2. TIMETABLE

The programme is still being developed and there are numerous assumptions that are being made which could affect the proposed timescale. Indicative upcoming activities include:

Activity	Date
Early Market Engagement (stage 2): conducting further Early Market Engagement with some key respondents to look more closely at feedback	February 2017
Technical Requirements finalised: further refinement of the project requirements to inform the design process (e.g. height and width of bridge, operational requirements etc.)	May 2017
Update Business case: revised cost estimates based on option selection, refinement of the project requirements, design development, and other analysis to inform revised business case	June 2017
Commence tender process for consortia: procurement documents and commence procurement activities for consortia	August 2017

Transport for London

Rotherhithe to Canary Wharf River Crossing

Option Assessment Report- Long List

Date: January 2017
Version: Draft

Executive summary

Context

1. Transport for London (TfL) is investigating the feasibility of providing a new walking and cycling crossing of the River Thames between Rotherhithe and Canary Wharf.
2. This project is one of a number of new river crossings for London which are intended to improve cross-river connectivity. These crossings consist of public transport, highway, pedestrian and cycle links.
3. This proposal seeks to increase travel by sustainable modes, improve the health of Londoners and support economic development. Growth in cycling across London, employment growth in Canary Wharf, and population growth due to new residential and mixed use development particularly at Canada Water are generating an increase in travel demand in the area. With the Jubilee line close to capacity at peak times and the lack of appropriate or sufficient infrastructure to accommodate cyclists and pedestrians wishing to cross the river east of Tower Bridge, there is a strong case to consider a crossing to cater for this demand.
4. The project objectives are:
    - To connect the two Opportunity Areas of Canada Water and the Isle of Dogs
    - To improve connectivity from the Rotherhithe peninsula, particularly the area beyond the walking catchment of Canada Water station
    - To encourage more people to walk and cycle in the area
    - To provide additional capacity and routes for cyclists as an alternative option to existing crossings in the area
    - To produce a well designed and convenient link which achieves value for money and is fundable
    - To provide an alternative link to the Jubilee line between Canada Water and Canary Wharf.
5. This Option Assessment Report- Long List should be read in conjunction with the 'Assessment of Need and Statement of Objectives', which reviews the issues which have been cited in support of a new crossing in this area, and explains the project objectives listed above.

Option shortlisting

6. The purpose of this Option Assessment Report (OAR) – Long List is to outline and assess options, and document any decisions made to identify a Short List of crossing options.
7. Table ES 1 presents the results of the assessment of the Long List options and the decision making behind the selection of the Short List of crossing options.
8. The Short List of options will then be assessed in more detail in a subsequent Option Assessment Report including further modelling, engineering and environmental assessments. The Option Assessment Report- Short List will inform the Strategic Outline Business Case.

1. Introduction

Context

1.1. Transport for London (TfL) is investigating the feasibility of providing a new walking and cycling crossing of the River Thames between Rotherhithe and Canary Wharf.

1.2. This project is one of a number of new river crossings for London which are intended to improve cross-river connectivity in London. These crossings consist of public transport, highway, pedestrian and cycle links to improve access to jobs, facilitate business activity, support housing development, enhance the resilience of the transport network and encourage more sustainable travel.

1.3. An idea of a river crossing in this area first emerged around a decade ago, under plans to develop Greenways for the 2012 Olympic and Paralympic Games. Work previously led by Sustrans, with funding from TfL and other organisations, resulted in a series of feasibility studies:

- A Preliminary report – Ramboll Whitby Bird, November 2006
- An Outline Economic Appraisal – Colin Buchanan, March 2007
- A Technical Feasibility Study – Ramboll Whitby Bird, March 2008
- A Demand Forecast report– Colin Buchanan, September 2008
- A Feasibility Study- Sustrans, February 2016.

1.4. Studies undertaken by Sustrans (a sustainable travel charity) concluded that a walking and cycling bridge at Canary Wharf to Rotherhithe would be both economically and technically viable. Relevant outputs from these studies are referenced within this document.

1.5. The work undertaken by Sustrans has informed, but is not part of, the current TfL work; the Mayor, through TfL, has independently reviewed the need and options for a crossing in this area.

1.6. Figure 1-1 below shows the proposed location of the crossing, as identified in the 'Assessment of Need and Statement of Objectives'.

- To improve connectivity from the Rotherhithe peninsula, particularly the area beyond the walking catchment of Canada Water station
- To encourage more people to walk and cycle in the area
- To provide additional capacity and routes for cyclists as an alternative option to existing crossings in the area
- To produce a well designed and convenient link which achieves value for money and is fundable
- To provide an alternative link to the Jubilee line between Canada Water and Canary Wharf.

Critical design requirements

1.10. While the project objectives set out what the project is seeking to achieve, there are also some critical requirements which the project needs to meet in order to be feasible; in essence, however well in theory an option meets the objectives, can it in reality be constructed given the physical constraints.

1.11. The list of requirements will grow as the project progresses into more detailed stages. Many of these could impact on the deliverability of the project, but the ability of an option to meet some of these requirements is difficult to ascertain at this stage in some cases without a design or mitigation strategy in place (for example, mitigation of any impacts on public open space will be critical, but cannot easily be assessed until there is a design and the impacts and mitigations are known). Hence a more detailed set of requirements will be developed as the project progresses to ensure that at the design stage all the requirements are met.

1.12. However some requirements are fundamental, and can be assessed, at least at a high level, at an early stage. If an option cannot meet these critical requirements, it will not be feasible and cannot be pursued.

1.13. The critical design requirements are presently:

- to meet the river navigational requirements, because without doing so it will not be possible to gain consent for the project; and
- the alignment is technically feasible taking into account the land and property constraints.

Stakeholder engagement

1.14. TfL has so far involved a number of key stakeholder organisations in the development of proposals for a new river crossing. This includes the affected local authorities, Port of London Authority (PLA), Canary Wharf Group (CWG), British Land, JP Morgan, and the Canal and River Trust.

1.15. Some public engagement has been undertaken (such as the presentation of the concept to community groups) but this has as yet been on a limited scale, given the early stage of the appraisal process. More stakeholder and community engagement will be needed to progress the project further, particularly with local residents living in the areas affected.

1.16. A Stakeholder Engagement Plan will be produced to outline the identified stakeholders and recommended engagement approach.

2. Location, constraints and user requirements

Preferred corridor

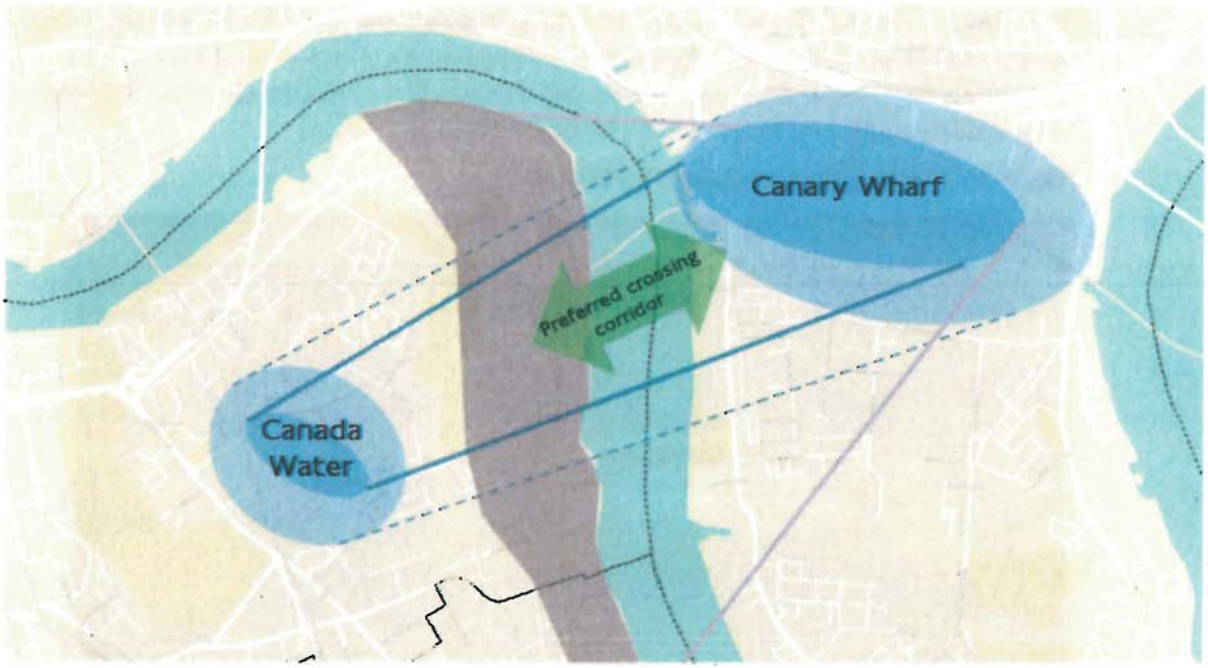
2.1. The 'Assessment of Need and Statement of Objectives' has helped to define a preferred corridor along which any new link should ideally be provided.

2.2. Firstly, it is important to provide a crossing which lies on, or very close to, the central axis of demand between the two centres of Canada Water and Canary Wharf, if it is to successfully attract new journeys between them (which may otherwise have been undertaken by Underground; journeys on foot in particular, and also by bicycle, are very sensitive to distance).

2.3. In addition, to address the poor public transport accessibility on the eastern side of the Rotherhithe peninsula, a crossing should link the area of low connectivity on the southern bank to the core urban area and transport nodes, on the northern bank.

2.4. Figure 2-1 below illustrates the core urban centres of Canada Water and Canary Wharf (in blue), and the area of poor accessibility (in purple), and indicates the corridor between them which would minimise the walking distance between the core urban areas on each bank while serving the area of poor connectivity.

Figure 2-1 Preferred crossing corridor



2.5. Corridors outside this broad alignment are unlikely to successfully meet the project's key aims of connecting these two centres.

2.6. Identification of the prefered corridor is described in more detail in the 'Assessment of Need and Statement of Objectives'.

2.14. In terms of the necessary height clearance, while cruise ships are large, for example the Silver Cloud has an air draft (height above the water line) of 36 metres, this part of the Thames is also still visited by sailing ships, or "tall ships".

2.15. In its open position, Tower Bridge as a clearance of 42 metres above Mean High Water Springs (MHWS). Meanwhile the Queen Elizabeth II Bridge at Dartford has a clearance of 54 metres (also at MHWS).

2.16. The Polish sailing ship Dar M•odzie•y has visited the Thames and has an air draft of 49.5 metres (see Figure 2-3).

Figure 2-3 Tall Ship passing under Tower Bridge

2.17. The centre of the River Thames has a designated navigational channel which is kept clear of obstructions for the passage of ships. A 15m exclusion zone either side of this navigable channel should be maintained for safety reasons. Any structures (including ship impact protection) should be outside of these sections of the river.

Jubilee line tunnels

2.18. The Jubilee line passes under the river in close proximity to the proposed location. Restrictions exist for construction of a number of these crossing options (namely bridges and tunnels) close to the existing tunnel alignment; TfL has advised that there is a strong preference for all structures within the river to be outside a 30m clearance of the Jubilee line tunnels. The closer to the tunnels, the greater the challenges and risks, and the higher the cost of construction.

Environment

2.19. The River Thames is a sensitive environmental site, particularly in terms of its aquatic ecology and historic environment (with a number of listed structures in the study area). Additionally, the close proximity of a large number of residents is a factor for consideration, given the potential visual and noise impacts. The environmental impacts will be discussed in further detail in the subsequent Option Assessment Report- Short List.

time spent accessing or interchanging between modes of transport by walking or cycling can be applied to represent the inconvenience experienced[2]; and

- A crossing option which is unrestricted is preferable to users. Travellers are sensitive to the consequences of travel time variability, such as prolonged waiting times, missed connections and arrival at the destination either before or after the desired or expected arrival time[2].

Long list options

3.8. The crossing options considered are:

- New non-navigable bridge (low-level fixed bridge)
- New navigable bridge (moveable or high level)
- New bored or mined tunnel
- New immersed tunnel
- New cable car
- Enhanced ferry.

Do Nothing

3.9. The crossing options are considered relative to a 'Do Nothing' scenario comprising the likely future transport networks in the study area, and predicted population and employment growth in the future without any new or improved crossing.

3.10. The assessment in the Option Assessment Report- Short List will quantify the differences between a 'Do Nothing' scenario and the Short List of options.

ASSESSMENT: Non-navigable bridge		
FIT WITH THE PROJECT OBJECTIVES		
To connect the two Opportunity Areas of Canada Water and the Isle of Dogs	✓✓ Achieved	Would provide a high quality connection between the two opportunity areas
To improve connectivity from the Rotherhithe peninsula, particularly the area beyond the walking catchment of Canada Water station	✓✓ Achieved	Would bring the eastern side of the peninsula within walking distance of Canary Wharf
To encourage more people to walk and cycle in the area	✓✓ Achieved	Much greater accessibility for pedestrian and cycle trips likely to encourage more local trips on foot or cycle
To provide additional capacity and routes for cyclists as an alternative option to existing crossings in the area	✓✓ Achieved	Compared with existing routes a fixed low level bridge would provide significant new capacity to cross between Canary Wharf and south London by cycle
To produce a well designed and convenient link which achieves value for money and is fundable	✓✓ Achieved	A fixed bridge would provide a direct, safe and pleasant form of crossing to users. It would be a low cost option compared with a tunnelled option (although more expensive then an enhanced ferry service)
To provide an alternative link to the Jubilee line between Canada Water and Canary Wharf	✓✓ Achieved	A new bridge would provide an alternative means of travelling between the Canada Water and Canary Wharf areas
FIT WITH THE CRITICAL DESIGN REQUIREMENTS		
Meets the river navigational requirements	✗ FAIL	A bridge which does not allow shipping past this point would not meet the navigational requirements and would not achieve a River Works Licence from the PLA
A technically feasible alignment has been identified	✓ PASS	
OTHER CONSIDERATIONS		
Environmental issues	A low-level fixed bridge is likely to impact on the river bed and foreshore, and aquatic ecology but consideration will need to be taken with regard to appropriate planning and mitigation. Impacts on the land will depend on the height of the bridge deck and the extent and design of any ramps; there could be some impacts on Durand's Wharf park (or the foreshore) depending on the extent and design of the approach ramps. It is possible that compensatory habitat may be required. Consideration of hydrological impacts of structures within the river channel would need to be examined further.	
Constructability issues	A low-level fixed bridge would be a standard construction task and no significant constructability issues have been identified.	
Land and property impacts	The land and property impacts will depend on the height of the bridge deck and the extent and design of any ramps; the longer the approach ramps, the greater the potential to impact on land interests.	

3.20. However, a fixed crossing of this type would be available to users at all times, and would not need to close for shipping. As a fixed structure, it would also be easier to maintain than a long-span moveable bridge, and would not require the operational staffing associated with managing a moveable structure, and so its ongoing maintenance and operating cost would be lower than a moveable bridge.

Moveable bridge

3.21. An alternative option is to build a lower-level bridge but with a movable central span to allow the bridge deck to be opened for passing vessels.

3.22. The attraction of a moveable bridge is that the low-level position of the span could be maintained at around 20 metres above MHWS so that it could be accessed by ramps, but would not be opening very frequently for shipping.

3.23. More detailed work would be needed to set the precise height of any structure over the navigable channel in order to maintain the right of navigation. Setting the height of the bridge is a balance of conflicting criteria. A lower bridge height will reduce the impact of the ramped approaches but will require the bridge to open and therefore be out of use more often. A higher bridge will open less frequently but will have a greater impact on the approaches to the bridge on either bank.

3.24. The duration of an opening would need to be agreed with the PLA because it is dependent on the detailed operational procedures, but this would include an allowance of time for shipping movements to be aborted in the event that the bridge cannot be opened for shipping. For large ships this time could be well in excess of 40 minutes. Small crafts with masts higher than the bridge height will generally not have such onerous requirements as large ships, because in an emergency they could abort and drop anchor close to the crossing. For these craft, a shorter opening time could potentially be achieved, subject to PLA agreement.

3.25. All such openings for shipping would impact on the utility of the crossing for users, as during these periods the crossing would not be available to either pedestrians or cyclists. While brief openings for small craft would result in only a minor delay, akin to those encountered and accepted at Tower Bridge, the longer closures would have a much greater impact on users, particularly given the distance to alternative routes. Very good advance warning of such closures would be needed to ensure that users could plan around such events.

3.26. A new moveable bridge would provide a direct, safe and pleasant form of crossing to users, albeit one subject to closures for shipping movements. The different moveable bridge options are discussed below.

Moveable bridge types

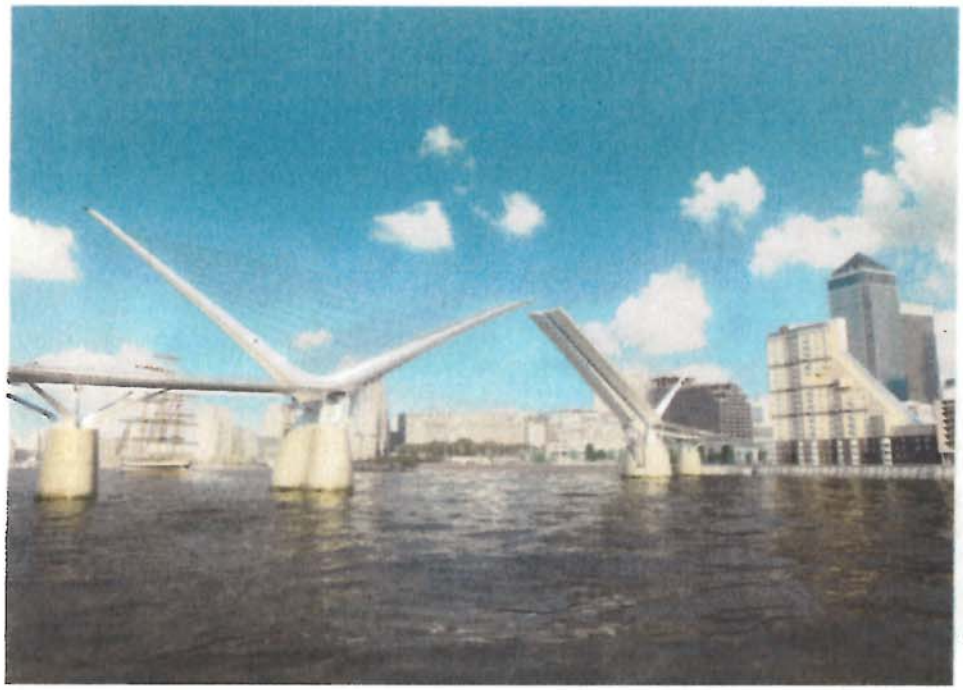
3.27. The differing types of moveable bridges each best serve the differing needs of a given location and use. These can be broken down into the following principle categories:

- Horizontal Swing
- Bascule
- Vertical Lift
- Other / Hinge

3.28. To understand the merits and assess the viability of each type of bridge design for this location, a brief description of each type has been detailed.

Horizontal Swing

Figure 3-4 Bascule bridge concept[3]



Vertical Lift

3.33. A vertical lift bridge is one in which the whole span of the bridge between piers is raised in order to allow the passage of vehicles or vessels. Whilst both bascule and swing bridges can have unlimited headroom when open, the headroom beneath a vertical lift bridge is restricted to the lifted height. This usually entails the construction of large towers over each pier to support the bridge deck in lowered or lifted position.

[3] Source: http://www.reform-architects.london/projects/rotherhithe-bridge-2/

ASSESSMENT: Navigable bridge		
FIT WITH THE PROJECT OBJECTIVES		
To connect the two Opportunity Areas of Canada Water and the Isle of Dogs	✓✓ Achieved	Would provide a high quality connection between the two opportunity areas
To improve connectivity from the Rotherhithe peninsula, particularly the area beyond the walking catchment of Canada Water station	✓✓ Achieved	Would bring the eastern side of the peninsula within walking distance of Canary Wharf
To encourage more people to walk and cycle in the area	✓✓ Achieved	Much greater accessibility for pedestrian and cycle trips likely to encourage more local tips on foot or cycle
To provide additional capacity and routes for cyclists as an alternative option to existing crossings in the area	✓ Partially achieved	Compared with existing routes a bridge would provide significant new capacity to cross between Canary Wharf and south London by cycle when available to users, especially if the deck is at a low level, but there would be times when it would be closed to users
To produce a well designed and convenient link which achieves value for money and is fundable	✓ Partially achieved	A fixed bridge would provide a direct, safe and pleasant form of crossing to users, albeit one subject to closures for shipping movements (there is strong potential to mitigate the impacts of these closures). A bridge would be a low cost option compared with a tunnelled option (although more expensive then a new ferry service)
To provide an alternative link to the Jubilee line between Canada Water and Canary Wharf	✓ Partially achieved	A new bridge would provide an alternative means of travelling between the Canada Water and Canary Wharf areas, but a moveable design would be unavailable during shipping movements
FIT WITH THE CRITICAL DESIGN REQUIREMENTS		
Meets the river navigational requirements	✓ PASS	A navigable bridge would be designed to meet the shipping constraint
A technically feasible alignment has been identified	✓ PASS	Concept design work suggests there are feasible bridge alignments in this area
OTHER CONSIDERATIONS		
Environmental issues	A navigable bridge is likely to impact on the river bed and foreshore, and aquatic ecology but consideration will need to be taken with regard to appropriate planning and mitigation. Impacts on the land will depend on the height of the bridge deck and the extent and design of any ramps; there could be some impacts on Durand's Wharf park (or the foreshore) depending on the extent and design of the approach ramps. It is possible that compensatory habitat may be required. Consideration of hydrological impacts of structures within the river channel would need to be examined further.	
Constructability Issues	A navigable bridge of this scale would be unusual and therefore relatively high risk, but early engagement with industry suggests there are several ways to meet the requirements.	

Bored or mined tunnel

3.36. A bored or mined tunnel could provide a direct, 24 hour accessible link connecting the two areas. This would provide a commuter link which is not susceptible to interference by weather or river traffic. Further, it would have little visual impact on the river and surrounding landscapes except during construction and around the portals.

3.37. A tunnel would need sensitive design to provide a high quality ambience to ensure it did not suffer from a perception of poor user safety which can be associated with tunnels. As per the bridge options, spatial separation between pedestrians and cyclists would be required to avoid problems of conflict between users.

Figure 3-6 A bored cycle tunnel in the Netherlands

3.38. Tunnelling can cause significant disturbance during the construction phase and difficulties often centre on finding suitable landing sites in dense urban areas.

3.39. Bored or mined tunnels are typically circular in cross-section and excavated below the river bed, without removal of the ground above. While these tunnels are often the most expensive of the fixed link crossing options, the environmental impact in the river during construction is much reduced compared with other tunnel types or bridges which require piers in the river.

3.40. A bored tunnel would require a tunnel boring machine, while a mined tunnel is similar in principle but uses smaller more conventional digging machines within the tunnel. In either case, worksites would be required at each end for construction, including worksite facilities, and space for the delivery and storage of materials to support the tunnel, and the removal of the excavated spoil.

3.41. Despite any impacts during the construction, free navigation is preserved with a tunnel option.

3.42. Users of a bored or mined tunnel would have to descend to tunnel level either by lift/stairs (as per for example the Greenwich and Woolwich foot tunnels), or with ramps, which would be significant in length for this depth of tunnel.

3.43. A tunnel would not require staff members on-site to help operate the crossing facility.

Immersed tunnel

3.44. As with a bored or mined tunnel, an immersed tunnel could provide a direct, 24 hour accessible link connecting the two areas which is not susceptible to interference by weather or river traffic. It would have little visual impact on the river and surrounding landscapes in its final state except around the portals, although the construction impact on the river and navigation would be much more significant than a bored or mined tunnel.

Figure 3-7 A cycle tunnel in Amsterdam *(bicycledutch.wordpress.com)*

3.45. An Immersed Tunnel is constructed from individual segments that are prepared in a casting basin and floated to the tunnel site to be sunk into place on the river bed, which would need to be dredged/excavated to the required size in advance. This approach would result in only a small impact on river traffic, as these operations could be planned well in advance to minimise impact on river users. Moreover, free navigation is preserved after construction with a tunnel option.

3.46. However, the environmental impact in the river during construction would be greatest for this option, requiring careful planning to minimise the impacts on aquatic ecology and riverine habitat during the dredging works, for example dredging at a time of year to minimise impacts on aquatic species, but not all impacts could be completely avoided.

3.47. In terms of impacts on neighbouring residents, more of the work for an immersed tunnel takes place in the river (dredging and sinking the structure) or off site (construction of the tunnel segments in a casting basin). As such the nuisance around the portals, while still more significant than bridge options, would be less than with a bored/mined tunnel.

3.48. There are opportunities to provide ramp structures to link to an Immersed Tunnel in the Nelson Dock on the Rotherhithe side and below the Westferry Circus roundabout complex on the Canary Wharf side.

3.49. A tunnel would not require staff members on-site to help operate the crossing facility.

Cable car

3.50. The Emirates Air Line is a gondola, or cable car, system crossing the Thames between North Greenwich and the Royal Docks, and opened in 2012. It provides a link between the two areas at a height which exceeds the clearances required to allow shipping to pass below, and was built rapidly and at a much lower cost than an equivalent bridge.

3.51. A similar system linking Rotherhithe and Canary Wharf could be considered, to provide a direct link for pedestrians and cyclists.

Figure 3-8 A cyclist using the Emirates Air Line

3.52. A cable car would need to span the whole navigational channel at a height sufficient to allow for tall ships to pass below. Given that the profile of a cable system is that it sinks in the centre, the towers on each side would need to be around 90 metres in height (based on the Emirates Air Line- this height would increase slightly if a longer span were needed between main towers, or reduce slightly if a shorter span were provided).

3.53. A straight corridor free of obstructions or residential buildings of considerable distance is required, including the descent from the main cross-river passage back to ground level at each end. A suitable alignment has not been identified within the wider catchment outlined in Figure 2-1, given the densely built up nature of the corridor and the numerous committed development sites. Whereas the Emirates Air Line was built over vacant or brownfield land, that potential does not exist on a plausible straight alignment in this area.

Enhanced ferry

3.54. Thames Clippers currently operates a cross-river pedestrian and cycle ferry service on a commercial basis between Nelson Dock Pier (DoubleTree Docklands Hotel) and Canary Wharf Pier. This service utilises a single vessel, which runs approximately every 10-15 minutes between 06:00 (09:00 at weekends) and 00:00 (22:30 on Sundays) and has a three minute journey time. Both of the piers are privately owned and the service receives no TfL subsidy.

3.55. One crossing option is to invest in enhancing the infrastructure and service of the cross river ferry connecting the Rotherhithe peninsula with Canary Wharf.

3.56. Pier upgrades at Canary Wharf and Nelson Dock could include new pontoons and an additional access brow to accommodate the new cross river ferries, increased passenger demand, and make the ramp a lower gradient and therefore more accessible. Both piers would be designed to accommodate roll-on / roll-off cycle vessels, learning from best practice elsewhere in Europe including Rotterdam. This would help provide ease of access for cyclists and facilitate the efficient and rapid boarding and alighting needed.

3.57. New vessels could provide a higher frequency service than the current service through provision of two or even three vessels to reduce waiting times, while a subsidy could potentially allow the fare to be reduced or eliminated to encourage greater use of this link. Making the crossing free is likely to encourage some more local trips on foot or cycle, but likely fewer than with bridge or tunnel options given a ferry is not a permanent structure.

3.58. It is assumed that even with an increased frequency of service, there would be no disruption to navigation along the river in the event of a larger vessel passing up or downstream (because the larger vessel would have priority over the ferry).

3.59. An enhanced service could be introduced within two years which would link cycle routes north and south of the river, and help to demonstrate whether there is significant latent demand for a potential future bridge or tunnel at this location.

3.60. However, a ferry service is less attractive to potential users than a bridge or tunnel, given the need for cyclists to dismount, the guaranteed wait to board/alight, and the potential for unplanned disruption due to mechanical issues, staff shortages, poor weather conditions (e.g. fog) and tide issues.These could all happen without prior warning, and without the opportunity to mitigate against any inconvenience.

3.61. These factors combined with the fact that the service would not operate 24 hours a day mean it would be a less effective connection, compared to other options.

3.62. It is assumed that in the event of an alternative option being implemented, the operation of the existing ferry service is likely to cease.

Complementary measures

3.63. Across all crossing options, TfL would need to work with local authorities to maximise the benefit of any new crossing, for example though improving cycle and pedestrian access to the crossing.

3.64. While an important aspect to consider as part of the project in due course, this is not considered a differentiating factor between the alternative options for the crossing itself at this stage of the appraisal process, and therefore is not considered further within this report.

3.66. The table illustrates that:

- A **non-navigable bridge** would achieve the project objectives, but would not be compatible with maintaining navigation on the River Thames;
- A **navigable bridge** would meet the project objectives and requirements;
- A **bored or mined tunnel** would meet most of the project objectives except that for achieving value for money, given that it is likely to be more costly than all other options while not providing more functionality than the closest alternative option (an immersed tunnel);
- An **immersed tunnel** would achieve the project objectives and requirements;
- A **cable car** would meet the project objectives, but a technically feasible alignment has not been identified; and
- An **enhanced ferry** would meet all the project objectives and requirements.

Market Sounding Questionnaire Response Key Findings

The Rotherhithe to Canary Wharf River Crossing Project (R2CW) has received a strong level of interest following the publication of a PIN on 19th October 2016. Accordingly, a large number of organisations submitted a completed MSQ across multiple disciplines. These organisations were then classified into the following groups: Tier 1 Contractors; Tier 2 Specialist Contractors (both referred to as 'Contractors'); Architectural Practices; Multidisciplinary Consultant; Specialist Consultants and; Consulting Engineers (referred to as 'ACEs').

1. Appetite

1.1. Respondents demonstrated a clear interest in the Project overall. Generally, Respondents have greater appetite to deliver a Bridge infrastructure solution compared to a Tunnel (albeit indicative and subject to Project assumptions). This is also demonstrated through the Project Phases; Design, Engineering and Construction. Only Operate and Maintain was favoured for a Tunnel infrastructure solution.

1.2. The majority of Respondents did not identify any critical factors that impact upon their interest in any aspects of the R2CW River Crossing (albeit at a very early planning phase).

1.3. The majority of Respondents agree with TfL's current views, concerning rejected River Crossing solutions for this Project. There is broad consensus for the options put forward by TfL. Whilst a small number of Respondents did believe that alternative options such as a Cable Car or Repurposing of the existing Rotherhithe Tunnel could be deemed as possible solutions, counter-views were also provided that would suggest that either crossing option would unlikely fulfil nor meet the purpose or objectives of this Project. Consequently, a bridge or tunnel solution is deemed the most appropriate by Respondents.

2. Programme Timetable & Commercial

2.1. On average Respondents believe the completion of the River Crossing project should range between 46 and 89 months when not accounting for any overlap of the phases involved. The Respondents further identify that an optimal/preferred time period in order to complete this River Crossing should take 62.3 months (5.2 years). All Respondents believe a River Crossing between Rotherhithe and Canary Wharf opening in 2022 is achievable. This is however subject to the outcome of Project assumptions.

2.2. Respondents have provided their response, based on any River Crossing solution. This may therefore not be truly representative of a particular River Crossing solution (i.e. Tunnel or Bridge).

2.3. Respondents have provided a substantial number of considerations and constraints in response to achieving the indicative programme. These key themes include; wide-ranging and early Stakeholder engagement; the Procurement route and Project funding arrangements; Logistics and site access within a built-up environment; Lead times for key components; Plant and machinery and also Environmental considerations.

3. Capacity and Capability

3.1. Respondents have all shown that they have some capability for the different Project Activities[1] associated with the River Crossing. As anticipated, Contractors and ACE's, identify in-house capabilities across different Project Activities. Contractors appear to have capabilities across the spectrum while ACE's tend to have in-house capabilities with pre-construction type Project Activities.

3.2. Percentage of sub-contracted activities provided by Respondents is primitive at this stage of the Project. As the scope of works and requirements are yet to be confirmed, Respondents either did not provide an approximate value or were conservative in response.

[1] Project Activities: Design, Engineering, Environmental Assessment, Construction (of infrastructure solution), Commissioning, Operation & Maintenance, Finance provision

4.7. Opportunities for reducing Whole Life Costs in either a bridge or tunnel solution were provided by the Respondents. The key opportunity themes varied across both River Crossing solutions however the common themes include; Cost minimisation; Revenue Generation; Programme and Procurement Approach and Operations (staffing and management of the River Crossing asset).

5. Risks and Opportunities

5.1. Risks and opportunities recognised by Respondents in relation to this River Crossing were varied in nature. However common themes were identified as per below.

Bridge River Crossing Solution

Top 3 Risks	*Top 3 Opportunities*
1. Stakeholder Management	1. Revenue Streams
2. Ground Conditions	2. Construction Materials
3. Planning and Approval	3. Innovation of Design and also Efficiency of the Project

Tunnel River Crossing Solution

Top 3 Risks	*Top 3 Opportunities*
1. Ground Conditions	1. Advertising/Sponsorship Revenue
2. Public Perception of the Tunnel	2. Potential of Toll Revenue
3. Construction Impact on the Environment	3. Synergies with other London Infrastructure Projects

6. Constraints, Technical & General

6.1. **R2. Functional for Mobility Impaired Users (MIU)**: Respondents noted that they will be able to deliver a bridge or tunnel that will be appropriate for MIUs. Lifts / Ramps will be utilised to ensure that the solution is adequate for MIUs. Capex / Opex should be considered as well as safety risks i.e. emergency access and rescue risks

6.2. **R8. Availability of solution:** Consensus from 67% of suppliers, identify that a bridge being available at all times is not feasible due to the shipping; any movable bridge will have gaps in availability to allow ships to pass. Weather conditions are recognised to potentially restrict the availability of the bridge such as a risk of flooding that could affect availability. The tunnel option however could provide availability at all times.

6.3. **R9. Lifecycle**: Respondents were in agreement that the 120 year design life was feasible subject to an effective inspection and maintenance strategy / regime. However, M&E components will have to be replaced to maintain the bridge.

6.4. **R10. Through life costs:** Respondents identify that a design, build and maintain solution could minimise maintenance intervention and associated costs while a moveable bridge will incur greater maintenance costs than a static bridge. Respondents suggested using durable materials, BIM and ensuring best practice in the M&E design to maximise value.

6.5. **C1. Crossing shall not impede the passage of shipping traffic**: In general, Respondents identify the need for early consultation with the PLA to establish navigation channels early in the design phase, mitigate the impact on operations caused by river traffic on a bridge solution, and respecting PLA constraints during design, construction and operation. Furthermore, construction methodology should also look to minimise any potential access restrictions and impingement on navigation channel.

6.6. **C2. Ramp gradient shall not exceed 5% provision of safe sight-lines:** Respondents identify that this requirement is achievable (subject to dependencies and assumptions), however, infrastructure type is a significant factor to consider in order to achieve a requirement for a ramp gradient that does not exceed 5%.

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5.0 The Consultant's Quality Submission