

HAMMERSMITH TEMPORARY FERRY – PRELIMINARY NAVIGATION HAZARD ANALYSIS REPORT



10-May-2021

Uber Boat by Thames Clipper

Ref: 20-NASH-105-100-R02-00

Preliminary Navigation Hazard Analysis report for operation of the Hammersmith Temporary Ferry on the River Thames in central London

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Issue R02-00

REPORT TITLE: HAMMERSMITH TEMPORARY FERRY – PRELIMINARY NAVIGATION HAZARD ANALYSIS REPORT

CLIENT: UBER BOAT BY THAMES CLIPPER

Document Control					
Document Number		20-NASH-105-100-R02-00			
Document Title		Hammersmith Temporary Ferry – Preliminary Navigation Hazard Analysis Report			
Revision	Date of Issue	Description	Prepared	Checked	Approved
R01-00	30-Apr-2021	Draft Report	SAB	EJR	EJR
R02-00	10-May-2021	Final Report	SAB	JJH	JJH

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1. INTRODUCTION

This report documents the findings of a preliminary navigation hazard analysis for the operation of the proposed Hammersmith Temporary Ferry, to the east of Hammersmith Bridge, in central London.

The report precedes a full Navigation Risk Assessment (NRA) which will be undertaken to accompany the application for the proposed project which will include a River Works License (RWL) application to the Port of London Authority (PLA). The full NRA will assess the potential effects of the development on safety of navigation, to the requirements of the PLA, and will be issued prior to the conclusion of the RWL process. The NRA will be required to cover the construction, operation and decommission phases of proposed project lifecycle.

1.1. OBJECTIVE

The purpose of the preliminary navigation hazard analysis work is to identify key navigation issues to validate the pier designs and overarching ferry operational principles and also identify any mitigations for further consideration, if required, based on PLA and stakeholder consultation.

This preliminary analysis focussed on assessment of the operational phase (i.e the 'as built' pier and associated infrastructure) of the project recognising there is also some uncertainty in how the baseline navigation environment will vary over the project lifecycle which will influence potential future assessment scenarios i.e. due to changes in the restrictions to navigation that are currently in place for Hammersmith Bridge and the changes in river usage associated with the Covid-19 pandemic (see **section 2.2**).

2. BARN ELMS REACH

2.1. HAMMERSMITH BRIDGE

Hammersmith Bridge is a historical bridge on the river Thames, which was constructed in 1887 and further strengthened in 1973 (see **Figure 1**). The bridge has three arches with arch #2, the central arch, lit for navigation and has the PLA authorised channel passing underneath. Arch #1 (to the left of arch #2 in **Figure 1**) and Arch #3 (to the right of arch #2 in **Figure 1**) are intertidal and therefore only navigable by small craft over periods of high water when there is sufficient depth of water and headway available.



Figure 1: Extract from PLA Guide to Bridges 2012 showing Hammersmith Bridge.

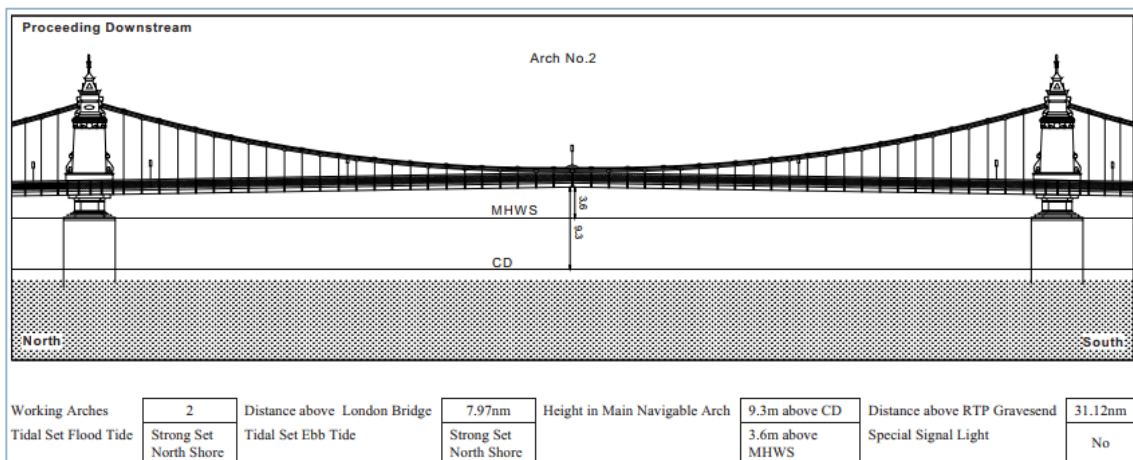


Figure 2: Section drawing of Hammersmith Bridge in relation to tidal heights.

An section drawing of Hammersmith Bridge is shown at **Figure 2**, which identifies the locations of existing bridge infrastructure.

The PLA Guide to Bridges 2012 notes that:

“The bridge is built on a sharp bend in the river and has one working arch and navigation at all states of the tide is to the south side of the centreline. The tide sets strongly to the north shore (Middlesex) on both the flood and ebb tides. On the north shore are several rowing and dinghy sailing clubs that should be passed with caution. Hammersmith Pier has an assortment of residential and active craft moored on and around it. On the south shore opposite Hammersmith Pier is a busy rowing club used for teaching and training schools, so one can expect activity from rowers throughout the day as well as during the early evening. Scullers and rowers can be out in the hours of darkness and may be difficult to detect before a mariner knows they are close by.

Hammersmith Bridge is the lowest of the bridges spanning the tidal Thames. Suitable passage planning taking into account the vessels air draught, and available headroom should be completed before navigating this bridge to ensure safe passage.”

When vessels transit under a navigable bridge the master must consider both water draught (the available depth of water for the vessel to navigate), and the air draught (the available “headway” for the vessel to safety pass underneath the bridge).

Hammersmith Bridge “headway” levels are given in **Table 1**, and show the available headway of arch #2 relative to tidal characteristics. It is important to note for Hammersmith Bridge that the greatest headway, which is located at the mid-point of arch #2, does not correspond to the deepest available water within the PLA authorised channel, which is located approximately 1/3 the way across arch from the south bridge pier.

Table 1: Hammersmith Bridge Arch #2 Headway Characteristics¹

Minimum Headway Characteristics [m]	Hammersmith (Arch #2)
Chart Datum - CD	9.3
Mean High Water Springs - MHWS	3.6
Mean High Water Neaps - MHWN	4.7
Mean Low Water Springs - MLWS	8.7
Mean Low Water Neaps - MLWN	9.1
Highest Astronomic Tide - HAT	3.0

2.2. HAMMERSMITH BRIDGE CLOSURE, RESTRICTIONS AND EXCLUSION ZONE

Hammersmith Bridge has been closed to pedestrians, cyclists and river traffic since August 2020 due to concerns regarding the structural integrity of the bridge resulting from corrosion of the iron work. Refurbishment options range from stabilisation to complete restoration although at present there is no known timeframe as to when the

¹ <https://www.pla.co.uk/assets/PLA-Tide-Tables-2019.pdf>

bridge will be fully reopened although it is anticipated that varying restrictions to navigation will be required through this timeframe.

Currently (at the date of this report) essential transits of the bridge can be booked via the PLA subject to a number of key criteria being met, as defined in PLA Notice To Mariners (NTM) U2 of 2021.² Arches #1 and #3 are closed to navigation and the bridge is closed to all recreational traffic including unpowered craft. In addition a 15m navigation exclusion zone is in place to the east and west of the bridge and a guard vessel is in place.

In order for vessels to arrange a pre-booked controlled passage through arch #2 the following conditions must be met:

- The transit is necessary and essential³;
- Transit may be cancelled at short notice;
- The vessels master has a suitable passage plan in place;
- The vessels master confirms the safest minimum number of crew are onboard; and
- The vessel monitors VHF channel 14 at all times.

The restrictions imposed by NTM U2 of 2021 mean that transits under the bridge are significantly reduced and will remain so until such a time that the current restrictions are amended or lifted.

²<http://www.pla.co.uk/assets/u2of2021-barnelmsreach-hammersmithbridge-closedtonavigationexclusionzonecontrolledtransits.pdf> (accessed 27-Apr-2021)

³ An essential transit is defined by NTM U2 of 2021 as a transit where “the requirement cannot be delayed to a later date or conducted elsewhere.”

3. HAMMERSMITH TEMPORARY FERRY

The purpose of the proposed Hammersmith Temporary Ferry service is to provide a relief crossing whilst the existing Hammersmith Bridge is closed or restricted to users and consists of a ferry operation between two new piers to be constructed and remain in place for the duration of the operation.

Figure 3 shows the locations of the proposed Barnes and Hammersmith ferry piers along with Hammersmith Bridge and the exclusion zone currently in operation. The proposed ferry pier locations, size and orientation have been optimised to ensure that the potential impact on navigation is minimised as much as possible and are offset to lessen the impact of the structures on the navigable width and authorised channel.

3.1. BARNES PIER DESIGN

Barnes Pier is situated on the southern side of the river and has been designed to allow two vessels to be moored at any state of tide (i.e. during off-peak operational times one ferry will be moored on the Barnes Pier whilst the other ferry operates).

Barnes Pier has been located at a point where the width of the river at low tide (in the immediate vicinity) is at its widest (see **Figure 3**). It is acknowledged that the location of Barnes Pier will impact the unpowered recreational route specified in the Tideway Code. Should the current restrictions, preventing non-essential (i.e recreational craft) from transiting under the bridge be lifted during the lifetime of the proposed Hammersmith Temporary Ferry operation, recreational craft will again look to utilise the inshore route passing beneath arch #3 and the “backspan” of Barnes Pier. For this reason, the pier has been located and orientated to align, as far as possible with the existing Hammersmith Bridge pier and arch #3 to minimise any additional restriction on usage of arch#3 and allow for the maximum possible tidal window during which recreational craft can navigate the backspan of Barnes Pier.

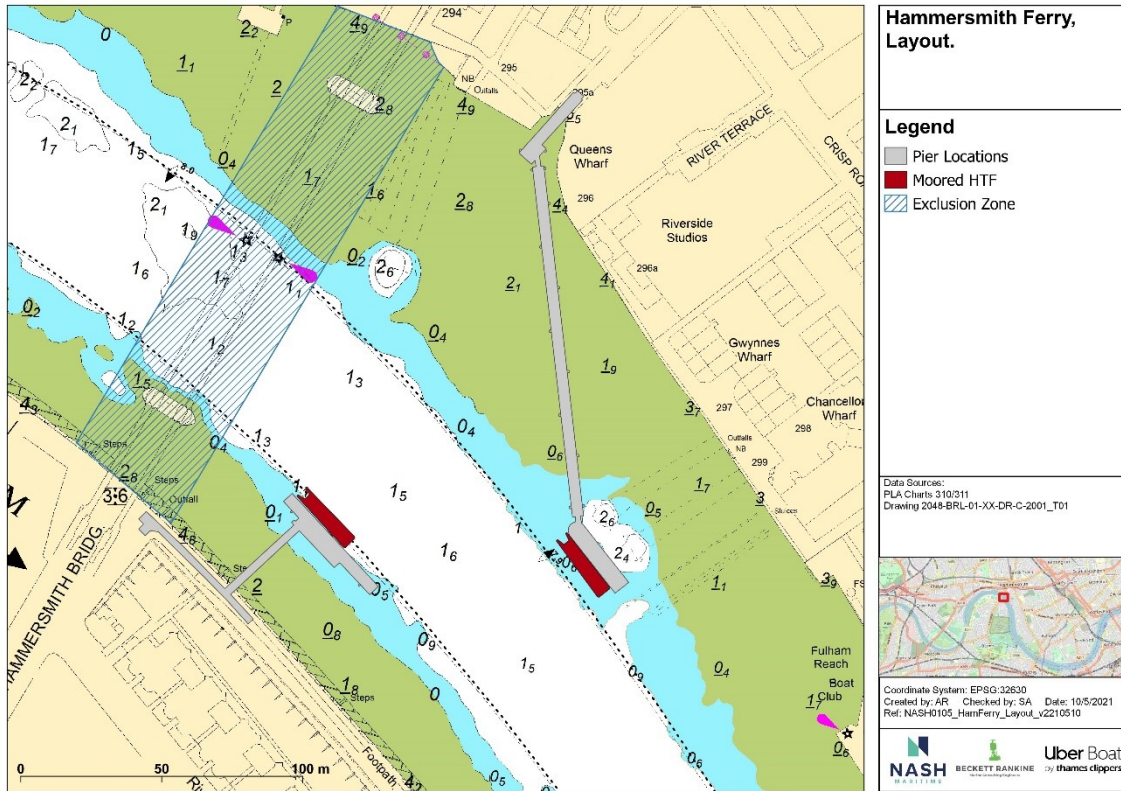


Figure 3: Pier Locations, Hammersmith bridge and Exclusion Zone.

In order to allow recreational craft to navigate the backspan, Barnes Pier is linked to the shore by a brow rather than a floating pontoon. **Figure 4** shows the available water depth, headway and navigable width available to vessels navigating the backspan at Mean Low Water Springs (MLWS), Optimum Tidal Level and Mean High Water Springs (MHWS). Other than at MLWS (when Arch #3 is also restricted due to comparable bathymetry) there is a theoretical window where vessels will be able to navigate under the pier brow. Further consultation with local stakeholders will be essential in determining the exact parameters in which it is deemed safe for vessels to utilise this route.

Working on the assumption that a minimum air draught of 1.5m and a minimum draught of 0.35m will be required to allow a rowing vessel to pass under the brow of Barnes Pier, then theoretical navigable widths have been calculated and are presented in **Table 2** and **Figure 4**.

Table 2: Theoretical Navigable width under Barnes Pier Brow.

State of tide	Navigable width available under brow (metres)
Mean Low Water Springs (MLWS)	7.2
Optimum tidal level for maximum navigable width	17.3
Mean High Water Springs (MHWS)	29.0

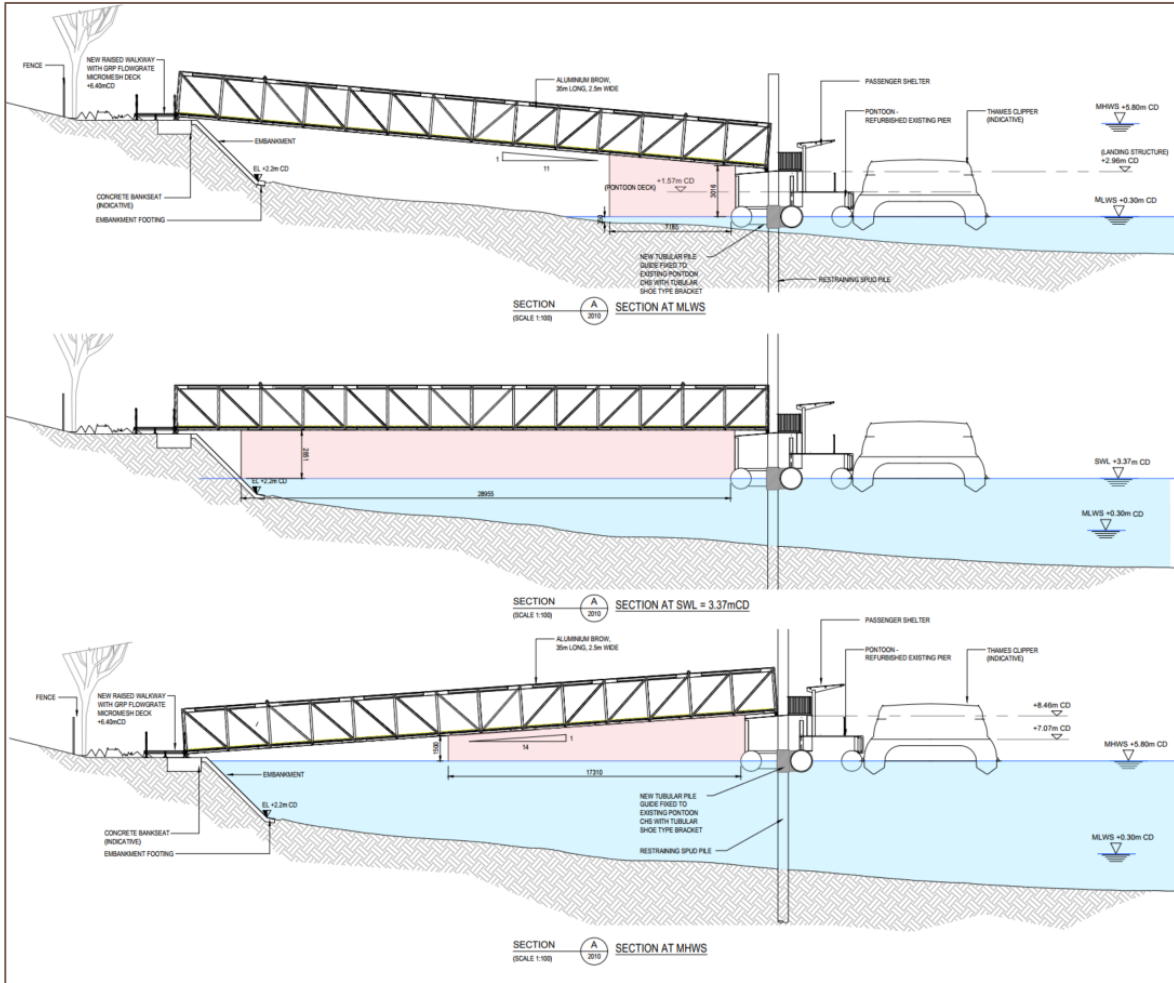


Figure 4: Barnes Pier Cross Section and Navigable width under Backspan.

3.2. HAMMERSMITH PIER DESIGN

Hammersmith Pier is located on the northern side of the Thames and has been located in an area where the low water width of the river is comparatively greater than other locations in the immediate vicinity. The location of the pier ensures that the maximum navigable width possible is retained balancing the length of the floating pontoon connecting the pier with the shore. In addition the pier has been deliberately located in an area of deeper water to mitigate the risk of project vessels grounding during low spring tides and to mitigate its intrusion on the authorised channel. The Hammersmith Pier has also been located further downstream than Barnes Pier rather than directly opposite. The intention of this staggered offset is to reduce the restriction on overall river width at each pier and also increases the room for safe navigation of those vessels navigating though the bridge at the point of maximum headway.

A floating walkway pontoon links the Hammersmith Pier to the shore which is designed to safely take the ground at low water conditions over the intertidal zone. Navigation within the backspan is therefore not possible.

An overview plot of Hammersmith Pier is shown in **Figure 5** with a cross sectional view of the floating walkway shown in **Figure 6**.

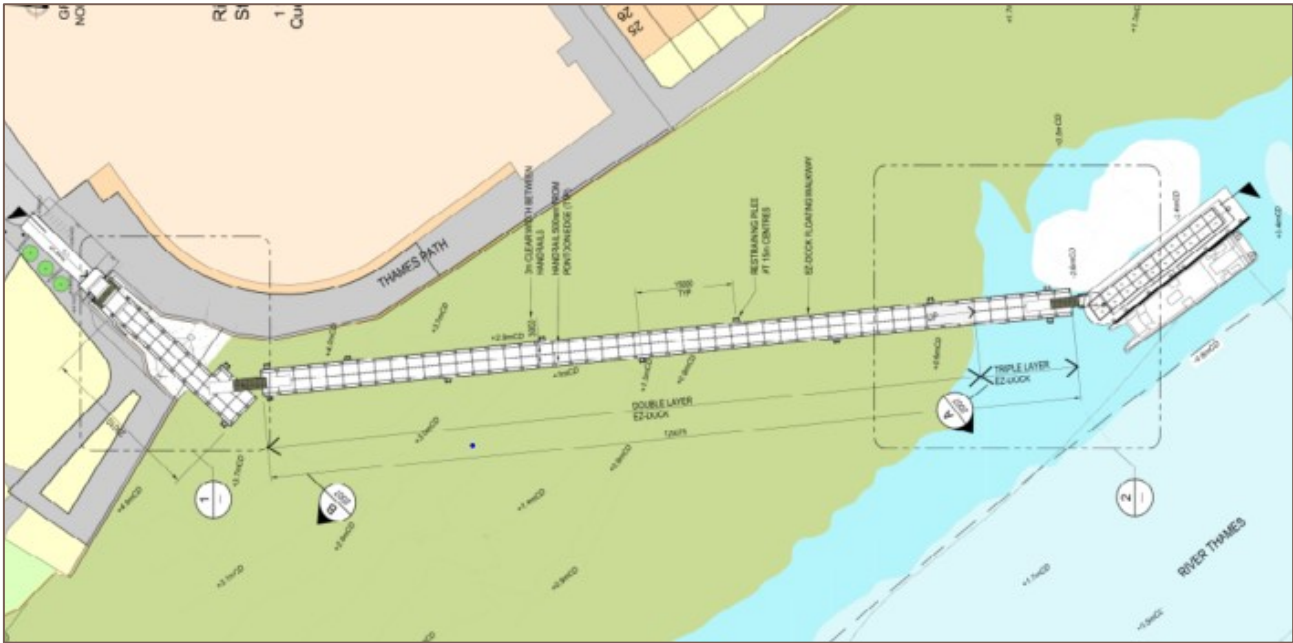


Figure 5: Overview of Hammersmith Pier.

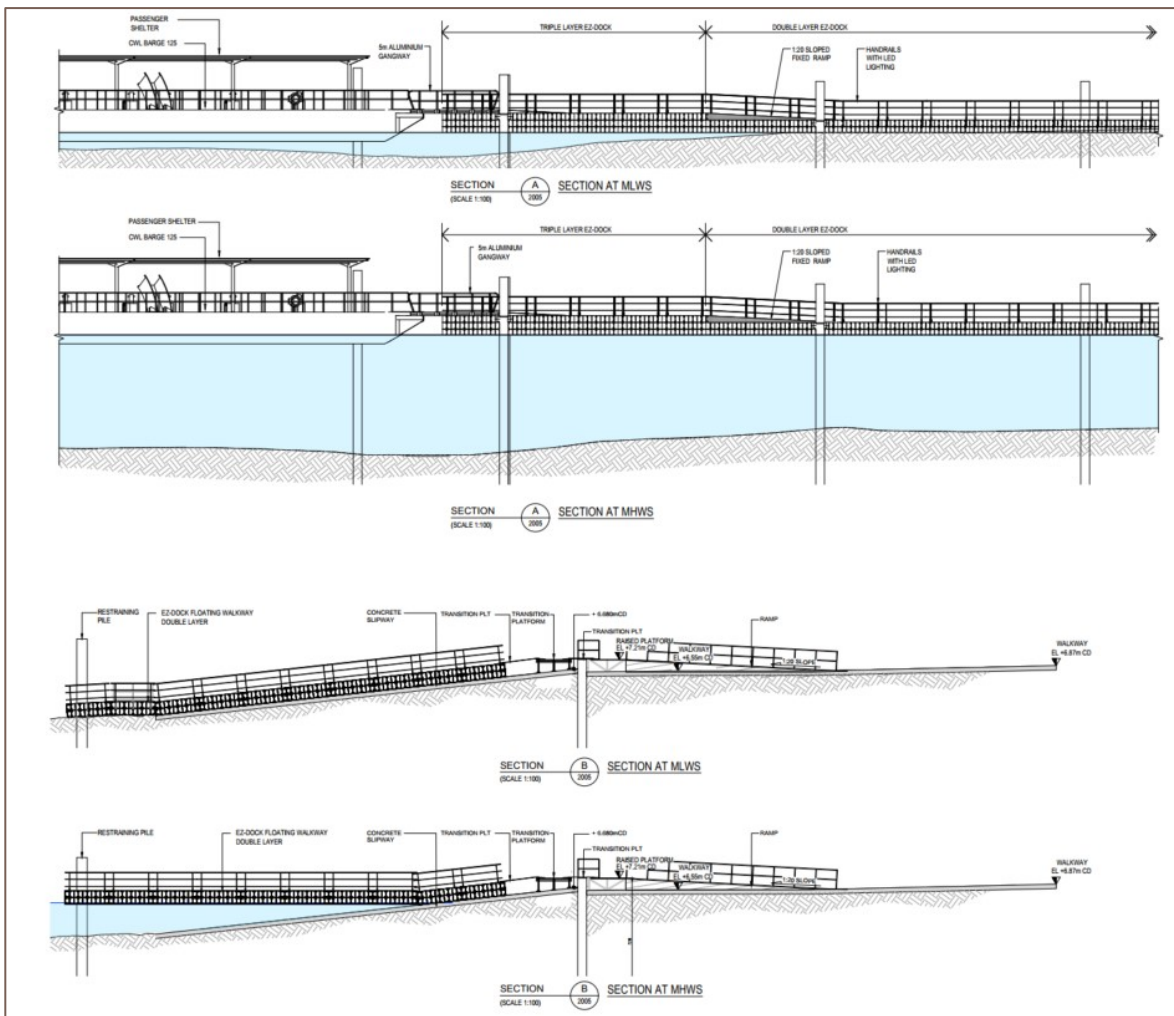


Figure 6: Cross Sectional view of Hammersmith Pier and Floating Pontoon Walkway at MLWS and MHWS.

3.3. FERRY SERVICE AND OPERATION

The proposed Hammersmith Temporary Ferry operation will take place between 06:00 and 22:00 on weekends and 08:00 – 22:00 at weekdays, with a peak and off-peak service being operated - as summarised in **Table 3**. Two vessels will be permanently deployed on the service, with one moored on the Barnes Pier and the other moored on the Hammersmith Pier outside hours of operation. During hours of off-peak operation (when only one vessel is operated) the non operational vessel will be moored on the Barnes Pier. A third vessel will be based at Plantation Wharf (approx. 25mins transit away) and will be on standby at a pre-determined state of readiness as a relief vessel.

Table 3: Summary of Service Provision.

	Peak Service	Off Peak Service
Operating times	06:00 – 10:00 & 15:00 – 19:00	10:00 – 15:00 & 19:00 – 22:00
Frequency (from each pier)	Every 5 – 7 mins	Every 10 – 12 mins
Number of vessels in operation	2 vessels	1 vessel (Spare vessel to layby on Barnes Pier)
Crossings per hour	18 – 24	10 – 12
Transit time in each direction	3 mins	3 mins

Uber boat will utilise the Thames Clippers, *Sky* (see **Figure 7**), *Storm* and *Star*. These Hydrocat vessels are well suited to the Hammersmith Temporary Ferry operation and are highly manoeuvrable. The vessels utilise two fully independent water jet propulsion systems and have a minimal draught of 0.80m making them suitable for operation in the comparable shallow waters. The vessels are able to accommodate a maximum of 62 passengers.



Figure 7: Image of Sky.

During hours of peak operation the two vessels will operate simultaneously with crossings made head to tide in an anticlockwise direction. This operation will occur during both the flood and ebb tides (and was developed as part of an onsite trial) with both vessels utilising the tidal stream as they ferry glide between the pontoons. On

the ebb tide the vessel departing Hammersmith Pier will push forward in to the tidal stream with the vessel departing Barnes Pier dropping back with the tidal flow (see **Figure 8**). On the flood tide the vessels will face downstream with the vessel departing Barnes Pier pushing forward in to the tidal flow with the vessel departing the Hammersmith Pier dropping back with the tidal flow (see **Figure 9**).

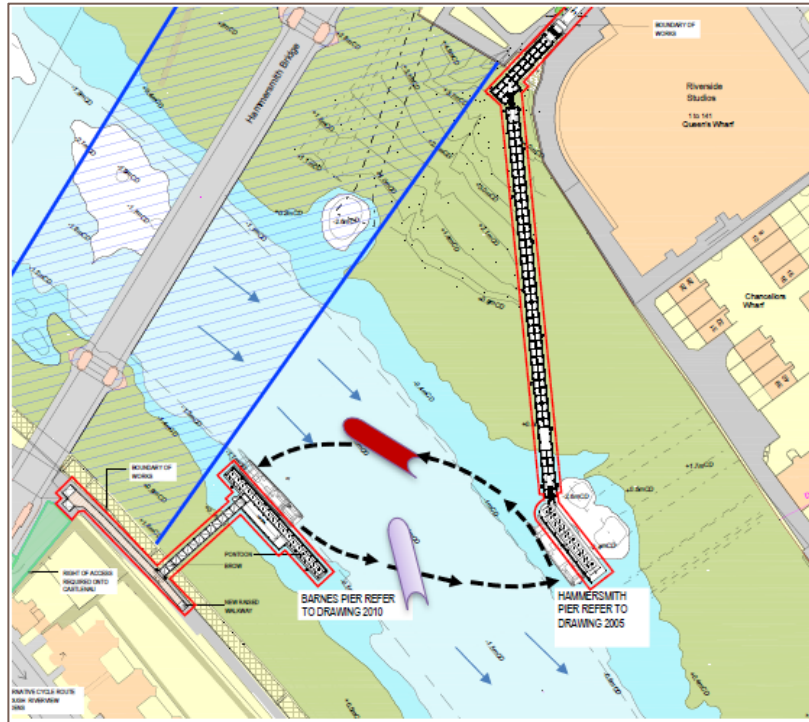


Figure 8: Peak Operation – Ebb Tide.

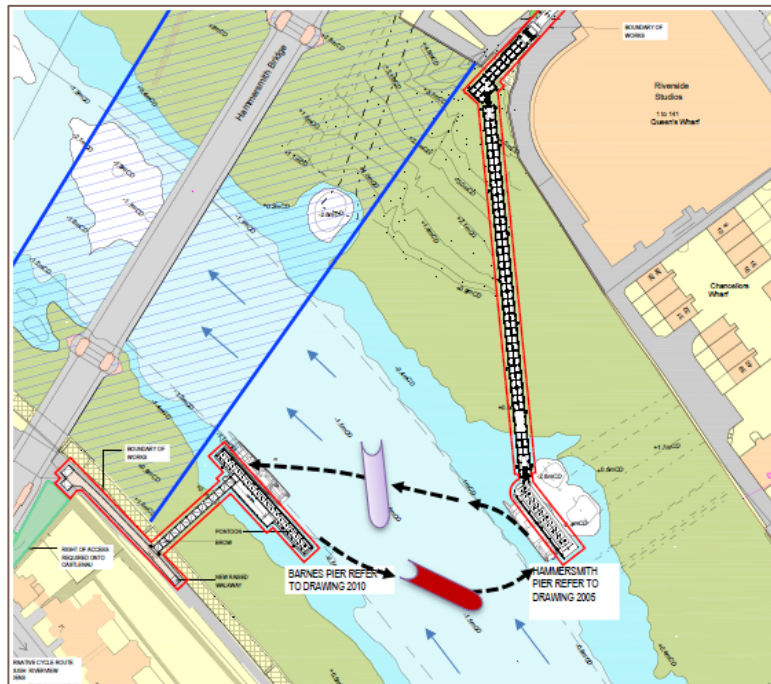


Figure 9: Peak Operation – Flood tide.

3.4. PORT OF LONDON AUTHORITY

The PLA is the Statutory Harbour Authority for the River Thames, responsible for “defining and enforcing the regulations needed to support and manage the safety of navigation on the 95 miles of the tidal River Thames”.

Risk controls of interest to the Hammersmith Temporary Ferry operation include:

- Pilotage Directions;
- General Directions – including Reporting vessel requirements including Isophase lights;
- Bye Laws;
- Code of Practice including the PLA Tideway Code - A code of practice for rowing and paddling on the tidal Thames;
- Aids to Navigation;
- Emergency Preparedness and Response;
- Harbour Service Launch and Patrols;
- Vessel Traffic Services and vessel traffic management; and
- Promulgation of information – e.g. Notices to Mariners, Navigation Warning.

4. BASELINE VESSEL TRAFFIC CHARACTERISATION

The vessel traffic activity in the project area can be classified into two major groups:

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

Analysis of group 1 (powered commercial vessels) was undertaken using Thames Automatic Information System (AIS) transponder data (commercial vessels are mandated to transmit various vessel characteristics, such as position, speed, size and name at prescribed intervals, which can be converted to create vessel tracks).

As AIS is not required on small recreational vessels (although some larger recreational craft voluntarily carry AIS) analysis of group 2 vessels (powered and unpowered recreational craft) is more qualitative in nature. Whilst information is available in publications such as the PLA Tideway Code, consultation with river users is necessary to ascertain detailed information on how they utilise the river

The following sections provide an overview of vessel traffic in the vicinity of the Hammersmith Temporary Ferry between 10-Sep-18 and 23-Sep-18. This data set has been chosen in agreement with the PLA because September was considered seasonally representative months in terms of vessel traffic and because Hammersmith Bridge was open to navigation during this time period. In addition this data set was collated prior to the Covid-19 pandemic so vessel traffic numbers are considered representative.

Note, currently navigation is restricted in the area due to ongoing concerns regarding the safety of Hammersmith Bridge, (see **section 2.2**). Therefore the analysis presented below does not present an overview of the current navigational disposition, rather it shows a realistic overview of the traffic levels and temporal/spatial nature of navigational transits in a normal open river scenario.

4.1. GROUP 1 VESSELS: POWERED COMMERCIAL VESSELS

Figure 10 shows tracks of all vessel transits of the project area, together with a gate between the Barnes and Hammersmith Piers (showing lateral distribution of transit numbers and directions), between 10-Sep-18 and 23-Sep-18. The number of vessel transits in this two-week period has been annualised.

Figure 11 shows the density of all vessel transits on a daily basis providing an indication of the spatial spread and intensity of the identified transits.

The plots demonstrate a number of Group 1 vessels transiting on the north side of the authorised channel as they pass the piers. This is because vessels heading in either an upstream or downstream direction will be aligning with the centre point of Hammersmith Bridge where there is the greatest headway.

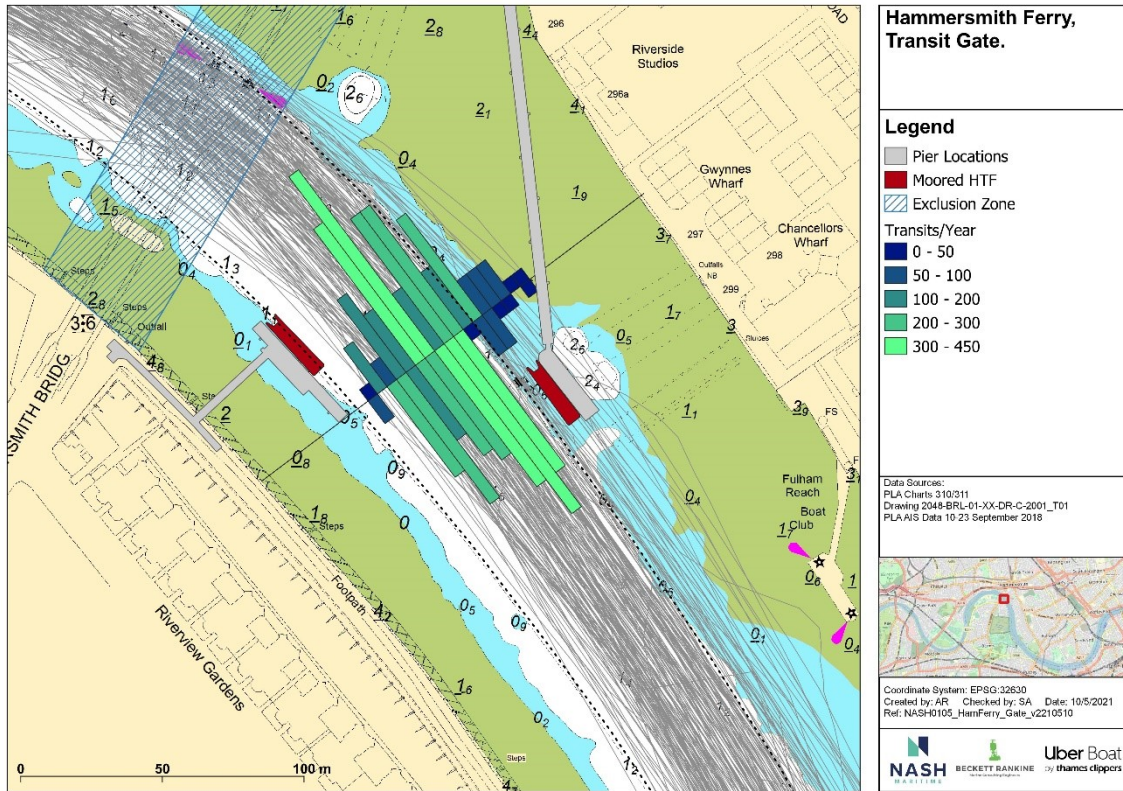


Figure 10: Hammersmith Temporary Ferry Gate Analysis (AIS Sep 2018 Annualised).

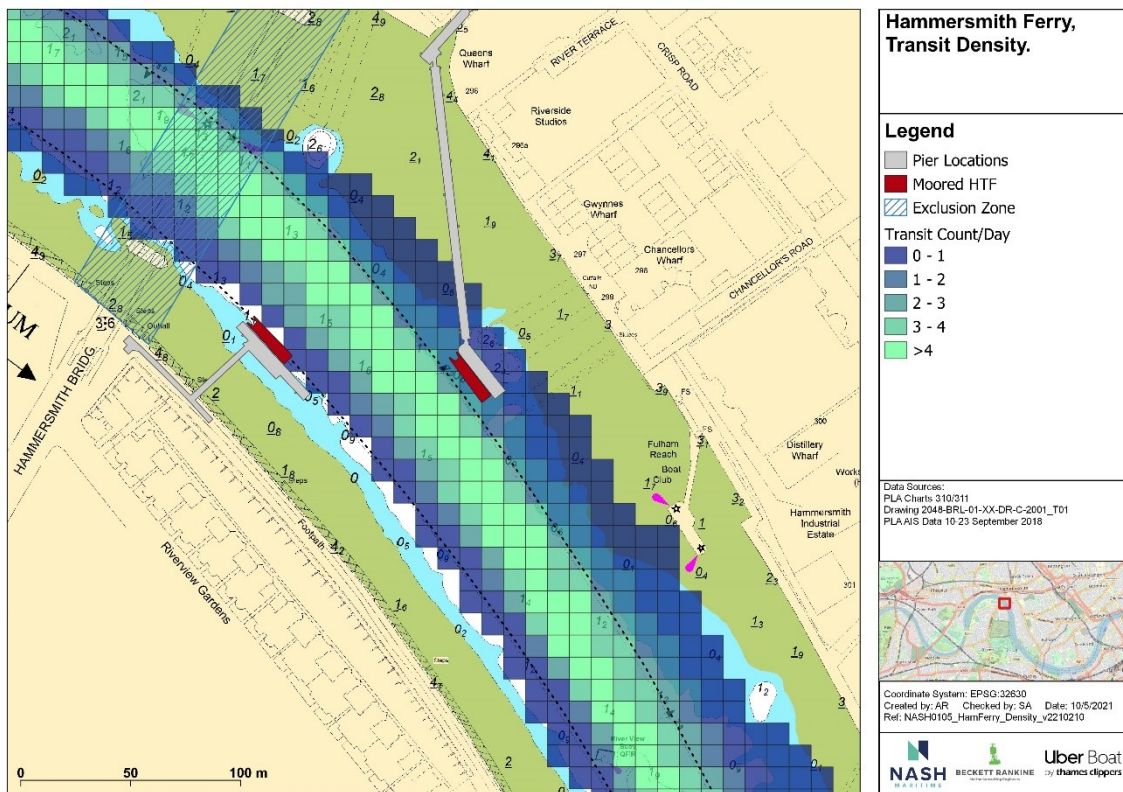


Figure 11: All Vessel Transits Density Plot (AIS Sep 2018).

4.1.1. PASSENGER VESSEL TRACKS

Passenger vessel tracks (shown in **Figure 13**), are comprised of Traditional Class V vessels and High-Speed Craft / Manoeuvrable Class V vessels.

Traditional Class V vessels make up the majority of vessel traffic transiting past the Hammersmith Temporary Ferry site and include the following vessels. Lengths and estimates of air draught have been provided in appreciation of headway restrictions under Hammersmith Bridge (images of those marked with * are shown in **Figure 12**):

- *Clifton Castle** Length 39m Estimated Air Draught Approx. 3.5m
- *Connaught** Length 34m Estimated Air Draught Approx. 4.5m
- *Pride of London** Length 29m Estimated Air Draught Approx. 5.5m
- *Royalty* Length 29m Estimated Air Draught Approx. 5.0m
- *Henley* Length 25m Estimated Air Draught Approx. 3.0m
- *Golden Salamander* Length 20m Estimated Air Draught Approx. 5.0m
- *Princess Freda* Length 19m Estimated Air Draught Approx. 4.0m
- *Cockney Sparrow** Length 16m Estimated Air Draught Approx. 5.0m

Passenger vessel track analysis in the vicinity of Hammersmith Bridge shows that passenger vessels transit almost entirely within the authorised channel (clear of both piers in all other than two isolated transits) and the very southern edge of the authorised channel is typically avoided which is likely associated with the reduced headway under the Hammersmith Bridge.

A single high-speed vessel was recorded as passing the site, which was the *Orion Clipper* a small passenger vessel.



Figure 12: Photos of River Tour vessels from Marinetravica.com, top left Clifton Castle, top right Cockney Sparrow, bottom left - Connaught, and bottom right Pride of London.

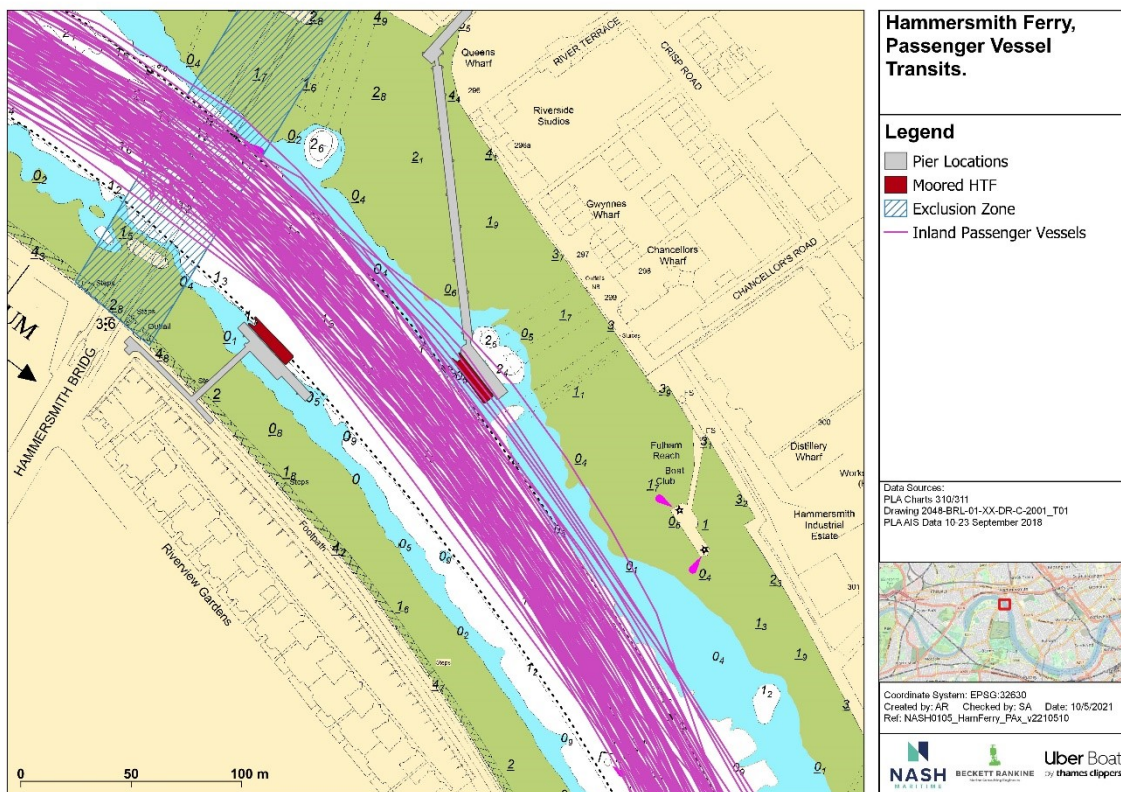


Figure 13: Passenger Vessel Transits (AIS Sep 2018).

4.1.2. SERVICE VESSEL TRACKS

Service vessel tracks are presented in **Figure 16** and include vessels of the following categories (images of those marked with * are shown in **Figure 14**):

- Law Enforcement Vessel (e.g. *Thames Guardian**);
- Port Tender (e.g. *Crane, Londinium 3, Richmond, Roker*);
- Search And Rescue Vessel (e.g. *RNLI Lifeboat E-07, RNLI Lifeboat E-08, RNLI Lifeboat E-09*); and
- Tug (e.g. *Dancha, Sanfiona, Speedwell, TLM Plashy**)

Analysis of service vessel tracks shows this class of vessel to be amongst the most numerous Group 1 vessel types transiting Hammersmith Bridge and between the proposed pier locations. Vessels of this type use the entire width of authorised channel (and on occasions outside to the north when sufficient tidal depth allows) although show a tendency to navigate in the northern side of the authorised channel which is likely due to aligning with the centre of Hammersmith Bridge and point of maximum headway.



Figure 14: Images of Selected Service Vessels, Top Right: Plashy, Top Left: Londinium, Bottom Centre: Thames Guardian.

4.1.3. INTRA PORT FREIGHT

There was only one intra port freight vessel observed transiting in the vicinity of the proposed ferry piers between 10-Sep-18 and 23-Sep-18. This was the vessel *Conquestor*, a tanker vessel operated by Thames Marine Services which transited past the proposed pier sites 6 times during the two-week period in which AIS data was collected, (see **Figure 17**). Analysis of the tracks shows the *Conquestor* navigating predominately in the northern portion of the authorised channel.



Figure 15: Conquestor

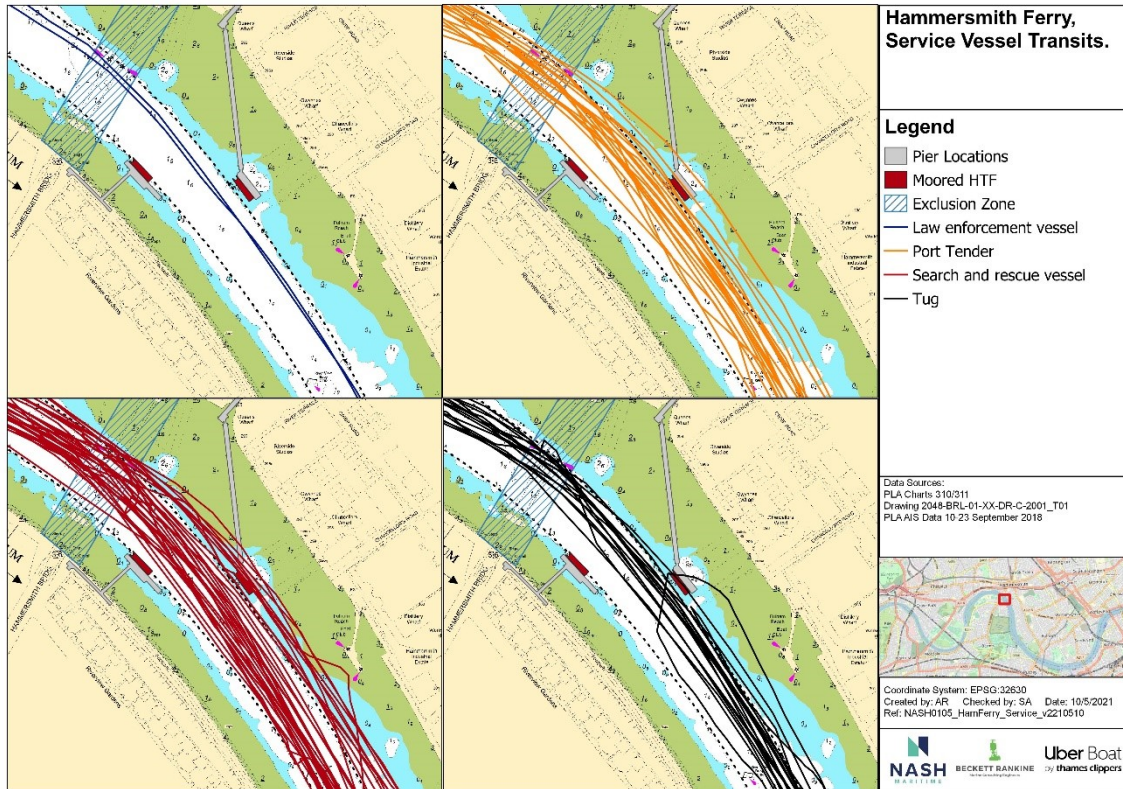


Figure 16: Service Vessel Transits (AIS Sep 2018)

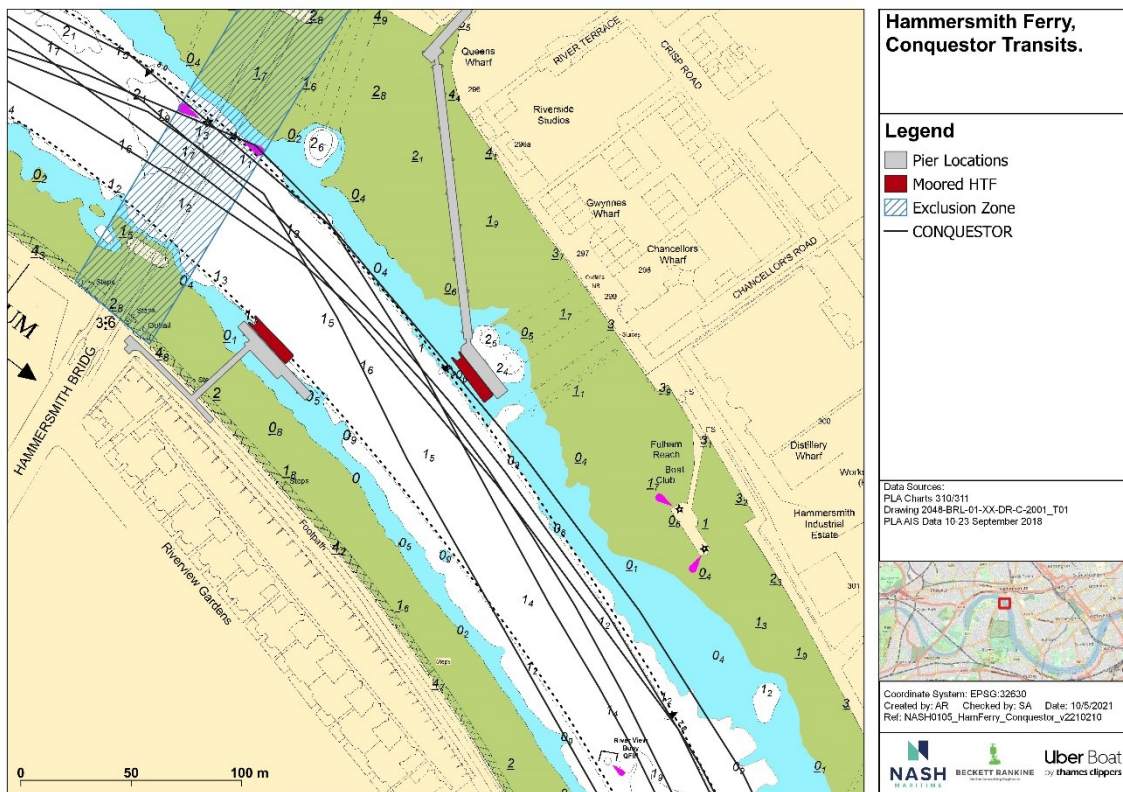


Figure 17: Intra Port Trade Vessel Tracks, Conquestor

4.2. GROUP 2 VESSELS RECREATIONAL CRAFT

Analysis of recreational vessel transits is difficult as most recreational vessels do not carry Thames AIS, a small number of vessels were identified in the AIS data set, these were:

- *Ascension* Length 19m Beam 4m
- *Whistler* Length 10m Beam 4m
- *Joker* Length 14m Beam 4m
- *Lady Lou* Length 12m Beam 4m

Analysis of the limited tracks shows these recreational vessels navigating across the full width of the authorised channel (see **Figure 18**).

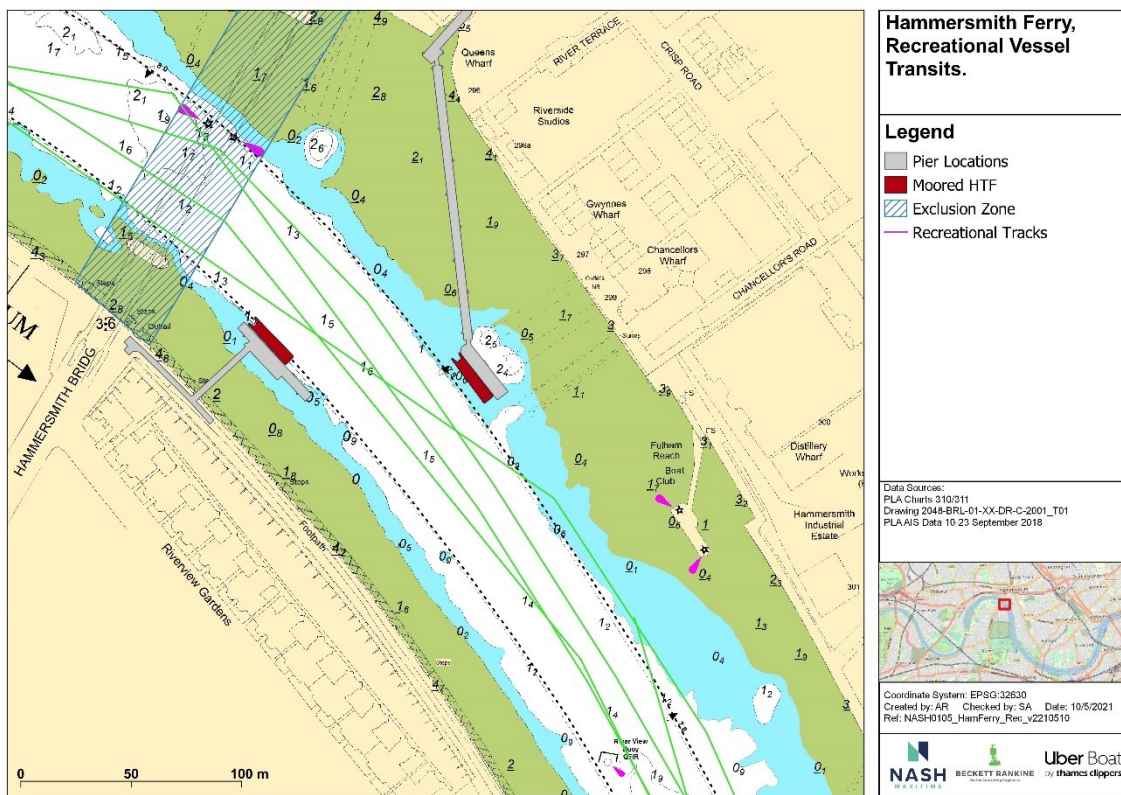


Figure 18: Recreational Vessel Transits (AIS Sep 2018).

In order to characterise recreational craft activity and corresponding navigational disposition whilst transiting through Hammersmith Bridge, the PLA Tideway code was reviewed for rowing and paddling activity, **Figure 19** shows the recommended Tideway code route on the ebb tide and **Figure 20** the recommended route on the flood tide.

As discussed in **section 2.2** the proposed location of the Barnes Pier will impact the recommended Tideway code route.

To obtain a greater understanding of the feasibility of unpowered recreational craft continuing to transit Arch #3 (and under the brow in the backspan of Barnes Pier) and recreational craft activity as a whole, detailed

consultation and/or a visual survey will be required to inform the full NRA. This should also include sailing craft and, where possible, unorganised activity (i.e. activity not affiliated to a club or association).

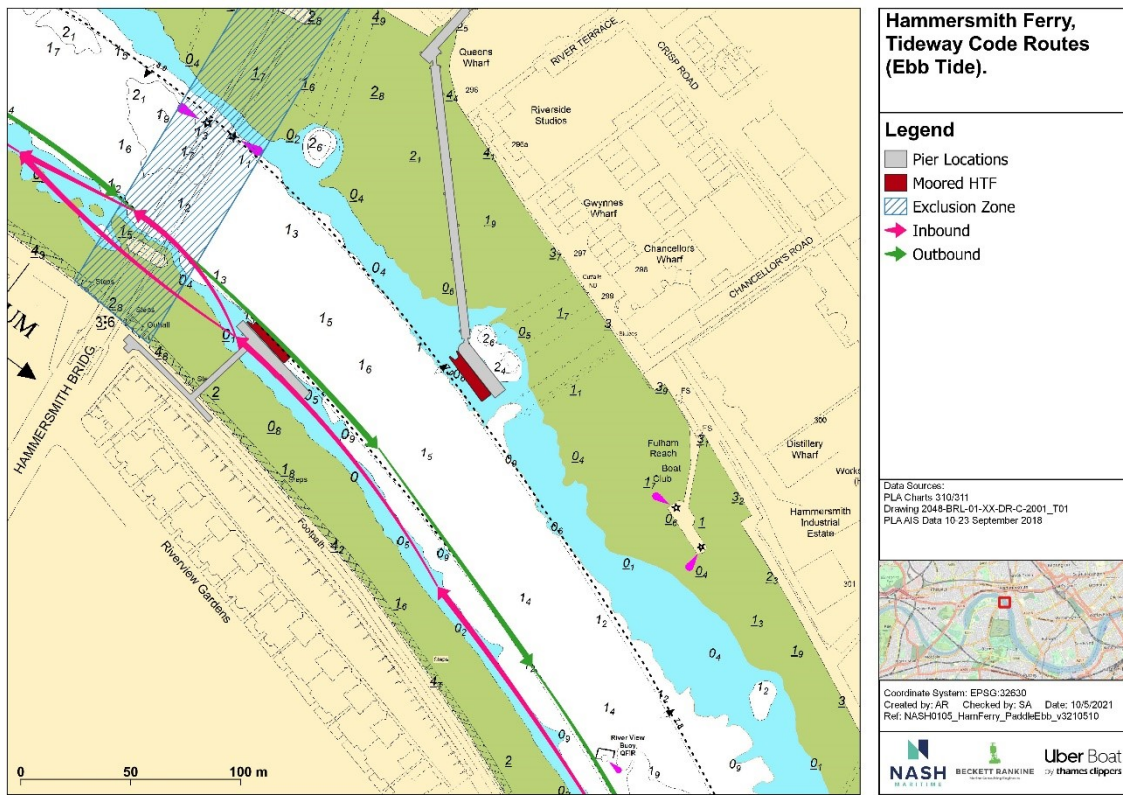


Figure 19: Tideway Code Route – Ebb Tide.

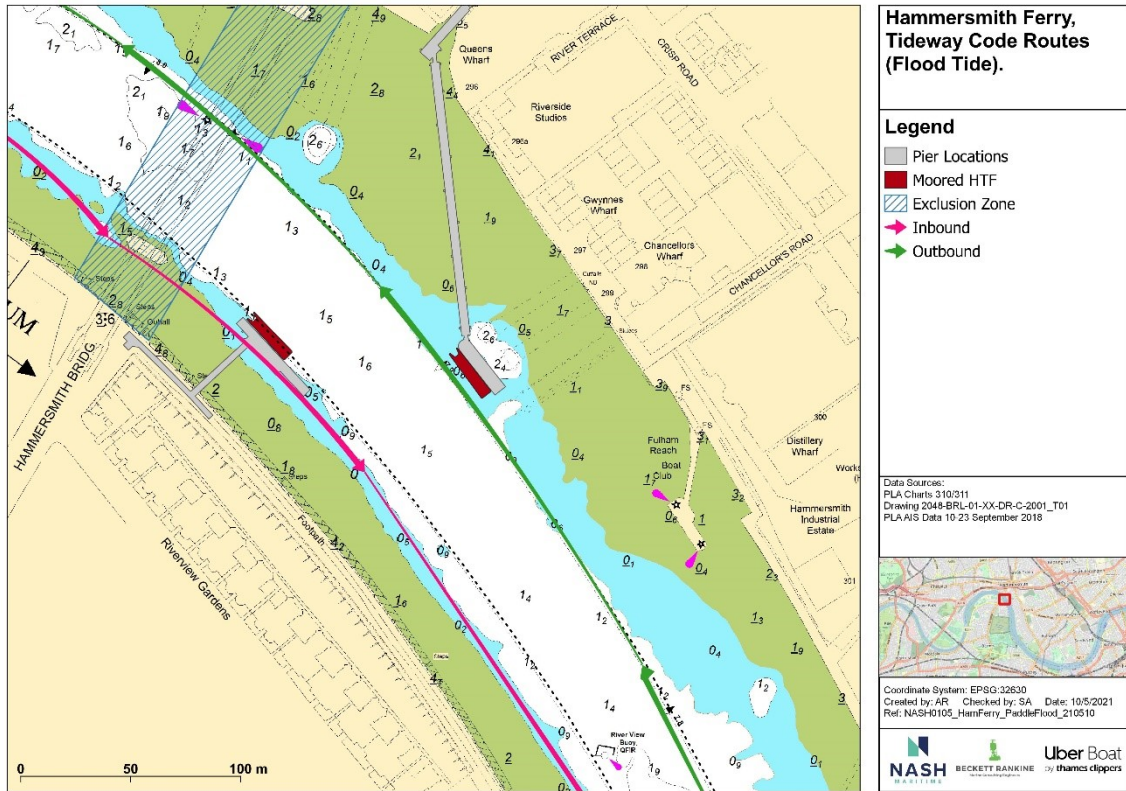


Figure 20: Tideway Code Route – Flood Tide.

5. STAKEHOLDER CONSULTATION

Consultation for the Preliminary Navigation Hazards Analysis was undertaken with the PLA Harbour Master, Thames Regional Rowing Council and Thames Marine Services Ltd. The purpose of this consultation was to:

- identify any key navigation issues/hazards and potential risk control mitigation measures for incorporation into the final scheme design and operation
- review the scope and requirement for the full NRA

A summary of each of the consultation meetings undertaken as part of this study is provided within this section. Full minutes for each of the consultation meetings can be viewed in **Annex A**.

5.1. PLA CONSULTATION

An initial meeting was held with Ryan Hall (PLA Harbour Master) on 16-Apr-2021 to introduce the project team and provide information for the Harbourmasters consideration ahead of more formal NRA consultation meetings to be undertaken at a later date. The meeting also presented an opportunity to introduce some of the key navigational issues at an early stage. The meeting was attended by:

- PLA
 - Ryan Hall – RH
- Uber Boat by Thames Clippers
 - Sean Collins – SC
 - Leva Sabone – IS
 - Mitchell Thorpe – MT
 - Derek Mann – DM
 - Jude McGrane – JM
 - Craig Brown – CB
- Beckett Rankine
 - Graham Gathergood - GG
 - Tim Beckett – TB
- Transport for London (TfL)
 - Jordan Knight – JK
- NASH Maritime Ltd.
 - Jamie Holmes – JJH
 - Sam Anderson-Brown – SAB

The meeting included the following agenda:

- Introductions and Meeting Objectives;
- NRA Approach;
- Proposed Design Layout and Design Geometry;

- Proposed Operation;
- Operational Scenario;
- Data Sources;
- Proposed Consultation; and
- Key Issues.

Key points raised in the meeting were:

- Consideration should be given to giving absolute clarity as to the circumstances in which vessels can navigate the brow of the Barnes Pier.
- It was recognised that the navigational disposition will likely change over the lifetime of the project depending on factors as yet unknown including the refurbishment works associated with Hammersmith Bridge and amendments to the current restrictions to navigation in place e.g. exclusion zone and booked passages, and therefore any risk assessment will need to be updated accordingly to ensure it remains current.
- It was confirmed by RH that the full NRA should be based on the current operational scenario of restricted navigation as per PLA NTM U2 of 2021.
- It was agreed that Thames Regional Rowing Council and Thames Marine Services should be consulted as part of the Preliminary Navigation Hazard Analysis Study as key user group representatives; and
- A number of potential risk control measures were discussed for consideration including:
 - Tidal boards situated on the piers to present actual water depth and headway;
 - A CCTV feed to assist ferry Master's in early identification of passing vessels;
 - Marker buoys to be placed a suitable distance downstream of Hammersmith Pier to warn rowers that they are approaching the ferry operation area; and
 - Details of booked transits could be made in advance to give the ferry Master advanced warning of when to expect passing traffic.

5.2. THAMES MARINE SERVICES CONSULTATION

A meeting was held with Thames Marine Services in order to further understand the impact the proposed piers may have on service vessels and intra port freight vessels such as *Conquestor* (which is a small bunker barge operated by Thames Marine Services). The meeting was held on 22-Apr-2021 and attended by:

- Thames Marine Services
 - Robert Dwan - RD
 - Nicholas Dwan - ND
- Nash Maritime Ltd:
 - Jamie Holmes - JJH
 - Sam Anderson-Brown – SAB

The Meeting included the following agenda points:

R02-00

- Objectives;
- NRA Approach;
- Proposed Site Design Layout;
- Proposed Operation;
- Operational Scenarios; and
- Key Issues.

Key points raised in the meeting were:

- RD and ND felt there would be little to no impact on Thames Marine Services operations as a result of the piers. However, ND raised concerns that a houseboat or Dutch barge navigating downstream on an ebb tide could be taken off course by the tidal set (which will push vessels toward the northern bank) and could make contact with the Hammersmith Temporary Ferry Pier and/or floating walkway. It is likely that such a vessel would aim for the centre of Arch #2 in order to pass under the bridge at the point of maximum headway. The skipper would then have to turn hard to starboard sufficiently early to avoid being pushed on to the pier by the tidal set. Adequate warning will therefore be needed for vessels passing downstream on the ebb tide.
- Concerns were also raised about site lines upstream from the Barnes pier.
- RD and ND suggested that transit times and service frequency times were realistic. *Conquestor* is likely to transit through the bridge at approximately 8 knots so would clear the operational area relatively quickly.
- Thames Marine Services operations are unlikely to differ substantially should the restrictions currently imposed by PLA NTM U2 of 2021 be lifted.
- RD observed that on a high spring tide flotsam and jetsam is picked up and deposited on the northern shore in and around the proposed Hammersmith Pier and pontoon walkway. RD raised the possible issue of debris collecting against or floating directly under the pontoon walkway, causing it to destabilise when it settles on to the bed or damaging it.

5.3. THAMES REGIONAL ROWING COUNCIL CONSULTATION

A meeting was held with Tony Reynolds and Bill Mitchell who represent Thames Regional Rowing Council on 23-Apr-21. The purpose of the meeting was to further understand the impact the proposed piers and ferry operation will have on rowing activity in the area.

Present at the meeting where:

- Thames Regional Rowing Council
 - Tony Reynolds - TR
 - Bill Mitchell - BM
- Nash Maritime Ltd
 - Jamie Holmes - JJH

- Sam Anderson-Brown -SAB

Key points raised in the meeting were:

- The following assumptions are considered a reasonable basis of required room for rowing craft: headroom (1.5m) depth (0.4m) and beam (7m) based on a rowing 8.
- The premise of maintaining navigation in arch #3 is desirable, where safe, to maintain the basis of the existing Tideway code and separate rowers from other navigation (and the ferry) within the authorised channel.
- TR observed that although the backspan would be navigable at most states of tide the existing constraints of arch #3 remain. JJH agreed that the combined 'window' of both arch #3 and backspan will be examined in the NRA. TR noted a potential that rowing vessels could navigate the backspan and then need to navigate back north to the navigation channel in order to pass through arch #2 as per the Tideway Code (with a large alteration of course within the space between the Barnes Pier and Hammersmith Bridge Pier).
- During off-peak periods, the non-operational ferry would be moored on the Barnes Pier which will force rowing craft further out and into the authorised channel when navigating upstream on the ebb tide.
 - Alternate mooring locations such as Dove or Hope pier should be explored.
 - If no alternative can be found a review will need to be conducted once unpowered recreational craft are able to transit Hammersmith Bridge.
- During times when significant rowing activity is carried out, for example on a Saturday peak time it will be difficult for the ferry Master(s) to find an available gap in traffic to make a crossing. It was agreed that should Hammersmith Bridge be opened to unpowered recreational traffic a clear and well communicated operational protocol will have to be developed collaboratively between the ferry operation and local rowing clubs.
- TR commented that it would be of benefit for the Hammersmith Temporary Ferry project team to engage with the rowing clubs in the area (all users meeting) prior to formal consultation as part of the NRA process. This would help pave the way for future discussions regarding operational protocols and improve lines of communication. TRRC would be happy to assist.

6. REVIEW OF DESIGN AND OPERATION

The Preliminary Navigation Hazard Analysis was conducted based on a review of the proposed Hammersmith and Barnes Pier designs, vessel traffic analysis, consultation with the PLA, Thames Marine Services, TRRC and the expertise of the project team.

The following section documents the preliminary hazard analysis and identifies (at a high level) potential risk control measures that could be implemented to mitigate navigation risk. The hazards presented below assumes an “open river” assessment scenario whereby there are no restrictions on navigation. It is recognised that it is possible such an assessment scenario may not occur within the lifetime of the project. However, as the remit of this preliminary hazard analysis is to identify potential design mitigations and as such all future assessment scenarios are considered at this high level in order to future proof the pier designs as much as is practicable.

6.1. DESIGN REVIEW

6.1.1. BARNES PIER AND BROW

In order to minimise the risk of contact and collision to passing vessels the Barnes Pier is well set back from the authorised channel and has been located in order to promote continued use of arch #3 of Hammersmith Bridge. A review of the design, by key hazard type is presented below and with potential risk controls identified in the narrative:

- Contact
 - The pier impinges the unpowered recreational craft route recommended in the Tideway Code although the proposed design has, so far as reasonably possible, been optimised to allow this route to continue by enabling unpowered recreational craft to navigate the under the brow.
 - The risk remains that these vessels could make contact with the pier or brow as they navigate the backspan. In order to mitigate this hazard it is recommended that the underside of the brow be painted in a bright colour to draw attention to its presence. Gauge boards indicating the available headway under the brow and the navigable state of arch # 3 of Hammersmith Bridge will inform unpowered craft users as to whether an attempt to navigate the pier brow and arch #3 is appropriate.
- Collision
 - There is poor line of site when looking for approaching traffic to the west as Hammersmith Bridge obscures the view upstream, and therefore there is a risk that a vessel transiting downstream will not be seen (until too late) by the ferry Master. Vessels transiting downstream with the ebb tide will be moving quickly and will struggle to take avoiding action should a ferry be crossing at the same time; such an instance could result in a collision between the passing vessel and ferry. It is recommended that measures be taken to improve site lines from the Barnes Pier. The installation of a CCTV camera facing west on the Hammersmith Pier with a live feed to the Barnes Pier (and Hammersmith Pier) would allow the ferry Master a clear view upstream of any approaching vessels. In addition a “calling out point” at Chiswick Eyot (or another appropriate location) could

be instated so that passing large vessels can give advanced warning of their intention to transit Hammersmith Bridge. Whilst controlled transits are still required the PLA should provide the ferry Master with an approved transit schedule so that passing traffic can be anticipated in advance and caution exercised.

- Grounding
 - Depths alongside Barnes Pier are limited and gauge boards indicating the available depth alongside will assist the ferry Master in avoiding a grounding incident.
 - Unpowered recreational craft transiting under the pier brow will be able to do so at most states of tide, some smaller craft may even be able to transit under the brow at low tide (even when arch #3 of Hammersmith Bridge is unnavigable). However, consultation with TRRC has revealed the presence of a number of large boulders on the foreshore protruding approximately 10cm above bed level. The removal of these boulders will improve navigation of Arch #3 and the backspan at low tide and reduce grounding risk as well as reduce the volume of unpowered recreational traffic having to utilise the authorised channel at low water.

6.1.2. HAMMERSMITH PIER AND FLOATING WALKWAY

Hammersmith Pier has been offset from Barnes Pier to avoid the piers being directly opposite each other and a narrowing of the available navigable width of the river. It is also positioned a sufficient distance away from Hammersmith Bridge to increase the distance to the centre span of arch #2 (point of highest headway) to maximise searoom for larger navigating vessels. This is balanced with maintaining enough distance from Fulham Reach Boat Club (FRBC) downstream to the east. The proposed location of the pier also seeks to utilise the naturally deeper pocket of water in which it is located to minimise intrusion into the authorised channel.

- Contact
 - A powered houseboat or Dutch barge navigating downstream on an ebb tide could be taken off course by the tidal set (which will push vessels toward the northern bank) and could make contact with the Hammersmith Pier and/or floating walkway or the ferry if alongside or in the area. It is likely that such a vessel would aim for the centre of arch #2 Hammersmith Bridge in order to pass under the bridge at the point of maximum headway. A significant alteration of course to starboard (and management of speed/power) may be required to pass the pier at a safe distance and avoid being pushed onto it by the tidal set. Adequate warning to vessels passing downstream on the ebb tide including consideration of visual markers on the bridge span and/or on the approaches to the west of the bridge warning of the Hammersmith Temporary Ferry (piers and vessels) and a requirement for a prompt turn to starboard could be installed.
 - Unpowered craft approaching Hammersmith Pier from the east and navigating upstream on a flood tide may be pushed north toward the pier by the tidal set. An early warning buoy could be placed to the east of the pier. This risk control will require further development during the full NRA in conjunction with stakeholder consultation with local clubs, notably Fulham Reach Boat Club, in order to ensure that such a buoy does not adversely impact current club activity.

- Grounding
 - Depths alongside Hammersmith Pier are limited and tide gauge boards indicating the available depth alongside will assist the ferry Master in avoiding grounding.
- Pinning
 - Unpowered craft approaching Hammersmith Pier from the east and transiting upstream on the Flood tide may be pushed on to the pier and more likely the floating walkway by the flood tide set. Access and egress points should be provided at regular intervals and incorporated into the floating walkway and pier design along with grabrails/chains to facilitate movement towards access/egress points. Signage on the access walkway alerting members of the public to call 999 and ask for the Coastguard if they notice anyone in the water in distress should be positioned at regular intervals along the walkway.
- Flotsam and Jetsam
 - On high spring tides, flotsam and jetsam is picked up and deposited on the northern shore in and around the Hammersmith Pier and pontoon walkway. There is a possibility of debris catching against/on the pontoon or under the pontoon walkway, causing it to sit at an angle when it settles on to the bed which risks damage or the walkway being unstable for pedestrian use. Regular clearance and inspections should be incorporated into standard operating procedures to ensure that any debris is identified and removed as quickly as possible.

6.2. OPERATION REVIEW

- Collision
 - During off peak operational periods, the ferry which is not in operation will be moored on the Barnes Pier and will protrude slightly into the authorised channel. At low water when navigation of the backspan is not possible unpowered recreational craft will be required to navigate to the north of the moored ferry and will encroach further into the authorised channel. This will increase the likelihood of a collision occurrence involving passing vessels. Alternate mooring locations such as Dove or Hope Pier should be investigated to limit any prolonged restriction of the authorised channel and the resulting constriction of navigation. If it is not possible to find an alternative mooring location the positioning of the non-operational vessel should be reviewed on a regular basis as part of the dynamic consultation intended to be carried out through a River Consultative Liaison Group.
 - During times when significant rowing activity is carried out (and in the event that current restrictions are lifted), for example on a Saturday morning, it will be difficult for the ferry Master's to find an available gap in traffic to make a crossing. Should Hammersmith Bridge be opened to unpowered recreational traffic a clear a well communicated operational protocol should be developed collaboratively between the ferry operation and local rowing clubs. The operational protocol will need to be developed collaboratively (in the event that transits of Hammersmith Bridge by unpowered craft are permitted) and could include the following:

- Rowing craft only navigate in single file and cease paddling as they navigate with the tide through the operational area;
- No racing within defined area;
- Proceed with careful lookout;
- Encourage individual clubs to risk assess novice rowers and coxes in the area; and
- It may be appropriate to station a safety/rescue boat in the area. This vessel could alert crews to the operational protocols in place. This measure would unlikely be in place for the duration of the operation but could be useful whilst the agreed operational protocols are “bedded in” and recreational users habituate to the ferry service.

6.3. RISK CONTROL MITIGATION

The following possible risk controls options have identified:

- **CCTV viewing upriver to improve visibility** - Installation of a CCTV camera on the Hammersmith Pier with a live link to the Barnes Pier, this will allow the ferry Master on the Barnes Pier (and Hammersmith Pier) to have an unobstructed view of traffic approaching from the west.
- **Tide Gauge Boards (depth alongside)** – Tide Gauge boards should be installed on Hammersmith and Barnes Pier to give a true indication of depth alongside the piers.
- **Gauge boards (brow headway and arch #3 navigable state)** - Gauge boards showing the available headway under the Barnes Pier brow and a tide gauge board showing whether arch #3 is navigable could be affixed to the downstream pile of the Barnes Pier providing real time information for rowers approaching the area. This board should be simple and easy to interpret at a glance, e.g. green/red depending on whether the limiting feature (assume critical depth is in arch # 3 and not the backspan) is safe to navigate.
- **Paint underside of brow**- The underside of the Barnes Pier brow should be painted in a bright colour to draw attention to it.
- **Remove foreshore boulders** - Boulders on the foreshore on the approach to the Barnes Pier brow and through Hammersmith Bridge Arch #3 should be removed where possible to reduce the likelihood of grounding occurrence and increase the low tide use. This will reduce unpowered recreational traffic utilising arch #2 towards low tide and decrease risk of collision.
- **Signage warning of Hammersmith Pier or notification when booking transit** - Signage warning of the presence of Hammersmith Pier and the need for craft transiting Hammersmith Bridge arch #2 downstream on an ebb tide to turn hard to starboard once the bridge is cleared. A notice could be issued when booking a transit warning of this hazard whilst operational.
- **Early warning marker buoy downstream of Hammersmith Pier** - There is potentially a need to place a buoy downstream of Hammersmith Pier to alert recreational craft (principally rowers) of the presence of the pier. Vessels not navigating with due care may be pushed on to the Pier/floating walkway by the flood tide which has a strong set to the north.

- **Access and egress points** should be provided at regular intervals along the Hammersmith Pier floating walkway and in accordance with PLA 'A Safer Riverside – Guidance for Development alongside and on the tidal River Thames' (Sep-2020).
- **Grab chains/rails** should be provided along the Hammersmith Pier walkway to facilitate movement towards access and egress points and in accordance with PLA 'A Safer Riverside – Guidance for Development alongside and on the tidal River Thames' (Sep-2020).
- **Notice to Mariners** to be issued giving information on the location of the piers, ferry operation, agreed operational protocols, advice on the navigation of Hammersmith Bridge etc.
- **Controlled transit list** to be provided by PLA to ferry Master's to allow for anticipation of passing transits.
- **River Liaison Group** This is particularly recommended given it is likely that the navigational disposition will change over the lifetime of the project as a result of amendments to the current restrictions to navigation and any bridge works etc. In such an event a further assessment of navigational risk will need to be carried out, this will include further stakeholder consultation and development of additional risk control measures that will need to be adopted and implemented to manage navigational risk. This forum would also sensibly develop/amend operational protocols.
- **Local Navigation Protocol** - Should Hammersmith Bridge be opened to unpowered recreational traffic clear and well communicated operational protocols will have to be developed collaboratively between the ferry operation, existing commercial operations, local rowing clubs and other users to ensure adequate and safe integration and deconfliction of associated activities.
- **Calling out point - Chiswick Eyot (navigating downstream)** - a "calling out point" at Chiswick Eyot (or another appropriate location) could be instated so that passing vessels can give advanced warning of their intention to transit Hammersmith Bridge.
- **Provision of Rescue/Safety Boat** - It may be appropriate to have a safety/rescue boat. This vessel could alert crews to the operational protocols in place. This measure would unlikely be in place for the duration of the operation but be useful whilst the agreed operational protocols "bedded in". It should be noted that the relationship between the proposed safety/rescue boat with any Hammersmith Bridge works guard boat currently onsite should be reviewed, (see minutes of discussion with TRRC for further detail in **Annex A**)

Table 4 summarises the provisional hazards identified as part of this assessment and the risk control measures that could be implemented in order to mitigate risk.

Table 4: Summary of Hazards and Applicable Risk Control Measures

Haz Type	Hazard Description	CCTV viewing upriver to improve visibility	Gauge boards (depth alongside)	Gauge boards (brow headway and arch #3)	Paint underside of brow	Remove foreshore boulders	Signage warning of presence of Hammersmith Pier or notification when booking bridge transit	Marker buoy downstream of Hammersmith pier (north side)	Access and Egress	Alternate mooring	Grab rails / chains Hammersmith Pier	Notice to Mariners	Controlled transit list provided	River Liaison Group	Local Navigation Protocol	Calling out point-Chiswick Eyot (navigating downstream)	Provision of Rescue/safety boat
Contact	Powered recreational vessel transiting downstream on an Ebb tide makes contact with Hammersmith pier having been pushed to the north by the ebb tidal set.						✓					✓					
Contact	Commercial vessel makes contact with Hammersmith or Barnes pier.						✓					✓			✓		
Contact	Unpowered recreational vessel makes contact with Barnes pier or Barnes pier Brow whilst attempting to navigate backspan.			✓	✓	✓											
Contact	Unpowered recreational vessel makes contact with Hammersmith pier having been pushed off course by flood tidal set.							✓									✓
Collision	Collision between ferry and passing powered recreational craft.	✓								✓		✓	✓	✓		✓	
Collision	Collision between ferry and passing unpowered recreational craft.	✓				✓		✓		✓		✓		✓	✓		✓
Collision	Collision between ferry and passing commercial vessel.	✓								✓		✓	✓	✓	✓	✓	
Grounding	Grounding of ferry vessel on approach to Hammersmith or Barnes pier at low water.		✓			✓											
Grounding	Grounding of third-party vessel as a result of ferry operation.	✓	✓			✓	✓					✓		✓	✓		
Pinning	Pinning of unpowered recreational vessel against Hammersmith pier having been pushed off course by flood site set.						✓	✓			✓			✓	✓		✓

7. NAVIGATION RISK ASSESSMENT

The PLA as regulator for navigation safety on the River Thames requires that a Navigation Risk Assessment be appended to any River Works License, where the works are likely to have an effect on vessel navigation.

The Navigation Risk Assessment for the Hammersmith Temporary Ferry will cover the construction phase, operational phase and decommissioning phase of the project.

7.1. ASSESSMENT SCENARIO

At present, navigation through Hammersmith Bridge is restricted to controlled transits only (see further detail in **section 2.2**). Consultation with the PLA (see **section 5.1**) has revealed that there is no expected time frame for the lifting of these restrictions. At present there are no transits through the bridge by passenger vessels, unpowered recreational craft or any craft that is not transiting as part of a pre-booked controlled passage. This significantly reduces the number of transits passed the proposed Hammersmith Temporary Ferry operational area. The NRA will be based on this current operational scenario. However, it should be noted that the NRA will need to be periodically reviewed and updated throughout the lifetime of the project to accommodate any future change in navigational disposition resulting from a lifting of restrictions or commencement of work to refurbish Hammersmith Bridge. This will include continued stakeholder consultation to review navigation disposition, hazards risk levels, and identify additional risk mitigation measures:

Future operational scenarios may be influenced by (but are not limited to) changes to:

- Transition to controlled/uncontrolled transits of users through bridge (restriction removal);
- Removal/revision of exclusion zone;
- Impacts from the refurbishment work to Hammersmith Bridge;
- Events; and
- Variation in traffic trends (e.g. post Covid-19 influence/'bounce' and reported increased usage of area by non-organised users).

Table 5 summarises the preliminary risk control measures that may be required, the vessel types that would be able to transits Hammersmith Bridge if such a scenario came in to affect and the risk control measures (previously listed in **section 6.3**) that would need to be implemented in a “controlled transit” (current) assessment scenario and “open river” scenario.

Table 5: Indicative Future Assessment Scenarios and Risk Control Development Summary.

		Controlled Transit*	Open River**
Hammersmith Bridge Transit Authorised	Class V Passenger Vessel		✓
	High Speed Passenger Vessel		✓
	Service Vessel	✓	✓
	Intra Port Freight	✓	✓
	Powered Recreational	✓	✓
	Unpowered Craft transiting as part of an organised group		✓
	Unpowered Craft not part of an organised group		✓
Possible Risk Control 1	CCTV viewing upriver to improve visibility	X	✓
Possible Risk Control 2	Gauge boards (depth alongside)	✓	✓
Possible Risk Control 3	Gauge boards (brow headway and arch #3)	X	✓
Possible Risk Control 4	Paint underside of brow	X	✓
Possible Risk Control 5	Remove foreshore boulders	X	✓
Possible Risk Control 6	Signage warning of presence of Hammersmith Pier or notification when booking bridge transit	✓	✓
Possible Risk Control 7	Marker buoy downstream of Hammersmith pier (north side)	X	?
Possible Risk Control 8	Access and Egress	✓	✓
Possible Risk Control 9	Alternate mooring	X	?
Possible Risk Control 10	Grab rails / chains Hammersmith Pier	✓	✓
Possible Risk Control 11	Notice to Mariners	✓	✓
Possible Risk Control 12	Controlled transit list provided	✓	X
Possible Risk Control 13	River Liaison Group	✓	✓
Possible Risk Control 14	Local Navigation Protocol	X	✓
Possible Risk Control 15	Calling out point-Chiswick Eyot (navigating downstream)	X	?
Possible Risk Control 16	Provision of Rescue/safety boat	X	?

*Controlled transits as per U2/2021, exclusion zone in place.

**Open River Scenario - no restrictions on transits and exclusion zone removed.

7.2. NAVIGATION RISK ASSESSMENT METHODOLOGY

The NRA methodology will be as agreed with the PLA at the consultation meeting held on the 16-Apr-2021, and broken down into the following individual tasks:

- Task 1: Project Inception and Review
- Task 2: Baseline Vessel Traffic Characterisation
- Task 3: Consultation
- Task 4: Risk Assessment
- Task 5: Reporting

7.2.1. PROJECT INCEPTION AND REVIEW

A review of documentation, to be provided by Uber Boat by Thames Clippers, Beckett Rankine and TfL, will be made to ensure that the project parameters are fully documented which will include the items below.

- Pier Designs and layouts;
- Operational procedures and Standard Risk Assessments;
- Drawings including temporary in river/marine work layouts;
- Works Schedules;
- Review of Hazard Themes and Provisional Risk Mitigation measures; and
- Review of NRA work to date.

7.2.2. TASK 2: BASELINE VESSEL TRAFFIC CHARACTERISATION

Baseline vessel traffic analysis (as presented in **section 4** of this preliminary report) will be further developed based on existing data. The analysis will inform the appropriate identification and assessment of navigation hazards. This task will include:

- Vessel traffic analysis of AIS data:
 - Vessel track analysis by vessel type;
 - Density analysis; and
 - Gate analysis near proposed site - Analysis of gate data by vessel type, time of day, speed, etc.
- Vessel traffic analysis of non-AIS vessels through review of available documents such as the Tideway Code.
- Vessel bridge transit tidal analysis to determine tidal states of vessel passages.
- Analysis of PLA incident data to inform likelihood / consequence of hazard occurrence.

7.2.3. TASK 3: CONSULTATION

An important aspect to the risk assessment process is the elicitation of local knowledge from the regulators and users of the River Thames. The river has a diverse and widespread number of marine users from commercial freight operators, commuter and tourist passenger vessel services, as well as workboats engaged in a variety of different activities. Recreational mariners also use the river in a variety of craft from canal barges to kayaks.

The potential for a number of as yet undefined future assessment scenarios means periodic stakeholder consultation will be essential to allow for rapid revision of the NRA and assessment of additional hazards and risk control mitigations throughout the lifetime of the project. Therefore a stakeholder liaison group should be formed comprising representatives of the following organisations as agreed with the PLA at the Early Engagement Meeting (this list should be reviewed depending on changes such as the re-opening of Hammersmith Bridge):

- PLA;
- Thames Regional Rowing Club (TRRC);
- Adjacent local rowing club (FRBC to East) (Furnivall, AK to West);
- Local Sailing Clubs - Ranelagh and South Bank SC (to East) and London Corinthians SC (to West);
- SUP (via Active 360);
- Kayaking / canoeing community;

- Key Commercial Vessel Operators;
- Colliers Launches;
- Thames Marine Services; and
- RNLI Chiswick.

Summary minutes of each of the stakeholder liaison group meetings will be produced.

7.2.4. TASK 4: RISK ANALYSIS

The risk analysis task will collate findings of Task 1, Task 2 and Task 3, with the expert judgement of project personnel, to perform a detailed “*Hazard Identification and Scoring*” assessment and is based on vessel type, area, and hazard type. Typical categories may include:

- Vessel types – e.g. Group 1 Vessels – powered commercial vessels and Group 2 vessels – Recreational Craft, etc.)
- Geographic/Spatial Risk Areas; and
- Hazard types – e.g. collision, contact, grounding, breakout, etc.

Where key or critical hazards are identified, further analysis will be undertaken to provide an evidence basis for the assessment of risk. In many instances, key hazards or concerns are identified based on limited information, especially when there is likely to be a change in vessel traffic activity, and therefore further detailed analysis and interpretation can be used to determine the magnitude of any change or concern.

The task will deliver a finalised hazard list that can be scored for hazard likelihood and consequence.

In order to ascertain the risk of individual hazard occurrence for both hazard likelihood and hazard consequence the PLA “*Risk Assessment Matrix: Risk Criteria*” will be used (see **Figure 21**). The process includes a project personnel workshop where all hazards are individually assessed against the baseline traffic and incident data, the results of the stakeholder consultation, the expert judgement of the project team, and any detailed key hazard analysis undertaken.

	Risk Score Matrix					Total Risk Score	
Almost Certain	5	10	15	20	25	Minor	1-3
Likely	4	8	12	16	20	Moderate	4-8
Possible	3	6	9	12	15	Serious	9-14
Unlikely	2	4	6	8	10	V Serious	15-19
Rare	1	2	3	4	5	Severe	20-25
Likelihood	Minor	Moderate	Serious	Very Serious	Severe	Severity	

Figure 21: Port of London Authority Risk Assessment Matrix and Criteria⁴.

Where hazards are scored as serious or higher risk, risk controls aimed at eliminating the hazard or reducing the risk to acceptable levels will be identified. The process of risk control identification and effectiveness scoring will be documented in the hazard register.

7.2.5. TASK 5: REPORTING

A technical NRA report will be prepared as the deliverable. The report will present the results of the NRA and will be appended to a River Works License for PLA approval.

⁴ Provided by PLA Harbour Master Mark Towns on 24 Jan 2020.

8. STUDY FINDINGS

8.1. CONCLUSIONS

This Preliminary Navigation Hazard Analysis has assessed at a provisional level, the navigation impact of constructing two piers located immediately downstream of the current Hammersmith Bridge on the River Thames and the operation of a temporary ferry service. A review of the proposed pier designs and ferry operation, along with consultation with the PLA, Thames Marine Services TRRC, and analysis of vessel track data was conducted to provide an evidence basis for the conclusions.

The conclusions are:

- The pier locations and designs have been optimised sufficiently to mitigate navigational risk as much as possible and no amendments to the pier locations are recommended.
- Minimal alterations to the existing pier designs are required (see **Table 5**).
- Subject to risk assessment, the requirement for incorporation of risk control mitigation on the design and operation (as per **Table 5**) will require consideration.
- The potential for a number of as yet undefined future operational scenarios means periodic stakeholder consultation will be essential to allow for rapid revision and update of the NRA including the update and assessment of additional hazards, and determination of risk control mitigations throughout the lifetime of the project;
- The NRA will be undertaken on the basis of the current assessment scenario, i.e. controlled transits through the Hammersmith Bridge (PLA NTM U2/2021); and

8.2. RECOMMENDATIONS

The primary recommendation of this preliminary navigation hazard assessment is that a full NRA is undertaken in line with PLA requirements for the installation, operation and decommissioning of the proposed piers and Hammersmith Temporary Ferry operation.

It is recommended that the risk mitigation measures identified in **Table 5** are implemented as per the controlled transit assessment scenario prior to the commencement of the Hammersmith Temporary Ferry operation.

The assessment scenario adopted for the NRA will be as per PLA NTM U2/2021, and the NRA will need to be updated periodically as part of future phases of work, should there be a change to the current navigational disposition (e.g. if Hammersmith Bridge transit restrictions are revised). In order to facilitate the development and implementation of risk controls identified in this preliminary navigation hazard assessment, enable periodic consultation, assessment of future assessment scenarios and to provide feedback of the effectiveness of implemented risk control measures a River Liaison Group should be formed at the earliest convenience.

It is further recommended that the Hammersmith Temporary Ferry project team holds an open meeting with all local river stakeholders to introduce the project and to open lines of communication prior to the formal consultation regarding the NRA.

ANNEX A – STAKEHOLDER CONSULTATION MINUTES

Notes of Meeting

Hammersmith Ferry Phase One – Scheme Overview (20-NASH-105)

Client: Uber Boat by Thames Clipper
 Project: Hammersmith Ferry
 Venue: Video/telecon (MS Teams)
 Date of Meeting: 16-Apr-2021 (14:00– 15:00)

Present:

Port of London Authority (PLA)	Ryan Hall - RH
NASH Maritime	Jamie Holmes - JH
NASH Maritime	Sam Anderson-Brown - SAB
Uber Boat by Thames Clipper	Sean Collins - SC
Uber Boat by Thames Clipper	Ieva Sabone - IS
Uber Boat by Thames Clipper	Mitchell Thorpe - MT
Uber Boat by Thames Clipper	Derek Mann – DM
Uber Boat by Thames Clipper	Jude McGrane -JM
Uber Boat by Thames Clipper	Craig Brown - CB
Transport for London	Jordan Knight - JK
Beckett Rankine	Graham Gathergood - GG
Beckett Rankine	Tim Beckett - TB

1.	Introductions and Meeting Objectives
	<ul style="list-style-type: none"> - Brief introductions. - Objectives of the meeting: <ul style="list-style-type: none"> • Brief all on NRA plan (and phased approach). • Provide an initial briefing for the PLA for consideration ahead of a formal Phase 1 consultation meeting. • Identify any areas/key issues where further information is required
2.	NRA Approach
	<ul style="list-style-type: none"> - SAB outlined approach to the NRA, the purpose of Phase 1 is to identify key navigation issues/hazards and potential risk control mitigation measures for incorporation into the final scheme design (e.g. layout/design aspects) and is focused on the operational project phase. - Phase 2 will consist of a full Navigation Risk Assessment (NRA) to support the license application.
3.	Proposed Design layout and Design/Geometry: Barnes Pier Brow
	<ul style="list-style-type: none"> - Pier design locations have been optimised to minimise impact on the navigation channel where possible.

	<ul style="list-style-type: none"> - The brow linking Barnes Pier to the shore has been designed in such a way to allow unpowered recreational craft (principally rowers) to pass between the shore and pier (the backspan). - Further consultation will be carried out during Phase 1 with TRRC to further explore potential use of backspan and incorporate any design critical learnings. - RH commented that consideration should be given to giving absolute clarity as to the circumstances in which vessels could navigate the backspan. Short discussion on this held.
4.	Proposed Operation
	<ul style="list-style-type: none"> - SAB presented an overview of the proposed operation
t	Operational Scenario
	<ul style="list-style-type: none"> - It is recognised that navigational disposition may change over the lifetime of the project for various factors including: <ol style="list-style-type: none"> 1. Hammersmith bridge closure/partial closure with restrictions to navigation and exclusion zones. 2. Refurbishment works associated with Hammersmith Bridge. 3. Variation in traffic trends (events, post covid usage of rivers – e.g., potential increase in non organised usage), summer season etc....) - RH outlined that restrictions to navigation may be relaxed/removed during the lifetime of the project but at present navigation of Arch 2 is available via pre-booked controlled transits for essential and necessary transits only (NTM U2 of 2021). - NRA should be based on current operational scenario and reviewed as and when restrictions are lifted/amended.
6.	Data sources for NRA
	<ul style="list-style-type: none"> - SAB noted limitations in existing data sets given the Hammersmith Bridge Closure and Covid 19 pandemic. - Stakeholder engagement will be crucial to the NRA process.
7	Consultation
	<ul style="list-style-type: none"> - SAB outlined initial stakeholders identified for Phase 1 and Phase 2 consultation. - RH commented that operators of large commercial vessels currently undertaking controlled transits should be consulted during Phase 1. Considered likely to be Conquestor or Plashy. Noted also larger class V vessels (e.g. colliers) albeit currently/likely to be operating an alternative route not through Hammersmith bridge) - RH also commented that contact with recreational stakeholders will require sensitive communication regarding undefined timescale of reduction/removal of restrictions to recreational transits (and other non-essential transits) in vicinity of Hammersmith Bridge. - It was agreed that a river user liaison group should be established to allow for dynamic consultation throughout the lifetime of the project. This risk control measure is considered essential as it is likely that the navigational disposition will change over the lifetime of the project as a result of amendments to the current restrictions to navigation. In such an event a further assessment of navigational risk will need to be carried out, this will include further stakeholder consultation and development of additional risk control measures that will need to be adopted and implemented to manage navigational risk.
8	Key Issues
	<ul style="list-style-type: none"> - SAB outlined key issues identified by NASH so far and it was agreed these were appropriate. - RH asked if NRA would consider grounding risk to vessels, it was confirmed that the full NRA would consider grounding risk and the installation of a tidal board on one of the pontoons would be a sensible risk control measure. Noted that the NE Pier is in a

	<p>deeper pocket and so vessels approaching from downriver may ground before contact with works.</p> <ul style="list-style-type: none"> - SC asked if any special directions could be put in place by the PLA to deconflict ferry operation with passing recreational vessels (noting potential 'peak' periods when a slot for the ferry may take time to emerge). RH confirmed that temporary amendments could be made to documents such as the Tideway Code warning of ferry operation and possibly defining windows when recreational craft should avoid the operational area. Discussion on the point and the basis of operational protocols to be developed. - JH asked if booked transits could be communicated to project and ferry operator. RH commented that PLA could make details of booked transits available in advance. This would give ferry skippers prior warning of when to expect third party passing transits. - SC commented that marker buoys could be placed a suitable distance downstream of Hammersmith Pier to provide advance visual warning to rowers (backward facing) to warn them when approaching the ferry operation area. JH agreed to review on similar basis as used at Fulham Football Club. - Consider pinning hazard on the piers and northern access pontoon (marker buoys to help mitigate likelihood). - JH considered whether video/CCTV feed may help ferry Master view. - Consider tidal boards at site to present actual depth of water and air draught relative to key assets (e.g. Hammersmith Bridge, Barnes side at Arch 3 for draught & air draught))
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Notes of Meeting

Hammersmith Ferry Phase One – Scheme Overview (20-NASH-105)

Client: Uber Boat by Thames Clipper
 Project: Hammersmith Ferry
 Venue: Video/telecon (MS Teams)
 Date of Meeting: 20-Apr-2021 (15:00– 16:00)

Present:

Thames Marine Services Robert Dwan - RD
 Thames Marine Services Nicholas Dwan - ND
 NASH Maritime Jamie Holmes - JH
 NASH Maritime Sam Anderson-Brown - SAB

1.	Introductions and Meeting Objectives
	<ul style="list-style-type: none"> - Brief introductions. - NASH Maritime appointed by Uber Boat to undertake Navigation Risk Assessment (NRA) and management services for the ferry project. - Objectives of the meeting: <ul style="list-style-type: none"> • Provide an early outline of the NRA plan. • Give an opportunity to identify gaps/where information is required and flesh out any key issues as well as discuss potential risk mitigation measures for progression of design and consent process.
2.	NRA Approach
	<ul style="list-style-type: none"> - SAB outlined approach to the NRA being undertaken in 2 phases: <ul style="list-style-type: none"> • Phase 1 is an initial package of work in order to identify key navigation issues/hazards and potential risk control mitigation measures for the proposed scheme (as provided by Uber Boat during tender stage) so that any findings can be incorporated (e.g. layout/design aspects) at this early stage. • Phase 2 will consist of a full Navigation Risk Assessment (NRA) to support the license application. - JJH and SAB explained that whilst Hammersmith Bridge is currently closed to non-essential navigation it is recognised that TMS are operating the <i>Conquestor</i> (through the PLA booking system) and she is considered a 'critical' vessel for the assessment hence being engaged at this stage.
3.	Proposed Design layout and Design
	<ul style="list-style-type: none"> - JJH and SAB explained that the Barnes and Hammersmith Pier designs and locations have been optimised during the tender stage to minimise impact on navigation where possible. - The brow linking Barnes Pier to the shore has been designed in such a way to allow unpowered recreational craft (principally rowers) to pass between the shore and pier (the backspan) as per the existing Tideway code and to deconflict, as much as possible, rowers with users of the authorised channel.

	<ul style="list-style-type: none"> - Further consultation will be carried out during Phase 1 with TRRC to further explore potential use of backspan and incorporate any design critical learnings. - RD and ND felt there would be little to no impact on Thames Marine Services operations as a result of the piers. - ND raised observational concerns that a powered houseboat or Dutch barge navigating downstream on an ebb tide could be taken off course by the tidal set (which will push vessels toward the northern bank) and could make contact with the Hammersmith pier (north pier) and/or floating walkway or the ferry if alongside or in the area. It is likely that such a vessel would aim for the centre of Arch no. 2 in order to pass under the bridge at the point of maximum air draught. A significant alteration of course to starboard (and management of speed/power) may then be required to pass the pier at a safe distance and avoid being pushed onto it by the tidal set. Noted also the implication of power/steering gear failure. Risk controls were discussed for this possibility including: <ul style="list-style-type: none"> • Adequate warning to vessels passing downstream on the ebb tide including consideration of visual markers on the bridge span and/or on the approaches to the west of the bridge (warning of ferry, pier and requirement for prompt turn to starboard etc...). • PLA guidance should also be updated and a NTM issued to assist in promulgation of information. • Awareness to ferry and Pier crews regarding transiting vessels (particularly those on the Hammersmith Pier) so they can increase their readiness/monitor transits [also see below calling out point] - Concerns were also raised about sight lines upstream from the Barnes pier. Possible risk mitigation measures include: <ul style="list-style-type: none"> • A CCTV feed to the west of the bridge with a feed to the ferry Master(s) – could be mounted on Hammersmith pier viewing west. • Chiswick Eyot could be used a “calling out point” for vessels transiting downstream in order to give further warning to the ferry Master of their intention to transit Hammersmith bridge. • Whilst controlled passage arrangements are still in place the PLA could provide an advance schedule of booked passages to the ferry operation.
4.	Proposed Operation
	<ul style="list-style-type: none"> - SAB presented an overview of the proposed operation. - RD and ND suggested that transit times and service frequency times were realistic. Conquestor is likely to transit through the bridge at approximately 8 knots so would clear the operational area relatively quickly. - TMS confirmed that their operation typically: <ul style="list-style-type: none"> • Transit up on the flood and down on the ebb typically over a 3-4 hour period. • Uses spring tides where possible to provide a longer window upstream. • Summer: typically 1x wk or 1 x 2wk. • Winter: typically 3x wk. • Numbers of transits not impacted by bridge closure or COVID-19 and considered that the plots presented by NASH of their transits will remain representative. • RD and ND suggested that transit times and service frequency times were realistic. Conquestor is likely to transit through the bridge at approximately 8 knots so would clear the operational area relatively quickly. - RD and ND noted that other Class V vessels such as Collier Launches will be relevant although not currently navigating the area.
f	Operational Scenario
	<ul style="list-style-type: none"> - It is recognised that navigational disposition may change over the lifetime of the project for various factors including:

	<ul style="list-style-type: none"> - 1. Hammersmith bridge closure/partial closure with restrictions to navigation and exclusion zones. - 2. Refurbishment works associated with Hammersmith Bridge. - 3. Variation in traffic trends (events, post covid usage of rivers – e.g., potential increase in non organised usage), summer season etc...) - RD and ND agreed that the NRA should be based on current operational scenario and reviewed as and when restrictions are lifted/amended. - Thames Marine Services operations are unlikely to differ substantially should the restrictions currently imposed by PLA NTM U2 of 2021 be lifted.
7	Consultation
	<ul style="list-style-type: none"> - SAB outlined initial stakeholders identified for Phase 1 and Phase 2 consultation. - Thames Marine Services are keen to be involved in future consultation. - RD and ND observed that they had seen an increase in the use of unpowered recreational craft by members of the public, i.e. not part of organised club activity.
8	Other Comments
	<ul style="list-style-type: none"> - RD observed that on high spring tides, flotsam and jetsam is picked up and deposited on the northern shore in and around the Hammersmith pier and pontoon walkway. RD raised the possible issue of debris catching on the pontoon or under the pontoon walkway, causing it to sit at an angle when it settles on to the bed/damage. Regular clearances would be recommended

Notes of Meeting

Hammersmith Ferry Phase One – Scheme Overview (20-NASH-105)

Client: Uber Boat by Thames Clipper
 Project: Hammersmith Ferry
 Venue: Video/telecon (MS Teams)
 Date of Meeting: 23-Apr-2021 (10:00– 11:00)

Present:

Thames Regional Rowing Council Bill Mitchell - BM
 Thames Regional Rowing Council Tony Reynolds- TR
 NASH Maritime Jamie Holmes - JH
 NASH Maritime Sam Anderson-Brown - SAB

1.	Introductions and Meeting Objectives
	<ul style="list-style-type: none"> - Brief introductions. - NASH Maritime appointed by Uber Boat to undertake Navigation Risk Assessment (NRA) and management services for the ferry project. - Objectives of the meeting: <ul style="list-style-type: none"> • Provide an early outline of the NRA plan. • Give an opportunity to identify gaps/where information is required and flesh out any key issues as well as discuss potential risk mitigation measures for progression of design and consent process.
2.	NRA Approach
	<ul style="list-style-type: none"> - SAB outlined approach to the NRA being undertaken in 2 phases: <ul style="list-style-type: none"> • Phase 1 is an initial package of work in order to identify key navigation issues/hazards and potential risk control mitigation measures for the proposed scheme (as provided by Uber Boat during tender stage) so that any findings can be incorporated (e.g. layout/design aspects) at this early stage • Phase 2 will consist of a full Navigation Risk Assessment (NRA) to support the license application. - JJH and SAB explained that whilst Hammersmith Bridge is currently closed to non-essential navigation, and rowers are currently avoiding the project area (turning in the area of River View Buoy), the ferry project recognises that the design should consider the return of this activity at a stage during its operation. This will be considered in further detail during the NRA once the bridge/user restrictions are more defined.
3.	Proposed Design layout and Design
	<p>JJH and SAB explained that the Barnes and Hammersmith pier designs were optimised during the tender stage to minimise impact on navigation where possible.</p> <ul style="list-style-type: none"> - The premise of the proposed location and alignment of Barnes Pier seeks to enable continued use of the inshore/Surrey span (arch no. 3) of Hammersmith Bridge. For this reason, the brow (linking Barnes Pier to the shore) has also been designed to incorporate transits of unpowered recreational craft (principally rowers) to pass

	<p>between the shore and pier (the backspan). JJH and SAB invited TRRC to comment on this aspect of design:</p> <ul style="list-style-type: none"> • The following assumptions are considered a reasonable basis of required room: headroom (1.5m) depth (0.4m) and beam (7m) based on a rowing 8. • The premise of maintaining navigation in arch no. 3 is desirable, where safe, to maintain the basis of existing code and separate rowers from other navigation (and the ferry) within the authorised channel. • TR observed that although the backspan would be navigable at most states of tide the existing constraints of arch no. 3 remain. JJH agreed that the combined 'window' of both arch no. 3 and backspan will be examined in NRA. TR noted a potential that rowing vessels could navigate the backspan and then need to navigate back north to the navigation channel in order to pass through arch no. 2 as per the Tideway Code (with a large alteration of course within the space between the Barnes Pier and Hammersmith Bridge Pier). <p>- Hammersmith Pier was re-located offset from Barnes Pier to avoid the piers being directly opposite each other and a narrowing of the river. It was also spaced a sufficient distance away from Hammersmith Bridge to increase the distance to the centre span (point of highest air draught) and increase room for larger navigating vessels. This is balanced with maintaining enough distance from Fulham Reach Boat Club (FRBC). The Pier also seeks to utilise the naturally deeper pocket of water in which its located to minimise its intrusion into the authorised channel.</p> <p>Risk controls were discussed in association with navigation of the backspan of Barnes Pier:</p> <ul style="list-style-type: none"> - A tide gauge board showing whether arch no. 3 is navigable could be affixed to the downstream pile of the Hammersmith pier providing real time information for rowers approaching the area. This board should be simple and easy to interpret, e.g green/red depending on whether the limiting feature (assume depth in arch no. 3) is safe to navigate. - BM mentioned that there are several large boulders on the foreshore between Arch no. 3 and the backspan creating a grounding/damage hazard potential and effectively reducing the window of usage. If these could be cleared then the usable window of arch no. 3 could be increased resulting in improved deconfliction with other users - Underside of the brow should be painted in a bright paint to improve visibility - Padding/protection measures on the underside of the brow are not considered to be necessary. <p>Other risk controls discussed</p> <ul style="list-style-type: none"> - The merits of an early warning buoy were discussed on both sides of the river. - Early warning buoy - Surrey side: TR and BM did not consider it of benefit for vessels navigating upstream on the ebb tide. It was felt that the existing River View buoy located downstream provides adequate visual reference (of distance and lateral positioning). - Early warning buoy - Middlesex side: It may be beneficial (particularly for vessels navigating upstream on the flood tide approaching Hammersmith pier). TRRC recommended NASH consult with FRBC to optimize the buoy location and ensure the clubs activity is not adversely impacted. - Vessels navigating upstream on the flood tide could be pinned against the Hammersmith pier walkway if they enter that area. JJH noted this and that it would be depth dependent. Sufficient access and egress should be included in the walkway design and riparian lifesaving equipment (grabrails/ chains to move to egress points etc...) should be incorporated in to the design. - Signage on the access walkway alerting members of the public to call 999 and ask for the Coastguard if they notice a vessel in distress should positioned at regular intervals along the walkway.
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4.	<p>Proposed Operation</p>
	<ul style="list-style-type: none"> - SAB presented an overview of the proposed ferry operation to promote discussion in the event that navigation through the bridge is opened to recreational craft. - TR and BM raised concerns that during off-peak period the non operational ferry would be moored on the Barnes pier which will force rowing craft further out and in to the authorised channel when navigating upstream on the ebb tide (and then have to return in so as to navigate under the yellow markers of the bridge. Discussion held on this: <ul style="list-style-type: none"> • TR and BM suggested alternative locations are explored - Dove or Hope pier. • If in place here they would wish to review once in place and consider if any issues present. - During times when significant rowing activity is carried out, for example on a Saturday peak time it will be difficult for the ferry Master(s) to find an available gap in traffic to make a crossing. It was agreed that should Hammersmith Bridge be opened to unpowered recreational traffic a clear and well communicated operational protocol will have to be developed collaboratively between the ferry operation and local rowing clubs. Likely to include: <ul style="list-style-type: none"> • Rowing craft only navigate in single file and cease paddling as they navigate with the tide through the operational area. • No racing within defined area • Proceed with careful lookout' • Encourage individual clubs to risk assess novice rowers and coxes in the area' • Operational protocols – to be determined and developed in risk assessment' - Noted that, during events, the ferry will cease operation and both vessels will need to relocate' - It may be appropriate to have a safety/rescue boat. This vessel could alert crews to the operational protocols in place. This measure would unlikely be in place for the duration of the operation but be useful whilst the agreed operational protocol "bedded in". - TR and BM noted the relationship of safety/rescue boat provision with any guard boat currently onsite should be reviewed (see also 'Other Comments') and NASH will review this together with potential to locate the guard capability onto land/piers.
†	<p>Operational Scenario</p>
	<ul style="list-style-type: none"> - It is recognised that navigational disposition may change over the lifetime of the project for various factors including: <ul style="list-style-type: none"> - 1. Hammersmith bridge closure/partial closure with restrictions to navigation and exclusion zones. - 2. Refurbishment works associated with Hammersmith Bridge. - 3. Variation in traffic trends (events, post covid usage of rivers – e.g., potential increase in non organised usage), summer season etc....) - NRA should be based on current operational scenario and reviewed as and when restrictions are lifted/amended.
7	<p>Consultation</p>
	<ul style="list-style-type: none"> - SAB outlined initial stakeholders identified for Phase 1 and Phase 2 consultation. - BM and TR agreed the establishment of a river user liaison group for dynamic consultation throughout the risk assessment and lifetime of the project would be recommended. This is particularly recommended given it is likely that the navigational disposition will change over the lifetime of the project as a result of amendments to the current restrictions to navigation and any bridge works etc.... In such an event a further assessment of navigational risk will need to be carried out, this will include further stakeholder consultation and development of additional risk control measures that will need to be adopted and implemented to manage navigational risk. This forum would also sensibly develop/amend operational protocols.

8	Other Comments
	<ul style="list-style-type: none"> - TR and BM observed that the current guard boat operated on behalf of Hammersmith & Fulham is frequently out of position and obstructs rowing craft turning between the River View buoy and the proposed ferry operation site. The suitability of the vessel currently used was questioned and whether a smaller more maneuverable vessel could be considered, particularly when the ferry service commences operation. - TR commented that it would be of benefit for the Hammersmith ferry project team to engage with the rowing clubs in the area (all users meeting) prior to formal consultation as part of the NRA process. This would help pave the way for future discussions regarding operational protocols and improve lines of communication. TRRC would be happy to assist.