The London Resort Development Consent Order

BC080001

Environmental Statement
Volume 2: Appendices

Appendix 10.1 – Preliminary Navigational Risk Assessment

Document reference: 6.2.10.1
Revision: 00

December 2020

Planning Act 2008
The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009
Regulation 5(2)(a)
The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017
Regulation 12(1)

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Revisions

Revision	Description	Issued by	Date	Approved by
00	Issue for DCO Submission	JO/CC	24/12/20	BUR/LRCH

Buro Happold Ltd
230 Lower Bristol Rd
Bath
BA2 3DQ

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Executive Summary

The objective of this Navigation Risk Assessment (NRA) is to assess the impact and mitigate the risks associated with the Proposed Development on navigation in the River Thames. The NRA seeks to establish whether the proposed operations on the River Thames can be undertaken safely alongside other known or committed river traffic, and to assess the potential impact of the project on river navigation as whole, such as impacts on sightlines and navigational aids. The assessment takes account of existing navigation control measures and identifies any additional measures that are considered necessary for safe navigation.

This document is a Preliminary NRA to support the DCO Application. Assumptions are stated regarding the future construction and operations. The NRA will be reviewed in order to capture relevant updates and refinement to the design, and finalised post DCO application. Finalisation of the NRA will be undertaken in consultation with the Port of London Authority (PLA), stakeholders and future contractors/operators. The PLA Protective Provisions may also require submission of a further NRA for relevant aspects of work when the appropriate level of detail is available.

This Preliminary NRA has been undertaken with input from the PLA, Port of Tilbury (PoT), and Thames Clippers. Several options for the marine infrastructure for the London Resort have been considered within this Preliminary NRA; this options-based approach has been discussed and agreed with the PLA.

The anticipated vessel movements associated with the Proposed Development are likely to cause a low-level increase to the overall number of vessel movements that occur within the vicinity of the Kent and Essex Project Sites, with the majority of the service operations (waste and material supply) occurring more frequently during the construction stage between 2022 and 2029.

Based on the preliminary routes and vessel operations identified within this document, specific hazards have been identified. These are derived from the generic hazards relating to break-out, collision and grounding. The remaining generic hazards, although serious, are not considered to be specifically elevated by the local conditions or proposed operations.

A collaborative Hazard Workshop was conducted on 6th October 2020 with representatives from the PLA, PoT and Thames Clippers attending. The agreed outcome of the Hazard Workshop was that the highest risk scored only 9 (out of 25), based on the PLA risk matrix and although this is considered to be a serious risk, further mitigation is not required for scores below 10. The worst scoring specific hazard related to collisions with recreational vessels while crossing the authorised navigation channel as there was considered to be a serious risk to personnel, property and port users with the likelihood determined to be possible.

The primary conclusion of this Preliminary NRA is that the identified specific hazards are considered to be manageable using the existing control measures with the majority of the risks scoring either as minor or moderate. Additional potential control measures have been presented that could be implemented to further reduce any potential risks. The Proposed Development is not anticipating any unusual marine operations, based on the outcome of the Hazard Workshop, the operations are relatively typical and can be safely managed using the existing suite of control measures set out by the PLA.

It is noted that there are further specific hazards that will need to be considered as the detailed designs for the Proposed Development are progressed. These include further work relating to the impact of landside operations on sightlines, lighting, and vessel contact with proposed marine infrastructure. Operational considerations, such as transporting construction personnel to/from the site via a designated ferry service, should also be considered. These will be captured in the Final NRA.

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Glossary

Term	Definition
AIS	Automatic Identification System
BH	Buro Happold
CCTV	Closed-circuit television
CD	Chart Datum
DCO	Development Consent Order
DfT	Department for Transport
EA	Environment Agency
GIS	Geographic information system
GT	Gross Tonnage
ha	Hectare
HAT	Highest astronomical tide
ISPS	International Ship and Port Facility Security
KCC	Kent County Council
km	Kilometre
LOA	Length overall
LPA	Local Planning Authority
LR	London Resort Passenger
LRCH	London Resort Company Holdings Ltd
LRD	London Resort dredged material via barges
LRR	London Resort Ro-Ro
LRS	London Resort Supply via barges
LRW	London Resort Waste via barges
m	Meters
MHW	Mean high water
MHWN	Mean high water neap
MHWS	Mean high water spring
MLWN	Mean low water neap
MLWS	Mean low water spring
MMO	Marine Management Organisation
NAABSA	Not always afloat but safely aground
NRA	Navigation Risk Assessment
OD	Ordnance Datum
PLA	Port of London Authority
PoT	Port of Tilbury
Ro-Ro	Roll on-Roll off
SMS	Safety Management System (PLA)
SOLAS	International Convention for the Safety of Life at Sea
VHF	Very high frequency
VTS	Vessel Traffic System

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Chapter One ◆ Introduction

Site description

1.1 The Project Site lies approximately 30 km east-south-east of central London on the south and north banks of the River Thames, in the ceremonial counties of Kent and Essex. For clarity, the section of the Project Site to the south of the River Thames is referred to as the 'Kent Project Site' and that to the north of the river is identified as the 'Essex Project Site'. The term 'Project Site' refers to both the Kent and Essex Project Sites collectively. The 'Order Limits' within which the proposed DCO would apply are shown on the Location Plan (document reference 2.1).

1.2 The Kent Project Site occupies much of the Swanscombe Peninsula, formed by a meander in the River Thames, and includes a corridor for transport connections extending generally southwards to the A2(T). It also includes a section of the A2(T) corridor approximately 3.5 km in length between the existing Bean junction to the west (A2(T) / B255) and Pepper Hill (A2(T) / B262) to the east. The Kent Project Site occupies 387.53ha of land in a complex shape.

1.3 The Kent Project Site includes land falling within the jurisdiction of Dartford Borough Council (DBC) to the west and Gravesham Borough Council (GBC) to the east. The majority of the Kent Project Site also falls within the Ebbsfleet Garden City, established in April 2015, for which Ebbsfleet Development Corporation (EDC) is the Local Planning Authority.

1.4 The High Speed 1 (HS1) line crosses the Kent Project Site along an approximate north-west to south-east axis. The urban areas of Stone, Greenhithe, Ingress Park and Swanscombe lie to the west and south. These are largely residential in character, with commercial uses concentrated on Stone's river frontage. Beyond Greenhithe to the south-west of the Kent Project Site lies Bluewater shopping centre, a significant regional retail destination. To the east of the Kent Project Site lies Northfleet, a neighbourhood of mixed residential and commercial uses.

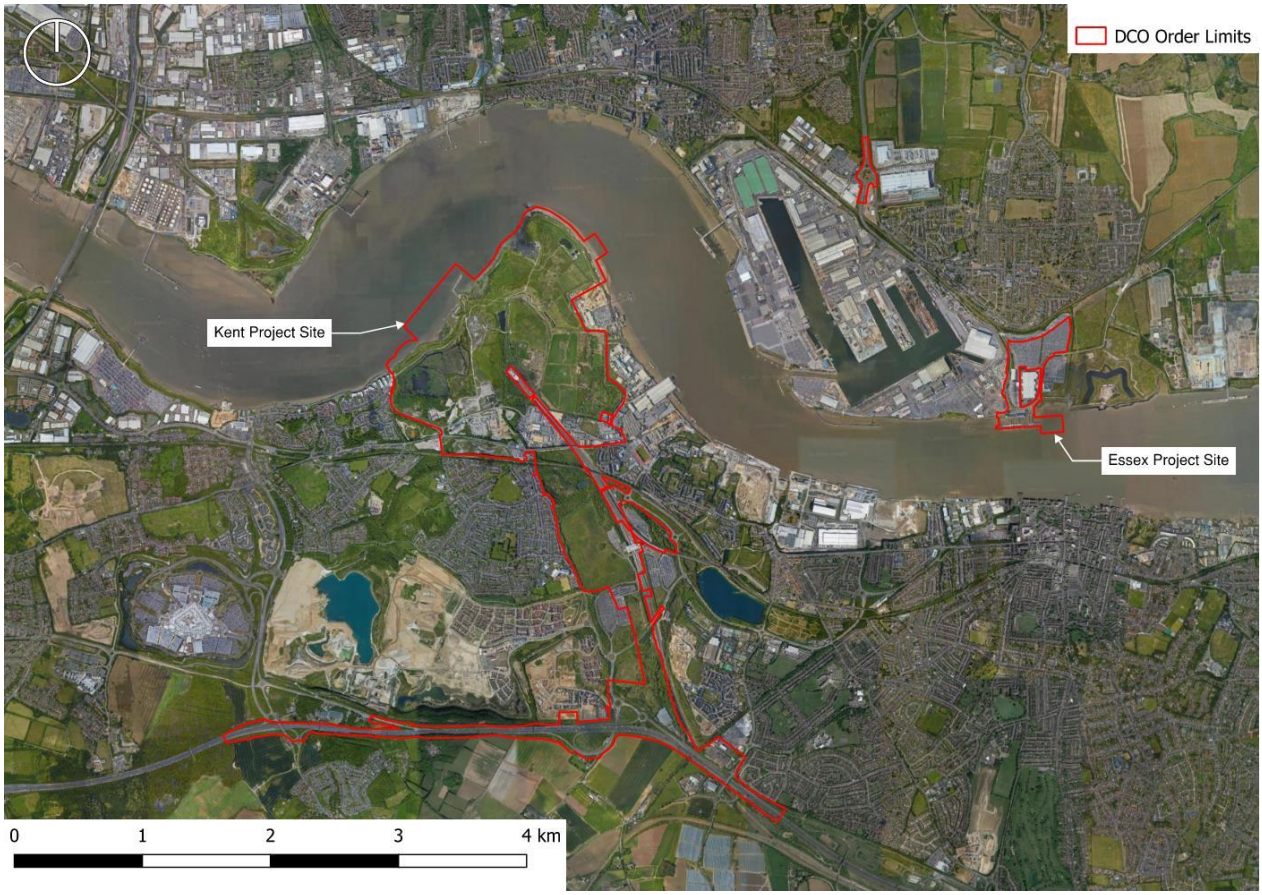
1.5 Across the southern and south-eastern parts of the Swanscombe Peninsula is an extensive industrial area concentrated around Manor Way, Galley Hill and London Road. To the south of the A2(T) the land is more open and rural in character, with small settlements amid farmland and woodland blocks. Most of this area lies in the Metropolitan Green Belt.

1.6 The Essex Project Site includes areas of land east of the A1089 Ferry Road and the Tilbury Ferry Terminal, incorporating the London International Cruise Terminal and non-contiguous the Asda roundabout at the junction of the A1089 St Andrews Road / Dock Road, Windrush Road and Thurrock Park Way. The Essex Project Site is 25.54 hectares in area.

1.7 The Essex Project Site falls within the jurisdiction of Thurrock Council, a unitary authority. The Essex Project Site lies immediately to the east of the existing port of Tilbury and to the west of Tilbury2, a new port currently under construction. At the south-east corner of the Port lies the Tilbury Ferry Terminal incorporating the London International Cruise Terminal (a grade II* listed building featuring a floating landing stage and series of bridge structures). The Asda roundabout is located to the north of the port of Tilbury and incorporates highway land.

1.8 Figure 1—1 shows the location of the site and the DCO Order Limits.

Figure 1-1 DCO Order Limits outlining the Project Site



Project description

1.9 The Resort will be a nationally significant visitor attraction and leisure resort, built largely on brownfield land at Swanscombe Peninsula in Kent on the south bank of the River Thames and with supporting transport and visitor reception facilities on the northern side of the river in Essex.

1.10 A detailed description of the Proposed Development is provided in chapter three of the Project ES. The focus of the Resort will be a 'Leisure Core' containing a range of events spaces, themed rides and attractions, entertainment venues, theatres and cinemas, developed in landscaped settings in two phases known as Gate One and Gate Two ('the Gates'). Outside the Gates will be a range of ancillary retail, dining and entertainment facilities in an area known as the Market.

1.11 The Resort will also include hotels, a water park connected to one of the hotels, a conference and convention centre known as a 'conferention centre', a Coliseum (capable of hosting e-Sports events), creative spaces, a transport interchange including car parking, 'back of house' service buildings, an energy centre, a wastewater treatment works and utilities required to operate the Resort. Related housing is also proposed to accommodate some of the Resort's employees.

1.12 Substantial improvements are proposed to transport infrastructure. This will include a new direct road connection from the A2(T) and a dedicated transport link between Ebbsfleet International Station, the Resort and a passenger ferry terminal beyond. The ferry terminal would serve visitors arriving by ferry on the River Thames from central London and Tilbury. A coach station is also proposed. On the northern side of the Thames to the east of the Port of Tilbury, additional coach and car parking and a passenger ferry terminal are proposed to serve the Resort.

1.13 The Proposed Development would involve an extensive restoration of land used in the past for mineral extraction, waste disposal and industrial activities including cement and paper production, with a comprehensive landscape strategy proposed incorporating the retention and enhancement of wildlife habitats.

1.14 London Resort Company Holdings Ltd is to be referred to as the 'Applicant'.

Assessment objectives

1.15 The objective of this Navigation Risk Assessment (NRA) is to assess the impact and mitigate the risks associated with the Proposed Development on navigation in the River Thames. The NRA seeks to establish whether the proposed operations on the River Thames can be undertaken safely alongside other known or committed river traffic, and to assess the potential impact of the project on river navigation as whole, such as impacts on sightlines and navigational aids. The assessment takes account of existing navigation control measures and identifies any additional measures that are considered necessary for safe navigation.

Assessment stages

1.16 This assessment comprises four stages:

1. **Data gathering:** gathering of data relating to the existing site and proposed operations, including environmental conditions, vessel management and organisational procedures, and the relevant Port of London Authority (PLA) systems.
2. **Hazard identification:** based upon the findings of the data gathering, this stage comprises the identification of hazards relating to the proposed operations, both generic and specific. This stage also introduces the risk control measures that are already in place.
3. **Risk analysis and assessment:** this stage analyses the risk associated with each hazard as a combination of frequency (likelihood of occurrence) and consequence (severity of occurrence). The assessment of risk aims to identify gaps within existing control measures.
4. **Risk control:** in this final stage, the requirement for specific control measures is considered, with recommendations for adoption included.

Planning process and programme

1.17 This document is a Preliminary Navigational Risk Assessment (NRA) to support the DCO Application. Assumptions will be stated regarding the future construction and operations where they have yet to be finalised.

1.18 The NRA will be reviewed in order to capture relevant updates and refinement to the design and finalised post DCO application. This will be undertaken in accordance with the principles described in this document. Finalisation of the NRA will be undertaken in consultation with the PLA, stakeholders and future contractors/operators.

1.19 The PLA Protective Provisions may also require submission of a NRA for relevant aspects of work when the appropriate level of detail is available.

Chapter Two ◆ Construction and operational assumptions

Development options

2.1 At this stage some of the details of proposed operations and detailed design of infrastructure are yet to be finalised. The following general assumptions referred to in this section are defined as the basis for the NRA and will be finalised during future stages as described in the Planning Process and Programme section.

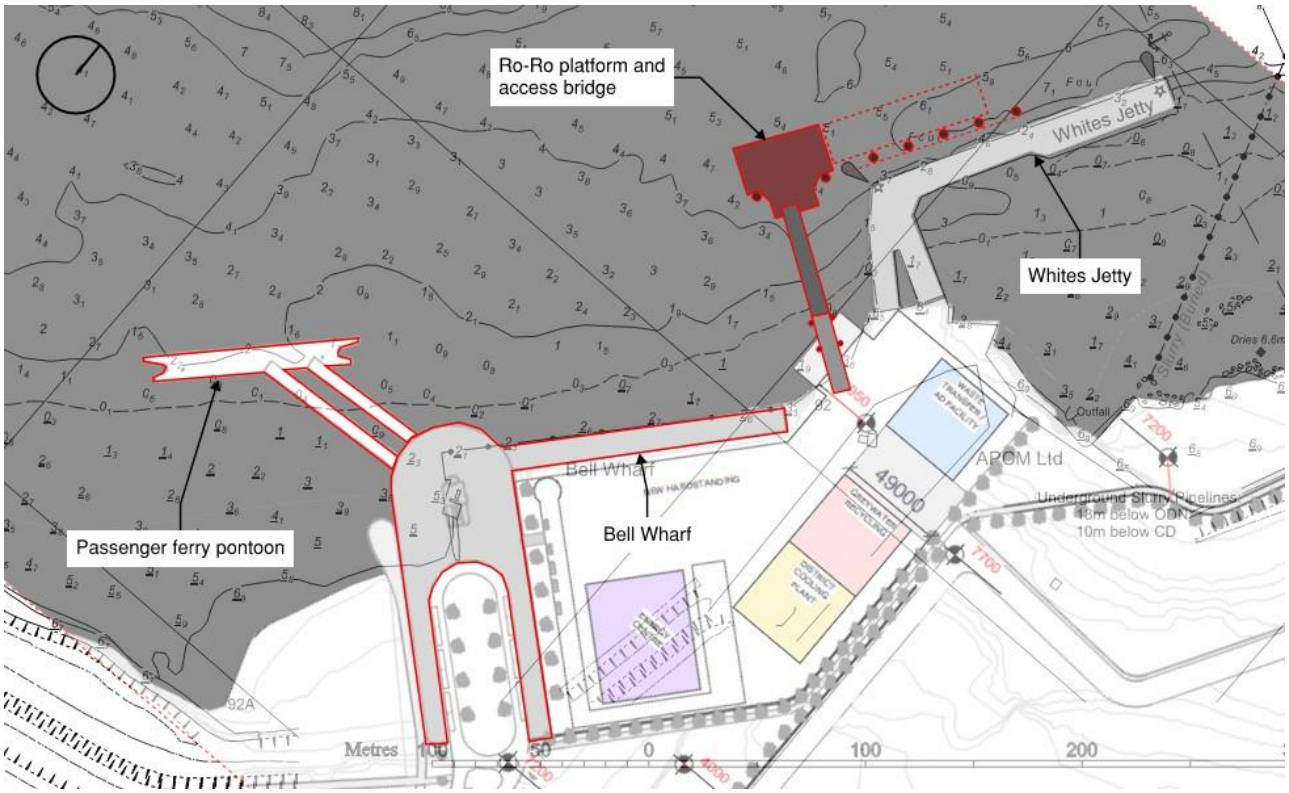
2.2 For developing the DCO, a parameters-led assessment under the "Rochdale Envelope" approach is being applied to provide a degree of flexibility to the development. Following consultation with the PLA it was deemed acceptable to present options for the marine infrastructure within the DCO. On this basis the following options have been considered as part of the NRA.

Kent Project Site

2.3 Option A – including the following marine infrastructure:

- New passenger ferry pontoon;
- Refurbishment of Bell Wharf; and
- Construction of a new floating Ro-Ro platform and access bridge.

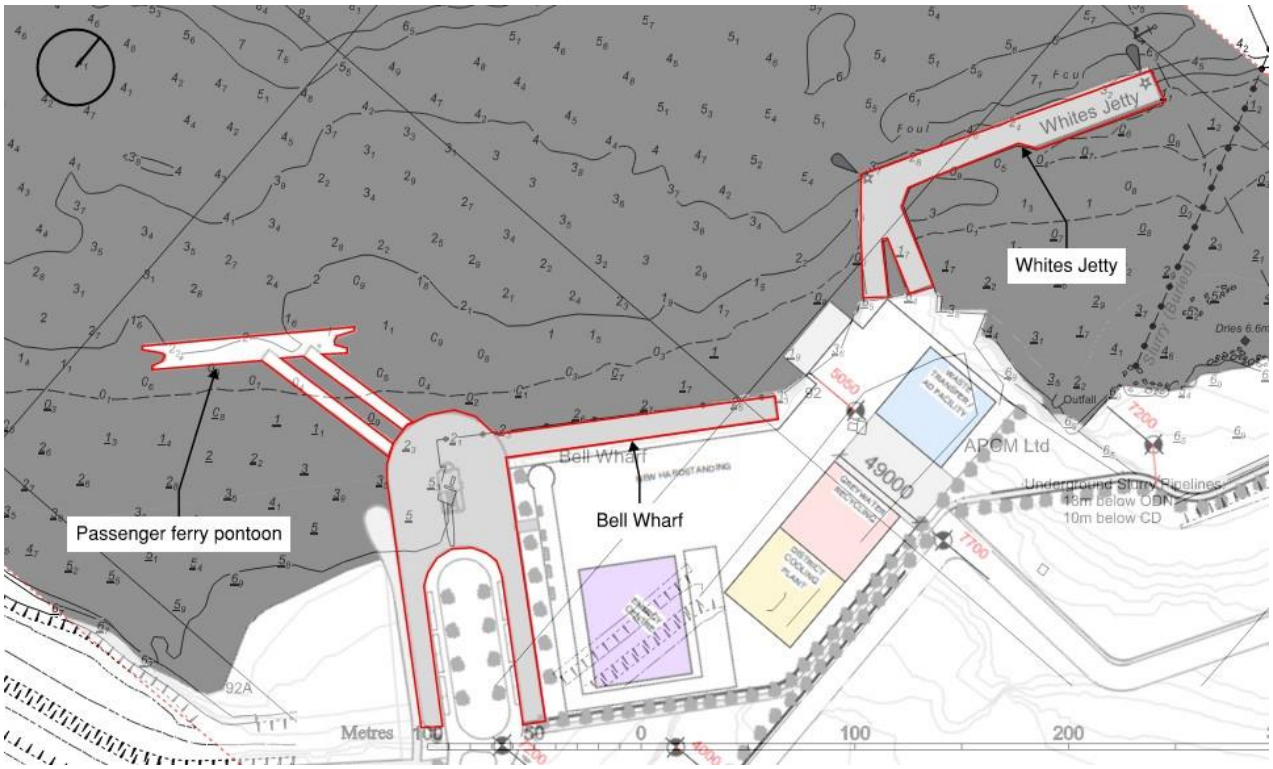
Figure 2-1 Schematic of Option A with the marine infrastructure highlighted in red outline (overlaid on the PLA Chart 333)



2.4 Option B – including the following marine infrastructure:

- New passenger ferry pontoon;
- Refurbishment of Bell Wharf; and
- Refurbishment/reinforcement of Whites Jetty.

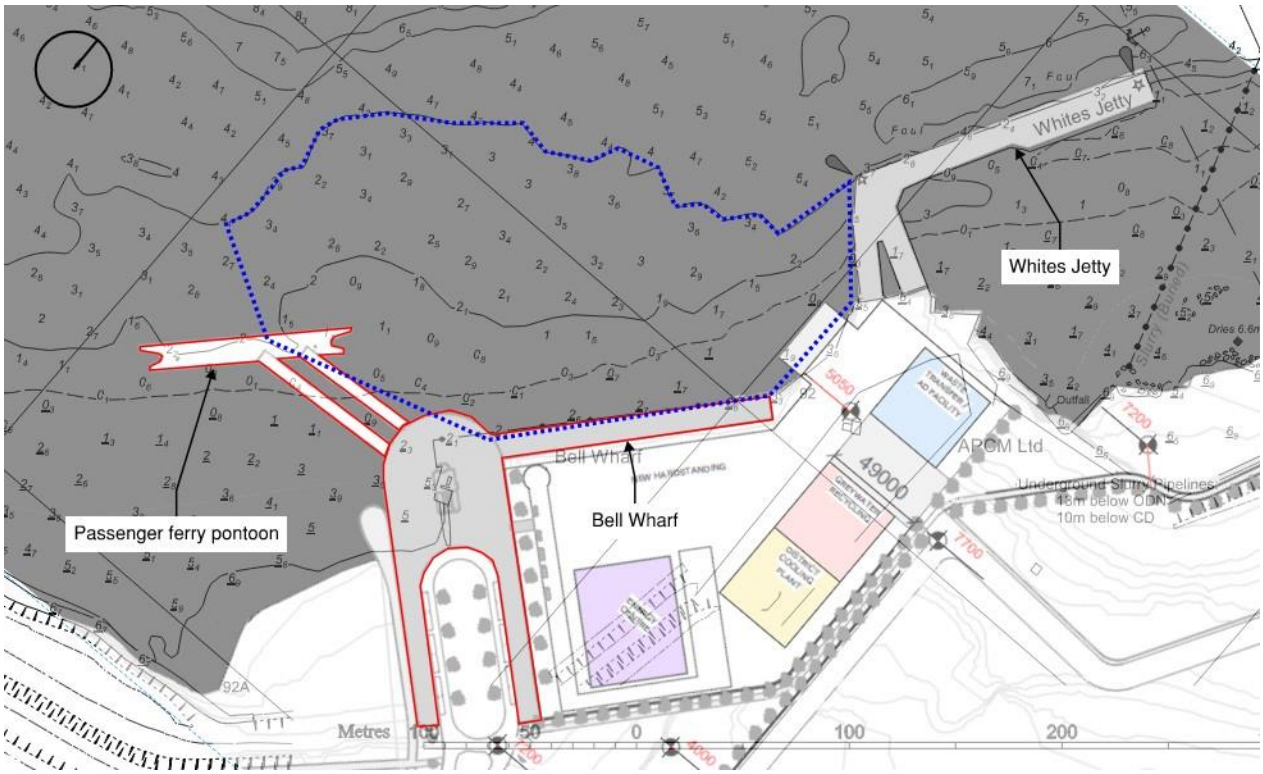
Figure 2-2 Schematic of Option B with the marine infrastructure highlighted in red outline (overlaid on the PLA Chart 333)



2.5 Option C – including the following marine infrastructure:

- New passenger ferry pontoon;
- Refurbishment of Bell Wharf; and
- Dredging to deepen access to Bell Wharf.

Figure 2-3 Schematic of Option C with the marine infrastructure highlighted in red outline and the footprint of dredge area indicated by the blue dotted line (overlaid on the PLA Chart 333)

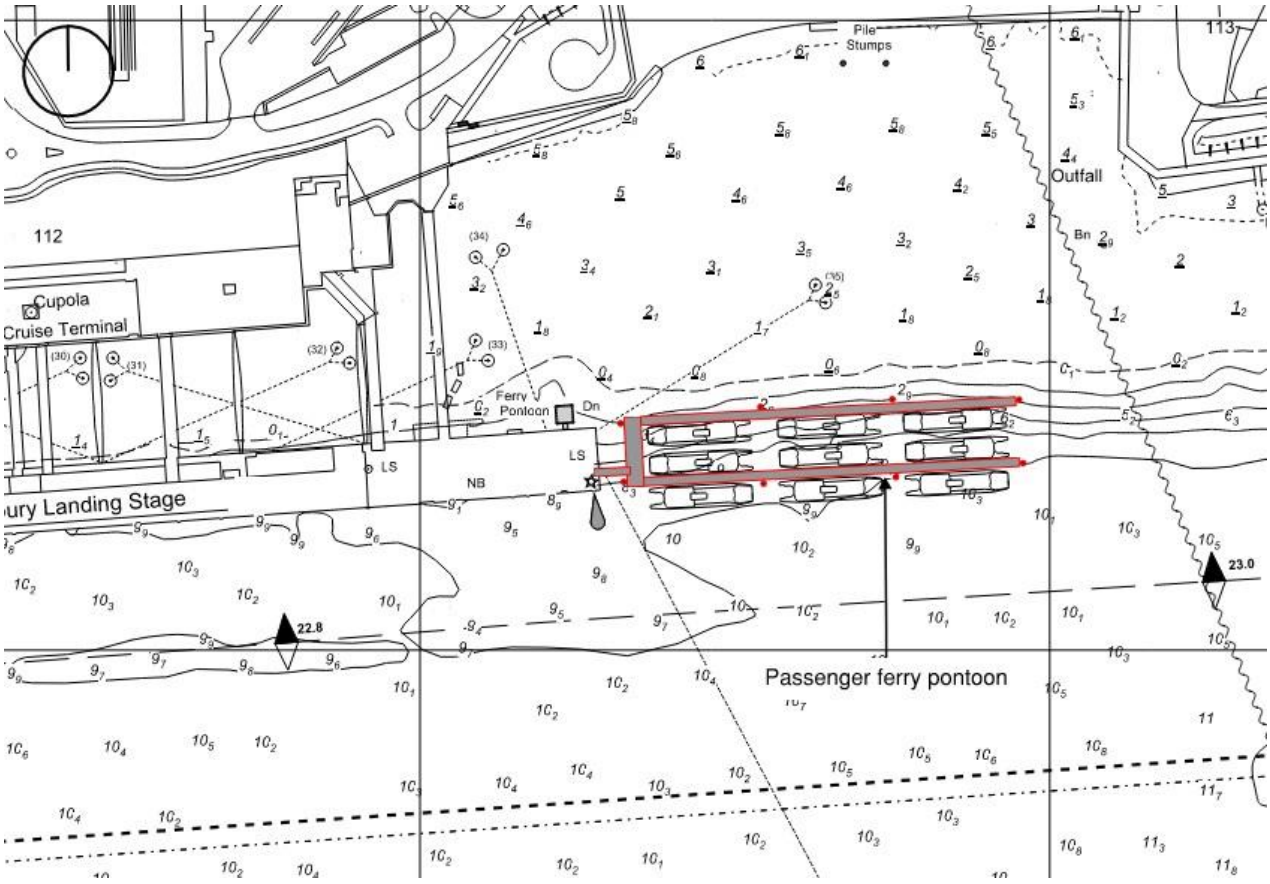


Essex Project Site

2.6 For the Essex Project Site a single option is proposed for a new floating pontoon to provide a new passenger ferry and to incorporate the existing ferry service from Tilbury to Gravesend whilst providing berthing for Thames Clippers vessels.

2.7 The layout presented in Figure 2-4 is subject to confirmation from the Port of Tilbury (PoT) and the PLA.

Figure 2-4 Schematic for the marine infrastructure connected to the end of the Landing Stage at the Essex Project Site with the marine infrastructure highlighted in red outline (overlaid on the PLA Chart 336)



Chapter Three ◆PLA Directions, Byelaws and Codes

3.1 The PLA publish a comprehensive set of regulations and codes to control and guide river operations. Reference is made to these documents within the following stages of this assessment in relation to the definition of current control measures and best practice operations.

- General Directions for Navigation in the Port of London, 2016 (PLA Directions)
- Pilotage Directions, 2017
- Port of London Thames Byelaws, 2012 (Thames Byelaws)
- Marine Safety Management Systems Manual, 2017 (PLA SMS)
- Code of Practice for the Management and Operation of Commercial Vessels on the Thames, 2013
- Code of Practice for Passenger Vessel Operations on the Thames, 2016
- Code of Practice for Craft Towage Operations on the Thames, 2017
- Code of Practice for the Safe Mooring of Vessels on the Thames, 2010

3.2 The definitions and interpretation used within this assessment are based upon the terms provided in Section 3 of the PLA Directions, as copied below:

3.3 *"AIS"* means Automatic Identification System.

3.4 *"Berthing Assistance"* means the provision of manoeuvring advice and local knowledge during berthing or unberthing operations involving any vessels not subject to compulsory pilotage, between the berth in question and a point in the Thames not more than one nautical mile from that berth.

3.5 *"Certificated Person"* means either a pilot authorised by the PLA or PEC holder for the vessel or any other person certificated by the PLA to conduct Local Navigation in accordance with regulations contained in the Schedule to these Directions.

3.6 *"Designated Anchorage"* means an area designated by a Harbourmaster as an anchorage area or berth and published on charts, in the PLA Handbook of Tide Tables and Port Information or in Notices to Mariners.

3.7 *"Harbourmaster"* means a person appointed by the PLA to be a Harbourmaster and includes the deputies and assistants of a person so appointed and Officers authorised to discharge the Harbourmaster's duties through one of the PLA VTS Centres.

3.8 *"Intra-port Vessel"* means a vessel that normally navigates wholly within the Thames, including to and from the Medway ports.

3.9 *"Master"* in relation to a vessel, means any person having or taking the command, charge or management of a vessel, for the time being.

3.10 *"Notices to Mariners"* means Notices to Mariners issued by the PLA.

3.11 *"Passenger Vessel"* means a vessel carrying more than 12 passengers.

3.12 *"Permission to Proceed"* means authorisation by a Harbourmaster to navigate as proposed by a vessel.

3.13 *"Port Passage Plan"* means a systematic and documented navigational plan for all stages of any voyage into, out of or within the Thames in accordance with the guidelines contained in the appropriate SOLAS regulations, High Speed Craft Code or any similar flag state administration notice issued pursuant to the associated IMO Conventions on Standards of Training, Certification and Watchkeeping for Seafarers (STCW).

3.14 *"Reporting Vessel"* means every vessel which is required by these Directions to report its position, intentions or movements, specifically: vessels of more than 40 metres in length overall, vessels of Gross Tonnage of more than 50 tons which ordinarily also navigate outside the Thames; and tugs engaged in towing, or about to tow one or more vessels.

3.15 *"Restricted Visibility"* means all circumstances when visibility is less than 0.5 nautical miles; Note: Within the Thames a Harbourmaster or his authorised representative may, using all available information, decide that Restricted Visibility prevails in a particular area or at a particular time or is likely to prevail and inform shipping as appropriate.

3.16 *"Thames Byelaws"* means the Port of London Thames Byelaws 2012.

3.17 *"Shifting Pilotage"* means the movement of a vessel no more than two nautical miles in the Thames in the area between London Bridge and the Gravesend Pilot Station for the purpose of changing any vessel from one berth, mooring or anchorage to another berth, mooring or anchorage, or of taking it into or out of any dock from or to another berth, mooring or anchorage. Shifting Pilotage does not apply to: Specified Vessels; Passenger Vessels more than 50 metres in length overall; vessels carrying marine pollutants in bulk; vessels more than 230 metres in length overall between the Gravesend Pilot Station and Queen Elizabeth II Bridge; vessels more than 140 metres in length overall between Queen Elizabeth II Bridge and Margaretness; and vessels more than 100 metres in length overall between Margaretness and London Bridge.

3.18 *"SOLAS"* means the International Convention for the Safety of Life at Sea.

3.19 *"Specified Vessel"* means any vessel having on board (including in its slop tanks), quantities of the following (IMO coding's in brackets): Explosives (Class 1, excluding Class 1.4), in excess of 10kg Net Explosive Quantity; LNG in bulk, LPG in bulk or being non-gas free following discharge of these cargoes (Class 2); Flammable liquids and substances in bulk or being non gas free following discharge of these cargoes (Class 3 of flashpoint <23° C); and/or Toxic and corrosive substances in bulk or being non-gas free following discharge of these cargoes (Classes 6.1 and 8.0).

3.20 *"Speed Reduction"* means a notification from London VTS that vessels must proceed at "reduced speed" through areas where activities sensitive to the effects of wash or draw-off are taking place.

3.21 *"Speed Restriction"* means any temporary limitation on the speed of vessels in a part of the Thames.

3.22 *"VTS Centre"* means the Vessel Traffic Service centres at Gravesend (Port Control Centre) and Woolwich (Thames Barrier Navigation Centre) – Call Signs 'London VTS' and includes any other Vessel Traffic Services control point through which a Harbourmaster's instructions and advice are issued to Masters of vessels by VHF radio and to which vessels report.

Chapter Four ◆ Data gathering – existing site

PLA Consultation

4.1 Buro Happold (BH) has consulted with the PLA through a number of meetings, telephone and email correspondence to inform the scoping and preparation of this NRA. The consultation meetings are listed below, with meeting minutes provided in **Error! Reference source not found.**2.0.

- 9th May 2017 – introductory meeting;
- 6th November 2017 – NRA scoping meeting;
- 6th April 2020 – PLA introductions;
- 19th June 2020 – Re-introductions and project update;
- 5th August 2020 – Update PLA on design developments and obtain feedback; re-clarify NRA scoping and approach to NRA as agreed in 2017; and
- 6th October 2020 – NRA Hazard Workshop, PLA attended and contributed to the identification and scoring of the specific hazards.

4.2 Information provided by the PLA is presented in the below table.

Table 4—1 PLA information and correspondence received

Ref	Feature
A	River Thames hydrographic survey maps, 332MS to 336MS
B	PLA Scoping Consultation, 5th December 2014, including sketch showing pilot sightlines across the Broadness Peninsula
C	Broadness Radar and Lighthouse Site, Existing Details Drawing, 20th April 2014
D	Email Correspondence from PLA to London Resort regarding sightlines and radar, 11th September 2015
E	GA drawings of the Broadness lighthouse access bridge installed in 2004 and the fence and gate at Broadness Radar replaced in 2018, 16th July 2020
F	Email Correspondence from PLA to BH regarding sightlines and radar, 10th July 2020
G	Email Correspondence from PLA to BH regarding constraints / concerns on the Tilbury Associated Development with additional information, 28th August 2020
H	Email Correspondence from PLA to BH with the incident records between 2nd January 2010 and 16th August 2020, 9th September 2020

Assessment area

4.3 The assessment area covers a 11.3km stretch of the River Thames between the Queen Elizabeth 2 Bridge (upstream) and Tilbury 2 (downstream). This area was agreed with the PLA during recent consultation during the meeting on 5th August 2020.

4.4 Features present within the assessment area are numbered in Figure 4-1 and Table 4—2 below.

Figure 4-1 Assessment Area – Existing Site

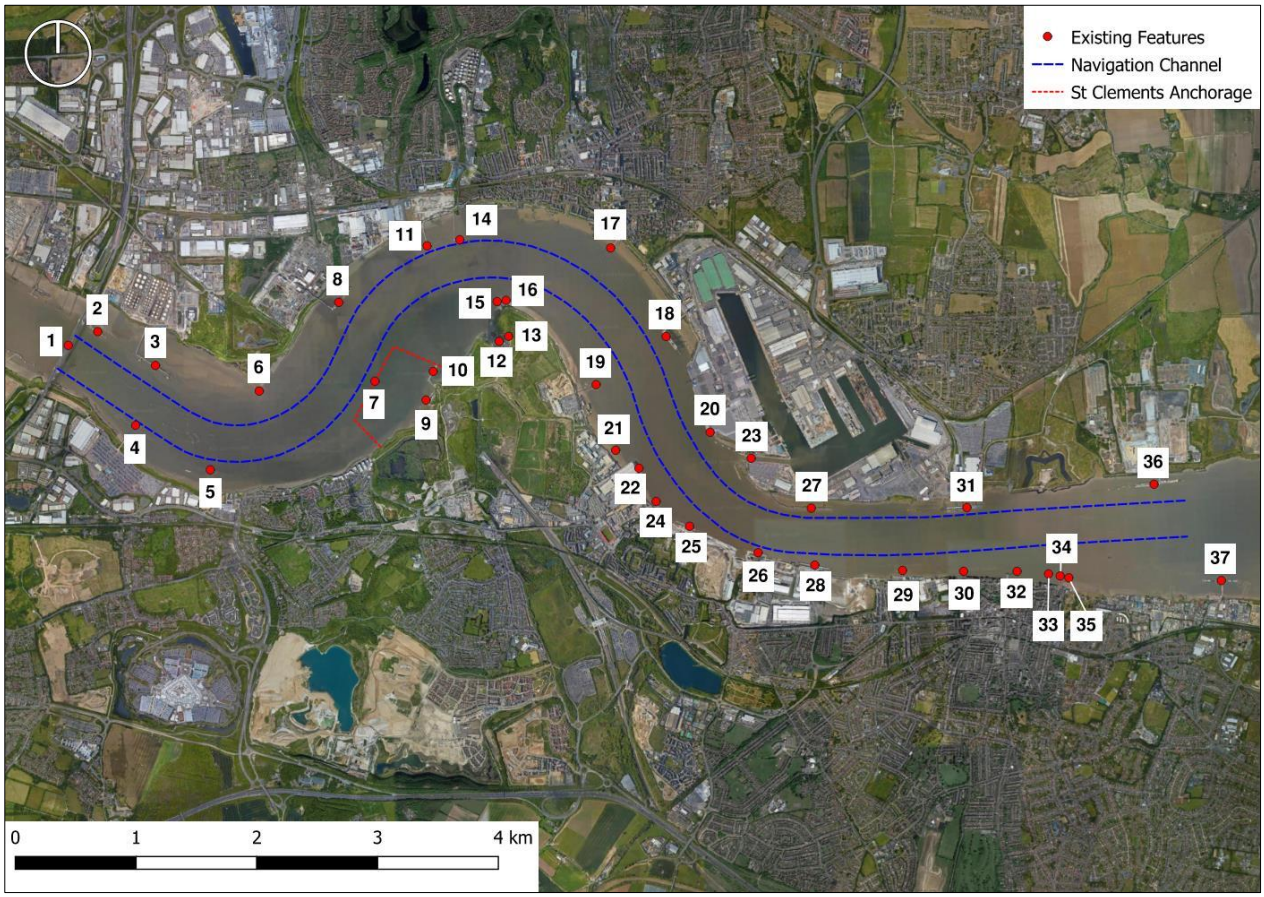


Table 4—2 Assessment Area Features – Existing Site

Ref	Feature	Chainage (km)	N/S Bank
1	Queen Elizabeth 2 Bridge The limits of passage are 100m wide with a minimum headway of 54.1m above MWHS	0	-
2	Lafarge Jetty 1no berth, 190m length, marine aggregates	0.1	N

Ref	Feature	Chainage (km)	N/S Bank
3	Vopak Pier 1, 2 and 3 Private jetty with three 3no berths serving Vopak London Terminal (oil storage)	0.7	N
4	Thames Europort Pier Private jetty serving Thames Europort (car imports)	0.8	S
5	Johnson's Wharf 1no berth (2no dolphins) serving Hanson Aggregates	1.4	S
6	Stoneness Peninsula Peninsula on northern bank within approximately 200m of the edge of the Authorised Channel	1.8	N
7	St Clements Anchorage Designated anchorage with 3no PLA moorings. Whites Jetty falls within the designated anchorage area.	2.8	S
8	West Thurrock Jetty Private jetty previously serving West Thurrock Generating Station (disused), now serving the adjacent Proctor and Gamble site (TBC) 1no deep-water berth, 213m length	3.1	N
9	Bells Wharf Currently not in use. 160m length wharf with bed level of approximately +2.5mCD taken from latest PLA chart.	3.1	S
10	Whites Jetty Currently not in use. 140m length jetty with bed level of approximately -4mCD taken from latest PLA chart.	3.2	S
11	Grays Terminal 1 Private jetty serving Nustar Terminals Ltd (oil and natural gas), 1no berth (3 dolphins)	3.8	N
12	Broadness Creek Occupied by a small live-aboard boating community, approximately 50 vessels varying between 5m and 20m in length. The bed level in the creek is approximately +4mCD, navigation is therefore limited to high tide.	3.8	S
13	Broadness Radar Station A radar and data communications facility consisting of a dual redundant radar transceiver and antenna, back up generator, UKPN electrical service and BT telecom ISDN and telephone landline.	3.8	S
14	Grays Terminal 2	4.0	N

Ref	Feature	Chainage (km)	N/S Bank
	Private jetty serving Nustar Terminals Ltd (oil and natural gas), 1no berth (3 dolphins)		
15	Broadness Lighthouse A fixed navigation light (beacon) on Broadness Peninsula which is a fixed reference point relied upon by mariners when they are navigating around the point. 50m walkway bridge to reach the beacon.	4.3	S
16	Broadness Peninsula Peninsula on southern bank within approximately 250m of the edge of the Authorised Channel, marked by Broadness Lighthouse	4.3	S
17	Thurrock Yacht Club Race events organised on Saturdays and Thursday evenings, subject to weather and tidal conditions. Yacht moorings are within a designated area which at its closest point is 150m from the authorised channel.	5.0	N
18	Tilbury Grain Terminal Jetty 350m length, grain/bulks	5.6	N
19	Hall's Northfleet Jetty 1no berth, 100m length, marine aggregates	5.7	S
20	Northfleet Hope Container Terminal 2no riverside berths, 600m length, 4 riverside cranes for container loading/unloading	6.3	N
21	Britannia Wharf Private jetty (1no berth), 65m length serving Britannia Refined Metals	6.5	S
22	Tower Wharf 2no berths (1no covered), vessels up to 200m length, variety of cargo	6.7	S
23	Tilbury Lock Lock connecting the Port of Tilbury docks to the River Thames	6.8	N
24	Robins Wharf 1no berth, 100m length, aggregates and bulk aggregate products	6.9	S
25	Bevans Wharf 185m length, serving Lafarge Cement UK Ltd	7.2	S
26	Northfleet Thames Terminal 1no deep water jetty, 1no barge bay, 190m length, serving Kimberly-Clark Ltd (wood pulp)	7.7	S
27	Tilbury Cargo Jetty (disused)	8.0	N
28	Red Lion Wharf	8.2	S

Ref	Feature	Chainage (km)	N/S Bank
	1no berth, 240m length, aggregates		
29	Imperial Jetty 2no berths, 90m length, general cargo handling bulk liquids	8.8	S
30	Gravesend Pier (disused)	9.4	S
31	London Cruise Terminal Tilbury Ro-Ro (260m length) and Tilbury Landing Stage (300m length), serving cruise liners with ferry pontoon serving the Tilbury to Gravesend passenger ferry service	9.4	N
32	Town Pier Pontoon 40m pontoon connected to Town Pier, serving the Tilbury to Gravesend passenger ferry service	9.8	S
33	Royal Terrace Pier 50m pontoon connected to Royal Terrace Pier, serving the PLA	10.1	S
34	Customs Pier	10.2	S
35	Newbridge Causeway (not suitable for trailers)	10.3	S
36	Tilbury 2 New port terminal, 2no Ro-Ro (~570m) and 1no construction materials berth (~330m)	11	N
37	Denton Wharf 290m length, serving the PLA Marine Service facility including boatlifts, maintenance and repairs	11.5	S

Information sourced from PLA Charts and the PLA Terminal Directory[1] and PLA Leisure Facilities Directory[2]

[1] http://server1.pla.co.uk/handbook/terminalDirectory.cfm?flag=2&terminal_id=178&site=commercial&orderDirection=asc
[2] https://www.boatingonthethames.co.uk/Leisure-Facilities-Directory?id=225

Environmental conditions

Tide levels

4.5 Located within the tidally influenced reach of the River Thames, water levels within the river fluctuate during the course of the day. .

4.6 Table 4—3 and Table 4—4 show the present-day tide levels applicable to the Kent and Essex Project Sites that have been taken from the PLA's published hydrographic survey (Chart 333 and 336). The levels in the tables below are expected to increase in the future because of sea level rise due to climate change. Using the guidance provided by the Environment Agency (EA) in Table 3 sea level allowances by river basin district for each epoch in mm per year (based on a 1981 to 2000 baseline) – the total sea level rise for each epoch is in brackets[3], sea level rise from the present day (2020) until 2120 is projected to be 1.02m.

Table 4—3 Kent Project Site Tide Levels

Tidal Reference	**Present Day (2020)**		**2120**	
	Level (mOD)	Level (mCD)	Level (mOD)	Level (mCD)
Highest Recorded High Water	4.95	8.15	5.97	9.17
Mean High Water Springs (MHWS)	3.33	6.53	4.35	7.55
Mean High Water (MHW)	2.80	6.00	3.82	7.02
Mean High Water Neaps (MHWN)	2.26	5.46	3.28	6.48
Mean Low Water Neaps (MLWN)	-1.74	1.46	-0.72	2.48
Mean Low Water Springs (MLWS)	-2.66	0.54	-1.64	1.56
Lowest Recorded Low Water	-3.91	-0.71	-2.89	0.31
NOTES: 0mCD = -3.2mOD as specified on the Port of London Authority Hydrographic Chart Ref. 113-333-097 (December 2013) The spring tidal range between MHWS and MLWS is 5.99m				

Table 4—4 Essex Project Site Tide Levels

Tidal Reference	**Present Day (2020)**		**2120**	
	Level (mOD)	Level (mCD)	Level (mOD)	Level (mCD)
Highest Recorded High Water	4.86	7.98	5.88	9.00

[3] https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances#table-3

Highest Astronomical Tide (HAT)	3.85	6.97	4.87	7.99
Mean High Water Springs (MHWS)	3.37	6.49	4.39	7.51
Mean High Water (MHW)	2.80	5.92	3.82	6.94
Mean High Water Neaps (MHWN)	2.23	5.35	3.25	6.37
Mean Low Water Neaps (MLWN)	-1.59	1.53	-0.57	2.55
Mean Low Water Springs (MLWS)	-2.49	0.63	-1.47	1.65
Lowest Recorded Low Water	-3.85	-0.73	-2.83	0.29
NOTES: 0mCD = -3.12mOD as specified on the Port of London Authority Hydrographic Chart Ref. 113-336-422 (March 2019) The spring tidal range between MHWS and MLWS is 5.86m				

Current data

4.7 Hydrodynamic modelling undertaken by HR Wallingford for the Proposed Development suggested that the currents around the Swanscombe Peninsula are relatively complex with a large eddy forming during the flood tide adjacent to the Kent Project Site and a similarly large eddy forming at on the eastern side of the peninsula during the ebb tide.

4.8 The general current direction at the Kent Project Site will be towards the north east for the majority of the time.

The model suggested the presence of piles associated with Whites Jetty are reducing the current speeds during the ebb tide, but the effect is less evident during the flood tide, when the currents are lower. The maximum peak currents of more than 2m/s are observed in the middle of the navigation channel during both times of peak ebb and flood tides. Figure 4-2 and

4.9 Figure 4-3 show the existing currents at the time of peak ebb and flood tides for the Kent Project Site.

4.10 The currents at the Essex Project Site are almost perpendicular to the land with flood and ebb currents going in the opposite directions. The peak currents approach 2m/s for both peak ebb and flood tides. Figure 4-4 and Figure 4-5 show the existing currents at the time of peak ebb and flood tides for the Essex Project Site.

4.11 For further information on the hydrodynamics and currents please refer to Appendix 17.4 of the ES Water Chapter - Hydrodynamic and Sedimentation Assessment.

Figure 4-2 Existing current magnitude at time of peak ebb tide at the Kent Project Site (Source: Hydrodynamic and sediment assessment, HR Wallingford (Appendix 17.4))

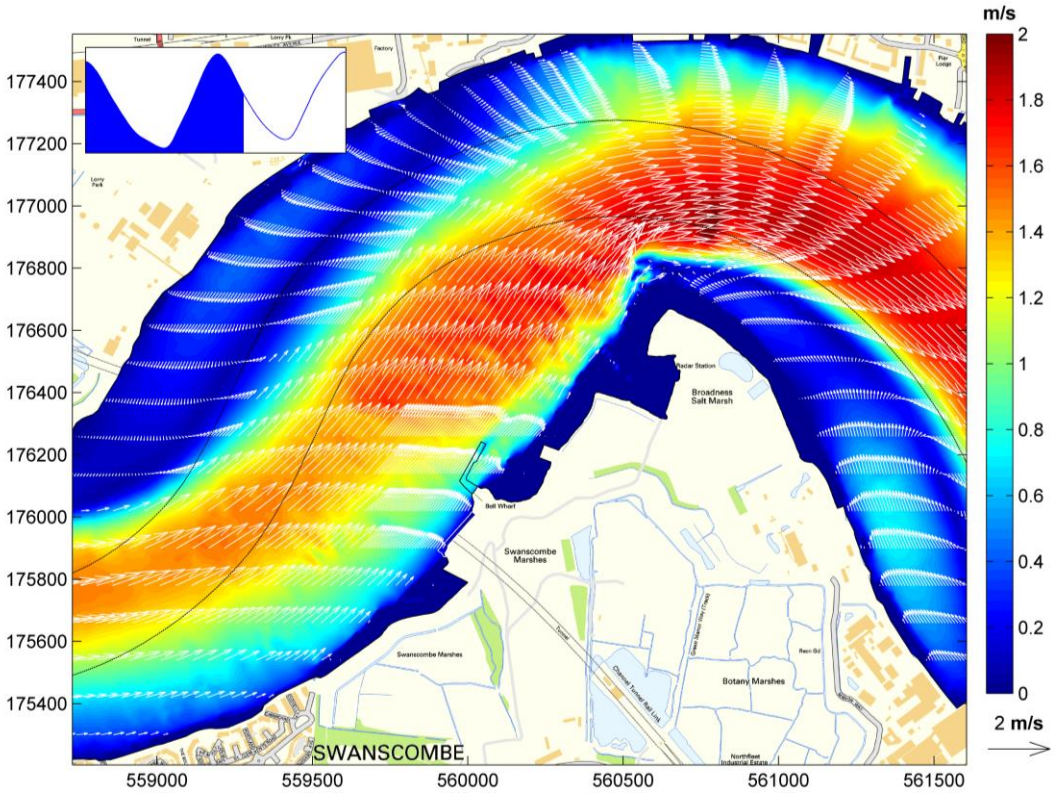


Figure 4-3 Existing current magnitude at time of peak flood tide at the Kent Project Site (Source: Hydrodynamic and sediment assessment, HR Wallingford (Appendix 17.4))

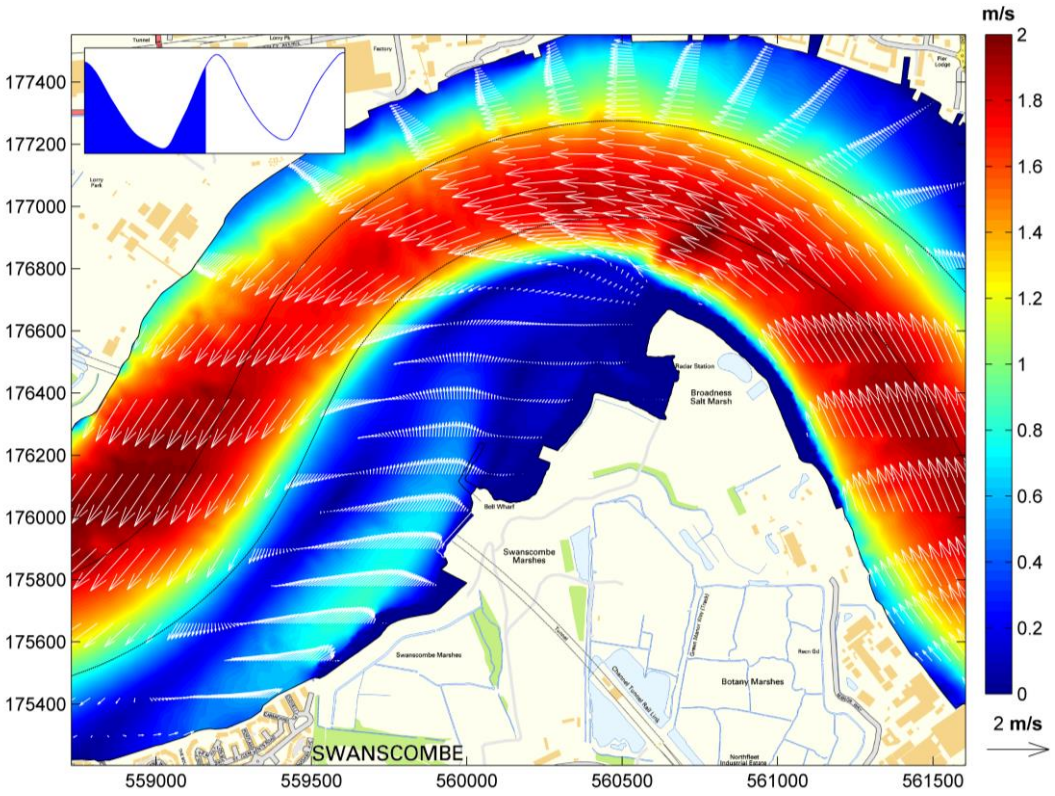


Figure 4-4 Existing current magnitude at time of peak ebb tide at the Essex Project Site (Source: Hydrodynamic and sediment assessment, HR Wallingford (Appendix 17.4))

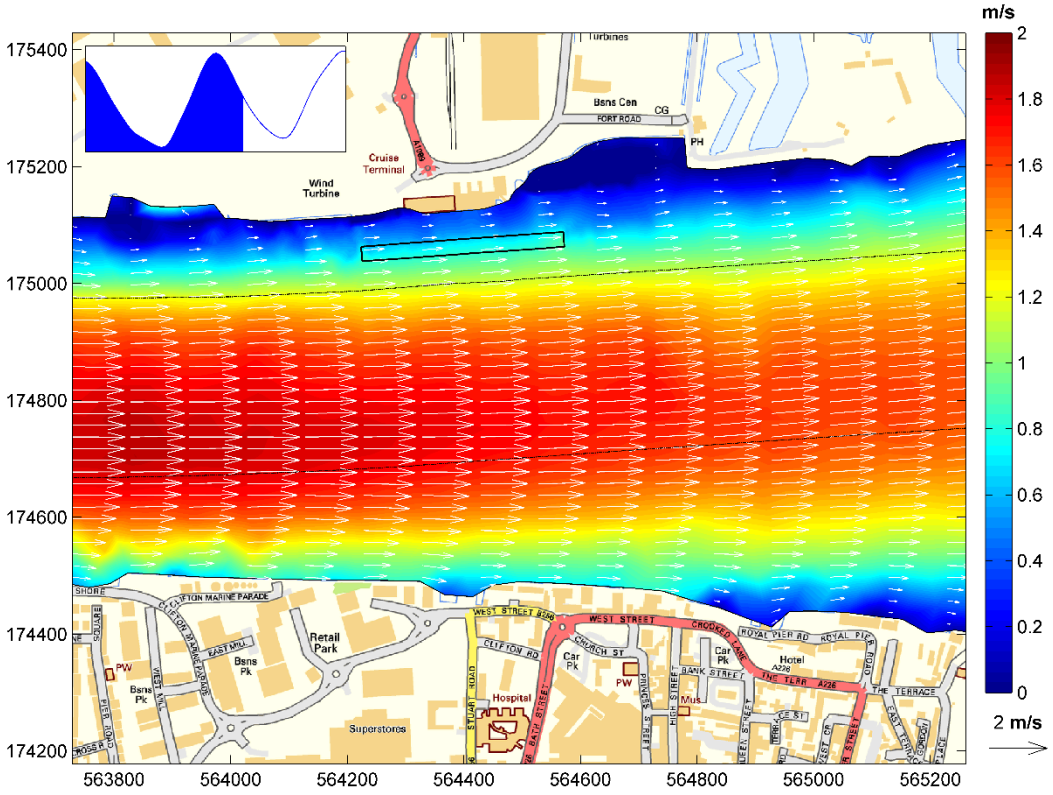
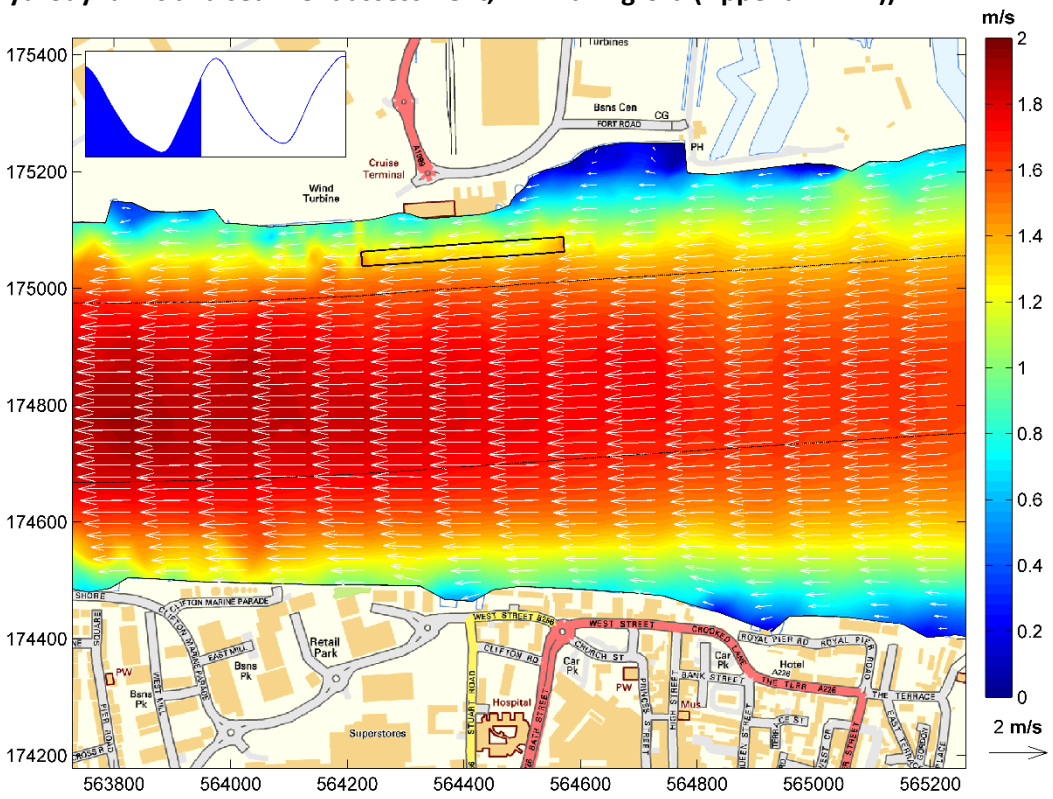


Figure 4-5 Existing current magnitude at time of peak flood tide at the Essex Project Site (Source: Hydrodynamic and sediment assessment, HR Wallingford (Appendix 17.4))



Vessel management and operational procedures

Navigation Authority

4.12 The PLA is the navigation authority for the assessment area and is both the Statutory and Competent Harbour Authority in the area.

Regulations and Codes

4.13 The PLA has a comprehensive set of regulations and codes covering all aspects of navigation on the tidal Thames as described in Section 1.163 of this assessment.

PLA Vessel Tracking System

4.14 The PLA's Vessel Tracking System (VTS) manages and oversees the safety of navigation within the Thames and beyond through the provision of traffic information, traffic organisation, and navigation assistance. The VTS services are undertaken in three sectors; the Barrier Sector (upstream of Purfleet), the River Sector (from Purfleet to Southend on Sea), and the Estuary Sector. The assessment area falls within the River Sector.

4.15 PLA surveillance is undertaken using a series of radar stations, Automatic Identification System (AIS) base stations, Closed-circuit television (CCTV) cameras and Very High Frequency (VHF) radio stations. Communications to vessel masters are transmitted by VHF from the two VTS Centres located at the Port Control Centre in Gravesend and at the Thames Barrier Navigation Centre in Woolwich.

PLA Safety Management System

4.16 The PLA operate a Safety Management System (SMS), incorporating comprehensive risk assessment of marine operations throughout the port, in compliance with the requirements of the Port Marine Safety Code[4]. The system, as described in the Marine SMS Manual, is a live system which is intended to be evolve through routine assessments, new circumstances and incident response.

4.17 The PLA has provided a 'List of Applicable Hazards' extracted from the SMS risk assessment for the defined assessment area. The hazards include collision, contract, grounding, fire/explosion, loss of hull integrity, mooring breakout, navigation hazard, girting, pollution, swamping and wash/draw off. Further description of these hazards is provided in Section **Error! Reference source not found.** of this report.

[4] https://www.gov.uk/government/publications/port-marine-safety-code

Emergency response

4.18 The PLA operate an emergency response system comprising initial response, on-going response and recovery, and command and control. Incidents which fall beyond the normal capacity of the PLA are classed as 'major incidents' and require special arrangements for response, coordination and management in conjunction with other agencies.

4.19 Search and Rescue elements are led by the Maritime and Coastguard agency – London or Thames Coastguard.

Aids to navigation

4.20 In addition to information provided by the VTS Centres, the following aids to navigation are currently available within the assessment area:

1. Broadness lighthouse;
2. Stoneness lighthouse;
3. Broadness, White Hart and Black Shelf navigation lights marking the authorised channel in the vicinity of the Broadness Peninsula;
4. Stoneness and Saint Clements navigation lights marking the authorised channel in the vicinity of the Stoneness Peninsula;
5. Navigation lights fixed to the outer edge of jetties and piers;
6. Line of site observations across Broadness Peninsula;
7. On-board radar during periods of restricted visibility if vessel >40m length overall (LOA)

4.21 In addition to the above aids, the PLA confirmed during consultation that:

1. the electricity pylons situated on the north and south bank near Broadness are used as an informal navigation aid; and
2. PLA Pilot cutter vessels use the east end of the Tilbury Landing Stage and identified the need to ensure line of sight in relation to position of the new passenger ferry pontoon.

Figure 4-6 Overview of the Navigation lights within the assessment area (source: http://fishing-app.gpsnauticalcharts.com/i-boating-fishing-web-app/fishing-marine-charts-navigation.html (not to be used for navigation))

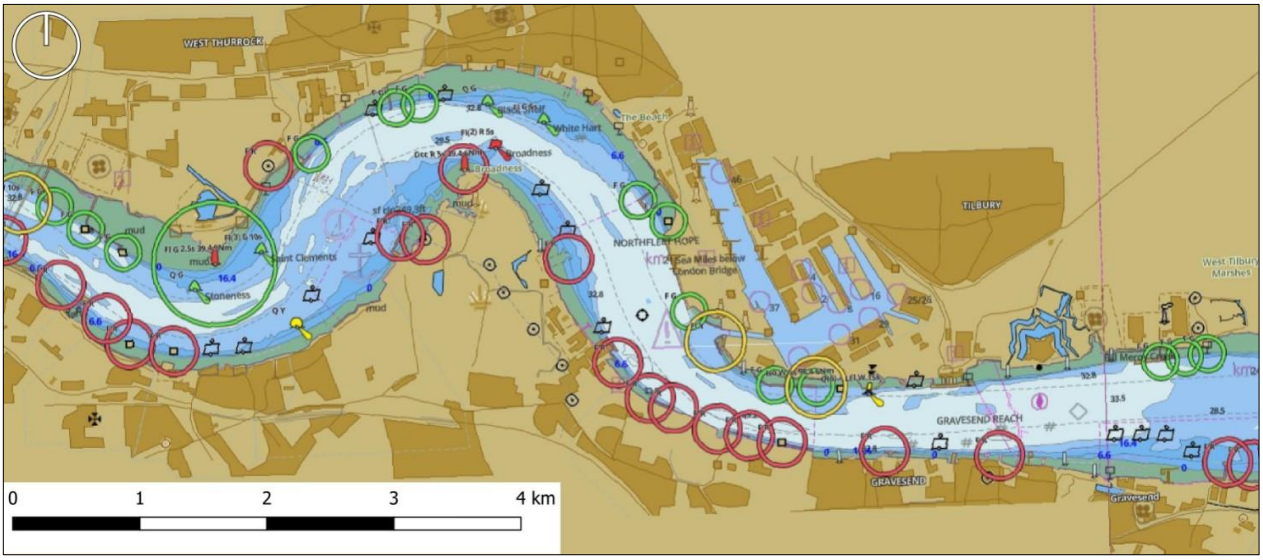
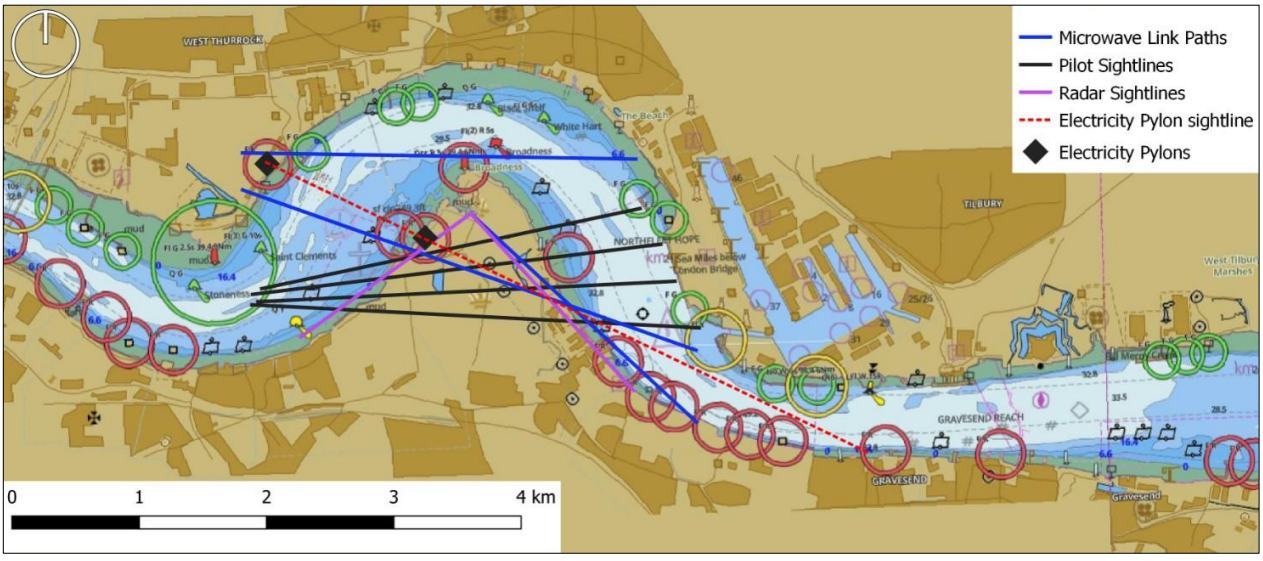


Figure 4-7 Overview of the sightlines and electrical pylons used as informal aids (source: http://fishing-app.gpsnauticalcharts.com/i-boating-fishing-web-app/fishing-marine-charts-navigation.html (not to be used for navigation))



Port passage plans

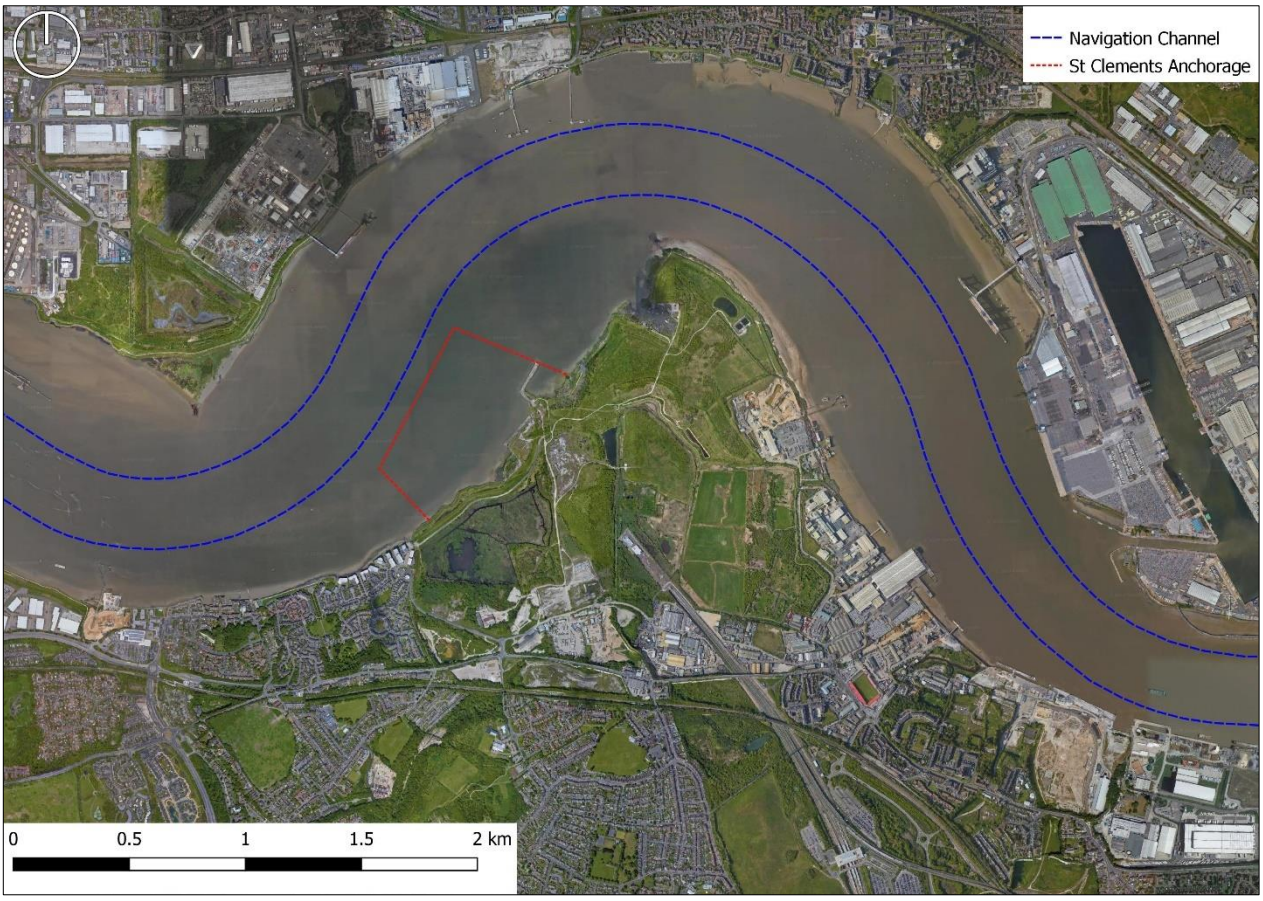
4.22 The PLA state in their General Directions for Navigation in the Port of London (2016) that:

4.23 '*All Commercial Vessels normally operating only in the Thames must (a) prepare and maintain a generic Port Passage Plan, appropriate for use during the vessel's routine passage and operations in the Thames; (b) as appropriate to their operational area and as part of their generic Port Passage Plan, establish through risk assessment, safe air draught and under keel clearances to be applied during the vessel's transits of the Thames bridges. All such Port Passage Plans may be inspected by the Harbourmaster. Further to the requirements of above, all Commercial Vessels operating in the Thames and licensed under the High Speed Craft Code or those issued with a PLA certificate of compliance, must have their generic Port Passage Plan approved by the Harbourmaster prior to commencing operations.*'

St Clements Anchorage

4.24 St Clements Anchorage is located north west of Bell Wharf as shown in Figure 4-8, and falls partly within the DCO Order Limits. The anchorage is managed by the PLA and offers a temporary deep-water anchorage for larger vessels. The facility includes three moorings with a maximum duration of 12 hours, although the PLA have confirmed that there is typically no more than one vessel anchored at any one time.

Figure 4-8 Extent of St Clements Anchorage



Thurrock Yacht Club

4.25 Thurrock Yacht Club is located on the north bank of the Thames between the Kent and Essex project sites, as shown in Figure 4 - 1. The club has been identified by the PLA as a potential concern and was consulted as part of the statutory consultation exercise undertaken between 27th July to 21st September 2020. It is noted that Thurrock Yacht Club did not provide any response during this statutory consultation period.

4.26 The NRA makes note that recreational vessels operate within the vicinity of the Kent Project Site. However, due to the management of vessel movements and operations along the Thames, as well as the locations of the Proposed Development, the meander in the Thames and the presence of the navigable channel, minimal interaction with Thurrock Yacht Club will take place.

4.27 This should be reviewed once the Final NRA is undertaken post DCO, at detailed design stage.

Traffic profile

Vessel types

4.28 Table 4—5 summarises the vessel types known to operate within the assessment area. This is not intended as an exhaustive list but attempts to cover the predominant vessel types.

Table 4—5 Vessel Types

Group	Vessel Type	Reporting Vessel
Commercial	Freight Vessels – carrying a variety of freight (berthing available for boats >200m length)	✓
	Tugs & Barges – carrying aggregate, waste, other	✓
	Specified Vessels – carrying oil and natural gas	✓
Passenger	Cruise ships – up to 300m (as of 2017)	✓
	Passenger Vessel – Tilbury-Gravesend Ferry	✓
Recreational	Sail boats – including Thurrock Yacht club vessels	(if over 40m)
	House boats – moored at Broadness Creek	
	Rowing boats	

Vessel movements existing site

4.29 The River Thames has a high level of shipping activities based on statistics from the Department of Transport (DfT)[5]. The Port of London, which comprises of numerous facilities on the Thames including the PoT and London Cruise Terminal, handled 11.4% of the total UK port freight in 2019 and came second only to Grimsby and Immingham (figures taken from Table PORT0303).

4.30 Information available from the DfT have been obtained with the following statistics relating to gross tonnage and number of vessels arriving at the Port of London for the last three years (2017-2019 inclusive). The vessel types are arranged by size according to their deadweight.

4.31 The Applicant is continuing to engage with the PLA and will review any additional vessel data provided following submission of the DCO application.

Table 4—6 Port of London estimated statistics for arriving vessels per vessel type from 2017 to 2019 (source: DfT)

Vessel Type	Vessel size	No. of vessels arriving			Gross Tonnage (Thousands)		
	(Deadweight)	2017	2018	2019	2017	2018	2019
Tankers	1 - 4,999	322	351	714	798	935	1,964
	5,000 - 19,999	454	492	982	3,728	3,947	7,678
	20,000 - 99,999	270	279	538	6,545	7,075	13,588
	100,000>	27	23	56	1,685	1,451	3,544
	Unknown	0	0	0	0	0	0
	Sub-Total	1,073	1,145	2,290	12,755	13,408	26,774
Ro-Ro vessels	1 - 4,999	0	0	0	0	0	0
	5,000 - 19,999	2,229	2,387	4,564	48,604	52,058	107,314
	20,000>	80	57	230	5,143	3,888	13,364
	Unknown	0	0	0	0	0	0
	Sub-Total	2,309	2,444	4,794	53,747	55,945	120,678
Fully cellular container vessels	1 - 4,999	24	0	0	70	0	0
	5,000 - 19,999	749	792	1,558	6,590	6,820	13,362
	20,000>	1,009	1,161	2,578	67,751	81,749	184,463
	Unknown	0	0	0	0	0	0
	Sub-Total	1,782	1,953	4,136	74,411	88,569	197,825
Other dry cargo vessels	1 - 4,999	945	1,006	1,878	2,535	2,529	4,833
	5,000 - 19,999	351	314	565	2,518	2,741	4,515
	20,000 - 99,999	170	183	406	5,725	5,880	12,622

[5] https://www.gov.uk/government/statistical-data-sets/port-and-domestic-waterborne-freight-statistics-port

Vessel Type	Vessel size	No. of vessels arriving			Gross Tonnage (Thousands)		
	(Deadweight)	2017	2018	2019	2017	2018	2019
	100,000>	0	0	0	0	0	0
	Unknown	0	0	5	0	0	15
	Sub-Total	1,466	1,503	2,854	10,778	11,150	21,985
Passenger vessels	1 - 4,999	36	45	70	561	991	2,039
	5,000 - 19,999	40	47	96	2,149	2,377	5,280
	20,000>	0	0	0	0	0	0
	Unknown	4	3	0	1	1	0
	Sub-Total	80	95	166	2,711	3,369	7,319
Other vessels	1 - 4,999	90	90	340	250	248	1,039
	5,000 - 19,999	1,312	1,233	2,300	5,979	5,817	11,049
	20,000>	0	0	0	0	0	0
	Unknown	2	1	0	6	3	0
	Sub-Total	1,404	1,324	2,640	6,235	6,068	12,088
Total all vessels	1 - 4,999	1,417	1,492	3,002	4,214	4,703	9,875
	5,000 - 19,999	5,135	5,265	10,065	69,569	73,761	149,197
	20,000 - 99,999	1,529	1,680	3,752	85,163	98,591	224,037
	100,000>	27	23	56	1,685	1,451	3,544
	Unknown	6	4	5	6	3	15
	Total	8,114	8,464	16,880	160,638	178,509	386,669

Note: the DfT data does not cover all commercial vessel or recreational vessel movements, in particular the statics only record 410 none freight (passenger or other) vessels less than 5,000GT and therefore it is assumed that the local ferry services including Thames Clippers and the Tilbury to Gravesend ferry are not included in the figures.

4.32 The data from DfT suggests that over the recent years between 2017 and 2019 there has been a percentage increase of approx. 108% for vessels arriving to The Port of London. Looking further back from 2009 to 2019 there has been an approx. 78% increase in arriving vessels.

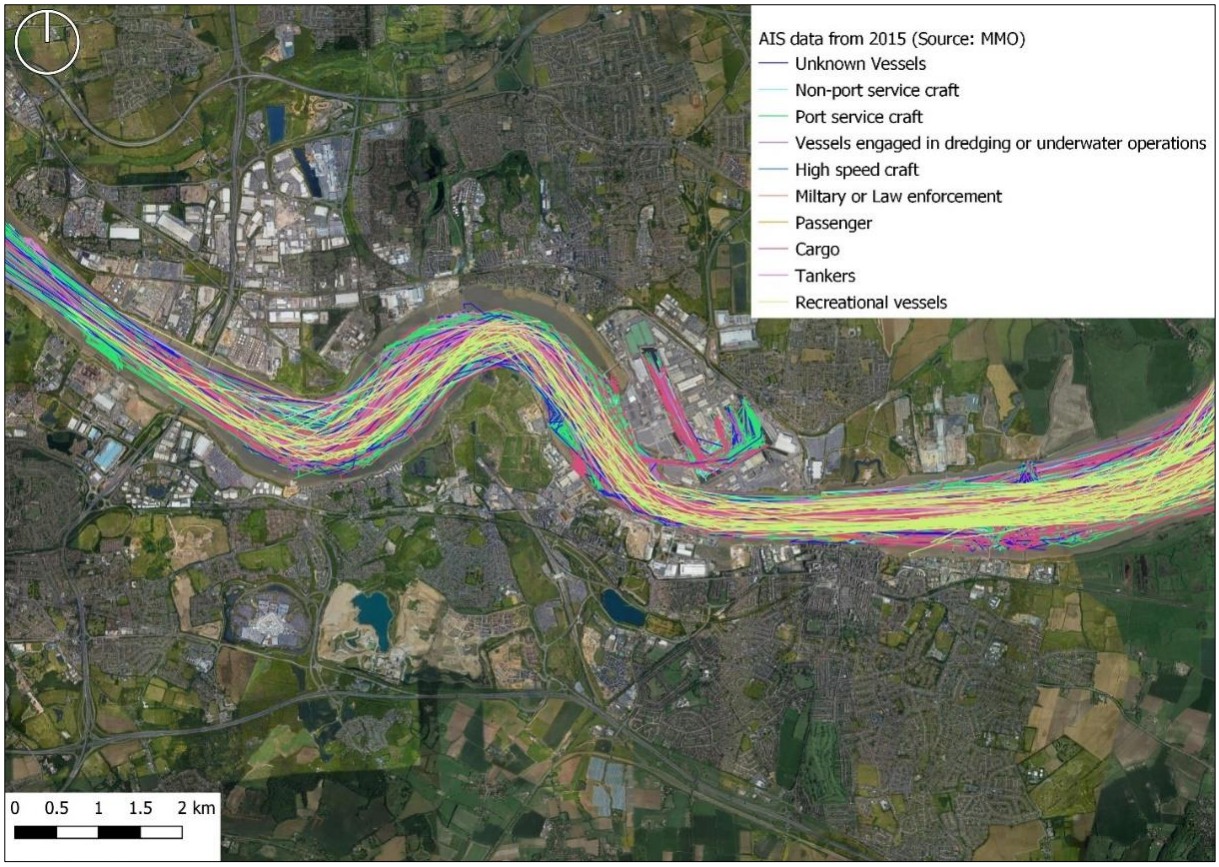
4.33 The recent data (2017 – 2019) would suggest that over the past two years the number of arriving vessels has doubled in the Port of London water ways. It should be noted that the method DfT use to estimate their data has changed and data from 2018 is estimated in a different way. This method change could help explain a proportion of increase in vessel movements over the recent years.

4.34 Based on the location of the Proposed Development it is a fair assumption that a large proportion of those movements will use this section of the River Thames. It is therefore assumed that 20,000 to 30,000 movements occur per year within this section of the River Thames.

4.35 AIS data was obtained from the Marine Management Organisation (MMO) via the government website[6]. The latest available data is from 2015. Although a few years old, they still provide a general overview of the vessel movements. The data highlight that the stretch of the River Thames where the Proposed Development is planned is busy and used by multiple vessel types. Figure 4-9 shows vessel tracks for 2015 for the various vessel types as defined by the MMO in the data set.

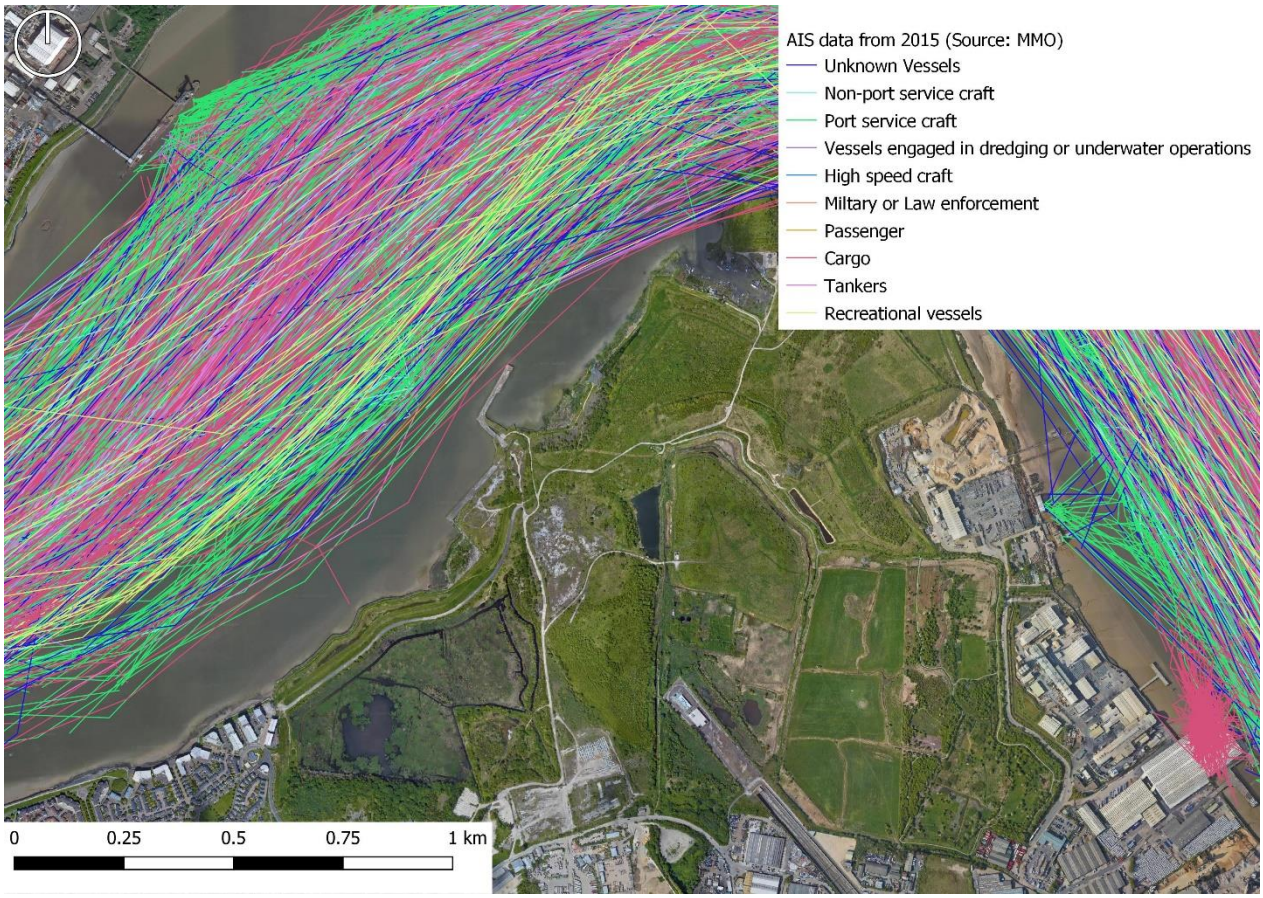
[6] https://data.gov.uk/dataset/963c1a7b-5b72-4cce-93f5-3f1e223fd575/anonymised-ais-derived-track-lines-2015

Figure 4-9 Vessel tracks for the different vessel types from 2015 AIS data (Source: MMO)



4.36 The AIS data obtained highlighted that little movement occurs in the immediate vicinity of Bell Wharf as highlighted in Figure 4-10 and it is assumed that this is the case at present.

Figure 4-10 Vessel tracks for the different vessel types from 2015 AIS data zoomed in Bell Wharf at the Kent Project Site (Source: MMO)



4.37 Figure 4-11 shows that passenger vessels operate within this section of the River Thames and clearly identifies the ferry crossing between Tilbury and Gravesend with the high density of movements in that area.

4.38 The published normal timetable for the Tilbury to Gravesend passenger ferry confirms that the ferry transits 26 times each way on weekdays and 25 times on a Saturday, and does not operate on Sundays or Bank Holidays

Figure 4-11 Vessel tracks for Passenger Vessels for 2015 (Source: MMO)

Incident records

4.39 The PLA has supplied incident records for the assessment area between the dates of 2nd January 2010 and 16th August 2020. The incidents are categorised in the groups presented in Table 4—7. Where the incident is narrowly avoided the event is recorded as a 'near miss'.

Table 4—7 PLA Incident Classifications

Incident	PLA Description
Breach of Regulation	A vessel's failure to comply with Regulation

Incident	PLA Description
Collision	An incident caused by ships striking or being struck by another ship, regardless of whether the ships are underway, anchored or moored.
Contact	An incident caused by ships striking or being struck by an external object. The objects can be: floating object (cargo, ice, other or unknown); fixed object, but not the sea bottom; or flying object.
Criminal / Malicious Damage	When a person unlawfully, intentionally or recklessly destroys or damages any property not belonging to them.
Fire / Explosion	The occurrence of an unexpected fire or explosion on a vessel.
Floating Hazard	The reporting and/or recovery of a floating hazard or potential hazard to navigation.
Foreshore Incident	An incident which has occurred on the exposed foreshore of the River below the level of MHWS.
Grounding	The unplanned contact by a vessel with the sea or river bed whilst underway, moored, alongside or at anchor; or the action of a vessel hitting the sea or river bed due to squat.
Inappropriate Navigation	A vessel's failure to interpret and apply the Colregs and/or local rules for navigation appropriately and/or to apply the good practice of seamen.
Loss of Hull Integrity	A sudden impairment or failure of a ships hull which allows water to ingress.
Man Overboard	An emergency situation involving the loss overboard of a member of the crew or a passenger.
Navigation Hazard	An occurrence or object, which is or has the potential to affect or endanger the safety of navigation.
Other	Any other Incident.
Pollution	The entry of harmful/polluting substances into the water or onto the foreshore (i.e. oils, chemicals, solid matter etc.)
Port Security Incident	An incident affecting the security of ISPS facilities and vessels on the Tidal Thames; or an incident affecting the security of designated PLA controlled buildings under the ISPS Code
Swamping	When a vessel takes on water from above its usual waterline due to the actions of another vessel or vessels.
Wash / Draw-Off	The action of sweeping waves made by a vessel passing through the water hitting shoreside infrastructure, moorings, the foreshore or another vessel.

4.40 Within the area of interest from the Queen Elizabeth II Bridge through to Denton Wharf, the PLA incident data records a total of 465 incidents over the last 10 years ranging from near miss to very serious. Table 4—8 provides a breakdown of the types of incident:

Table 4—8 Number of PLA Recorded Incidents

	Near Miss	Minor	Moderate	Serious	Very Serious	TOTAL
No. of Incidents	113	315	5	31	1	465

4.41 To enable geographical inspection of the incident data, the information has been input into GIS with the resulting plots presented in Figure 4-12 to Figure 4-17.

Figure 4-12 PLA Incident Data for near miss incidents between 2nd January 2010 and 16th August 2020

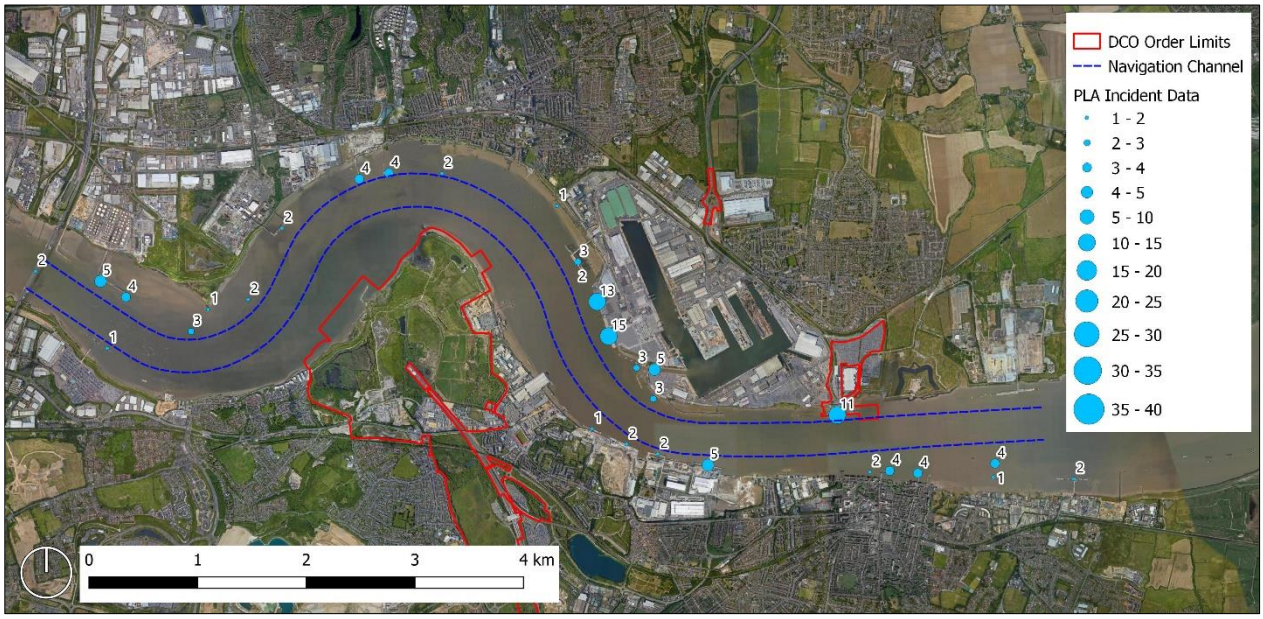


Figure 4-13 PLA Incident Data for minor incidents between 2nd January 2010 and 16th August 2020

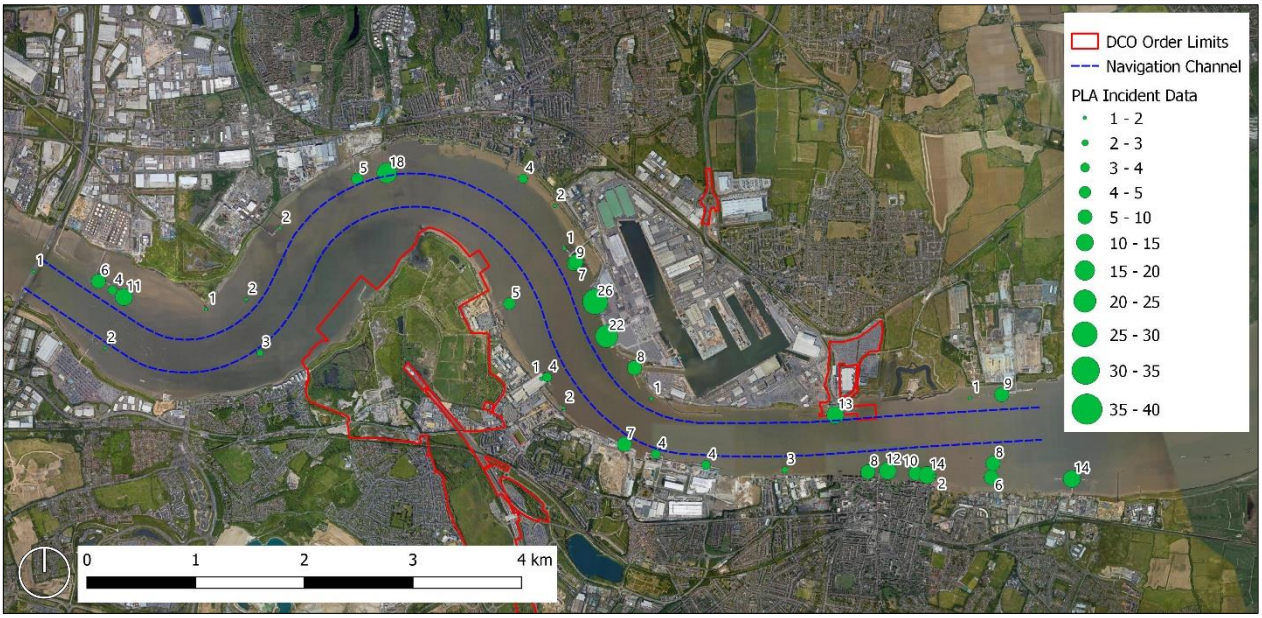


Figure 4-14 PLA Incident Data for moderate incidents between 2nd January 2010 and 16th August 2020

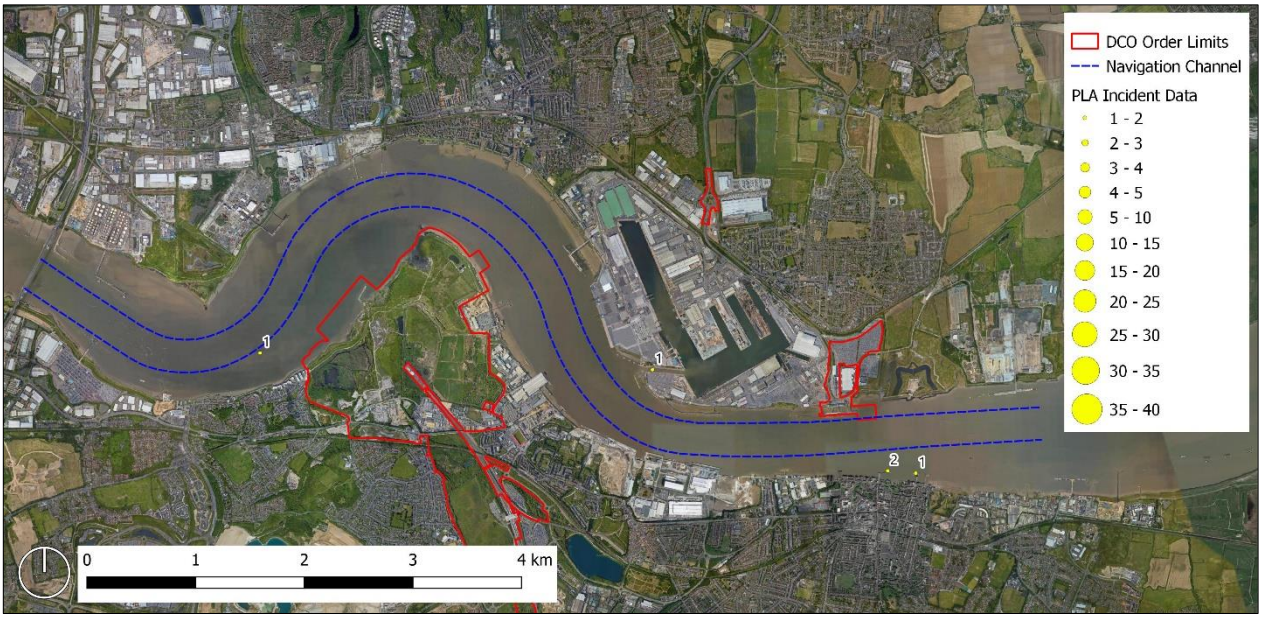


Figure 4-15 PLA Incident Data for serious incidents between 2nd January 2010 and 16th August 2020

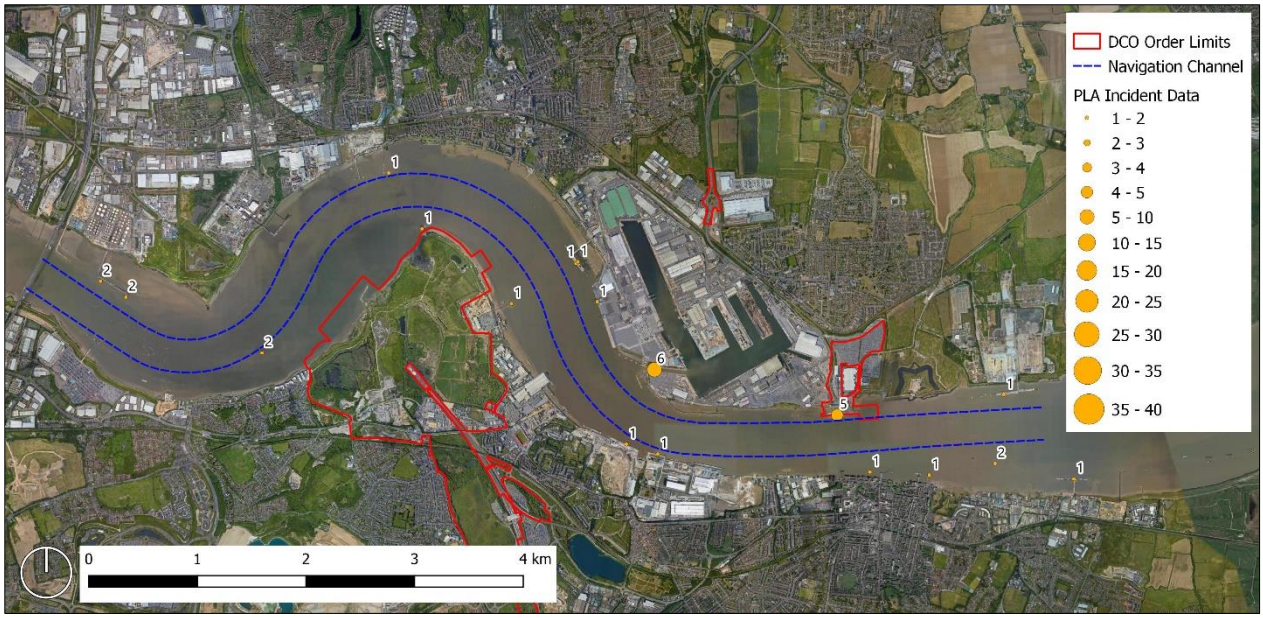


Figure 4-16 PLA Incident Data for very serious incidents between 2nd January 2010 and 16th August 2020

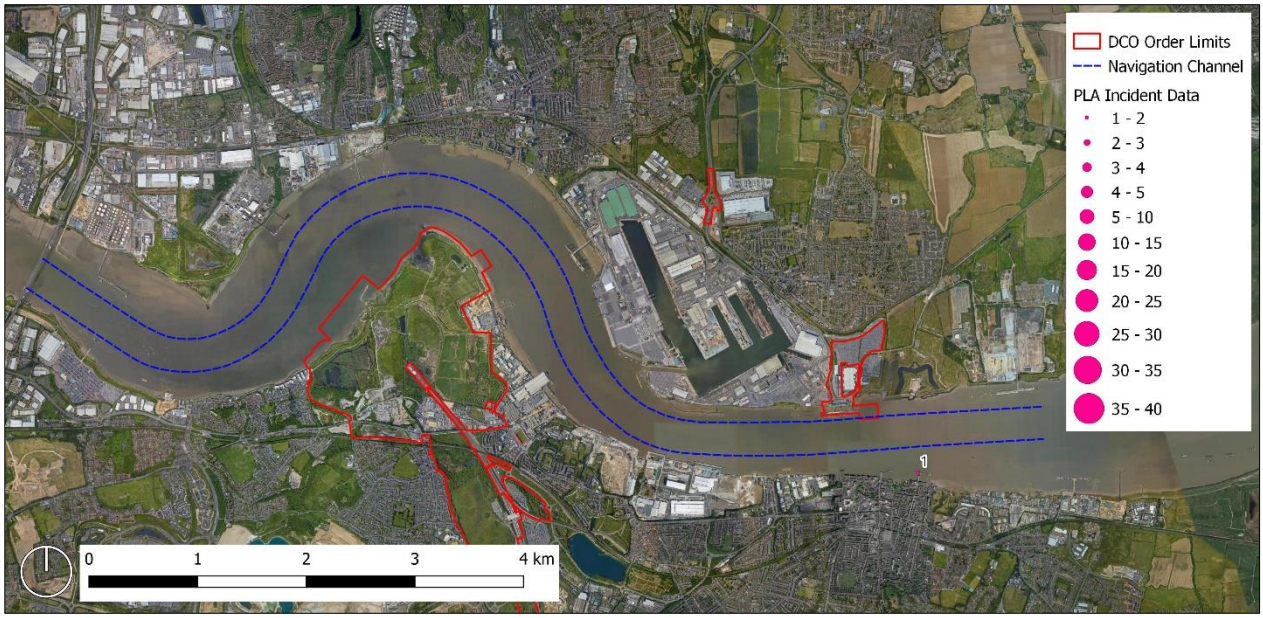
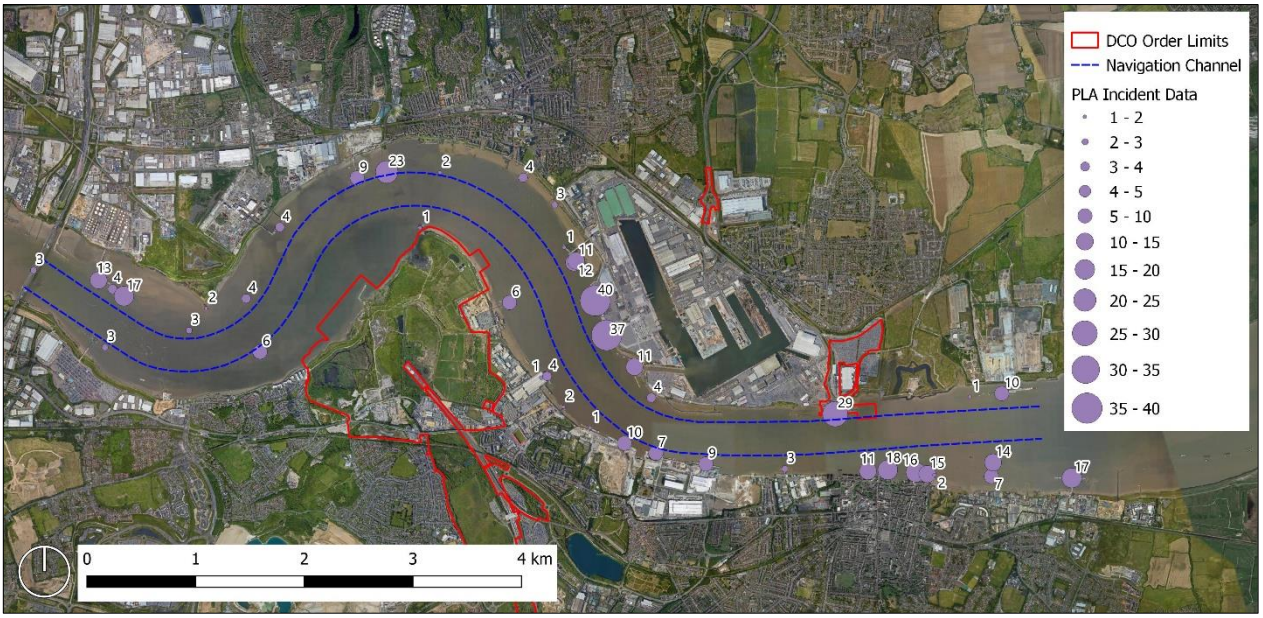


Figure 4-17 PLA Incident Data for total number of incidents between 2nd January 2010 and 16th August 2020



4.42 Analysis of the incident data has yielded the following conclusions:

- Most of the incidents recorded are to the east of the Swanscombe Peninsula. The largest cluster is around Tilbury Docks (specifically Northfleet Hope Container Terminal and the Tilbury Lock Gate) with another large cluster around the Tilbury Landing Stage where the Essex Project Site associated development is proposed along with the passenger ferry service from Tilbury to Gravesend. There is a moderate cluster around Grays Terminal 2 north of Swanscombe Peninsula.

- The incidents identified at the Tilbury Landing Stage can be broken down as follows; Near Miss = 11, Minor = 13, Moderate = 0, Serious = 5, Very Serious = 0, Total = 29. Of these the majority of incidents are described as Vessel Contact (8 counts), Vessel Collision (6 counts) and Vessel Wash / Draw-off (4 counts). With two vessel contacts and vessel wash/draw-off being minor incidents; six vessel collisions and four vessel contacts being near misses; and two vessel contacts and two vessel wash / draw off being serious incidents. Reference is made to Table 4—7 for further detail relating to the PLA incident classifications

- The number of incidents appear to be greater on the eastern side of the Swanscombe Peninsula from Grays Terminals onwards.

- Of the serious incidents recorded (31 in total), most of these coincide with the two clusters around Tilbury Docks and the Tilbury Landing Stage. There is however one serious incident recorded near St Clements Anchorage.

- There is one very serious incident recorded at the Royal Terrace Pier which is located

further downstream on the southern side of the Gravesend ferry pontoon. It is noted that the incident has been recorded as a "security – other" in the PLA database. No further detail is provided other than the classifications in Table 4—7.

- No incidents have been recorded in the vicinity of Bell Wharf or Whites Jetty where the associated developments for ferry terminal for the Thames Clippers and additional marine infrastructure is to be located at the Kent Project Site.

Chapter Five ◆ Data gathering – proposed operations

5.1 The NRA covers the construction and operational phases of the Proposed Development. The activities are summarised within this section and include assumptions relating to the various operations.

Operator consultation

5.2 Cory Riverside Energy have been consulted as in relation to waste removal via river. It is noted that no commitment is made between Cory Riverside Energy and the Applicant.

5.3 Seacon Terminal has been approached by the Applicant to discuss possible options for using their facilities during the construction phase and potential further. Similarly, there is no commitment from either party.

Thames Clippers

5.4 Consultation with Thames Clippers throughout the pre-application process has included the layouts of the passenger ferry pontoons at both the Kent and Essex Project Site. Including the size of the pontoons, number of berths and size of vessels.

5.5 Thames Clippers have also provided an operational proposal including proposed routes and timetable. These draft proposals been incorporated into the ES Chapter 10 River Transport.

5.6 Thames Clippers attended and contributed to the Hazard Workshop on 6th October 2020.

Port of Tilbury

5.7 Consultation with PoT throughout the pre-application process has included the layout of the passenger ferry pontoon on the Essex Project Site, the potential Ro-Ro facility at the Kent Project Site, and the risk of conflicts relating the existing operations using the Tilbury Landing Stage, including the ferry crossing from the Landing Stage to Gravesend currently operated by Jetstream.

5.8 It is noted that the PoT has been developing its own phased approach to an extension to the Tilbury Landing Stage on the Essex Project Site. The Applicant will continue to consult and engage with the PoT.

5.9 PoT attended and contributed to the Hazard Workshop on 6th October 2020.

Construction and operational phase

5.10 The construction and operational phases have been separated out into the following operations:

- Barge operations – Waste removal (construction and operational phases)
- Barge operations – Material supply (construction and operational phases)
- Barge operations – Removal of dredged material (construction phase)
- Ro-Ro operations – Waste removal and material supply (partial construction phase and operational phase)
- Passenger vessel operations (partial construction phase and operational phase)

5.11 As explained in the Outline Construction Method Statement that accompanies the DCO application (appended to Chapter 3 of the Environmental Statement – Project Description) construction of Gate One is scheduled to commence in 2022. The peak construction year is anticipated to be 2023, with Gate One opening in 2024 and Gate Two opening in 2029. The construction work is anticipated to cease in 2029. The anticipated construction hours of work are Monday to Friday 8am to 6pm / Saturday 8am to 1pm and work outside these core times will need to be agreed with the Local Planning Authorities (LPA).

5.12 For the purpose of the NRA the waste removal and material supply will be assessed both in respect to Bell Wharf and Seacon Terminal. It is assumed that a percentage of the construction materials will be transported from the Port of Tilbury to the Kent Project Site. Whilst the disposal of waste material will be subject to the agreement with the appointed contractor, for this NRA it is assumed the waste removed will either be transported further upstream, past the Queen Elizabeth II Bridge, or further downstream, past Tilbury2 as this allows for a worse case assessment to be included.

5.13 The below assumptions have been developed to inform the NRA and include all three of the potential marine infrastructure scenarios as outlined in Chapter 2.

5.14 The following acronyms have been used for the various operations:

- London Resort Waste via barges – LRW
- London Resort Supply via barges – LRS
- London Resort dredged material via barges – LRD
- London Resort Ro-Ro – LRR
- London Resort Passenger – LR

Barge operations – waste removal

5.15 Assumptions related to barge operations (waste removal) are as follows:

1. Waste removal by barge will be undertaken during both the construction and operational phases;
2. Waste will be transported from the London Resort and taken further upstream and/or downstream;
3. The contractor will use barges of a capacity of approximately 1,000 tonnes (approximately 35m length, 10m width, 3m loaded draught);
4. The contractor will be free to determine the mode of marine transport (tow configuration);

5. Barges will be berthed at either the Seacon Terminal or Bell Wharf (dependent on the status of Bell Wharf) during construction phase and Bell Wharf and White Jetty during operational phase;
6. A total of two barges (either waste or material) will be able to berth alongside at Bell Wharf during the construction phase (dependent on the status of Bell Wharf);
7. At Bell Wharf the minimum navigable window will be one hour either side of high tide (two hours total) however if / once dredging is undertaken it is anticipated there will be no restriction. No restriction is considered at Whites Jetty or Seacon Terminal;
8. Due to the potential small navigable window, arrival, unloading and departure may not be possible at the same high tide. It is assumed that a 'not always afloat but safely aground' (NAABSA) condition will be acceptable at Bell Wharf.

5.16 The various waste removal scenarios are outlined in the following preliminary routes illustrated in the Figure 5-1 to Figure 5-4 below.

Figure 5-1 LRW preliminary route from upstream to the Kent Project Site

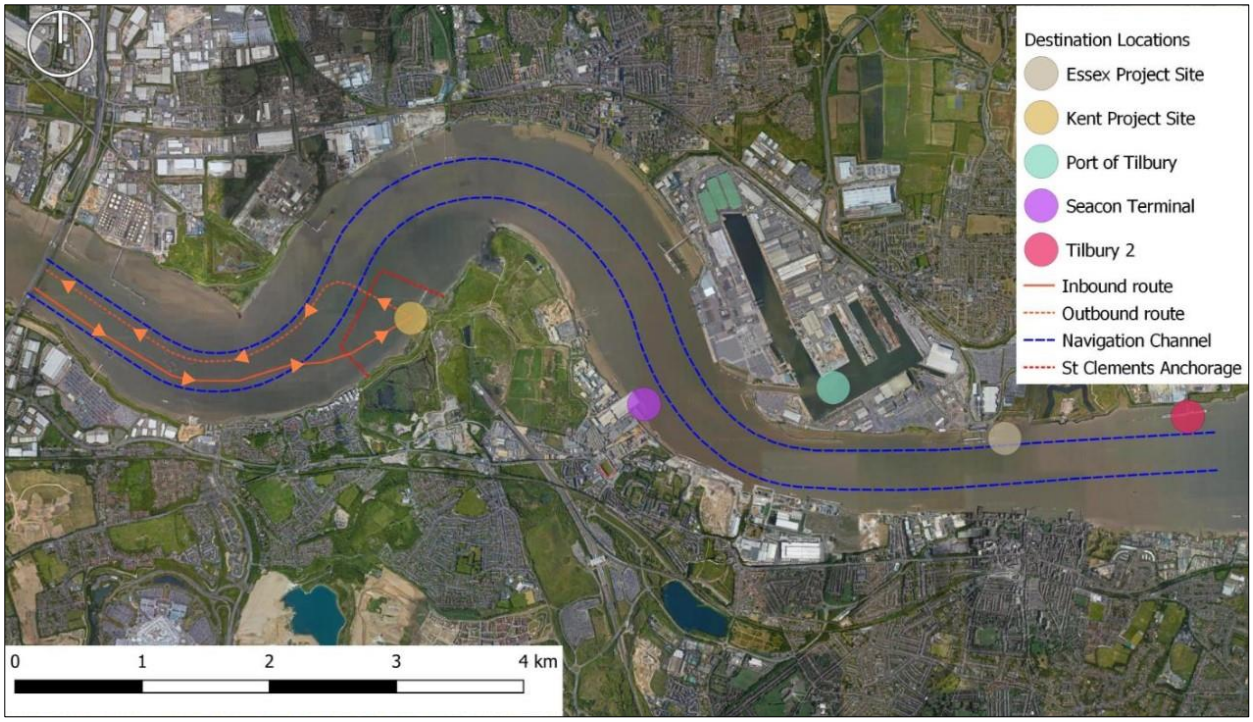


Figure 5-2 LRW preliminary route from downstream to the Kent Project Site

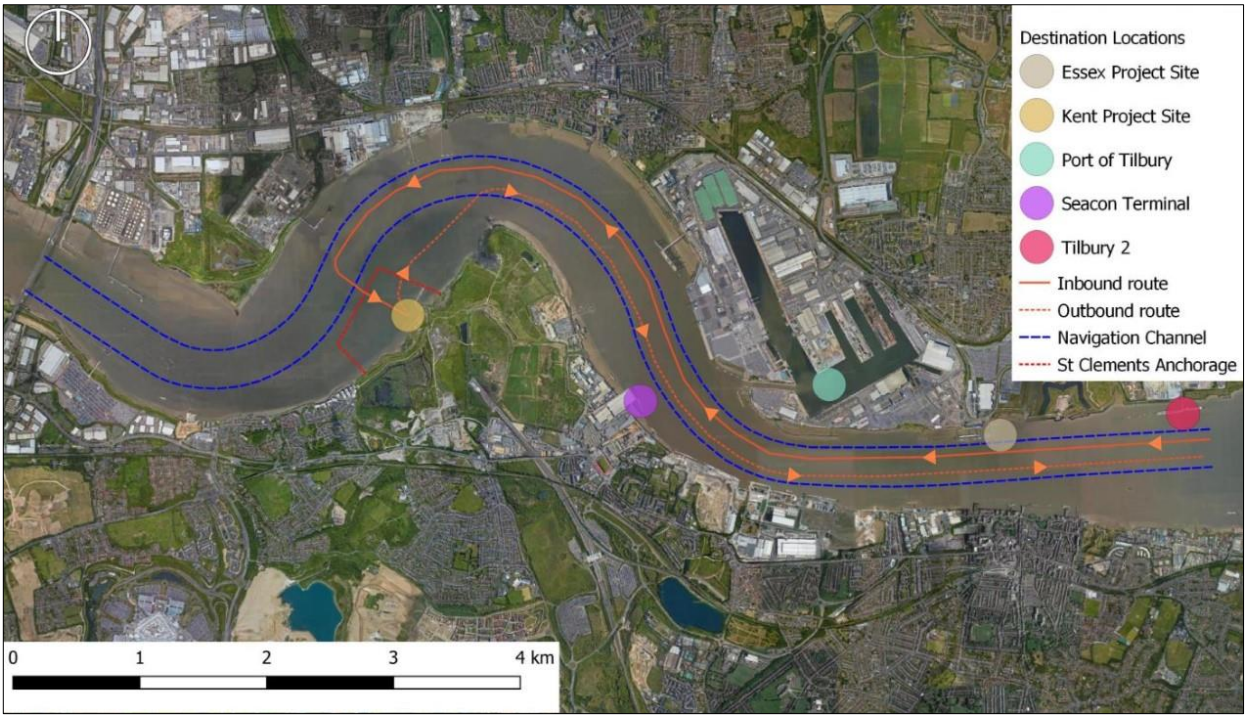


Figure 5-3 LRW preliminary route from upstream to the Seacon Terminal

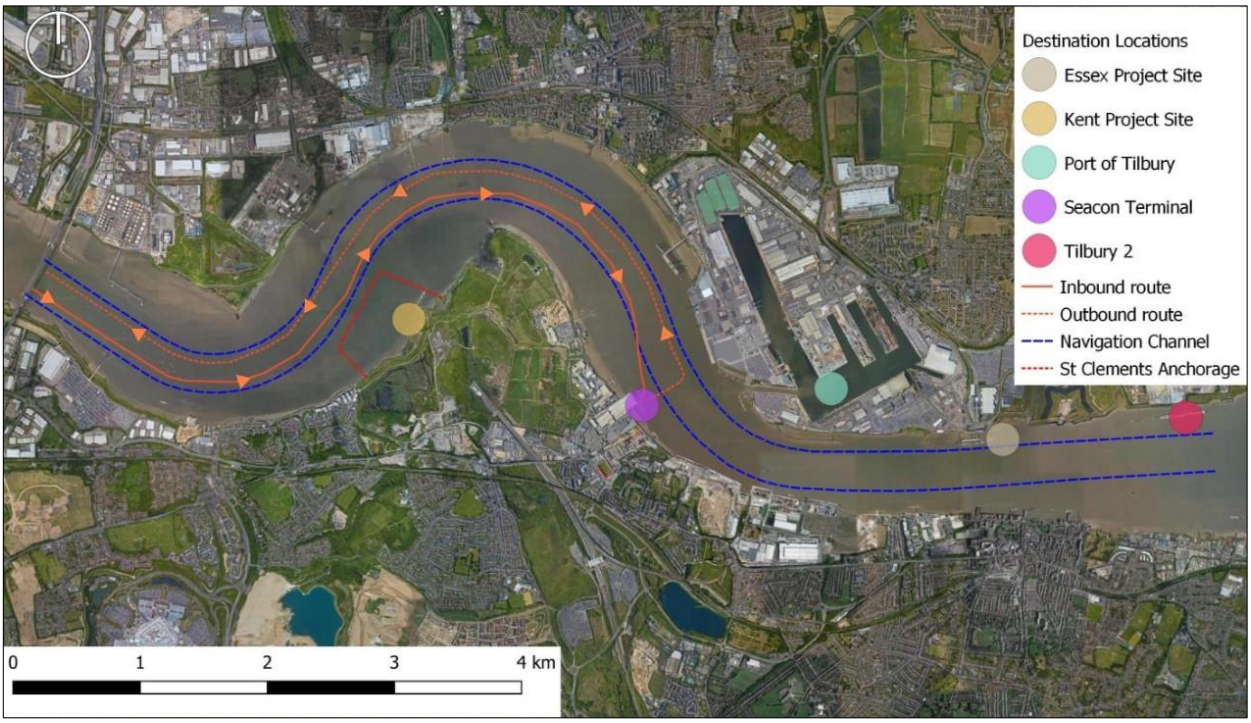
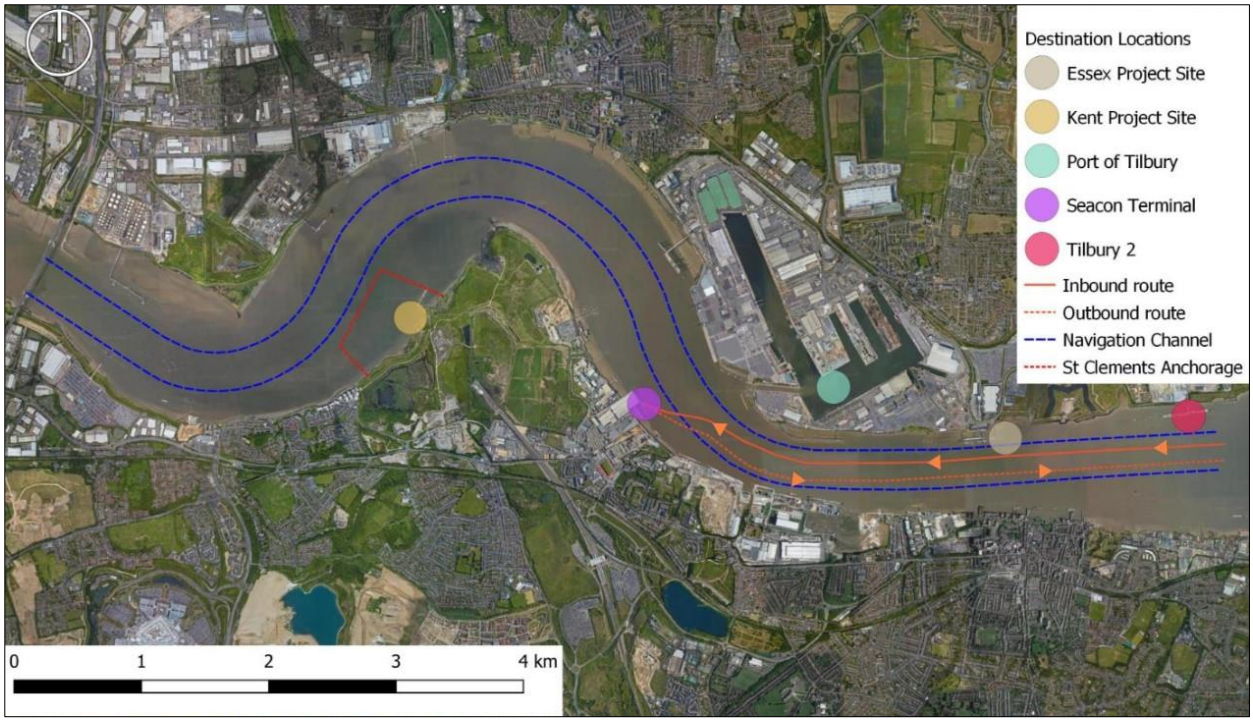


Figure 5-4 LRW preliminary route from downstream to the Seacon Terminal



Barge operations – material supply

5.17 Assumptions related to barge operations (material supply) are as follows:

1. Material Supply by barge will be undertaken during both the construction and operational phases;
2. Materials will be carried between the Port of Tilbury and London Resort, and following unloading empty barges will return to the Port of Tilbury;
3. The contractor will use barges of a capacity of approximately 1,000 tonnes (approximately 35m length, 10m width, 3m loaded draught);
4. The contractor will be free to determine the mode of marine transport (tow configuration);
5. Barges will be berthed at either the Seacon Terminal or Bell Wharf (dependent on the status of Bell Wharf) during construction phase and Bell Wharf and Whites Jetty during operational phase;
6. A total of two barges (either waste or material) will be able to berth alongside at Bell Wharf during the construction phase (dependent on the status of Bell Wharf);
7. At Bell Wharf the minimum navigable window will be one hour either side of high tide (two hours total) however if / once dredging is undertaken it is anticipated there will be no restriction. No restriction is considered at Whites Jetty or Seacon Terminal;
8. Due to the potential small navigable window, arrival, unloading and departure may not be possible at the same high tide. It is assumed that a NAABSA condition will be acceptable at Bell Wharf.

5.18 The various material supply scenarios are outlined in the following preliminary routes illustrated in the Figure 5-5 and Figure 5-6 below.

Figure 5-5 LRS preliminary route from Port of Tilbury to the Kent Project Site

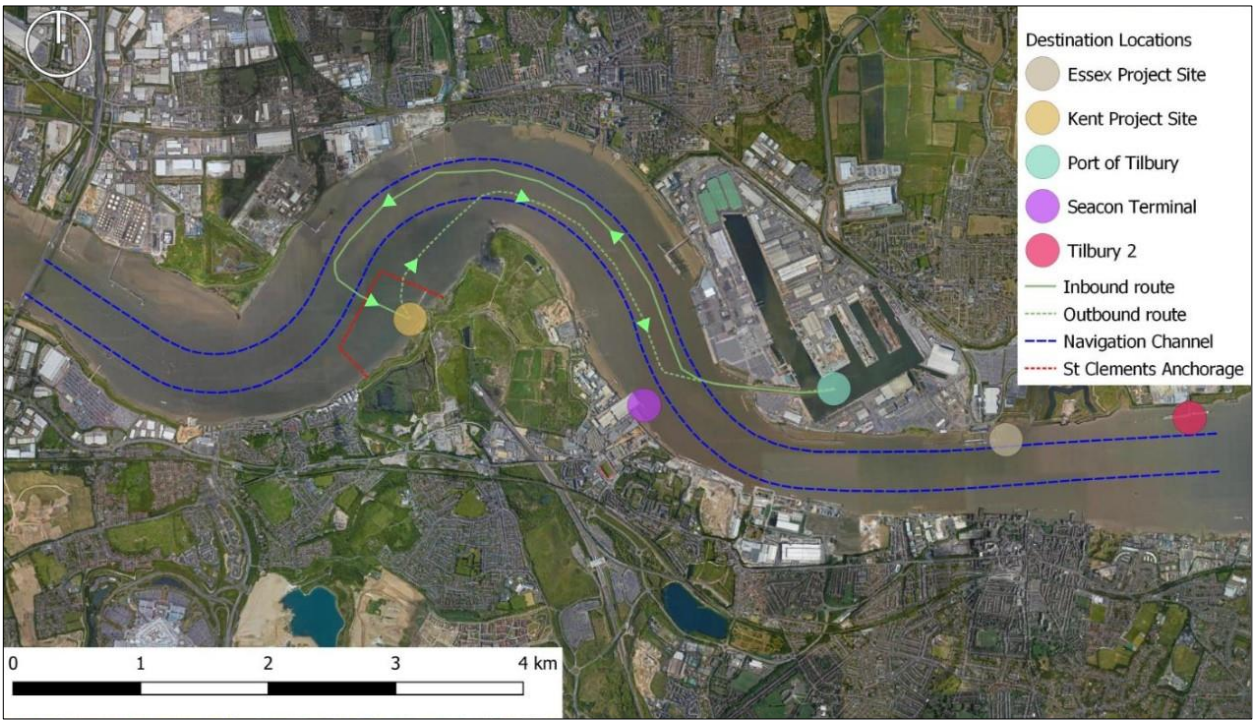
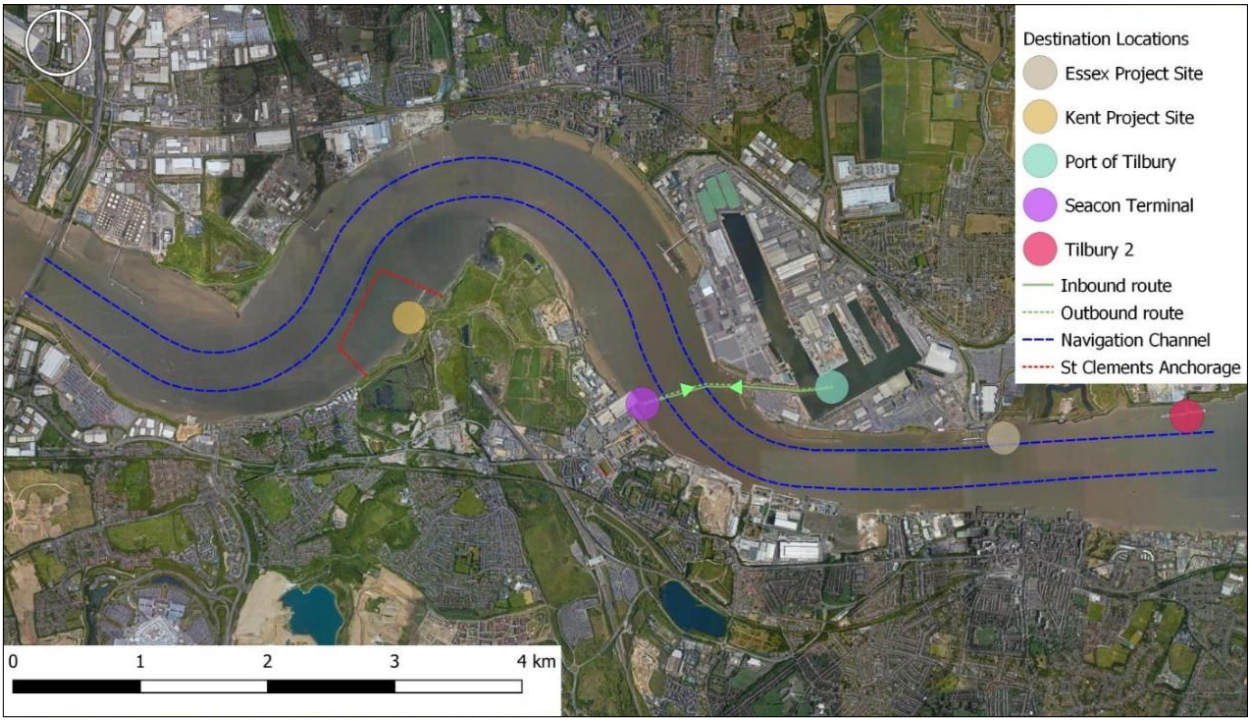


Figure 5-6 LRS preliminary route from Port of Tilbury to the Seacon Terminal



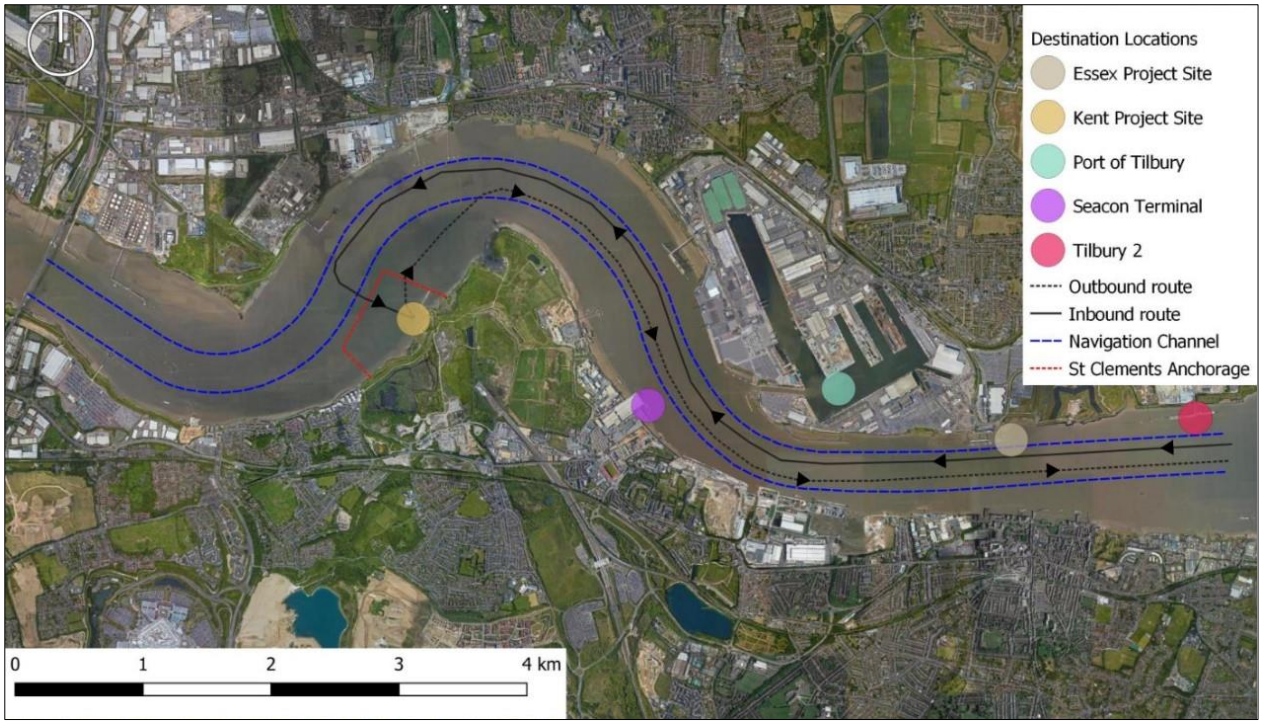
Barge operations – removal of dredged material

5.19 Assumptions relating to the barge operations relating to the possible dredging operations are as follows:

1. Hopper barges for dredging will be during the construction phase only;
2. Dredged material will be transported from the area adjacent to Bell Wharf to a designated licenced offshore disposal site located outside of the Thames Estuary (to be confirmed based on level of contamination);
3. The contractor will use hopper barges of a capacity of approximately 1,000 tonnes (approximately 35m length, 10m width, 3m loaded draught);
4. The contractor will be free to determine the mode of marine transport (tow configuration);
5. Barges will be moored alongside the dredging plant (assumed to be backhoe dredge) for loading of material; and
6. Assumed that two barges will be used for the dredging operations.

5.20 The dredging barge scenario is outlined in the following preliminary route illustrated in Figure 5-7 below.

Figure 5-7 LRD preliminary route from offshore disposal site to the Kent Project Site



Ro-Ro operations – waste removal and material supply

5.21 Assumptions related to Ro-Ro operations are as follows:

1. Ro-Ro vessels will be used during part of the construction phase and during the operational phase;
2. Ro-Ro vessels will operate between the London Resort and Tilbury2 as well as the Port of Tilbury;
3. The contractor will use Ro-Ro vessels with a capacity of 1,000 tonnes;
4. Ro-Ro vessels will be berthed at the new Ro-Ro platform on the Kent Project Site;
5. Ro-Ro vessels will handle both material supply and waste removal, it is assumed the various items will be segregated appropriately onboard; and
6. One Ro-Ro vessel will be able to berth during the operational phase.

5.22 The Ro-Ro vessel scenarios are outlined in the following preliminary routes illustrated in Figure 5-8 and Figure 5-9 below.

Figure 5-8 LRR preliminary route from Kent Project Site to Tilbury2

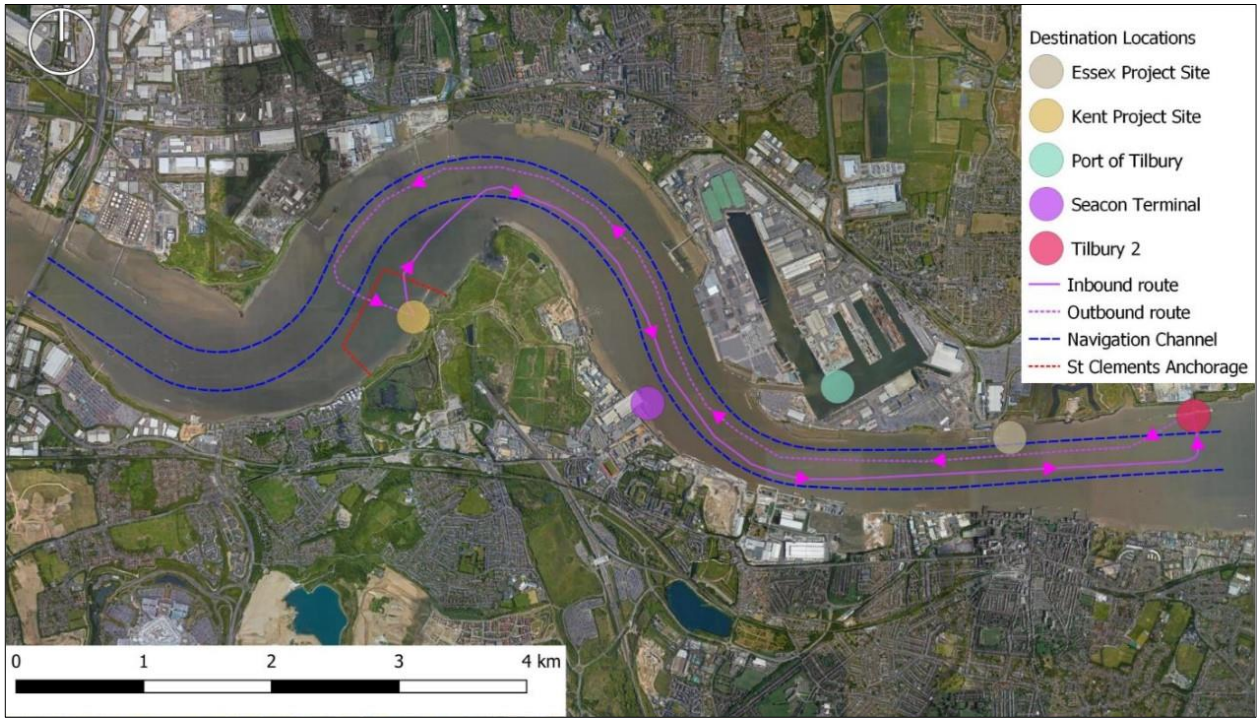
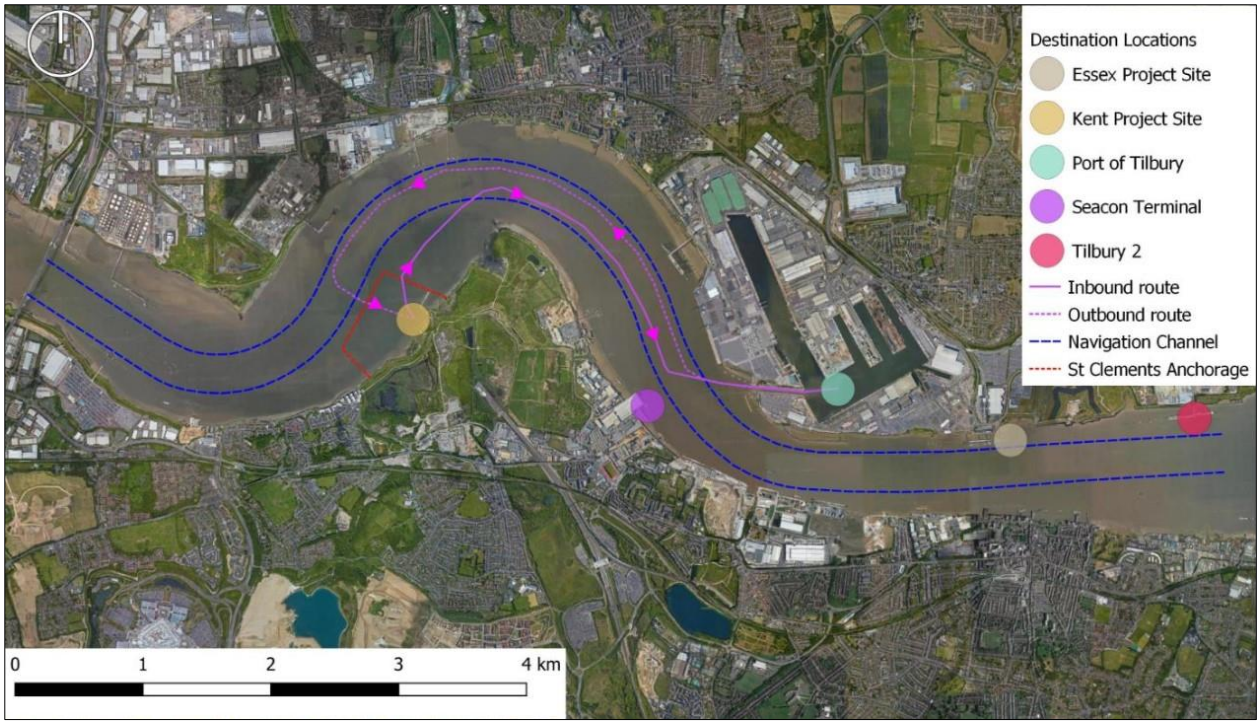


Figure 5-9 LRR preliminary route from Kent Project Site to the Port of Tilbury



Passenger vessel operations

5.23 Assumptions related to passenger vessel operations are as follows:

1. Passenger vessel operations relating to guest arrivals through the Thames Clippers services will be undertaken during part of the construction phase and during the operational phase. The transport of construction workers via the river has not been considered in this NRA;
2. Thames Clippers will operate a ferry service between central London and both the Kent and Essex Project Sites of the Resort, with a separate shuttle service operating between the Essex and Kent Project Sites;
3. Passenger vessels will be berthed at a new floating pontoon located off the upstream end of Bell Wharf (Kent Project Site) and on the downstream end of the Landing Stage (Essex Project Site);
4. At the Kent Project Site up to two vessels may be berthed at any one time;
5. At the Essex Project Site up to eight vessels may be berthed at any one time (two berths for operating Thames Clippers ferries and six berths for maintenance);
6. Berthing will be possible at any stage of the tide;
7. Embarkation/disembarkation will be via a floating pontoon and access gangways;
8. During the initial phase (Gate One) of the Proposed Development a single vessel will arrive/depart at approximately 30-minute intervals during peak times, times for embarkation/disembarkation will vary according to number of passengers;
9. Following full build-out, the arrival/departure of vessels may decrease to a 15-minute internal; and

10. Thames Clippers will operate 220-seater catamarans for passenger operations (40m LOA).

5.24 The passenger vessel scenarios are outlined in the following preliminary routes illustrated in Figure 5-10 and Figure 5-11 below.

Figure 5-10 LR preliminary route from the Essex Project Site to the Kent Project Site

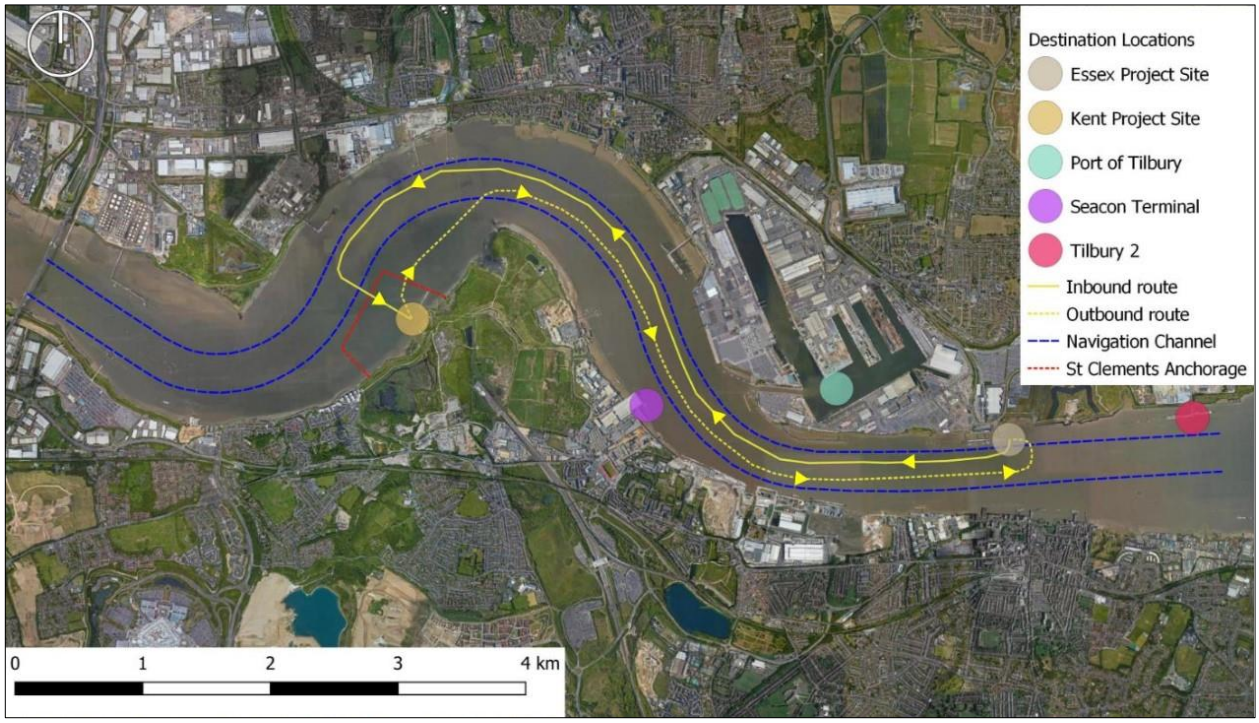
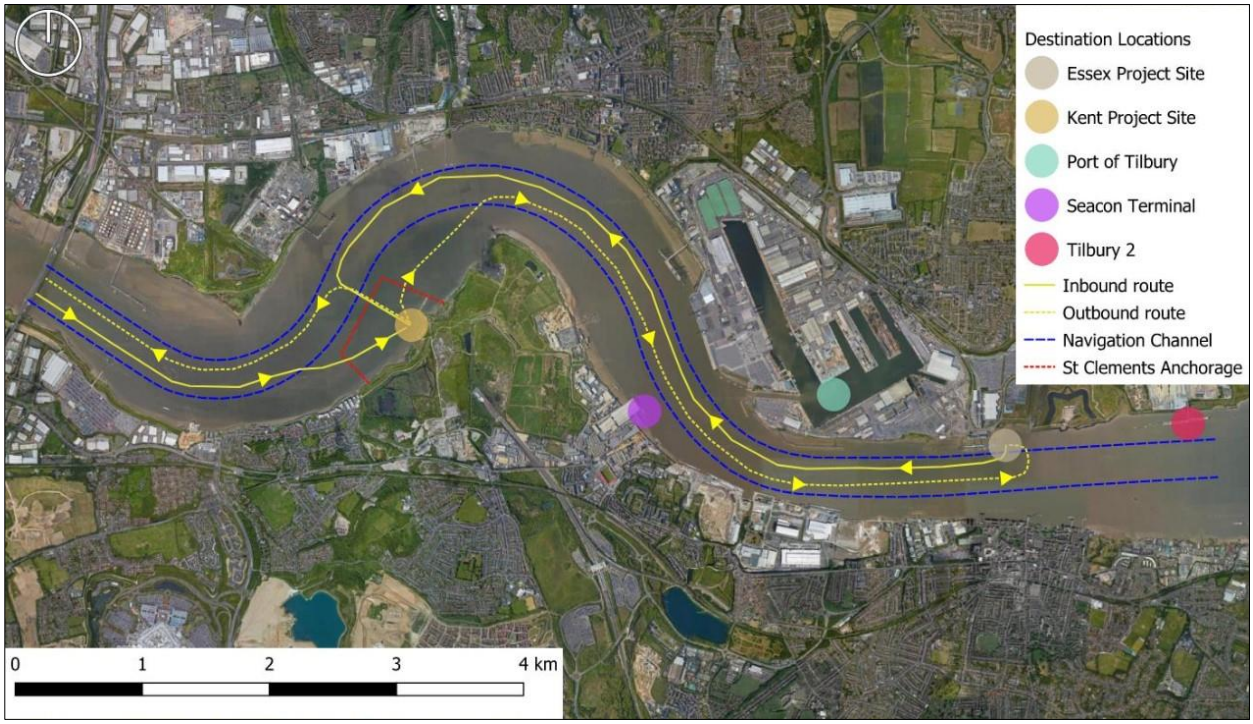


Figure 5-11 LR preliminary route from upstream to the Kent Project Site and on to the Essex Project Site



Vessel movements

5.25 The number of vessel movements relating to the Proposed Development for both construction and operational phases has been estimated for the Proposed Development. The following estimates are given for the anticipated vessel movements for logistics and passenger ferries:

- 10 of barge movements per day during the construction phase. It is noted that during the operational phase the number of barge movements is anticipated to reduce;
- 27 of passenger vessel movements per day between upstream and London Resort (extension of existing route);
- 42 of passenger vessel movements per day between London Resort and Tilbury (new passenger ferry services).

5.26 The passenger vessel movements are based on the indicative timetables produced by Thames Clippers, which are appended to ES Chapter 10 River Transport.

5.27 Based on the above information and the estimated material movements required it is assumed that there will be 2,000 barge movements per year during construction. An approximate estimate for the percentage increase of freight movements is based on the assumed vessel movements identified in Section 0 ranging between 20,000 to 30,000 per year. As such, the percentage increase per year would range between 7-10% during the construction phase, which will reduce during operational phase.

Waterside construction with the potential to impact navigation

5.28 Waterside construction activities related to the project are likely to include repairs to Bell Wharf and Whites Jetty, new pontoon installations (for passenger vessel berthing), and the construction of new outfalls into the Thames. At this stage the details of these activities are not finalised, and this part of the assessment is deferred until finalisation of the NRA at detailed design stage. The activities will be outside of the authorised navigation channel and undertaken in advance of the proposed operations (described above in section 5 paragraph 5.10). The risk to navigation is therefore anticipated to be low, although this will be assessed in greater detail within a Final NRA.

Landside construction with the potential to impact navigation

5.29 The London Resort Illustrative Masterplan 2.21 includes land raising and building construction on the Swanscombe Peninsula with the potential to negatively impact sightlines, radar and microwave transmissions.

5.30 Lighting of buildings, access routes, landscaping and rides/attractions has the potential to negatively affect the River Thames navigation lighting. A Lighting Statement accompanies the application (document reference 7.10).

Land raising and buildings

5.31 The masterplan does not propose to have any buildings within 300m of the radar station as shown in Figure 4-7, and no buildings or land raising are proposed within 500m of the tip of the Swanscombe Peninsula.

5.32 However, building and land raising is proposed further south on the peninsula, with buildings typically ranging between 25m and 55m in height.

5.33 Figure 5-12 below shows the PLA Pilot Sightlines visualised in 3D and overlaid on the illustrative masterplan (note that rides are extruded and not to scale). The sightlines are presented as 50m wide channels (25m either side of the centre line) and set at 21mAOD as per PLA guidance. Note that Figure 4-7 present the sightlines in plan view for reference.

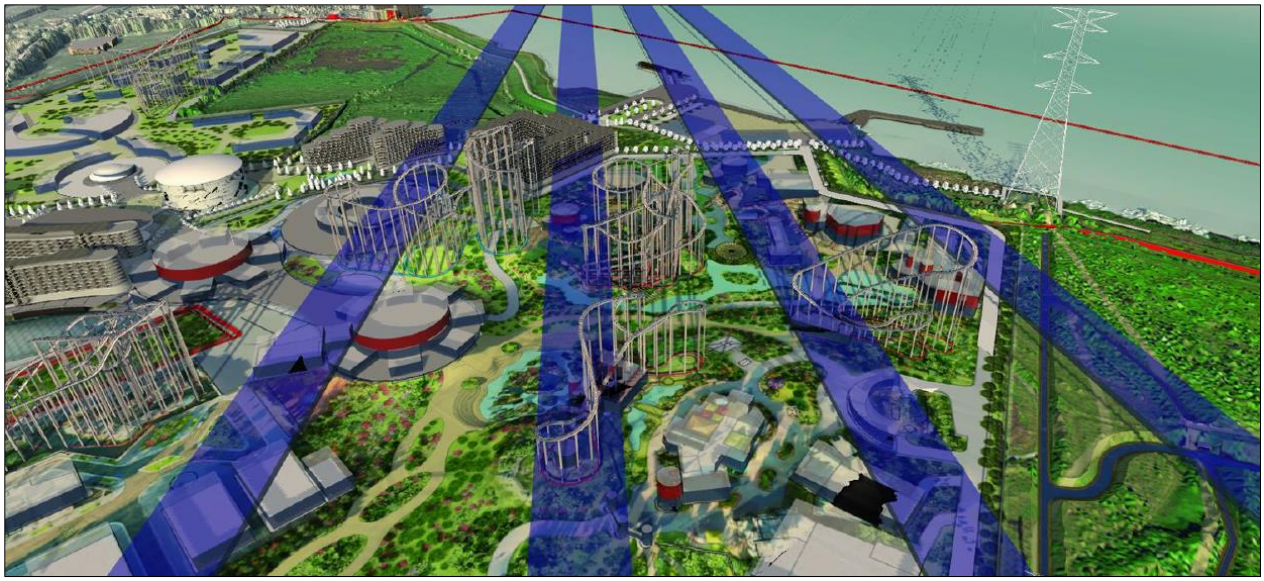
5.34 Figure 5-12 demonstrates that there is a potential obstruction to one of the sightlines and a partial obstruction to another. The two northerly sightlines are considered to have clear sightlines as the locations of the two northernly rollercoasters are to be confirmed.

5.35 Following further consultation with the PLA it is noted that the PLA are looking into placing CCTV at strategic positions to mitigate the risk of the Proposed Development affecting the PLA Pilot Sightlines.

5.36 The PLA have noted that Pilots use the existing electricity pylons, one of which is located within the Order Limits as a navigational aid. The Applicant is currently working with the PLA to understand if the Proposed Development will have any impact on this navigational aid.

5.37 The Applicant is actively consulting with the PLA on the topic of sightlines and navigation around the Swanscombe Peninsula, in order to understand and mitigate any negative impact of land raising and buildings on navigation.

Figure 5-12 3D visualisation of the PLA Pilot Sightlines overlaid on the illustrative masterplan



Lighting

5.38 Generally the majority of the riverside boundary for the Proposed Development consists of marshland and natural habitats, for which the lighting will be controlled to avoid spill light onto the River Thames, in compliance with the recommendations of the ILP GN01:20 'Guidance notes for the reduction of obtrusive light'. Further reference is made within the Lighting Statement (document reference 7.10).

5.39 The main area to address relating to impact on to the waterways, would be Bell Wharf. This will need to be compliant with any port lighting requirements, and also those for the Thames Clippers service.

5.40 Lighting from the Proposed Development will need to be designed to reduce/mitigate against any impact to navigation. The Lighting Statement (document reference 7.10) lays out the general approach to lighting at the Proposed Development.

5.41 In addition, the PLA has highlighted that it is best to avoid lights directed towards the River Thames including laser lights. If lights can be seen from the River Thames then red, green and white should be avoided where possible. The use of fireworks will need to be carefully considered, with the use of red fireworks to be avoided in particular.

5.42 All works that need to take place, such as diversions, moving existing navigation aids or installing temporary aids, shall be undertaken in accordance with relevant guidance and with the consent of the regulatory authorities.

Chapter Six ◆ Hazard identification

6.1 International Maritime Organisation (IMO) guidelines define a hazard as 'something with the potential to cause harm, loss or injury'. Under the PLA SMS these are categorised as generic or specific hazards.

Generic hazards

6.2 According to the PLA SMS these are '*hazards which involve an 'ordinary' or 'standard' vessel'*. Generic hazards are identified in Table 6—1.

Table 6—1 Generic hazards

Hazard	Description
Break-out	Failure of mooring or anchor
Collision	Any vessel striking or being struck by another vessel, regardless of whether the ships are underway, anchored or moored.
Contact	Any vessel striking or being struck by an external object. The objects can be: floating object (cargo, ice, other or unknown); fixed object, but not the sea bottom; or flying object.
Fire / Explosion	An unexpected fire or explosion on a vessel.
Floating / Navigation Hazard	A floating hazard or potential hazard to navigation.
Grounding	The unplanned contact by a vessel with the sea or river bed whilst underway, moored, alongside or at anchor; or the action of a vessel hitting the sea or river bed due to squat.
Loss of Hull Integrity	A sudden impairment or failure of a vessel's hull which allows water to ingress.
Pollution	The entry of harmful/polluting substances into the water or onto the foreshore (i.e. oils, chemicals, solid matter etc.)
Swamping	When a vessel takes on water from above its usual waterline due to the actions of another vessel or vessels.
Wash / Draw-Off	The action of sweeping waves made by a vessel passing through the water hitting shoreside infrastructure, moorings, the foreshore or another vessel.

6.3 The PLA SMS notes that '*these hazards contain generic causes and controls which are applied to all vessels*'.

Specific hazards

6.4 These hazards are based on the generic hazards above and focus on a particularly significant hazard, either due to the hazard's location or the type of vessel in question.

6.5 Specific hazards identified for the proposed operations are included within Table 6—2 to Table 6—9 below. These are derived from the generic hazards relating to break-out, collision and grounding. The remaining hazards, although serious, are not considered to be specifically elevated by the local conditions or proposed operations.

Table 6—2 Specific Hazards – Barge Operations – Waste Removal

Ref	Specific Hazard
1	LRW Tug and Tow collision with Freight Vessel while crossing authorised channel
2	LRW Tug and Tow collision with Freight Vessel anchored within St Clements Anchorage
3	LRW Tug and Tow grounding at or close to Bell Wharf
4	LRW Tug and Tow collision with LR Passenger Vessel at or close to Bell Wharf
5	LRW Tug and Tow collision with LRS Tug and Tow at or close to Bell Wharf
6	LRW Tug and Push collision with LRS Tug and Push at or close to Bell Wharf
7	Contact or Grounding of LR Passenger Vessel as a result of LRW Tug and Tow
8	Contact or Grounding of LRS Tug and Push as a result of LRW Tug and Push
9	Contact or Grounding of LRS Tug and Tow as a result of LRW Tug and Tow

Table 6—3 Specific Hazards – Barge Operations – Material Supply

Ref	Specific Hazard
10	LRS Tug and Tow collision with Freight Vessel while crossing authorised channel
11	LRS Tug and Tow collision with Freight Vessel anchored within St Clements Anchorage
12	LRS Tug and Tow collision with Recreational Vessel while crossing authorised channel
13	LRS Tug and Tow collision with Freight Vessel while waiting for use of Tilbury Lock
14	LRS Tug and Tow grounding at or close to Bell Wharf
15	LRS Tug and Tow collision with LR Passenger Vessel at or close to Bell Wharf
16	LRS Tug and Tow collision with LRW Tug and Tow at or close to Bell Wharf
17	LRS Tug and Push collision with LRW Tug and Push at or close to Bell Wharf
18	Contact or Grounding of LR Passenger Vessel as a result of LRS Tug and Tow
19	Contact or Grounding of LRW Tug and Push as a result of LRS Tug and Push
20	Contact or Grounding of LRW Tug and Tow as a result of LRS Tug and Tow
21	Contact, Grounding or Collision of Freight Vessel as a result of LRS Tug and Tow

Table 6—4 Specific Hazards – Barge Operations – Removal of dredged material

Ref	Specific Hazard
22	LRD Tug and Tow collision with Freight Vessel while crossing authorised channel

23	LRD Tug and Tow collision with Freight Vessel anchored within St Clements Anchorage
24	LRD Tug and Tow collision with Recreational Vessel while crossing authorised channel
25	LRD Tug and Tow grounding at or close to Bell Wharf
26	Contact, Grounding or Collision of Freight Vessel as a result of LRD Tug and Tow

Table 6—5 Specific Hazards – Ro-Ro Operations – Waste Removal and Material Supply

Ref	Specific Hazard
27	LRR collision with Freight Vessel while crossing authorised channel
28	LRR collision with Freight Vessel anchored within St Clements Anchorage
29	LRR collision with Recreational Vessel while crossing authorised channel
30	LRR collision with LRW Tug and Tow at or close to Bell Wharf
31	LRR collision with LRW Tug and Push at or close to Bell Wharf
32	LRR collision with LR Passenger Vessel at or close to Bell Wharf
33	Contact or Grounding of LR Passenger Vessel as a result of LRR
34	Contact or Grounding of LRW Tug and Tow as a result of LRR
35	Contact, Grounding or Collision of Freight Vessel as a result of LRR

Table 6—6 Specific Hazards – Passenger Vessel Operations

Ref	Specific Hazard
36	LR Passenger Vessel collision with Freight Vessel while crossing authorised channel
37	LR Passenger Vessel collision with Freight Vessel anchored within St Clements Anchorage
38	LR Passenger Vessel collision with Cruise Liner while crossing authorised channel
39	LR Passenger Vessel collision with Gravesend to Tilbury Ferry service while crossing authorised channel
40	LR Passenger Vessel collision with LRW Tug and Tow at or close to Whites Jetty
41	LR Passenger Vessel collision with LRS Tug and Tow at or close to Whites Jetty
42	LR Passenger Vessel collision with LRR at or close to Whites Jetty
43	Contact or Grounding of LRW Tug and Tow as a result of the LR Passenger Vessel
44	Contact or Grounding of LRS Tug and Tow as a result of the LR Passenger Vessel
45	Contact or Grounding of LRR as a result of the LR Passenger Vessel
46	Contact, Grounding or Collision of Freight Vessel as a result of the LR Passenger Vessel
47	Contact, Grounding or Collision of Cruise Liner as a result of the LR Passenger Vessel

Table 6—7 Specific Hazards – Wash

Ref	Specific Hazard
48	Wash on recreational vessels as a result Resort traffic near vicinity of Bell Wharf
49	Wash on recreational vessels as a result Resort traffic in navigation channel
50	Wash on recreational vessels as a result Resort traffic near vicinity of Essex Project Site

6.6 Some specific hazards have not been captured at this stage and will need to be considered once the associated designs have developed. These include the landside operations relating to impacts on the sightlines and additional lighting along with the vessel contact with marine infrastructure associated with the Proposed Development.

6.7 Furthermore, the concept of transporting construction staff via a designated ferry service has not been developed and will need to be considered in the Final NRA if this operation is carried forward.

Table 6—8 Specific Hazards – Landside Operations (sightline and lighting)

Ref	Specific Hazard
51	To be completed as part of the Final NRA following development of design and construction methodologies

Table 6—9 Specific Hazards – Waterside Operations (contact with quayside, pontoons etc.)

Ref	Specific Hazard
X	To be completed as part of the Final NRA following development of design and construction methodologies

Existing generic risk control measures

6.8 The generic risks are controlled by a wide range of existing control measures, including documentary measures and hardware.

6.9 The standard documentary measures as managed by the Regulatory Authority (PLA) include the following:

- The Regulatory Framework;
- Accurate Charts and other Navigational Information;
- Operational Manuals and Guidelines;
- Operating Procedures;
- Emergency Plans and Procedures;
- Permanent Notices to Mariners;
- Notices to Mariners;
- Ship Information System – POLARIS (vessel notification – PLA River Information System); and
- Formalised Training and Assessment.

6.10 These are supported and supplemented by a number of hardware components including radars, VHF communication systems, VTS equipment, tide gauges and various aids to navigation.

Hazard Workshop

6.11 A Hazard Workshop was undertaken to assess the specific hazards and review if there were any further hazards that need to be considered.

6.12 The workshop took place on 6th October 2020 and included relevant attendees from the PLA, PoT and Thames Clippers as well as the Applicant and WSP.

6.13 The workshop allowed all parties to consider the likelihood and severity of each hazard in accordance with the PLA SMS. The minutes of the workshop are available in **Error! Reference source not found.**.

Chapter Seven ◆ Risk analysis and assessment

Likelihood and severity

7.1 Risk is widely accepted as a being a measure of the likelihood and severity of a particular hazard. At the low end of the scale where likelihood is rare and the severity minor, then the risk would be considered negligible and acceptable. At the high end of the scale where likelihood is almost certain and the severity severe, the risk would be considered very high and intolerable.

7.2 Navigational Incidents reported under the PLA's marine SMS are classified by severity as follows[7]:

- **Minor incident**: Incidents, which do not affect persons and have a negligible cost implication (<£5K)
- **Serious incident**: Incidents which may involve slight/significant injury to persons and have a moderate cost implication (>£50K)
- **Very serious incident**: Incidents reported to the PLA Board, which involve serious injury or fatality and have a serious/major cost implication (>£2M)

7.3 The likelihood classifications described the table below within will be used for this assessment.

Table 7—1 Likelihood classifications

	Description	Definition	Operational interpretation
1	Rare	An event occurring less than once in every 500 years	Less than once every 500 years
2	Unlikely	An event occurring in the range of once in every 50 years to once in every 500 years	More than once every 50 years
3	Possible	An event occurring in the range of once in every 10 years to once in every 50 years	More than once every 50 years
4	Likely	An event occurring in the range of once a year to once every 10 years	More than once every 10 years
5	Almost Certain	An event occurring in the range of once a week to once a year	More than once a year

[7] http://www.pla.co.uk/Safety/SMS/Incident-Investigations-Reports-and-Data

7.4 The PLA has developed the following scoring matrix for assessing the risk level for the identified

Table 7—2 Risk Level Criteria (source PLA SMS)

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

Table 7—3 Total Risk (source PLA SMS)

	Scoring Range	Total Risk Outcome
1	1-3	Minor
2	4-8	Moderate
3	9-14	Serious
4	15-19	Very Serious
5	20-25	Severe

Assessment of risk

7.5 The assessment of the specific hazards is presented in full in **Error! Reference source not found.** along with the summary of the assessment in Table 7—4. These include consideration of the existing generic control measures described in Existing Generic Risk Control Measures section of this assessment. As well as excluding the impact of adverse weather conditions.

7.6 The existing control measures are generally considered adequate where the assessed risk score is below 10 (of 25). Following the hazard workshop none of the specific hazards considered scored greater than 9. Although it is noted that the landside and waterside operations will need to be assessed once further details of the Proposed Development additional control measures are recommended within Proposed additional control measures section with the aim of further reducing all risk scores.

Table 7—4 Summary Risk Scoring for the specific hazards (without additional mitigation measures)

Total Risk Outcome	Personnel	Environment	Property	Port users
Minor	24	24	24	24
Moderate	23	26	17	23

Serious	3	0	9	3
Very Serious	0	0	0	0
Severe	0	0	0	0
Total	50	50	50	50

7.7 The majority of the specific hazards are considered to be minor or moderate risks that are relatively evenly spread across the four assessment types (personnel, environment, property and port users). There is a total of 15 specific hazards that have scored as a serious risk, although it is noted that they all scored 9. There was considered to be no serious risk to the environment.

7.8 The worst scoring specific hazard related to collision with recreational vessels while crossing the authorised navigation channel as there was thought to a serious risk to personnel, property and port users. These account for the three specific hazards identified under the personnel and port users in Table 7—4 above.

7.9 The remaining serious risk related to damage to property as a result of a collision and contact or ground relating to tug and tow operations.

Chapter Eight ◆ Risk control

Proposed additional control measures

8.1 Following the completion of the Hazard Workshop none of the specific hazards scored greater than 9. None of the hazards was deemed to require additional control measures.

8.2 It should be noted that some specific hazards were unable to be assessed at this stage and must be assessed at detailed design stage.

8.3 However, in order to reduce any risk as much as possible the following list of potential additional control measures were discussed and identified. Additional control measures will be confirmed in the Final NRA.

Potential additional control measures:

- Marine Contractors to undertake detailed NRA;
- Timing of operations to be planned in order to avoid periods of highest river traffic;
- Engage with local stakeholders, especially around recreational race events etc.;
- Port Passage Plans:
    - Route chosen to achieve good visibility where crossing the authorised channel;
    - Speed control prior to crossing the authorised channel (maximise opportunity to observe oncoming vessels);
    - Port Passage Plans to be reviewed by the PLA;
- Limitations on the movement of hazardous material associated with the Proposed Development;
- Setting appropriate weather parameters to maintain safe operations;
- Permission to proceed for crossing the navigation channel, specifically relating to the LR passenger ferry services;
- Encourage operators to undertake pushing operations for barges rather than tug and tow;
- Appropriate and sufficient design of marine infrastructure including the fendering system; and

- Appropriate lighting design for the Proposed Development to reduce potential impact navigation.

Chapter Nine ◆ Conclusion

9.1 This Preliminary NRA has been undertaken with input from the PLA, PoT, and Thames Clippers.

9.2 Several options for the marine infrastructure for the London Resort have been considered within this Preliminary NRA; this options-based approach has been discussed and agreed with the PLA.

9.3 The anticipated vessel movements associated with the Proposed Development are likely to cause a low-level increase to the overall number of vessel movements that occur within the vicinity of the Kent and Essex Project Sites, with the majority of the service operations (waste and material supply) occurring more frequently during the construction stage between 2022 and 2029.

9.4 Based on the preliminary routes and vessel operations identified within this document, specific hazards have been identified. These are derived from the generic hazards relating to break-out, collision and grounding. The remaining generic hazards, although serious, are not considered to be specifically elevated by the local conditions or proposed operations.

9.5 A collaborative Hazard Workshop was conducted on 6th October 2020 with representatives from the PLA, PoT and Thames Clippers attending. The agreed outcome of the Hazard Workshop was that the highest risk scored only 9 (out of 25), based on the PLA risk matrix and although this is considered to be a serious risk, further mitigation is not specifically required for scores below 10. The worst scoring specific hazard related to collisions with recreational vessels while crossing the authorised navigation channel as there was thought to a serious risk to personnel, property and port users with the likelihood determined to be possible.

9.6 The primary conclusion of this Preliminary NRA is that the identified specific hazards are considered to be manageable using the existing control measures with the majority of the risks scoring either as minor or moderate. Additional potential control measures have been presented that could be implemented to further reduce any potential risks. The Proposed Development is not anticipating any unusual marine operations, based on the outcome of the Hazard Workshop, the operations are relatively typical and can be safely managed using the existing suite of control measures set out by the PLA.

9.7 It is noted that there are further specific hazards that will need to be considered as the detailed designs for the Proposed Development are progressed. These include further work relating to the impact of landside operations on sightlines, lighting, and vessel contact with proposed marine infrastructure. Operational considerations, such as transporting construction personnel to/from the site via a designated ferry service, should also be considered. These will be captured in the Final NRA.

Appendix 1.0 Risk Assessment (Specific Risks)

	Ref	Specific Hazard	Risk											
			Personnel			Environment			Property			Port users		
			L	S	R	L	S	R	L	S	R	L	S	R
Barge Operation - Waste Removal	1	LRW Tug and Tow collision with Freight Vessel while crossing authorised channel	Unlikely	Serious	6	Unlikely	Serious	6	Unlikely	Moderate	4	Unlikely	Moderate	4
	2	LRW Tug and Tow collision with Freight Vessel anchored within St Clements Anchorage	Rare	Serious	3	Rare	Serious	3	Rare	Moderate	2	Rare	Moderate	2
	3	LRW Tug and Tow grounding at or close to Bell Wharf	Rare	Minor	1	Rare	Minor	1	Rare	Moderate	2	Rare	Minor	1
	4	LRW Tug and Tow collision with LR Passenger Vessel at or close to Bell Wharf	Rare	Serious	3	Rare	Moderate	2	Rare	Serious	3	Rare	Moderate	2
	5	LRW Tug and Tow collision with LRS Tug and Tow at or close to Bell Wharf	Possible	Moderate	6	Possible	Moderate	6	Possible	Serious	9	Possible	Moderate	6
	6	LRW Tug and Push collision with LRS Tug and Push at or close to Bell Wharf	Unlikely	Moderate	4	Unlikely	Moderate	4	Unlikely	Serious	6	Unlikely	Moderate	4
	7	Contact or Grounding of LR Passenger Vessel as a result of LRW Tug and Tow	Unlikely	Moderate	4	Unlikely	Moderate	4	Unlikely	Serious	6	Unlikely	Moderate	4
	8	Contact or Grounding of LRS Tug and Push as a result of LRW Tug and Push	Unlikely	Moderate	4	Unlikely	Moderate	4	Unlikely	Serious	6	Unlikely	Moderate	4
	9	Contact or Grounding of LRS Tug and Tow as a result of LRW Tug and Tow	Possible	Moderate	6	Possible	Moderate	6	Possible	Serious	9	Possible	Moderate	6
Barge Operation - Material Supply	10	LRS Tug and Tow collision with Freight Vessel while crossing authorised channel	Unlikely	Serious	6	Unlikely	Serious	6	Unlikely	Moderate	4	Unlikely	Moderate	4
	11	LRS Tug and Tow collision with Freight Vessel anchored within St Clements Anchorage	Rare	Serious	3	Rare	Serious	3	Rare	Moderate	2	Rare	Moderate	2
	12	LRS Tug and Tow collision with Recreational Vessel while crossing authorised channel	Possible	Serious	9	Possible	Moderate	6	Possible	Serious	9	Possible	Serious	9
	13	LRS Tug and Tow collision with Freight Vessel while waiting for use of Tilbury Lock	Unlikely	Moderate	4	Unlikely	Moderate	4	Unlikely	Serious	6	Unlikely	Moderate	4
	14	LRS Tug and Tow grounding at or close to Bell Wharf	Rare	Minor	1	Rare	Minor	1	Rare	Moderate	2	Rare	Minor	1
	15	LRS Tug and Tow collision with LR Passenger Vessel at or close to Bell Wharf	Rare	Serious	3	Rare	Moderate	2	Rare	Serious	3	Rare	Moderate	2
	16	LRS Tug and Tow collision with LRW Tug and Tow at or close to Bell Wharf	Possible	Moderate	6	Possible	Moderate	6	Possible	Serious	9	Possible	Moderate	6
	17	LRS Tug and Push collision with LRW Tug and Push at or close to Bell Wharf	Unlikely	Moderate	4	Unlikely	Moderate	4	Unlikely	Serious	6	Unlikely	Moderate	4
	18	Contact or Grounding of LR Passenger Vessel as a result of LRS Tug and Tow	Unlikely	Moderate	4	Unlikely	Moderate	4	Unlikely	Serious	6	Unlikely	Moderate	4
	19	Contact or Grounding of LRW Tug and Push as a result of LRS Tug and Push	Unlikely	Moderate	4	Unlikely	Moderate	4	Unlikely	Serious	6	Unlikely	Moderate	4
	20	Contact or Grounding of LRW Tug and Tow as a result of LRS Tug and Tow	Possible	Moderate	6	Possible	Moderate	6	Possible	Serious	9	Possible	Moderate	6
	21	Contact, Grounding or Collision of Freight Vessel as a result of LRS Tug and Tow	Unlikely	Moderate	4	Unlikely	Moderate	4	Unlikely	Serious	6	Unlikely	Serious	6
Barge Operation - Removal of dredged material	22	LRD Tug and Tow collision with Freight Vessel while crossing authorised channel	Unlikely	Serious	6	Unlikely	Serious	6	Unlikely	Moderate	4	Unlikely	Moderate	4
	23	LRD Tug and Tow collision with Freight Vessel anchored within St Clements Anchorage	Rare	Serious	3	Rare	Serious	3	Rare	Moderate	2	Rare	Moderate	2
	24	LRD Tug and Tow collision with Recreational Vessel while crossing authorised channel	Possible	Serious	9	Possible	Moderate	6	Possible	Serious	9	Possible	Serious	9
	25	LRD Tug and Tow grounding at or close to Bell Wharf	Rare	Minor	1	Rare	Minor	1	Rare	Moderate	2	Rare	Minor	1
	26	Contact, Grounding or Collision of Freight Vessel as a result of LRD Tug and Tow	Unlikely	Moderate	4	Unlikely	Moderate	4	Unlikely	Serious	6	Unlikely	Serious	6
Ro-Ro Operation - Waste Removal & Material Supply	27	LRR collision with Freight Vessel while crossing authorised channel	Unlikely	Serious	6	Unlikely	Serious	6	Unlikely	Moderate	4	Unlikely	Moderate	4
	28	LRR collision with Freight Vessel anchored within St Clements Anchorage	Rare	Serious	3	Rare	Serious	3	Rare	Moderate	2	Rare	Moderate	2
	29	LRR collision with Recreational Vessel while crossing authorised channel	Possible	Serious	9	Possible	Moderate	6	Possible	Serious	9	Possible	Serious	9
	30	LRR collision with LRW Tug and Tow at or close to Bell Wharf	Possible	Moderate	6	Possible	Moderate	6	Possible	Serious	9	Possible	Moderate	6
	31	LRR collision with LRW Tug and Push at or close to Bell Wharf	Unlikely	Moderate	4	Unlikely	Moderate	4	Unlikely	Serious	6	Unlikely	Moderate	4

	Ref	Specific Hazard	Risk											
			Personnel			Environment			Property			Port users		
			L	S	R	L	S	R	L	S	R	L	S	R
Ro-Ro Operation - Waste Removal & Material Supply	32	LRR collision with LR Passenger Vessel at or close to Bell Wharf	Rare	Serious	3	Rare	Moderate	2	Rare	Serious	3	Rare	Moderate	2
	33	Contact or Grounding of LR Passenger Vessel as a result of LRR	Unlikely	Moderate	4	Unlikely	Moderate	4	Unlikely	Serious	6	Unlikely	Moderate	4
	34	Contact or Grounding of LRW Tug and Tow as a result of LRR	Possible	Moderate	6	Possible	Moderate	6	Possible	Serious	9	Possible	Moderate	6
	35	Contact, Grounding or Collision of Freight Vessel as a result of LRR	Unlikely	Moderate	4	Unlikely	Moderate	4	Unlikely	Serious	6	Unlikely	Serious	6
Passenger Vessel Operations	36	LR Passenger Vessel collision with Freight Vessel while crossing authorised channel	Rare	Serious	3	Rare	Moderate	2	Rare	Serious	3	Rare	Serious	3
	37	LR Passenger Vessel collision with Freight Vessel anchored within St Clements Anchorage	Rare	Serious	3	Rare	Moderate	2	Rare	Serious	3	Rare	Serious	3
	38	LR Passenger Vessel collision with Cruise Liner while crossing authorised channel	Rare	Serious	3	Rare	Moderate	2	Rare	Serious	3	Rare	Serious	3
	39	LR Passenger Vessel collision with Gravesend to Tilbury Ferry service while crossing authorised channel	Unlikely	Very Serious	8	Unlikely	Moderate	4	Unlikely	Very Serious	8	Unlikely	Serious	6
	40	LR Passenger Vessel collision with LRW Tug and Tow at or close to White's Jetty	Rare	Serious	3	Rare	Moderate	2	Rare	Serious	3	Rare	Moderate	2
	41	LR Passenger Vessel collision with LRS Tug and Tow at or close to White's Jetty	Rare	Serious	3	Rare	Moderate	2	Rare	Serious	3	Rare	Moderate	2
	42	LR Passenger Vessel collision with LRR at or close to White's Jetty	Rare	Serious	3	Rare	Moderate	2	Rare	Serious	3	Rare	Moderate	2
	43	Contact or Grounding of LRW Tug and Tow as a result of the LR Passenger Vessel	Rare	Moderate	2	Rare	Moderate	2	Rare	Serious	3	Rare	Moderate	2
	44	Contact or Grounding of LRS Tug and Tow as a result of the LR Passenger Vessel	Rare	Moderate	2	Rare	Moderate	2	Rare	Serious	3	Rare	Moderate	2
	45	Contact or Grounding of LRR as a result of the LR Passenger Vessel	Rare	Moderate	2	Rare	Moderate	2	Rare	Serious	3	Rare	Moderate	2
	46	Contact, Grounding or Collision of Freight Vessel as a result of the LR Passenger Vessel	Rare	Moderate	2	Rare	Moderate	2	Rare	Serious	3	Rare	Moderate	2
	47	Contact, Grounding or Collision of Cruise Liner as a result of the LR Passenger Vessel	Rare	Moderate	2	Rare	Moderate	2	Rare	Serious	3	Rare	Moderate	2
Wash from Resort traffic	48	Wash on recreational vessels as a result Resort traffic near vicinity of Bell Wharf	Possible	Minor	3	Possible	Minor	3	Possible	Minor	3	Possible	Minor	3
	49	Wash on recreational vessels as a result Resort traffic in navigation channel	Possible	Minor	3	Possible	Minor	3	Possible	Minor	3	Possible	Minor	3
	50	Wash on recreational vessels as a result Resort traffic near vicinity of Essex Project Site	Possible	Minor	3	Possible	Minor	3	Possible	Minor	3	Possible	Minor	3

Risk Level Criteria (source PLA SMS)

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

Total Risk (source PLA SMS)

	Scoring Range	Total Risk Outcome
1	1-3	Minor
2	4-8	Moderate
3	9-14	Serious
4	15-19	Very Serious
5	20-25	Severe

Appendix 2.0 Meeting Minutes – PLA Consultation

BUROHAPPOLD ENGINEERING

Minutes

Subject	London Entertainment Resort - PLA briefing	Job no	036325
Place	PLA Offices, Gravesend	Date	09 May 2017
Present	Lucy Owen, Deputy Director of Planning and Environment, Port of London Authority (PLA) Garry Shaw, Navigation Systems Engineer, PLA Helena Payne, Senior Planner, PLA Tim Corthorn, Deputy Harbour Master, PLA Alex Mortley, Marine Conservancy Manager, PLA Tim Norwood, Policy Officer (Thames Vision) David Palmer, BuroHappold (BH) Matthew Vaughan-Shaw, BH Christine Cambrook, BH	Distribution	As present plus Kevin Doyle, LRCH Karl Craddick, Savills BuroHappold project team

Objective of meeting: to reintroduce the Port of London Authority to the London Entertainment Resort project and establish lines of communication for future enquiries

Item		Action
1.0	**Reintroduction to the project**	
1.1	CC briefly ran through the background to the project including site location, previous red-line boundary.	
1.2	It was noted that the masterplan is currently being revised by Farrells, together with the resort designers, and that all design information tabled today is subject to change in the coming weeks. *Post meeting note:- It is understood that the design team is aiming for a Masterplan Concept freeze at the end of May 2017.*	
1.3	CC shared the current programme for preparation of the DCO application, with the key date noted as a December 2017 submission. *Post meeting note:- It is envisaged that the PEIR will be issued late July/early August 2017.*	
1.4	LO noted that Tilbury Docks are also in the process of preparing a DCO with a similar timeframe.	
1.5	CC talked through the current proposals for the site, DP emphasised that the masterplan is likely to change therefore proposals are indicative only.	

Minutes taken by: Christine Cambrook

2.0 Red line boundary	
2.1 LO reiterated the PLA position that a red line boundary which extends into the river without justification of the works proposed in those areas would be unhelpful to the PLA and could make the planning process less efficient as the PLA would have to safeguard any / all activities that could go on in the areas shown. The development is encouraged to considered carefully the areas required for specific operations.	
2.2 It was noted that the red line boundary is still under development.	
2.3 CC tabled an indicative red line boundary along the river that shows the red line being pulled towards land around the northern tip of the peninsula, except where works are likely to be required around the jetty and wharf.	
2.4 LO noted that any areas for moorings, outfalls and dredging requirements should all be considered within the DCO. AM noted that small works could fall outside the DCO and be considered at a later date if required.	
3.0 Sight lines and PLA Assets	
3.1 GS confirmed that the PLA asset locations, access requirements and sight lines are as per the previous information which was tabled.	
3.2 GS noted that access to the PLA assets is required 24/7.	
3.3 GS noted that the radar equipment within the radar facility on site has been upgraded. Only half of the radar system has been upgraded at this stage, no other physical changes have been made.	
3.4 DP queried if the PLA preference would be for sightlines to be maintained. LO noted this would be a question for the Harbour Master, but shared a summary of previous correspondence between the PLA and LRCH which set out potential mitigation should sightlines be impeded – including antenna raising / relocation of facilities. LO to share this correspondence with the BH team. Broadly the PLA would prefer for development to stay away from the north of the peninsula. This is best way to preserve the sight lines.	LO
4.0 River transport proposals	
4.1 CC summarised the proposed usage of the river for transport of people and materials. This includes discussions with Thames Clippers on transport of visitors and construction workers, and discussions with Tilbury on use of their facilities for storage of construction materials, and potential use during operation for logistics (food and waste).	
4.2 CC noted that these conversations are being led by Kevin Doyle of LRCH.	
4.3 LO welcomed the positive use of the river during both construction and operation, and confirmed that PLA would be looking to secure a numerical commitment to % of materials moved by river, which could be of the order of 85-90%. BH to feed back to rest of project team. LO also advised that materials, such as earthworks, that were retained and re-used on site would be considered to contribute to this % target.	BH
5.0 Works in / close to river	

Minutes taken by: Christine Cambrook

5.1	CC summarised the works in / close to the river as follows: - Raising of flood defences where required, to a level of approx. 7.2m. - Refurbishment or replacement of White's Jetty / Bell's Wharf as appropriate to facilitate river transport. - No specific works proposed to the Anchorage, accepting that works to the jetty/wharf may impact the anchorage. - No works currently proposed to Broadness Harbour. - LO noted that if there is potential to connect the public to the river, or educate the public about the river, this would be well received.	BH Note
5.2	LO noted that issues of proximity to the existing operational wharves should be considered through the PEIR.	
6.0	**Navigational Risk Assessment**	
6.1	MVS requested an example of a good practice NRA. LO to share.	LO
6.2	GS confirmed that PLA can provide AIS and VTS data – there is a cost to providing this data and a large amount of data is available. Incident management data is also available via the Harbour Master. BH to send data requests via LO who will coordinate PLA response.	MVS
6.3	MVS queried the level of consultation anticipated on operational procedures of existing facilities – MVS to include in NRA scope outline for PLA comment.	MVS
6.4	MVS noted that vessel swept path analysis was not anticipated to be required for LER as there are no close constraints (bridge piers etc.)	
6.5	LO confirmed that any impact on sightlines across the peninsula should be included in the NRA.	
6.6	CC noted that any assumptions about future operation expansion should be coordinated with the assumptions made in the EIA cumulative impact analysis, for project consistency.	
6.7	MVS requested further information about the anchorage, physical and operational constraints. GS confirmed that Jim Denby of PLA would be the best contact. BH to include information request in NRA outline for LO to coordinate.	MVS
6.8	AM noted that the NRA could be seen as an iterative process. The NRA issued with the DCO application will be referred to as a Preliminary NRA and it will be a matter of condition that this will be updated as new and more detailed information becomes available, such as final vessel sizes and frequencies, temporary works e.g. for outfall construction etc. These could be captured as part of the protective provisions under the DCO.	
7.0	**Other**	
7.1	LO emphasised that PLA would like to see a draft DCO as early as possible, in order to avoid last minute discussion, particularly around issues such as the right of navigation.	BH to feedback
7.2	LO noted that a record of meetings should be kept as this will be required to draft the statement of common ground at a later date.	PLA/BH
7.3	LO noted that the project team will need to engage with the MMO.	CC

Minutes taken by: Christine Cambrook

7.4	AM noted that more specific proposals are required around the works within the river. For example, if extensive jetties are proposed to be rebuilt hydrodynamic assessment may be required, but if limited to 1-2 piles and a floating pontoon, this may not be required. PLA has data available on the river bed, sedimentation etc. LO noted that for the DCO application the worst case should be assessed.	Note
7.5	CC and LO will agree a schedule of meetings. Next meeting date to be agreed – likely early July.	CC/LO

The minutes detailed herein reflect the author's recollection of the discussions held during the meeting detailed above. If you feel that these minutes are inaccurate; proposed additions, corrections and/or comments must be submitted to the author in writing within five working days of the date of these minutes. If no written responses are received within this period, these minutes will be deemed the official record of the meeting.

Minutes taken by: Christine Cambrook

BUROHAPPOLD ENGINEERING

Minutes

Subject	London Resort - Navigational Risk Assessment	Job no	036235
Place	PLA Offices, Gravesend	Date	06 November 2017
Present	Lucy Owen, Deputy Director of Planning and Environment, Port of London Authority Cathryn Spain, Harbour Master Lower, PLA Tim Corthorn, Deputy Harbour Master Lower, PLA Lyn Funnell-Kindlen, Deputy Harbour Master Lower, PLA Garry Shaw, Navigation Systems Engineer, PLA Simon Phillips, *Harbour Master (SMS & VTS)* PLA Jon Beckett, *SMS Manager*, PLA Kevin Doyle, London Resort Company Holdings Christine Cambrook, BuroHappold Matthew Vaughan-Shaw, BuroHappold	Distribution	As present, plus: Karl Craddick, Savills BuroHappold project team

Objective of meeting: to discuss the Navigational Risk Assessment being undertaken for the London Resort project, and receive PLA feedback on scoping and information available.

Item	Action
1.0 Introductions and Project Updates	
1.1 KD gave an update on project design progress over the last few months, and programme moving forwards. Consultation is anticipated Q1 2018, with DCO submission Q2 2018. Opening date is anticipated to be Easter 2023.	
1.2 Multiple IP providers are in place for the project and information will be released on the first of these in the coming months.	
1.3 MOUs have been signed with both Thames Clippers and Port of Tilbury London Limited; the project intends to use the river for both passenger and materials movement.	

Minutes taken by: Matthew Vaughan-Shaw

1.4 Consultation is ongoing with Highways England, the Environment Agency, Natural England, Historic England	
2.0 River Transport	
2.1 Passenger - KD confirmed that Thames Clippers will be providing a passenger transport service; currently this is anticipated to transport 10% of the project's London visitor catchment, which will be 3-4% of the overall visitor numbers. There is an aspiration to increase this. Thames Clippers are also in discussion with others about a river boat service in the local area.	
2.2 Goods – KD confirmed the project intention to use the Port of Tilbury as a construction logistics point. The project aspiration is for 95% or more of construction materials movement to be by river.	
3.0 Statement of Common Ground	
3.1 The project and the PLA will need to prepare a Statement of Common Ground in support of the DCO. LO commented that it would be worth drafting this SOCG early, as this will help focus the discussions on items that need to be agreed. KD to pass on template for SoCG to LO.	KD
4.0 Alternative Jetty Location	
4.1 The alternative jetty location that has been discussed separately was raised. KD/CC reiterated that this alternative location is essentially a fall-back option, should it be found at a later date that the existing White's Jetty is not suitable for reuse. Currently, it is anticipated that the deck will need to be rebuilt but that the piles are structurally sound.	
4.2 LO shared that the planning application for the new Sea Scouts slipway adjacent to Ingress Park has just been resubmitted following previous refusal.	
5.0 Navigational Risk Assessment	
5.1 MVS ran through the assumed scope of the NRA. The following points were noted by MVS:	
a) The NRA will describe the full 6 mile assessment area, as previously agreed, but will focus upon the areas of greatest impact – stretching between the St Clements Anchorage and the Port of Tilbury. b) The main vessel movements introduced by the project will be passenger ferries during operation, and barges, potentially during construction and operation. c) The NRA at DCO stage will be a Preliminary NRA. This will be quantitative in terms of assumed vessel movements, but qualitative in terms of risk assessment (high/medium/low). The Preliminary NRA will include assumptions regarding the types of vessels and frequency/timing of movement. The pathway for finalising the NRA will be set out within the Preliminary NRA. d) The NRA will be prepared based upon consultation with the PLA, Thames Clippers and the Port of Tilbury. Consultation with other local operators is not proposed at this stage but may be undertaken during finalisation of the NRA at the recommendation of the PLA. e) BH propose that two risk workshops will be held during the preparation of the NRA.	
5.2 The following information and initial feedback to the NRA scoping was provided by PLA:	

a) The area of river around Tilburyness is already heavily congested due to high density of operating berths in this area. This includes the lock entrance at the Port of Tilbury which is influenced by the time required for large ships to enter the docks. Port of Tilbury currently allow 1 hour for large vessels to enter the docks, with smaller vessels such as tugs fitting in between the larger vessel. Turnaround in the lock is faster at hightide and regular callers are granted scheduled slots to ensure lock availability.
b) The eastern side of the peninsula, opposite Port of Tilbury, will be the area of highest risk – as in this area there will be tugs and barges, as well as large vessels – both of which have limited manoeuvrability.
c) The Tilbury 2 project will remove some of the current scheduled traffic movements away from this area which will increase available lock time and reduce congestion until such time that new services are brought into the enclosed dock.
d) The project NRA should be prepared in close liaison with Port of Tilbury to understand how vessels waiting to enter the docks could be managed – for example it may be necessary to have vessels wait adjacent to the project site and only cross the river when they have clear entry into the docks.
e) Peak traffic, particularly around the Port of Tilbury, will be during periods of high water. Avoidance of these times, if possible, may mitigate navigation risks.
f) PLA confirmed that river traffic is managed through VTS, and that there is one person monitoring this stretch of river at all times. Any vessels under 50 tonnes / 40 m are not required to contact VTS. There is also a PLA patrol vessel on the river, however it is only one vessel and a long stretch of river to cover.
g) The PLA Safety Management System (SMS) is available online (http://www.pla.co.uk/assets/marinesmsmanual.pdf) and sets out the rules and control measures etc. PLA to share risk assessment.
h) Navigational lighting requirements for jetties are as per IALA standard. Lighting / sequences of lighting on rides may need to be considered in terms of avoiding any navigational impacts.
i) Navigation around the Peninsula – the PLA noted that the existing electricity pylons are currently used as a navigation aid. KD/CC noted that the project has no intention to move these pylons.
j) Technologies for navigational use are prioritised as follows: 1) Radar (passive), 2) AIS 3) CCTV. The existing radar facility could be raised. KD/CC noted that the project has no intention to build on this area hence relocation unlikely. — BH
k) The impact of any new buildings on the landside of the radar will need to be assessed. Reflection of signals can result in 'ghost readings'.

6.0 St Clement's Anchorage

6.1 Anchorage to west of peninsular is called St Clement's Anchorage and should be referred to as such.

6.2 PLA confirmed that these are PLA moorings and use of this anchorage is for large vessels who cannot continue due to tide.

6.3 It would typically be used by one large vessel at a time, and use is limited to 12 hours. The only consultation required on this anchorage is with the PLA.

7.0 Data Available

7.1 AIS data is available at a charge of £100/data day, for a specific geographic area. It can be provided in spreadsheet format. 2 hours of data would contain approx. 30,000 records. Radar data may be used to fill gaps in AIS data (small vessels) – although this is not considered necessary for this study. Rather than requesting large amounts of data, data can be — BH/LO — BH

	requested for specific stretches of the river and times of day / tide, in order to understand the most constrained periods. BH to consider what data they require to inform the assessment and submit a request via LO.	
7.2	Small leisure crafts are not required to carry AIS hence will not be captured in PLA data. There are small boat moorings within the NRA study area (e.g. Thurrock Yacht Club) – BH should consult with Thurrock Yacht Club to understand the timing of their race nights.	BH/LO
7.3	Incident records are available, these include information on date, time of incident, and vessels involved. The SMS explains the categories of incidents. Since 2010 there have been 394 recorded incidents. BH to consider what data they require to inform the assessment and submit a request via LO.	LO BH
7.4	PLA to share example NRAs.	
7.5	Project to consider if cumulative impacts need to be considered in NRA, similar to for EIA process – e.g. Lower Thames Crossing, Tilbury 2.	
8.0	**Bells' Wharf / White's Jetty**	BH
8.1	Both White's Jetty and Bell's Wharf have limited tidal working hours which will be taken into account when developing the transport strategies and NRA.	
8.2	Potential use of Bell's Wharf as a NAABSA – BH are to discuss with future barge operator and review the PLA Code of Practice for Berthing.	
8.3	PLA publish guidance on the operation of commercial berths; however the onus is on the operator to ensure it is safe for vessel use.	
8.4	The PLA hydrographic department have historic survey data, it may be possible to see if the area has been dredged before, e.g. whilst in use during the Channel Tunnel construction. There is likely to be a charge for this data.	
8.5	If dredging is required it would be likely to be considered capital dredging.	CC
9.0	**Further meetings**	
9.1	LO suggested regular meetings could be set up. CC suggested regular phone calls are agreed to provide high level updates, with meetings scheduled as required.	
9.2	CC to propose timing and frequency of phone calls for PLA agreement.	

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Minutes taken by: Matthew Vaughan-Shaw

BUROHAPPOLD ENGINEERING

Minutes

Subject	London Resort - PLA Introductions	Job no	0042936
Place	Via Teams	Date	06 April 2020
Present	David Palmer (BH) Christine Cambrook (BH) Lucy Owen (PLA) Molly Tucker (PLA)	Apologies	None
Distribution	David Palmer (BH) Christine Cambrook (BH) Lucy Owen (PLA) Molly Tucker (PLA) London Resort Project Team		

Objective of meeting: To initiate discussion with the PLA on the London Resort project. [Note that this call took place during the Covid-19 Lockdown period.]

Item			Action
1.0	**Introduction / Project Updates**		
	1.1	CC summarised the current project programme, including the intent to submit DCO in November 2020, and for public consultation to be undertaken either pre- or post-summer holiday period.	
	1.2	LO is familiar with the previous iterations of London Resort.	
	1.3	CC noted that the project Order Limits will now include part of Tilbury Docks.	
	1.4	LO confirmed that the PLA key concerns will be as per previous project iterations – that is primarily – sightlines and radar interference across the peninsula, works in the river / relating to river transport (jetty / wharf proposals), encouraging use of the river, and specific infrastructure in the river such as outfalls.	Project team to note
	1.5	LO noted that the project team should carefully consider the extent of the Order Limits within the river, and the provisions the DCO applies for. The less of the order limits within the river, the lower the impact on the PLA. The project team should consider if they wish to disapply the River Works Licence, etc. How this is managed can lead to significant work later in terms of applications under protected provisions.	Project team to note

Minutes taken by: Christine Cambrook

1.6 LO noted that the Lower Thames Crossing DCO is currently anticipated around the same period.	
1.7 The PLA are familiar with the process around the EMF interference assessment. The relevant technical expert within the PLA is Gary Shaw, LO will pass on queries on this.	
2.0 Working Arrangements	
2.1 Given the current Covid-19 Lockdown situation, distributed working arrangements are in place. At the present time, this is working well for the London Resort project team and for the PLA, and there is no reason why virtual meetings should not function as stakeholder consultation.	
2.2 CC ran through the changes within the project team and confirmed that Kevin Doyle is no longer engaged on the project. Buro Happold's Andrew Comer may cover part of Kevin's old role on behalf of the client.	
2.3 CC and LO discussed that a charging agreement would need to be put in place, to cover PLA technical inputs up to DCO submission. LO to review previous arrangements and share.	LO
2.4 CC noted that as in the past, the project team and the PLA would need to establish regular meeting and communication protocols, including keeping a record of meetings as required for the DCO process.	

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BUROHAPPOLD ENGINEERING

Minutes

Subject	The London Resort	Job no	0042936
Place	Teams	Date	19th June 2020
Present	Port of London Authority (PLA): Lucy Owen (LO); John Stevenson (JS) London Resort Holdings Company (LRCH): Andy Martin (AM) Savills: Chris Potts (CP) WSP: Richard Hutchings (RH) Buro Happold: Andrew Comer (AC)	Apologies	
Distribution	PLA Team, London Resort Client and Professional Team		

Objective of meeting: Re-introduction and Project Update, etc

Item			Action
1.0	**Introductions**		
	1.1	Brief introductions to those taking part in the discussion.	
	1.2	AM provided a brief background to session, highlighting the desire of LRCH to ensure alignment with the PLA as a key stakeholder.	
	1.3	LO welcomed the opportunity to discuss and ensure that the DCO process proceeds as efficiently as possible.	
2.0	**Planned Development and Process**		
	2.1	CP introduced the approach being adopted for the Resort development, including the projected programme for submission of the DCO application towards the middle of November 2020.	
	2.2	CP offered to send copies of the recently submitted Environmental Scoping report and a copy of the draft DCO documentation as soon as it was ready for issue. LO keen to receive and begin the internal PLA review. (this was sent by CP post-meeting).	CP
	2.3	LO pointed out that this application will be the third DCO to be promoted this year, all within a short distance of each other and that this may place strains on the resources of reviewing stakeholders, including PLA.	
	2.4	CP explained the Order Limits shown in the Scoping Report retain the same extent of River around the Peninsula as previously identified, plus the	

	area of River at Tilbury. There is significant work at present which will allow the Order Limit in the River to be drawn more tightly as the pre-application process continues.	
2.5	CP offered to progress any required Cost Recovery Agreement. LO is drafting one for the Lower Thames Crossing and will issue as a draft to CP.	LO
3.0	**Key Technical Issues**	
3.1	AC described the current evolution of the masterplan, now being promoted by Apt. The key change to the project is the engagement with the Port of Tilbury (PoT) and their plans for development of facilities on the north bank of the Thames.	
3.2	RH described the opportunity that engagement with PoT offers, including the ability to intercept and provide park and 'glide' for visitors to avoid the Thames crossings and A2 plus use of the River for delivery of construction and logistics	
3.3	RH also described the ongoing discussions with Thames Clipper to provide visitor access to the Resort via the River, with increased services from central London as well as cross-River from the PoT. Up to an estimated 15% of arrivals will be accommodated by this means of transport.	
3.4	AC highlighted the key technical issues that the development will interest the PLA, including: • Increased vessel movements the River Thames requiring navigation impact assessment and review of vessel movements/ manoeuvring; • The construction and refurbishment of permanent structures within the River Thames corridor including ferry stations at PoT and the Ebbsfleet Peninsula, wharf and ro-ro facilities at the Peninsula, and the potential for a water-source heat pump (WSHP) at the Peninsula; • Consideration of the PLA radar station and lines of sight that existing on the Peninsula and any proposed infrastructure components impinging on the River, eg surface water outfall pipes.	
3.5	LO confirmed that these will be the key issues, together with any potential environmental impacts / juxtaposition issues with the wharves (AC confirmed that the client is holding detailed conversation with the EA in respect of the polluted ground and its impact on ground water).	
3.6	A short discussion ensued between LO and AM regarding the informal 'sailing club' located at the apex of the Peninsula. LO foresaw the need to manage the relationship with the club.	Watching brief by AM
4.0	**Other Issues**	
4.1	LO will discuss internally with their Harbourmaster, environmental manager and others in the PLA technical team so that early engagement can be promoted with the relevant Client consultant team. LO to retain external legals in order to start discussing the draft DCO	LO/ AC to follow up
4.2	LO flagged the recent report prepared by the PLA: https://server1.pla.co.uk/assets/drowningpreventionstrategy.pdf and made the point that safety issues for visitors, staff, construction workers, etc should be considered. AC agreed to flag this with the team developing the overall development security strategy.	AC to flag to Security team

4.3	No other matters were flagged for discussion at the meeting.	

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BURO HAPPOLD

Minutes

Subject	London Resort - PLA Consultation	Job no	0042936
Place	Via Teams	Date	05 August 2020
Present	*PLA* Lucy Owen – Dep. Director Planning & Environment Cathryn Spain - Harbour Master Lower Miles Featherstone – Deputy HML Garry Shaw – Navigation Systems *BuroHappold* Christine Cambrook Jonathan Ogilvie – Marine Infra David Maclachlan – Digital Infrastructure Nilani Venn – Water *WSP* David Dixon – Transport Modelling	Apologies	None
Distribution	As present plus internal project teams		

Objective of meeting: To update the PLA on design development for the London Resort project and obtain feedback.

Item	Action
1.0 Introductions & Approach	
1.1 LO confirmed that the PLA have received the project consultation material including the PEIR report.	
1.2 LO noted that the PLA are pleased to see the use of the river proposed within the scheme, and are keen to see that the project does not only consider visitors when looking at passenger transport (construction workers, staff).	
1.3 DD gave an update on the project traffic modelling which is in delay and is a critical path item for programme. This will impact the river transport and in-river infrastructure required to support this transport.	
1.4 There was discussion on the merits of the project disallowing the PLA act and use of protective provisions, as is standard for a DCO, or an alternative approach whereby the PLA powers were retained.	
1.5 P*ost-meeting note: Following consultation with the legal team, the project will look to disallow the PLA act, with appropriate protective provisions.*	
2.0 In-river works	
2.1 TILBURY	

Minutes taken by: Christine Cambrook

2.2	LO enquired as to the proposed works at Tilbury, and if the DCO is seeking to acquire the river bed. CC confirmed that the project is not seeking to acquire the river bed, and this is probably to do with the 'baggy fit' red line boundary as overlaid on the land and works plans. Temporary possession in this location is more likely. The PLA would like more detail as to the proposed works in Tilbury.	Note
2.3	JO talked through the proposed in-river works at Tilbury, i.e. the extension to the landing stage to accommodate a Thames Clipper service and boat maintenance area. *(See attached sketch)*.	
2.4	JO shared that BH and Thames Clipper had developed proposals for this area showing alternative vessel mooring arrangements – BH believe the current proposal is preferable as it has all vessels entering from downstream – away from the cruise ships – but PLA advice on this is sought.	PLA
2.5	LO highlighted that the proposals will not work with the current arrangement for the Gravesend-Tilbury ferry service, which comes in to the rear of the landing stage.	
2.6	LO noted the PLA Pilot Cutter also uses the downstream end of the landing stage and operates a frequent service. There is potential for this to conflict with the proposed clipper service.	
2.7	LO noted that PLA staff currently park cars on the landing stage; it is assumed that another arrangement will need to be made for PLA staff parking as part of the works. The edge protection will also need to be updated, though this detail can be considered post-DCO provided appropriate signposting / protective provisions are agreed.	Note
2.8	LO queried how the existing services – ferry, pilot cutter will operate while the new facility is under construction.	
2.9	JO queried if the extension to the landing stage could be pulled further south, closer to the navigable channel, to allow the ferry to move behind it.	
2.10	PLA queried if a new ferry facility could or should be considered as part of the project proposals. LO explained that the ferry is a public service procured by the council, similar to local buses. The current operator is Jetstream Tours. PLA was not aware when the contract was due for the current operator.	
2.11	PLA to mark up the vessel routes on a plan for project team to consider.	PLA
2.12	JO will provide a plan of the works overlaid on the PLA chart to assist in the PLA review.	JO
2.13	*SWANSCOMBE*	
2.14	JO talked through the proposed in-river works at Swanscombe. Works are contained in the area around the existing Bell Wharf. *(See attached sketches)*.	
2.15	Works at Swanscombe include the refurbishment of the existing Bell Wharf, and the construction of a new passenger jetty to receive Thames Clipper vessels. This will be approximately 80m long and located at the –2mCD contour to ensure sufficient clearance.	
2.16	LO queried the number of vessels, and noted there may be a continuous churn of boats at peak times.	

2.17 The project is currently considering two options at Swanscombe to provide water access which can be used irrespective of the tidal cycle. This is necessary to deliver on the river transport aspirations.	
2.18 Option A is to provide a floating ro-ro facility, with an approximately 12m wide access route for vehicles.	
2.19 JO queried if ro-ro access on the Thames needs to be dual sided for any particular reason, such as tidal constraints.	
2.20 CS responded that there are plenty of examples of one-sided berthing on the Thames, but the PLA would seek to understand the proposed vessels / propulsion systems, and would use simulation to confirm the berthing operations.	
2.21 Option B is to refurbish the existing Whites Jetty. This will require intrusive structural investigation; the technical feasibility of this may not be confirmed pre-DCO.	
2.22 LO confirmed that the PLA do not have any issue with the project including two options for flexibility, but the project team must ensure that the worst case is assessed within the ES.	
2.23 JO confirmed that both options are looking to avoid dredging.	
2.24 CC queried how the project needed to consider the anchorage. CS to review drawings and confirm.	CS
2.25 VESSELS	
2.26 JO enquired as to if there are ro-ro vessels of the type of scale required currently operating on the Thames. The only example BH have found is the Woolwich Ferry which is a flat top vessel. PLA note that the ramp is located on the jetty and the ramp onshore is the moving aspect.	
2.27 CS/MF confirmed that while there are plenty of ro-ro vessels on the Thames, they are significantly larger than the scale proposed for the project.	
2.28 CS queried where the vessels would be going from the project site. (T2 / Landing stage?). CS shared that at T2 the smallest ro-ros are approx. 150m LOA, and these vessels are having problems at T2 as the moorings are not suitable for smaller vessels – berths are being modified to accommodate. The implications of this for the project are that small ro-ro vessels may not be able to use many other facilities on the Thames.	
3.0 Development impacts on existing sightlines / nav systems	
3.1 MICROWAVE LINKS	
3.2 GS confirmed the height of the microwave links as follows:	
3.3 Link path 02 – installed at 40m	
3.4 Link path 03 – 25m at Grays, 65m at Erith, likely to be ~25-35m where crossing the site.	
3.5 GS noted that the PLA would not want to put all microwave routing through one location for resilience.	
3.6 GS noted that a microwave repeater could be provided at a suitable high point on site and the path route adjusted.	

Minutes taken by: Christine Cambrook

3.7	If this approach were to be followed, the PLA would require 24 hour access to this equipment, for 2 people and a vehicle.	
3.8	DM queried if the PLA would accept sharing a location with a mobile provider. GS confirmed there are no technical impediments, and they do already co-locate with some telecoms operators in some locations. There would be some practical issues around access and awareness that would need to be considered.	
3.9	CC noted that the likely locations for any such equipment would be on top of the proposed hotel buildings, but the hotel operator's commercial requirements would also need to be considered.	
3.10	DM queried if there is an opportunity to raise the link paths in other locations. GS confirmed these are already located at high points and there is no opportunity for raising.	
3.11	*RADAR*	
3.12	GS described the operation of the radar, and noted that while the radar does not transmit behind itself, radar can experience a secondary return, where signals are reflected from multiple surfaces. There is currently nothing behind the radar, but the proposed development will increase the chance of this secondary return.	
3.13	GS noted that raising the radar is a potential solution, to a height of approx. 15m. This would require a new platform or structure as the existing mast adjacent has not been designed to accommodate radar at a raised height.	
3.14	At the current radar location, the equipment will not be able to see the proposed passenger jetty and vessels arriving and departing from this location.	
3.15	DM queried if the PLA use propagation modelling software to understand the impacts. GS stated that in certain cases software has been used to determine this. If it is required it will be used, but the PLA is confident of assessing the impact on the radar.	
3.16	GS queried if the project has considered the risk of PLA equipment being at increased risk of tampering given the increase in visitors to the site. CC confirmed that it has not been considered to date, but the project can consider this. LO noted that there could be a nice design solution to this that incorporates some signage explaining the equipment, and provides increased security.	
3.17	GS reiterated the PLA needs to have access to this area, as per previous discussions.	GS
3.18	GS will share a baseline in terms of what the PLA currently see on the radar image from the site.	
3.19	*PILOT SIGHTLINES*	
3.20	CC shared the visualisations of the impact of the development on the 4 pilot sightlines that cross the peninsula. At present, 2 of the 4 sightlines are significantly impacted. Note that the development shown within Gate 1 is illustrative only.	CC
3.21	CC to send these images to CS for detailed review and comment.	
3.22	LO noted that the DCO could consider some wording whereby the parameter plans are accepted as maximum heights, but the sightlines are carved out within them as an area to be protected / reviewed with PLA. A	

	solution would need to not only consider the initial design of the project but also future rearrangements of the Gate areas.	
4.0	**Navigational Risk Assessment**	
4.1	JO ran through a number of questions on the NRA, the conclusions of these were:	
4.2	The NRA should consider both construction and operational risks.	
4.3	The proposed approach / structure of the NRA is standard and still valid.	
4.4	The preliminary NRA will be prepared to accompany the DCO and final NRA will be prepared in accordance with conditions / protective provisions.	
4.5	The previous scope for the NRA needs to be extended to the east, to accommodate the proposed works at the Tilbury landing stage. *(See attached sketch for approval of the scope).*	CS / LO
4.6	The PLA hydrographic department have information on wave and current conditions. CS will share contact details.	CS
4.7	The project should contact Thurrock Yacht Club and let them know about the public consultation process. While they may not look favourably on the development they should have an opportunity to share their views.	
4.8	Incident records – PLA will check if they have had any significant incidents since the previously provided data (2010-2017) and will share any additional data if relevant.	
4.9	BH to set up a hazard identification workshop, following confirmation of preferred vessel movement strategy. Attendees should include Thames Clipper, Port of Tilbury, and potentially a logistics / construction operator.	JO
4.10	CS noted that the proposal for clippers at Tilbury is complex and the PLA will require a certain amount of detail on this in order to be clear that this works for the DCO stage.	
5.0	**AOB**	
5.1	CC noted that the next meeting will be set up for early September, as will the Hazard Workshop.	
5.2	MF queried if the project will be incorporating RNLI facilities. CC and JO responded that it has been considered, but not confirmed. MF noted that the RNLI facilities should be referred to within the NRA if they are proposed.	
5.3	PLA shared that the RNLI have no facilities in this stretch of river (nothing between Tower and Gravesend), and due to the number of visitors proposed at the site, as well as the general expansion / development of London to the East, the RNLI are looking for a new location in the area. The PLA would support the inclusion of RNLI facilities.	

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Minutes taken by: Christine Cambrook

Appendix 3.0 Meeting Minutes – Hazard Workshop

BURO HAPPOLD

Minutes

Subject	London Resort Navigational Risk Assessment	Job no	0042936
Place	Via Teams	Date	06 October 2020
Present	Jonathan Ogilvie – Buro Happold Christine Cambrook – Buro Happold Leah Southern – Port of Tilbury Nick Evans – Port of Tilbury Steve Lyons - Port of Tilbury Sean Collins - Thames Clippers Mitchell Thorpe – Thames Clippers Miles Featherstone - PLA Tom Stoddart-Scott – LRCH Peter Popper - LRCH Richard Hutchings – WSP	Apologies	None
Distribution	As present + internal teams as required		

Objective of meeting: To complete the Preliminary Navigational Risk Assessment for the London Resort.

Item			Action
1.0	**Introductions**		
	1.1	Those present introduced themselves.	
2.0	**Background & Baseline**		
	2.1	JO ran through the background to the NRA, including:	
	2.2	The proposed marine infrastructure – the three options under consideration on the Kent project site, and the extension to the landing stage at Tilbury.	
	2.3	The agreed physical extents of the NRA.	
	2.4	The baseline data for vessel movements, based on DfT data. JO notes the steep increase in vessel numbers between 2017 and 2019, and that the data does not include all vessel types.	
	2.5	MF queried if vessel movement data has been requested from the PLA; JO confirmed it has and that new data could be reviewed post DCO submission when available.	
	2.6	JO summarised the incident records. SC noted it would be useful to have more detail on the specific incidents at the Tilbury Landing Stage as this could inform the proposed extension. NE confirmed there have been some incidents on the Tilbury Ro-Ro, and some minor incidents with the ferry when it changed operators. PoT to confirm if any more detailed incident	PoT

Minutes taken by: Christine Cambrook

	information is available that may inform the design or operation of the landing stage extension. <u>Post meeting note:</u> *Following a further review of the PLA incident data it was observed that the processed data had not picked up all the recorded incidents as such the updated overview for the recorded incidents are provided below. It is noted however that this does not affect the findings of the NRA as the key conclusions from the incident data remain:* *Near misses – 113; Minor – 315; Moderate – 5; Serious – 31; Very Serious – 1; Total - 465*	
2.7	JO summarised key dates and timings, and types of vessels using each area.	
2.8	Routes up and downstream for different vessels / functions were discussed. SC had a number of comments on the preliminary proposed vessel routes – mainly around when vessels would enter and exit the navigable channel. Thames Clipper to share passage plans with BH for information only to assist BH in revising the preliminary routes.	TC
2.9	TSS commented that waste removal via Seacon is not anticipated, and there may be passenger arrival coincident with construction work (either construction workers or during construction of Gate 2 whilst Gate 1 is operational). JO confirmed that waste removal via Seacon is included as an option for flexibility, and that the NRA will consider coincident passengers and construction vessels.	BH
2.10	TSS commented that the Ro-Ro operations would are thought to be going via the Port of Tilbury but that at this stage Ro-Ro is uncertain. JO will include a route into the Port of Tilbury for flexibility.	BH
2.11	Please note the draft NRA had been circulated in advance of the call.	
3.0	**Risk Assessment Scoring**	
3.1	The risk assessment matrix was completed collaboratively. The following comments were raised and have been incorporated within the risk assessment:	
3.2	The scoring has been undertaken with consideration of the normal control measures in place, using the PLA risk matrix and scoring parameters as identified in their Safety Management System (SMS).	
3.3	The grouping of different operation types in terms of their risk profile was agreed due to the similarity between the hazards for the various operating vessels. This was presented via a colour coding system during the workshop.	
3.4	The assessment was conducted based on normal operating conditions i.e. no adverse weather conditions. It was noted that additional weather specific mitigations should be considered including the identification appropriate operational weather parameters. These will need to be taken into consideration by the specific operators and included within the Final NRA	BH note
3.5	Tug and tow represent a higher risk than tug and push due to reduced manoeuvrability in adverse wind/tidal conditions. Additional tug and push specific hazards included to address the difference.	
3.6	The impact of boat wash on recreational users should be considered. These were added as specific hazards in the Risk Assessment.	

3.7	Contact with mooring structures should be considered at a later stage when the detailed design of the structures can be considered; appropriate fendering is the primary mitigation.	Note
3.8	Passage planning will be a key part of mitigation, to be developed at a detailed design stage. Specific attention to be paid to tidally restricted vessels leaving PoT. PLA to review passage plans when developed.	BH/TC/PLA
3.9	A specific mitigation could be considered regarding Thames Clippers requiring Permission to Proceed to cross the navigable channel. Permission to Proceed is a standard mitigation for all reporting vessels.	
3.10	CC enquired as to any additional risks associated with working in hours of darkness. It was confirmed that navigation during hours of darkness occurs along the river and risks are managed through operational procedures.	
3.11	MF noted that a general concern on increased traffic on the river and potential impact on operations. When additional baseline data is available for vessel movements the percentage increase of vessel movements can be refined within the Final NRA	Note
3.12	NE raised the potential need to differentiate between piloted and non-piloted vessels. MF noted that piloting is a mitigation measure, and thought that most vessels being considered in the NRA would be piloted.	
3.13	Following completion of the risk assessment matrix, the initial risk scores are low (<10). Mitigation measures identified will further reduce risks in specific areas, however the low risks shown are a consequence of the normal control measures in place to manage risk on the river and that the majority of the operations in the vicinity of the Project Sites will be at low speeds.	
3.14	Based on the low scores and the need to develop the designs further to apply specific mitigation methods, it was agreed that the NRA would present the initial risks and identify possible additional control measures to further reduce the scores.	
3.15	The preliminary NRA should identify the outstanding areas to be assessed at a later date / when further design information is available.	BH

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Minutes taken by: Christine Cambrook