proposed Scheme, the information, principles, best practices, and recommendations are relevant to the marine navigation of the Proposed Scheme.
International Association of Lighthouse Authorities (IALA) Recommendation O-139 on the Marking of Man-Made Structures 2013[19]	These recommendations are for the guidance and information for stakeholders such as National Authorities, Lighthouse Authorities, Aviation Authorities and other competent authorities, Aids to Navigation (AtoN) providers, and the contracts, developers and operators involved in marine structures.
Code of Practice for Ship Towage Operations on the Thames (2023)[20]	This Code of Practice was published on 14 June 2021, amended on 13th July 2023, and is reviewed every three years in line with PLA Policy. It is provided for the guidance of Masters, Pilots and tug crews involved or likely to be involved in ship towage operations on the tidal Thames. Ships' agents are also recommended to make themselves familiar with the content of the Code, and in particular the application of Part Two -

Policy, Legislation or Guidance	Description
	the Guidelines for the Utilisation of Ship Towage Tugs on the Thames.

19.3. CONSULTATION AND ENGAGEMENT

19.3.1. **Table 19-2** provides a summary of the consultation and engagement undertaken in support of the preparation of this assessment.

19.3.2. **Table 19-3** provides a summary of comments provided as part of the statutory consultation process and an appropriate response.

19.3.3. **Appendix 4-2: Scoping Opinion Responses (Volume 3)** provides a summary of the Planning Inspectorate and consultee comments on the EIA Scoping Opinion[21] and the Applicant's responses.

Table 19-2: Consultation and Engagement Summary Table in relation to Marine Navigation

Date and Method of Consultation	Consultee	Summary of Key Topics discussed and Key Outcomes
22nd July 2022, Meeting	Port of London Authority *Statutory Harbour Authority for the River Thames*	Review of pNRA scope and methodology.
9th August 2022, Meeting	Port of London Authority *Statutory Harbour Authority for the River Thames*	Validation of baseline navigational environment and review the identified preliminary hazards and key navigational matters. Discuss next steps including ship bridge simulations and the pNRA.
22nd September 2022, Meeting	Port of London Authority *Statutory Harbour Authority for the River Thames*	Presentation and discussion of the initial pNHA findings, and associated works which had been undertaken up to that point. Information presented was an early iteration of Appendix 19-1: Preliminary Navigation Hazard Analysis (Volume 3) of the PEIR[1]. Scope of pNRA agreed between NASH Maritime, WSP, and the PLA.
29th March 2023, Meeting	Port of London Authority *Statutory Harbour Authority for the River Thames*	Presentation of the initial findings of the Appendix 19-1: Preliminary Navigation Hazard Analysis (Volume 3) of the PEIR[1], including the preliminary hazard identification. Discussion regarding the options for the location and layout of the Proposed Jetty, including the preferred location and layout. Discussion on the next steps for navigation safety work including the ship bridge simulations and scope of the pNRA (which was agreed). Presentation of analysis illustrating passing cargo and tanker transits in proximity to the preferred location and layout of the Proposed Jetty.

Date and Method of Consultation	Consultee	Summary of Key Topics discussed and Key Outcomes
24th and 25th April 2023, Meeting	Port of London Authority *Statutory Harbour Authority for the River Thames*	Ship bridge simulations for Options 2 and 3 for PLA pilots to test approach, berthing, and de-berthing at Proposed Jetty. Options 2 and 3 of the Proposed Jetty are discussed further in **Chapter 3: Consideration of Alternatives (Volume 1)**.
22nd July 2023, Meeting	Port of London Authority *Statutory Harbour Authority for the River Thames*	Overall Proposed Scheme update and presentation of the developing location and layout of the Proposed Jetty. Discussion around the potential demolition of the Belvedere Power Station Jetty (disused).
22nd August 2023, Meeting	Port of London Authority *Statutory Harbour Authority for the River Thames*	Consultation with Ford's Jetty's vessel operator will be expedited. It was agreed that pellet buoys will be located in the River Thames to mark the location of the Proposed Jetty in order to assess the adequacy of the manoeuvring area for tugs and barges. PLA confirmed that the Sept-22 Automatic Identification System (AIS) dataset used for the pNHA meets the PLA's requirements for the pNRA. The PLA confirmed that the Study Area proposed is appropriate for the pNRA. Methodology and consultees for the pNRA were discussed. PLA to provide information on future traffic profile. Significance of passing vessel (hydraulic) interaction to be considered further during the process of the pNRA. The PLA confirmed that the pNRA scope was suitable.

Date and Method of Consultation	Consultee	Summary of Key Topics discussed and Key Outcomes
3rd October 2023, Email	Erith Rowing Club *Local recreational club on the River Thames downstream of the Study Area.*	Erith Rowing Club were advised that the purpose of stakeholder consultation was to inform the pNRA and to define hazards and appropriate risk control measures to reduce risk associated with the Proposed Jetty. Erith Rowing Club advised that the potential location of the Proposed Jetty presented to them, that being Option 2, may pose hazards for navigating this section of the River Thames, however the impact on Erith Rowing Club would be somewhat negligible. Note: This was based on Proposed Jetty Option 2 which is not part of the Proposed Scheme (see **Chapter 3: Consideration of Alternatives (Volume 1)**).
4th October 2023, Meeting	GPS Marine *Multi cargo intra-port operator on the River Thames* *Transiting the River Thames through the Study Area*	GPS confirmed the presented AIS plots from AIS Data are representative of the real-world scenario and an accurate overview. A key concern for GPS Marine related to the potential positioning of the Proposed Jetty, explaining that when muck away barges are outbound on an ebb tide it is necessary for them to navigate south of the authorised channel when approaching Jenningtree bend. GPS stated that the current position of the jetty would block the route south of the authorised channel for tankers, risking vessels being set too far north and grounding or colliding with inbound vessels. An increased number of vessel movements was a concern for GPS, but noted inbound vessels would need to give way to them on an ebb tide. Contact with construction barges was the main concern for GPS during the construction phase. Note: This was based on Proposed Jetty Option 2 which is not part of the Proposed Scheme (see **Chapter 3: Consideration of Alternatives (Volume 1)**).

Date and Method of Consultation	Consultee	Summary of Key Topics discussed and Key Outcomes
5th October 2023, Meeting	CLdN *Operator of Ford's Jetty vessels* *Undertaking berthing and loading/unloading within the study area, on the northern bank of the River Thames*	Discussions around vessel plots from AIS Data and whether these are representative of the real-world scenario, CLdN confirmed the presented AIS plots were an accurate overview. CLdN commented that vessels transited south of the authorised channel because they were able to do so, not because they needed to do so, and were unaware of any current navigational risks requiring their vessels to navigate in this manner. It was agreed that CLdN would notify their captains of the proposed operations and asked to give their opinions and respond to a number of queries. These responses are presented in this table. CLdN were concerned about the potential proximity of the Proposed Jetty to the authorised channel, and felt it was too close, though this would be raised with the captains for response. Note: This was based on Proposed Jetty Option 2 which is not part of the Proposed Scheme (see **Chapter 3: Consideration of Alternatives (Volume 1)**).
8th October 2023, Email	CLdN Captain A	CLdN asked their captains to provide responses and feedback to the Proposed Jetty. Captain A stated that the full width of the fairway was used due to *"the limited manoeuvrability power of the Cobelfret vessels plying this route"*, and due to the wind and current this room was needed. It would also be a struggle to navigate further north, but as long as navigation in the authorised channel is possible there should be no issues. Exclusion zones around vessels, plant, and equipment during the construction phase, forcing vessels further north within the authorised channel, would be an issue, however. Note: This was based on Proposed Jetty Option 2 which is not part of the Proposed Scheme (see **Chapter 3: Consideration of Alternatives (Volume 1)**).

Date and Method of Consultation	Consultee	Summary of Key Topics discussed and Key Outcomes
9th October 2023, Email	CLdN Captain B	CLdN asked their captains to provide responses and feedback to the Proposed Jetty. Captain B stated that the presence of the Proposed Jetty will make their life more complicated. The first concern is that small craft and recreational vessels would be using the main channel, impeding the safe passage of larger vessels. Secondly, during strong winds vessels currently get close to Middleton Jetty, and would get even closer to the Proposed Jetty should it be built. The last main concern is that scheduled arrivals and departures of CLdN vessels will be affected by the arrivals and departures of vessels for the Proposed Scheme. Note: This was based on Proposed Jetty Option 2 which is not part of the Proposed Scheme (see **Chapter 3: Consideration of Alternatives (Volume 1)**).
8th October 2023, Email	CLdN Captain C	CLdN asked their captains to provide responses and feedback to the Proposed Jetty. Captain C stated that due to the size of CLdN vessels calling at Dagenham departing on ebb and flood tide, the full channel width is required in order to complete manoeuvres safely. CLdN vessels tend to sail as close as possible to the southern edge of the fairway when reducing speed compensating for drift due to wind and tide, and there is some concern regarding draw off at very low speeds. Additionally, vessels require a clear run in both directions from Crayfordness to the berth. Concern on how this will be established was mentioned. Note: This was based on Proposed Jetty Option 2 which is not part of the Proposed Scheme (see **Chapter 3: Consideration of Alternatives (Volume 1)**).

Date and Method of Consultation	Consultee	Summary of Key Topics discussed and Key Outcomes
9th October 2023, Email	Heidelburg Aggregates *Aggregates and building materials company operating vessels on the River Thames* *Transiting the River Thames through the Study Area*	Stakeholders were advised that the purpose of stakeholder consultation was to inform the pNRA and define hazards and appropriate risk control measures to reduce risk associated with the Proposed Jetty Option 2 and Marine Operation and were asked their views on a number of items, which are detailed in **Section 5** of **Appendix 19-1: Preliminary Navigational Risk Assessment (Volume 3)**. A Heidelburg Aggregates captain stated that he uses the full extent of the navigation channel, and that the area is tight as it is, so having a vessel sat against the Proposed Jetty would make the space even tighter. Large tankers also use this area of the River Thames. Note: This was based on Proposed Jetty Option 2 (see **Section 3.4** of **Chapter 3: Consideration of Alternatives (Volume 1)**).
18th October 2023, Meeting	CLdN *Operator of Ford's Jetty vessels* *Undertaking berthing and loading/unloading withing the study area, on the northern bank of the River Thames*	CLdN stated that it is crucial that CLdN vessels are able to utilise the full width of the fairway when navigating to and from Ford's Jetty; any encroachment of the Proposed Scheme into the fairway as a result of any exclusion zone around the Proposed Jetty would not be acceptable. Conflict with Tug and Barge traffic is currently relatively infrequent. Jenningtree is not seen as an appropriate location for vessels to pass due to narrow fairway and bend. When presented with the Option 3 (see **Chapter 3: Consideration of Alternatives (Volume 1)**) for the Proposed Jetty, CLdN stated that this was more preferable. All parties agreed that further detailed simulation work is necessary to allow CLdN captains to get a feel for how they would be impacted by the presence of a new structure on their key area of operation near where they berth and manoeuvre their

Date and Method of Consultation	Consultee	Summary of Key Topics discussed and Key Outcomes
		vessel, and identify any problems which could arise whilst undertaking these simulation runs.
7th November 2023, Meeting	Port of London Authority *Statutory Harbour Authority for the River Thames*	Meeting to undertake a review of Option 3 (representative of the Proposed Jetty as put forward in the DCO application) and explore key themes and outcomes of the stakeholder consultation exercise summarised above alongside additional analysis. During the meeting, information was also provided on the inherent risk assessment results, additional risk control measures, and the residual risk assessment results.
29th to 31st January 2024, Meeting	Port of London Authority *Statutory Harbour Authority for the River Thames* CLdN *Operator of Ford's Jetty vessels* Heidelburg Aggregates *Aggregates and building materials company operating vessels on the River Thames*	Ship bridge simulations for Options 2 and 3, to assess the impact (if any) of the Proposed Jetty options on existing CLdN vessels navigating to and from Fords Jetty, assess the impact (if any) of the Proposed Jetty options on passing vessel transits, particularly passing distance and speed, and further understand how (if at all) the Proposed Jetty influences the positioning of vessels within the authorised channel when transiting Halfway Reach and Jenningtree bend. The results of these simulations are detailed in **Section 6** of **Appendix 19-1: Preliminary Navigational Risk Assessment (Volume 3)**.
22nd February 2024, Meeting	Port of London Authority *Statutory Harbour Authority for the River Thames*	Meeting to formally discuss the PLA's General Direction requirement for a 60m exclusion zone around a moored LCO_2 vessel at the Proposed Jetty.

Date and Method of Consultation	Consultee	Summary of Key Topics discussed and Key Outcomes
		The exclusion zone would not apply to the Proposed Jetty alone as the terminal is not an oil or gas jetty, and it would only apply to passing (through) traffic. The PLA agreed that the applicability of the General Direction to the berthed LCO_2 tanker could be revisited pending the provision of gas dispersion modelling providing further context as to the nature, extent, and effects of a LCO_2 release. Until such a time that evidence is provided to reduce or remove the exclusion zone, the PLA would enforce a 60m exclusion zone on a precautionary basis. It was agreed the simulations had demonstrated that vessels could safely navigate well clear of the proposed exclusion zone extent in accordance with the General Direction.
5th March 2024, Meeting	Port of London Authority *Statutory Harbour Authority for the River Thames*	Meeting to present the findings of **Appendix 19-1: Preliminary Navigational Risk Assessment (Volume 3)**.

Table 19-3: Summary of the Statutory Consultation Comments in relation to Marine Navigation

Statutory Consultee	Response
Port of London Authority	
"… the Proposed Jetty has been positioned within the channel such that a minimal volume of dredging is required, whilst ensuring safe navigation for Proposed Scheme vessels berthing at the Proposed Jetty, and third-party vessels transiting along the navigation channel. This has not yet been agreed within the Preliminary Navigational Risk Assessment (pNRA) and there are ongoing assessments and	**Appendix 19-1: Preliminary Navigational Risk Assessment (Volume 3)** is based on the Proposed Jetty described in **Chapter 2: Site and Proposed Scheme Description (Volume 1)**.

Statutory Consultee	Response
discussions for the pNRA which will determine whether the proposed jetty location is acceptable."	
"Furthermore point 6 of paragraph 19.7.3 states that ship bridge simulations have confirmed that no significant ship handling issues were identified, and sight lines were not felt to be an issue. As part of the simulations there was a period of the tide where manoeuvres off the berth would not be acceptable to PLA Pilots and as such would be included as limitations of operational use. This must be highlighted as part of the Preliminary Navigation Hazard Analysis."	The PLA pilots were concerned about a mid-ebb tide departure. This scenario was simulated in order to consider the worst case scenario. However, the vessels will be required to depart the Proposed Jetty no later than High Water +1.5 hrs to avoid compromising Under Keel Clearance further down the River Thames, therefore a mid-ebb tide departure is highly unlikely to occur, and could be made a limitation of operational use. See **Appendix 19-1: Preliminary Navigational Risk Assessment (Volume 3)**.
"Section 19.9 (Additional design, mitigation, and enhancement measures) in paragraph 19.9.3 includes a proposal that the Proposed Jetty will be able to facilitate the berthing of Riverside 1 and Riverside 2 tugs via a landing pontoon that will be located at the rear of the Proposed Jetty so as not to interfere with vessel movements on the LCO_2 export operations. To confirm this proposal has not been discussed with the PLA and does not currently form part of the NRA."	As described in **Chapter 2: Site and Proposed Scheme Description (Volume 1)** it is proposed that berthing facilities for Cory tugs operating at the Middleton Jetty are integrated to the Proposed Jetty. The berthing of Cory tugs will be facilitated via a landing pontoon which will be located at the rear of the Proposed Jetty. As well as providing berthing facilities, the pontoon will provide a means of increased safety during operations at both the Proposed Jetty and Middleton Jetty. Details of this can be found in **Section 2.2** of **Chapter 2: Site and Proposed Scheme Description (Volume 1).** **Appendix 19-1: Preliminary Navigational Risk Assessment (Volume 3)** is based on the Proposed Jetty described in **Chapter 2: Site and Proposed Scheme Description (Volume 1)**. Information on the proposal to facilitate the berthing of Riverside 1 and Riverside 2 tugs via a landing pontoon on the Proposed Jetty is outlined in **Appendix 19-1: Preliminary Navigational Risk Assessment (Volume 3)**.

Statutory Consultee	Response
"Noted that paragraph 19.9.5 states that the installation of a navigation mark in line with the Proposed Jetty and to the north of the authorised channel will be considered to indicate the boundary of navigable water available during swinging. To confirm it has not yet been established between the PLA and the applicant if this is required or if such a mark would be suitable/possible in this location."	Further engagement with the PLA was held during January/February 2024 on this point. This has since been removed from **Appendix 19-1: Preliminary Navigational Risk Assessment (Volume 3)**.
"With regard to section 19.10 on monitoring, to confirm the PLA would expect monitoring to be ongoing throughout construction when the risks are different to the operational phase. For the operational phase it is expected that the proposed jetty would be suitably navigationally risk assessed prior to any construction."	Monitoring during the construction phase is part of the Proposed Scheme to ensure safety on the River Thames. The proposed monitoring is detailed in **Section 19.10** and in the pNRA and secured by the DCO requiring compliance with the pNRA. With regard to monitoring during the operation phase, a suitable NRA would be produced, in accordance with **Appendix 19-1: Preliminary Navigational Risk Assessment (Volume 3)** before operational activities are undertaken.
"Welcome paragraph 19.9.2 which states that as part of the pNRA and the construction phase of the development, it is anticipated that the maximum extent of marine plant would be assessed and agreed, and that additional measures would be recommended, which might include (but are not limited to) operational limits, deconfliction of vessel movements, abort points and contingency anchorages, a dedicated safety vessel, appropriate site lighting, promulgation of Notice to Mariners, detailed passage plans, and additional safety moorings to prevent breakout of marine plant."	No response required.
CLdN in relation to Ford Dagenham	
"We note from the PEIR (para 19.8.5) that consultation with affected operators (including CLdN) is ongoing to better understand the impacts of the proposed jetty location. The PEIR contains limited information on these impacts and therefore our ability to comment in	A consultation meeting with CLdN was undertaken on the 18th October 2023, in which the Proposed Scheme and Proposed Jetty were discussed (see **Table 19-2**).

Statutory Consultee	Response
detail is very limited. However, you are aware already of our concerns about the design of the proposed jetty extending 160-180m into the River, with the effect of reducing the fairway. We understand that reducing requirements for capital and maintenance dredging is the main factor that has influenced the length of the jetty. *CLdN considers that the proper way to approach the jetty design is dictated by the impacts to navigation; if that means additional capital dredge requirements that is a necessity for the project. Reducing dredging requirements (and/or cost) should not drive the design process so that the project presents issues for navigation, which are otherwise avoidable."*	The design of the Proposed Jetty, as described in **Chapter 2: Site and Proposed Scheme Description (Volume 1)**, these have been dictated by the balance of various elements which could affect construction and operation phases, including in this instance, balancing the importance of navigational ease against dredging requirements leading to loss of the foreshore (i.e. the environmental consequences of dredging). Further ship simulations were undertaken in January 2024 based upon the Proposed Jetty design, as described in **Chapter 2: Site and Proposed Scheme Description (Volume 1)**. The results of these ship simulations in relation to risk are detailed in **Appendix 19-1: Preliminary Navigational Risk Assessment (Volume 3)**.
"We note that the alternatives chapter of the PEIR does not address alternative designs, including reducing the length of the jetty. This is in our view a flaw in design development and assessment of the Project, particularly when the impacts on navigation of the proposed design are still unknown as detailed navigation simulations have not been undertaken. We are able to comment in due course in this respect and ask that we are involved in those simulations including agreeing the parameters for conducting them."	The PEIR discussed alternative designs for the Jetty in Section 3.4, of Chapter 3: Alternatives Chapter (Volume 1). The length of the Proposed Jetty (distance into the river) put forward in the DCO application (Option 3) was established based on a number of factors including, navigational safety, dredging requirements and environmental sensitivities. Further information on the chosen location Proposed Jetty is provided in **Chapter 3: Consideration of Alternatives (Volume 1)** and detailed in the **Jetty Site Alternatives Report (Document Reference 7.6)**. Further ship simulations were undertaken in January 2024 based upon the Proposed Jetty design, as described in **Chapter 2: Site and Proposed Scheme Description (Volume 1)**. CLdN reviewed and accepted the parameters proposed and attended the ship simulations. The results of these ship simulations are included in **Appendix 19-1: Preliminary Navigational Risk Assessment (Volume 3)**.

Statutory Consultee	Response
"As explained at the 18 October meeting by our Captain Veys, it is essential that vessels approaching/leaving Ford Dagenham can use the whole width of the fairway. This is because (per minutes of 18 October meeting) "when inbound on a flood tide with a strong south westerly wind, CLdN vessels, having rounded Jenningtree bend, must remain close to the southern limit of the fairway to avoid being set to the north, bearing in mind their likely swept path and the fact that they are reducing speed at this time. *This is particularly important with the CLdN single propeller vessels given the difficulty of maintaining directional stability on these vessels in a beam wind, when reducing speed. If an exclusion zone is present meaning vessels cannot navigate in this manner, then there would be a risk of setting too far north into shallow water and being too close to the jetty on the approach. Issue is primarily with inbound transits not outbound."*	This was assessed with further ship simulations undertaken in January 2024. The results of these are detailed in **Appendix 19-1: Preliminary Navigational Risk Assessment (Volume 3)**.
"At the 18 October meeting you presented an alternative jetty design which is 20m shorter than Option 2 (160m versus 180m). CLdN explained that whilst this is an improvement, the shorter design still protrudes significantly into the fairway. This is not likely to resolve the navigational impacts outlined by Captain Veys. We consider that you should also look at design/construction of a shorter jetty to avoid these impacts, which can then also be subject to navigation simulations. Without doing that, our legal advice is that you will not have adequately considered options for the design of the project or the need to consider alternatives to minimise the impacts of the project."	The alternate option presented, Option 3, is closer to the southern bank of the River Thames, therefore further from the navigation channel, than Option 2. Subject to further design development and discussion with the Environment Agency and PLA, the Proposed Jetty could potentially be set back very slightly further from the navigation channel than currently shown with Option 3 during detailed design. However, Option 3 represents the approximate maximum distance from the navigation channel and is representative of the worst case scenario due to the dredging requirements and other environmental implications as described in **Chapter 3: Consideration of Alternatives (Volume 1)**. Option 3 was assessed with further ship simulations undertaken in January 2024. The results of these are included in **Appendix 19-1: Preliminary Navigational Risk Assessment (Volume 3)**.

Statutory Consultee	Response
"Further, the PEIR does not directly address potential exclusion zones around the jetty and the impacts of this on vessels passing or manoeuvring to berth at Ford Dagenham, although you have stated that exclusion zones should not be applied as CO2 is not flammable. We should appreciate confirmation of this bearing in mind that the PEIR at 19.9.2 and 19.9.3 states that deconflicting measures may be initiated. These will need to be explained and discussed. Deconflicting measures should not interrupt or impede passing vessels, including during construction."	This was assessed during passing vessel analysis and ship simulations undertaken in January 2024. The results of these are included in **Appendix 19-1: Preliminary Navigational Risk Assessment (Volume 3)**. General Direction 17.1 (b) of the PLA bylaws require a 60m exclusion zone from the outer edge of the LCO_2 tanker when moored alongside the Proposed Jetty. This has been accounted for in the pNRA and detailed in **Section 6.1** of **Appendix 19-1: Preliminary Navigational Risk Assessment (Volume 3)**.
"We also note from para 19.8.5 of the PEIR that you are yet to assess the hydrodynamic effect of large vessels passing the jetties, which may of itself indicate that the location of the jetty is unsuitable and potentially dangerous during loading of gas to vessels. It would not be acceptable to interrupt river traffic during loading operations."	Hydrodynamics were assessed with further ship simulations undertaken in January 2024. The results of these are included in **Appendix 19-1: Preliminary Navigational Risk Assessment (Volume 3)**.

19.4. ASSESSMENT METHODOLOGY AND SIGNIFICANCE CRITERIA

19.4.1. Data and assessment from **Appendix 19-1: Preliminary Navigational Risk Assessment (Volume 3)** have been used to inform this chapter. **Appendix 19-1: Preliminary Navigational Risk Assessment (Volume 3)** assesses the navigation risks during the construction and operation phases of the Proposed Scheme. **Appendix 19-1: Preliminary Navigational Risk Assessment (Volume 3)** has incorporated analysis, consultation with stakeholders, expert judgement, and local knowledge to establish risk and identify appropriate controls.

19.4.2. **Figure 19-1** shows the risk matrix used to inform **Appendix 19-1: Preliminary Navigational Risk Assessment (Volume 3).** The matrix is based on, and adheres to, the PLA NRA methodology[16], which requires hazards to be identified and assessed in relation to hazard likelihood and hazard consequence, to generate a hazard risk score.

Risk Scoring Matrix					
Almost Certain	5	10	15	20	25
Likely	4	8	12	16	20
Possible	3	6	9	12	15
Unlikely	2	4	6	8	10
Rare	1	2	3	4	5
Likelihood	Minor	Moderate	Serious	Very Serious	Severe

Figure 19-1: Marine Navigation – PLA Risk Scoring Matrix

19.4.3. Likelihood classifications range from Rare, to Almost Certain, and describe the probability of a hazard occurring. Consequence classifications range from Minor to Severe, and describes the level of impact the hazard may cause in relation to:

- people;
- environment;
- property;
- reputation; and
- port impact.

POTENTIAL SIGNIFICANT EFFECTS

19.4.4. As set out in the EIA Scoping Report[22] and PEIR[1], the likely significant effects associated with the construction and operation phases on marine navigation include:

- Construction:
  - Collision:
    - Construction vessel in collision with cargo vessel/ tanker/passenger vessel/recreational vessel/Cory tug or barge/another construction vessel; or
    - Collision between third party vessels resulting from action taken to avoid a construction vessel.
  - Contact:
    - Construction vessel makes contact with marine construction works;
    - construction Vessel makes contact with existing infrastructure (e.g. Middleton Jetty);
    - Cory tug and barge makes contact with marine construction works; or
    - Third party vessel makes contact with marine construction works.
  - Grounding:
    - Construction vessel grounds; and
    - Cory tug or barge grounds as a result of avoiding construction vessel.
  - Breakout:
    - Construction vessel breakout.
- Operation:
  - Collision:
    - Proposed Scheme vessel in collision with cargo vessel/tanker/passenger vessel/recreational vessel/Cory tug or barge; or
    - Collision between third party vessels resulting from action taken to avoid vessels from the Proposed Scheme.
  - Contact:
    - Proposed Scheme vessel makes contact with Proposed Jetty;
    - Proposed Scheme vessel makes contact with existing infrastructure (e.g. Middleton Jetty);
    - Cory tug and barge makes contact with Proposed Jetty; and
    - Third party vessel makes contact with Proposed Jetty.
  - Grounding:
    - Proposed Scheme vessel grounds; or
    - Cory tug or barge grounds as a result of avoiding Proposed Scheme vessels.
  - Breakout:
    - Proposed Scheme vessel breakout;

- ~ Cory tug or barge breakout as a result of marine operations associated with the Proposed Scheme; or
- ~ Third party vessel breakout as a result of marine operations associated with the Proposed Scheme.

19.4.5. These have been assessed in **Appendix 19-1: Preliminary Navigational Risk Assessment (Volume 3)** in line with the legislation, policy and guidance described in **Section 19.2**.

MATTERS SCOPED OUT

19.4.6. There are no matters that have been scoped out of further assessment.

BASELINE DATA COLLECTION

19.4.7. Baseline data has been collected as reported in **Section 2** of **Appendix 19-1: Preliminary Navigational Risk Assessment (Volume 3)**.

ASSESSMENT METHODOLOGY

19.4.8. The scope of **Appendix 19-1: Preliminary Navigational Risk Assessment (Volume 3)** has been agreed with the PLA, and as such, the assessment methodology is in accordance with the International Maritime Organisation Formal Safety Assessment methodology[23] and the Port Marine Safety Code[15]. The methodology adopted is considered to be 'best practice' for port marine operations. It meets the requirements of the PLA's Guidance to Operators and Owners on NRAs[16].

19.4.9. The assessment presented within this chapter considers potential impacts from the construction and operation of the Proposed Scheme alongside Riverside 1 and Riverside 2.

19.4.10. The below sections provide a summary of the assessment methodology which is detailed further in **Appendix 19-1: Preliminary Navigational Risk Assessment (Volume 3)**.

Vessel Traffic Analysis

19.4.11. Vessel traffic analysis has been used to assess the type, number, speed, and frequency of vessels passing through the section of the River Thames surrounding the Proposed Jetty, this is included within in **Section 3** of **Appendix 19-1: Preliminary Navigational Risk Assessment (Volume 3)**. The vessel traffic analysis was informed by a vessel traffic survey, conducted for a four-week period during October/November 2023, to better understand and quantify how Cory tug and barge manoeuvres may operate and the likely spatial requirements within the vicinity of Middleton Jetty with the Proposed Jetty in place. The survey involved placing the three pellet buoys, a high definition Pan-Tilt-Zoom optical sensor, and an AIS receiver, within the Study Area. This equipment captured the movements of Cory tugs and barges, to allow analysis against the location of the Proposed Jetty.

19.4.12. **Section 3** of **Appendix 19-1: Preliminary Navigational Risk Assessment (Volume 3)** also includes commentary on possible future vessel scenarios, including Riverside 2 operations, and an assessment of the increases in vessel movements as a result of the Proposed Scheme.

Ship Bridge Simulations

19.4.13. Models of the River Thames, the Proposed Jetty, and a range of atmospheric and weather conditions have been used to simulate real world marine navigation and vessel berthing in a ship simulator. The purpose of these simulations was to highlight any problems or difficulties which could be experienced by vessel masters and pilots during movements up and down the navigation channel, during berthing and de-berthing manoeuvres, and whilst berthed at the Proposed Jetty.

19.4.14. Pilot Exemption Certificate holders (CLdN and Hanson) participated in the ship bridge simulations to assist in familiarisation with the operational navigational environment of the Proposed Jetty and to inform the evidence-based decision making in relation to the Proposed Jetty orientation and location.

19.4.15. The results of the ship bridge simulations are presented in **Appendix 19-1: Preliminary Navigational Risk Assessment (Volume 3)**.

Passing Vessel Mooring Analysis

19.4.16. Due to the close proximity of outward passing traffic and rapidly shallowing depths inshore of the berth draw off/interaction damage and/or suction off berth is a possibility. Therefore, a passing vessel mooring analysis was undertaken to determine the hydrodynamic effect of close passing large ships on moored vessels. The results of the passing vessel mooring analysis are presented in **Appendix 19-1: Preliminary Navigational Risk Assessment (Volume 3)**.

SIGNIFICANCE CRITERIA

19.4.17. The significance of potential effects these have been evaluated using the Port of London Authority Navigation Risk Assessment methodology[16].

19.4.18. The acceptability of risk is not explicitly stated, however based on professional judgement, it is assumed that ‘Moderate’ and ‘Minor’ risk would be deemed acceptable, and anything above would require risk controls to be identified and allocated to hazards.

19.4.19. For the purposes of this assessment, effects that are deemed to be unacceptable, or not within ALARP (As Low As Reasonably Practicable) parameters, are considered to be significant in EIA terms; effects deemed to be broadly acceptable or tolerable and ALARP are deemed as not significant in EIA terms.

19.5. STUDY AREA

19.5.1. The River Thames is split into extended sections known as 'Reaches'. The Study Area sits within Halfway Reach, which leads 1.5 nautical miles (NM) west-north-west from Jenningtree Point (51°30'20N, 0°08'06E) to Crossness Light. The Study Area extends upstream past the Thames Water Jetty and downstream to Jenningtree Point on the River Thames, just past the Thames Water Barge Moorings. The Study Area for marine navigation is the same for the construction and operation phases of the Proposed Scheme, and was established based on available space to develop a jetty in connection with the terrestrial options. Upstream, it was not physically possible connect a new jetty past the Crossness Thames Water site as their site utilises all of the waterfront, meaning anything further than this was ruled out. Downstream, it was not practical or safe, from a navigation perspective, to place the Proposed Jetty within the bend on the river, again meaning anything further was ruled out. The Study Area is shown In **Figure 19-1: Marine Navigation Study Area with Key Navigational Features (Volume 2)**.

SENSITIVE RECEPTORS

19.5.2. The following sensitive receptors have been identified, as they could be affected during the construction and/or operation phase of the Proposed Scheme:

- Proposed Scheme vessels (including vessels used for maintenance dredging);
- Proposed Scheme construction vessels (including vessels for construction dredging);
- cargo vessels;
- tankers;
- passenger vessels;
- recreational vessels;
- Cory tugs and barges;
- existing infrastructure (e.g. Middleton Jetty); and
- the Proposed Jetty.

19.6. BASELINE CONDITIONS AND FUTURE BASELINE

BASELINE

19.6.1. The key sources of information to inform baseline marine navigation conditions are:

- AIS survey data;
- UK Admiralty Charts[24];
- PLA Charts 327 and 328[25];
- PLA Recorded Incidents;
- PLA Risk Assessment methodology[16];
- further PLA Guidance (see **Table 19-1**);
- Marine Accident Investigation Branch for marine incident data [26]; and

- discussions between the PLA and the Applicant. See **Appendix 19-1: Preliminary Navigational Risk Assessment (Volume 3)**.

19.6.2. The Proposed Scheme is located approximately 500m west of Jenningtree Point on the southern bank of the River Thames. **Figure 19-1: Marine Navigation Study Area with Key Navigational Features (Volume 2)** shows the location of the Proposed Scheme.

19.6.3. The section of the River Thames upstream of Halfway Reach is dominated by in-land passenger and recreational vessels; downstream of the Reach is more frequented by commercial shipping associated with Tilbury and London Gateway ports, amongst other facilities. The vessels that most commonly frequent Halfway Reach are inland non-passenger vessels, such as barges travelling to the various local wharfs and jetties, as well as commercial shipping to and from central London.

19.6.4. The vessel traffic activity in the Study Area can be classified into two major groups:

- Group 1: Powered commercial vessels, which make up the larger vessels and include cargo vessels, tankers, passenger vessels, tugs and port service vessels; and
- Group 2: Recreational vessels made up of powered (e.g. cabin cruisers) and unpowered craft (e.g. rowing sculls, canoes, paddle boarders and sailing dinghies).

19.6.5. Analysis of Group 1 (powered commercial vessels) was undertaken using Thames AIS transponder data (commercial vessels are mandated to transmit by Very High Frequency (VHF) various vessel characteristics, such as position, speed, size, and name at prescribed intervals, which can be converted to create vessel tracks).

19.6.6. As AIS is not required on small recreational vessels (although some larger recreational craft voluntarily carry AIS) analysis of Group 2 vessels (powered and unpowered recreational craft) is more qualitative in nature. Whilst information is available in publications, consultation with appropriate users was necessary to ascertain detailed information on how they utilise the River Thames. There are no recreational clubs or facilities located within the Study Area, and those which utilise this section of the River Thames, such as the Erith Rowing Club, have been consulted. This information is presented, where available, in detail in **Appendix 19-1: Preliminary Navigational Risk Assessment (Volume 3)** and in **Table 19-2** above.

19.6.7. The marine operations to Riverside 1 currently comprise:

- On average ten arrivals and departures at Middleton Jetty a day;
  - four arrivals and four departures from/to an upstream direction; and
  - one arrival and one departure from/to a downstream direction.
- The upstream arrivals and departures represent the movement of waste from various waste transfer stations in central London to the Middleton Jetty.
- The downstream arrival and departure represent the movement of ash barges from Riverside 1 to a processing facility at Tilbury Docks.
- Riverside 1 operation take place on six days a week (Monday-Saturday).

- Approximately 3,120 tug and barge movements per annum to Middleton Jetty.

FUTURE BASELINE

19.6.8. The Thames Vision 2050 goals[27] and 'Future Trade' developed through the Port of London forecasts[28] will add to River Thames traffic but are unlikely to change the type of vessels transiting the Study Area. The projected increase in vessels carrying unitised cargo and decrease in liquid bulk vessels will likely mainly impact terminals downstream of the Study Area and will, consequently, not impact the marine navigation risks of the Proposed Scheme.

19.6.9. When Riverside 2 (at the time of writing, construction works for Riverside 2 are being undertaken) is operational in 2026, the Cory marine operation will expand to comprise:

- 16 vessel arrivals and departures at Middleton Jetty a day;
  - six arrivals and six departures from/to an upstream direction; and
  - two arrivals and two departures from/to a downstream direction.
- All tug and barge vessel movements will occur over one (daytime) tide, other than the downstream ash movement to Tilbury, which is over two tides.
- Operations will continue to take place on six days a week (Monday-Saturday).
- Approximately 4,990 tug and barge movements per annum to Middleton Jetty.

19.6.10. This equates to an increase of approximately 1,870 tug and barge movements per annum to Middleton Jetty over the current baseline scenario (Riverside 1 only).

19.6.11. **Chapter 2: Site and Proposed Scheme Description (Volume 1)** and **Chapter 3: Consideration of Alternatives (Volume 1)** describe the design vessels which will call at the Proposed Jetty, and detail can also be found in **Appendix 19-1: Preliminary Navigational Risk Assessment (Volume 3)**.

19.6.12. The marine operations for Riverside 2 were the subject of an NRA that formed a technical appendix to the ES prepared for Riverside 2[29]. The Riverside 2 NRA concluded that "*additional movements associated with the REP would have a Negligible impact upon navigational safety on the River Thames with all hazards remaining inside ALARP (As Low as Reasonably Practicable) with existing risk controls in place".*

19.7. EMBEDDED DESIGN, MITIGATION AND ENHANCEMENT MEASURES

19.7.1. Marine vessel traffic within the Study Area is highly controlled and regulated with the PLA administering a suite of baseline risk controls. The Proposed Scheme will be fully compliant with these risk controls during both construction and operation phases.

19.7.2. The **Design Principles and Design Code (Document Reference 5.7)** are commitments which will govern the design of the Proposed Scheme during the detailed design stage. The **Design Principles and Design Code (Document**

Reference 5.7) are considered to be embedded mitigation for the purposes of the assessment presented in this chapter.

19.7.3. A summary of the embedded design, mitigation and enhancement measures taken from **Section 7** of **Appendix 19-1: Preliminary Navigational Risk Assessment (Volume 3)** is provided below:

- The alignment of the Proposed Jetty has been optimised sufficiently to mitigate as far as reasonably practicable the impacts on the ebb tide.
- The alignment of the Proposed Jetty has been optimised sufficiently to ensure that sight lines on the approach to the berth are suitable for the PLA pilots at the helm of the vessel.
- The optimum location of the Proposed Jetty with respect to the eastern extremity of Cory operations on the Middleton jetty has been considered. The Riverside 1 Lighterage Team has confirmed that the Proposed Jetty will not have an impact on the existing lighterage operations at the Middleton Jetty.
- The location of the Proposed Jetty has been optimised sufficiently to mitigate as far as reasonably practicable the impacts on third party vessels transiting the channel and manoeuvring in proximity to the Proposed Jetty.
- The alignment of the Proposed Jetty has been optimised to ensure that wind conditions for berthing of the vessels are appropriate and within accepted levels for safe manoeuvring.
- Vessel departures from the Proposed Jetty will likely be limited to High Water ±1.5 hours. This is in part due to the optimised dredge depth for the berthing pocket, to provide an appropriate under keel clearance for the identified design vessel with the greatest draft.
- The design of the Proposed Jetty will incorporate riparian lifesaving equipment in line with statutory requirements and the PLA's Guidance 'A Safer Riverside'[30].
- The Proposed Scheme is in accordance with industry guidance and standard good practice regarding port safety issues.

19.7.4. The above measures, as detailed in **Appendix 19-1: Preliminary Navigational Risk Assessment (Volume 3)**, have been accepted by the PLA. A full NRA(s) will be secured in accordance with the **Draft DCO (Document Reference 3.1)**.

19.8. ASSESSMENT OF LIKELY IMPACTS AND EFFECTS

19.8.1. This section details the assessment of impacts and effects for the Proposed Scheme, considering the embedded design, mitigation and enhancement measures outlined in **Section 19.7** and detailed in **Appendix 19-1: Preliminary Navigational Risk Assessment (Volume 3)**.

19.8.2. The two options for the construction programme (as described in **Chapter 2: Site and Proposed Scheme Description (Volume 1)**) do not affect the navigation assessment as it is not proposed to transport landside construction materials by the River Thames.

19.8.3. The two options for the number of Absorber Columns and Stacks programme (as described in **Chapter 2: Site and Proposed Scheme Description (Volume 1)**) do not affect the navigation assessment, as this has no bearing on marine navigation.

19.8.4. The demolition or retention of the Belvedere Power Station Jetty (disused) will not change the assessment reported within this chapter, as it is not in the path of any Proposed Scheme vessel (during either the construction or operation phases), or tugs navigating to the proposed tug mooring. Further detail about this is provided in **Appendix 19-1: Preliminary Navigational Risk Assessment (Volume 3)**. When considering contact hazards, it was assumed that the Belvedere Power Station Jetty (disused) would remain in-situ. This is a precautionary assumption, and should it be later decided that the Belvedere Power Station Jetty (disused) will be removed it is likely that, in some instances, contact hazard likelihood scores, as presented in **Appendix 19-1: Preliminary Navigational Risk Assessment (Volume 3),** may be reduced alongside the detailed design of the Proposed Scheme.

19.8.5. **Section 7** of **Appendix 19-1: Preliminary Navigational Risk Assessment (Volume 3),** identifies the preliminary hazards associated with the construction and operation of the Proposed Jetty. Four principal hazard types (or''potential significant effects') were identified (collision, contact, grounding, and breakout) and considered for each of the vessel categories. The hazards are summarised in **Section 19.4** of this chapter and in **Table 12** of **Appendix 19-1: Preliminary Navigational Risk Assessment (Volume 3)**.

CONSTRUCTION PHASE

19.8.6. As detailed in **Section 7** of **Appendix 19-1: Preliminary Navigational Risk Assessment (Volume 3)** effects during the construction phase are deemed to be broadly acceptable or tolerable and ALARP and are deemed **Not Significant**.

OPERATION PHASE

19.8.7. As detailed in **Section 7** of **Appendix 19-1: Preliminary Navigational Risk Assessment (Volume 3)** effects during the operation phase are deemed to be broadly acceptable or tolerable and ALARP and are deemed **Not Significant**.

19.9. ADDITIONAL DESIGN, MITIGATION AND ENHANCEMENT MEASURES

19.9.1. This section sets out the additional mitigation and compensation measures that are relevant for marine navigation.

CONSTRUCTION PHASE

19.9.2. Additional risk control measures have been identified for the construction phase and are detailed in **Table 21** of the **Appendix 19-1: Preliminary Navigational Risk Assessment (Volume 3)**. These include:

- Promulgation and dissemination of information relating to project construction phase to be shared as widely as possible through Notices to Mariners (NtM),

Vessel Traffic Services (VTS) broadcasts, updates to guidance documents, emails to key stakeholders and through social media platforms, including:

  - planned vessel movements (arrivals and departures of materials barges); and
  - sequencing of construction works and proposed Marine Works mooring configurations to be shared with VTS and marine stakeholders (e.g. CLdN).

- Defining operational limits of uncontrollable factors to ensure safe and efficient travel, berthing, and loading operations, above which such operations will cease until levels are back within acceptable tolerances will be determined. Such limits will include:
  - wind speed and direction;
  - height of tide;
  - tidal stream; and
  - visibility.

  These limits would be determined during the preparation of the full NRA by the involved parties, which is to be prepared in accordance with **Appendix 19-1: Preliminary Navigational Risk Assessment (Volume 3)**. Parties would include but may not limited to the Applicant, the PLA, and those involved in preparing **Appendix 19-1: Preliminary Navigational Risk Assessment (Volume 3)**.
- Defining operational limits, during the construction phase, of controllable factors to ensure safe and efficient travel, berthing, and loading operations, which if not met, will cause a cease in operations until met. Such limits will include:
  - minimum under keel clearance within channel and berth pocket;
  - tug assistance; and
  - tidal state at time of arrival and departure.
- Enforcement of a minimum passing distance from Marine Works (50m) to vessels passing within the authorised channel in addition to a requested maximum speed reduction (less than 6kts).
- A navigation exclusion zone to all vessels other than those engaged in the construction phase for the Proposed Scheme and the Applicant's vessels navigating to and from Middleton Jetty should be enforced to minimise risk associated with contact and collision hazard occurrence and allow safe passage.
- A standby tug to be present onsite throughout the construction phase to provide assistance in the event of a construction vessel breakout. The standby tug should be manned and ready to respond when construction activity is taking place onsite.
- The use of a Safety Boat to provide a recovery response for falling persons, and alert works Contractor(s) of impending breach of non-intrusion area by errant craft.
- Appropriate mooring configurations to minimise risk of breakout resulting from vessel interaction, and optimise construction sequencing to ensure maximum distance between southern extent of authorised channel and Marine Works.
- The use of marine works lighting before permanent aids to navigation are installed.

OPERATION PHASE

19.9.3. Additional risk control measures have been identified for the operation phase and are detailed in **Table 21** of the **Appendix 19-1: Preliminary Navigational Risk Assessment (Volume 3)**. These include:

- Promulgation and dissemination of information relating to project operation phase to be shared as widely as possible through NtM, VTS broadcasts, updates to guidance documents and navigational charts, emails to key stakeholders and through social media platforms, including planned vessel movements (arrivals and departures).
- Defining operational limits of uncontrollable factors to ensure safe and efficient travel, berthing, and loading operations, above which such operations will cease until levels are back within acceptable tolerances will be determined. Such limits will include:
  - wind speed and direction;
  - height of tide;
  - tidal stream; and
  - visibility.

  These limits would be determined during the preparation of the full NRA by the involved parties prior to the Proposed Scheme commencing operation. Parties would include but may not limited to the Applicant, the PLA, and those involved in the preparation of **Appendix 19-1: Preliminary Navigational Risk Assessment (Volume 3)**.The full NRA is to be prepared in accordance with **Appendix 19-1: Preliminary Navigational Risk Assessment (Volume 3)**.
- Defining operational limits of controllable factors to ensure safe and efficient travel, berthing, and loading operations, which if not met, will cause a cease in operations until met. Such limits will include:
  - minimum under keel clearance within channel and berth pocket;
  - tug assistance; and
  - tidal state at time of arrival and departure.
- Cory tug and barge movements in and around Middelton Jetty to cease during vessel arrival/departure to the Proposed Jetty.
- Berth infrastructure will be designed to mitigate the likelihood and consequences of the vessels ranging on the Proposed Jetty.
- Completion of a Passing Vessel Mooring Study as part required by **Appendix 19-1: Preliminary Navigational Risk Assessment (Volume 3)**, which would determine the hydrodynamic effect of close passing large ships on moored vessels.
- Third Party Ship Bridge Simulations required by **Appendix 19-1: Preliminary Navigational Risk Assessment (Volume 3)** to allow PEC holders to become familiar with the operational navigational environment and detailed design of the Proposed Scheme.

19.10. MONITORING

CONSTRUCTION PHASE

19.10.1. Monitoring measures during the construction phase will include:

- The use of London VTS Channels Marine-band VHF radio frequencies to provide a source of live updates and information for users of the River Thames, and provide a means for vessel crew to communicate with other vessels and shore stations (e.g. ports, locks, bridges, and marinas) on operational, navigation and safety matters. Listening to the appropriate radio channel will provide a picture of vessel traffic, which is important for safety.
- Visual monitoring via deployed safety boat when construction works are underway for the Proposed Jetty.

OPERATION PHASE

19.10.2. Monitoring measures during the operation phase will include:

- The use of London VTS Channels Marine-band VHF radio frequencies to provide a source of live updates and information for users of the River Thames, and provide a means for vessel crew to communicate with other vessels and shore stations (e.g. ports, locks, bridges, and marinas) on operational, navigation and safety matters. Listening to the appropriate radio channel will provide a picture of vessel traffic, which is important for safety.
- AIS systems used to monitor the location, heading and other details of vessels on the Thames. This system is not mandatory for all vessels, but most vessels navigating this section of the River Thames will carry it.
- AIS tracks recorded and collated to produce a range of swept paths, which can be analysed to show longer term vessel movements in an area. This analysis can be used to show routes and transit frequencies for different vessel classes and, from an individual vessel through to all vessels over a certain time period.
- Numbers of non-AIS equipped vessels such as recreational and leisure craft, used by more casual River Thames users such as rowing clubs, for example, may be captured using CCTV positioned on or around the Proposed Jetty, or by consultation with such groups to ascertain their weekly or monthly activities in the area.

19.11. RESIDUAL EFFECTS

CONSTRUCTION PHASE

19.11.1. As detailed in **Section 7** of **Appendix 19-1: Preliminary Navigational Risk Assessment (Volume 3)** effects during the construction phase with the additional mitigation measures in place have been categorised as acceptable and are deemed **Not Significant**.

OPERATION PHASE

19.11.2. As detailed in **Section 7** of **Appendix 19-1: Preliminary Navigational Risk Assessment (Volume 3)** effects during the operation phase with the additional mitigation measures in place have been categorised as acceptable or tolerable if ALARP and are deemed **Not Significant**.

19.12. LIMITATIONS AND ASSUMPTIONS

19.12.1. This section outlines the limitations, uncertainties, and assumptions made in undertaking the marine navigation assessment reported in this chapter:

- The specification of the vessels is not finalised. However, details of a number of indicative vessels that could be utilised to facilitate LCO_2 export have been provided for the basis of this assessment. Details of these vessels are shown in **Table 1** of **Appendix 19-1: Preliminary Navigational Risk Assessment (Volume 3)**.
- There are several unlit barge moorings within Halfway Reach including the Cory barge mooring within the Study Area. A note on Admiralty Chart 3337[31] warns *"Moorings and moored barges, lit and unlit, are moored frequently and may not be as charted".* This means that Aids to Navigation may not be present on all of these structures.

19.13. REFERENCES

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