SILVERTOWN TUNNEL

Preliminary Environmental Information Report: Appendix 4.B

Navigational Issues and Preliminary Risk Assessment

MAYOR OF LONDON

TRANSPORT FOR LONDON
EVERY JOURNEY MATTERS

Contents

List of Abbreviations

AIS	Automatic Identification System
ALARP	As Low As Reasonably Practicable
DCO	Development Consent Order
EA	Environment Agency
IMO	International Maritime Organisation.
ISPS	International Ship and Port Facility Security
LSA	Life Saving Appliances
NABSA	Not Afloat but Safely Aground
NIPRA	Navigation Issues and Preliminary Risk Assessment
PEC	Pilotage Exemption Certificate
PLA	Port of London Authority
RSPB	Royal Society for the Protection of Birds
TBCZ	Thames Barrier Control Zone

TfL	Transport for London
TFS	Thames Freight Standard
VTS	Vessel Traffic Services

Glossary of Terms

Campshed	A campshed permits the barge to sit upright at low tide and not fall to the slope of the river bed when moored at the river wall next to the site
Category C Waters	Tidal rivers, estuaries and large, deep lakes and lochs where the significant wave height could not be expected to exceed 1.2 metres at any time
Category D Waters	Tidal rivers and estuaries where the significant wave height could not be expected to exceed 2 meters at any time
HAV ship	The HAV ship fleet comprise shallow drafted sea/river tonnage with single box holds and low air draft
Local Knowledge Endorsement (LKE)	In July 2012 the PLA's Thames Byelaws 2012 were implemented, which require the master of any commercial vessel between 40m and 13.7m length overall and those vessels under 13.7m length overall, which are engaged in passenger carriage or towing to hold an LKE for the tidal Thames.

NABSA berth	NABSA berth is used to describe berths in tidal waters, where the water depth is restricted. The bottom to the berth is soft mud which allows ships/barges to safely lie on the bottom
Reference Design	Design proposals that the consultation and DCO application will refer to.
TFS	Thames Freight Standard
The O2	The large dome-shaped building sometimes referred to as the O2 arena and/or the Millennium Dome

SUMMARY

1. This draft Navigational Issues and Preliminary Risk Assessment (NIPRA) presents the preliminary activities and assessments undertaken to identify the navigational issues and prepare a preliminary risk assessment to identify mitigation measures for the Silvertown Tunnel scheme. The assessments undertaken are all based on the engineering proposals reported within the Preliminary Engineering Report (PER) that defines the scheme in sufficient detail to allow consultees to understand the scope and extent of the Scheme and to inform the studies assessing the environmental, socio-economic, construction and transport related impacts of the Scheme.

2. The findings of the preliminary assessments are currently under consultation with directly affected stakeholders as part of the Scheme development with due consideration to be taken to minimise the impact of the Scheme proposals on river users.

3. As part of the construction process and in order to assist with the delivery of materials to site (tunnel segments etc.), and removal of excavated material generated by the tunnelling activities, the project proposals promote marine logistics that require the construction of a temporary jetty and the reconditioning of an existing berth facility along Thames Wharf.

4. To inform the likely hazards and associated risks relating to the planned construction activities, a short river traffic survey was undertaken to identify trends of existing wharf and river users within the area. A review of recorded incident and accident data provided by the Port of London Authority (PLA) was also undertaken. A list of stakeholders with riverine interests within the project area was also developed and likely concerns identified.

5. The navigational risk assessment was carried out to quantify and mitigate the impact of a new jetty and the reconditioning of a river berth along Thames Wharf. In total 21 hazards were identified and baseline risk scores identified. In order to reduce the baseline risks, a series of mitigation measures were identified and their effects on the overall risks measured. Of the 21 hazards identified, one had a score of 10 or above (which according to the PLA's risk scoring guidance requires risk reduction measures). Following the mitigation measures all the hazards' scores were reduced to 9 or below. Based on the PLA's requirements this means the activity can be carried out provided appropriate controls are implemented.

6. Based on the risk assessment, in addition to a series of “good practice” design measures that can be adopted to reduce the risks related to the construction of and operation of the temporary structures, a series of additional measures were identified. These include:

7. The appointment of a berthing coordinator for the duration of the project riverine activities to assist with planning, managing and ensuring that safe berthing, approach and manoeuvring practices are adopted and maintained during the project duration.

    - The establishment of a permanent construction river response team to manage the construction and river user vessel interface in particular with any recreational users. The river response team would ensure that any exclusion zones are enforced and that safe distances are maintained between construction plant and construction related vessel movements in particular when and if river conditions change.

    - The continuation of stakeholder engagement and the need to employ suitably qualified staff, pilots and marine operators.

    - The navigation issues preliminary risk assessment and associated mitigation measures identified demonstrates that the increase of risk to the navigation is low and temporary and that there are a number of measures available to manage and control these risks. Therefore, provided mitigation measures are adopted and existing rules, regulations and good practice measures are maintained, it is considered that the Scheme’s proposals to utilise the river would not compromise navigational safety.

8. This document is part of a suite of documents which have been made available for the statutory consultation on the Silvertown Tunnel scheme which runs from 5 October to 29 November 2015. Following this consultation, Transport for London (TfL) will carefully consider comments made by the public and stakeholders in order to improve and refine the Scheme proposals. TfL aims to submit a DCO application to the Planning Inspectorate in Spring 2016. This application will seek the consent of the Secretary of State for Transport to build and operate the proposed tunnel and all associated measures.

1. INTRODUCTION

1.1 Purpose of this report

1.1.1 The purpose of this Navigational Issues and Preliminary Risk Assessment (NIPRA) is to present the preliminary activities and assessments undertaken to identify the navigational issues and prepare a preliminary risk assessment to identify mitigation measures for the use of the river during construction of the Silvertown Tunnel scheme. The findings of the preliminary assessments are currently under consultation with directly affected stakeholders as part of the Scheme development with due consideration to be taken to minimise the impact of the Scheme proposals on river users. We will continue to develop the risk assessment based on feedback from this consultation.

1.1.2 The objective of this report is to demonstrate that the navigational risks associated with the construction of this project have been identified and suitable mitigation measures have been accommodated within the early project development stages. The risk assessment reflects the level of development of the design in the application for development consent.

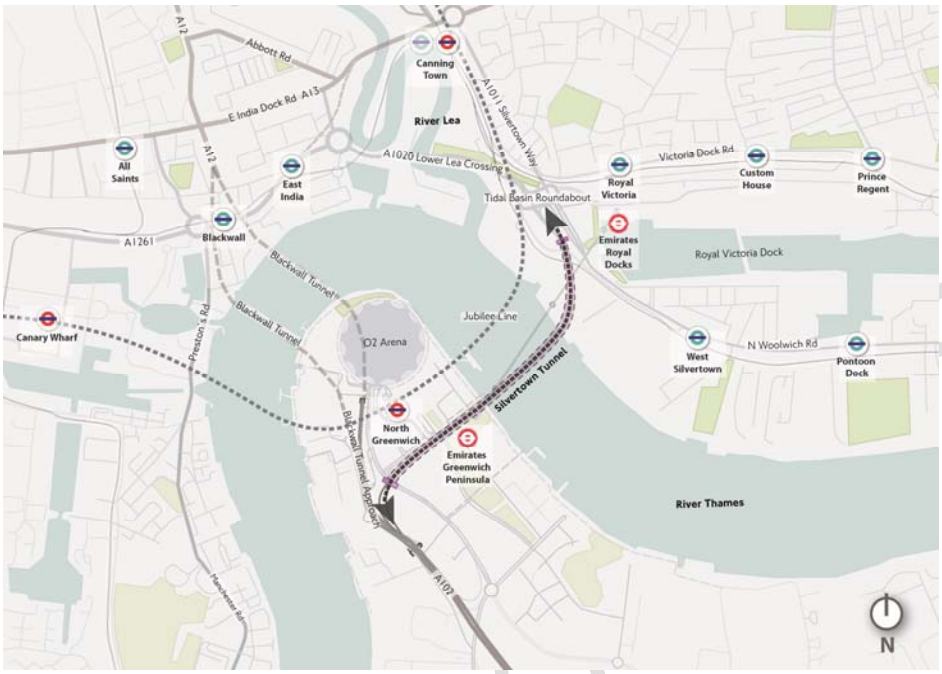
1.1.3 The Navigation Issues and Preliminary Risk Assessment (NIPRA) report will accompany the Silvertown Tunnel reference design to support the Development Consent Order (DCO) application and to inform project representations by stakeholders including the Port of London Authority (PLA).

1.1.4 The project team engaged Livetts Launches (Livetts) as a navigational expert to provide navigational expertise and advice on the existing and anticipated navigational risks associated with the project and identify suitable mitigation measures.

1.2 Scheme Description

1.2.1 The Scheme involves the construction of a twin bore road tunnel providing a new connection between the A102 Blackwall Tunnel Approach on Greenwich Peninsula (London Borough of Greenwich) and the Tidal Basin roundabout junction on the A1020 Lower Lea Crossing/Silvertown Way (London Borough of Newham as shown in **Error! Reference source not found.** below. The Silvertown Tunnel would be approximately 1.4km long and would be able to accommodate large vehicles including double-deck buses.

Figure 1: Scheme Overview



1.2.2 On the north side, the tunnel approach road connects to the Tidal Basin Roundabout, which would be altered to create a new signal-controlled roundabout linking the Silvertown Way, Dock Road and the Lower Lea Crossing. Dock Road would be realigned to accommodate the new tunnel and approach road. On the south side, the A102 would be widened to create new slip-road links to the Silvertown Tunnel. A new flyover would be built to take southbound traffic exiting the Blackwall Tunnel over the northbound approach to the Silvertown Tunnel. The Boord Street footbridge over the A102 would be replaced with a pedestrian and cycle bridge.

1.2.3 New portal buildings would be located close to each portal to house the plant and equipment necessary to operate the tunnel, including ventilation equipment.

1.2.4 The introduction of free-flow user charging on both the Blackwall and Silvertown Tunnels would play a fundamental part in managing traffic demand and support the financing of the construction and operation of the Silvertown Tunnel.

1.2.5 The design of the tunnel would include a dedicated bus/coach and HGV lane, which would provide opportunities for TfL to provide additional cross-river bus routes.

1.2.6 Main construction works would likely commence in 2018 and would last approximately four years with the new tunnel opening in 2022/23. A Tunnel Boring Machine (TBM) would be used to bore the main tunnel sections under the river with shorter sections of cut and cover tunnel at either end linking to the portals. The proposal is to erect and launch the TBM from a specially constructed chambers at Silvertown and Greenwich Peninsula where the bored and cut and cover sections connect.

1.2.7 The main site construction compound would be located at Silvertown to utilise Thames Wharf to facilitate the removal of excavated material and delivery of materials by river. A temporary jetty and Not Aground but Safely Afloat (NABSA) facility would be constructed to support construction site activities. A secondary site compound would be located adjacent to the alignment of the proposed cut and cover tunnel on the Greenwich peninsula.

1.3 Site Context

1.3.1 Silvertown North side - The northern tunnel portal and associated highway tie-in is situated in Silvertown to the south of Canning Town in the London Borough of Newham. Transport infrastructure is a dominant feature of the area with the elevated A1020 Silvertown Way/Lower Lea Crossing and the elevated Docklands Light Railway (DLR) Woolwich extension running north-west to south-east and the Jubilee Line and Emirates Air Line (EAL) cable car running north-east to south-west across the River Thames. To the north of Silvertown Way the area predominantly consists of mixed residential and recreational land uses around the perimeter of the Royal Victoria Docks. This contrasts with light industrial and commercial uses to the south of Silvertown Way, which is bounded by a safeguarded wharf known as Thames Wharf. In this area Dock Rd/North Woolwich Road provide local access to a number of businesses including steel and metal suppliers, scrap metal dealers, concrete batching plants, waste recycling and management businesses and an aggregates supplier. There are emerging plans to redevelop the area for high density residential and mixed uses in the future but no formal proposals exist.

1.3.2 Greenwich Peninsula South side - The southern tunnel portal and associated highway tie-in lies on the Greenwich Peninsula in the Royal Borough of Greenwich. The main transport infrastructure on the peninsula are: the A102 Blackwall Tunnel Approach leading to the north and southbound tunnels; Millennium Way providing access to the North Greenwich London Underground (LU) and bus station; Jubilee Line linking to Canning Town and Canary Wharf; and EAL south station. The majority of the area to the north

and east of the A102 is undergoing re-development as part of the consented Greenwich Peninsula Masterplan, which is a major high-density residential-led (ca. 12,000 homes), mixed-use development. Currently the masterplan is part implemented with offices, hotel and college buildings to the north set around the established O2 events arena and new residential blocks to the south. The central portion is predominantly laid out as surface car parks and access roads associated with the O2 arena and the station. There is a redundant gas holder (approximately 75m in diameter), former lorry park, nightclub and office/commercial uses between Millennium Way and the A102 immediately south of the proposed southern tunnel portal. This area is bisected west to east by Boord Street which provides access to a footbridge crossing of the A102 and links to Tunnel Avenue on the west side. Tunnel Avenue provides access to a variety of existing and former light industrial and commercial uses on the west side of the peninsula including aggregates supplier/wharf and chemical distribution company.

1.3.3 River Thames – In addition to the EAL, Jubilee Line and Blackwall Tunnel infrastructure mentioned above there is a pier serving the Thames Clipper river bus on east side of the Greenwich Peninsula. South of this there are moorings for leisure craft and on the north side there are moorings for barges, tugs and marine engineering vessels adjacent to Thames Wharf. The main navigation channel serves a variety of traffic from large sea-going vessels and to small leisure craft. The River Lea (known as Bow Creek) joins the main river at the northern end of Thames Wharf.

1.3.4 below illustrates the various areas associated with the Scheme.

Figure 2: Site description

1.4 Structure of the report

1.4.1 This report follows the preferred PLA methodology for NIPRAs which is appropriate to the level of design completed to gain planning approval, with more detailed consideration and approvals necessary during the detailed design stage of the project.

1.4.2 This report is set out as follows:

- Chapter 2 Navigational Overview;
- Chapter 3 Summary of Navigational Issues;
- Chapter 4 Stakeholder Consultation;
- Chapter 5 Risk Assessment Methodology;
- Chapter 6 Mitigation Measures;
- Chapter 7 Conclusions;
- Chapter 8 Recommendations;
- Appendix A: Location Plan
- Appendix B: PLA meeting minutes
- Appendix C: Temporary Works Plan
- Appendix D: Incident Data
- Appendix E: River Wall survey report
- Appendix F: Risk Assessment
- Appendix G: ASD Stakeholder Consultation
- Appendix H: Stakeholder Consultation

1.5 Future design and build Development

1.5.1 As noted in the Outline Business Case, TfL propose to deliver the Silvertown Tunnel through a private financed initiative and has established that a Design Build Finance and Maintain (DBFM) structure would best meet the project objectives and constraints, and achieve an appropriate risk balance. A DBFM contract would be competitively tendered in accordance with EU procurement procedures.

1.5.2 The DBFM contractor would complete the detailed design, construct the tunnel and supporting infrastructure and be responsible for maintenance

during a 30 year concession period. TfL would control the day to day operation (traffic management) of the Silvertown Tunnel while Blackwall Tunnel would continue to be managed by TfL under the existing operations and maintenance arrangements.

1.5.3 The engineering design for the scheme has been developed in sufficient detail to enable a Development Consent Order (DCO) application to be submitted. Termed the Reference Design, it defines the scheme in sufficient detail to allow stakeholders to understand the scope and extent of the scheme and to inform the studies assessing the environmental, socio-economic, construction and transport related impacts of the scheme. In preparation for the Statutory Consultation the Reference Design has been reviewed to take into consideration stakeholder requirements identified during earlier consultations.

1.5.4 The Reference Design and associated construction methodology and programme have established:-

- That construction of the scheme is feasible in the timescale indicated,
- A possible construction sequence allowing traffic movements and services (utilities) supplies to be maintained during construction,
- The land required for the permanent works,
- Land required temporarily for the safe construction of the works
- A level of detail to allow assessment of the likely costs, impacts, effects and benefits of the scheme.

1.5.5 The Reference design includes illustrative examples of what a suitable solution might look like and how it could be built.

1.5.6 Once out to tender, bidders for the DBFM service would submit proposals to meet TfL's specification and requirements which will reflect the requirements of the DCO. Bidders' proposals will be subject to a robust technical and environmental evaluation in addition to financial evaluation to ensure a sympathetic enhancement of highway infrastructure is delivered to meet the Scheme objectives whilst also offering value for money.

1.5.7 Subject to award of the Development Consent Order a DBFM contractor would be appointed and they would be responsible for completing the detailed design. TfL's specifications and requirements and commitments made under the DCO examination would be encased in the contract documents and the contractor's detailed proposals would be subject to further detailed review prior to construction to ensure that the final design and construction methodology have no greater adverse effects than those assessed for the DCO.

1.6 Next Steps

1.6.1 This Navigation Issues Preliminary Risk Assessment is part of a suite of documents which have been made available for the statutory consultation on the Silvertown Tunnel scheme which runs from 5 October to 29 November 2015. Following this consultation, TfL will carefully consider comments made by the public and stakeholders in order to improve and refine the scheme proposals. TfL aim to submit a DCO application to the Planning Inspectorate in Spring 2016. This application will seek the consent of the Secretary of State for Transport to build and operate the proposed tunnel and all associated measures.

2. NAVIGATIONAL OVERVIEW

2.1 Summary

2.1.1 As mentioned in Section 1, the tunnel boring activities would generate a large amount of excavated material. To align with TfL policy for large schemes, projects generating large quantities of excavated material should be removed where possible from site by river. In order to enable fluvial transportation and reduce road movements, a temporary jetty facility would be constructed and fitted with a conveyor system to load HAV ships with excavated material. Similarly a Not Afloat but Safely Aground (NABSA) facility would be constructed alongside Thames Wharf to allow barges to berth alongside the project site to receive and offload construction materials such as tunnel segments.

2.1.2 The Reference Design assumes that all materials that have been deemed suitable for beneficial reuse at a site such as Wallasea Island would be loaded onto either 2000t HAV ships or 1000t barges via the temporary jetty facility. Further discussion on the suitability of barges for spoil removal in open water is provided in Section 2.2.

2.1.3 Similarly, deliveries to site would seek to minimise disruption to the local highway network hence the project would seek to maximise the use of the river frontage. A NABSA berth facility would be developed to allow barges to offload materials to site at Thames Wharf.

2.1.4 A NABSA (Not afloat but Safely Aground) berth facility consists of a levelled section of river bed, which is cleared of debris and can be capped with a chalk layer. There is an existing NABSA facility along Thames Wharf believed to be in the order of 120m in length. The berth at present is not entirely level, however barges and ships up to 1500t discharging aggregates have used the berth within the past two years. It is believed this facility was used daily and was operational + 2 hours either side of low tide. Provided the berth is levelled, cleared of debris, possibly capped with a chalk layer, the integrity of the wall confirmed and fenders, ladders and other Life Saving Appliances (LSA) provided, the berth would be acceptable for use under the Scheme proposals.

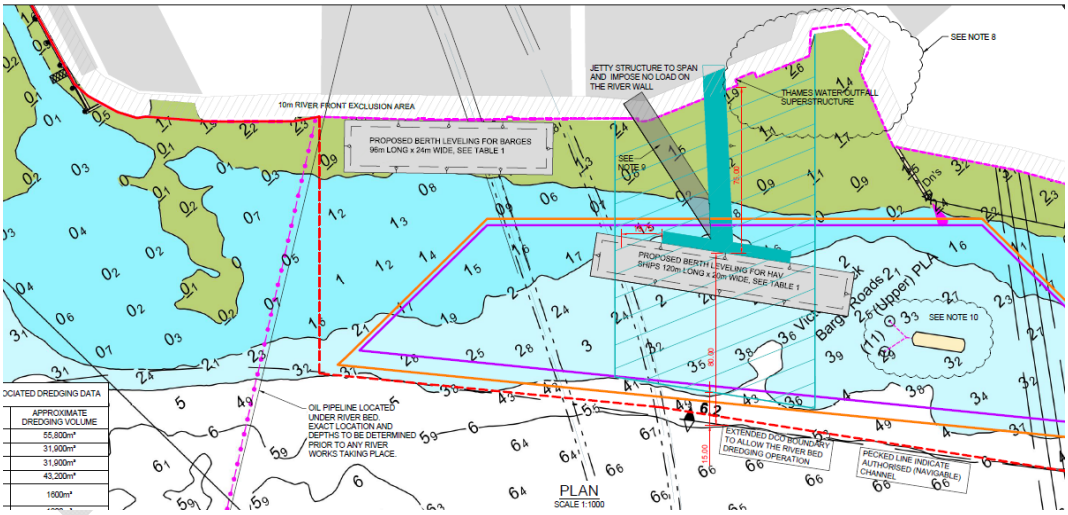
2.2 Route Overview and removal of excavated material

2.2.1 Following consultation with the PLA, and further design development it is proposed that the project would utilise the river front at Thames Wharf by:

- Reinstating an existing Not Afloat but Safely Aground (NABSA) berthing facility.
- Construction of a temporary jetty

2.2.2 Figure 3 below shows the overall layout plan of the proposed location of the NABSA facility and temporary jetty along Thames Wharf. A full sized plan is included in Appendix C for reference.

Figure 3: Temporary works plan showing proposed location of NABSA facility and jetty along Thames Wharf.



2.2.3 A NABSA is used to describe berths in tidal waters, where the water depth is restricted. The bottom to the berth is soft mud which allows ships/barges to safely lie on the bottom.

2.2.4 It is currently assumed that the jetty would be operational for the duration of the tunnelling works and then decommissioned and removed. Although, the jetty would be constructed for the purposes of spoil removal, the PLA have indicated that due to the Safeguarded nature of Thames Wharf an operator or development partner (subject to a separate planning process) may be amenable to take on ownership of the structure once the tunnelling works are complete (Section 2.3 of the meeting minutes, Appendix B).

2.2.5 The options investigated as part of this NIPRA include:

- Construction of a new jetty along Thames Wharf with some dredging and/or localised bed levelling around the jetty head to allow safe and suitable navigation for the vessels and ships that would service the Scheme over the required tidal conditions.
- Reinstate an existing NABSA berthing facility along Thames Wharf.

2.2.6 The project would have a number of impacts both on the river and the river frontage associated with removal of excavated material and associated construction material deliveries. This is discussed Section 2 and Section 2 Summary of navigational issues sections of this report.

2.2.7 Further details on the temporary structures, construction methodology and indicative phasing are provided in the scheme description section of this report.

2.2.8 The volumes estimated to arise from the tunnel boring activities approximate 350,000 m^3. The HAV ship fleet comprise shallow drafted sea/river tonnage with single box holds and low air draft. Typical HAV ship details are provided in **Table 1** below.

2.2.9 As open water movement may be required, limitations apply to the operation of the 1000t flat bottom river barges. They are limited in their capacity to approximately 50% of the possible 1000t. The adoption of HAV ships would permit operation of the vessels to their full capacity and transport for reuse. As such, HAV ships are recommended for the removal of spoil for the current proposed site at Wallasea Island.

2.2.10 The PLA expressed some concern about the potential high moisture content of the excavated spoil which could cause some instability issues with ships (section 2.2 of the meeting minutes dated 26th August in Appendix B). Provision would be made within the construction site to allow stockpiling and drying of excavated material. The risk associated with removing the excavated material would require careful monitoring and review throughout the scheme duration to ensure the measures taken reflect the level of risk and safe Cargo Transportable Moisture Limits would be defined prior to any movement of spoil. Should the disposal location change from Wallasea Island, the use of more stable barge vessels may be considered. The final solution may include excavated material disposal options that require both open sea beyond port limits and category C and D waters.

2.3 Limits of land to be acquired or used

2.3.1 The extent of the land identified as required for the scheme is detailed on the drawings contained within Appendix G, drawing Silvertown End (North) Worksite Layout Phase 1.

2.3.2 Drawing STWN-ATK-STU-XXXX-DR-C-0011 (Appendix G) shows where the works area, storage sites would be located.

2.4 Project Phases

2.4.1 For the purpose of the NIPRA, the project can be split into three distinct phases. Each phase would have a different impact on the river and river frontages and consequently will be assessed individually. **Error! Reference source not found.** summarises the three project phases.

2.5 Construction phase

2.5.1 The jetty would likely be constructed using hollow tubular steel piles embedded into the river bed. The jetty superstructure is likely to consist of cross beam steel members with a pre-cast concrete deck. Temporary scour protection may be required around piles at the head of the structure and berth pocket. This may consist of rock mattresses, rip-rap or concrete mattresses. Requirements for fendering and berth arrangements are discussed in Section 2.19.

2.5.2 Reconditioning of the existing NABSA berth would be required prior to use. This would involve the removal of debris and / or local removal of sediment. The berth may also need to be capped with a chalk layer. The integrity of the river wall will need to be confirmed and fenders, ladders and other Life Saving Appliances (LSA) provided.

2.5.3 Some maintenance/capital dredging or berth levelling would be required to create a berth pocket at the jetty head. The size of the levelling and dredge pocket will depend on the ship used, when the jetty is to be used (tidal conditions) and the means of berthing (tug assisted or self-propelled). Reference will need to be made to the Port Designer's Handbook.

2.5.4 Depending on the dredging or berth levelling requirements, the PLA mooring "Barge Roads 2" may need to be removed.

2.5.5 The dredging would be undertaken by experienced dredging companies fully familiar and experienced in operating in the Thames. Dredging would be undertaken by “water injection” or dredging by grab or trailer hopper suction dredger, depending upon quantity and type of material to be dredged. The specific method would need to take into consideration any impacts on the river wall. Generally “Water Injection” is suitable for fine/silty material. Grab dredging or trailer hopper suction dredger is suitable for the more granular materials.

2.6 Operation phase

2.6.1 There may be a need for some localised maintenance dredging/ berth levelling required in the vicinity of the jetty (in the berth pocket and manoeuvring area) although this is unlikely if the jetty is used regularly.

2.6.2 If the NABSA berth area facility is used regularly there should not be the need for any maintenance dredging although it will require to be maintained clear of debris.

2.7 De-commissioning/ Dismantlement Phase

2.7.1 The jetty would be dismantled by removing the concrete and steel superstructure first, followed by the removal of steel piles. The piles would be cut 1 m below bed level (subject to agreement) or pulled out.

2.7.2 The NABSA berth would remain in-situ and no further construction works are anticipated.

Table 1: Scheme Waterside Construction Phases

Project Phase	Description of Activity	Vessels Used/ Impact on River
Construction Phase **Site set up, construction of temporary structures.**	**Key components:** Construction of jetty and making good of existing NABSA berth facility. **Construction activities:** Barge movements, dredging, crane movements and lifting from barge.	**Barges/ Hopper:** Capacity approximately**:** 1,000 – 1,500t Length: 1,000t ~38m, 1,500t ~70m Unladen draft of barge: approx. 0.5m Laden draft of barge: approx. 2.8m **Dredgers:** Injection dredger or trailer suction hopper dredger. **Tug:** Draft of tug:approx. 2.4m **Safety Boat/Guard Boat**

Project Phase	Description of Activity	Vessels Used/ Impact on River
Operation Phase: **Delivery of materials to site and removal of excavated material from site.**	**Key components:** Operation of jetty and NABSA facility. **Construction activities:** Barge and HAV ship movements with support from tugs if required. Maintenance dredging if required. Tunnelling excavated material would-be loaded into the HAV ships using a conveyor system located on the Jetty. Tunnel segments and other bulk materials would be offloaded from barges using cranes located on the quayside/NABSA.	**HAV ships:** Capacity approximately: 2,000t Length: 77-88m Unladen draft of vessel: 2.8m Laden draft of vessel: 4.2-4.7m **Barges/ Hopper:** Capacity approximately: 1,000 – 1,500t Length: 1,000t ~38m, 1,500t ~70m Unladen draft of barge: approx. 0.5m Laden draft of barge: approx. 2.8m Dredgers (maintenance dredging): Injection dredger or trailer suction hopper dredger. **Tug:** Draft of tug: approx. 2.4m **Safety Boat/Guard Boat**
De-commissioning/ Dismantlement of temporary structures	**Key components:** Dismantlement of jetty, making good. **Construction activities:** Barge movements, crane movements and lifting from barge.	**Barges:** Capacity approximately: 1,000 – 1,500t Length: 1,000t ~38m, 1,500t ~70m Unladen draft of barge: approx. 0.5m Laden draft of barge: approx. 2.8m **Tug:** Draft of tug: approx. 2.4m **Safety Boat/Guard Boat**

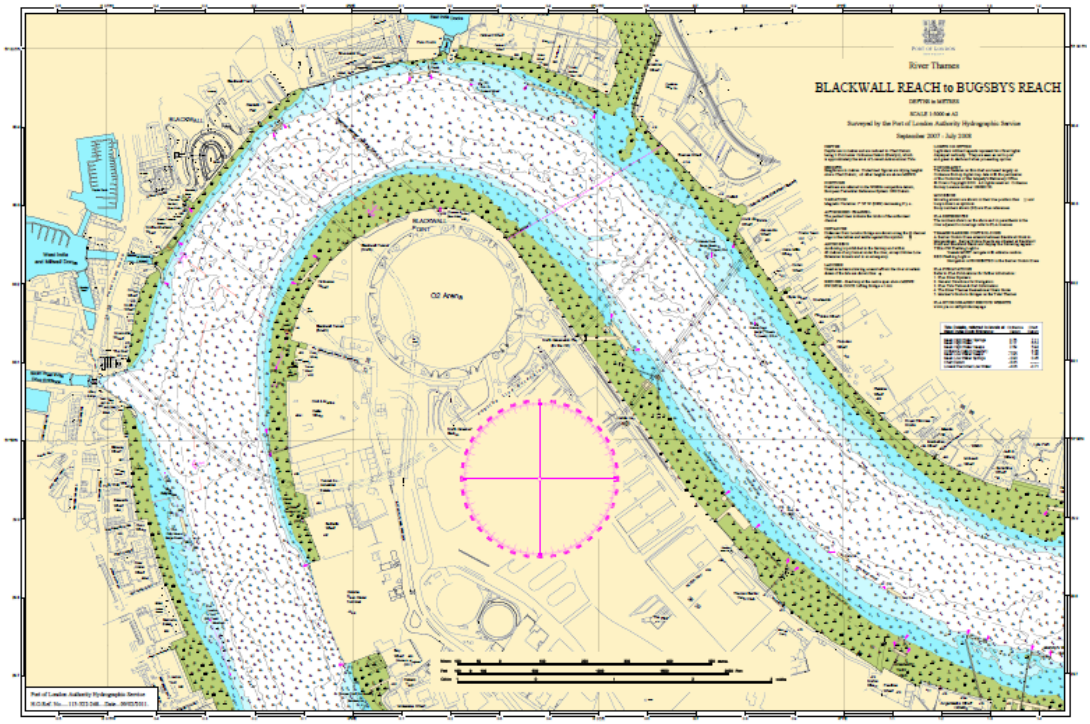
2.7.3 As can be seen, each project phase would have different impacts on the river, therefore, the risk assessment will consider the hazards and risks associated with each phase individually.

2.8 General Navigation

2.8.1 For the purpose of the NIPRA, the PLA confirmed that the impacts should be measured between Reuters Pier and Hookness, as shown in Appendix A and for minutes of meeting with the PLA refer to Appendix B.

2.8.2 The Silvertown Tunnel project falls within the “Thames Barrier Control Zone” (TBCZ) which is a controlled navigation zone. Further details relating to navigation requirements within the TBCZ are discussed in Section 2.15 of this report. The area under consideration falls within the PLA’s Chart 322 - Blackwall Reach to Bugsby reach, as indicated in Figure 4.

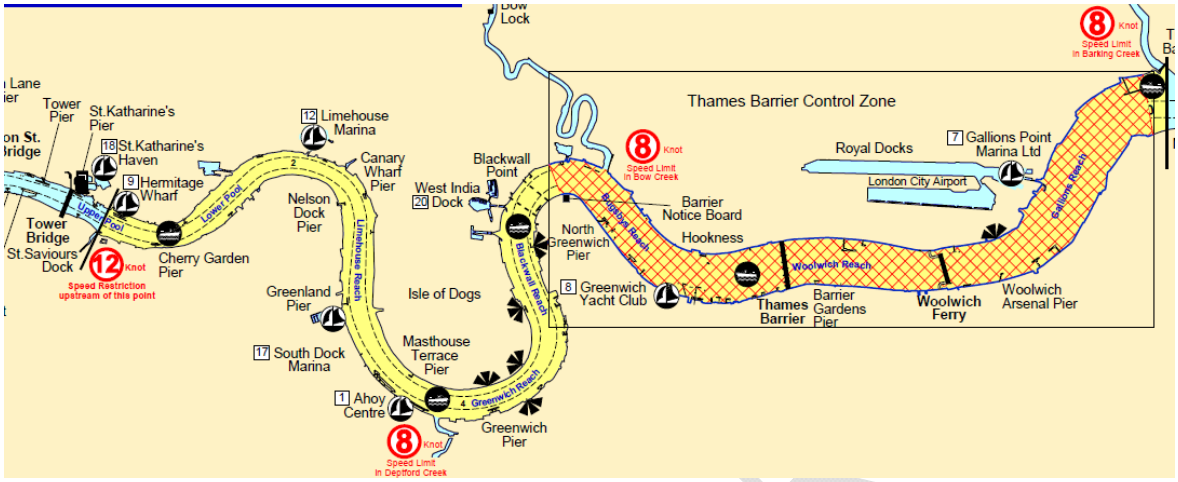
Figure 4: Blackwall Reach to Bugsby reach



2.8.3 The PLA confirmed that the location of the site within the TBCZ (Section 4.0 of the Meeting Minutes in Appendix B) would not pose any specific constraints on the project other than adopting appropriate mitigation measures identified following the risk assessment.

2.8.4 The Silvertown Tunnel project site falls with one of two High Speed Craft Zones on the River Thames, between Margaretness (downstream end) and St Saviour’s Dock (upstream end). The high speed craft zone is highlighted in yellow in Figure 5 below. Within this area authorised vessels that comply with the Thames Byelaws requirements and have been issued with a Certificate of Compliance are allowed to travel at speeds up to 30 knots and will need to display an all-round yellow flashing light when travelling at speed.

Figure 5: Margaretness and St Saviour's Dock high speed craft zone in yellow. (Source: PLA Teddington to Broadness Chart).



2.9 Navigation Authority

2.9.1 The PLA is the navigation authority for this reach and is both the Statutory and Competent Harbour Authority along the River Thames. The PLA has a primary responsibility to maintain safe access and to manage and support the safety of navigation for all vessels using the tidal River Thames.

2.9.2 The Authorised Channel, marked by pecked lines on PLA and Admiralty charts is the main channel for navigation and should not under any circumstances be obstructed by any permanent works. The PLA endeavours to maintain a 15m channel either side of the Authorised Channel to enable vessels manoeuvring onto or off berths and recreational vessels to remain clear of traffic navigating in the Authorised Channel.

2.9.3 The temporary structures to be constructed as part of the works would not encroach upon the Authorised channel and the manoeuvring 15m channel offset is maintained, as shown on the Temporary works plan drawing in Appendix C.

2.10 Regulations and Pilotage

2.10.1 The PLA has a comprehensive set of regulations covering all aspects on the tidal Thames which, amongst others include:

- The Port of London Act
- The Port of London River Byelaws
- General and Pilotage Directions

- Notice to Mariners
- Thames Freight Standards
- Local Knowledge Endorsement (LKE)

2.10.2 The pilotage requirements for vessels navigating within the assessment area are set out in the PLA Pilotage Directions. In general terms, to the West of Margaretness limit, vessels over 40m in length overall are required to take a pilot or hold a valid Pilot Exemption Certificate (PEC), [PLA pilotage directions 2010] .The PLA provides Vessel Traffic Services (VTS) from the outer Thames Estuary to Teddington Lock.

2.10.3 In July 2012 the PLA's Thames Byelaws 2012 were implemented, which require the master of any commercial vessel between 40m and 13.7m length overall and those vessels under 13.7m length overall which are engaged in passenger carriage or towing to hold an LKE for the Tidal River Thames.

2.11 Key Issues to be addressed

2.11.1 Thames Wharf would be used during the construction phase and the location of the temporary structures are shown in Appendix C.

2.11.2 Thames Wharf forms part of Safeguarded Wharves identified in the Safeguarded Wharves Review 2013, by the Mayor of London. This means that the wharf has been given special status by the Mayor of London and the PLA to ensure it is retained as a working wharf and protected from re-development into non port use. The Thames Wharf site is currently in use by a number of operators and handles aggregates, construction, demolition waste and project cargoes amongst others. Similarly, due to the Safeguarded nature of the Wharf, the project will need to ensure, as far as reasonably practicable, that once the works are completed Thames Wharf can revert to carrying out commercial operations.

2.11.3 The Thames Wharf, as defined in the Safeguarded Wharves report, encompasses the Instone Wharf (the Bow Creek Frontage) which is currently being used by the Crossrail project to store and remove excavated material from tunnelling activities. Instone Wharf and the North-Eastern land extent of Thames Wharf used by ASD Metal services along Bow Creek would not be impacted by the Scheme, although the impacts of construction related river traffic would need to be managed as discussed in Section 2.3.

2.11.4 The temporary structures would impact not only existing users of Thames Wharf but also other river users and operators within the vicinity as well as the main navigable channel.

2.11.5 As mentioned in Section 2.8 the NIPRA will focus on the area of river between Reuters Pier and Hookness. As such the following potential interactions and associated navigational risks associated with the Silvertown Tunnel project will consider the following:

2.12 Interaction with existing river users

2.12.1 River traffic on the Thames in this section of the river may consist of:

- Class V passenger vessels on scheduled services;
- Class V passenger vessels on charter services;
- Fast Ferries;
- Tugs and tows (waste transfer or barges delivering aggregates);
- PLA, Environment Agency (EA) and Emergency services;
- Recreational vessels such as dragon boats, rowing boats, kayaks, dinghy's etc.
- Cruise ships or naval ships such as HMS Bulwark.

2.12.2 Special attention would need to be given to river users at the O2 pier (on the south side), ships manoeuvring for aggregate terminals (south side at Charlton), Trinity Buoy Wharf (Thames Clippers), vessels entering and leaving Bow Creek, vessels transiting the Thames Barrier and in particular vessels outward bound at Blackwall Point. Recreational users from Greenwich Yacht Club, rowing clubs from Greenwich and private leisure users also need particular attention. There are a number of leisure and recreational clubs and facilities operating on the River Thames. Further details of these are provided in the stakeholder consultation Section 4.

2.12.3 The Thames Clippers operate commuter vessels on the River Thames. There are two routes within the project area, RB1 and RB5. The Woolwich shuttle operates a limited service. Thames Clippers make use of Trinity Buoy Wharf which is located on the West side of Bow Creek mouth.

2.12.4 The PLA indicated that a 228m cruise liner had passed this stretch of the river recently with more vessels of this size anticipated in the future (Section 4 of

Meeting Minutes in Appendix B). The proposed development at Enderby's Wharf would allow berthing of large cruise liners up to 240m in length.

2.12.5 The Mayor of London has developed a Thames 2020 strategy which seeks to increase passenger numbers from 6 million to 12 million by 2020. As such some £10 million worth of investment has been made available to stimulate growth on the river and new partnerships are being established to seek how to maximise the potential for river traffic. It is therefore likely that there will be an increase in river traffic.

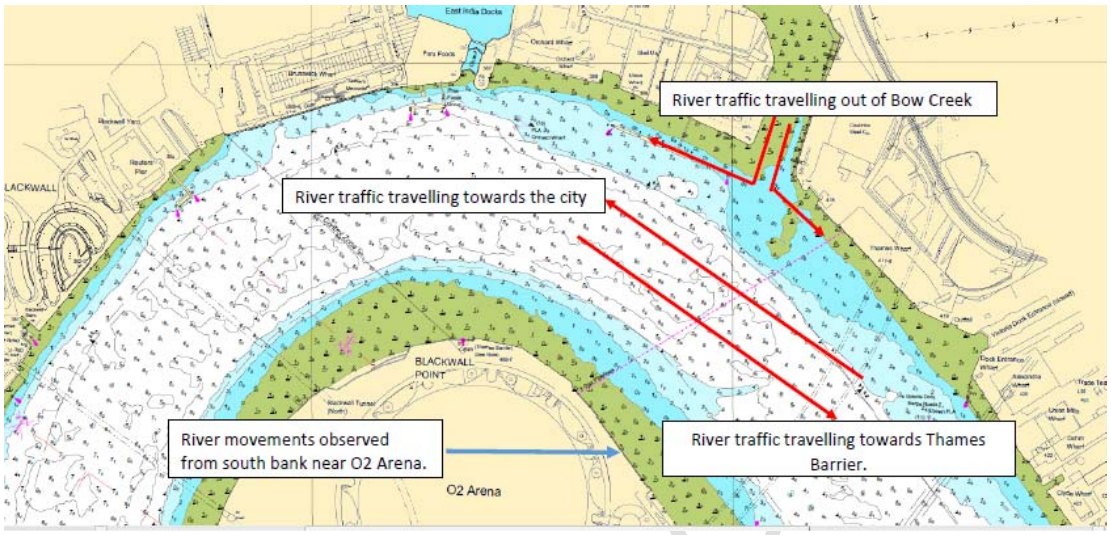
2.12.6 Keltbray Ltd use a section of the land behind the Thames Wharf frontage for contaminated land disposal. The land is used to store spoil and there are excavators which transfer the spoil to barges on the river which then remove the spoil from the site using tugs.

2.12.7 ASD Ltd use a site at the western end of Thames Wharf as part of their steel stockholding activities. The impact on the scheme on their commercial interests is discussed in Section 2.3.

2.12.8 If both the Thames Wharf and Peruvian Wharfs are operational concurrently, particular attention would need to be paid to vessel interactions within these areas.

2.12.9 To understand the likely movements of typical vessels on the river within the study area and to aid the risk assessment process, vessel surveys were conducted over two consecutive days. The surveys were carried out on 20 July 2015 and 21 July 2015 between 9AM and 5PM. Data for the second day for movements on Bow Creek has not been provided as there were no observed vessel movements on that day during the survey times. Over the survey period, only one vessel was observed leaving Bow Creek and travelling towards the city. A schematic showing the survey location and river movements is shown in Figure 6 below.

Figure 6: Schematic showing details of river survey location and river movements.



2.12.10 Table 3 **Error! Reference source not found.**to

2.12.11 Table 6 **Error! Reference source not found.**below summarise the traffic movements observed on the survey dates. Based on the data collected, it can be seen that the biggest traffic movements accounted for relate to fast ferries and in particular fast ferries using Trinity Buoy Wharf. On the days the survey was carried out there was little recreational use of the river at this location, although this would potentially increase at weekends. There was only one vessel movement (a passenger vessel) observed travelling down Bow Creek on the dates of the survey.

Table 2: Upstream Movements (travelling towards the City) 20 July 2015

	0900 - 1000	1000 - 1100	1100 - 1200	1200 - 1300	1300 - 1400	1400 - 1500	1500 - 1600	1600 - 1700	**Totals**
Passenger vessels	2			1	3	2	3	1	**12**
Fast ferries	3	3	2	3	3	3	3	3	**23**
Trinity Buoy Wharf	2	4	5	3	7	3	3	4	**31**
Tugs/tows	2			2	7	2	3	1	**17**
Service vessels									**0**
Rowing									**0**
Sailing									**0**
Rigid Inflatable Boats						3	1	1	**5**
TOTALS	9	7	7	9	20	13	13	10	**88**

Table 3: Downstream Movements (travelling towards the Thames Barrier) 20 July 2015

	0900 - 1000	1000 - 1100	1100 - 1200	1200 - 1300	1300 - 1400	1400 - 1500	1500 - 1600	1600 - 1700	**Totals**
Passenger vessels	2			1	3	2	3	1	**12**
Fast ferries	3	3	2	3	3	3	3	3	**23**
Trinity Buoy Wharf	2	4	5	3	7	3	3	4	**31**
Tugs/tows	2			2	7	2	3	1	**17**
Service vessels									**0**
Rowing									**0**
Sailing									**0**
Rigid Inflatable Boats						3	1	1	**5**
TOTALS	9	7	7	9	20	13	13	10	**88**

Table 4: Upstream Movements (travelling towards the City) 21 July 2015

	0900 - 1000	1000 - 1100	1100 - 1200	1200 - 1300	1300 - 1400	1400 - 1500	1500 - 1600	1600 - 1700	Totals
Passenger vessels	1			1	1	1	1	2	**7**
Fast ferries	3	3	2	4	3	3	3	3	**24**
Trinity Buoy Wharf	5	4	5	5	3	9	7	6	**44**
Tugs/tows				1	4	3		1	**9**
Service vessels				2					**2**
Rowing									**0**
Sailing						3	2	1	**6**
Rigid Inflatable Boats						2	3		**5**
TOTALS	**9**	**7**	**7**	**13**	**11**	**21**	**16**	**13**	**97**

Table 5: Downstream Movements (travelling towards the Thames Barrier) 21 July 2015

	0900 – 1000	1000 - 1100	1100 - 1200	1200 - 1300	1300 - 1400	1400 - 1500	1500 - 1600	1600 - 1700	Totals
Passenger vessels	3		1	2	1	1	1	2	**11**
Fast ferries	2	3	2	2	5	3	3	3	**23**
Trinity Buoy Wharf	5	6	6	4	3	7	5	5	**41**
Tugs/tows		1		1	1	1			**4**
Service vessels				3	1				**4**
Rowing									**0**
Sailing			2				1		**3**
Rigid Inflatable Boats			1	1		2	3		**7**
TOTALS	**10**	**10**	**12**	**13**	**11**	**14**	**13**	**10**	**93**

Table 6: Bow Creek Movements (travelling down Bow creek and heading towards the City) 20 July 2015

	0900 – 1000	1000 - 1100	1100 - 1200	1200 - 1300	1300 - 1400	1400 - 1500	1500 - 1600	1600 - 1700	**Totals**
Passenger vessels								1	1
Fast ferries									
Trinity Buoy Wharf									
Tugs/tows									
Service vessels									
Rowing									
Sailing									
Rigid Inflatable Boats									
Totals								1	1

2.13 Proximity to Bow Creek

2.13.1 Bow Creek connects the River Lea to the River Thames on the North bank at Leamouth. Instone Wharf is located on the left bank of Bow Creek at the entrance to the River Thames. Instone Wharf was used by Crossrail as an excavated material storage and removal site. A steel frame supporting rails for a spoil transfer hopper has been constructed in front of the river wall. The frame is protected by large diameter steel tubular piles with rubber fenders. The site is apparently currently being decommissioned by Crossrail.

2.13.2 During the Silvertown Tunnel construction phase, particular attention would need to be provided to the shoal adjacent to Bow Creek when manoeuvring for access to the temporary jetty and the NABSA berth facility within 2 hours either side of low water. There may be times when fluvial flows from Bow Creek affect the jetty in terms of the set of the tide. This should not impact on shipping or barge operations. As details of the scheme progress, further consideration will be required to define the river movement timings. Although the tunnelling activities will run 24/7, the allowance for some excavated material stockpiling on site will allow some flexibility to load vessels.

2.14 Impact on Moorings:

2.14.1 There are approximately 3 moorings adjacent to the Thames wharf construction site area (Orchard Wharf, Victoria Docks Barge Roads Upper, and Victoria Docks Barge Roads Lower). These are used for delivery or removal of materials via barges. Careful consideration will be required to assess impacts of construction vessel traffic and the interaction with any other vessels using these moorings. These moorings are shown on the PLA chart Blackwall Reach to Bugsby Reach.

2.14.2 The Victoria Dock Barge Roads Upper mooring is most likely to be impacted by the Scheme. The dredging, localised bed levelling and operation of the jetty may require the removal and possible relocation of the PLA mooring “Barge Roads 2 Upper” during the project duration.

2.14.3 Cory environmental (tugs and barges) are based at Charlton (Southside) and frequently use barge moorings in this area. Special consideration should be given when these moorings are being worked and at slack water periods when the moorings swing with the tide. These moorings can have up to four 50m barges on them at any time.

2.15 Proximity to the Thames Barrier

2.15.1 The area under consideration for this assessment falls within the Thames Barrier Control Zone (TBCZ) which extends between Margateness and Blackwall Point. All vessels navigating within this zone are subject to the requirements of the General Directions for navigation within the TBCZ.

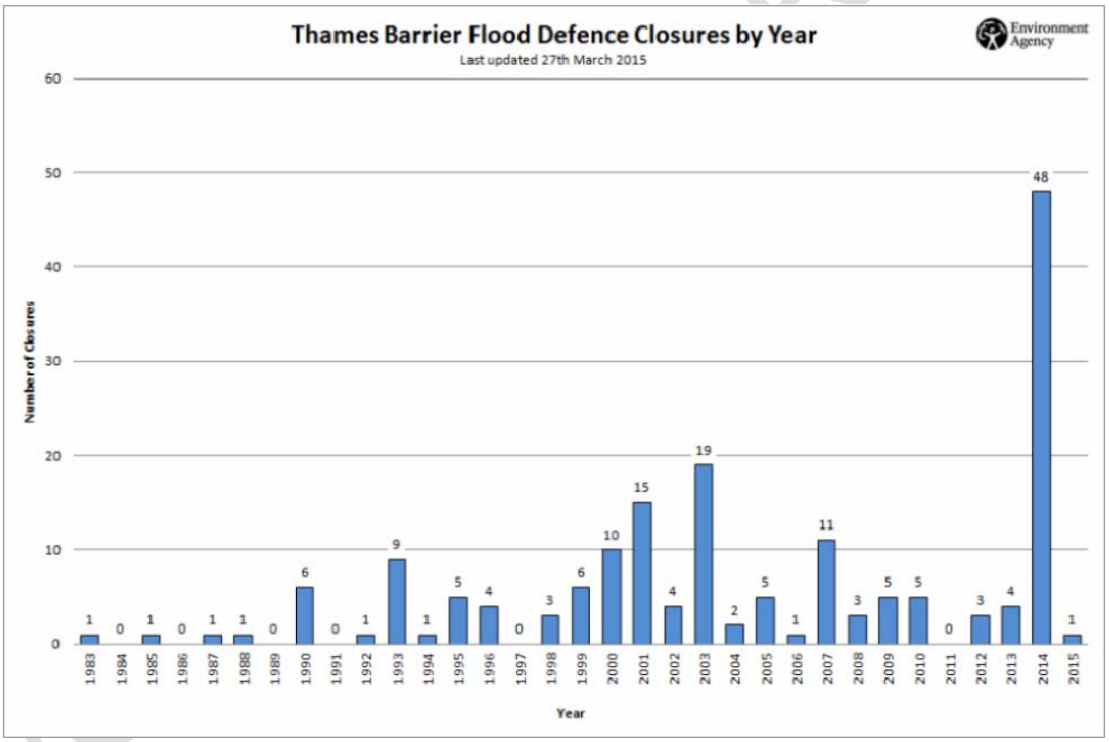
2.15.2 The Thames Barrier is subject to regular scheduled closure for maintenance and testing purposes. Information and detail about planned scheduled closures are made available to Mariners via the website www.boatingonthethames.co.uk, emails to operators, issued as notice to Mariners or broadcast on VTS. During the scheduled closures no vessels should enter the TBCZ without permission. The Thames Barrier is owned and operated by the Environment Agency (EA) and is under navigational control of the PLA via their traffic management system (London VTS). Any vessel movements are required to give prior notice of intention and need to be authorised before implemented.

2.15.3 During periods of poor visibility (less than 0.5 nautical miles) the TBCZ is closed to navigation. During these closure periods abnormal tidal heights and flows will be experienced. These may include lack of tidal height and zero tidal flow. The Environment Agency operates the Thames Barrier every month for

maintenance and testing. Once a year, they also test the barrier at a high spring tide (normally September or October). Closure times are listed on the Environment Agency website or notice to Mariners and closing and reopening of the gates may be up to an hour before the times listed.

2.15.4 The Environment Agency has closed the Thames Barrier 175 times since it became operational in 1982 (correct as of April 2015). Of these closures, 88 were to protect against tidal flooding and 87 were to alleviate river flooding. In 2014, the Thames Barrier was closed a record number of 48 times for flood defence closures, as shown in Figure 7. Previous year closures were 3 and 4 times a year for 2012 and 2013 respectively. Further information is available on the Environment Agency Website and in Figure 7 below.

Figure 7: Thames Barrier Flood Defence Closures by Year



2.15.5 Scheduled closures of the Thames Barrier will prevent HAV ships and barges from being able to transport excavated material down river or deliver materials to site. This may cause either a back log of vessels waiting to pass the barrier or a back log of material on site requiring a stockpiling area. This will need to be carefully managed and planned for.

2.16 Impact on River Events:

2.16.1 There are multiple annual events on the River Thames which will need to be taken in to consideration as they may have an impact on the project. These events generally occur over a single day and may locally increase vessels in a stretch of the river or require river closures.

2.16.2 Annual events on the River Thames, in the Greenwich area, which may be affected by project activities are the 'TOW Barge Race' and 'The Great River Race'. These events occur annually and are usually held in July and September, respectively.

2.16.3 The 'TOW Barge Race' is held annually in July and runs between Greenwich and Westminster.

2.16.4 'The Great River Race' is held in September and runs between Greenwich Reach and Cross Deep in Twickenham. Around 350 river craft take part in the race. The Great River Race requires controlled navigation as well as a river closure. The large number of vessels form a congregation in the marshalling area prior to the race, which could interact with project vessel traffic.

2.16.5 In August, there is an annual event which sees around 10 Tall Ships finish their end of summer cruises from Greenwich up the river to the Tower of London.

2.16.6 'Totally Thames' is a festival which is held annually throughout the month of September. There are over 150 events held throughout the festival such as tall ships, river races and water sports. Consideration of the timetabled events will need to be made.

2.16.7 Greenwich Yacht Club hold regattas and other boating events regularly.

2.17 Impact on other Large Construction Projects.

2.17.1 Other major projects are planned to commence construction in the near future, or having already commenced construction work, which will affect the marine traffic in the area, but primarily in the navigational channel are:

- Nine Elms development/ Northern Line Extension (TfL)
- Thames Tideway Tunnel (Thames Water)
- Garden Bridge (Garden Bridge Trust)
- Cross Rail (TfL)

- Enderby Wharf
- Brunel Bridge- a proposed pedestrian and cycling bridge between Rotherhithe and Canary Wharf.

2.17.2 There are also significant developments planned as part of the Greenwich peninsula masterplan. The developer Knight Dragon have put forward a proposal to develop the Western Side of the Greenwich peninsula which would include a new river bus pier which is directly adjacent to the swinging point for 240m vessels at Enderby's Wharf. The PLA have expressed concerns with this location which would not be allowed in its current position and an alternative location in the vicinity of Delta Wharf potentially using an existing structure has been approved.

2.17.3 Sustrans have recently obtained funding to carry out a feasibility study to look at options for a new cycling and pedestrian bridge between Rotherhithe and Canary Wharf. The study is to be finalised in autumn 2015. The new bridge- Brunel Bridge, would improve river connectivity along the Thames. The Brunel Bridge project is still currently at high level design stage.

2.17.4 These projects will likely require use of the river for construction related activities such as delivery and removal of materials. The interaction with the river traffic related to these projects will be considered in the NIPRA.

A summary of the forecast start and finish times for some of the construction projects mentioned above is shown below in Error! Reference source not found. **Table 7: Indicative large construction projects start and end dates**

	2015	2016	2017	2018	2019	2020	2021	2022	2023
Silvertown Tunnel									
Thames Tideway Tunnel									
Enderby Wharf									
Crossrail									
Garden Bridge									
Northern Line Extension/Nine Elms									

2.17.5 Construction works for Thames Tideway Tunnel will run for approximately 6 years starting in 2016. Construction of tunnel portals and shafts for Crossrail are due to finish in 2018.

2.17.6 Enderby's Wharf (Planning application reference10/3022/F) will berth new cruise liners with length of ships potentially up to 240m from 2017 onwards.

2.17.7 There are many planned construction projects which will affect river traffic in the area (Table 7) **Error! Reference source not found.**and also planning applications for new piers or potential new piers (Knight Dragon) which will also likely increase permanent river traffic in the area.

2.17.8 It should be noted that the PLA are at present undertaking an extremely detailed study of future marine traffic on the River Thames from Wapping to Westminster. Input is being provided by the various stakeholders, freight and passenger associations and other organisations planning major works/operations in the coming years.

2.17.9 It will therefore be of benefit to ensure that any information available from the PLA following their review is fed into the planning and operational phases for Silvertown Tunnel project.

2.17.10 Due to the forecast increase in river freight as part of the construction activities associated with other large projects, careful consideration will need to be given in the planning and availability of required vessels for the purposes of Silvertown Tunnel Project.

2.17.11 Similarly, due consideration will need to be given to the availability of suitably qualified pilots. This is discussed in more detail in Sections 5 and 6. The PLA indicated that they currently had (May 2015) 15 trained pilots with PEC (Section 4.0 of the Meeting Minutes in Appendix B). There is likely be a shortfall of PEC pilots which will need to be addressed.

2.18 Impact of Silvertown Tunnel on river traffic.

2.18.1 Construction of Silvertown Tunnel will run for approximately four years starting in autumn 2018. The estimated excavation removal activities will generate approximately 700 HAV ship return journeys over four years with a peak in years two and three as demonstrated in Figure 8 and

2.18.2 Figure 9. The figures show monthly and cumulative quantities of excavated material to be removed from site in m^3 on the left hand and right hand axes respectively. This peak in river traffic movements will coincide with the

Thames Tideway Tunnel activities and therefore due consideration should be given when planning the project activities.

Figure 8: Volume of material generated for removal by river

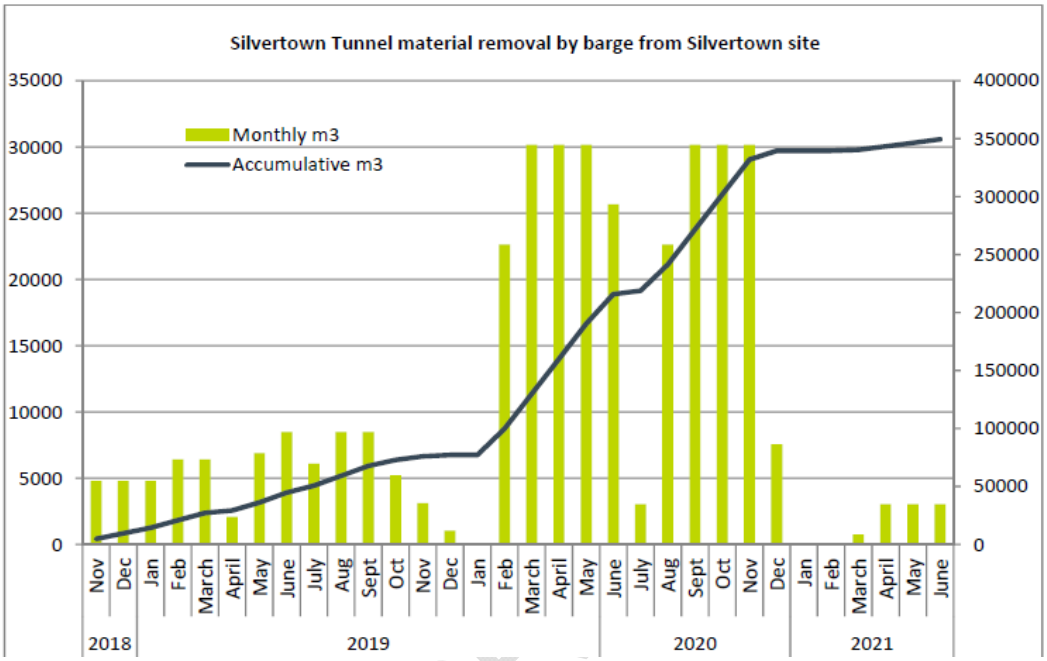
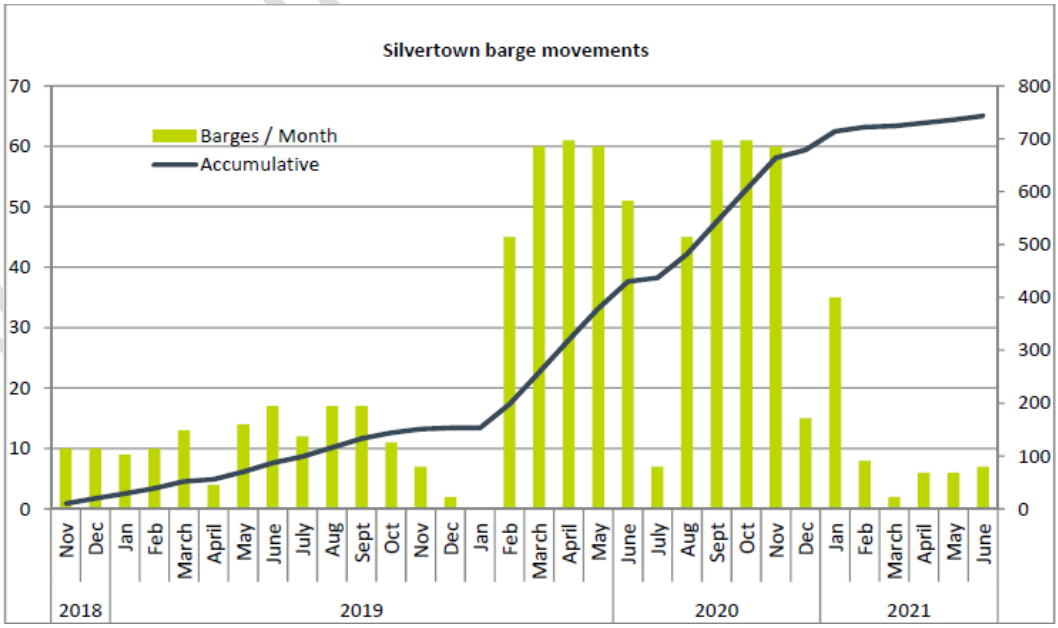


Figure 9: Barge movements based on volume of material generated for removal by river.



2.19 Impact of location of temporary jetty for safe berthing and approach

2.19.1 The reference design has considered providing the best possible alignment of the jetty to align parallel to the river channel flow to minimise risk of sedimentation build up. Similarly, ships and barges using the temporary jetty should be able to berth safely at all states of tides. To enable this, the temporary jetty should allow for a minimum depth of 1.0m beneath the keel at Mean Low Water Springs (MLWS) and this will be achieved by creating a berthing pocket in the form of a NABSA berthing facility and will require some dredging and bed levelling. Consideration will also need to be given to berthing approaches and draft depths should water levels fall below MLWS and will be dependent on operation requirements and windows of when the jetty is to be accessible. The minimum criteria for the build and maintenance of the facility will require sign to ensure it complies with Health and Safety requirements and good design practice.

2.19.2 The following points should also be considered when refining the detailed design of the jetty:

- Accessible bollards and mooring equipment. The design needs to take into account the requirements for ship anchorage and mooring at low and high tides. Also when the vessel is fully empty. The jetty could have a form of floating bollards or travellers to remove the need for throw lines.
- Berthing on an ebb tide (flowing out towards the sea) is relatively simple. The vessel will already approach running parallel with the North Shore and would moor head up river. On the ebb tide there could be a slight tidal set to the North shore; this is to be confirmed by a hydrographic survey.
- If the ship preference for operational reasons is to moor head down on an ebb tide the vessel would then need to swing/turn above the berth and stern fetch onto the berth. This operation can only be achieved by vessels that have adequate propulsion systems/manoeuvrability and power. Without these, tug assistance would be required. One operational reason for this system of mooring is to enable the ship to leave the berth facing the correct direction of travel and not to require swinging when loaded.

- Tugs with barges would either swing if required on the jetty using ropes to assist or the tug would tow or push the barge in backwards if the barge is required to berth head facing in the opposite direction of the tidal flow.
- When approaching and berthing on a flood tide ships could either stern fetch head facing up river providing adequate propulsion systems/manoeuvrability and power is available or they would need to swing head facing downstream adjacent to the jetty. Any swing would need special attention paid to wind, tidal conditions, depth of water and other river users.
- Barges would need to swing if being towed on the flood tide. If being pushed tugs and barges may stern fetch under the same criteria as ships.
- The prevailing wind is from the south west which will have a tendency to blow the ship/barges onto the jetty. Any strong winds from a southerly direction should be treated as a potential hazard and should therefore be mitigated within the approved passage plan. Effects of wind can be mitigated by the use of tugs or anchors.

3. SUMMARY OF NAVIGATIONAL ISSUES

3.1 Interaction with existing river traffic

3.1.1 In addition to the punctual river traffic survey carried out 20th and 21st of July 2015 and discussed in Section 2.12 the PLA collect Automatic Identification System (AIS) data.

3.1.2 AIS data would likely indicate that the high level of vessel movements not only in the navigational channel but also around Trinity Buoy Wharf due to the high speed passenger vessels “Clippers” both arriving and departing from their base at that location. It should be noted that the number of vessel movements will increase in the near future due to Thames Clippers increasing their fleet of vessels.

3.1.3 However, AIS data would not pick up any recreational traffic movements. The results of the river movement surveys indicate there was some recreational vessel movement during the survey period although it would be normal to see an increase over the weekend and during the spring and summer periods.

3.1.4 Preliminary discussions have been had with the PLA regarding obtaining some AIS data to further quantify current traffic movements on this stretch of the Thames.

3.1.5 Track path data for cruise ships over 210m LOA currently using Enderby Wharf (Meeting minutes with the PLA Appendix B), has been plotted on the Temporary works plan drawing in Appendix C.

3.2 Incident data

3.2.1 The PLA provided incident data in the Bugsby Reach area for the period covering 1st of January 2010 until 31st of December 2014. The full data set is included in Appendix D and Table 8 **Error! Reference source not found.** below summarises the key findings.

3.2.2 As can be seen from the data, a total of 14 incidents were recorded, of which three were collisions, five contacts, and six groundings. Of the 14 incidents recorded, four were given a severity warning of 1. The severity rating is based on the PLA’s rating system ratings 1-4, 1 being of minimum severity and 4 being a very serious incident.

Table 8: Bugsby Reach Incident Data (01 Jan 2015 to 31 Dec 2014)

Type	Severity	Primary Cause	Berth Channel	Vessel Type	Investigation Summary
Collision	1	Misjudgement	Victoria Dock Buoy	Motor tug	HM Investigated and agreed the following actions with GPS : - The crew of GPS IBERIA will conduct a toolbox talk on this incident with the aid of the AIS data - The incident will be raised and discussed with all tug crews at the next GPS Safety Training day - A guidance document on the methodology of towing alongside will be produced by GPS and provided to all employees. In addition to the GPS actions the following PLA actions were identified: - The PLA will give a presentation on safety issues to all GPS crews at the next GPS Safety Training day - Section 7.1 of the COP for Craft Towage Operations on the Thames would be updated to include lessons identified following this incident.
Contact	1	Main engine failure	Victoria Dock Buoy	Rec V\L - Dinghy\Sail boat	HM Investigated - The Master was sent an educational letter reminding them that early deployment of anchors is essential when vessels suffer from engine failures. A copy of Safety Bulletin No. 2 of 2013 was enclosed in the educational letter.
Collision	1	Failure to act in a timely manner	North Greenwich Pier	Rec V\L - Yacht	HM investigated. No impact on SMS.
Grounding	1	Failure to follow a Passage Plan	Bow Creek Anchorage	Motor Tug	HM Investigated - Following investigation the following actions were undertaken: - The Master was re-trained in the GPS SMS; including the purpose and necessity of reading and understanding operational memos. - An up to date chartlet covering the Bow Creek shoal has been provided on board all GPS tugs servicing Limmo and Instone Wharves.
Grounding	0	Failure to follow a passage plan	Bow Creek	Motor tug	HM Investigated - GPS have issued an operational memo to staff advising that the boards at Instone Wharf are depth boards for the berth, not tide boards, and they should not be used to determine whether safe passage over the bow creek shoal is possible.
Grounding	0	N/A	Bow Creek	Vessel-Sail	HM investigated- no further action.

Type	Severity	Primary Cause	Berth Channel	Vessel Type	Investigation Summary
				Training	
Collision	0	Failure to follow Colregs	Blackwall Point Drawdock	Rec V\L - Dinghy\Sail boat	HM Investigated - The MRI followed this incident up with the Vice-Commodore, who agreed he would highlight how vessels should be navigating whilst engaged in racing in the future.
Contact	0	Misjudge ment	North Greenwich Pier	Service Vessel - Harbour (PLA)	DHMU investigated. No impact on SMS.
Contact	0	Failure to keep a proper look out	Orchard Buoy	Vessel - High Speed Passenger	HM Investigated - No further action taken
Grounding	0		Bow Creek	Motor Tug	No further action
Grounding	0		Blackwall Point	Motor Tug	Educational letter sent
Grounding	0		Bow Creek	Vessel - High Speed Passenger	HM Investigated - No further action taken
Contact	0	Misjudge ment	North Greenwich Pier	Vessel - High Speed Passenger	HM Investigated - Incident cause identified as Human Error with the Master taking full responsibility for his misjudgment. No further action taken
Contact	0	Failure to act in a timely manner	North Greenwich Pier	Rec V\L - Dinghy\Sail boat	Telephoned Mr Leal and expressed concern as to his actions. Advised him that I did not want to see his name again in relation to another incident and that he should take more care. Suggested that trying to scull a 19' boat whilst towing a dingy was not the best.

3.2.3 The incident logs show that five accidents occurred in the vicinity of Bow Creek (of which all were related to grounding). This indicates unfavourable and difficult navigation conditions. Bow creek shoal and the narrow waterway would be of concern for project related vessel movements.

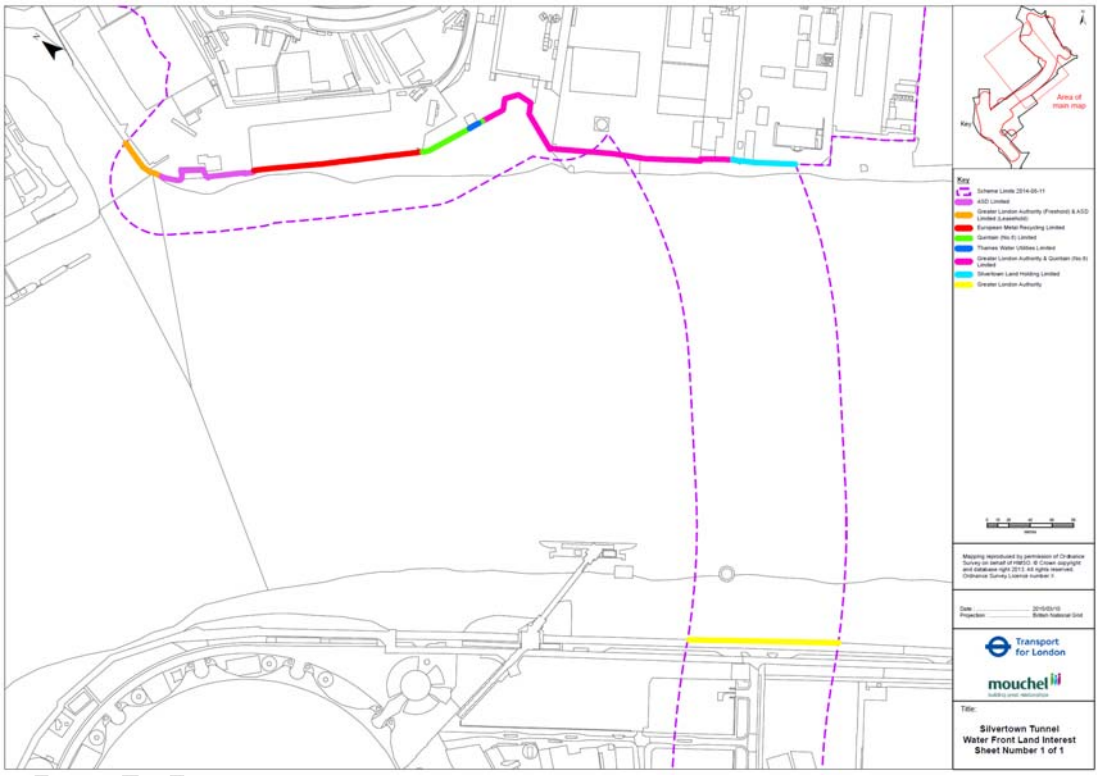
3.2.4 The data also reflects the various vessel types in the navigation channel which the project would need to take consideration of. A number of incidents reported are related to recreational vessels and craft. Working hours will be confirmed during the next stage of the project and consideration will be made

to ensure that the site operations have minimal impact on recreational river users.

3.3 Condition Assessment

3.3.1 Thames Wharf is made up of multiple Environment Agency frontages, refer to Figure 10. The frontages located within the area in which the NABSA berthing may be reinstated and/or a temporary jetty constructed are owned by European Metal Recycling Ltd / Keltbray Ltd, GLA and Quintain Ltd. These frontages are predominantly of steel sheet pile construction.

Figure 10: Environment Agency frontages



3.3.2 A visual structural condition assessment of the river walls from Instone Wharf to Clyde Wharf was undertaken by Atkins in June 2015. A separate report (River Wall Structural Condition Survey TfL 90001 TASK 125) documents the condition assessment of the river frontage at this location, and is included in Appendix E. The condition of the river wall was assessed using the Environment Agency's Condition Assessment Manual (Reference 166_03_SD01).

3.3.3 The frontages owned by European Metal Recycling Ltd / Keltbray Ltd are both sheet piled. A plan showing the EA's asset reference numbers for the relevant river walls is included in the River Wall Structural Condition Survey report in

Appendix E. The downstream frontage (06304TH000302L33) consists of relatively newer sheet piles, believed to be piled in front of a former, older defence. The upstream frontage (06304TH000302L34) shown in Figure 11 is set back from the line of asset 06304TH000302L33 and consists of visibly older sheet piling. Based on the Environment Agency condition assessment criteria and terminology, the survey concluded that the frontages owned by European Metal Recycling Ltd / Keltbray Ltd are both in poor condition. The piles at the downstream extent of 06304TH000302L34 and the whole length of 06304TH000302L33 were observed to be leaning backwards. The cause of the non-verticality of the piling could not be deduced from a purely visual inspection, but it may be an indicator of structural instability caused by excessive surcharging of the land behind.

Figure 11: Example of condition of Sheet pile walls of European Metal Recycling upstream frontage.

3.3.4 Further assessment may be required to ascertain the cause of the piles' apparent leaning. This could include a back-analysis of the piled wall, using available as-built information, to determine whether its structural capacity is sufficient for the level of surcharging being imposed by current and planned activities on the land behind. It may be that an exclusion zone is required which restricts the use of heavy plant (for example, cranes and heavy excavators) and stockpiling of spoil in an established area behind the affected wall. This potential risk is considered in the risk assessment in Section 5.

3.3.5 The assets owned by Quintain Ltd are of varying construction and are generally in good condition, with no indication of structural instability over the sections where a temporary jetty could be constructed.

4. STAKEHOLDER CONSULTATION

NOTE: THE STAKEHOLDER CONSULATION PROCESS IS UNDERWAY. THE SECTIONS BELOW PROVIDE DETAIL OF THE PROPOSED CONSULTATION PROCESS THAT WILL BE ADOPTED.

4.1 Consultees

4.1.1 The project recognises the importance to engage at an early stage with any project stakeholders which is also a statutory requirement under the DCO process.

4.1.2 In order to identify likely project risks and associated impacts and concerns of river users a list of stakeholders with direct river interests has been developed identifying some of their potential likely concerns. **Error! Reference source not found.** Table 10 below lists the key stakeholders for this reach of the River Thames. Other project stakeholders which may need to be consulted but who do not have such a direct interest in the river frontages are provided in Table 11**Error! Reference source not found.**.

4.1.3 Early engagement is essential to give stakeholders briefings on the intentions, timescales, impact and progress of the project. There must be allowance for the dissemination of information, debating areas of concern, health and safety, ideas of mitigation and sharing all issues. It is imperative that regular updates of how the programme is evolving are shared amongst construction and marine workforces as well as the general public and stakeholders. A number of will be consulted in advance of formal consultation process as requested by the PLA following a meeting on 28th of August 2014 (meeting minutes in Appendix B). This is an ongoing process.

4.1.4 These stakeholders are identified in Table 9 **Error! Reference source not found.** below and a summary of any meetings with these parties is included in Appendix H. Full contact details for Stakeholders Identified in Table 9 **Error! Reference source not found.** and **Error! Reference source not found.** will be provided in Appendix H.

4.1.5 A SUMMARY OF THE OUTCOMES OF THE MEETINGS WITH THE STAKEHOLDERS INDENTIFIED IN TABLE 9 WILL BE INCOPORATED WITHIN THIS NIPRA REPORT. KEY ISSUES AND POINTS RAISED WILL BE INCLUDED IN THE MAIN REPORT WHILST MEETING MINUTES WILL BE INCLUDED IN THE RELEVANT APPENDICES.

Table 9: Stakeholders to be consulted in advance of DCO formal consultation. NOTE: CONSUTLATION PHASE ONGOING.

Stakeholder Grouping	Stakeholder	Stakeholder Name Names to be confirmed
Passenger Boat	Thames Clippers	
Freight Operators	Cory Environmental	
	Thames Shipping	
	General Marine	
Recreational Yacht, Sailing & Rowing Clubs	Greenwich Yacht Club	
	Thames Barrier Yacht Club	
Wharf & Pier Operators (Thames Wharf)	Thames Wharf (Keltbray)	
	Instone Wharf (ASD Metal Services Ltd)	
	Nuplex Resin Limited	
	Quintain (No8) Limited	

4.2 Direct Stakeholders

Table 10: Stakeholders and likely potential concerns

Organisation	Stakeholder	Contact	Potential Concerns of Stakeholder
Passenger Boat Association (PBA)	Thames Clippers	http://www.thamesclippers.com/	Movement of marine construction traffic close to the operations base of Thames Clippers at Trinity Buoy Wharf
			Movement of vessels using 02 pier
			Delays caused by congestion or need to slow down
			Delays to services due to traffic density
			Potential of scour at Trinity Buoy Wharf(unlikely)
	Passenger boat operators who transit this area I.e. all middle/ lower Thames operators	https://tfl.gov.uk/modes/river/corporate-and-private-boat-hire	Movement of vessels using 02 pier
			Delays caused by congestion or need to slow down
			Delays to services due to traffic density
	RIB operators (eg London RIB Voyages, Thames RIB Experience)	http://www.londonribvoyages.com/ http://www.thamesribexperience.com/?&mkwid=sdP55FMhe_dc|pcrid|76018042861|pkw|the%20%2Brib%20experience|pmt|b&mh_keyword=the%20%2Brib%20experience&gclid=CMuX-eeTlMcCFcTItAodAPEMFA	Unlikely to be affected
Wharf & Pier Operators	Thames Wharf (Keltbray)	http://www.keltbray.com/material-management-and-recycling	Impact of project works to wharf operators and business concerns. Main wharf for Silvertown Tunnel project for handling excavated material, TBM segments Main wharf for Silvertown Tunnel project for handling excavated material, TBM segments and other construction materials

Organisation	Stakeholder	Contact	Potential Concerns of Stakeholder
	Docklands Wharf (Euromix)	http://www.euromixconcrete.com/	Marine access to wharf may possibly be reduced when there are marine movements to and from Thames Wharf
	Instone Wharf (ASD Metal Services Ltd)	http://www.asdmetalservices.co.uk/	
	Angersteins Wharf (Cemex)	http://server1.pla.co.uk/handbook/terminalDirectory.cfm?flag=2&terminal_id=83&site=commercial&orderDirection=asc	Delays & impact on service, traffic congestion, impact on existing moorings and operations
	Angersteins Inner Jetty (Days Aggregates)	http://www.daygroup.co.uk/	
	Murphys Wharf (Hansons)	http://www.hanson.co.uk/en/Hanson-Concrete-Silvertown	
	Peruvian Wharf	http://www.pla.co.uk/Port-Trade/Port-services/Terminal-Directory	
	West India Dock (Canal & River Trust)	https://canalrivertrust.org.uk/places-to-visit/destination/73/west-india-docks	Delays to lock access at West India Dock owing to traffic density
Recreational Yacht, Sailing & Rowing Clubs	Greenwich Yacht Club	http://www.greenwichyachtclub.co.uk/	The area immediately offshore from Thames Wharf should be considered an exclusion zone for recreational users due to movement of marine construction traffic.
	Poplar Rowing Club	http://www.pbdrc.co.uk/	
	Blackwall Rowing Club	http://www.pbdrc.co.uk/	
	Curlew Rowing Club - Greenwich	http://www.curlewrowingclub.co.uk/	
	Globe Rowing Club	http://www.globerowingclub.co.uk/	
	Ahoy Sailing & Rowing Centre at Deptford centre	http://www.ahoy.org.uk/	
	Rowing Activities at Trinity Buoy	http://www.trinitybuoywharf.com/	
	Users of the Canal and River Trust Waterways	https://canalrivertrust.org.uk	
	Docklands Sailing and Watersports Centre	http://www.dswc.org/	
Freight Operators **RAFT (River Association of Freight & Transport) Association**	Cory Lighterage	http://www.coryenvironmental.co.uk/our-services/lighterage/	Delays to service, impact on service, traffic congestion, impact on existing moorings and operations Barge services to Victoria Deep Terminal, impact on traffic density within the
	GPS Marine	http://www.gpsmarine.co.uk/	
	Bennetts Barges	http://www.aggregate.com/our-businesses/bennetts-barges/	
	S Walsh	http://www.swalsh.com/h/services/marine-management-services/400/	

Organisation	Stakeholder	Contact	Potential Concerns of Stakeholder
now disbanded			Thames Barrier Control Zone
Others	Metropolitan Police - Marine Policing Unit	http://content.met.police.uk/Site/marinepolicingunit	Safety of river users.
	Royal National Lifeboat Institution (RNLI)	http://www.rnli.org	

4.3 Indirect Stakeholders

4.3.1 In addition to the immediate stakeholders listed above, **Error! Reference source not found.** below suggests other stakeholders or representation association groups who may have an interest in the works. An email link to further information/contact details provided.

Table 11 Names and Contact Details of other potential stakeholders

Description	Contact
Leisure facilities (Yacht Clubs, Rowing Clubs & Marinas on the River Thames	http://www.boatingonthethames.co.uk/Leisure-Facilities-Directory
Riparian boroughs of the River Thames	http://top-topics.thefullwiki.org/Riparian_boroughs_of_the_River_Thames
Wharf Directory	http://www.pla.co.uk/Port-Trade/Port-services/Terminal-Directory
Cargo, ship & barge operators	http://server2.pla.co.uk/handbook/port_community.cfm?flag=3&class_id=88
Towage companies	http://server2.pla.co.uk/handbook/port_community.cfm?flag=3&class_id=80
Bulk cargo handlers	http://server2.pla.co.uk/handbook/port_community.cfm?flag=3&class_id=25
Port licencing and regulatory authority - PLA	http://www.pla.co.uk/
National licensing & regulatory authority - Marine Coastguard Agency	https://www.gov.uk/government/organisations/maritime-and-coastguard-agency
Thames rescue operation - RNLI	http://www.rnli.org
Environmental issues - City of London, Port of London Health Authority	https://www.cityoflondon.gov.uk/service/port-health/pages/default.aspx
Policing - Metropolitan Police, Marine Policing Unit	http://content.met.police.uk/Site/marinepolicingunit
Fire & rescue - London Fire Brigade (Thames Division)	http://www.london-fire.gov.uk/
Owner/operator of majority of London's key Piers and Emirates	https://tfl.gov.uk/modes/river/

Description	Contact
Cable Car - TfL(London River Services)	
Trade association - Passenger Boat Association	http://britishmarine.co.uk/Associations/Group/Passenger-Boat-Association
Trade association - Commercial Boat Operators Association	http://www.cboa.org.uk
Environmental Action Group - Thames 21	www.thames21.org.uk
Industry led training body - Thames Training Alliance	http://www.thames-training-alliance.org/
Large infrastructure project - Thames Tideway Tunnel	http://www.thamestidewaytunnel.co.uk/
Representing London - Greater London Authority	https://www.london.gov.uk/mayor-assembly/gla
Charity representing Thames Estuary stakeholders - Thames Estuary Partnership (members include RSPB among other interested parties)	http://www.thamesweb.com/
Flood defence, environmental issues - EA	https://www.gov.uk/government/organisations/environmentagency
Guild, training body - The Company of Watermen and Lightermen	http://www.watermenshall.org/
Rowing Organisation - Thames Traditional Rowing Association	http://www.traditionalrowing.com/
MMO – Marine Management Organisation	https://www.gov.uk/government/organisations/marine-management-organisation
London Ambulance & their Specialist Teams	http://www.londonambulance.nhs.uk/
Museum of London Archaeology	http://www.mola.org.uk/

5. RISK ASSESSMENT METHODOLOGY

5.1 Approach

5.1.1 The Port Marine Safety Code (the Code) requires that all ports base their management of marine operations (i.e. their powers, policies, plans and procedures) on a formal assessment of the hazards and risks to navigation within the port. As such the PLA maintains a Safety Management System which is based on a risk assessment. Any departures from the risk assessment carried out by the PLA , i.e. change to baseline navigation such as towage or a new jetty, therefore need to demonstrate no additional risks to navigation or that the risks are within As Low as Reasonably Practicable (ALARP) level.

5.1.2 The risk assessment methodology adopted for the purpose of NIPRA follows the PLA's methodology and makes use of the required risk assessment template supplied by the PLA.

5.1.3 Risk is a product of the consequence and the likelihood of an unwanted event. The International Maritime Organisation (IMO) define a hazard as "something with the potential to cause harm, loss or injury" the realisation of which results in an incident or accident. The potential for a hazard to be realised can be combined with an estimated or known consequence or outcome. This combination is termed "risk". Risk is therefore a measure of the likelihood and consequence of a particular hazard occurring.

5.1.4 The NIPRA report and risk identification process follows the methodology prescribed by the PLA following a meeting at their offices on May 28th 2015. The process adopted as part of this NIPRA follows the preferred PLA methodology which consists of the following steps:

- Hazard identification,
- Definition of hazard likelihood and consequence to define risk score.
- Identification of mitigation measures to reduce the risk score to an acceptable level as defined.

5.1.5 Risk terminology used as part of the risk assessment is defined in **Error! Reference source not found.** below.

Table 12 Risk Assessment Terminology

Risk	Is a measure of the likelihood and consequence of a hazard occurring
Hazard	Is an occurrence that can create an unsafe situation
Initial risk	Is a measure of risk prior to additional risk controls being added (existing risk controls such as PLA measures are included)
Residual risk	Is a measure of risk once additional controls have been added that were not in place at the time of the assessment.

5.2 Criteria

5.2.1 The combination of consequence and frequency of occurrence of a hazard is combined using a risk matrix, **Error! Reference source not found.**, which enables hazards to be ranked and a risk score assigned. The resulting scale can be divided into three general categories (or Action key) as per the PLA risk matrix.

5.3 Risk Matrix

5.3.1 The purpose of the risk assessment is to identify suitable measures that will bring any risks identified which have a score of 10 or higher to a moderate or lower scale (i.e. a score of 9 or lower). The overall aim is to bring risks to an As Low as Reasonably Practicable (ALARP) level.

5.3.2 However, the project team has also considered how to reduce risks altogether through careful design (shape and location of jetty, capacity for stockpiling of spoil to allow flexibility to manage HAV movements to reflect weather or flow condition etc.).

5.3.3 **Error! Reference source not found.**below is taken from the PLA's prescribed risk assessment template and summarises the frequency and consequence risk assessment criteria and associated scores. Action requirements based on score bandings define when mitigation measures are required or for example when the risk is so high that the activity should not be carried out.

Table 13: PLA Risk Matrix

RISK ASSESSMENT MATRIX: RISK CRITERIA		FREQUENCY				
		Level 1	Level 2	Level 3	Level 4	Level 5
		Rare	Unlikely	Possible	Likely	Almost Certain
		One or more times greater than 100	One or more times 100 year	One or more times in 10 years	One or more times per year	Ten or more times per year
Consequence	5 – Loss of vessel or severe damage to vessel / environment. Multiple fatalities International news coverage.	Moderate (5)	High (10)	Extreme (15)	Extreme (20)	Extreme (25)
	4 – Major damage to vessel / environment. Single Fatality. National news coverage.	Minor (4)	Moderate (8)	High (12)	Extreme (16)	Extreme (20)
	3 – Moderate damage to vessel / environment. Moderate / major injury Regional news coverage.	Minor (3)	Moderate (6)	Moderate (9)	High (12)	Extreme (15)
	2 - Minor or superficial damage to vessel / environment. Minor injuries and local news coverage.	Slight (2)	Minor (4)	Moderate (6)	Moderate (8)	High (10)
	1 - Insignificant or no damage to vessel / equipment / environment. No injuries.	Slight (1)	Slight (2)	Minor (3)	Minor (4)	Moderate (5)

ACTION KEY	
Slight (1 – 2)	No Action is required
Minor (3 – 4)	No additional controls are required, monitoring is required to ensure no changes in circumstances
Moderate (5 – 9)	Efforts should be made to reduce risk to 'As low as reasonably practicable' (ALARP), but activity may be undertaken
High (10 – 14)	Efforts should be made to reduce risk to 'As low as reasonably practicable' (ALARP). Activity can only be undertaken with further additional controls.
Extreme (15 – 25)	Intolerable risk. Activity not authorised

5.4 Hazard Identification

5.4.1 The PLA's definition for the Hazard Categories has been adopted to categorise the hazard types and is defined below in **Error! Reference source not found.**.

Table 14: PLA Hazard Categories

Hazard Type	Definition adopted and used for identifying risks
Contact	Vessel hitting a fixed or moored structure or vessel
Collision	Two vessels underway hitting each other.
Grounding	Is the impact of a ship on seabed or waterway side. It may be intentional as in beaching to land crew or cargo, and careening, for maintenance or repair or unintentional as in a marine accident.
Other	Considers more generic risks such as break out, dropped objects etc.

5.4.2 **Error! Reference source not found.** below provides a summary of the hazards identified. For each hazard identified a hazard reference number is provided as well as a category. Similarly, in order to better manage the risks or when the occurrence of the risk is likely to be greatest, the risks have been sub-divided into the project phases which include:

- Construction (C);
- Operation (O) and
- Dismantlement (D).

Table 15: Hazards identified

Hazard ID	Category	Phase	Hazard Title	Hazard Causes
1	Contact	C of temporary structures	Contact of construction vessels/plant with existing structures (during construction).	Lack of visibility from coning positions Lack of manoeuvrability Lack of power Interaction with river topography (bank effect, squat, etc.) High winds Buoy or moorings out of position Inadequate Master/lack of local knowledge/human error Failure to passage Plan Traffic congestion Restricted visibility Result of avoiding 3rd party vessel Mechanical defect/failure Fatigue
2	Contact	O and D of temporary structures.	Contact of commercial and freight with temporary structures.	Commercial freight traffic not aware of changes to river morphology Commercial/Freight Masters not aware of works Restricted visibility
3	Contact	O and D of temporary structures.	Contact of recreational and service vessels with temporary structures	Recreational and service vessels traffic not aware of changes to river morphology Recreational/service vessel operators not aware of works Restricted visibility
4	Contact	O and D of temporary structures.	Contact of Class V passenger vessels with temporary structures.	Class V passenger vessel operators not aware of changes to river morphology Class V passenger vessel operators not aware of works Restricted visibility

Hazard ID	Category	Phase	Hazard Title	Hazard Causes
5	Collision	C/O/D	Collision of construction vessels/plant with Class V passenger vessel	Lack of visibility from coning positions Lack of manoeuvrability Class V vessels unaware of construction activities Interaction with river topography (bank effect, squat, etc.) High winds Buoy or moorings out of position Inadequate Master/lack of local knowledge/human error Failure to passage Plan Traffic congestion Restricted visibility Result of avoiding 3rd party vessel Mechanical defect/failure Fatigue
6	Collision	C/O/D	Collision of construction vessels/plant with recreational and service vessel	Lack of visibility from coning positions Lack of manoeuvrability Recreational craft unaware of construction activities Interaction with river topography (bank effect, squat, etc) Buoy or moorings out of position Inadequate Master/lack of local knowledge/human error Failure to passage Plan Traffic congestion Restricted visibility Result of avoiding 3rd party vessel Mechanical defect/failure Fatigue
7	Collision	C/O/D	Collision of construction vessels/plant with commercial and freight	Lack of visibility from coning positions Lack of manoeuvrability Lack of power Interaction with river topography (bank effect, squat, etc) High winds Buoy or moorings out of position Inadequate Master/lack of local knowledge/human error Failure to passage Plan Traffic congestion Restricted visibility Result of avoiding 3rd party vessel Mechanical defect/failure Fatigue

Hazard ID	Category	Phase	Hazard Title	Hazard Causes
8	Collision	C/O/D	Collision of construction vessels/plant with construction vessels/plant.	Lack of visibility from coning positions Lack of manoeuvrability Lack of power High winds Buoy or moorings out of position Inadequate Master/lack of local knowledge/human error Failure to passage Plan Traffic congestion Restricted visibility Result of avoiding 3rd party vessel Mechanical defect/failure Fatigue
9	Grounding	C/O/D	Grounding of construction vessels within DCO.	Lack of visibility from coning positions Lack of manoeuvrability Lack of power Interaction with river topography (bank effect, squat, etc) High winds Restricted visibility Inadequate Master/lack of local knowledge/human error Tidal Cuts Vessel taking avoidance action due to pending action. Incorrect chartered depth/unknown hazard to navigation Failure to passage plan Inability to abort passage
10	Grounding	C/O/D	Grounding of construction barges on NABSA Berth	Lack of visibility from coning positions Lack of manoeuvrability Lack of power Interaction with river topography (bank effect, squat, etc) High winds Unsuitable design of NABSA for planned barge size Inadequate Master/lack of local knowledge/human error Tidal Cuts Vessel taking avoidance action due to pending action. Incorrect chartered depth/unknown hazard to navigation Failure to passage plan Inability to abort passage
11	Other	C/O/D	Blackout, loss of propulsion	Flotsam Mechanical Failure Lack of maintenance/maintenance plan

Hazard ID	Category	Phase	Hazard Title	Hazard Causes
12	Other	C/O/D	Vessel swinging.	Inadequate mooring ropes and/or securing arrangements Excessive wash Insufficient space for swing High moisture content limits of spoil
13	Other	C/O/D	Personal injury: Dropped objects Freight and commercial.	Vessel straying into exclusion area Failure of lifting equipment Object dropped by a worker Freight/ commercial unaware of marine construction plant location
14	Other	C/O/D	Personal injury: Dropped objects Class V Passenger vessels	Vessel straying into exclusion area Failure of lifting equipment Object dropped by a worker Class V vessel unaware of marine construction plant location
15	Other	C/O/D	Personal injury: Dropped objects, recreation/service vessels.	Vessel straying into exclusion area Failure of lifting equipment Object dropped by a worker
16	Break Out	C/O/D	Breakout of mooring during construction, operation and dismantlement jetty/NABSA berth.	Inadequate mooring ropes/and/or securing arrangements Moorings part Excessive wash Loss of control during manoeuvring area
17	Other	C/O/D	Construction plant/ HAV/Barges congestion during Thames Barrier Closure	Lack of traffic forecast Traffic threshold volumes undefined Lack of local knowledge Lack of safe berthing options Lack of safe anchoring zones
18	Other	C/O/D	Failure of marine construction equipment	Scour leading to undermining of cofferdam or jack up Failure of jack up or cofferdam etc
19	Other	C/O/D	Terrorist Threat	Malicious Action on temporary structures or vessels
20	Other	C/O	Damage to river wall following dredging/berth levelling activities.	Lack of information of existing condition of river wall Inadequate berth levelling depths Inadequate design of berth levelling depths
21	Other	C/O/D	Failure of existing Thames River wall during construction operations.	Lack of information of existing condition of river wall Construction plant operating too closely to river wall edge Imposed loads too high for river wall capacity

5.5 Risk assessment results

5.5.1 As per the PLA's methodology, once the risks are identified, a baseline risk score is generated based on the likelihood of the hazard realising itself and the potential consequence. Based on the hazards 1 to 21 above baseline risk scores have been developed and are summarised in **Error! Reference source not found.**. The hazards and associated baseline risk score assume that good practice PLA procedures, rules and regulations are already followed.

5.5.2 The hazards identified considered environmental, equipment, human error and operational causes.

5.5.3 **Error! Reference source not found.** below, indicates that one risk has a score of 10 or above which requires steps to be taken to reduce risk score to ALARP. There are no hazards with a risk score of 15 or above, which would prevent the activity from taking place. The full risk assessment tables can be found in Appendix F.

5.5.4 The credible outcomes of the hazard realising itself have been defined and include potential impacts to the environment, loss of property, human life and impact to the project. The most likely hazard outcomes were considered as opposed to the worst case. For example, Risk hazard ID 8 which considers the hazard outcomes of collision of construction vessels and plant with other construction vessels operating within the project site would most likely cause some damage to either or both vessels, have an adverse effect on the programme and potentially cause some minor injuries to personnel on board. However, although possible, the worst case scenario which could consist of multiple fatalities and extensive environmental pollution has not been scored. Should it be scored the risk ranking would bring it into the "intolerable risk" category which would, based on the PLA's risk assessment matrix, mean that the activity cannot be authorised.

Table 16: Risk Assessment summary

Hazard ID	Hazard Rank	Hazard Title	Baseline Risk	Baseline Level
1	6	Contact of vessel/ plant with existing structures (during construction).	**9.0**	**Moderate**
2	10	Contact of commercial/freight with temporary works	**6.0**	**Moderate**
3	3	Contact of recreational and service vessels with temporary works.	**9.0**	**Moderate**
4	16	Contact of Class V passenger vessels with temporary works.	**6.0**	**Moderate**
5	9	Collision of construction plant with Class V passenger vessel	**8.0**	**Moderate**
6	1	Collision of construction vessels/plant with recreational and service vessel.	**12.0**	**High**
7	15	Collision of construction vessels/plant with commercial and freight	**6.0**	**Moderate**
8	5	Collision of construction vessels plant with construction vessels plant	**9.0**	**Moderate**
9	14	Grounding- Construction vessels generally within project vicinity	**6.0**	**Moderate**
10	19	Grounding- Construction barges on Nabsa berth	**6.0**	**Moderate**
11	2	Blackout Loss of propulsion	**8.0**	**Moderate**
12	17	Vessel swinging during construction, operation, dismantlement	**6.0**	**Moderate**
13	20	Personal injury, dropped objects on freight and commercial	**6.0**	**Moderate**
14	12	Personal injury, dropped objects Class Passenger vessels	**8.0**	**Moderate**
15	4	Personal injury, dropped objects, recreation/ service vessels.	**9.0**	**Moderate**
16	13	Breakout of mooring during construction, operation (usage of jetty/NABSA) and/or Dismantlement	**6.0**	**Moderate**
17	11	Construction plant HAV/Barges congestion during Thames barrier closure	**6.0**	**Moderate**

18	18	Failure of marine construction equipment	**4.0**	**Minor**
19	21	Terrorist Threat	**2.0**	**Slight**
20	7	Damage to river wall following dredging/berth levelling activities	**8.0**	**Moderate**
21	8	Failure of Thames Wharf wall	**8.0**	**Moderate**

6. MITIGATION MEASURES

6.1 Risk Reduction

6.1.1 The PLA already have a comprehensive and robust risk control system in place to mitigate risk from vessels navigating along the River Thames. These controls ensure that the risks associated with the hazards identified in the Scheme are currently within or below the As Low As Reasonably Practicable (ALARP) band.

6.1.2 The “identified mitigation” measures are therefore measures that go above and beyond what is already required. Sections 6.2 to 6.3 to below provide a summary of some of the mitigation measures identified as part of the risk assessment process which were used to reduce the baseline risk score.

6.1.3 The residual risk scores for the identified hazards taking into account mitigation measures are presented in **Error! Reference source not found.**. A short discussion on the impact of the additional mitigation measures on river users is provided in Section 6.5.

6.1.4 Using the prescribed PLA template, risk reduction measures were identified and associated risk likelihood and consequence percentage applied for each of the mitigation measures defined. A total of 47 risk reduction measures have been identified. Some of these measures for example, the creation of a construction river response team or compliance with Thames Freight Standard are “umbrella” risk reduction measures which include several risk reduction measures. Details of these umbrella risk control measures are shown in **Error! Reference source not found.** below.

Table 17: Grouped risk control measures

Risk Control Measure	Risk Control Measure details	Associated Hazard Cause
Comply with Thames Freight Standards	Wheelhouse to have adequate all round visibility	Lack of visibility from coning positions
	Manoeuvrability of vessel assessed by HM. Defined weight/power displacement ratios and maintenance	Lack of manoeuvrability
	Vessel to have a Planned Maintenance System (PMS) in place	Mechanical Failure
	Vessel anchors to be appropriately sized to the vessel and have enough cable for required water depth	Mechanical Failure
	Vessels to have an approved Safety Management System in place (ISM, PLA, CoP etc).	Mechanical Failure
	Emergency steering/power to be tested on a regular basis and crew to be familiar with use (company operating procedures)	Mechanical Failure
Construction River Response Team	Construction river response team to check site daily	Buoy or mooring out of position
	CRRT to have trained personnel on board	Mechanical defect/failure/ Recreational vessels entering construction zone.
	CRRT to warn stray vessels	
Passage Plan	Allowance for appropriate, safe and suitable manoeuvring areas in design and construction	Lack of manoeuvrability
	Provide detail of tide operation windows	Interaction with river topography (bank effect/squat etc)
	Include general directions and reference to NRA 8, 12.	Failure to passage plan
	Minimum visibility for manoeuvring to be 0.5 Miles	Restricted visibility
	Minimum Keel clearance to be defined.	Interaction with river topography (bank effect/squat etc.)
	Adjust delivery/construction times to allow safe passage conditions (tides/floods)	Failure to passage plan
	Define suitable abort points.	Inability to abort passage
	Identify emergency anchorage zones/restrictions	Mechanical failure
	Define vessel traffic management requirements.	Failure to passage plan
	Limit speed of vessels and define speed zones.	
	Define safe berthing and mooring options.	
Pilotage and LKE	Ensure Master has PEC and has been approved by HM. Captain to have LKE	Inadequate Master/lack of local knowledge Human error
Establish works exclusions zones	During any lift During piling and associated lifting activities Restrict heavy lift activities to periods of low commercial and recreational river use. During any offloading activities Ensure any lift equipment is rigorously tested and implement permits to operate systems.	Failure of lifting equipment
Updated river signalling	Ensure adequate signal lighting is designed for temporary structures and appropriate signalling	Commercial freight not aware of changes to river/new structures

Risk Control Measure	Risk Control Measure details	Associated Hazard Cause
system	systems such as tiger boards informing of work zones are implemented. Promote and adopt, use of AIS transponders on construction plant. Establish temporary navigation lights and signage	Vessels straying into exclusion area
Hours at work regulations	Regular breaks for ship pattern in line with international and inland waterway regulations. Working hours to be monitoried by the captain of the vessel and shore side personnel and the Berthing Coordinator	Fatigue/Human Error

6.1.5 Once risk control measures are identified, the PLA risk assessment spreadsheet requires the user to define the percentage likelihood and consequence reductions that such a control measure may have. The assumed percentages to adopt were confirmed with the PLA (Appendix B and subsequent email dated 28 August) as being in the order of 30-40% for engineering controls such as use of navigation aids and less than 10% for administrative controls such as imposing speed limits etc.

6.1.6 Furthermore, it was assumed that if a risk control measure was identified twice i.e. to deal with both the risk of a vessel being unable to abort passage or mechanical failure (such as within the Passage Plan risk control measure) than the effect of applying a particular risk control measure consequence and likelihood percentage reduction would only be considered once for that particular risk. Full details are shown in Appendix F.

6.2 Mitigation of Issues – Design

6.2.1 The current proposed outline design for the temporary structures is the result of an iterative design process. A number of measures to eliminate or reduce navigational hazards have been taken into consideration at the reference design stage. For example, the design and in river footprint of the temporary jetty was minimised so that intrusion into the river is minimal and set back from the authorised channel by a minimum of 15m.

6.2.2 Some “design” mitigation measures have already been identified as part of the risk assessment carried out. However, as the design progresses, the following items will need to be considered:

- Provision of suitable fendering and mooring arrangements that take into consideration potential impact requirements for the jetty and NABSA berth.

- Allowance for appropriate, safe and suitable manoeuvring areas, installation of adequate signal lighting, anchor zones and exclusion zones included in the temporary works design.
- Requirement to carry out detailed bathymetric surveys.
- Identification of lay by moorings to assist with traffic congestions during high traffic flows or Thames Barrier closures.
- Adoption of safe berthing and approach as discussed in Section 2.19.
- Identification of emergency anchorage zones/restrictions
- Preparation of a passage plan to suit local traffic requirements and conditions. The passage plan to include elements defined in **Error! Reference source not found.**.

6.3 Mitigation of Issues - Physical and during construction

6.3.1 The risk assessment has already identified the need to implement some mitigation during the construction phase of the temporary works. In addition to these measures the following would need to be considered:

- Regular checks carried out on the structural integrity of the structures.
- Issue notice to mariners informing operators and river users of planned operations in area and highlighting times when project barges and HAV ships are likely to be servicing the site.
- Ongoing liaison with the PLA.
- Liaison with the Harbour Master to assess manoeuvrability of vessels.
- Implementation of a river response team to warn stray vessels and check the site to ensure river signalling systems, lighting etc. is working
- Implementation of local traffic control measures to mariners.
- Ensuring vessels follow the International Ship and Port Facility Security (ISPS) code
- Ensuring security awareness around temporary work sites including regular checks of work site for suspect packages

6.4 Mitigation of Issues - Procedures and during operations.

6.4.1 During the operational phase of the works with an impact on the river operations, the following mitigation measures should be implemented:

- Appoint a berthing coordinator to liaise with other local operators and co-ordinate safe project and vessel operations in line with other local traffic control.
- Identify safe berthing approaches and ensure they are complied with in Passage Plans.
- Regularly communicate with identified stakeholders and recreational river users. Inform the community with appropriate information about project operations and planned work.
- Vessels to have an approved Safety Management System in place
- Emergency steering / power to be tested on a regular basis and crew to be familiar with its use.
- Vessel to have a Planned maintenance system (PMS) in place
- Ship patterns to be in line with international and inland waterway regulations. Working hours to be monitored by the captain of the vessel and on board personnel and berthing coordinator.
- User community to inform them of project operations and planned work.

6.4.2 The adoption of risk control measures would reduce the risks associated with the project to the residual levels shown in **Error! Reference source not found.**. The mitigation measures and likely impact would reduce the risks to As Low as Reasonably Practicable as required by the PLA.

6.4.3 Full details of the likelihood reduction and consequence reduction percentages applied to each risk control measure are included in Appendix F. These are as per the risk reduction percentage weightings recommended by the PLA (Meeting minutes Appendix B).

6.4.4 It should be noted that even if a hazard is assessed to be low risk, there remains a possibility, no matter how small, that it could be realised. The full details risk assessment is included in Appendix F.

Table 18: Residual Risk Level

Hazard ID	Hazard Title	Baseline Risk	Residual Risk	Residual Level	Risk Reduction
1	Contact of vessel/ plant with existing structures (during construction).	**9.0**	**6.5**	**Moderate**	**2.5**
2	Contact of commercial/freight with temporary works	**6.0**	**4.9**	**Minor**	**1.1**
3	Contact of recreational and service vessels with temporary works.	**9.0**	**6.8**	**Moderate**	**2.2**
4	Contact of Class V passenger vessels with temporary works.	**6.0**	**4.1**	**Minor**	**1.9**
5	Collision of construction plant with Class V passenger vessel	**8.0**	**5.1**	**Moderate**	**2.9**
6	Collision of construction vessels/plant with recreational and service vessel.	**12.0**	**9.0**	**Moderate**	**3.0**
7	Collision of construction vessels/plant with commercial and freight	**6.0**	**4.1**	**Minor**	**1.9**
8	Collision of construction vessels plant with construction vessels plant	**9.0**	**6.7**	**Moderate**	**2.3**
9	Grounding- Construction vessels generally within project vicinity	**6.0**	**4.2**	**Minor**	**1.8**
10	Grounding- Construction barges on Nabsa berth	**6.0**	**3.5**	**Minor**	**2.5**
11	Blackout Loss of propulsion	**8.0**	**7.0**	**Moderate**	**1.0**
12	Vessel swinging during construction, operation, dismantlement	**6.0**	**4.1**	**Minor**	**1.9**
13	Personal injury, dropped objects on freight and commercial	**6.0**	**3.4**	**Minor**	**2.6**
14	Personal injury, dropped objects Class V Passenger vessels	**8.0**	**4.6**	**Minor**	**3.4**
15	Personal injury, dropped objects, recreation/ service vessels.	**9.0**	**6.7**	**Moderate**	**2.3**

Hazard ID	Hazard Title	Baseline Risk	Residual Risk	Residual Level	Risk Reduction
16	Breakout of mooring during construction, operation (usage of jetty/NABSA) and/or Dismantlement	**6.0**	**4.4**	**Minor**	**1.6**
17	Construction plant HAV/Barges congestion during Thames barrier closure	**6.0**	**4.6**	**Minor**	**1.4**
18	Failure of marine construction equipment	**4.0**	**3.9**	**Minor**	**0.1**
19	Terrorist Threat	**2.0**	**1.9**	**Slight**	**0.1**
20	Damage to river wall following dredging/berth levelling activities	**8.0**	**6.0**	**Moderate**	**2.0**
21	Failure of Thames Wharf wall	**8.0**	**5.2**	**Moderate**	**2.8**

6.5 Impact of mitigation measures on river users

6.5.1 The temporary works and associated mitigation measures to reduce navigation construction risks to an acceptable level will have an impact on river users including freight, commercial operators and recreational river users. Some of these impacts will include:

- Impact to Thames Wharf occupants and current business operations
- Planned increase in river traffic based on Thames 2020 Strategy and other large construction projects.
- Exclusion zone in operation during the establishment of jetty pilling activities.
- Issue notice to mariners during operation phase when barges are loaded.

6.5.2 As identified in the stakeholder consultation section of this report, it will be essential to ensure continued and ongoing liaison and consultation with stakeholders and other project partners and parties. The mitigation measures identified above will need to ensure that they are tailored to suit the range of river users and parties with an interest in this section of the river. For example, dissemination of information about river exclusion zones will be more readily

communicated to Class V operators via “notice to mariners” type of communication than to recreational users. Therefore, the presence and implementation of a construction river response team will ensure that any recreational users do not stray unknowingly into any unsafe areas or exclusion zones.

7. CONCLUSIONS

TO BE UPDATED FOLLOWING CONSULTATION PHASE.

7.1 Conclusions

7.1.1 The main risks associated with the Scheme would be generated during the construction and operation phase of the project with no anticipated long term residual risks.

7.1.2 Through careful design of the structures including location of the jetty and consideration of mooring, berthing and manoeuvring arrangements and through the implementation of a series of measures (berthing coordinator and River Response team), the NIPRA demonstrates that these risks can be reduced to As Low As Reasonable Practicable and it is therefore recommended that the additional risk control measures identified are implemented.

7.1.3 The operation phase of the Scheme will generate additional traffic. It should be carefully considered, in particular when set against the projected additional passenger and freight traffic created by:

- London Mayor's policy on passenger numbers
- Major construction projects including the Thames Tideway Tunnel and the Northern Line extension.
- Thames Clipper plans to increase vessel fleet.
- Need to have suitably qualified pilots.

7.1.4 In order not to jeopardise safe navigation in the vicinity of the Silvertown Tunnel project area during the construction, operation and dismantlement phase a construction methodology and programme should be developed. This should include vessel movement rules within the project boundaries and consider increases in river traffic resulting in policies and other construction projects.

8. RECOMMENDATIONS

TO BE UPDATED FOLLOWING CONSULTATION PHASE.

8.1 General

8.1.1 Following the preliminary activities and assessments undertaken to date the initial recommendations reached by the project are set out below for further consideration through ongoing stakeholder consultation.

8.2 Recommendation 1 – Berthing-Co-ordinator

8.2.1 The project recommends appointing a berthing co-ordinator to communicate with all commercial operators in order to facilitate the safe berthing and departures from berths in close proximity to the project operations.

8.2.2 The berthing co-ordinator's duties would need to be defined as the project progresses, but should include as a minimum:

- Liaison with the PLA
- Liaison with local stakeholders
- Liaison with Main Contractor

8.3 Recommendation 2 – Construction river response team

8.3.1 The project recommends the establishment of a permanent construction river response team for the duration of the works. Their role would principally be to manage the construction interface and recreational users that may not be aware of the risks.

8.3.2 The river response team's duties would need to be defined as the project progresses, but should include as a minimum:

- Patrol of the construction area 24/7
- Checking of condition of traffic exclusion zones and marking in line with project requirements
- Enforcing river exclusion zones during significant project phases (lifts) or during inclement weather or river conditions (e.g. High winds, Thames Barrier closures, high flow conditions).

8.4 Recommendation 3 – Continued Communication with project parties and stakeholders and navigation rules.

8.4.1 The project recommends that appropriate channels of communication, roles and responsibilities are defined (including the above berthing co-ordinator or river response team) to liaise throughout the construction period with project parties and stakeholders. For example, it will be necessary to manage the increased construction traffic generated by the Silvertown project with other large construction projects making use of the River Thames.

8.4.2 The project recommends that temporary Navigational Rules are developed and temporary works exclusion zones are set up and defined during high risk project activities.

8.4.3 Although outside the scope of the NIPRA, once the Silvertown Tunnel project is complete, there will be a need to implement Navigation Rules, such as anchoring restrictions within the proximity of the tunnel. The PLA confirmed that they operate a blanket anchoring exclusion zone of 60m either side of a tunnel with the exception of the Jubilee Line extension tunnels which cross the river adjacent to the Cable Car. Although the PLA would prefer that no restrictions are placed on the Silvertown tunnel there may be a need to do so. Any requirements for anchoring restrictions both temporary (during periods of construction where the tunnel may be more vulnerable) or permanent will need to be discussed with the PLA and communicated to any other relevant authorities.

8.5 Recommendation 4 – Early identification of suitably trained marine staff and pilots

8.5.1 Due to the forecast increase in construction related traffic on the Thames for the reasons identified in this report, there is likely to be a shortage of suitably trained pilots and marine staff.

8.5.2 Early contractor involvement would enable any skills gaps to be identified and suitable measures developed to address any potential issues. Such measures could include development of recruitment and training plans by the contractor, and the development of a suitable training programme to address any skills shortage to meet the project construction timeframe.

Appendix A LOCATION PLAN

NOTE:
INFORMATION SHOWN ON THIS DRAWING IS SUBJECT TO NAVIGATIONAL ISSUES PRELIMINARY RISK ASSESSMENT

10m RIVER FRONT EXCLUSION AREA

PROPOSED BERTH LEVELING FOR BARGES 96m LONG x 24m WIDE, SEE TABLE 1

JETTY STRUCTURE TO SPAN AND IMPOSE NO LOAD ON THE RIVER WALL

SEE NOTE 9

THAMES WATER OUTFALL SUPERSTRUCTURE

SEE NOTE 8

PROPOSED BERTH LEVELING FOR HAV SHIPS 120m LONG x 20m WIDE, SEE TABLE 1

SEE NOTE 10

OIL PIPELINE LOCATED UNDER RIVER BED. EXACT LOCATION AND DEPTHS TO BE DETERMINED PRIOR TO ANY RIVER WORKS TAKING PLACE.

EXTENDED DCO BOUNDARY TO ALLOW THE RIVER BED DREDGING OPERATION

PECKED LINE INDICATE AUTHORISED (NAVIGABLE) CHANNEL

Victoria Dock

Barge 32Roads 2

2 (Upper) PLA

Barge 32Roads 3PLA 44 (Lower)

Steps

Dn's

Scale 1:10000
100m 0m 200m 400m 600m

Millimetres 100 0 10 DO NOT SCALE

PLAN
SCALE 1:1000

TABLE 1 - HAV SHIP (vesselfinder.com), RIVER BARGE (aggregate.com) AND ASSOCIATED DREDGING DATA

VESSEL	GROSS TONNAGE	LENGTH	BREADTH	LOADED DRAFT	APPROXIMATE DREDGING VOLUME
DOLPHIN HAV	2075t	88.30m	12.50m	4.642m	55,800m³
IBERICA HAV	1599t	85.0m	11.0m	3.7m	31,900m³
GERMANICA HAV	1557t	77.0m	11.0m	3.7m	31,900m³
DANICA HAV	1536t	77.0m	11.0m	4.184m	43,200m³
NABSA BERTH ALONG PROPOSED JETTY	N/A	100.0m	15.0m	N/A	1600m³
NABSA BERTH ALONG THAMES WHARF	1740t	66.0m	9.0m	N/A	1200m³

NAVIGABLE CHANNEL BOUNDARY

THE HULL SECTION BASED ON DATA PROVIDED IN TABLE 1

PROPOSED JETTY STRUCTURE

PROFILE OF THE RIVER BED BASED ON THE PLA CHART 322

NORTH RIVER WALL

FOR THE HAV VESSELS DATA PLEASE REFFER TO TABLE 1 IN THE NOTES SECTION.

DOLPHIN HAV

IBERICA HAV

NABSA BERTH FOR HAV SHIP

DEPTH OF DREDGING REQUIRED FOR IBERICA HAV

DEPTH OF DREDGING REQUIRED FOR DOLPHIN HAV

1.00 2.30 3.30 10.60 (IBERICA) 1.00 9.60 (DOLPHIN) 12.90 4.85

900mm Ø PILES DEPTHS SHOWN INDICATIVELY

JUBILEE LINE (NORTHBOUND TUNNEL)

ELEVATION (m) O.D

5.000 0.000 -5.000 -10.000 -15.000 -20.000 -25.000

LEVEL DATUM = -25.000

CHAINAGE	150.00	140.00	130.00	120.00	110.00	100.00	90.00	80.00	70.00	60.00	50.00	40.00	30.00	20.00	10.00	0.00
EXISTING LEVELS (PLA CHART 322)	-8.65	-7.35	-6.90	-6.45	-5.65	-5.55	-5.45	-5.25	-5.15	-4.25	-3.05	-2.45	-2.35	-2.25	-1.85	5.00

LONGITUDINAL SECTION AT THE JETTY LOCATION
SCALE 1:200

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

In addition to the hazards/risks normally associated with the types of work detailed on this drawing, note the following significant residual risks (Reference shall also be made to the design hazard log).

Construction
GEN-HAZ 001 Driven piles installation for the jetty structure in close proximity of the Jubilee Line Tunnel and other structures.
GEN-HAZ 002 Jetty construction in close proximity to the River Thames Navigable Channel.
GEN-HAZ 003 Thames River Berth Levelling in close proximity to the existing Silvertown river wall.
TUN-HAZ 001 High risk of encountering the unexploded ordnance (UXO) during the civil works

Maintenance / Cleaning
Not Applicable

Use
Not Applicable

Decommissioning / Demolition
GEN-HAZ 004 Cutting off the jetty steel piles at the river bed level during the decommissioning process.

NOTES
1. ALL DIMENSIONS AND LEVELS ARE IN METERS
2. THE PROPOSED JETTY ARRANGEMENT IN ACCORDANCE WITH ATKINS REPORT No. STWTN-ATK-GEN-XXXX-RP-W-0004 "SILVERTOWN TUNNEL REFERENCE DESIGN, CONSTRUCTION STATEMENT".
3. JUBILEE LINE TUNNELS ALIGNMENT BASED ON THE 2014 CORRELATION SURVEY DATA.
4. RIVER BED AS SHOWN BASED ON THE PLA 322 CHART DATA AND THE BATHYMETRIC SURVEY DATA PROVIDED BY PLA.
5. AT PLA CHART 322 DEPTHS ARE IN METERS AND ARE REDUCED TO CHART DATUM BEING 3.35m BELOW ORDNANCE DATUM (NEWLYN), WHICH IS APPROXIMATELY THE LEVEL OF THE LOWEST ASTRONOMICAL TIDE.
6. UNDERLINED FIGURES ARE DRYING HEIGHTS ABOVE CHART DATUM.
7. THE PECKED LINES INDICATE THE LIMITS OF THE AUTHORISED CHANNEL.
8. THE EXISTING MARINE CIVIL CONTRACTOR OPERATIONS AT THIS SITE TO BE COORDINATED WITH THE PROPOSED JETTY CONSTRUCTION AND OPERATION.
9. JETTY ORIENTATION TO BE AGREED WITH THE EXISTING MARINE CIVIL CONTRACTOR, IF OPERATIONS RETAINED.
10. EXISTING MOORINGS LOCATED WITHIN PROXIMITY OF THE PLANNED JETTY MAY NEED TO BE RELOCATED.
11. JETTY DRIVEN PILES NOT TO BE POSITIONED CLOSER THAN 15m FROM THE JUBILEE LINE TUNNEL LINING.
12. FOR THE JETTY PILES AND THE DREDGING AREAS CO-ORDINATES PLEASE REFER TO DOCUMENT NUMBER STWTN-ATK-GEN-XXXX-DO-Z-0008.
13. CLEAR DISTANCE BETWEEN THE NAVIGABLE CHANNEL BOUNDARY AND THE MOORED HAV SHIP SHOULD NEVER BE LESS THAN 15.0m, AS PER PLA REQUIREMENTS.
14. A DETAILED ASSESSMENT OF THE JETTY DESIGN WILL BE REQUIRED TO DETERMINE THE OPTIMAL PILE ARRANGEMENTS TO ACCOMMODATE BERTHING LOADS AND FORCES AND TO DETERMINE APPROPRIATE FENDERING REQUIREMENTS.
15. FULL SURVEY OF ANY SERVICES BELOW RIVER BED (INCLUDING JUBILEE LINE TUNNELS) TO BE CARRIED OUT PRIOR TO ANY RIVER WORKS TO ASSESS CONSTRUCTION AND OPERATIONAL RISKS.

KEY:
- DRYING HEIGHTS ABOVE CHART DATUM
- SUBMERGED HEIGHTS BELOW CHART DATUM
- LIMITS OF DEVIATION FOR THE JETTY CONSTRUCTION
- DEVELOPMENT CONSENT ORDER (DCO) BOUNDARY
- EXTENDED DEVELOPMENT CONSENT ORDER (DCO) BOUNDARY
- SAFEGUARDED CORRIDOR (HISTORIC)
- IBERICA HAV DREDGING LINES
- DOLPHIN HAV DREDGING LINES
- AUTHORISED (NAVIGABLE) CHANNEL

Rev	Drawn / Des	Checked	Approved	Date
P01	SB	MRM	MRM	22/05/15
First Issue				
P02	TW	MK	MK	12/06/15
For TfL Review				
P03	MP	MK	MK	21/09/15
For TfL Review				
P04.1	---	---	---	---
For TfL Review				

Description

Drawing Status: WORK IN PROGRESS
Suitability: S0

ATKINS
Woodcote Grove
Ashley Road
Epsom
Surrey
KT18 5BW
Tel: +44 (0)1372 726140
Fax: +44 (0)1372 740055
www.atkinsglobal.com

Client: Transport for London

Project Title: SILVERTOWN TUNNEL REFERENCE DESIGN

Drawing Title: RIVER THAMES TRANSPORTATION PROPOSED INFRASTRUCTURE

Scale	Designed / Drawn	Checked	Approved	Authorised
AS SHOWN	---	---	---	---
Original Size	Date	Date	Date	Date
A1	---	---	---	---

Drawing Number: STWTN-ATK-SGN-XXXX-DR-W-0002
Revision: P04.1

Plotted: Sep 21, 2015 - 2:41pm by: BROW3184

Appendix B PLA MEETING MINUTES

B.1.1 Minutes from PLA meeting 28 May 2015

B.1.2 Minutes from PLA meeting 26th August 2015

Appendix C TEMPORARY WORKS PLAN

Appendix D INCIDENT DATA

D.1 PLA Rating data

D.1.1 The severity rating is based on the PLA's rating system rating between 1-4. Non reportable incidents are all incidents falling below the scope of the requirements reporting to NMT and are dealt with solely at District Harbour Master Level, these would normally have a severity rating of 0. This is aligned the MCA rating of "Minor Incident".

D.1.2 NMT reportable incidents are those incidents with a severity rating of between 1 and 4 for Navigational Incidents. Where an incident has occurred and there is an impact or potential for a more serious outcome, then these incidents should be classified with a minimum severity of 1. EXCO reportable incidents are navigational incidents with a Severity Rating between 2 and 4, which are normally reported to MAIB. This is also aligned to the MCA rating of "serious incident". Board reportable incidents are navigational incidents with a severity rating between 3 and 4. This is aligned to the MCA rating of a "Very Serious Incident.

Appendix E RIVER WALL SURVEY REPORT

Appendix F RISK ASSESSMENT

CURRENTLY WITH THE PLA FOR REVIEW AND COMMENT

Appendix G ASD STAKEHOLDER CONSULTATION

TO BE COMPLETED WITH STAKEHOLDER CONSULTATION MINUTES AND COMMENTS GATHERED OVER THE CONSULTATION

Appendix H STAKEHOLDER CONSULTATION

TO BE COMPLETED WITH STAKEHOLDER CONSULTATION MINUTES AND COMMENTS