



## Application for Development Consent

Application Reference Number: WWO10001

# Navigational Issues and Preliminary Risk Assessment

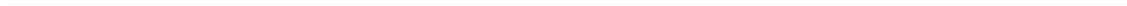
Doc Ref: **7.20.06**

## Cremorne Wharf Depot - Annexes: Hazard Logs

APFP Regulations 2009: Regulation **5(2)(q)**

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January 2013

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## Annexes

### List of annexes in order

**Annex A: Hazard log introduction**

**Annex B: Most likely hazard log - Phase B: Shaft and connection tunnel construction**

**Annex C: Worst credible hazard log - Phase B: Shaft and connection tunnel construction**

## Annex A – Hazard log introduction

### A.1 Construction Phases

A.1.1 The assessment has been divided into 4 distinct project phases to allow for assessment of hazards and the proposal of risk reduction measures commensurate with the risk posed by different operations associated with the project. These are:

- Phase A – Site set-up
- Phase B – Shaft and connection tunnel construction
- Phase C – Permanent works site.

### A.2 Risk assessment criteria

A.2.1 **Risk Matrix** - The following risk matrix has been used to provide a risk score that combines severity of a particular consequence together with the probability of the consequence occurring.

Likelihood	1 - Rare	1	2	3	4	5
	2 - Unlikely	2	4	6	8	10
	3 - Possible	3	6	9	12	15
	4 - Likely	4	8	12	16	20
	5 - Almost Certain	5	10	15	20	25
Severity		Level 1	Level 2	Level 3	Level 4	Level 5

A.2.2 **Risk Classification** – The risk score indicates the magnitude and acceptability of the risk in accordance with the ALARP principle.

Score	Classification	Definition
1 - 2	Slight	No Action is required
3 - 4	Minor	No additional controls are required, monitoring is required to ensure no changes in circumstances
5 - 9	Moderate	Efforts should be made to reduce risk to 'As Low As Reasonably Practicable' (ALARP). Job can be performed under direct supervision of Senior Officer
10 - 14	High	Efforts should be made to reduce risk to 'As Low As Reasonably Practicable' (ALARP). Job can only be performed after authorisation from Harbour Master and after further additional

		controls required under the circumstances
15 - 25	Extreme	Intolerable risk. Job is not authorised

A.2.3 **Severity** – The criteria used throughout this assessment has been provided by the Port of London Authority. It identifies four distinct areas of risk with the probable consequences associated with each hazard assessed in terms of harm or loss to:

- People (life);
- Environment;
- Operational Impact, and;
- Media Attention.

People	Level
First aid case / Medical treatment case	1
Restricted work case	2
Lost Time Injury / Moderate permanent partial disability injury	3
Single Fatality / Severe permanent partial disability	4
Multiple fatalities	5

Operational Impact	Level
Insignificant or no damage to vessel / equipment	1
Minor or superficial damage to vessel / equipment	2
Moderate damage to vessel / equipment requiring immediate repairs	3
Major damage to vessel / equipment and detention	4
Very serious damage to vessel or equipment possible criminal proceedings	5

Environment	Level
Low impact with no lasting effect	1
Temporary effect / Minor effect to small area	2
Short to medium term impact	3
Medium to long term effect / large area affected	4
Long term impact / severe impact on sensitive area	5

Media Attention	Level
No Coverage	1
Local coverage	2
Regional coverage	3
National coverage	4
International coverage	5

## Annex B – Most likely hazard log: Phase B – Shaft and connection tunnel construction

### B.1 Most likely summary hazard list: Phase B – Shaft and connection tunnel construction

Hazard Id	Hazard Title	Hazard Description	People	Environment	Operational	Media
1A	Collision between existing river users - freight	Collision with Freight Operator - A vessel involved in Thames Tideway Tunnel construction / material removal activities collides with a freight operator in the vicinity of Cremorne Wharf	4	4	4	4
2A	Collision between existing river users - commercial	Collision with a Commercial Passenger Vessel - A vessel involved in Thames Tideway Tunnel construction / material removal activities collides with a commercial passenger vessel operator in the vicinity of Cremorne Wharf.	6	4	6	6
3A	Collision between existing river users - recreational	Collision with a Recreational / Private Leisure vessel - A vessel involved in Thames Tideway Tunnel construction / material removal activities collides with a recreational / private leisure vessel in the vicinity of Cremorne Wharf.	6	2	6	6
4A	Mooring breakout	A vessel involved in Thames Tideway Tunnel construction / material removal activities breaks free from moorings.	2	2	2	2
5A	Contact – Thames Tideway Tunnel vessel with existing river infrastructure	Contact – a vessel involved in Thames Tideway Tunnel construction / material removal activities makes contact with existing river infrastructure	4	4	6	4

## B.2 Most likely hazard list – Phase B – Shaft and connection tunnel construction

### 1A - LTTTCW - Collision between existing river users – Freight

Hazard ID	Hazard Title	Hazard Description	Likely Hazard Causes	Consequence(s) Most Likely	Existing Safeguards	Proposed Additional Mitigation
1A- LTTTCW	Collision between existing river users - Freight	Collision with Freight Operator - A vessel involved in Thames Tideway Tunnel construction / material removal activities collides with a freight operator in the vicinity of Cremorne Wharf	<ul style="list-style-type: none"> <li>Misjudgement</li> <li>Inattention</li> <li>Adverse weather conditions</li> <li>Machinery breakdown</li> <li>Collision avoidance</li> </ul>	<ul style="list-style-type: none"> <li>Restricted work case</li> <li>Temporary effect / Minor effect to small area</li> <li>Minor of superficial damage to vessel / equipment</li> <li>Local coverage</li> </ul>	<ul style="list-style-type: none"> <li>BML Local Knowledge Endorsement</li> <li>Qualified Crew</li> <li>Vessel Master Experience</li> <li>Thames AIS</li> <li>VHF Communications</li> <li>Tug Operator Procedures</li> <li>Ship Towage Code of Practice</li> <li>Aids to Navigation</li> <li>Emergency Plans &amp; Procedures</li> <li>COLREGs</li> </ul>	<ul style="list-style-type: none"> <li>Regular communication between Thames Tideway Tunnel marine contractors and existing freight operators.</li> <li>Notice to Mariners - informing operators and river users of planned operations in area, highlighting times when Thames Tideway Tunnel vessels are likely to be operating in this area.</li> <li>Sub-Contractors Risk Assessment.</li> <li>Use of reputable and experienced marine contractor.</li> </ul>

Pre Control - People			
Severity	Probability	Risk Score	Risk Band
2	3	6	<b>Moderate</b>

Pre Control - Environment			
Severity	Probability	Risk Score	Risk Band
2	3	6	<b>Moderate</b>

Pre Control - Operational Impact			
Severity	Probability	Risk Score	Risk Band
2	3	6	<b>Moderate</b>

Pre Control - Media Attention			
Severity	Probability	Risk Score	Risk Band
2	3	6	<b>Moderate</b>

Relevant PLA Guidance
<ul style="list-style-type: none"> <li>General Directions for Navigation in the Port of London</li> <li>Schedule to the General Directions for Navigation in the Port of London</li> <li>Pilotage Directions</li> <li>River Byelaws 1978 (as amended)</li> <li>Permanent Notice to Mariners</li> <li>Ship Towage Operations on the Thames</li> <li>Code of Practice for Craft Towage Operations on the Thames</li> <li>Navigational Risk Assessments in the Port of London - Guidance to Operators and Owners</li> </ul>

Post Control - People			
Severity	Probability	Risk Score	Risk Band
2	2	4	<b>Minor</b>

Post Control - Environment			
Severity	Probability	Risk Score	Risk Band
2	2	4	<b>Minor</b>

Post Control - Operational Impact			
Severity	Probability	Risk Score	Risk Band
2	2	4	<b>Minor</b>

Post Control - Media Attention			
Severity	Probability	Risk Score	Risk Band
2	2	4	<b>Minor</b>

Assessment Notes
<ul style="list-style-type: none"> <li>Analysis of Cory Environmental Ltd vessel track movements conducted for this area. Further information contained in Appendix B – Freight analysis.</li> </ul>

## 2A - LTTWCW - Collision between existing river users - Commercial

<b>Hazard ID</b>	<b>Hazard Title</b>	<b>Hazard Description</b>	<b>Likely Hazard Causes</b>	<b>Consequence(s) Most Likely</b>	<b>Existing Safeguards</b>	<b>Proposed Additional Mitigation</b>
<b>2A - LTTWCW</b>	Collision between existing river users - Commercial	Collision with a Commercial Passenger Vessel - A vessel involved in Thames Tideway Tunnel construction / material removal activities collides with a commercial passenger vessel operator in the vicinity of Cremorne Wharf.	<ul style="list-style-type: none"> <li>• Misjudgement</li> <li>• Inattention</li> <li>• Adverse weather conditions</li> <li>• Machinery breakdown</li> <li>• Collision avoidance</li> </ul>	<ul style="list-style-type: none"> <li>• Lost Time Injury / Moderate permanent partial disability injury</li> <li>• Temporary effect / Minor effect to small area</li> <li>• Moderate damage to vessel / equipment requiring immediate repairs</li> <li>• Local coverage</li> </ul>	<ul style="list-style-type: none"> <li>• BML Local Knowledge Endorsement</li> <li>• Qualified Crew</li> <li>• Vessel Master Experience</li> <li>• Thames AIS</li> <li>• VHF Communications</li> <li>• Tug Operator Procedures</li> <li>• Ship Towing Code of Practice</li> <li>• Aids to Navigation</li> <li>• Emergency Plans &amp; Procedures</li> <li>• COLREGs</li> </ul>	<ul style="list-style-type: none"> <li>• Regular communication between Thames Tideway Tunnel marine contractors and existing commercial operators.</li> <li>• Notice to Mariners - informing operators and river users of planned operations in area, highlighting times when Thames Tideway Tunnel vessels are likely to be operating in this area.</li> <li>• Sub-Contractors Risk Assessment.</li> <li>• Use of reputable and experienced marine contractor.</li> </ul>

<b>Pre Control - People</b>			
Severity	Probability	Risk Score	Risk Band
3	3	9	<b>Moderate</b>

<b>Pre Control - Environment</b>			
Severity	Probability	Risk Score	Risk Band
2	3	6	<b>Moderate</b>

<b>Pre Control - Operational Impact</b>			
Severity	Probability	Risk Score	Risk Band
3	3	9	<b>Moderate</b>

<b>Pre Control - Media Attention</b>			
Severity	Probability	Risk Score	Risk Band
2	3	6	<b>Moderate</b>

<b>Relevant PLA Guidance</b>
<ul style="list-style-type: none"> <li>• Code of Practice for the Safe Mooring of Vessels on the Thames 2010</li> </ul>

<b>Post Control - People</b>			
Severity	Probability	Risk Score	Risk Band
3	2	6	<b>Moderate</b>

<b>Post Control - Environment</b>			
Severity	Probability	Risk Score	Risk Band
2	2	4	<b>Minor</b>

<b>Post Control - Operational Impact</b>			
Severity	Probability	Risk Score	Risk Band
3	2	6	<b>Moderate</b>

<b>Post Control - Media Attention</b>			
Severity	Probability	Risk Score	Risk Band
2	3	6	<b>Moderate</b>

<b>Assessment Notes</b>
<p>An additional control measure 'Sub Contractors Risk Assessment' has been identified during this assessment. The 'Sub Contractors Risk Assessment' is to be produced by the Sub Contractor appointed by the Thames Tideway Tunnel Project Team to conduct tug &amp; barge operations and berth / jetty management activities.</p>

### 3A - LTTCW - Collision between existing river users - Recreational

Hazard ID	Hazard Title	Hazard Description	Likely Hazard Causes	Consequence(s) Most Likely	Existing Safeguards	Proposed Additional Mitigation
3A - LTTCW	Collision between existing river users - Recreational	Collision with a Recreational / Private Leisure vessel - A vessel involved in Thames Tideway Tunnel construction / material removal activities collides with a recreational / private leisure vessel in the vicinity of Cremorne Wharf.	<ul style="list-style-type: none"> <li>Misjudgement</li> <li>Inattention</li> <li>Improper lookout</li> <li>Adverse weather conditions</li> <li>Machinery breakdown</li> <li>Collision avoidance</li> <li>Inadequate training and experience</li> </ul>	<ul style="list-style-type: none"> <li>Lost Time Injury / Moderate permanent partial disability injury</li> <li>Low impact with no lasting effect</li> <li>Moderate damage to vessel / equipment requiring immediate repairs</li> <li>Local coverage</li> </ul>	<ul style="list-style-type: none"> <li>BML Local Knowledge Endorsement</li> <li>Qualified Crew</li> <li>Vessel Master Experience</li> <li>Thames AIS</li> <li>VHF Communications</li> <li>Tug Operator Procedures</li> <li>Ship Towing Code of Practice</li> <li>Aids to Navigation</li> <li>Emergency Plans &amp; Procedures</li> <li>COLREGs</li> </ul>	<ul style="list-style-type: none"> <li>Regular Notice to Mariners - informing operators and river users of planned operations in area, highlighting times when Thames Tideway Tunnel vessels are likely to be operating in this area.</li> <li>Information provided to local recreational clubs and marinas providing an overview of the works being conducted and expected duration.</li> <li>Sub-Contractors Risk Assessment.</li> <li>Use of reputable and experienced marine contractor.</li> </ul>

Pre Control - People			
Severity	Probability	Risk Score	Risk Band
3	3	9	<b>Moderate</b>

Pre Control - Environment			
Severity	Probability	Risk Score	Risk Band
1	3	3	<b>Minor</b>

Pre Control - Operational Impact			
Severity	Probability	Risk Score	Risk Band
3	3	9	<b>Moderate</b>

Pre Control - Media Attention			
Severity	Probability	Risk Score	Risk Band
2	3	6	<b>Moderate</b>

Relevant PLA Guidance
<ul style="list-style-type: none"> <li>General Directions for Navigation in the Port of London</li> <li>Schedule to the General Directions for Navigation in the Port of London</li> <li>Pilotage Directions</li> <li>River Byelaws 1978 (as amended)</li> <li>Permanent Notice to Mariners</li> <li>Ship Towing Operations on the Thames</li> <li>Code of Practice for Craft Towing Operations on the Thames</li> <li>Navigational Risk Assessments in the Port of London - Guidance to Operators and Owners</li> </ul>

Post Control - People			
Severity	Probability	Risk Score	Risk Band
3	2	6	<b>Moderate</b>

Post Control - Environment			
Severity	Probability	Risk Score	Risk Band
1	2	2	<b>Slight</b>

Post Control - Operational Impact			
Severity	Probability	Risk Score	Risk Band
3	2	6	<b>Moderate</b>

Post Control - Media Attention			
Severity	Probability	Risk Score	Risk Band
2	3	6	<b>Moderate</b>

Assessment Notes
<p>An additional control measure 'Sub Contractors Risk Assessment' has been identified during this assessment. The 'Sub Contractors Risk Assessment' is to be produced by the Sub Contractor appointed by the Thames Tideway Tunnel Project Team to conduct tug &amp; barge operations and berth / jetty management activities.</p>

## 4A - LTTCW - Mooring breakout

Hazard ID	Hazard Title	Hazard Description	Likely Hazard Causes	Consequence(s) Most Likely	Existing Safeguards	Proposed Additional Mitigation
4A - LTTCW	Mooring breakout	A vessel involved in Thames Tideway Tunnel construction / material removal activities breaks free from moorings.	<ul style="list-style-type: none"> <li>Misjudgement</li> <li>Inattention</li> <li>Adverse weather conditions</li> <li>Equipment failure (ropes/wires)</li> </ul>	<ul style="list-style-type: none"> <li>Restricted work case</li> <li>Temporary effect / Minor effect to small area</li> <li>Minor damage to vessel / equipment</li> <li>Local coverage</li> </ul>	<ul style="list-style-type: none"> <li>Tug Operator Procedures</li> <li>Emergency Plans &amp; Procedures</li> <li>Mooring Inspections</li> <li>Inspection Routine</li> <li>Qualified Crew</li> </ul>	<ul style="list-style-type: none"> <li>Use of reputable marine contractors</li> <li>Explore the prospect of using ground moorings to ensure a further level of safety.</li> </ul>

Pre Control - People			
Severity	Probability	Risk Score	Risk Band
2	2	4	Minor

Pre Control - Environment			
Severity	Probability	Risk Score	Risk Band
2	2	4	Minor

Pre Control - Operational Impact			
Severity	Probability	Risk Score	Risk Band
2	2	4	Minor

Pre Control - Media Attention			
Severity	Probability	Risk Score	Risk Band
2	2	4	Minor

Relevant PLA Guidance
<ul style="list-style-type: none"> <li>Code of Practice for the Safe Mooring of Vessels on the Thames 2010</li> </ul>

Post Control - People			
Severity	Probability	Risk Score	Risk Band
2	1	2	Slight

Post Control - Environment			
Severity	Probability	Risk Score	Risk Band
2	1	2	Slight

Post Control - Operational Impact			
Severity	Probability	Risk Score	Risk Band
2	1	2	Slight

Post Control - Media Attention			
Severity	Probability	Risk Score	Risk Band
2	1	2	Slight

Assessment Notes
<p>An additional control measure 'Sub Contractors Risk Assessment' has been identified during this assessment. The 'Sub Contractors Risk Assessment' is to be produced by the Sub Contractor appointed by the Thames Tideway Tunnel Project Team to conduct tug &amp; barge operations and berth / jetty management activities.</p>

### 5A - LTTWCW - Contact – Thames Tideway Tunnel vessel with existing river infrastructure

<b>Hazard ID</b>	<b>Hazard Title</b>	<b>Hazard Description</b>	<b>Likely Hazard Causes</b>	<b>Consequence(s) Most Likely</b>	<b>Existing Safeguards</b>	<b>Proposed Additional Mitigation</b>
<b>5A - LTTWCW</b>	Contact – Thames Tideway Tunnel vessel with existing river infrastructure	Contact – a vessel involved in Thames Tideway Tunnel construction / material removal activities makes contact with existing river infrastructure	<ul style="list-style-type: none"> <li>• Misjudgement</li> <li>• Inattention</li> <li>• Improper lookout</li> <li>• Lack of communications</li> <li>• Adverse weather conditions</li> <li>• Machinery breakdown</li> <li>• Tug or line failure</li> <li>• Non-compliance with procedures</li> <li>• Collision avoidance</li> </ul>	<ul style="list-style-type: none"> <li>• Restricted work case</li> <li>• Temporary effect / Minor effect to small area</li> <li>• Moderate damage to vessel / equipment requiring immediate repairs</li> <li>• Local coverage</li> </ul>	<ul style="list-style-type: none"> <li>• BML Local Knowledge Endorsement</li> <li>• Qualified Crew</li> <li>• Vessel Master Experience</li> <li>• Thames AIS</li> <li>• VHF Communications</li> <li>• Tug Operator Procedures</li> <li>• Ship Towage Code of Practice</li> <li>• Aids to Navigation</li> <li>• Emergency Plans &amp; Procedures</li> <li>• COLREGs</li> <li>• Speed restrictions</li> </ul>	<ul style="list-style-type: none"> <li>• Sub-Contractors Risk Assessment</li> <li>• Use of reputable and experienced marine contractor</li> </ul>

<b>Pre Control - People</b>			
Severity	Probability	Risk Score	Risk Band
2	3	6	<b>Moderate</b>

<b>Pre Control - Environment</b>			
Severity	Probability	Risk Score	Risk Band
2	3	6	<b>Moderate</b>

<b>Pre Control - Operational Impact</b>			
Severity	Probability	Risk Score	Risk Band
3	3	9	<b>High</b>

<b>Pre Control - Media Attention</b>			
Severity	Probability	Risk Score	Risk Band
2	3	6	<b>Moderate</b>

<b>Relevant PLA Guidance</b>
<ul style="list-style-type: none"> <li>• General Directions for Navigation in the Port of London</li> <li>• Schedule to the General Directions for Navigation in the Port of London</li> <li>• Pilotage Directions</li> <li>• River Byelaws 1978 (as amended)</li> <li>• Permanent Notice to Mariners</li> <li>• Ship Towage Operations on the Thames</li> <li>• Code of Practice for Craft Towage Operations on the Thames</li> <li>• Port Entry Guide</li> <li>• Navigational Risk Assessments in the Port of London - Guidance to Operators and Owners</li> </ul>

<b>Post Control - People</b>			
Severity	Probability	Risk Score	Risk Band
2	2	4	<b>Minor</b>

<b>Post Control - Environment</b>			
Severity	Probability	Risk Score	Risk Band
2	2	4	<b>Minor</b>

<b>Post Control - Operational Impact</b>			
Severity	Probability	Risk Score	Risk Band
3	2	6	<b>Moderate</b>

<b>Post Control - Media Attention</b>			
Severity	Probability	Risk Score	Risk Band
2	2	4	<b>Minor</b>

<b>Assessment Notes</b>
<ul style="list-style-type: none"> <li>• An additional control measure 'Sub Contractors Risk Assessment' has been identified during this assessment. The 'Sub Contractors Risk Assessment' is to be produced by the Sub Contractor appointed by the Thames Tideway Tunnel Project Team to conduct tug &amp; barge operations and berth / jetty management activities.</li> </ul>

## Annex C– Worst credible hazard log: Phase B – Shaft and connection tunnel construction

### C.1 Worst credible summary hazard list: Phase B – Shaft and connection tunnel construction

Hazard Id	Hazard Title	Hazard Description	People	Environment	Operational	Media
1A	Collision between existing river users - freight	Collision with Freight Operator - A vessel involved in Thames Tideway Tunnel construction / material removal activities collides with a freight operator in the vicinity of Cremorne Wharf	8	6	8	6
2A	Collision between existing river users - commercial	Collision with a Commercial Passenger Vessel - A vessel involved in Thames Tideway Tunnel construction / material removal activities collides with a commercial passenger vessel operator in the vicinity of Cremorne Wharf.	4	2	4	4
3A	Collision between existing river users - recreational	Collision with a Recreational / Private Leisure vessel - A vessel involved in Thames Tideway Tunnel construction / material removal activities collides with a recreational / private leisure vessel in the vicinity of Cremorne Wharf.	5	1	5	4
4A	Mooring breakout	A vessel involved in Thames Tideway Tunnel construction / material removal activities breaks free from moorings.	2	3	2	3
5A	Contact – Thames Tideway Tunnel vessel with existing river infrastructure	Contact – a vessel involved in Thames Tideway Tunnel construction / material removal activities makes contact with existing river infrastructure	6	4	8	6

## C.2 Worst credible hazard list – Phase B – Shaft and connection tunnel construction

### 1B - LTTWCW - Collision between existing river users – Freight

Hazard ID	Hazard Title	Hazard Description	Likely Hazard Causes	Consequence(s) Worst Credible	Existing Safeguards	Proposed Additional Mitigation
1B - LTTWCW	Collision between existing river users - Freight	Collision with Freight Operator - A vessel involved in Thames Tideway Tunnel construction / material removal activities collides with a freight operator in the vicinity of Cremorne Wharf	<ul style="list-style-type: none"> <li>Misjudgement</li> <li>Inattention</li> <li>Adverse weather conditions</li> <li>Machinery breakdown</li> <li>Collision avoidance</li> </ul>	<ul style="list-style-type: none"> <li>Single fatality / Severe permanent partial disability</li> <li>Short to medium term impact (environmental)</li> <li>Major damage to vessel / equipment and detention</li> <li>Regional coverage</li> </ul>	<ul style="list-style-type: none"> <li>BML Local Knowledge Endorsement</li> <li>Qualified Crew</li> <li>Vessel Master Experience</li> <li>Thames AIS</li> <li>VHF Communications</li> <li>Tug Operator Procedures</li> <li>Ship Towage Code of Practice</li> <li>Aids to Navigation</li> <li>Emergency Plans &amp; Procedures</li> <li>COLREGs</li> </ul>	<ul style="list-style-type: none"> <li>Regular communication between Thames Tideway Tunnel marine contractors and existing freight operators.</li> <li>Notice to Mariners - informing operators and river users of planned operations in area, highlighting times when Thames Tideway Tunnel vessels are likely to be operating in this area.</li> <li>Sub-Contractors Risk Assessment.</li> <li>Use of reputable and experienced marine contractor.</li> </ul>

Pre Control - People			
Severity	Probability	Risk Score	Risk Band
4	3	12	<b>High</b>

Pre Control - Environment			
Severity	Probability	Risk Score	Risk Band
3	3	9	<b>Moderate</b>

Pre Control - Operational Impact			
Severity	Probability	Risk Score	Risk Band
4	3	12	<b>High</b>

Pre Control - Media Attention			
Severity	Probability	Risk Score	Risk Band
3	3	9	<b>Moderate</b>

Relevant PLA Guidance
<ul style="list-style-type: none"> <li>General Directions for Navigation in the Port of London</li> <li>Schedule to the General Directions for Navigation in the Port of London</li> <li>Pilotage Directions</li> <li>River Byelaws 1978 (as amended)</li> <li>Permanent Notice to Mariners</li> <li>Ship Towage Operations on the Thames</li> <li>Code of Practice for Craft Towage Operations on the Thames</li> <li>Navigational Risk Assessments in the Port of London - Guidance to Operators and Owners</li> </ul>

Post Control - People			
Severity	Probability	Risk Score	Risk Band
4	2	8	<b>Moderate</b>

Post Control – Environment			
Severity	Probability	Risk Score	Risk Band
3	2	6	<b>Moderate</b>

Post Control - Operational Impact			
Severity	Probability	Risk Score	Risk Band
4	2	8	<b>Moderate</b>

Post Control - Media Attention			
Severity	Probability	Risk Score	Risk Band
3	2	6	<b>Moderate</b>

Assessment Notes
<ul style="list-style-type: none"> <li>Analysis of Cory Environmental Ltd vessel track movements conducted for this area. Further information contained in Appendix B – Freight analysis.</li> </ul>

## 2B – LTTWCW - Collision between existing river users - Commercial

<b>Hazard ID</b>	<b>Hazard Title</b>	<b>Hazard Description</b>	<b>Likely Hazard Causes</b>	<b>Consequence(s) Worst Credible</b>	<b>Existing Safeguards</b>	<b>Proposed Additional Mitigation</b>
<b>2B - LTTWCW</b>	Collision between existing river users - Commercial	Collision with a Commercial Passenger Vessel - A vessel involved in Thames Tideway Tunnel construction / material removal activities collides with a commercial passenger vessel operator in the vicinity of Cremorne Wharf.	<ul style="list-style-type: none"> <li>• Misjudgement</li> <li>• Inattention</li> <li>• Adverse weather conditions</li> <li>• Machinery breakdown</li> <li>• Collision avoidance</li> </ul>	<ul style="list-style-type: none"> <li>• Single fatality / Severe permanent partial disability</li> <li>• Temporary effect / Minor effect to small area</li> <li>• Major damage to vessel / equipment and detention</li> <li>• National coverage</li> </ul>	<ul style="list-style-type: none"> <li>• BML Local Knowledge Endorsement</li> <li>• Qualified Crew</li> <li>• Vessel Master Experience</li> <li>• Thames AIS</li> <li>• VHF Communications</li> <li>• Tug Operator Procedures</li> <li>• Ship Towage Code of Practice</li> <li>• Aids to Navigation</li> <li>• Emergency Plans &amp; Procedures</li> <li>• COLREGs</li> </ul>	<ul style="list-style-type: none"> <li>• Regular communication between Thames Tideway Tunnel marine contractors and existing commercial operators.</li> <li>• Notice to Mariners - informing operators and river users of planned operations in area, highlighting times when Thames Tideway Tunnel vessels are likely to be operating in this area.</li> <li>• Sub-Contractors Risk Assessment.</li> <li>• Use of reputable and experienced marine contractor.</li> </ul>

<b>Pre Control - People</b>			
Severity	Probability	Risk Score	Risk Band
4	3	12	<b>High</b>

<b>Pre Control - Environment</b>			
Severity	Probability	Risk Score	Risk Band
2	3	6	<b>Moderate</b>

<b>Pre Control - Operational Impact</b>			
Severity	Probability	Risk Score	Risk Band
4	3	12	<b>High</b>

<b>Pre Control - Media Attention</b>			
Severity	Probability	Risk Score	Risk Band
4	3	12	<b>High</b>

<b>Relevant PLA Guidance</b>
<ul style="list-style-type: none"> <li>•General Directions for Navigation in the Port of London</li> <li>•Schedule to the General Directions for Navigation in the Port of London</li> <li>•Pilotage Directions</li> <li>•River Byelaws 1978 (as amended)</li> <li>•Permanent Notice to Mariners</li> <li>•Ship Towage Operations on the Thames</li> <li>•Code of Practice for Craft Towage Operations on the Thames</li> <li>•Navigational Risk Assessments in the Port of London - Guidance to Operators and Owners</li> </ul>

<b>Post Control - People</b>			
Severity	Probability	Risk Score	Risk Band
4	1	4	<b>Minor</b>

<b>Post Control - Environment</b>			
Severity	Probability	Risk Score	Risk Band
2	1	2	<b>Slight</b>

<b>Post Control - Operational Impact</b>			
Severity	Probability	Risk Score	Risk Band
4	1	4	<b>Minor</b>

<b>Post Control - Media Attention</b>			
Severity	Probability	Risk Score	Risk Band
4	1	4	<b>Minor</b>

<b>Assessment Notes</b>
<p>An additional control measure 'Sub Contractors Risk Assessment' has been identified during this assessment. The 'Sub Contractors Risk Assessment' is to be produced by the Sub Contractor appointed by the Thames Tideway Tunnel Project Team to conduct tug &amp; barge operations and berth / jetty management activities.</p>

### 3B - LTTWCW - Collision between existing river users - Recreational

Hazard ID	Hazard Title	Hazard Description	Likely Hazard Causes	Consequence(s) Worst Credible	Existing Safeguards	Proposed Additional Mitigation
3B - LTTWCW	Collision between existing river users - Recreational	Collision with a Recreational / Private Leisure vessel - A vessel involved in Thames Tideway Tunnel construction / material removal activities collides with a recreational / private leisure vessel in the vicinity of Cremorne Wharf.	<ul style="list-style-type: none"> <li>• Misjudgement</li> <li>• Inattention</li> <li>• Improper lookout</li> <li>• Adverse weather conditions</li> <li>• Machinery breakdown</li> <li>• Collision avoidance</li> <li>• Inadequate training and experience</li> </ul>	<ul style="list-style-type: none"> <li>• Multiple fatalities</li> <li>• Low impact with no lasting environmental effect</li> <li>• Very serious damage to vessel or equipment possible criminal proceedings</li> <li>• National coverage</li> </ul>	<ul style="list-style-type: none"> <li>• BML Local Knowledge Endorsement</li> <li>• Qualified Crew</li> <li>• Vessel Master Experience</li> <li>• Thames AIS</li> <li>• VHF Communications</li> <li>• Tug Operator Procedures</li> <li>• Ship Towage Code of Practice</li> <li>• Aids to Navigation</li> <li>• Emergency Plans &amp; Procedures</li> <li>• COLREGs</li> </ul>	<ul style="list-style-type: none"> <li>• Notice to Mariners - informing operators and river users of planned operations in area, highlighting times when Thames Tideway Tunnel vessels are likely to be operating in this area.</li> <li>• Information provided to local recreational clubs and marinas providing an overview of the works being conducted and expected duration.</li> <li>• Sub-Contractors Risk Assessment.</li> <li>• Use of reputable and experienced marine contractor.</li> </ul>

Pre Control - People			
Severity	Probability	Risk Score	Risk Band
5	3	15	<b>Extreme</b>

Pre Control – Environment			
Severity	Probability	Risk Score	Risk Band
1	3	3	<b>Minor</b>

Pre Control - Operational Impact			
Severity	Probability	Risk Score	Risk Band
5	3	15	<b>Extreme</b>

Pre Control - Media Attention			
Severity	Probability	Risk Score	Risk Band
4	3	12	<b>High</b>

Relevant PLA Guidance
<ul style="list-style-type: none"> <li>• General Directions for Navigation in the Port of London</li> <li>• Schedule to the General Directions for Navigation in the Port of London</li> <li>• Pilotage Directions</li> <li>• River Byelaws 1978 (as amended)</li> <li>• Permanent Notice to Mariners</li> <li>• Ship Towage Operations on the Thames</li> <li>• Code of Practice for Craft Towage Operations on the Thames</li> <li>• Navigational Risk Assessments in the Port of London - Guidance to Operators and Owners</li> </ul>

Post Control - People			
Severity	Probability	Risk Score	Risk Band
5	1	5	<b>High</b>

Post Control - Environment			
Severity	Probability	Risk Score	Risk Band
1	1	1	<b>Slight</b>

Post Control - Operational Impact			
Severity	Probability	Risk Score	Risk Band
5	1	5	<b>High</b>

Post Control - Media Attention			
Severity	Probability	Risk Score	Risk Band
4	1	4	<b>Moderate</b>

Assessment Notes
<p>An additional control measure 'Sub Contractors Risk Assessment' has been identified during this assessment. The 'Sub Contractors Risk Assessment' is to be produced by the Sub Contractor appointed by the Thames Tideway Tunnel Project Team to conduct tug &amp; barge operations and berth / jetty management activities.</p>

## 4B - LTTCW – Mooring Breakout

Hazard ID	Hazard Title	Hazard Description	Likely Hazard Causes	Consequence(s) Worst Credible	Existing Safeguards	Proposed Additional Mitigation
4B - LTTCW	Mooring breakout	A vessel involved in Thames Tideway Tunnel construction / material removal activities breaks free from moorings.	<ul style="list-style-type: none"> <li>Misjudgement</li> <li>Inattention</li> <li>Adverse weather conditions</li> <li>Equipment failure (ropes/wires)</li> </ul>	<ul style="list-style-type: none"> <li>Lost time injury / Moderate permanent partial disability injury</li> <li>Temporary effect / Minor effect to small area</li> <li>Moderate damage to vessel / equipment requiring immediate repairs</li> <li>Local coverage</li> </ul>	<ul style="list-style-type: none"> <li>Tug Operator Procedures</li> <li>Emergency Plans &amp; Procedures</li> <li>Mooring Inspections</li> <li>Inspection Routine</li> <li>Qualified Crew</li> </ul>	<ul style="list-style-type: none"> <li>Use of reputable marine contractors</li> <li>Explore the prospect of using ground moorings to ensure a further level of safety.</li> </ul>

Pre Control - People			
Severity	Probability	Risk Score	Risk Band
3	2	6	<b>Moderate</b>

Pre Control - Environment			
Severity	Probability	Risk Score	Risk Band
2	2	4	<b>Minor</b>

Pre Control - Operational Impact			
Severity	Probability	Risk Score	Risk Band
3	2	6	<b>Moderate</b>

Pre Control - Media Attention			
Severity	Probability	Risk Score	Risk Band
2	2	4	<b>Minor</b>

Relevant PLA Guidance
<ul style="list-style-type: none"> <li>Code of Practice for the Safe Mooring of Vessels on the Thames 2010</li> </ul>

Post Control - People			
Severity	Probability	Risk Score	Risk Band
3	1	3	<b>Minor</b>

Post Control - Environment			
Severity	Probability	Risk Score	Risk Band
2	1	2	<b>Slight</b>

Post Control - Operational Impact			
Severity	Probability	Risk Score	Risk Band
3	1	3	<b>Minor</b>

Post Control - Media Attention			
Severity	Probability	Risk Score	Risk Band
2	1	2	<b>Slight</b>

Assessment Notes
<p>An additional control measure 'Sub Contractors Risk Assessment' has been identified during this assessment. The 'Sub Contractors Risk Assessment' is to be produced by the Sub Contractor appointed by the Thames Tideway Tunnel Project Team to conduct tug &amp; barge operations and berth / jetty management activities.</p>

**5B - LTTWCW - Contact – Thames Tideway Tunnel vessel with existing river infrastructure**

Hazard ID	Hazard Title	Hazard Description	Likely Hazard Causes	Consequence(s) Worst Credible	Existing Safeguards	Proposed Additional Mitigation
5B - LTTWCW	Contact – Thames Tideway Tunnel vessel with existing river infrastructure	Contact – a vessel involved in Thames Tideway Tunnel construction / material removal activities makes contact with existing river infrastructure	<ul style="list-style-type: none"> <li>• Misjudgement</li> <li>• Inattention</li> <li>• Improper lookout</li> <li>• Lack of communications</li> <li>• Adverse weather conditions</li> <li>• Machinery breakdown</li> <li>• Tug or line failure</li> <li>• Non-compliance with procedures</li> <li>• Collision avoidance</li> </ul>	<ul style="list-style-type: none"> <li>• Lost Time Injury / Moderate permanent partial disability injury</li> <li>• Temporary effect / Minor effect to small area</li> <li>• Major damage to vessel / equipment and detention</li> <li>• Regional coverage</li> </ul>	<ul style="list-style-type: none"> <li>• BML Local Knowledge Endorsement</li> <li>• Qualified Crew</li> <li>• Vessel Master Experience</li> <li>• Thames AIS</li> <li>• VHF Communications</li> <li>• Tug Operator Procedures</li> <li>• Ship Towage Code of Practice</li> <li>• Aids to Navigation</li> <li>• Emergency Plans &amp; Procedures</li> <li>• COLREGs</li> <li>• Speed restrictions</li> </ul>	<ul style="list-style-type: none"> <li>• Sub-Contractors Risk Assessment</li> <li>• Use of reputable and experienced marine contractor</li> </ul>

Pre Control - People			
Severity	Probability	Risk Score	Risk Band
3	3	9	<b>Moderate</b>

Pre Control - Environment			
Severity	Probability	Risk Score	Risk Band
2	3	6	<b>Moderate</b>

Pre Control - Operational Impact			
Severity	Probability	Risk Score	Risk Band
4	3	12	<b>High</b>

Pre Control - Media Attention			
Severity	Probability	Risk Score	Risk Band
3	3	9	<b>Moderate</b>

Post Control - People			
Severity	Probability	Risk Score	Risk Band
3	2	6	<b>Moderate</b>

Post Control - Environment			
Severity	Probability	Risk Score	Risk Band
2	2	4	<b>Minor</b>

Post Control - Operational Impact			
Severity	Probability	Risk Score	Risk Band
4	2	8	<b>Moderate</b>

Post Control - Media Attention			
Severity	Probability	Risk Score	Risk Band
3	2	6	<b>Moderate</b>

Relevant PLA Guidance
<ul style="list-style-type: none"> <li>• General Directions for Navigation in the Port of London</li> <li>• Schedule to the General Directions for Navigation in the Port of London</li> <li>• Pilotage Directions</li> <li>• River Byelaws 1978 (as amended)</li> <li>• Permanent Notice to Mariners</li> <li>• Ship Towage Operations on the Thames</li> <li>• Code of Practice for Craft Towage Operations on the Thames</li> <li>• Port Entry Guide</li> <li>• Navigational Risk Assessments in the Port of London - Guidance to Operators and Owners</li> </ul>

Assessment Notes
<ul style="list-style-type: none"> <li>• An additional control measure 'Sub Contractors Risk Assessment' has been identified during this assessment. The 'Sub Contractors Risk Assessment' is to be produced by the Sub Contractor appointed by the Thames Tideway Tunnel Project Team to conduct tug &amp; barge operations and berth / jetty management activities.</li> </ul>

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A decorative graphic at the bottom of the page consisting of several overlapping, wavy, organic shapes in various shades of green, ranging from a light lime green to a dark forest green. The shapes flow from the left side towards the right, creating a sense of movement and depth.