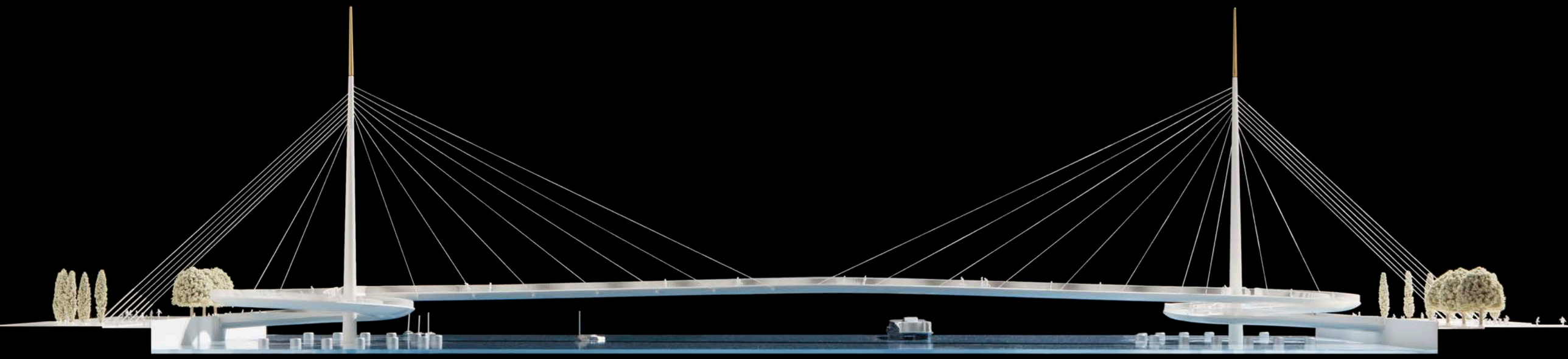
Nine Elms Pimlico Bridge

Stage 2 Report

January 2019



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Acronyms

AIS	Automatic Identification System
ACV	Asset of Community Value
BPS	Battersea Power Station
CA	Conservation Area
CYNEMON	Cycle Model Network London
EA	Environment Agency
EIA	Environmental Impact Assessment
FREDA	Federation of Pimlico Residents' Associations
GLA	Greater London Authority
GLAAS	Greater London Archeology Advisory Service
HE	Historic England
LBL	London Borough of Lambeth
LBW	London Borough of Wandsworth
MTS	Mayor's Transport Strategy
NEP	Nine Elms Pier
NR	Network Rail
NLA	New London Architecture
OAPF	Opportunity Area Planning Framework
PLA	Port of London Authority
RPA	Root Protection Area
SINC	Site of Importance for Nature Conservation
TfL	Transport for London
TPO	Tree Preservation Order
TT	Thames Tideway
TTT	Thames Tideway Tunnel
TW	Thames Water
TWAO	Transport Works Act Order
UKPN	United Kingdom Power Network
USSPT	Urban Space Strategic Pedestrian Tool
VNEB	Vauxhall, Nine Elms, Battersea
WBB	Westminster Boating Base
WCC	Westminster City Council

Please note this report is intended to be printed and read as a double sided document. If viewing the document digitally in Adobe Reader, it is best viewed by selecting View>>Page Display>>Two Page View

Cover Page: Elevation view of Nine Elms Pimlico Bridge Concept Model

1.0 Abstract

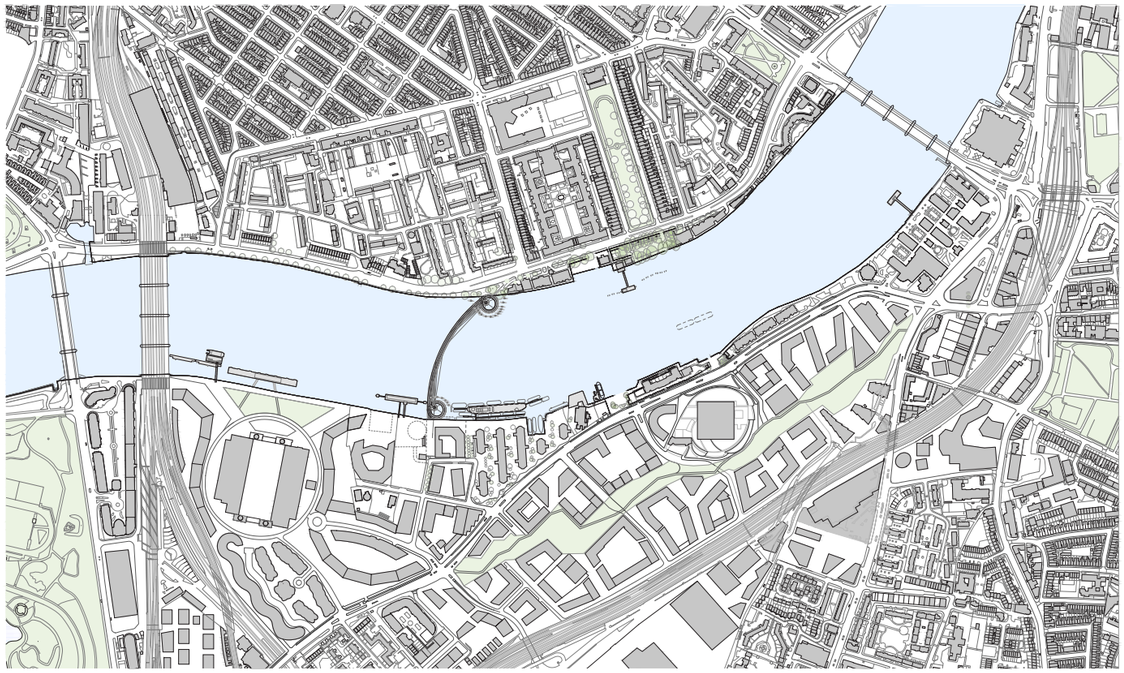
On behalf of the London Borough of Wandsworth and with the endorsement of the Nine Elms Vauxhall Partnership, the Nine Elms Pimlico Bridge Design Team have undertaken technical investigations, engaged with key stakeholders and consulted with the public over a period of two years, as part of a thorough process to identify and recommend a preferred location for a new pedestrian and cycle bridge over the Nine Elms Reach of the River Thames.

The Stage 1 report identified three suitable locations for a crossing. Stage 2 has investigated each of these options in more detail against a range of appraisal criteria.

This report recommends a bridge between Grosvenor Road riverbank, (west of Claverton Street) on the north side of the Thames, and Kirtling Street on the southern side, known as Location 4C.

This recommendation is the result of detailed investigations and appraisal of three feasible location options, which all address the need to provide sustainable transport connections strategically identified for the vital development of a healthy city and contribute to addressing the transport needs of the Vauxhall Nine Elms Battersea Opportunity Area.

The recommended location offers the best opportunity to connect the developing Opportunity Area to new and existing onward routes locally and to the wider city. It also provides the opportunity to positively shape the riverside public realm on both sides of the river whilst reducing any negative impacts that the analysis and consultation with stakeholders and local communities has identified. Overall the preferred location provides the greatest advantages when compared to all other alternatives.



Location Plan showing the preferred location for the Nine Elms Pimlico Bridge

Aerial concept visualisation from the north bank of the Thames showing the preferred location for the Nine Elms Pimlico Bridge

Opposite Page: Visualisation of the preferred location for the Nine Elms Pimlico Bridge looking towards Battersea Power Station

2.0 Executive Summary

The Nine Elms Pimlico Bridge, first proposed by the Cross River Partnership in 2003, has been identified as part of the package of transport and connectivity improvements required to support the developments in the Vauxhall Nine Elms Battersea Opportunity Area. This is reflected in the Mayor's Draft London Plan and the Opportunity Area Planning Framework. London Borough of Wandsworth, with the support of the Nine Elms Vauxhall Partnership, has taken the project forward through the commissioning of the Project Design Team and has earmarked a proportion of the Opportunity Area infrastructure programme budget for its development.

The proposal for a new crossing over the Thames between the existing Vauxhall and Chelsea Bridges is consistent with the pedestrian and cycle policies of the surrounding local authorities and the Greater London Authority, aiming to make a significant contribution to the shared objectives of creating healthy streets and encouraging safe, sustainable transport methods.

As part of the next generation of new cycle and pedestrian infrastructure planned for London, the Nine Elms Pimlico Bridge would:

- Meet and create the demand for high quality, safe, mixed cycling and pedestrian routes;
- Improve local connectivity;
- Complement a wider package of transport infrastructure including the Northern Line Extension, opening up the Thames Path and significant improvements to Nine Elms Lane;
- Connect to and from the Vauxhall Nine Elms Battersea Opportunity Area which provides thousands of jobs and homes, and a new town centre full of shopping, leisure and cultural attractions;
- Create new areas of quality public space at the landing points as well as on the bridge itself;
- Become a new landmark for London;
- Encourage healthier travel for communities on both sides of the river;
- Make a positive contribution to tackling air pollution;
- Provide a safer route to reduce accidents and encourage walking and cycling;
- Support the mode shift to walking, cycling and public transport in line with local and strategic policies.

Background

Following a Transport for London Feasibility Study in 2013 which confirmed a strong case for the bridge, Wandsworth Council promoted an international competition and in 2016 appointed a Design Team to progress the project towards a worked up design, including the identification of a preferred location for the new crossing.

During the first stage of the Project, undertaken in 2017, the Team investigated nine potential locations for the new crossing, comparatively assessing the strengths and weaknesses, ability to meet the project objectives and potential impacts of each option in consultation with key stakeholders and local communities.

At the conclusion of Stage 1 three locations were identified which each provided a strong case for further development, taking into account the above factors. Using the Stage 1 location numbering, these were:

- Location 2 - Pimlico Gardens to Bourne Valley Wharf
- Location 3 - Dolphin Square to Prescot Wharf
- Location 4C - Grosvenor Road (Claverton Street) to Kirtling Street

Stage 2

The purpose of Stage 2 of the project was to:

- Develop technically feasible Concept Design proposals for each alterative location;
- Undertake further technical and environmental studies to confirm the feasibility and understand the impact of the three location options for the bridge identified for further investigation;
- Undertake further updates to the transport modelling to understand usage of the bridge at different locations and onward travel demand;
- Undertake further consultation with local communities through meetings and a series of public exhibitions held, as before, across Wandsworth, Westminster and Lambeth;
- Continue to consult on technical constraints and opportunities of the locations with local authorities, statutory bodies and key stakeholders;
- Provide a recommendation for a preferred location.

As a result of this work, Location 4C is recommended as the preferred location for the Nine Elms Pimlico Bridge. This report summarises the work undertaken in Stage 2 to further assess and demonstrate the feasibility of the three identified locations and the appraisal methodology that has led to the selection of the preferred location.

Concept Design and Technical Studies

During Stage 2 a technically feasible concept design has been developed for each of the three alternative locations identified for further investigation responding to the specific constraints and opportunities of each site. These concept designs are not proposed final solutions, but rather, were developed to establish the potential implications of siting a bridge in these specific locations, test the technical validity and support the on-going options appraisal, continued from Stage 1, leading to the identification of the preferred location.

Further technical studies have been undertaken on the basis of the concept designs to confirm the feasibility and understand the impact of the three locations. This includes comparative assessments of transport, environment, engineering, planning, heritage, access, navigation and river use impacts.

Work to date demonstrates that all the options are technically feasible, however, analysis also shows that no single location can deliver all the desired benefits without some impacts and challenges.

The process of updating the transport modelling has continued to demonstrate both the need for and feasibility of the crossing. The comparative demand assessment undertaken confirms there remains a high potential demand for a crossing on this stretch of the River with all three options indicating a demand of approximately 6,400-12,400 walking and cycling trips per day. Location 4C, both displays a good level of demand, up to 10,600 trips per day and a relatively even split between walking and cycling encouraging healthy travel options for all. To give this comparative context, the existing (2017) level of demand on Lambeth Bridge is 8,728 combined pedestrian and cyclists (although the split of pedestrians and cyclists is different).

Initial investigations and discussions with key stakeholders including Transport for London also suggest that there is, in principle, a workable solution for integrating each location option into local and wider city transport and healthy street networks.

Locations 2 and 3 were identified as preferred options in the original TfL Feasibility Study 2013 and both have clear merits, including strong demand and good connectivity to the south via Arch 42 under the Waterloo railway line past the new Nine Elms underground station. Location 2, particularly, is well placed strategically and sits well in the existing townscape connecting a prominent site adjacent to the US Embassy to Pimlico Gardens and St George's Square and creating a desirable landing location and legible attractive route north towards Victoria and beyond. Despite a strong townscape and heritage assessment, the impacts associated with constructing the bridge on the north bank for Locations 2 and 3, especially in Pimlico Gardens (which is designated as an Asset of Community Value), mean that planning policy constraints are likely to be considerable. These locations also generated the strongest concerns in the public consultation.

Initial environmental assessments have identified that with regard to ground conditions, water resources and flood risk, aquatic, terrestrial ecology, archaeology and noise there are no specific environmental constraints that would preclude development at the identified locations, subject to implementation of appropriate (standard) mitigation. The main difference identified between the sites in terms of environmental impacts relates to arboriculture, which in a conservation area is a material planning consideration. Results indicate Location 2 would have the highest arboricultural impact requiring the removal of one to two high quality trees.

Whilst all the proposals are technically feasible from an engineering perspective the greatest identified constraints are at the southern side of Location 3, given the proximity to existing utilities, including a UK power networks cable and the Thames Tideway Tunnel.

The proposals for all options have been designed to meet the requirements of the Port of London Authority and river users. All options are similar in their potential impact on the River but analysis shows that Location 4C demonstrates a slightly smaller overall impact on river users and marine operations in comparison to the other locations.

Whilst Locations 2 and 3 have strong transport demand cases, they do not directly serve the core focal points of the Opportunity Area at Battersea Power Station or Vauxhall and may therefore be less successful at meeting new locally generated demand. Location 4C provides the best connection to the heart of the new town emerging around Battersea Power Station. It offers good links north up Claverton Street and to Victoria and significant opportunity to enhance the public realm on both banks, linking into riverside walks and helping create enhanced spaces and better environments beside the river for all to use and enjoy.

Overall results indicate that it is possible to design a bridge at any of the three identified locations that will support the likely demand, is technically feasible, can meet the functional and technical requirements of river users and the controlling authorities, connect into the local and wider transport networks and is likely to be supported by technical stakeholders and heritage bodies. However, on balance from the structured technical appraisal outlined in this report, Location 4C is likely to present the benefits and opportunities of a crossing with the fewest impacts and associated risks.

Consultation

During Stage 2 extensive consultation has been undertaken with stakeholders, residents and the public, building upon the positive engagement undertaken to date and allowing all stakeholders the opportunity to provide specific feedback on the shortlisted locations under investigation.

During autumn 2018 the three identified location options were consulted on through a series of meetings and workshops with local authorities and statutory bodies, as well as a set of public exhibitions open to residents, businesses and those working in the surrounding area, held as before across Wandsworth, Lambeth and Westminster.

The majority of stakeholders did not object to the bridge proposals presented, based on adherence to technical requirements. Consultation confirmed that proposals can meet the technical requirements of key stakeholders. Some stakeholders indicated a specific location preference, such as Battersea Power Station who highlighted the potential of Location 4C to connect into the emerging town centre at the heart of Nine Elms. Westminster City Council indicated a negative position and that they require further detail to address specific concerns, such as the transport case for the bridge and benefits and impacts for Westminster residents.

Some continued local opposition, particularly amongst some Pimlico residents was confirmed in the public consultation. The development of design proposals has however been able to alleviate the concerns of some of those who opposed, as well as garner further support for the project on both sides of the river. Since the previous consultation, it was notable that people who engaged on the north seemed to be increasingly aware of the opportunities emerging in Nine Elms and recognised the benefits that better connectivity to the area will bring.

The purpose of the consultation was to receive views on specific locations. Support and opposition varied across the options and by borough. Location 2 had the most opposition with concern expressed at the potential impact on Pimlico Gardens and St George's Square, and overall, Location 4C was the preferred option demonstrating a net positive support from all respondents.

Feedback received during the consultation from stakeholders and the public has been used to inform the appraisal of possible crossing points and formed a crucial part of the assessment that has led to the recommendation of a preferred location.

Aerial visualisation showing the preferred location 4C on the Nine Elms Reach of the Thames

Recommendation of Preferred Location

As a result of the technical work and incorporating feedback from residents and stakeholders, it is recommended that Location 4C is selected as the preferred location. In the assessment this location displayed a number of particular benefits including:

- Good demand to support mixed pedestrian and cycle use and opportunity to link into safe, attractive active travel routes encouraging healthier travel for communities on both sides of the river;
- Potential to enhance the riverside public realm with high quality public spaces created at north and south bank landings connecting into riverside walks;
- Opportunity for the bridge to shape the design of the public realm around the area of the landing on the south bank, an area where development can only take place following the completion of the Thames Tideway Tunnel Kirtling Street works in 2021;
- It provides a clear link to the new Town Centre at Battersea Power Station at the heart of the Vauxhall Nine Elms Battersea Opportunity Area which will provide 20,000 new homes and 25,000 new jobs;
- Strongest public support shown in consultation with a net positive support;
- Crossing location is central on the Nine Elms Reach of the Thames;
- Lower impact on existing public / private amenity and green space;
- Low environmental constraint with reduced arboricultural impact;
- Good local and wider connectivity both north and south of the river;
- Low engineering risk and better potential ease of construction access.

Next Steps

Identification of a preferred location allows the project to move to Stage 3 and the development of a detailed design, working towards the submission of a Consents Application.

Arriving at a detailed design will mean that construction costs can be more accurately determined and incorporated within the wider Nine Elms infrastructure programme and allow consents, deliverability, funding and procurement strategies to be developed in conjunction with key stakeholders.

A preferred location will also enable a detailed update of the case for the Bridge to be concluded including detailed environmental impact analysis and production of an absolute transport demand assessment on the basis of new transport surveys.

The project will continue to engage and consult with all stakeholders and local communities as the site specific design develops to address the challenges which need further detailed investigation. This may include, for example, working directly with river users and controlling authorities to mitigate any impact on operations, particularly at Safeguarded Wharves and on the Westminster Boating Base, and continued consultation with Nine Elms Pier and other local residents to ensure any impacts can be minimised. Close collaboration with Thames Tideway Tunnel and developers will be required to ensure the proposals are technically feasible and integrate with the emerging plans for the surrounding developments. Further public consultation will be carried out as part of any formal consent application.

Prior to proceeding to Stage 3 and the development of detailed design and a Consents Application there is the option to undertake a small amount of work to further refine the case for the recommended location and develop an outline programme that ensures if the project is taken forward the opportunity for placemaking, particularly at the southern side is not lost.

3.0 Background

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The Nine Elms Pimlico Bridge is recognised as an important element of London's new transport infrastructure and has been included in a succession of strategic plans for London including identification in the Mayor of London's Draft London Plan (2017).

The concept of a new pedestrian and cycle bridge on this reach of the Thames was first identified in 2003 in the Cross River Partnership's Vision for Vauxhall Battersea as a way to improve cross-river connectivity.

In 2012, the proposal was adopted as a key part of the Vauxhall Nine Elms Battersea Opportunity Area Planning Framework (VNEB OAPF).

The bridge is identified in the OAPF as part of the package of transport and connectivity improvements required to support the developments in the Opportunity Area which is fast becoming central London's newest business, residential and leisure district. New public spaces, parks, schools, arts organisations, homes and businesses are emerging from previously under-used industrial land on the banks of the River Thames. Within an area stretching from Lambeth Bridge to Chelsea Bridge, Nine Elms is becoming a strikingly modern addition to the capital's city scape and a new centre for arts and culture.

The construction of a new pedestrian and cycle bridge across the River Thames, connecting the new homes, businesses and visitors to Nine Elms with neighbourhoods and districts on the north bank such as Pimlico and Victoria is a core element of the vision and part of a package of transport improvements to ensure the area is highly accessible and connected with the rest of central London.

In 2013, TfL completed a Feasibility Study which confirmed a strong case for a pedestrian and cycle bridge across the Thames between Vauxhall and Chelsea Bridges, promoting sustainable transport alternatives and reducing impacts on air quality (Nine Elms Pimlico Bridge Feasibility Study, 2013).

Following the TfL Study, Wandsworth Council promoted an international competition and in 2016 appointed a Design Team to progress the project towards a worked up design, including the identification of a preferred location for the new crossing. The Team is led by Bystrup (a Danish architecture and design practice), with Robin Snell and Partners (UK Architects), Cowi (Engineers) and Aecom (Environmental, Transportation Engineers and Cost Consultants).

The proposal for a new pedestrian and cycle bridge in this location is consistent with the pedestrian and cycle policies of the surrounding local authorities and the Greater London Authority, aiming to make a significant contribution to the shared objectives of improving air quality and encouraging safe, sustainable transport methods.

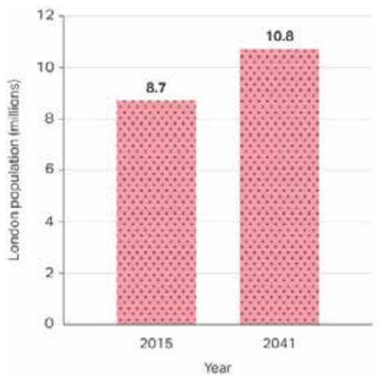
Although the analysis contained within this report focuses on the feasibility of the potential site locations for the Nine Elms Pimlico Bridge, there are a number of over arching benefits to a bridge which would be true for a new crossing positioned anywhere along this reach of the Thames.

As part of the next generation of new cycle and pedestrian bridges planned for London, the Nine Elms Pimlico Bridge would:

- Meet and create the demand for high quality, safe, mixed cycling and pedestrian routes as identified by the Mayor of London's Transport Strategy (2017), and the Draft London Plan (2017);
- Improve local connectivity;
- Complement a wider package of transport infrastructure in the Opportunity Area including the Northern Line extension, opening up the Thames Path and significant improvements to Nine Elms Lane;
- Connect to and from the Vauxhall Nine Elms Battersea Opportunity Area which provides thousands of jobs and homes, and a new town centre full of shopping, leisure and cultural attractions;
- Create new areas of quality public space at the landing points as well as on the bridge itself;
- Become a new landmark for London;
- Encourage healthier travel for communities on both sides of the river;
- Make a positive contribution to tackling air pollution;
- Provide a safer route to reduce accidents and encourage walking and cycling;
- Support the mode shift to walking, cycling and public transport in line with local and strategic policies and in line with the Mayor's aim for 80 per cent of Londoners' trips to be on foot, by cycle or by using public transport by 2041;
- Reduce the largest uncrossed stretch of the river in central London (between Vauxhall and Chelsea Bridges).

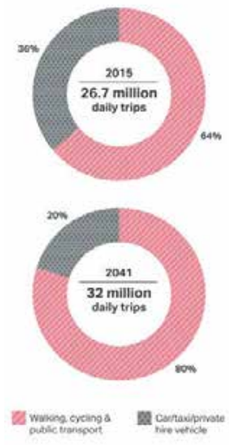
Policy and key strategy documents which identify the Nine Elms Pimlico Bridge as part of London's new planned infrastructure

London's population is forecast to grow by 2.1 million by 2041



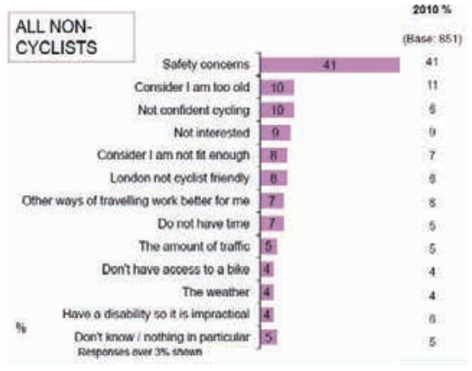
London population growth 2015-2041 (expected) Source: MTS, 2017

A target of over 80% of all trips in London to be made on foot, by cycle or using public transport by 2041



Mode share 2015 and 2041 (expected) Source: MTS, 2017

41% of non-cyclists cite safety concerns as the reason for not cycling



Reasons given by non-cyclists for not wanting to take up cycling Source: TfL Attitudes to Cycling, 2011

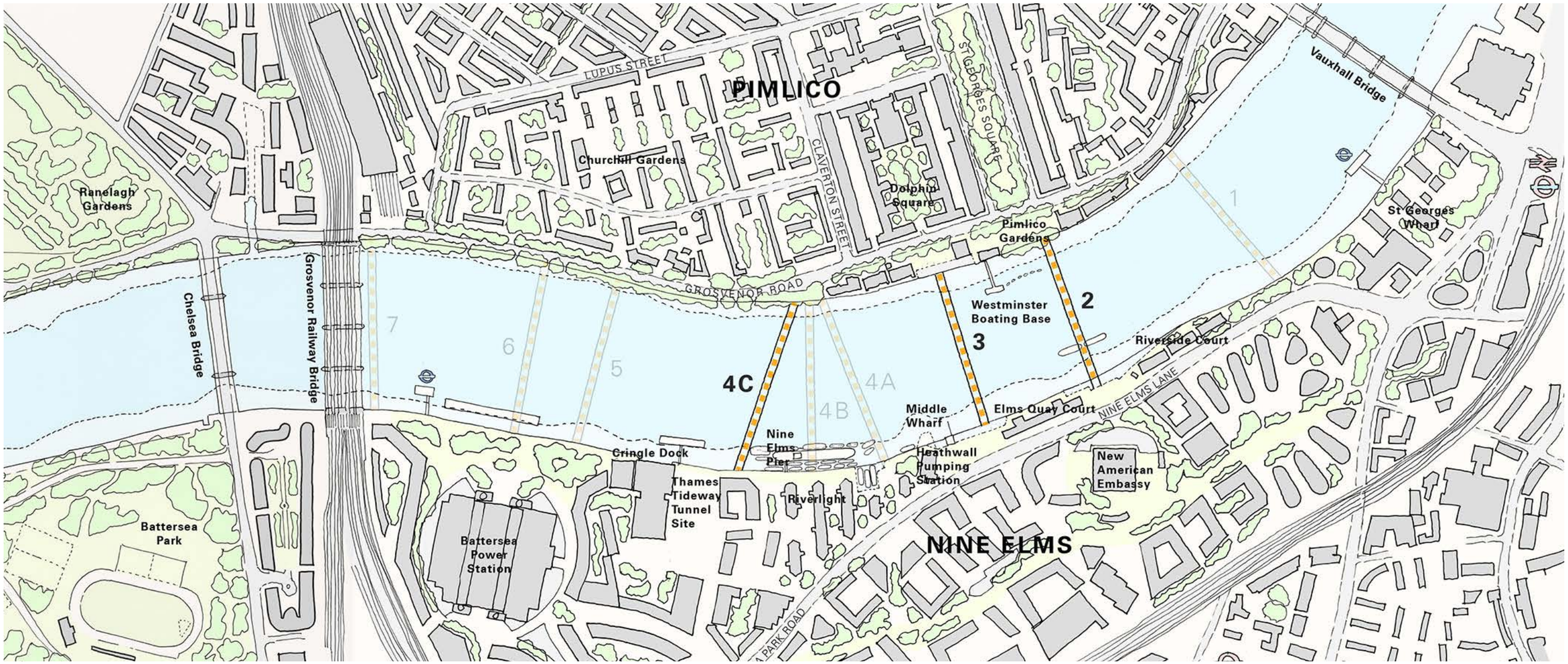
3.0 Background

During the first stage of the Project, undertaken in 2017, the Team investigated nine potential locations for the new crossing, comparatively assessing the strengths and weaknesses, ability to meet the project objectives and potential impacts of each option in consultation with key stakeholders and local communities.

At the conclusion of Stage 1 three locations were identified which each provided a strong case for further development, taking into account the above factors. Using the Stage 1 location numbering, these were:

- Location 2 - Pimlico Gardens to Bourne Valley Wharf
- Location 3 - Dolphin Square to Prescot Wharf
- Location 4C - Grosvenor Road (Claverton Street) to Kirtling Street

This report summarises the work undertaken in Stage 2 which further assesses and demonstrates the feasibility of the three identified locations and results in the recommendation of Location 4C as the preferred location.



Plan showing 9 locations investigated at Stage 1 and highlighting the 3 locations identified for further investigation

4.0 Technical Studies

4.0 Technical Studies

At this stage the Design Team, in consultation with relevant stakeholders and local communities, have undertaken further structured analysis of the three options identified during Stage 1 as the most feasible potential locations for a new pedestrian and cycle crossing over the Thames between the existing Vauxhall and Chelsea Bridges.

This report recommends a preferred crossing point for the new bridge following evolution of design and technical analysis of the three locations identified for further investigation.

This Technical Studies section of the report begins by describing how a technically feasible concept design has been developed for each of the three alternative locations responding to the specific constraints and opportunities of each site.

These concept designs are not proposed final solutions, but rather were developed to establish the potential implications of siting a bridge in these specific locations, test the technical validity and support the on-going options appraisal, continued from Stage 1, and inform the identification of the preferred location.

Further technical studies have been undertaken by specialists in the Design Team on the basis of the concept designs to confirm the feasibility and understand the impact of a bridge at each of the three identified locations. Comparative technical assessments of the designs have been undertaken in the following areas and are summarised in the remainder of this section:

- Design
- Heritage and Townscape
- Engineering
- Marine and Navigation
- Transport
- Environment
- Planning
- Deliverability

Urban context model showing the three location options identified for further investigation at the end of Stage 1

At this stage the Team have also continued their extensive consultation with key stakeholders and the public, building upon the positive engagement undertaken to date and allowing all stakeholders the opportunity to provide specific feedback on the shortlisted locations and the concept designs which have been developed. The key outcomes of this engagement are described in Section 5 of this report.

The technical analysis for each discipline was then, together with the input of stakeholders, fed into the wider location appraisal which is contained in Section 6 of this report and comparatively assesses each potential location highlighting their respective constraints and opportunities; it is this appraisal which results in the recommendation of a preferred location.

Visualisation of Nine Elms Pimlico Bridge looking towards Battersea Power Station from the Competition Stage of the Project


WARWICK SQUARE
WARWICK WAY
BELGRAVE ROAD
ST GABRIEL'S CHURCH
ST GEORGES DRIVE
DENBIGH STREET
CLARENDON STREET
SUSSEX STREET
GLOUCESTER STREET
CHARLWOOD STREET
SUTHERLAND STREET
LUPUS STREET
VAUXHALL BRIDGE ROAD
TATE BRITAIN
CHELSEA COLLEGE OF ARTS
PIMLICO
ST SAVIOR'S CHURCH
PIMLICO ACADEMY
CHURCHILL GARDENS PRIMARY
CHURCHILL GARDENS
ST GEORGE'S SQUARE
CROWN REACH
GROSVENOR ROAD
VAUXHALL BRIDGE
VICTORIA RAILWAY SIDINGS
ST GABRIEL'S PRIMARY
CHURCHILL GARDENS ROAD
CLAVERTON STREET
DOLPHIN SQUARE
ST GEORGE WHARF (VAUXHALL) PIER
VAUXHALL
EAGLE WHARF
ST GEORGE WHARF
PIMLICO GARDENS
WESTMINSTER BOATING BASE
VAUXHALL CROSS
LOCATION 2
LOCATION 3
LOCATION 4C
CHELSEA BRIDGE
GROSVENOR RAIL BRIDGE
BATTERSEA POWER STATION PIER
BATTERSEA POWER STATION JETTY
KIRTLING WHARF JETTY
NINE ELMS PIER
POWER STATION PARK
CIRCUS WEST
CRINGLE DOCK
TIDEWAY SHAFT
88 KIRTLING STREET BPS (PHASE 7)
KIRTLING WHARF
RIVERLIGHT
CRINGLE STREET
KIRTLING STREET
BPS (PHASE 6)
BPS (PHASE 5)
PUMPHOUSE LANE
BPS (PHASE 4)
BPS (PHASE 3)
PROSPECT PARK
ELECTRIC BOULEVARD
BATTERSEA (2020)
BATTERSEA PARK
QUEENSTOWN ROAD
BATTERSEA POWER STATION
BOOKER / BMW
NEW COVENT GARDEN MARKET ENTRANCE SITE
THESSALY ROAD
BATTERSEA PARK ROAD
STEWART'S ROAD
BPS (PHASE 4A)
MIDDLE WHARF
ELM DAIRY COURT
BOURNE VALLEY WHARF
PRESCOT WHARF
HEATHWALL PUMPING STATION
PONTON ROAD
NINE ELMS LANE
EMBASSY GARDENS (PHASE 1)
US EMBASSY
VIADUCT GARDENS
EMBASSY GARDENS (PHASE 3)
RIVERSIDE COURT
ONE NINE ELMS
NINE ELMS SQUARE
VAUXHALL SQUARE
LINEAR PARK
VAUXHALL PARK
EMBASSY GARDENS (PHASE 2)
NINE ELMS PARKSIDE
THE RESIDENCE
NINE ELMS POINT
ARCH 42
46 PONTON ROAD
NINE ELMS (2020)
NEW COVENT GARDEN MARKET
WANDSWORTH ROAD
SOUTH LAMBETH ROAD

4.1 Design

During Stage 2 a feasible concept design has been developed for each alternative location which responds to the specific constraints and opportunities of that location as well as feedback and technical requirements of stakeholders identified in previous consultation.

These site specific concept designs are detailed on the following pages, however whilst site specific refinements have been incorporated, the new designs retain the same key principles from the original competition proposal, for the bridge to be:

Connective
- Responsive to demand / desire lines.
- Local connectivity to existing & future infrastructure.
- London wide connectivity.
- Supports / encourages modal transfer.
- Quality of user experience.
- Equal treatment to both sides of river.

Sustainable
- Improve user safety.
- Improve air quality.
- Minimise impact at landings.
- Minimise negative ecological impacts.

Innovative
- Provide a positive contribution to public realm.
- Provide a positive contribution to heritage setting.
- Provide level and open access for all from river bank.
- Integration of bridge users on a shared surface.
- Meet key stakeholder technical requirements.

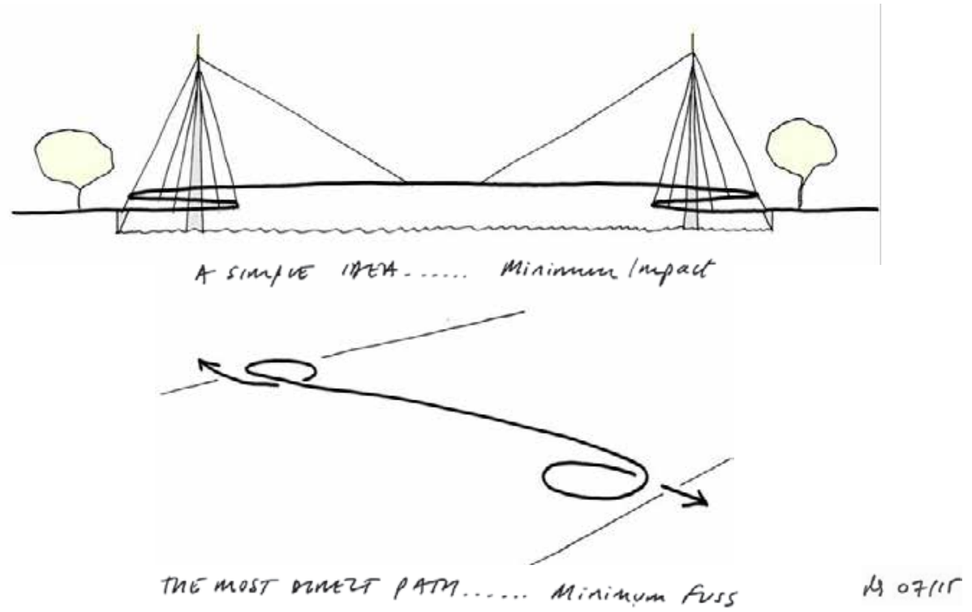
Deliverable
- Deliver value for money.
- Deliver on cost.
- Minimise disruption during construction.
- Minimise planning risk.

Collaborative
- Undertake engagement with schools, businesses and residents.
- Undertake consultation throughout the design process with all stakeholders.
- Undertake public exhibitions and workshops at key stages.
- Keep communities up to date on progress via interactive website, social media, press releases and email newsletters etc.

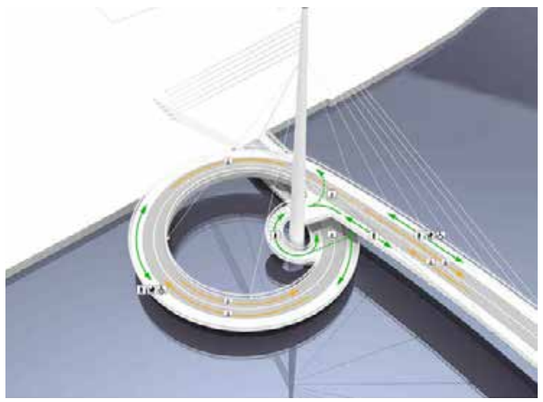
These objectives are fundamental to the design concept of the bridge at all locations, and are common to all three proposals irrespective of their specific sites. For example, from the outset the design concept has aimed to provide safe, level and open access for all from the river bank and demonstrate it can meet current expectations regarding inclusive design.

To this end, potential users, including active travel groups, have been engaged to understand their requirements and involve them in the early stages of the design process. The access strategy for the bridge has also been reviewed in the context of current standards, best practice and policies related to access and inclusive design and these have started to be incorporated into the initial concept designs.

These key objectives are expected to be carried forward to the next stage of design following selection of a preferred location; for example site specific design solutions for landing conditions, accessibility and integration into existing transport networks will be able to be developed in more detail at the next stage for a single preferred location.

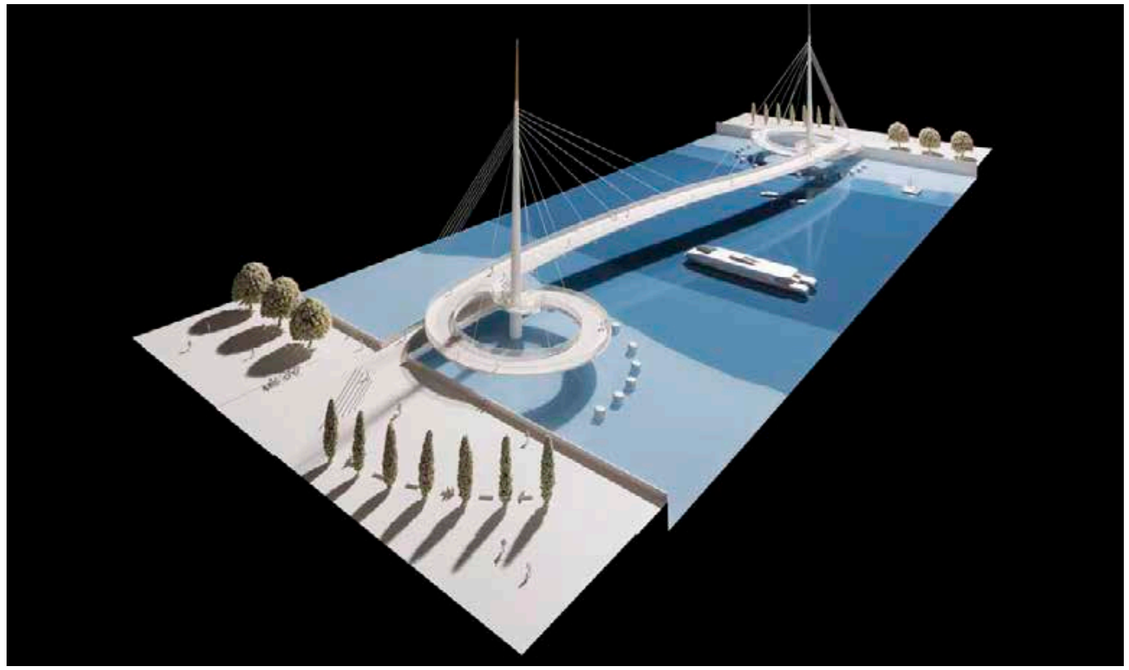


Design concept sketch for the pedestrian and cycle river crossing



Aerial visualisation of Nine Elms Pimlico Bridge concept design showing pedestrian and cycle ways

View of Langelinie pedestrian and cycle bridge, Copenhagen by Bystrup



View of Nine Elms Pimlico Bridge Concept Model

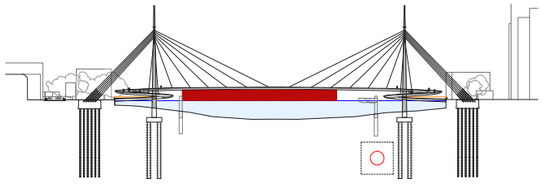
Opposite Page: Plan showing the three location options identified for further investigation at the end of Stage 1

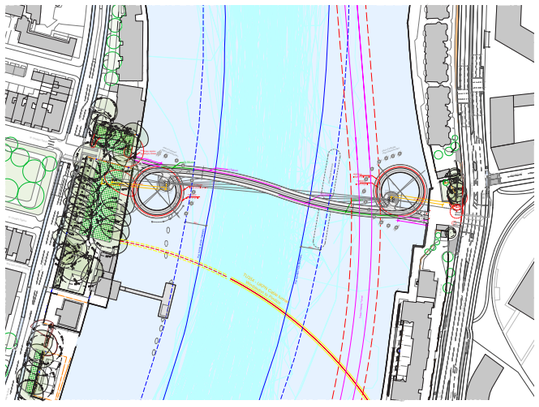
4.1 Design

Location 2 is considered to have the best relationship to the existing townscape. It is aligned with spaces between buildings each side of the river, allowing the bridge to be prominent, elegant and freestanding in views from its surroundings, particularly from Vauxhall Bridge. The landing sites of Location 2 are both public realm with the most space and highest amenity value of the three locations, allowing for landing arrangements that integrate well with existing public space. By contrast, landing sites at Locations 3 and 4C are either not currently publicly accessible, or are of lower amenity value, so may offer greater design potential for public benefit should a bridge land at one of these locations.

Developments of the Concept Design at Location 2

- Addition of staircase giving shorter crossing option for pedestrians.
- Reduced width of deck spiral given staircase minimises mass of deck and reduces darker covered area.
- Backstay concept detail developed to minimise impact above ground.
- Impact protection concept developed to minimise visual intrusion in the river.
- Geometry of arrangement and position of spirals moved to align with access at landing sites.
- Outline proposals for integrating with existing / proposed transport routes.

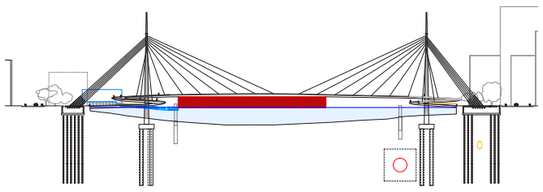


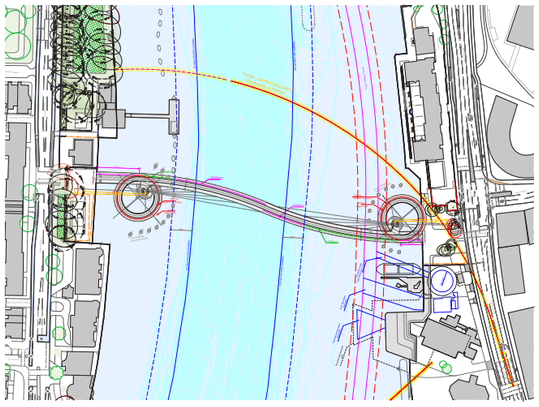


Constraints at Location 3 mean that the design concept is not so successfully implemented as at other options, neither is it differentiated by exhibiting specific design opportunities that are not also or better offered by the other options. The design arrangement is limited at the south bank by the constraints of Thames Tideway Tunnel, underground cables and Middle Wharf. The result is that landings at either end do not share a similar relationship to the riverbank, and therefore the bridge arrangement is less balanced in the open riverscape than at Location 2. The close proximity of large buildings to masts and landings also weaken the architectural setting in the townscape.

Developments of the Concept Design at Location 3

- Addition of staircase giving shorter crossing option for pedestrians.
- Reduced width of deck spiral given staircase minimises mass of deck and reduces darker covered area.
- Backstay concept detail developed to minimise impact above ground.
- Backstay position and foundation arrangement positioned with respect to underground utilities.
- Impact protection concept developed to allow for future operation of Middle Wharf and minimise visual intrusion in the river.
- Outline proposals for integrating with existing / proposed transport routes.
- Geometry of arrangement and position of spirals moved to align with access at landing sites.
- North mast and spiral landing positioned away from river wall at river channel inlet to accommodate backstays and allow mast to be clearly visible in the riverscape.
- South mast and spiral landing positioned close to south river wall due to location of Thames Tideway Tunnel.



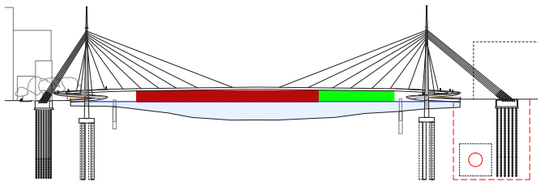


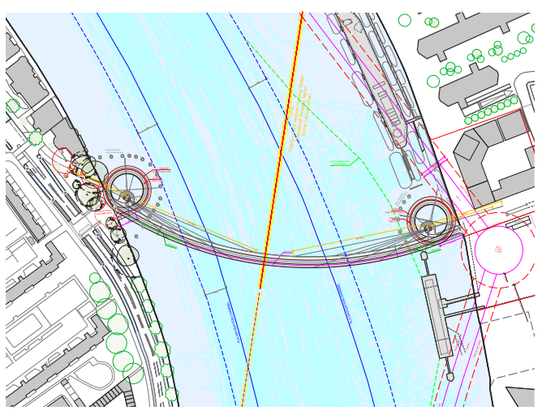
4.1 Design

The most significant developments to the concept design have been at Location 4C, where the modified arc arrangement responds to the diagonal alignment across the river. Consequently the spiral landings are both positioned on the downstream side and close to the river wall to allow for vessel navigation and wharf operations at the south bank. The south landing arrangement does however impact on houseboats at the western end of Nine Elms Pier. Access at both landing sites is proposed from new and improved public realm, with particular future place-making opportunity at the undeveloped south bank where the adjacent riverfront to the west is safeguarded from development of buildings by the Thames Tideway Shaft. Location 4C has the strongest relationship to the setting of Battersea Power Station, of which new and valuable views would be created. The sensitive setting of a bridge at this location with respect to the Grade II* listed Power Station is proposed as an enhancement to the townscape of the area.

Developments of the Concept Design at Location 4C

- Arc plan arrangement with spirals on the same side to fit alignment between landing sites.
- Forestays from each mast arranged to both sides of the deck over main span due to arced plan arrangement.
- South landing arrangement positioned close to river bank to allow vessel navigational access to Kirtling Wharf and Cringle Dock from downstream.
- Impact protection concept developed to allow future operations of Kirtling Wharf and Cringle Dock, and minimise visual intrusion in the river.
- Addition of staircase giving shorter crossing option for pedestrians.
- Reduced width of deck spiral given staircase minimises mass of deck and reduces darker covered area.
- Backstay concept detail developed to minimise impact above ground.
- South backstay positioned with respect to Thames Tideway Tunnel Shaft exclusion zone.
- Geometry of arrangement and position of spirals moved to align with access at landing site and minimise impact on trees.
- Outline proposals for integrating with existing / proposed transport routes.





Design Assessment Summary

The concept designs for each location have been developed in response to the specific constraints and opportunities of each site, consultation and stakeholder feedback while still meeting the key aims and objectives of the design which were established in the competition.

The outline general arrangements which have emerged are not a proposed final solution, but rather, have been developed to establish the potential implications of siting a bridge in these specific locations, test the technical validity and support the on-going options appraisal.

Having developed the competition design proposal for each location, each has been appraised from an architectural design perspective, considering the merits and potential implications of siting a bridge at these specific locations.

The design analysis found that all location options provide solutions which achieve the user experience and design objectives of the project. The design work undertaken at Stage 2 does not therefore preclude any of the location options, and does not in itself justify identification of an outright preferred location. However, there are differing relative design benefits and limitations of each location, which are summarised in the 'Design Assessment' table below.

The following pages continue this process and describe the other comparative technical appraisals which have been undertaken at this stage to understand the impact and opportunity of the concept designs at each location option.

The key findings from the design and technical appraisals were combined with feedback from consultation and fed into the wider location appraisal process, which is contained in Section 6 of this report; it is this wider appraisal which results in the recommendation of a preferred location.

KEY **Assessment**
- Very Good Opportunity / No Constraint / Fully Acheivable
- Good Opportunity / Minor Constraint / Predominantly Achievable
- Moderate Opportunity / Moderate Constraint / Mostly Achievable
- Low Opportunity / Significant Constraint / Partially Achievable
- Very Low Opportunity / Major Constraint / Not Achievable
- Not comparatively assessed at this stage

Design Assessment

Design Criteria	**Location 2** Comparative Assessment			**Location 3** Comparative Assessment			**Location 4c** Comparative Assessment		
Technical Assessment	N	S		N	S		N	S	
Landing Condition			**Very Good Opportunity** Good space for landing, user access and construction access north and south of the river. Slight ground level increase needed at north.			**Good Opportunity** Space available for landing and access north and south of the river is relatively restricted, particularly at north. Level changes across south landing site.			**Very Good Opportunity** Space available for landing and construction access is good at north side and excellent at south side, assuming new building not yet built.
Ability to Meet Objectives									
Minimise impact at landings			**Mostly Achievable** Minimised structure on land north and south. Backstays and users at north bank landing will result in change to existing public space.			**Predominently Achievable** Minimised structure on land north and south. Backstays and users at north bank landing will result in change to existing private space.			**Fully Achievable** Minimised structure on land north and south. Potential positive opportunities for placemaking at both landing sites.
Quality user experience			**Fully Achievable** Provides an attractive user experience. Quickest crossing of river with direct access to bridge at open, green landing spaces at both banks.			**Predominently Achievable** Provides an attractive user experience. Restricted landing space at north due to tennis court.			**Predominently Achievable** Provides an attractive user experience. Approach access and connection to south landing less apparent from main routes than at other options.
Equal treatment to both sides of the river			**Fully Achievable** Direct connection to main routes at both landings with equivalent ramp connection at each river bank			**Predominently Achievable** Direct connection to main route at both landings, however position of access ramps relative to riverbanks may differ.			**Mostly Achievable** Direct connection to main route at north. Llink to main route required at south. Site constraints/opportunities of south development may require alternative design.
Enhance public realm			**Predominently Achievable** Bridge provides new public realm open 24hrs. Increased access and use of existing good public spaces north and south. Some strong opposition locally to any change at north landing.			**Fully Achievable** Bridge provides new public realm open 24hrs. Potential to provide new public space for north bank and increased access and use of south bank public space.			**Fully Achievable** Bridge provides new public realm open 24hrs. Improvement to low value north bank public space. Potential opportunity to provide new public space integrated with south river walk.
Provide level and open access for all from river banks			**Fully Achievable** Open, publically accessible level space at both landings to enable access for all.			**Predominently Achievable** Level north landing has potential to open up public access for all. South has level change to be managed to enable access for all.			**Predominently Achievable** Open, publically accessible level space at north landing to enable access for all. Undeveloped south landing opportunity needs to be developed.
Improve user safety			**Not assessed in detail** Provides a new safer alternative river crossing. Safe integration possible with main routes and good space availability to manage user movements.			**Not assessed in detail** Provides a new safer alternative river crossing. Safe integration possible with main routes. Potentially restricted manouvring space to manage high user flows.			**Not assessed in detail** Provides a new safer alternative river crossing. Safe integration possible with main routes on both sides. Separated from main traffic route at south landing.

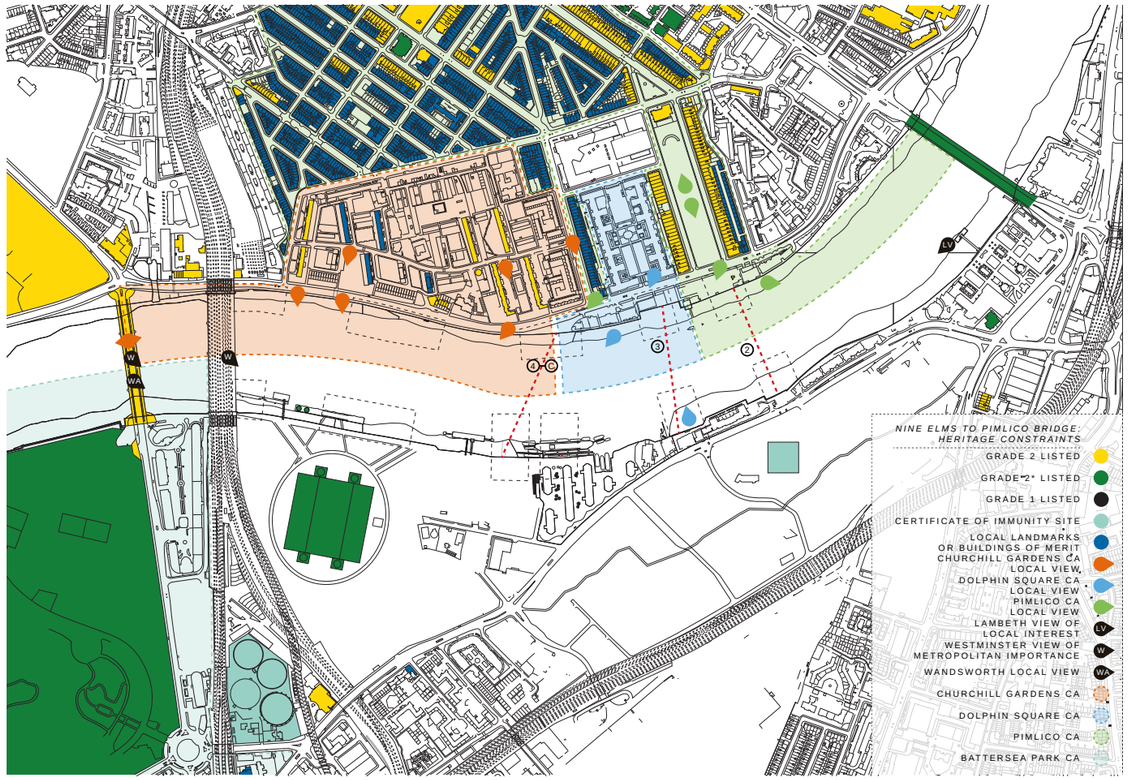
4.2 Heritage and Townscape

The heritage and townscape assessment undertaken at this stage considers the three identified Locations in regards to the impact on listed building and conservation areas; and in relation to wider townscape and visual impact as well as the potential for the new bridge to enhance the townscape and the historic environment. This assessment has allowed the locations to be comparatively assessed for the potential for harm as well as the potential benefits which may emerge from the bridge enhancing its environment. The assessment indicated that although there are differences between the locations there is nothing in heritage terms which makes any of the locations unviable and they all have the potential to enhance the townscape and setting of the surrounding heritage assets.

The analysis undertaken at this stage has been backed up through engagement with Historic England who indicated that while Location 2 has a greater sensitivity in heritage terms than either Location 3 or Location 4C the likely heritage impacts should not prevent development at any of the identified location subject to sensitive design.

Location 2
Location 2 is the most sensitive of the three locations from a heritage perspective. The north bank landing of this location is in Pimlico Gardens, and in the setting of St. George's Square, which lies just to the north of Pimlico Gardens, across Grosvenor Road, and is surrounded by two terraces of 1850s Italianate townhouses with a church at its northern end (all listed at Grade II). The north bank landing is within Pimlico Conservation Area. There is also a Grade II listed monument in Pimlico Gardens: a marble statue of William Huskisson. The statue would need to be re-sited within Pimlico Gardens as part of the proposals however it is not felt this would be harmful to its special interest.

Location 2 could have a strong positive impact on the townscape in that it would be visible from Vauxhall Bridge and from a designated key view at Vauxhall St. George Pier, providing an effective visual counterpoint to the chimneys of Battersea Power Station and potentially enhancing these views. Initial testing indicates that in the view from St George's Square, the bridge would be largely obscured by trees, although the masts would be visible above the tree canopy. Glimpses of the bridge have the potential to enhance the townscape, indicating the presence of the River Thames and providing a counterpoint to the Victorian church spire at the opposite end of the square.



Heritage constraints map showing the area surrounding the Nine Elms Reach of the Thames and the potential Locations under investigation

Location 3
A bridge at Location 3 could have a strong positive impact on the townscape as it would be visible from Vauxhall Bridge and from a designated key view at Vauxhall St. George Pier, providing an effective visual counterpoint to the chimneys of Battersea Power Station and potentially enhancing these views. However, it would not have as strong a positive impact on the townscape of the immediate vicinity of the bridge as Locations 2 and 4C. This is because its landing on the north bank would be in front of Dolphin Square, an unlisted building which presents a long, tall and relatively uniform elevation to Grosvenor Road and which would prevent the bridge being visible in longer views from the surrounding area.

The northern landing of Location 3 lies in the Dolphin Square Conservation Area. Location 3 therefore has some heritage implications related to the character and appearance of the conservation areas on the north bank, and a designated key view of the Dolphin Square Conservation Area from the south bank. However, there would be no impact on listed buildings and overall, the impact on heritage assets would be low.

Location 4C
Location 4C forms part of the setting of listed buildings and the northern landing lies on the border between Churchill Gardens and Dolphin Square Conservation Areas. The design of the bridge could complement the post-war aesthetic of the listed Churchill Gardens on the north bank and the proposals have the potential to enhance their setting. A bridge at this location also has the potential to enhance the setting of the Grade II* listed Battersea Power Station and the surrounding townscape on the south bank.

There are designated views towards Battersea Power Station from the Dolphin Square Conservation Area, but the potential for harm to these designated views from conservation areas north of the river is limited. Indeed, Location 4C has the potential to benefit this section of river and townscape overall, and in particular to improve the townscape in the vicinity of both Battersea Power Station and Churchill Gardens. The more open character of the townscape in this location, in comparison to Location 3, leads to greater potential for enhancement.

Heritage and Townscape Assessment Summary
Overall Location 2 is the most sensitive in heritage terms, however it is felt that it still has the potential to enhance the setting of St George's Square, to improve Pimlico Gardens and to enhance the setting of the statue of William Huskisson. It also has potential to enhance the townscape overall, in views from St George's Square, from Vauxhall Bridge and from the Thames Path.

While Location 3 has some potential to enhance the townscape overall, in views from Vauxhall Bridge and from the Thames Path, it does not have the same potential as Location 2 or 4C. The option has some potential to enhance the conservation area, but, again, not as much as in Locations 2 or 4C.

Location 4C does not adversely impact on heritage assets and has potential to enhance the setting of a series of listed buildings and the surrounding Conservation Areas. It also has potential to enhance the townscape overall, in views from Churchill Gardens, Battersea Power Station and from the Thames Path.

The key findings from the heritage appraisal are summarised in the matrix below and are then fed into the wider location appraisal process, which is contained in Section 6 of this report, and led to the recommendation of a preferred location.

Heritage and Townscape Assessment

KEY	Assessment
	Very Good Opportunity / No Constraint / Fully Acheivable
	Good Opportunity / Minor Constarint / Predominantly Achievable
	Moderate Opportunity / Moderate Constraint / Mostly Acheivable
	Low Opportunity / Significant Constraint / Partially Achievable
	Very Low Opportunity / Major Constraint / Not Achievable
	Not comparatively assessed at this stage

Heritage Criteria	Location 2			Location 3			Location 4c		
	Comparative Assessment			Comparative Assessment			Comparative Assessment		
Technical Assessment	N	S		N	S		N	S	
Townscape and visual impact			**Very Good Opportunity** Positive relationship to townscape with consideration required for setting of St Georges Square.			**Moderate Constraint** Positive relationship to townscape, but visibility in townscape constrained by proximity to large surrounding buildings.			**Good Opportunity** Positive relationship to townscape
Conservation and Heritage			**Moderate Constraint** Located in Pimlico Conservation Area and in setting of Grade II listed assets to the north			**Minor Constraint** Located in Dolphin Square Conservation Area			**Minor Constraint** Located at border between Dolphin Square and Churchill Gardens Conservation Areas
Ability to Meet Objectives									
Enhance heritage setting			**Predominently Achievable** Potential to enhance views of local interest and riverscape Opportunity to develop positive relationship to St Georges Square but carefully consider proximity of heritage assets.			**Mostly Achievable** Much of the bridge's potential to enhance views of local interest and riverscape would be lost by the location.			**Predominantly Achievable** Potential to enhance views of local interest and riverscape. Opportunity to develop positive relationship to Churchill Gardens and Battersea Power Station.

Local View and Townscape Studies of Design Proposals

View studies of the design proposal at each location option were made to consider the visual impact and setting of the bridge in the townscape. Some of the key Local Views identified by Statutory Authorities in which each design proposal features are shown on this page. Descriptions of the views are given in the text and key below.

Conservation Area (CA) Local Views Identified by Statutory Authorities

A Location 2: Pimlico CA Local View
Pimlico Gardens riverfront from Grosvenor Road

B Location 3: Dolphin Square CA Local View
Riverfront from Grosvenor Road at Dolphin Square

C Location 4C: Pimlico CA Local View
Along Grosvenor Road riverfront from SE corner of Churchill Gardens at Claverton Street junction

D Location 2: Lambeth View of Local Interest
Up river from Vauxhall St George Wharf Pier

E Location 3: Lambeth View of Local Interest
Up-river from Vauxhall St George Wharf Pier

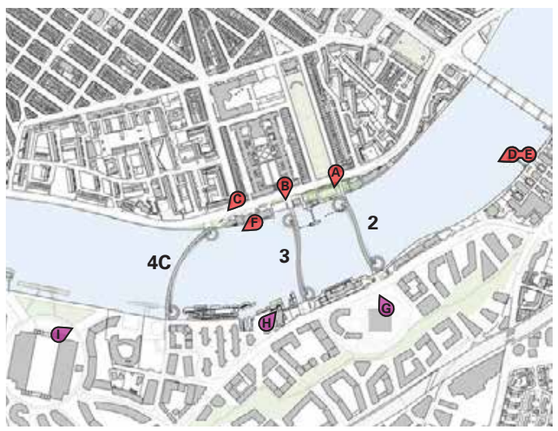
F Location 4C: Dolphin Square CA Local View
Across/up-river view from river bank

Townscape Views shown from Local Buildings

G Location 2: View from American Embassy across-river to St George's Square.

H Location 3: View from Riverlight One down-river towards Vauxhall

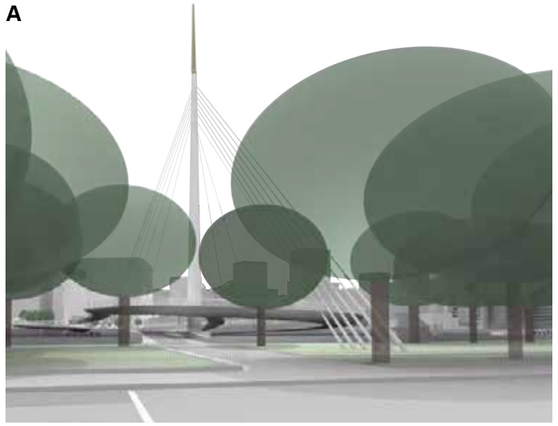
I Location 4C: View from Battersea Power Station down-river towards Vauxhall



Key plan of local and townscape view studies

Location 2

A



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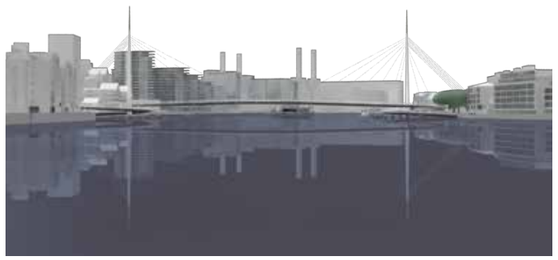

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Location 3

B

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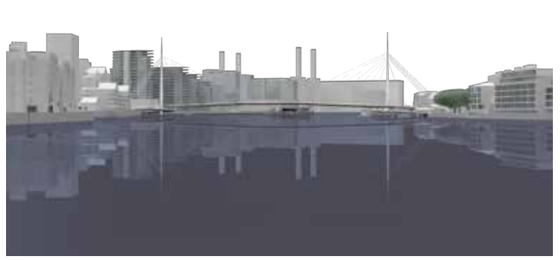

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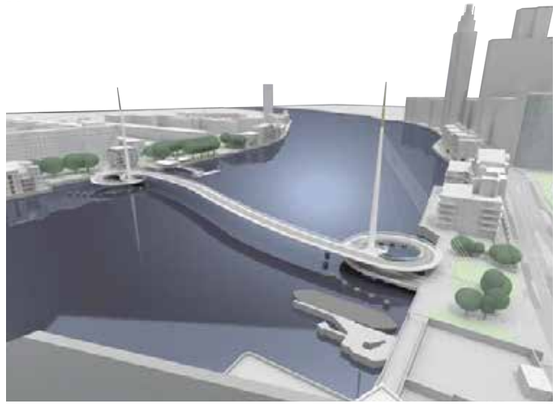

Location 4C

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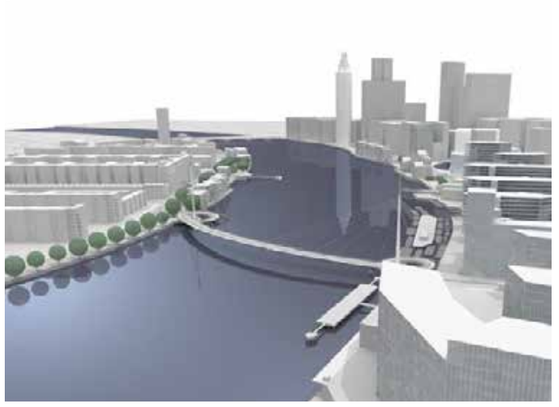


4.3 Engineering

The structural engineering studies undertaken during this stage appraised the three options for the Nine Elms Pimlico Bridge crossing locations (2, 3 and 4C) taken forward from Stage 1.

Engineering analysis of varying span length, vessel impact protection, ramp geometry, deck material, potential backstay and foundation arrangements have been undertaken. This has allowed a conceptually feasible structural solution to be developed for each alternative location based on the cable stayed structural arrangement used in the competition design.

The design has been varied at each location, including ramp geometry, mast position and backstay arrangement to suit the specific site opportunities and constraints which were identified in consultation with key technical stakeholders including the Port of London Authority and Thames Tideway.

In the evaluation, the physical constraints for each of the three locations have been examined to understand the implications of potentially locating a bridge at each one, based on the competition stage design, or variations of it. The appraisal takes account of mitigation measures, where these may be needed to overcome certain obstacles or constraints, and presents the implications for each site. Based upon this information, an engineering-specific recommendation of a preferred location is made. It should, however, be noted that at this stage, the evaluation of the locations has been carried out using the indicative design from the competition stage, modified for each location to suit the specific alignment, opportunities, constraints and meet the technical requirements identified by stakeholders. The final design at the selected location may differ in some respects.

Location 2

Location 2 presents the shortest of the proposed routes and is an attractive solution from a technical engineering point of view. The two abutment and backstay anchor areas are relatively tight for space and access for construction will need to involve river transport as much as possible so as to minimise disruption to adjacent properties and highways. The design is considerably constrained at the north end by Pimlico Gardens with its protected trees, and to a lesser extent at the south end by being in close proximity to the Thames Tideway Tunnel. These constraints add extra risk to the construction of the piled foundations, but are not insurmountable.

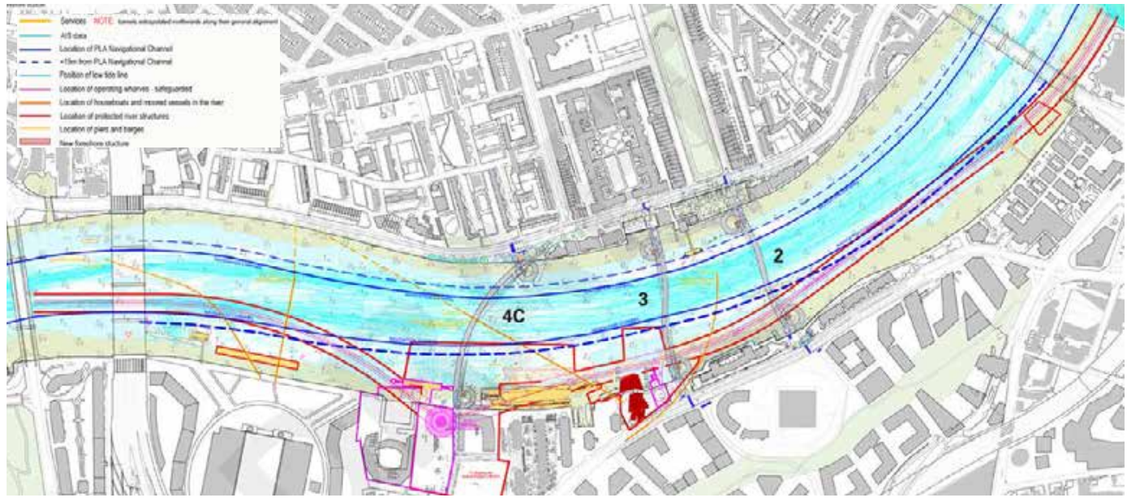
Location 3

Location 3 is extremely congested at the south side of the river by virtue of its close proximity to Thames Tideway, Middle Wharf, underground utilities (UKPN 354) and Nine Elms Lane. These combine to create very challenging constraints and result in high risks and potentially high costs associated with constructing the piled foundations. To the north, the site is also very constrained, with relatively little space available for construction of the backstay foundations and anchorage. The extra length of the north approach ramp also creates additional difficulties, with the possible need for additional supports in the river and potentially greater risks at the interface between the abutment and the river wall.

Location 4C

Location 4C is the longest of the three crossings but is nevertheless an attractive option. At the north end, the proximity of the Navigation Channel to the river bank restricts the space available for the spiral ramp. The bridge is located in an area of the river that experiences manoeuvring and turning vessels, including those accessing Cringle Dock and the safeguarded Kirtling Street Wharf on the south bank. These would present some constraints during construction, but feasible mitigation measures have been proposed to alleviate them. Conversely, potential for construction access and the space available for the land-based works is much better at this site, particularly to the south.

The route also offers opportunities to integrate the bridge into the wider Nine Elms development area, with plans for a possible high-level walkway along the south bank. The south abutment and approaches to the bridge will need to be considered alongside proposals for the new building at 88 Kirtling Street to ensure a co-ordinated and coherent overall solution. A bridge at this site may require a modified conceptual design compared to that presented at competition stage, however this is very much in keeping with the agreed approach of developing a bridge design which suits the specific constraints of the site.



Site plan of Nine Elms Reach illustrating identified constraints with concept design for Locations 2,3 and 4C overlaid

Engineering Assessment Summary

All three locations have been evaluated from the point of view of temporary disruption during construction to nearby residents and users of the river or adjacent highways and footpaths. All three sites will require temporary piers in the river and will make use of floating plant and equipment, and all three are likely to need floating barges alongside the river banks in order to create sufficient space for temporary construction and welfare facilities. There is little to choose between them, but of the three, Location 4C appears to be the least disruptive in this respect and Location 3 the most disruptive.

It is technically feasible to design and construct a bridge on all three sites, although with the concept design which has been used in the evaluation there are constraints affecting the foundations on the south side of the river for Location 3 that make this location risky and undesirable.

On balance, talking all things into consideration, there is little to choose between Locations 2 and 4C from a purely technical engineering perspective. Location 4C is in many ways the most attractive from the point of view of minimum risk and ease of construction access, but Location 2 has the shortest span which implies some greater simplicity making it also a very attractive option. Location 3 presents very significant construction risks, particularly at the south side, and is the least desirable of the three.

The key findings from the engineering appraisal are summarised in the matrix below and are then fed into the wider location appraisal process, which is contained in Section 6 of this report, and led to the recommendation of a preferred location.

KEY Assessment
- Very Good Opportunity / No Constraint / Fully Acheivable
- Good Opportunity / Minor Constraint / Predominantly Achievable
- Moderate Opportunity / Moderate Constraint / Mostly Acheivable
- Low Opportunity / Significant Constraint / Partially Achievable
- Very Low Opportunity / Major Constraint / Not Achievable
- Not comparatively assessed at this stage

Engineering Assessment

Engineering Criteria	Location 2			Location 3			Location 4c		
	Comparative Assessment			Comparative Assessment			Comparative Assessment		
Technical Assessment	N	S		N	S		N	S	
Engineering Feasibility: Structure			**Good Opportunity** Shortest span option. Engineering arrangement constrained by arboricultural considerations, particularly at north. Minor constraint on south mast foundation proximity to TTT.			**Moderate Constraint** North approach span implies possible extra support. Major constraints on south mast foundation close proximity to TTT and back stay anchorage clash with UKPN cable tunnel.			**Good Opportunity** Longest span option. No significant constraints for foundations, assuming new building at south not yet built. South abutment partially constrained by TTT access shaft exclusion zone.
Engineering Feasibility: Utilities			**Good Opportunity** No identified utility constraints to preclude development at this stage.			**Moderate Constraint** Thames Tideway Tunnel and UKPN cable tunnel are major constraints to the south side.			**Good Opportunity** TTT and access shaft, and the new building at 88 Kirtling Street, are moderate constraints to the structural arrangement to the south. No constraints at north.
Ability to Meet Objectives									
Minimise disruption from construction			**Mostly Acheivable** There are likely to be some construction impacts (e.g. noise / river use) but mitigation measures can be employed in the construction methodology. Deliveries by road need to be minimised, both sides of the river.			**Mostly Acheivable** There are likely to be some construction impacts (e.g. noise / river use) but mitigation measures can be employed in the construction methodology. Deliveries by road need to be minimised both sides of the river.			**Predominantly Acheivable** There are likely to be some construction impacts (e.g. noise / river use) but mitigation measures can be employed in the construction methodology. Road access at north slightly better than elsewhere. Less impact, and good road access at south.

The locations for the new crossing are all situated within the Nine Elms Reach of the Thames between the existing Vauxhall and Chelsea Bridges. The Team have collected AIS Data to record the frequency and typical paths of vessels passing this area and from this have prepared mapping to illustrate existing and future river use. The investigations found the river in this area is busy with a wide variety of vessel and traffic users.

Preliminary assessments of the vessel tracking data have been used to review navigational risk assessments and impact scenarios, develop design criteria and prepare initial options for impact protection.

Key marine stakeholders, including Port of London Authority (PLA), Thames Tideway, Westminster Boating Base and Nine Elms Pier Residents, have been engaged in the process enabling the Team to establish their technical requirements and offering the opportunity for them to input into the Location Appraisal. An initial engagement meeting was conducted with the Environment Agency (EA) during Stage 1 with the opportunity for further engagement offered but not taken up at this stage.

The initial concept designs for the bridge have been developed to meet the functional requirements of river users and the clearance requirements identified in consultation with the PLA. However, the investigations have also identified a rationale for potentially refining the air gap requirement at the edges of the navigational channel. Westminster Boating Base, who operate sailing dinghies which require a greater clear height than any other regular user of this reach of the river, have been engaged and they are broadly accepting of initial options to refine the air gap requirements. This opens the opportunity to significantly reduce ramp lengths.

It is anticipated that further consultation will be undertaken with all these stakeholders as the project progresses and that they will be kept engaged in the design process.

It is recommended that a detailed navigational risk assessment be completed following final site selection and outline design stages to fully validate the design with regard to vessel impact risk.

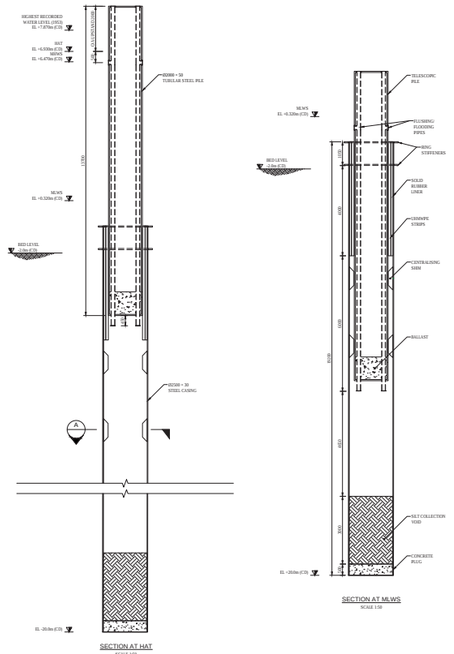
Vessel Impact Protection

It is expected that the exposed areas of the bridge will require protection. There are a number of options to prevent vessels impacting the bridge and causing significant damage. These options vary in suitability between different locations, in degrees of visual impact, and in associated construction cost.

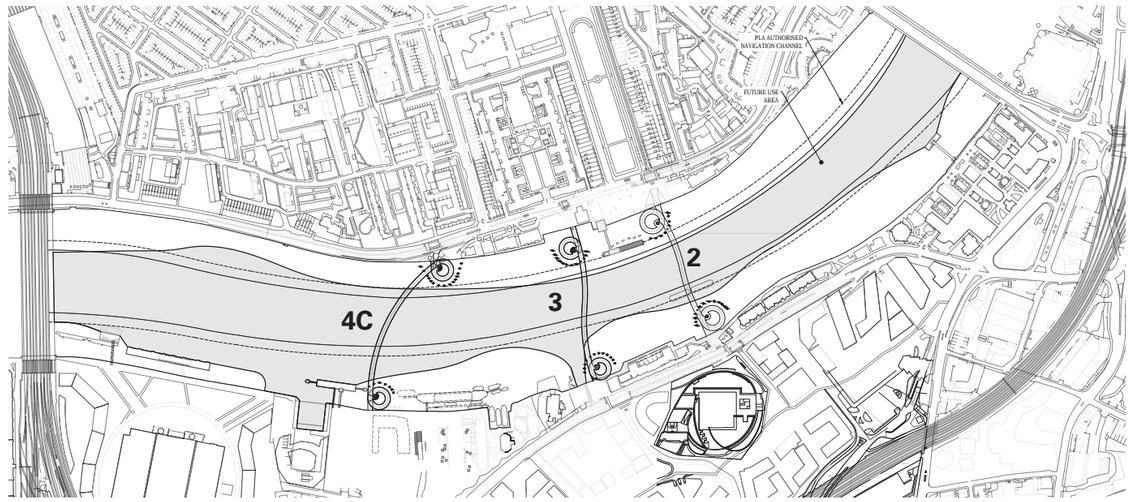
The following impact protection options have been considered at this stage.

- Impact protection piles would be expected to have a lesser visual impact, but be more expensive. They require sufficient spacing to ensure that a vessel which could damage the bridge is highly unlikely to breach the row of piles. A vessel may impact the bridge either head on or at an oblique angle so piles are to be spaced and sized accordingly to take into account the potential angle of the collision, with head-impact zones having closer pile spacing. Smaller boats and kayaks may pass between the piles and maintain an access route.
- Impact protection booms, are floating structures held in position and restrained by piles at either end. The booms surround the bridge spiral to stop any vessel impacting the bridge. This type of structure prevents all vessels accessing the bridge structure, but may restrict some recreational access such as kayaks.

Initial proposals based on these options have been reviewed with the PLA and other key stakeholders, and will be developed further in consultation at future stages of the project.



Initial Concept Design for Impact Protection Piles



Plan of Nine Elms Reach illustrating projected future use navigation zone based on vessel tracking data with Locations 2,3 and 4C overlaid

Marine Navigation Assessment Summary

Following consideration of the impact to navigation, the impact to the operations at and adjacent to the proposed bridge landing locations and the relative risks of vessel impact, Location 4C is the preferred location.

In terms of vessel navigation Location 4C demonstrates a slightly smaller overall impact on river users and marine operations in comparison to the other locations. Cringle Wharf will be impacted by the southern landing, however, as Cringle Wharf projects a reasonable distance into the river, the landing is generally landward of the wharf and hence the impact on the operations at the wharf is not anticipated to be highly significant. The safeguarded Kirtling Wharf will also be impacted by the Location 4C landing at the south and this landing will need careful design with stakeholders including the PLA to ensure any impacts are minimised.

Five houseboats at the western end of Nine Elms Pier are currently relocated due to Thames Tideway works, however in accordance with the Tideway Development Consent Order they are due to be returned at the completion of the works. According to the current concept design for Location 4C one of the houseboats which is due to be returned in the Tideway end state would need to be relocated to allow the bridge to land at this point.

From a vessel impact risk perspective, the shortlisted bridge locations are broadly similar. The Location 4C northern ramp is considered to be the highest risk in the current form of the assessed sites. However, vessel impact risks are not considered to be significantly worse at Location 4C than at the other locations assessed indeed the southern landing is well protected by the adjacent Kirtling Wharf jetty and Nine Elms Pier with its houseboats and is therefore at least risk of impact of all six of the landing zones considered.

Continued consultation with Port of London Authority, Nine Elms Pier residents, Westminster Boating Base and other key river stakeholders will be crucial as the project progresses to ensure any impacts on river users are minimised.

KEY Assessment

- Very Good Opportunity / No Constraint / Fully Acheivable
- Good Opportunity / Minor Constarint / Predominantly Achievable
- Moderate Opportunity / Moderate Constraint / Mostly Acheivable
- Low Opportunity / Significant Constraint / Partially Achievable
- Very Low Opportunity / Major Constraint / Not Achievable
- Not comparatively assessed at this stage

Marine and Navigation Assessment

River Use Criteria	Location 2			Location 3			Location 4c		
	Comparative Assessment			Comparative Assessment			Comparative Assessment		
Technical Assessment	N	S		N	S		N	S	
Navigation and operations			**Moderate Constraint** Feasible solution to meet requirements of river users and authorities with consideration for Westminster Boating Base. Requires Cory's moorings to be relocated.			**Moderate Constraint** Feasible solution to meet requirements of river users and authorities with consideration for safeguarded wharf and Westminster Boating Base			**Minor / Moderate Constraint** Feasible solution to meet requirements of river users and authorities with consideration for safeguarded wharf and Westminster Boating Base
Vessel impact			**Minor / Moderate Constraint** Some protection from adjacent pier structures at North. N.B. South Score assumes relocation of barge moorings.			**Minor Constraint** Some protection from adjacent pier structures. Significant risk from vessels using Middle Wharf but can be mitigated by rebuilding the wharf.			**Minor / Moderate Constraint** North bank landing is exposed to turning vessels. South landing well protected by adjacent piers.

4.5 Transport

The Nine Elms Pimlico Bridge proposal is consistent with the transport policies of the surrounding Local Authorities and the Greater London Authority, aiming to make a significant contribution to the shared objectives of creating healthy streets and encouraging safe sustainable transport methods. The crossing has been identified as part of the package of transport and connectivity improvements required to support the developments in the Vauxhall Nine Elms Battersea Opportunity Area and aiming to connect local neighbourhoods and provide safe and attractive onward connection. This is reflected in the Mayor's Draft London Plan and aligns with the transport section of the Opportunity Area Planning Framework.

As part of the ongoing process to update the original TfL Feasibility Study (2013), further updates to the transport modelling have been undertaken to understand the usage of the bridge at different locations and onward travel demand.

At Stage 2, the project sought to provide a revised comparative assessment of demand in each of the three bridge locations taken forward from Stage 1. To update the demand analysis, work has been undertaken to refine both the pedestrian and cycle forecasts produced at Stage 1.

In terms of pedestrian demand, work has been undertaken to refine the trip generation assessment both in terms of the forecast number of walk trips generated by the Vauxhall Nine Elms Battersea Opportunity Area and the distribution of trips on the network. AECOM has continued to use its in-house Urban Space Strategic Pedestrian Tool (USSPT) to estimate pedestrian demand on the new bridge. The zones in the model have been refined to provide an enhanced level of assessment.

The Stage 2 cycle demand review was carried out using the Cynemon model developed by TfL. To refine the analysis, the Nine Elms development area zones were disaggregated into smaller areas in order to provide a finer grain assessment and to help differentiate between the three potential bridge locations.

It should be noted that the Cynemon assessment does not take into account any aspirational targets, for example those set out in the Mayor's Transport Strategy. Whilst significant effort has been spent reviewing and updating the Cynemon model network around the bridge locations and Vauxhall Nine Elms Battersea Opportunity Area generally, focus has been on the bridge landing locations, zone connection areas and main routes to the bridges. Cynemon contains a wealth of information and coding attributes for every link including elevation, attractiveness, bus lanes and many more items, of which it has not been possible to fully review and test every one across the Opportunity Area and beyond. Whilst this may be having some effect on demand and routing this is likely to be both positive and negative and further site surveys can be undertaken at the next stage on key routes to refine the assessment.

In order to seek to address the current uncertainties surrounding the demand assessment, a range of sensitivity tests have been undertaken for both pedestrian and cycle demand. These tests have sought to help understand whether changes in selected parameters would be likely to alter conclusions with respect to relative levels of demand. They would also provide an indication of the potential range in demand, noting the comparative nature of the assessment at this stage.

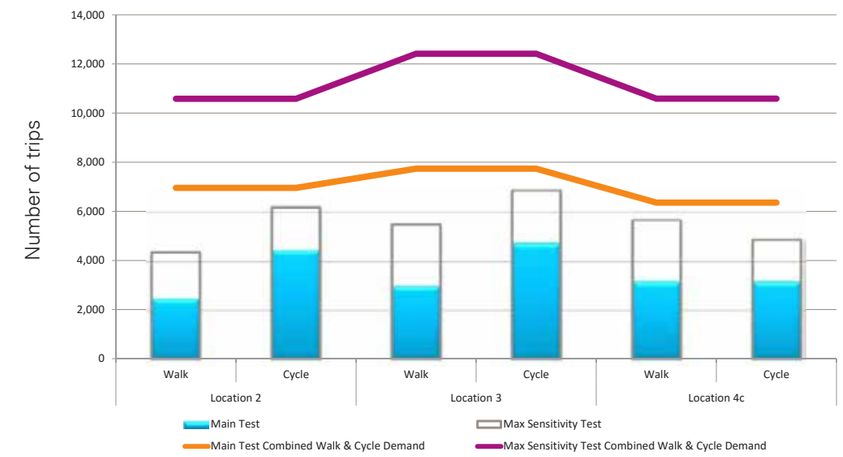
Key Demand Assessment Findings

The graph opposite shows the comparative assessment of 12-hour, weekday bridge demand, combining pedestrians and cyclists based on the current ramp design. This indicates that a new bridge is forecast to generate between 6,400 and 12,400 combined walking and cycling trips each day, depending on bridge location and sensitivity test. Overall Location 3 resulted in the highest overall combined demand, with Locations 2 and 4C at slightly lower levels of demand. To give this comparative context, the existing (2017) level of demand on Lambeth Bridge is 8,728 combined pedestrian and cyclists (although the split of pedestrians and cyclists is different).*

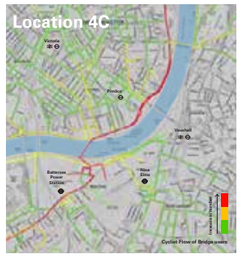
It can also be seen that the sensitivity testing undertaken did not indicate different comparative trends of the location options in terms of sequence from highest to lowest demand. The results show that the sensitivity testing undertaken represents a greater range in demand (from low to high) for a given location, than the variation in demand between locations.

This therefore indicates that the current comparative demand assessment does not provide a strong indication that any of the three potential bridge locations should be excluded from further consideration on the basis of demand assessment. Again, it should be reiterated that this assessment still represents a comparative assessment of alternative locations and the absolute level of demand projected is subject to change in later stages as the assessment is further refined and parameters updated.

	Location 2	Location 3	Location 4c
Pedestrians	2,500 – 4,400	3,000 – 5,500	3,200 – 5,700
Cyclists	4,500 – 6,200	4,800 – 6,900	3,200 – 4,900
Combined	7,000 – 10,600	7,800 – 12,400	6,400 – 10,600



Above: Comparative Assessment of Bridge Demand (12-Hour Average Weekday)
Right: Comparative projected user demand - Local cyclists (12 hour weekday flows)



Connectivity

The transport assessment at this stage considered not only the level of demand on the bridge but also the routing of pedestrians and cyclists either side of the River. While there is additional data collection and further refinement to be done, particularly with respect to the Vauxhall Nine Elms Battersea Opportunity Area, this provided a preliminary consideration of the routes in the comparative assessment. Particularly amongst cyclists, this demonstrated a strong desire line from south-west to north-east, and vice versa, with other routes showing some south-north connectivity. Amongst pedestrians, there was a strong local connectivity between the areas immediately north and south of the River.

It could be seen that significant proportions of demand are related to the Vauxhall Nine Elms Battersea Opportunity Area, both as a generator of trips (residential development), but also as an attractor of trips (employment, retail and leisure). It can also be seen that the opening of Arch 42 and the provision of the bridge are complementary in helping to significantly improve access to areas south of the railway and the connectivity to the north side of the River.

The different bridge locations respond to the different network configurations and development areas on each side for the River. For example, Location 3 would benefit greatest from the connectivity to areas south of the railway line in Wandsworth by virtue of having the closest proximity to Arch 42, while Location 4C is in closest proximity to the BPS development area. On the north side of the river, Location 4C and Location 2 land at north-south links (Claverton Street and St George's Square respectively) in addition to the east-west connectivity of Grosvenor Road, while at Location 3 there is a slight diversion required to access this north-south connectivity, to which pedestrian demand may be particularly sensitive.

The assessment to date has sought to make best use of the data currently available. In order to refine the pedestrian and cycle demand forecasts at Stage 3 additional and updated data and information will be required. This is expected to include undertaking a new questionnaire survey on Vauxhall and Chelsea bridges and travel surveys of various Nine Elms developments which have recently been completed in order to provide updated information on existing desire lines and travel patterns in the local area. Additional pedestrian and cycle counts will also be undertaken in order to provide a better indication of current pedestrian and cycle demand in the local area.

* Source: TfL screenline counts July-September 2017, two-way 12-hour flows.

Integration with Surrounding Transport Networks

The feasibility of integrating each of the proposed bridge landing locations into the existing road network and transport infrastructure has been assessed from a transport perspective. This work was undertaken to support the design studies at the identified locations and also to respond to key concerns raised in consultation with stakeholders and active travel groups, namely connectivity into existing networks and impact on existing transport infrastructure.

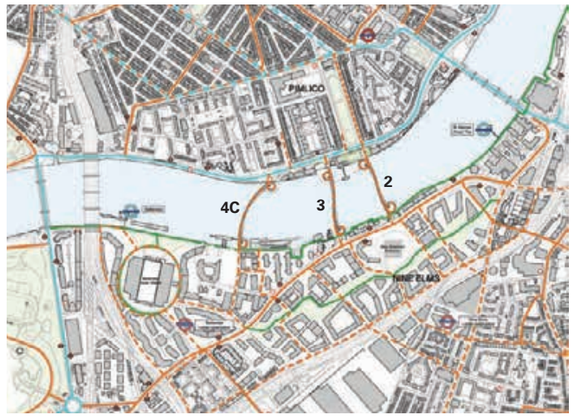
City Scale

Wider connectivity drawings have been produced which illustrate the potential for the scheme to link into the emerging cycle and active travel networks of the surrounding Boroughs and wider city, providing a key part of this new infrastructure. A flow analysis was produced based on the comparative demand assessment to illustrate predicted movements of pedestrians and cyclists using the new bridge and potential impact on surrounding streets for each of the three potential locations under investigation.

Local Scale

A series of preliminary crossing options to illustrate how the new bridge may be integrated with the existing highway network have been developed. These have been incorporated into the initial concept design layouts for each site, but will be subject to further development at later stages of the project. In consultation, TfL have suggested that they believe there is, in principle, a workable solution for integrating with the surrounding roads at each location option and that they are open to developing these final solutions with the Design Team and other key stakeholders at the next stage following selection of a preferred location.

The connectivity analysis and flow mapping for each location is detailed within the Section 6 of this report - the Location Appraisal.



Location Plan of the Nine Elms Reach of the Thames showing the three identified options with public transport and active travel connections

Transport Assessment Summary

The results of the comparative transport analysis indicate that a new bridge is forecast to generate between 6,400 and 12,400 walking and cycling trips each day (12-hour average week day), depending on location. Whilst Location 3 resulted in the highest combined demand in all tests, Locations 2 and 4C exhibited only marginally lower levels of demand. Analysis also indicates that all three locations can connect into the local and wider transport networks and provide strong local connectivity between the areas immediately north and south of the river and also onward routes and desire lines particularly south-west to north-east desire line and vice versa, but also south-north.

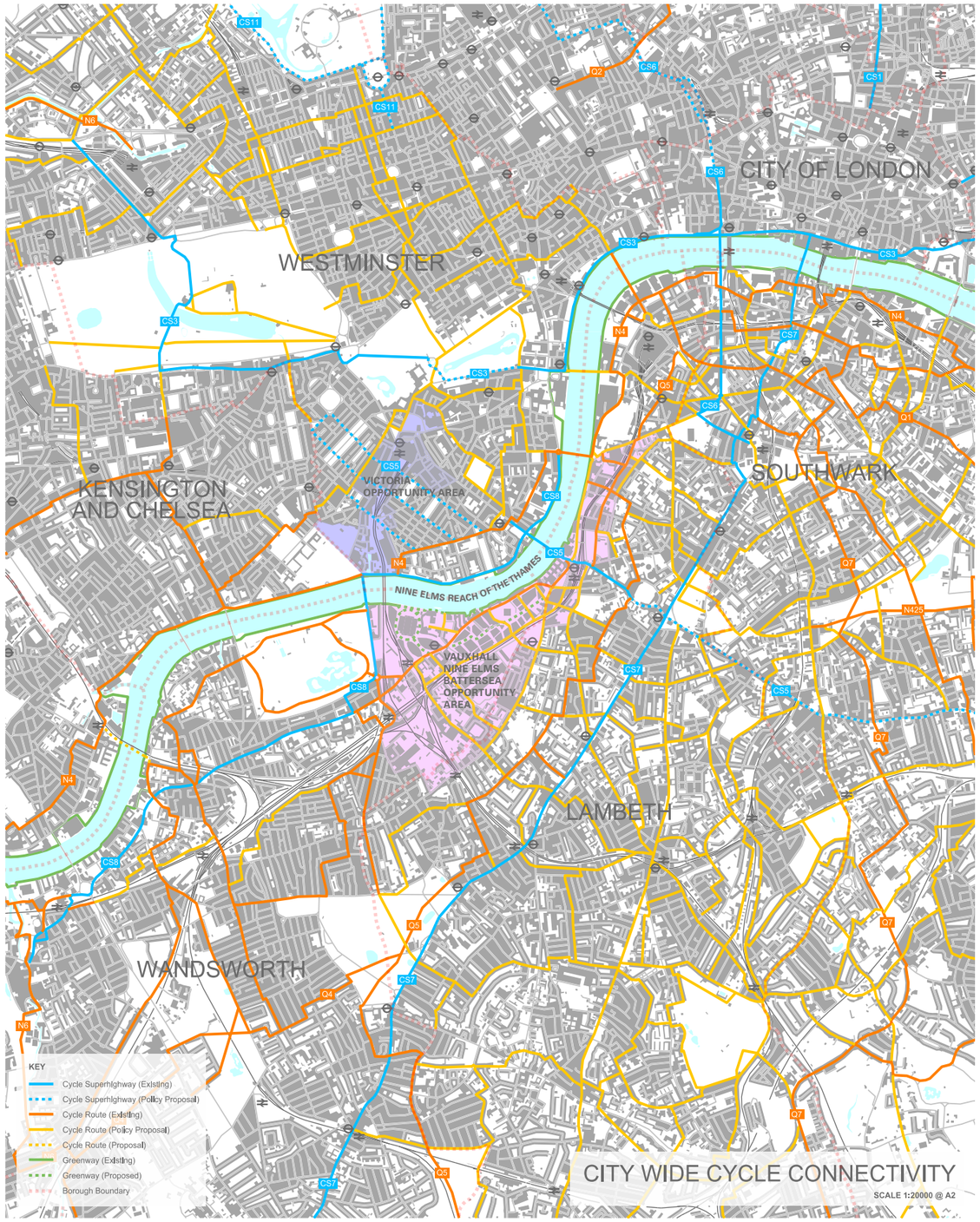
Overall, transport assessment does not provide a strong indication that any of the three potential bridge locations should be excluded from further consideration, however the findings are summarised in the matrix below and are fed into the wider location appraisal, which is contained in Section 6 of this report, and led to the recommendation of a preferred location.

Transport Assessment

KEY **Assessment**

- Very Good Opportunity / No Constraint / Fully Acheivable
- Good Opportunity / Minor Constraint / Predominantly Achievable
- Moderate Opportunity / Moderate Constraint / Mostly Achievable
- Low Opportunity / Significant Constraint / Partially Achievable
- Very Low Opportunity / Major Constraint / Not Achievable
- Not comparatively assessed at this stage

Transport Criteria	Location 2		Location 3		Location 4c	
	Comparative Assessment		Comparative Assessment		Comparative Assessment	
Technical Assessment	N	S	N	S	N	S
Local Transport Connectivity						**Good Opportunity** Feasible solutions for direct connection to transport network north and to main transport network south by link route. Links directly into BPS development area
				Good Opportunity Feasible solutions for direct connection to transport network north and south		
		Good Opportunity Feasible solutions for direct connection to transport network north and south, impact on St Georges Square				
City Wide Transport Connectivity						**Very Good / Good Opportunity** Connections supporting primary and secondary cycle and pedestrian flows to the wider city north and south. Connects to new BPS Station and under viaduct via Thessaly Road. More remote from Nine Elms Lane.
				Good Opportunity Connections supporting primary and secondary cycle and pedestrian flows to the wider city north and south. Connects well to new Nine Elms Station via Arch 42 under the viaduct.		
		Good Opportunity Connections supporting primary and secondary cycle and pedestrian flows to the wider city north and south. Connects well to new Nine Elms Station via Arch 42 under the viaduct.				
Demand						**Good** 12hr weekday combined pedestrian and cycle demand 6,400 - 10,600
				Very Good 12hr weekday combined pedestrian and cycle demand 7,800 - 12,400		
		Good 12hr weekday combined pedestrian and cycle demand 7,000 - 10,600				



Cycle Connectivity mapping showing proposed and existing routes as contained in the active travel policies of the surrounding boroughs

The initial environmental assessments of Locations 2, 3 and 4C undertaken at Stage 1 identified that with regard to ground conditions, water resources and flood risk, aquatic, terrestrial ecology, archaeology and noise there are no specific environmental constraints identified that would preclude development at these locations, subject to further detailed assessment once the design and construction methodology are fixed as well as the implementation of appropriate (standard) mitigation.

The Stage 1 investigations also highlighted some specific areas for further investigation at Stage 2 which were required to ascertain the comparative level of environmental constraint for each identified location and inform the selection of a preferred location. These Stage 2 investigations included:

Flood Wall Condition Survey

The Flood condition survey revealed that the condition of the flood wall is good on the north bank of the River Thames. However the southern side appears to have experienced more structural problems over time. This will need to be considered in the future structural design of the bridge but was not considered to be a differentiating factor between the three identified locations.

Ecology Surveys

At Stage 1 ecological studies were undertaken which considered the habitats at each of the landing locations and potential for protected species to be present. The results of this survey identified the need for further season dependent surveys in regards to bats and black redstarts to determine if they are present and pose a constraint.

The results of the bat roost assessment indicated that while Locations 3 and 4C do not have the potential to support roosting bats, there is a single storey building on the north landing of Location 2 which could. Further testing was undertaken at Location 2 including a bat emergence survey which found no evidence of bats. Therefore it was concluded that bats will not pose any current constraints on the landing locations.

Black redstart surveys identified a single singing black redstart at Battersea Power Station approximately 260m from Location 4C however it is considered unlikely, given the distance, that any of the proposed bridge location options form part of this bird's territory. Therefore no potential impacts, including disturbance, are considered likely from any of the options and confirms that in ecological terms there are no significant environmental constraints which should impact on the selection of a preferred location.

Arboricultural Impact Assessment

As set out at Stage 1, the arboricultural assessment undertaken concluded that trees on the north bank pose the greatest environmental constraint on the three locations investigated.

Each of the three options will have some impact on trees through requiring their removal or heavy pruning to enable construction of the bridge however this impact varies by location. Location 2 is the most constrained in terms of arboriculture with Locations 3 and 4C being less constrained and requiring the removal of fewer trees.

The impact assessment noted that which ever option is taken forward further detailed design of the back stays will need to be undertaken to minimise effects on trees and their root protection areas. Retained trees will likely also be a key constraint on construction activity and work space restrictions, which will require a detailed construction methodology to be developed in order to minimise any potential impacts.

Environmental Assessment Summary

Overall when combining the Stage 1 and Stage 2 environmental assessments the environmental constraints for each of the three potential locations are very similar with the main difference between the sites relating to arboriculture. Therefore in environmental terms Location 2 is the most constrained with Locations 3 and 4C less constrained.

The outcomes of the environmental assessment are summarised in the matrix opposite. This was fed into the overall location appraisal which is detailed in Section 6 of this report and led to the recommendation of a preferred location.

View across the existing Pimlico Gardens towards the proposed north landing point of Location 2

Consultation

During Stage 1 the project met with the Environment Agency (EA) and the EA subsequently provided a preliminary opinion setting out the key issues and opportunities from their perspective. This feedback was taken on board as the designs were developed and the environmental assessments were carried out during Stage 2. Further meetings were offered to the EA during Stage 2 to provide an update on the status of the project and allow them the opportunity to specifically input into the location appraisal, however this was not taken up at this stage.

Archaeological specialists at Historic England (HE) were also consulted. Whilst initial studies have not identified any significant archaeological constraint which would prevent development subject to standard mitigation, there are some minor differences in the potential constraint between the three locations. HE therefore recommended that further investigation should be undertaken at the next stage. This should include walkover surveys of the foreshore at low tide as this would help identify any risks and give a benchmark reference point for future monitoring once works are commenced and complete.

Further consultation with key environmental stakeholders will be undertaken as the project progresses.

Next Steps

It is considered likely that any application for consent for the bridge would need to be supported by an Environmental Impact Assessment (EIA) including further study to describe the likely environmental effects, as well as possible mitigation measures. An EIA would consider the effects of the construction and operation of the proposed bridge as well as the effect in combination with other developments within the surrounding area. The scope of these environmental assessments would need to be agreed with the relevant planning authorities through a formal scoping process.

Some of the surveys which would be required for a Consents Application can only be undertaken at certain times of the year. With this in mind a set of wintering bird surveys are currently ongoing and have been undertaken now in advance of the commencement of the next stage of work so as not to constrain the timing of any future Consents Application.

KEY	Assessment
	Very Good Opportunity / No Constraint / Fully Achievable
	Good Opportunity / Minor Constraint / Predominantly Achievable
	Moderate Opportunity / Moderate Constraint / Mostly Achievable
	Low Opportunity / Significant Constraint / Partially Achievable
	Very Low Opportunity / Major Constraint / Not Achievable
	Not comparatively assessed at this stage

Environmental Assessment

Environment Criteria	Location 2			Location 3			Location 4c		
	Comparative Assessment			Comparative Assessment			Comparative Assessment		
Technical Assessment	N	S		N	S		N	S	
Arboriculture			**Major Constraint** Removal of 1 to 2 high quality trees at north landing, moderate pruning of 5 high quality trees and incursions required into root protection areas. On south 1 moderate and 2 lower quality trees would need to be removed along with pruning to 2 moderate quality trees			**Moderate Constraint** Removal of low quality trees only, 1 from north and 1 to 3 trees from south landing due to the likely requirement to reduce the ground levels. Pruning of high quality tree on north landing and potential incursion of root protection areas due to the backstay.			**Moderate Constraint** Removal of 3 trees at the north landing. (2 moderate and 1 low quality) Pruning would also be required to 1 high quality and 3 moderate quality trees at north landing. No trees affected on southbank.
Archaeology			**Minor Constraint** No identified constraints to preclude development subject to appropriate (standard) mitigation			**Moderate Constraint** No identified constraints to preclude development subject to appropriate (standard) mitigation			**Minor Constraint** No identified constraints to preclude development subject to appropriate (standard) mitigation
Ground Conditions			**Moderate Constraint** No identified constraints to preclude development subject to appropriate (standard) mitigation			**Moderate Constraint** No identified constraints to preclude development subject to appropriate (standard) mitigation			**Moderate Constraint** No identified constraints to preclude development subject to appropriate (standard) mitigation
Ground Water and Flood Risk			**Minor Constraint** No identified constraints to preclude development subject to appropriate (standard) mitigation			**Moderate Constraint** No identified constraints to preclude development subject to appropriate (standard) mitigation			**Moderate Constraint** No identified constraints to preclude development subject to appropriate (standard) mitigation
Aquatic Ecology			**Minor Constraint** No identified constraints to preclude development subject to appropriate (standard) mitigation			**Minor Constraint** No identified constraints to preclude development subject to appropriate (standard) mitigation			**Minor Constraint** No identified constraints to preclude development subject to appropriate (standard) mitigation
Terrestrial Ecology			**Minor Constraint** No identified constraints to preclude development subject to appropriate (standard) mitigation			**Minor Constraint** No identified constraints to preclude development subject to appropriate (standard) mitigation			**Minor Constraint** No identified constraints to preclude development subject to appropriate (standard) mitigation
Noise			**Moderate Constraint** No identified constraints to preclude development subject to appropriate (standard) mitigation			**Minor Constraint** No identified constraints to preclude development subject to appropriate (standard) mitigation			**Minor Constraint** No identified constraints to preclude development subject to appropriate (standard) mitigation

4.7 Planning

Planning Policy Review

The proposed Nine Elms Pimlico Bridge benefits from broad policy support across the Development Plan at strategic and local level. The Development Plan comprises the National Planning Policy Framework at national level, the London Plan at regional level, and London Borough of Wandsworth's Local Plan and Westminster City Council's City Plan in Wandsworth and Westminster respectively.

The Draft London Plan aims to encourage walking and increase the number of cyclists in London by providing safe and attractive routes which are easy to navigate. Policy 6.4 (Enhancing London's Transport Connectivity) is most pertinent to the bridge and states that the Mayor will seek to increase public transport capacity by providing new river crossings.

The Draft London Plan, which is anticipated to be adopted in late 2019 continues this support, particularly through Policy T3 (Transport capacity, connectivity and safeguarding) and Table 10.1, which identifies the bridge as a low-cost future transport scheme for the capital with a timescale of delivery between 2020-2030.

The Nine Elms Pimlico Bridge is also supported by the Mayor's Transport Strategy which places a strong emphasis on changing the transport mix towards walking, cycling and public transport and supports the notion of 'good growth', allowing transport to play a fundamental role in the growth of London's economy.

The London Borough of Wandsworth's local plan offers broad policy support, and is supported by the Vauxhall Nine Elms Battersea Opportunity Area Planning Framework (VNEB OAPF). The bridge is identified in the OAPF as part of the package of transport and connectivity improvements required to support the developments in the VNEB Opportunity Area which is fast becoming central London's newest business, residential and leisure district.

Westminster's draft City Plan, which Westminster are seeking to adopt in 2019 also contains a number of objectives which are in line with the aims of the Nine Elms Pimlico Bridge, including providing a healthier greener city, improved connectivity, encouraging active travel and enhancing mobility.

However the draft City Plan also provides a potential policy constraint as policy 29 has a presumption against the principle of any new bridges across the Thames, unless compelling evidence is provided to demonstrate the demand for the bridge. Furthermore draft policy 7, addressing neighbourly development may also present constraints in terms of impacts on neighbouring amenity. London Borough of Wandsworth have submitted representations to the consultation with feedback on these policies in respect of the bridge.

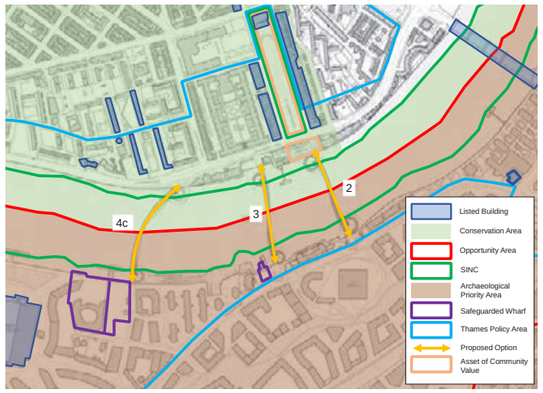
Planning Assessment of Locations

As part of the assessment undertaken at Stage 2 the relative constraints and opportunities of each of the identified locations was considered against the background of the planning policy context.

Locations 2 and 3 were seen to have clear merits in terms of their location, particularly Location 2 which is well placed strategically and would connect a prominent site adjacent to the US Embassy to Pimlico Gardens. It was felt this would create a desirable landing location, with St George's Square providing a legible and attractive route northwards towards north Pimlico, Victoria and beyond. However, the assessment also identified a high level of policy constraint with both Locations 2 and 3.

Location 2, in particular, is within the vicinity of a number of heritage assets and St George's Square and Pimlico Gardens are designated as an Asset of Community Value. Furthermore St George's Square is allocated as a Site of Importance for Nature Conservation which would be a material consideration in any Consents Application. Pimlico Gardens also contains a number of protected trees which are considered to be of high amenity value and add to this constraint.

As noted above, Westminster City Council's draft City Plan introduces a new policy on neighbourly development. This is a holistic requirement for all proposals to consider impacts on amenity and the environment. This policy will likely be applicable to any of the options, however Location 2 is likely to be most constrained given Westminster residents have most concern about potential impacts at this location.



Planning constraints plan illustrating significant site designation applicable to the identified potential landing options

At Location 3 Dolphin Square is subject to an ongoing planning application for refurbishment and extension which is understood to include an ambition to open up the courtyard space to public access. However the potential impacts on residents and residential amenity are still felt to be a considerable policy constraint to Location 3 which lands adjacent to the development. Similarly the proximity of the safeguarded Middle Wharf to the southern landing would also provide a key policy constraint to this site.

Like the other sites, the northern landing of Location 4C is located in a Conservation Area and in close proximity to a number of heritage assets. However, it is considered that a bridge at this location could enhance the townscape, the setting of the conservation area and surrounding listed buildings including Churchill Gardens and Battersea Power Station.

The northern landing of Location 4C is close to Claverton Street which can provide a strong direct pedestrian and cycle route northwards towards the Victoria Opportunity Area in Westminster. Like the other locations, there will likely be impact on protected trees at this location, however it is expected to be lower than at Location 2. Similarly the impact on residential amenity is potentially lower at this location, and is likely to be considered more neighbourly in light of the draft new Westminster City Plan's policies than Locations 2 and 3.

The southern landing of Location 4C is located adjacent to the safeguarded Kirtling Wharf and Cringle Dock which will be a key consideration if this option is progressed. However the landing site is well positioned landing close to Battersea Power Station at the heart of the VNEB Opportunity Area allowing permeability southwards towards Nine Elms Lane and beyond.

Overall from the perspective of planning policy and constraint Location 4C is recommended as the preferred location. This analysis is summarised in the matrix below and then feeds into the wider location appraisal contained in Section 6 of this Report.

Next Steps - Statutory Consents Process

A new bridge would require full planning permission as it constitutes development together with additional consents including a Marine Licence, River Works Licence and Flood Defence Licence.

The statutory consents strategy for the project has not yet been determined, with options including:

- The concurrent submission of two planning applications to Wandsworth and Westminster Councils
- An application for an Order under the Transport Works Act 1992 (TWAO)

There may be benefits to the TWAO route, such as the potential to incorporate powers for land acquisition and additional consents in a single application. However, it is likely the TWAO process would take longer and be subject to additional costs. It has been recommended that both options should be considered in more detail during the next stage including obtaining specialist legal advice.

KEY **Assessment**

- Very Good Opportunity / No Constraint / Fully Acheivable
- Good Opportunity / Minor Constarint / Predominantly Achievable
- Moderate Opportunity / Moderate Constraint / Mostly Acheivable
- Low Opportunity / Significant Constraint / Partially Achievable
- Very Low Opportunity / Major Constraint / Not Achievable
- Not comparatively assessed at this stage

Planning Assessment

Planning Criteria	Location 2 Comparative Assessment			Location 3 Comparative Assessment			Location 4c Comparative Assessment		
Technical Assessment	N	S		N	S		N	S	
Impact on Residential Amenity			**Moderate Constraint** Bridge landing and flow of users likely to impact some neighbouring residences north and south of the river.			**Moderate Constraint** Bridge landing and flow of users likely to impact some neighbouring residences north and south of the river.			**Minor Constraint** Lesser impact on existing residences, although some impact on houseboat residents at western end of Nine Elms Pier.
Relationship to non-residential uses			**Good Opportunity** Employment, retail and leisure opportunities in the Victoria and central VNEB opportunity areas.			**Moderate Opportunity** Employment, retail and leisure opportunities in the Victoria and central VNEB opportunity areas.			**Good Opportunity** Employment, retail and leisure opportunities in the Victoria and western end of the VNEB opportunity areas, particularly Battersea Power Station.
Planning Policy			**Significant Constraint** Meets strategic policies but with local planning policy constraints, particulary to the north			**Significant Constraint** Meets strategic policies but with local planning policy constraints to the north and south.			**Moderate Constraint** Meets strategic policies but with local planning policy constraints to the north and south, however lowest constraint of the north landings.
Ability to Meet Objectives									
Maximise planning acceptability			**Partially Achievable** Meets strategic policies but local planning constraints at this location are the highest risk for consents acceptance.			**Mostly Achievable** Meets strategic policies but local planning constraints at this location are a risk for consents acceptance.			**Predominently Achievable** Meets strategic policies. Local planning constraints and risk for consents acceptance are lowest at this location. Opportunity to develop planning policy to the south.

4.8 Deliverability

Cost

The Transport for London Feasibility Study (2013) suggested that construction of the bridge would cost around £40m (in 2013 prices), providing a car-free alternative to Vauxhall or Chelsea Bridges.

The three location options identified for further investigation have been reviewed in light of the latest information from the design team to give a revised construction cost of between £39.2m to £41.6m (in 2013 prices) depending on the final location of the bridge as summarised below:

Element	Location 2	Location 3	Location 4C
Substructure	£6.0m	£6.1m	£6.0m
Superstructure	£9.9m	£10.0m	£10.6m
Finishes and Services	£1.9m	£1.9m	£2.0m
Landings	£7.8m	£7.8m	£7.8m
Net Construction Cost	**£25.6m**	**£25.8m**	**£26.4m**
Preliminaries & Overheads and Profit	£7.1m	£7.5m	£8.3m
Contingencies	£6.5m	£8.3m	£6.9m
Construction Cost (2013 prices)	**£39.2m**	**£41.6m**	**£41.6m**

NB: All figures rounded to £0.1m

Exclusions

1 Inflation beyond 2013. Contract assumes a notional one day contract
2 Site acquisition and associated costs including land, agents, legal fees
3 Site investigation costs
4 Abnormal ground conditions, including consequential works and significant level of imported filling or removal of excavated material from site
5 Effect of discovery of archaeological artefacts or other antiquities, leading to delayed start
6 Allowance for extensive / specialist external works beyond immediate landing points
7 Finance charges
8 VAT
9 Compensation to adjoining owners
10 Landscaping outside a notional 500m2 zone to each landing
11 Transport
12 Utilities diversion, reinforcement and abnormal connection charges
13 Phasing of works
14 Other third party costs
15 Ecology requirements - protected species etc.
16 Section 106 and 278 contributions
17 Road closure costs
18 Temporary access requirements
19 Provision of off-site consolidation centre
20 Artwork
21 Wind deflection
22 Utilities and routes across bridge for third parties

The scheme is at a concept stage, with the Design Team's efforts focussed on the wider issues surrounding location of the bridge rather than the detailed design of the final engineering solution.

Multiple options for design and construction are still under consideration at this stage which could all impact upon cost, for example the costs above assume the use of a dolphin pile and boom solution for impact protection, whereas the telescopic pile solution which is also being considered would be substantially higher.

The final cost will be confirmed as the design solution is developed, however this preliminary analysis shows that the spread of construction cost between the three locations is relatively narrow, at approximately 5%, and is therefore not considered to be a major diferentiating factor when it comes to choosing the recomended location.

Risks are fairly consistent across the options, albeit that the structural engineer has flagged up the risk in construction is higher for the south side of Location 3 where the project interfaces with the Thames Tideway Tunnel and other utilities and the increased extent of in-river work associated with Location 4C (for which allowance has been made above).

Further cost analysis will be undertaken in the subsequent stages of the project, for example analysis will be undertaken on the whole life costs of the project. This will include looking at the costs of future maintenance and how best to balance out the capital costs against future maintenance costs so that value for money over the whole lifecycle of the bridge can be achieved.

Selection of the preferred location will enable a site specific detailed design and engineering solution to be developed. On this basis construction costs can be more accurately determined and incorporated into an overall deliverability strategy along with a project programme and detailed strategies for consents, procurement, construction and funding.

Business Case

The Transport for London (TfL) Feasibility Study (2013) established a strong case for a pedestrian and cycle crossing between the existing Vauxhall and Chelsea Bridges and included an initial assessment of the business case. During Stage 2 the Team have conducted an initial review of this Outline Business Case.

The aim of the review was to update the assessment according to any changes in guidance, methodology or input variables since the Outline Business Case was prepared in 2013. This was then applied to each option to understand the potential impact on the relative business case for each and establish if it was likely to be a differentiating factor in selecting a preferred location. The review also aimed to identify any significant gaps and limitations of the assessment and start to outline the next steps for any further business case analysis.

The initial comparative review of the economic benefits assessment highlighted that a number of changes have occurred since 2013 to the assumptions/parameters which form the basis of such assessments, including forecast demand, values of time, accident savings, ambience benefits, fuel consumption parameters, health and absenteeism benefits.

The comparative assessment identified broadly similar benefits for each of the location options, within a range of approximately 10% and therefore suggests this is unlikely to be a major differentiating factor when it comes to choosing the preferred location.

Whilst there is no statutory requirement to complete a Business Case for a project like this, there may be particular internal requirements of for example the promoter, funders or key stakeholders which mean that a Business Case is required or that a particular methodology should be employed.

As a key part of the initial review, consultation was undertaken with the TfL Team working on the Rotherhithe Canary Wharf Crossing which is a similar pedestrian and cycle crossing currently proposed for east London. There are some differences between the projects which are location and context specific, for example where the potential benefits would be derived from and how these relate to scheme objectives. However the consultation identified there was general alignment between the projects in terms of the approach and methodology being used and proposed for both transport demand modelling and business case analysis.

Further refining the case for the Bridge has been identified during stakeholder engagement as a key priority, particularly in relation to the emerging Westminster City Council planning policy, and it is recommended that a business case is developed for the chosen location which aligns with agreed approaches for other similar projects.

In any work going forward, it will be necessary to make best use of all available tools and processes to support any future assessment. During the consultation TfL recommended that any future work:

- Follow and be consistent with the Department for Transport's WebTAG guidance and TfL's Business Case Development Manual;
- Use London values of time, which are accepted by the Department for Transport in calculating journey time benefits, as part of a sensitivity test or potentially the core assessment;
- Follow the five case Business Case approach in future work, including:
    - Economic case - ensuring the full range of benefits are incorporated in the appraisal, including health and wider impacts (ranging from impacts on land value and developer confidence to monetised wider economic impacts);
    - Strategic Case - including demonstrating alignment with Strategic Policy objectives such as the Vauxhall Nine Elms Battersea Opportunity Area Planning Framework, Draft London Plan, Mayor's Transport Strategy, the Healthy Streets and Healthy People Agendas;
    - Financial Case - including funding and financing options and role of developer contributions;
    - Commercial Case - including procurement options, who will promote the scheme and take it forward;
    - Management Case - including Statutory Consents route, governance, assurance, programme and communication and stakeholder management.

If this approach was adopted, the next step would be the development of an Appraisal Specification Report which would set out the methodology and scope for further appraisal.

4.8 Deliverability

Land Ownership

It was highlighted during Stage 1 of the project that land ownership may prove to be a significant constraint or opportunity for the development and that it may be a critical factor in the selection of the preferred location, the deliverability of the scheme, and determining the preferred planning route.

At Stage 2 Savills have undertaken a set of comparative land ownership and land valuation studies on the proposed locations to inform the wider location appraisal.

Savills' analysis established that each of the proposed landing sites is in multiple ownerships. The owners of the land that would be required by each of the landing sites were made aware of the consultation during this stage of work and invited to meet.

It is important to account for land ownership during the site selection process. If the dual planning application strategy is adopted, a planning permission on a site where the owner is unwilling to sell or surrender the land, could lead to complications and may require a Compulsory Purchase Order, or pursuit of the Transport Works Act Order route.

Savills have made an initial assessment of the relative costs to secure the land required both in the permanent and temporary condition during construction activities which indicated that the relative difference between each landing site for land acquisition is within a range of 10% and the uplift in values is within a range of 40% indicating that land valuation may not, at this stage, be considered to be a major differentiating factor in the selection of a preferred location.

Programme

The timeline for the project is indicative and will be subject to a range of factors, including receipt of necessary consents, further engagement with key stakeholders and coordination with other proposed development in the area. For example, construction of the bridge could not commence until after the completion of the Thames Tideway works which is expected in 2021.

The indicative future timeline for the project is as follows:

- 2019 - Developed Design
- 2020 - Target Consents Application
- 2022 - Target Construction Start
- 2024 - Target Completion

A key next step for the project will be the production of an outline programme addressing the constraints surrounding the proposed landings of the preferred location. This will overlay the project timetable with the timetable for other proposed developments surrounding the site including Thames Tideway, Battersea Power Station and Nine Elms Lane. Production of an outline programme will help allow the development of an integrated solution and help make sure that if the project is taken forward the opportunity for placemaking, particularly at the southern side, is not lost.

Deliverability Assessment Summary

Overall the analysis has indicated that cost should not, at this stage, be considered to be a major diferentiating factor when it comes to choosing the recomended location as the spread of cost between the three locations is relatively narrow, at approximately 5%. Similarly the relative difference between each landing site for land acquisition is also predicted to be similar across the options and within a range of 10%. However there are some notable differences between the three locations in terms of the higher identified construction risk at Location 3. The key outcomes of the deliverability assessment are summarised in the matrix below.

KEY Assessment

- Very Good Opportunity / No Constraint / Fully Acheivable
- Good Opportunity / Minor Constarint / Predominantly Achievable
- Moderate Opportunity / Moderate Constraint / Mostly Acheivable
- Low Opportunity / Significant Constraint / Partially Achievable
- Very Low Opportunity / Major Constraint / Not Achievable
- Not comparatively assessed at this stage

Deliverability Assessment

Deliverability Criteria	Location 2			Location 3			Location 4c		
	Comparative Assessment			Comparative Assessment			Comparative Assessment		
Technical Assessment	N	S		N	S		N	S	
Land Ownership			**Significant Constraint** Land ownership at north landing location represents a significant contraint.			**Significant Constraint** Land ownership at north landing location represents a significant contraint.			**Moderate Constraint** Some landowners have indiciated support thus far. Constraint is less at this north landing than at the other locations .
Ability to Meet Objectives									
Cost			**Predominantly Acheivable** Not identified as a major differentiating factor at this stage. Construction cost estimate (2013 prices) of £39.2 Million.			**Mostly Acheivable** Not identified as a major differentiating factor at this stage, but slightly higher construction risk Construction cost estimate (2013 prices) of £41.6 Million.			**Predominantly Acheivable** Not identified as a major differentiating factor at this stage. Construction cost estimate (2013 prices) of £41.6 Million.

All the technical analyses completed at this stage and detailed in this chapter have been undertaken in consultation with key stakeholders and local communities. This engagement is described in the following section. The findings from all the technical assessments and consultation were then fed into the wider location appraisal which is contained in Section 6 of this report, and led to the recommendation of a preferred location.

5.0 Consultation

5.1 Public Consultation

The project is being progressed in a collaborative way, in consultation with key stakeholders and local communities building upon the positive engagement undertaken to date.

A consultation programme, undertaken during autumn 2018 was designed to engage as widely as possible with the local community and key stakeholders to explain the project status and get feedback on the three location options identified for further investigation.

Engagement is particularly important at this stage as the input of stakeholders and local communities is crucial to inform the identification of a preferred location.

A series of public exhibitions and meetings with local residents, political stakeholders and statutory consultees have allowed stakeholders the opportunity to input into the process and the key outcomes of this engagement is outlined in the following pages.

Public Consultation

The Design Team carried out public consultation from 3rd - 19th November 2018. Five public exhibitions were held on both the north and south banks of the river to engage with local communities and stakeholders and provide an update on the project, including the need for a bridge, current location options and the technical and feasibility work being undertaken. All of the material available at the exhibitions was also made available online on the project website, together with the opportunity to submit feedback via an online form.

- The public exhibitions were held in Wandsworth on 3rd and 7th November, Lambeth on 6th November and Westminster on 9th and 10th November to engage with local communities and stakeholders.
- Invitation flyers promoting the events were distributed to approximately 45,000 households and local businesses in Westminster, Wandsworth and Lambeth. Invitation flyers were also issued directly to key local and London wide stakeholders and the consultation was also publicised via press, social media and dedicated website.
- Overall approximately 340 people attended the exhibitions including local residents, politicians, members of local amenity groups and residents' associations, together with attendees from local and wider groups such as Wandsworth Living Streets.
- Members of the Design Team were in attendance to explain the information, answer questions and gather feedback.
- The exhibition consisted of a set of 10 information panels; these included the background to the project, details of the three possible locations under investigation and outlined the consultation process and project timeline. Visuals were included to show the options in context and key facts including the comparative demand forecast.
- The exhibition also included a physical model to show the alternative options in the urban context and a second larger scale concept design model which was used to help demonstrate the potential visual appearance and user experience of the bridge.
- All visitors were encouraged to leave their views via a feedback form. A straw poll was used at the exhibition to engage visitors in the process of selecting a preferred location, however, the results of the consultation process are taken exclusively from the formal feedback forms submitted.
- The feedback form could be completed at the exhibition, returned via Freepost or completed online. Questions sought to understand the views on the location options, as well as to collect demographic and contact information to help analyse the feedback and enable future contact and engagement.
- The online consultation platform contained copies of the information panels displayed at the public exhibitions as well as an online version of the questionnaire. The dedicated website was updated with a link to the online consultation platform.
- Overall 783 feedback forms were received including 533 completed online and 250 at the 5 days of exhibitions.

Outcomes of Public Consultation

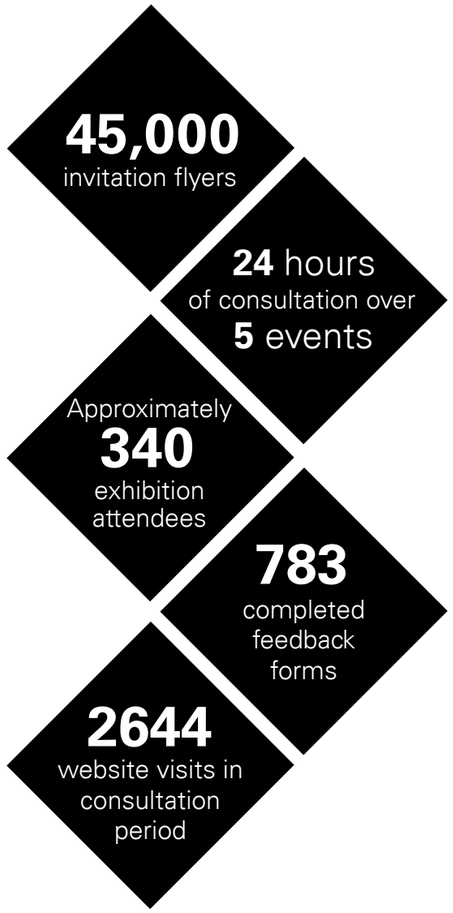
The exhibitions provided the opportunity for the Design Team to engage directly with the public and attendees were generally open and interested in discussing both the principle of a bridge and potential locations.

Feedback received during the consultation from stakeholders and the public has been used to inform the appraisal of possible crossing points and formed a crucial part of the assessment leading to the recommendation of a preferred location.

The outcomes of the public consultation are set out below and on the following pages, but in summary whilst the public consultation confirmed some local opposition on both sides of the river and particularly amongst some Pimlico residents, evidence of significant support for the project on both sides of the river was also established.

Since the previous consultation it was notable that people who engaged on the north seemed to be increasingly aware of the opportunities emerging in Nine Elms and recognised the key benefits better connectivity to the area will bring.

Support and opposition varied across the options and by borough, however, Location 2 had the most opposition with concern expressed at potential impact on Pimlico Gardens and St George's Square, and overall, Location 4C was the preferred option demonstrating a net positive support from all respondents.



Key Outcomes of Public Consultation

- **Location 4C was the most supported location for a bridge.**
- **Support and opposition for all locations was shown both north and south of the river, however Location 4C had clear net support.**
- **The most likely mode of use for a bridge was walking, followed by cycling.**
- **Key design issues for future consideration in the next stage were raised, irrespective of location preference including:**
  - **accessibility and safety;**
  - **integration with transport networks;**
  - **impact on residents and amenity;**
  - **cost and funding.**

Westminster Public Exhibition

5.1 Public Consultation

Public Exhibitions were held in Wandsworth, Westminster and Lambeth and the key outcomes from consultation both north and south of the river are set out below:

Feedback from Consultation North of the River

- Support and opposition was identified for all three location options in Westminster.
- Preservation of Pimlico Gardens and the residential character of Pimlico were key issues raised.
- Concern about the possible negative impact of cyclists on residential streets and on the junction with Grosvenor Road.
- Location 4C was the preferred location and the one most positively engaged with at Westminster exhibitions.
- Increasing awareness of opportunities emerging at Nine Elms and recognition of some of the key benefits of connecting to this area.

Feedback from Consultation South of the River

- Support and opposition was identified for all three location options.
- Net support for all three location options indicates recognition of the benefits of a bridge at any location.
- Location 4C was the preferred location of consultation respondents in Wandsworth, and Location 2 the preference in Lambeth.
- Supportive of new and improved infrastructure for pedestrians and cyclists, notably for the existing route along Thessaly Road.
- Concerns and some opposition based on the cost and funding of the bridge.
- Some Nine Elms Pier residents opposed all the potential options and particularly Location 4C, although others were supportive.

In the public consultation period, visitors to the exhibitions and project website were able to provide their comments on the three location options and indicate their level of support or opposition for each. The results of this feedback for each location are compared below and have provided input to the recommendation of a preferred location.

Location 2 feedback

Location 2 was the least supported of the three locations in public consultation. Feedback for this location showed 'Strongly opposed' was the most frequent response given. Considering the total levels of opposition and support shown, there is net opposition towards Location 2.

- Most respondents opposed the location due to the perceived impacts on Pimlico Gardens and St George's Square.
- Concern about possible impacts on Westminster Boating Base.
- Supported due to quickest crossing with good connections to the US Embassy and surrounding Embassy Gardens development.
- Although the least supported location by Westminster and Wandsworth respondents, Location 2 was the preference of respondents in Lambeth, with strong majority support.

Location 3 feedback

Levels of support and opposition for Location 3 are more balanced than for Location 2. Although 'strongly opposed' was also the most common response for this location, the net levels of support and opposition from respondents feedback were very close.

- Opposed locally due to perceived impacts on Dolphin Square.
- Concern about potential negative impact on traffic congestion on Grosvenor Road.
- Supported due to connectivity, central location between Vauxhall and Chelsea bridges and benefits for Riverlight and Embassy Gardens residents.
- Location 3 was the second most supported location by respondents in Westminster, Wandsworth and Lambeth.

Location 4C feedback

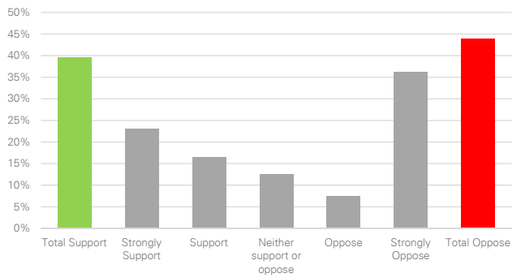
Contrary to Locations 2 and 3, the most common Location 4C feedback response was 'strongly support'. Public consultation shows net support for Location 4C, with the greatest difference between the total support and opposition levels.

- Most supported and least opposed of the three locations, with overall net support.
- Supported due to improved access to Battersea Power Station, connections to transport links, minimal impact on riverbank landings and a positive relationship with employment and amenities including retail, leisure and transport.
- Some opposition was due to the perceived close proximity to Chelsea Bridge and benefit focussed towards the western end of the Nine Elms reach.
- Location 4C was the most supported location in Wandsworth and Westminster, although still with net opposition in Westminster. Strong net support in Wandsworth and Lambeth, although it is the least preferred option of the respondents from Lambeth.

In comparing the levels of total support and opposition for each location, the trend in the order of preference amongst the public consulted is clear. Location 4C was most supported, followed by Location 3, with Location 2 least supported.

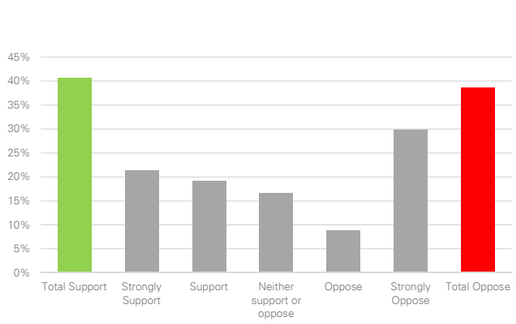
Location 2

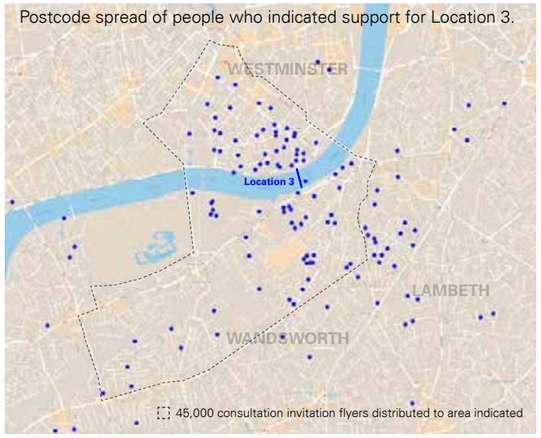
- **39%** of the public feedback received indicated support for Location 2



Location 3

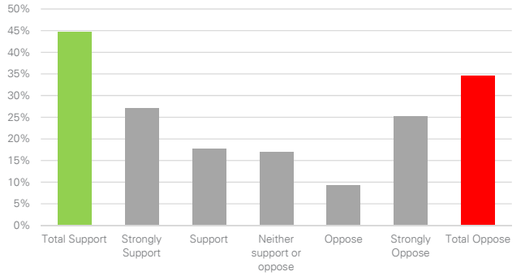
- **40%** of the public feedback received indicated support for Location 3

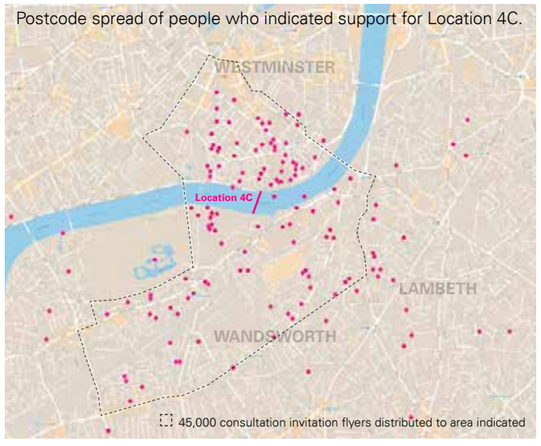




Location 4C

- **45%** of the public feedback received indicated support for Location 4C





5.2 Stakeholder Engagement

Key stakeholders made aware of consultation and offered a meeting at Stage 2		
Statutory Consultees		
London Borough of Wandsworth	Westminster City Council	London Borough of Lambeth
Greater London Authority	Environment Agency	Historic England
Port of London Authority	Thames Tideway	Transport for London
Politicians		
Westminster Council Leader	Lambeth Council Leader	London Deputy Mayor Planning Regeneration and Skills
Wandsworth Queenstown Ward Councillors	Westminster Churchill Ward Councillors	Westminster Tachbrook Ward Councillors
Westminster Warwick Ward Councillors		
Local Organisations (Wandsworth and Lambeth)		
Battersea Park Business Association	Battersea and Wandsworth Trades Union Council	Battersea Society
Carey Gardens Co-operative	Chelsea Bridge Wharf Residents' Association	Chancery Building Embassy Gardens Residents' Associations
Doddington and Rollo Estate Residents' Association	Doddington West Residents' Association	Elm Quay Court Residents' Association
Embassy Gardens Residents' Association	Friends of the Tate South Lambeth Library	Kennington, Oval and Vauxhall Forum
Lambeth Cycling Campaign	Nine Elms Pier residents	Oval Partnership
Patmore Co-operative	Riverlight Residents' Association	Riverside Court Residents' Association
Savona Residents' Association	St George Wharf Residents' Association	The Patmore Co-operative
Vauxhall Gardens Estate Residents' and Tenants' Association	Vauxhall Society	Viridian Residents' Association
Wandsworth Chamber of Commerce	Wandsworth Cycling Campaign	Wandsworth Living Streets
Local Organisations (Westminster)		
Abbots Manor Tenants' Association	Belgravia Residents' Association	Churchill Gardens Residents' Association
Dolphin Square	Eccleston Square Residents' Association	Federation of Pimlico Residents' Associations
Gatliff Close Residents' Association	Russell House Residents' Association	Semley House Residents' Association
St George's Square Pimlico Residents' Association	The Thorney Island Society	Westminster Boating Base
Westminster Cycling Campaign	Westminster Society	Westmoreland Triangle Residents' Association
Wider Organisations		
British Cycling	Campaign For Better Transport	Centre for London
Clean Air in London	Cycle Embassy of Great Britain	Cycle London City blog
Cycling UK	Cycling Works	Future of London
Living Streets	London Living Streets	London Cycling Campaign
London First	New London Architecture	River Thames Society
Sustrans	Tate	The Future Fox
The Ramblers	Transport for All	Wheels for Wellbeing
Local Landowners and Developers		
Ballymore	Barratt	Battersea Power Station
Bellway	Berkeley Group	Covent Garden Market Authority
CLS Holdings	FLO	Fraser Property
Penguin Random House	L&Q	Sainsbury's
Sir Robert McAlpine	St. James (Berkeley)	St. Modwen
Taylor Wimpey	US Embassy	Vinci Construction
R&F	UK National Grid	Westbrook Partners

Other key stakeholders made aware of consultation at Stage 2 included:		
Wandsworth Councillors	Westminster Councillors	Lambeth Councillors
London Borough of Hammersmith and Fulham Senior Councillors	Royal Borough of Kensington and Chelsea Senior Councillors	MP for Battersea
MP for Chelsea and Fulham	MP for Cities of London and Westminster	MP for Hammersmith
MP for Putney, Roehampton and Southfields	MP for Tooting	MP for Vauxhall
Local London Assembly Members	London Deputy Mayor for Transport	London Walking and Cycling Commissioner
Canal and Rivers Trust	Crown Estates	Cross River Partnership
Department for Transport	Highways Agency	Marine Management Organisation
Natural England	Network Rail	River Thames Society
Thames Central Open Spaces	Twentieth Century Society	Victorian Society
Local Residents	Local Businesses	Local Schools
Local Charities	Professional Instituitions	

The exhibitions described on the previous page, formed part of a wider and on-going programme of consultation and engagement with community and statutory stakeholders, which has been crucial at this stage to feed into the identification of a preferred location for the crossing.

Local communities and stakeholders from across London were made aware of the consultation. In addition to this, certain key stakeholders for the project, including local residents' associations, community representatives, amenity organisations, political stakeholders, active travel groups, potential users and statutory consultees were also offered further consultation meetings.

Stakeholder Engagement

Engagement was undertaken with local authorities, statutory consultees and other stakeholders who took up the offer of further more detailed engagement to update them on the status of the project, to understand their key technical requirements which could be fed into the concept designs, and to offer them the opportunity to input directly into the location appraisal.

At these meetings the background to the proposals was presented, followed by a detailed exploration of each of the three location options. This engagement allowed for more detailed discussions with a focus on gathering further feedback on the three location options under consideration to feed into the location appraisal.

A summary of the feedback received from key stakeholders during the Stage 2 consultation is provided below. The detailed responses received from stakeholders in engagement meetings is condensed into this brief summary, however, the full stakeholder responses have been used for analysis purposes, and are referenced in the location appraisal and fed into the recommendation for a preferred location.

The consultation with key stakeholders at Stage 2 confirmed that:

- The proposals are considered to be supported in strategic planning terms identified in the Draft London Plan and Vauxhall Nine Elms Battersea Opportunity Area Planning Framework;
- The proposals are considered to be in line with the pedestrian and cycling policies of the surrounding local authorities and the Greater London Authority contributing to the shared objectives of creating healthy streets and encouraging safe, sustainable transport methods;
- The proposals would likely be able to integrate well with the surrounding existing and proposed walking and cycling networks, both at a local and more strategic scale;
- The proposal was thought to be able to deliver benefits to the surrounding local communities;
- It is feasible to design a bridge at any of the three identified locations that will meet the functional and technical requirements of the relevant controlling authorities;

- All three locations were likely to able to meet the identified requirements of the Port of London Authority and river users. However, Locations 3 and 4C were considered to be more constrained than Location 2 due to their proximity to safeguarded wharfs. Further consultation is required at the next stage to ensure impacts on the river are minimised;
- There is, in principle, a workable solution for integrating with the surrounding roads and wider transport networks at each location option. However these final solutions will need further detailed development with key stakeholders at the next stage following selection of a preferred location;
- All three proposed locations are feasible with respect to the Thames Tideway Tunnel, given that they can in principle meet the Tideway Safeguarding Guidelines for Developers and Local Planning Authorities. Further engagement will be required with Thames Tideway regarding the developed design and respective project programme;
- Westminster City Council Leadership and Members remain opposed to the proposals for a new river crossing. Planning officers require further information on the transport case for the bridge, and the benefits and impacts for Westminster residents;
- Location 2 is considered to be marginally more sensitive in heritage terms than either Location 3 or Location 4C, however, the likely heritage impacts should not prevent development at any of the identified locations, subject to sensitive design and reasoning;
- Locations 2 and 3 were seen to have strong and similar strategic transport benefits connecting well into the wider city;
- Location 4C was considered to offer a strategic benefit as a connection into the heart of the new Opportunity Area and emerging town centre around Battersea Power Station, leading to it being the preferred location by some stakeholders, including Battersea Power Station;
- Location 4C was considered likely to have the least impact on existing open space/public realm leading to it being preferred by some stakeholders;
- Close collaboration would be required in future stages for all locations to mitigate against any potential impacts on Westminster Boating Base operations. Engagement with Westminster Boating Base representatives was undertaken at the exhibitions and additional meetings were offered but not taken up at this stage;
- Strong support was identified in meetings with some local residents associations. This included a meeting with Embassy Gardens Residents Association to which they also invited residents of Embassy Gardens, Chancery Building Embassy Gardens and Riverlight;
- Some Nine Elms Pier residents opposed all the identified options and particularly Location 4C due to its proximity to the Pier and potential impact on the houseboat community. Other residents were however more supportive. Engagement with Pier residents was undertaken at the exhibitions and additional meetings were offered but not taken up at this stage. Further engagement will be required at future stages to ensure any impacts on residents are minimised;
- Active travel groups generally expressed strong support for the proposals both at the exhibitions and in social media on-line, including for example Wandsworth Living Streets, members of the London Cycling Campaign and Ramblers;
- Proposals going forward will need to be carefully programmed with other surrounding proposed developments including Thames Tideway Tunnel, Nine Elms Lane improvements and Battersea Power Station Phase 7 to help the development of an integrated solution and make sure that the opportunity for placemaking, particularly at the southern side is not lost;

Overall the public exhibitions and meetings with key stakeholders have resulted in a positive round of consultation directly informing the site location appraisals, and which have had a significant bearing on the recommendation for a preferred location.

Next Steps

The project will continue to engage and consult with stakeholders and local communities as the site specific design is developed to address the challenges which need further detailed investigation. This may include, for example,

- Continued engagement with surrounding Local Authorities and Greater London Authority to ensure the project can meet their policy requirements and feed into their strategic aspirations for the area;
- Continued engagement with key stakeholders to ensure the proposals can meet their requirements;
- Working directly with river users and controlling authorities to mitigate any impact on operations, particularly at Safeguarded Wharves and on Westminster Boating Base;
- Continued consultation with local communities including Nine Elms Pier residents to ensure any impacts can be minimised;
- Close collaboration with surrounding landowners and developers to ensure the proposals can integrate with emerging surrounding developments, and;
- Further public consultation will be a crucial component of the next phase of work to develop a site specific design for the selected location and will be carried out as part of any formal consent application.

Stakeholder Appraisal Summary

Feedback received during the consultation from stakeholders and the public has been used to inform the appraisal of possible crossing points and formed a crucial part of the assessment leading to the recommendation of a preferred location. Feedback from stakeholder engagement has been fed into the wider location appraisal, which is set out in Section 6 of this report, and led to the recommendation of a preferred location.

KEY	Stakeholder Position
	Positive
	Permissive
	Negative
	Not met in Stage 2 / No collective position

Stakeholder Appraisal

Stakeholder	Location 2		Location 3		Location 4c	
		Position		Position		Position
Westminster City Council		**Neagtive** Require further information on Transport case for the bridge and concern over potential impacts, particularly to Pimlico Gardens.		**Neagtive** Require further information on Transport case for the bridge and concern over potential impacts.		**Neagtive** Require further information on Transport case for the bridge and concern over potential impacts.
London Borough of Lambeth		**Permissive** Positive subject to the consideration of integration with routes in Lambeth Transport Strategy		**Permissive** Positive subject to the consideration of integration with routes in Lambeth Transport Strategy		**Permissive** Positive subject to the consideration of integration with routes in Lambeth Transport Strategy
Greater London Authority		**Permissive**		**Permissive**		**Positive**
Transport for London		**Permissive**		**Permissive**		**Permissive**
Port of London Authority		**Permissive**		**Permissive** Subject to programme and necessary reconfiguration of Middle Wharf Jetty		**Permissive**
Historic England		**Permissive**		**Permissive**		**Permissive**
Environment Agency		Not met in Stage 2 Preliminary Stage 1 engagement expressed no objections		Not met in Stage 2 Preliminary Stage 1 engagement expressed no objections		Not met in Stage 2 Preliminary Stage 1 engagement expressed no objections
Thames Tideway and Thames Water		**Permissive** Subject to meeting TTT safeguarding measures		**Permissive** Subject to meeting TTT safeguarding measures		**Permissive** Subject to meeting TTT safeguarding measures
Battersea Power Station		**Permissive**		**Permissive**		**Positive**
Active Travel Groups		**Positive**		**Positive**		**Positive**
Nine Elms Pier		Not met in stage 2, apart from individual residents at exhibitions. No collective position.		Not met in stage 2, apart from individual residents at exhibitions. No collective position.		Not met in stage 2, apart from individual residents at exhibitions negative due to impact on Nine Elms Pier residents. No collective position
Westminster Boating Base		Not met in stage 2, apart from WBB individuals at exhibition. Permissive at stage 1, collaboration required to migitage against impacts on operations.		Not met in stage 2, apart from WBB individuals at exhibition. Permissive at stage 1, collaboration required to migitage against impacts on operations.		Not met in stage 2, apart from WBB individuals at exhibition. Permissive at stage 1, collaboration required to migitage against impacts on operations.

6.0 Location Appraisal

Location 4C

Location 3

Location 2

6.1 Location Appraisal - Methodology

During Stage 1, in consultation with key stakeholders and local communities, the Design Team undertook a detailed Location Appraisal of nine potential locations for a new crossing over the Thames. This structured analysis identified the following options for further investigation as those which best met the objectives of the project, were least constrained, and offered the greatest benefit opportunities.

- Location 2 - Pimlico Gardens to Bourne Valley Wharf
- Location 3 - Dolphin Square to Prescot Wharf
- Location 4C - Grosvenor Road (Claverton Street) to Kirtling Street

During Stage 2 the Team have continued the appraisal leading to the identification of a preferred location. This report summarises this work and results in a recommendation for a preferred crossing point for the new bridge following evolution of design and technical analysis of the three locations identified for further investigation.

Section 4 of this report set out how a technically feasible concept design has been developed for each of the three alternative locations responding to the specific constraints and opportunities of each site. It also described how technical studies have been undertaken on the basis of these concept designs to assess the feasibility and understand the impact of a bridge at each of the three identified locations.

Section 5 described the consultation undertaken with key stakeholders and the public, allowing all stakeholders the opportunity to provide specific feedback on the shortlisted locations and the concept designs which have been developed.

This section of the report, the location appraisal, brings together the technical analysis with the input of stakeholders, and comparatively assesses each potential location, highlighting their respective constraints and opportunities and results in the recommendation of a preferred location.

Using the same appraisal methodology established at Stage 1, each location is consistently and comparatively assessed against a range of factors likely to affect the feasibility of constructing at the different locations.

Each location option was assessed in two respects:

- Assessment of technical constraints
- Assessment of the ability to meet the project objectives

Under the assessment methodology each site is analysed against multiple criteria, which are set out in full on page 60 but include for example issues such as transport demand, local and city connectivity, heritage, planning and environmental issues including ecology and arboriculture etc.

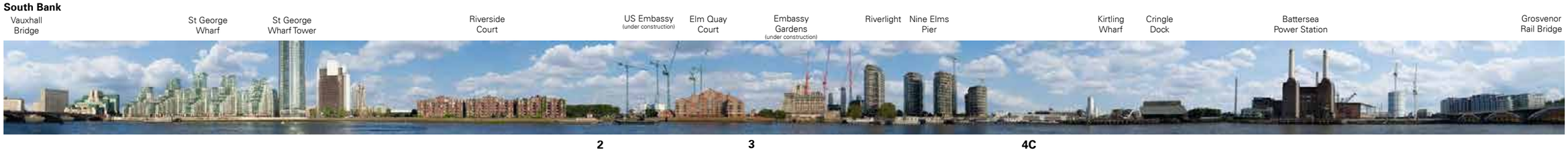
Each potential location has been comparatively assessed against each of these criterion in a series of appraisal matrices using a colour coded rating system.

Stakeholders have also been given the opportunity to input directly into this appraisal. Their response has formed a crucial part of the analysis informing the identification of constraints and opportunities at each location.

The following pages appraise in turn the Concept Design for each location, its general arrangement, the technical assessment and consultation feedback which has together lead to the recommendation of a preferred location.

North Bank

South Bank



Panoramas between Vauxhall Bridge and Grosvenor Bridge (2014) showing the Location Options identified for further investigation at the end of Stage 1 Credit: Panorama of the Thames Ltd

Opposite Page: Aerial visualisatiion showing the Location Options identified for further investigation at the end of Stage 1 on the Nine Elms Reach of the Thames

6.2.1 Location 2 [Pimlico Gardens to Bourne Valley Wharf]

General Alignment

The north bank landing of Location 2 is in Pimlico Gardens, a public riverside park separated from St George's Square by Grosvenor Road. The proposed riverfront landing within Pimlico Gardens is to the east of Westminster Boating Base jetty and moorings.

Bourne Valley Wharf, the south bank landing site, is a landscaped public space which is part of the riverside walk. It provides access to the river between Elm Quay Court and Riverside Court residential blocks. Immediately across Nine Elms Lane is the US Embassy.

The crossing alignment between the two landing points is perpendicular to the river banks, which at 218 metres, have the shortest distance between them on this stretch of the River. The main span of the bridge is aligned perpendicular to the river banks with the spiral 'ramps' offset on opposing sides.

The spiral ramp landing concept rotating about the mast structure is common to the proposed landing arrangements at all three location options. The access ramps are positioned over the river minimising impact on the banks. A spiral staircase about the mast between the base and top of the spiral ramp is included in the general arrangement of both landings at this location. This may provide a shorter more attractive crossing for some pedestrians and is therefore likely to result in higher pedestrian demand.

North Bank Arrangement

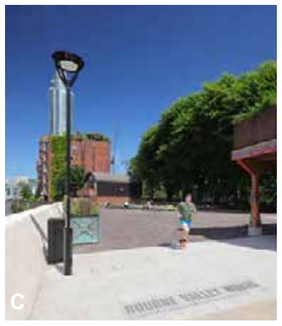
The north landing ramp is on the western, upstream side of the crossing alignment, placing the spiral ramp towards the centre of Pimlico Gardens and away from the residential blocks to the east. The spiral ramp is entirely over the river channel and does not overhang the river bank, therefore minimising the impact on the park and trees in Pimlico Gardens.

The bridge would connect directly into Grosvenor Road through Pimlico Gardens and opposite St George's Square East. Initial proposals have been developed for how the crossing would interface with Grosvenor Road based on the predominant cycle and pedestrian movements. The detail of these crossing arrangements will need to be developed in the next stage but the initial proposals have been reviewed with TfL who are content that a feasible solution can be achieved for both the local and wider connections at this crossing point.

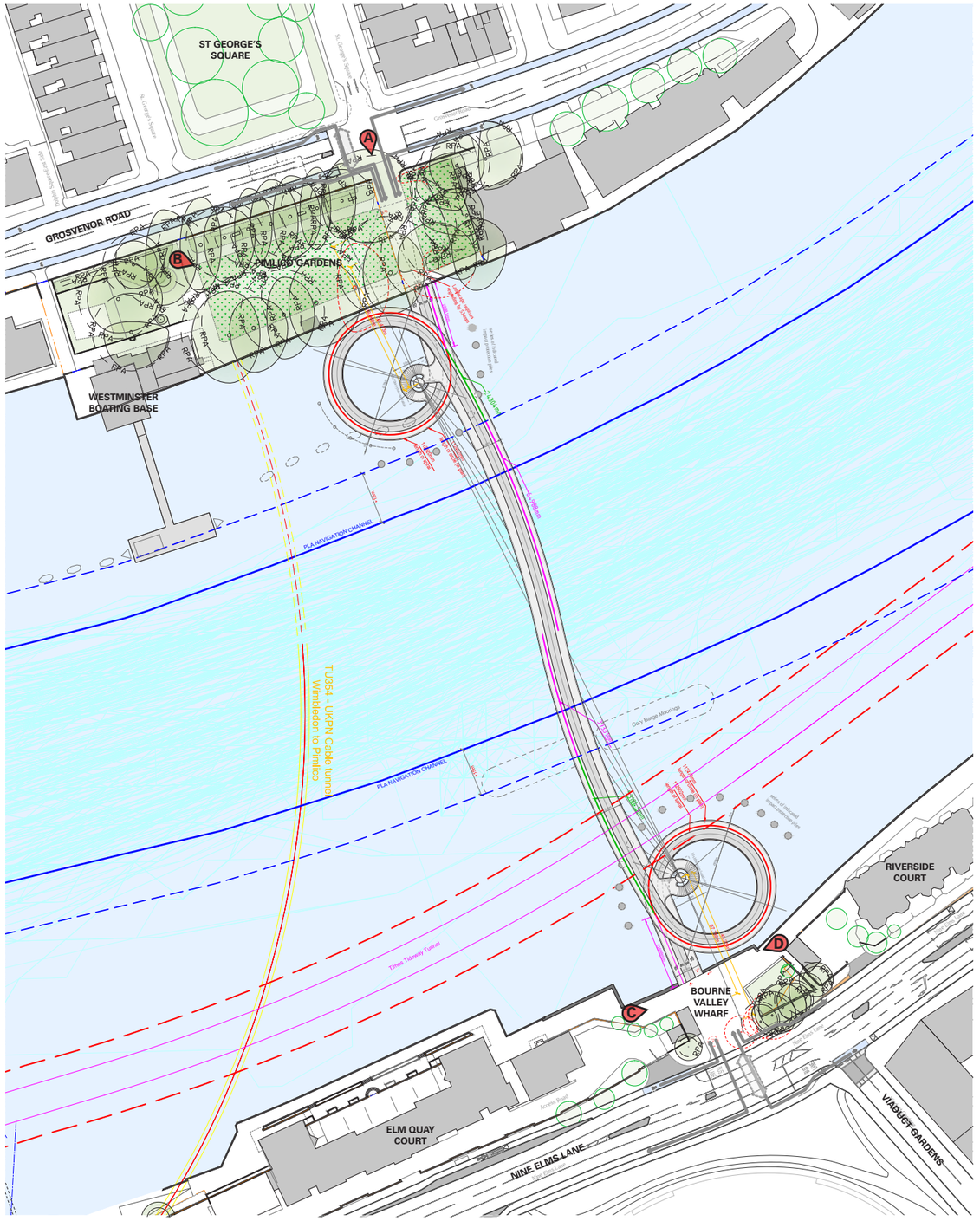
South Bank Arrangement

The south landing ramp is on the eastern, downstream side of the crossing alignment. The spiral ramp is also entirely over the river channel at the south side and does not overhang the river bank, maximising the open space at the Bourne Valley Wharf landing.

At this location the bridge would connect directly into Nine Elms Lane to the west of the junction with Viaduct Gardens which runs south from Nine Elms Lane to the east of the US Embassy. Initial proposals have been developed for how the crossing would interface with Nine Elms Lane based on the predominant cycle and pedestrian movements. The detail of these crossing arrangements will need to be developed in the next stage but the initial proposals have been reviewed with TfL who are content that a feasible solution can be achieved for both the local and wider connections at this crossing point and integrated with the wider Nine Elms Lane improvements.



Location 2 photographs of existing north bank and south bank (see plan opposite for view location points)



Concept Design General Arrangement Plan for Location 2

Opposite Page: Visualisation of Nine Elms Pimlico Bridge at Location 2 looking towards Battersea Power Station from the south bank riverside walk

6.2.1 Location 2 [Pimlico Gardens to Bourne Valley Wharf]

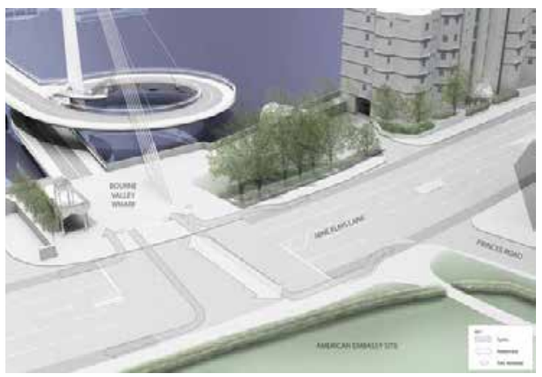
Design

Location 2 is considered to have a strong architectural response to the heritage and existing built environment context. The design and user experience objectives set out in the Project Brief, which are manifested in the design concept conceived at the competition stage, are arguably best achieved at this location. Pimlico Gardens and Bourne Valley Wharf landing sites offer the best existing public realm space of the three options considered. They are the largest spaces available and at present have the highest public amenity of the riverside landing spaces, due in part to the valuable greenspace that they contain. Integrating with established public riverside spaces is advantageous for the setting and access of the bridge, and can further increase the use and value of riverside public amenity, of which there is a shortage on the north bank in particular. The design objectives to improve the quality, access and use of riverside space are achievable for Location 2, however change to the character of the landing sites is inevitable; particularly to Pimlico Gardens greenspace, which although viewed as an opportunity for betterment through design by the Design Team, is perceived as detrimental by some.

The design proposed for a bridge at Location 2 provides a very good user experience for those crossing. Its location is most prominent in the townscape with a clear way finding presence for user access and navigation from major routes immediate to the landing sites. The balanced 'S' shape on plan provides views of the city in all directions, and from alternating perspectives across the path of the bridge, which is also the shortest crossing in length. The landing spirals are able to be placed optimally in relation to the riverbank to enhance the public realm where the townscape and riverscape meet.

Location 2 has a strong townscape relation to the heritage setting and linearity of St George's Square, and also to the spatial setting of the US Embassy and its modern surroundings. The form of the bridge sits best in the open riverscape at this location, with the most positive enhancement to the view from Vauxhall Bridge. It is noted however that the alignment of the crossing is marginally off axis with St George's Square, which may affect certain views of the bridge in the townscape.

Visualisation of concept design, general arrangement for Location 2 (from south)



Visualisation of concept design landing arrangements for Location 2 (north landing above and south below)

Environment

The initial environmental assessments identified that with regard to ground conditions, water resources and flood risk, aquatic, terrestrial ecology, archaeology and noise there are no specific environmental constraints identified that would preclude development at this location, subject to appropriate (standard) mitigation being applied.

Like the other location options under investigation the largest identified environmental constraint is trees. The environmental analysis of the three location options tested suggests that Location 2 has the greatest potential for arboricultural impact.

At its north landing, the removal of two high quality trees is likely to be required. It may be possible to retain one of these subject to detailed design of the backstay arrangement. Moderate pruning of five high quality trees is also likely to be required. Given these impacts a bridge landing in Pimlico Gardens is likely to conflict with Westminster City Council policy from an arboricultural perspective.

The assessment identified that the proposal for the south landing of Location 2 would likely require the removal of up to one moderate quality tree and two low quality trees, dependent on the final arrangement of back stays. Pruning would likely be required to two moderate quality trees both of which are previous pollards.

Initial studies also identified this location as having the potential for bats. However bat emergence surveys undertaken found no evidence of bats within the single storey building in Pimlico Gardens and therefore no further mitigation is required. However, it is recommended that a further survey is undertaken prior to construction.

Heritage

The north bank landing of this location is in Pimlico Gardens, and in the setting of St. George's Square, which lies just to the north of Pimlico Gardens, across Grosvenor Road, and is surrounded by two terraces of 1850s Italianate townhouses with a church at its northern end (all listed at Grade II). The north bank landing is within Pimlico Conservation Area. There is also a Grade II listed monument in Pimlico Gardens: a marble statue of William Huskisson. The statue would need to be re-sited within Pimlico Gardens as part of the proposals however it is not felt this would be harmful to its special interest. Whilst Historic England noted Location 2 as the most sensitive option from a heritage perspective, these considerations do not mean that a bridge at Location 2 is unviable.

Location 2 could have a strong positive impact on the townscape in that it would be visible from Vauxhall Bridge and from a designated key view at St. George Wharf Pier, providing an effective visual counterpoint to the chimneys of Battersea Power Station and potentially enhancing these views. Initial testing indicates that in the view from St George's Square, the bridge would be largely obscured by trees, although the masts would be visible above the tree canopy. Glimpses of the bridge have the potential to enhance the townscape, indicating the presence of the River Thames and providing a counterpoint to the Victorian church spire at the opposite end of the square.

Overall Location 2 has the potential to enhance the setting of St George's Square, to improve Pimlico Gardens and to enhance the setting of the statue of William Huskisson. It also has potential to enhance the townscape overall, in views from St George's Square, from Vauxhall Bridge and from the Thames Path.

Planning

While the southern landing location is arguably the best placed out of the three shortlisted options, the northern landing location is by far the most constrained with its significant heritage assets, additional adjacent allocation of St George's Square as a SINC, and the allocation of Pimlico Gardens and St George's Square as an Asset of Community Value. Pimlico Gardens also contains protected trees which are considered to be of a high amenity value and add to this constraint.

A new policy identified in the draft Westminster City Plan focuses on Neighbourly development protecting against adverse impacts on local communities and amenity. Throughout the consultation process so far, while some opposition has been posted to all options within Westminster, it is considered that Location 2 has raised perhaps the greatest level of local concern regarding potential impact on local streets and amenity.

This location has good credentials in terms of its accessibility, particularly on the southern bank, however it is considered that this option, out of the three shortlisted, it is the most constrained in planning policy terms.

6.2.1 Location 2 [Pimlico Gardens to Bourne Valley Wharf]

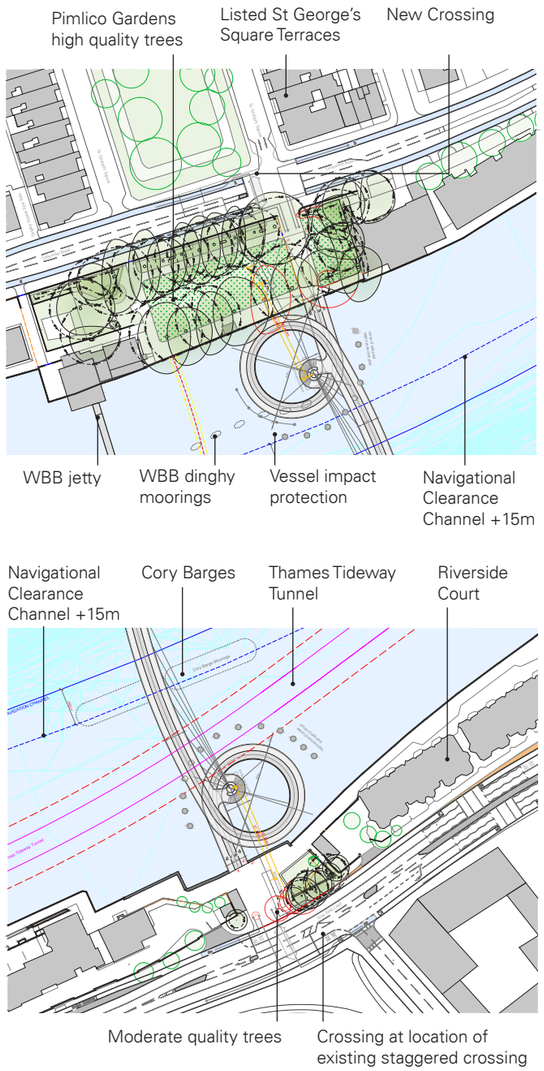
Engineering

Location 2 presents the shortest of the proposed routes and is an attractive solution from a technical engineering point of view. The two abutment and backstay anchor areas are relatively tight for space and access for construction will need to involve river transport as much as possible so as to minimise disruption to adjacent properties and highways. The design is considerably constrained at the north end by the sensitive Pimlico Gardens with its protected trees, and to a lesser extent at the south end by being in close proximity to the Thames Tideway Tunnel. These constraints add extra risk to the construction of the piled foundations, but are not insurmountable.

The north landing is located in a highly sensitive garden with a dense area of protected London Plane trees. This complicates the design of backstay and abutment foundations considerably as well as the overall geometry. Otherwise there are no foreseen physical constraints affecting foundation construction other than the river wall interface with the abutment which is common to all sites.

The south mast foundation is close to Thames Tideway Tunnel, which introduces a moderate constraint and construction risk to the project. Construction of the backstay anchorage may impact the trees on this side but is otherwise not considered too problematic.

Space for construction equipment and plant at both north and south ends is extremely restricted, and it is expected that floating plant and river transport will need to be used extensively to minimise disruption to surrounding properties and highways.



Location 2 Landing Constraints Plan (North above, south below)

River / Vessel Impact Protection

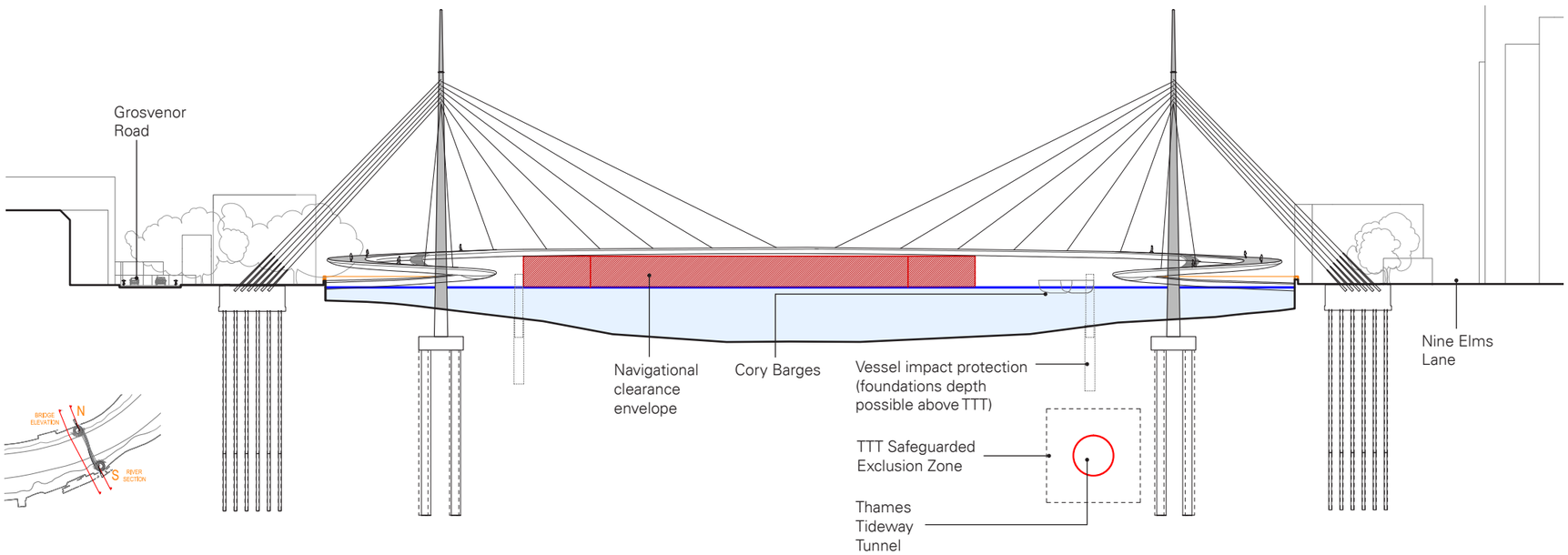
Location 2 positions the bridge within the sweeping bend of the Nine Elms Reach although the radius of the curvature is large. There is good visibility beyond the site toward Vauxhall Bridge travelling downstream. The site remains a good distance from any Clipper turning manoeuvres at St George Wharf Pier (although this is not the western end of the standard route).

Initial studies have identified that exposed areas of the bridge will require protection from vessel impact. The north landing structure is protected upstream by the position of Westminster Boating Base. The south landing is partially sheltered given its position in a slight concave section of the riverbank.

Vessels generally travel along the right-hand-side of the river passing other vessels port-to-port. The orientation of the bridge ramps at this location are such that they are best protected behind the main bridge piers and further from the main vessel traffic.

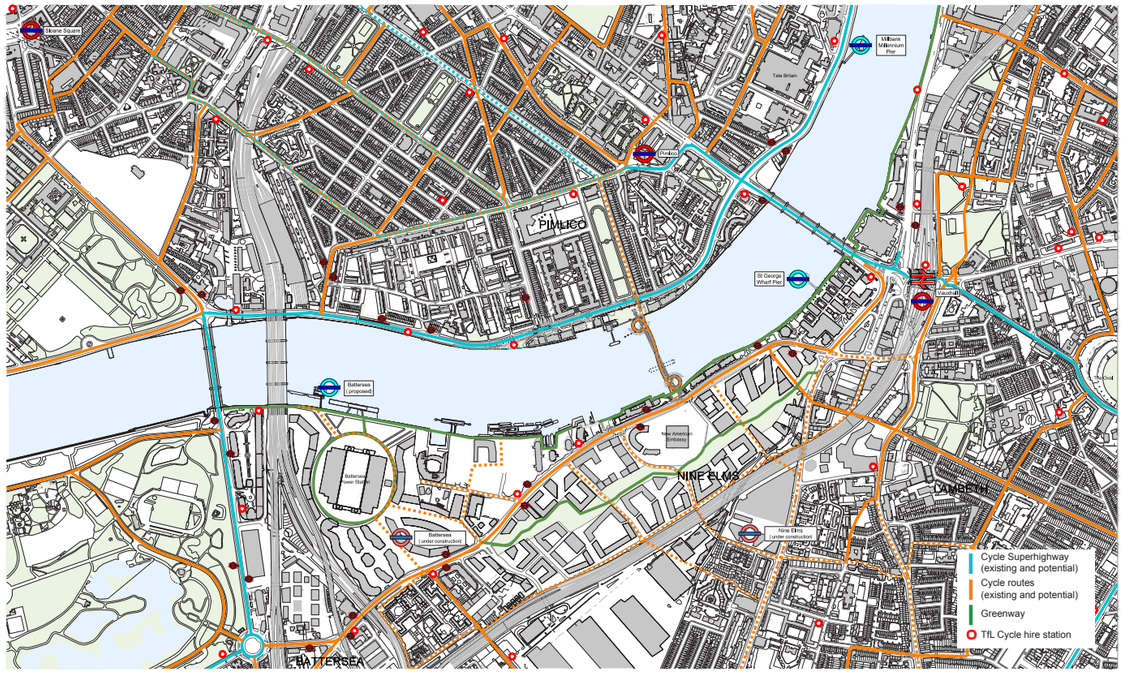
Vessel tracking data indicates that navigation on this section of the river is within a narrow channel, and is located away from the local Safeguarded Wharves. There are typically no larger vessels accessing moorings outside the navigational channel at this location, however Cory Barges operate a number of moorings to the South of the channel which will need to be relocated. Whilst the relocation of moorings is feasible, finding alternative sites may be challenging.

Location 2 will have a significant impact on the operations of Westminster Boating Base due to the proximity of the north landing to the pier. This can be mitigated through relocations of moorings and/or pontoon arrangements, however significant risk of dinghies drifting into the bridge and becoming trapped should be noted. However, the location being to the East of the Boating Base safeguards a continuous fetch of river to the West for the use of the boating base.



Sectional elevation of concept design for Nine Elms Pimlico Bridge at Location 2

6.2.1 Location 2 [Pimlico Gardens to Bourne Valley Wharf]



Location Plan showing local public transport and active travel connections with Location 2

Connectivity:

Location 2 offers good potential connectivity directly to existing routes on Grosvenor Road on the north bank and Nine Elms Lane to the south. Cycle superhighway 8 on Grosvenor Road serves demand towards the City to the north east. The proposed improved route for Nine Elms Lane connects with Cycle Superhighways 5 and 8 at Vauxhall and Queens Circus roundabout respectively, as well as to Battersea and residential areas to the south west.

In addition to these existing routes, new connections on quieter, healthier streets could be opened up, along St George's Square northwards towards Victoria, and southwards via the proposed Arch 42 link under the railway viaduct toward the Nine Elms Underground Station, Lambeth and South London.

Forecast Demand:

The comparative Transport Demand Assessment undertaken in Stage 2 indicates that in 2031 between 2,500 (main test) and 4,400 (maximum sensitivity test result) pedestrian trips are forecast per 12-hour average weekday and 4,500 to 6,200 cycling trips. That equates to a total of between 7,000 and 10,600 combined cycle and pedestrian trips per 12-hour (07:00-19:00) weekday. This is a similar level of demand to Location 4C and marginally lower than Location 3.

It should be noted that this remains a comparative assessment of alternative locations and the absolute level of projected demand is to be confirmed in later stages as the assessment is further refined and parameters updated. However, to give this comparative context, the existing (2017) level of demand on Lambeth Bridge is 8,728 combined pedestrian and cyclists (although the split of pedestrians and cyclists is different).

Deliverability

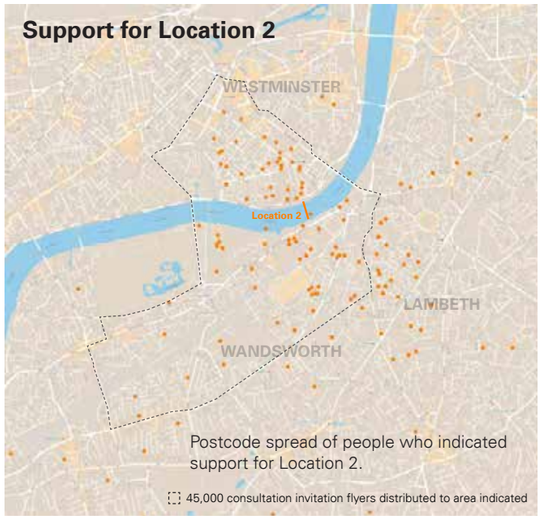
A site where the owner is unwilling to sell or surrender the land, could lead to complications for delivery of the project and the analysis has identified that Location 2 could potentially be the most constrained in this regard.

The final costs will be confirmed as the design solution develops, however, preliminary analysis undertaken at this stage indicates the spread of construction cost between the three locations is relatively narrow, at approximately. 5% and so should not be a major differentiating factor in selecting the preferred location. However it is notable that Location 2 is predicted to have a lower construction risk than Location 3.

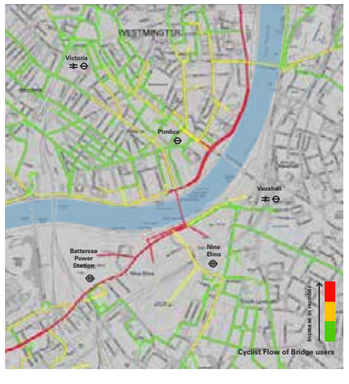
The future programme for the project at this location would need to be carefully coordinated with surrounding developments including Nine Elms Lane improvement works to help deliver an integrated solution.

Consultation

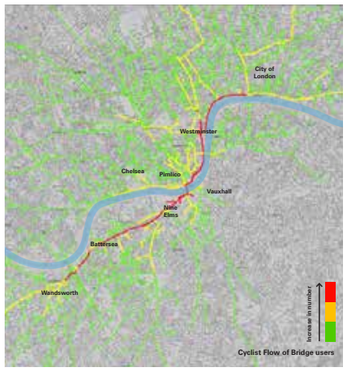
- 39% of the public feedback received indicated support for Location 2
- It is the most opposed location due to perceived impacts on Pimlico Gardens and St George's Square.
- Concern about possible impacts on Westminster Boating Base.
- Supported due to quickest crossing with good connections to the US Embassy and surrounding Embassy Gardens development.
- Although the least supported location by Westminster and Wandsworth respondents, Location 2 was the preference of respondents in Lambeth, with strong majority support.



Projected user demand - Pedestrians (12 hour weekday flows)

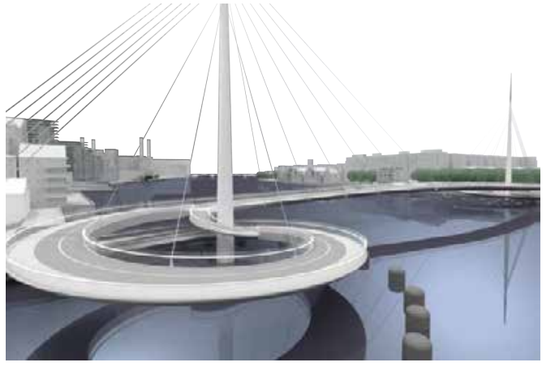


Projected user demand - Local cyclists (12 hour weekday flows)



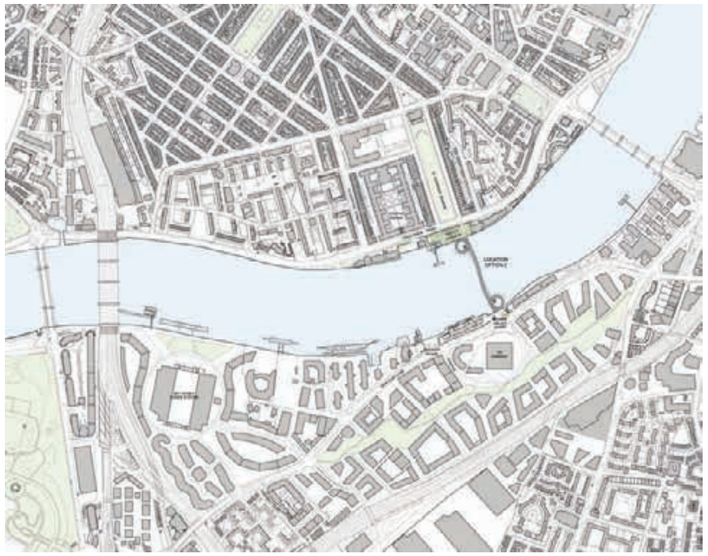
Projected user demand - City wide cyclists (12 hour weekday flows)

Visual impact at north landing viewed from residence at end of St George's Square (west).



Visual impact at south landing viewed from Riverside Court residences.

6.2.1 Location 2 [Pimlico Gardens to Bourne Valley Wharf]



Assessment	Pros	Cons
Design Team	• Good transport demand. • Good local and wider city connectivity north and south of the river. • Good landing space availability on both banks. • Good existing public realm landing sites with good riverside amenity space at north and south banks. • Narrowest crossing point of the river. • Allows for continued river operations. • Opportunity to enhance heritage setting. • Best setting in the townscape and riverscape with excellent views from Vauxhall bridge. • Clear way finding presence in the townscape for users.	• Impact on Pimlico Gardens green space, trees and public amenity. • Loss of one or two high quality trees and pruning of densely spaced high quality trees on Pimlico Gardens riverfront. • Close proximity to Westminster Boating Base. • Local residents concerned about the impact of cyclists and pedestrians on local streets (e.g. St George's Square). • Highest level of opposition from north bank residents. • Highest planning risk. • Pimlico Gardens Planning Policy protections. • Proximity of heritage assets. • Possible relocation of Cory Barges required.
Stakeholders	• TfL, LBL and GLA note strong strategic transport connectivity to the south, (via Arch 42 under the railway viaduct) and to the north. • PLA, and TT note limited impact to their operations and utilities at this location. • WBB noted that close collaboration will be required to minimise impact on operations, but potential mutual benefits possible. • TfL, LBL, PLA, HE, TT, note no significant constraints to this location option.	• WCC and Westminster Residents strongly oppose the location for the perceived impact of cyclists and pedestrians on St George's Square, and Pimlico Gardens. • Westminster residents note strong concerns that the amenity and character of Pimlico Gardens would be harmed with impact to the trees. • GLA note potential impact on existing public realm and acknowledge the opposition in Westminster to this location and note the difficulty this presents in planning terms. • HE note marginally most sensitive location in heritage terms. • Wandsworth residents local to the south landing note concerns regarding the proximity of a bridge landing to residences on the south bank.

Technical Appraisal - Opportunity and Constraint Assessment

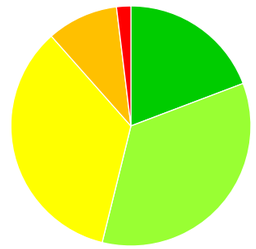
	Transport			Spatial			Environment							River Use		Planning and Heritage					
	Local Transport Connectivity	City Wide Transport Connectivity	Demand	Landing Condition	Engineering Feasibility: Structure	Engineering Feasibility: Utilities	Arboriculture	Archaeology	Ground Conditions	Ground Water and Flood Risk	Aquatic Ecology	Terrestrial Ecology	Noise	Navigation and operations	Vessel impact	Impact on Residential Amenity	Relationship to non-residential uses	Land Ownership	Townscape and visual impact	Conservation and Heritage	Planning Policy
N																					
S																					

Objectives Appraisal

	Connective			Sustainable		Innovative				Deliverable		
	Respond to demand / desire lines	Quality user experience	Equal treatment to both sides of the river	Improve user safety	Minimise impact at landings	Enhance public realm	Enhance heritage setting	Provide level and open access for all from river banks	Meet technical stakeholder requirements	Cost	Minimise disruption from construction	Maximise planning acceptability

KEY **Assessment**

- Very Good Opportunity / No Constraint / Fully Acheivable
- Good Opportunity / Minor Constarint / Predominantly Achievable
- Moderate Opportunity / Moderate Constraint / Mostly Acheivable
- Low Opportunity / Significant Constraint / Partially Achievable
- Very Low Opportunity / Major Constraint / Not Achievable
- Not comparatively assessed at this stage



Location 2 - Appraisal Criteria Assessment Summary

FEASIBLE ALTERNATIVE TO PREFERRED LOCATION

Appraisal Summary

- Good location technically for a bridge with sufficient space north and south of the river for landing and integrating users directly with main routes.
- Shortest distance across the river channel is potentially the most technically economic with regards to structure and cost.
- Good transport demand.
- Architecturally elegant and potentially iconic setting in the river and townscape; location with the best views from Vauxhall Bridge.
- Good connectivity north and south of the river, and clear way finding presence in the townscape.
- Further investigation would be required to determine the impact of cycle and pedestrian demand on local streets, (e.g. St George's Square).
- Challenge to mitigate against significant impact on Pimlico Gardens green space and trees.
- Roots of high quality trees are an engineering constraint to the arrangement of backstay foundations in Pimlico Gardens.
- The significant arboricultural impact on Pimlico Gardens, in the Pimlico conservation area, is a material planning constraint.
- This location represents the highest planning risk due to the planning policy protections of Pimlico Gardens, proximity of heritage assets and strong opposition from local residents.

6.2.2 Location 3 [Dolphin Square to Prescot Wharf]

General Alignment

The north bank landing is a piece of land understood to be owned by Dolphin Square, the complex of flats immediately across Grosvenor Road from the site. The site is privately accessed by Dolphin square residents and contains a tennis court and croquet lawn on the riverside. The alignment of the initial Concept Design aims to avoid loss of the tennis court, landing at the croquet lawn at the eastern end of the site. The north landing site is to the west of Westminster Boating Base, from which it is separated by a currently undeveloped site at 135 Grosvenor Road, which has planning permission for a four storey residential building.

Prescot Wharf, the south bank landing site, is a landscaped public space on the riverside walk to the west of Elm Quay Court. The south landing space connects directly to Nine Elms Lane which runs parallel to the River at this point. Directly to the west of the landing lie the safeguarded Middle Wharf and Heathwall Pumping Station which are currently a site for Thames Tideway. The future plans for this Thames Tideway site include a new public promontory and continuation of the Riverside walk in front of Middle Wharf and Heathwall which will be accessed directly from Prescot Wharf. The landing points of this alignment are 242 metres apart.

The spiral ramps and masts are offset on opposing sides of this alignment and are positioned almost directly opposite each other across the river. The spiral ramp landing concept rotating about the mast structure is common to the proposed landing arrangements at all three location options. The access ramps are positioned over the river minimising impact on the banks. A spiral staircase about the mast between the base and top of the spiral ramp is included in the general arrangement of both landings at this location. This may provide a shorter more attractive crossing for some pedestrians and is therefore likely to result in higher pedestrian demand.

North Bank Arrangement

The spiral ramp is entirely over the river channel on the north side, centred in an inlet of the river bank in front of Dolphin Square. The nosing of the spiral ramp is approximately 13 metres from the north river wall at its closest point. The face of the spiral ramp towards the river channel is behind the line of the front of Westminster Boating Base jetty.

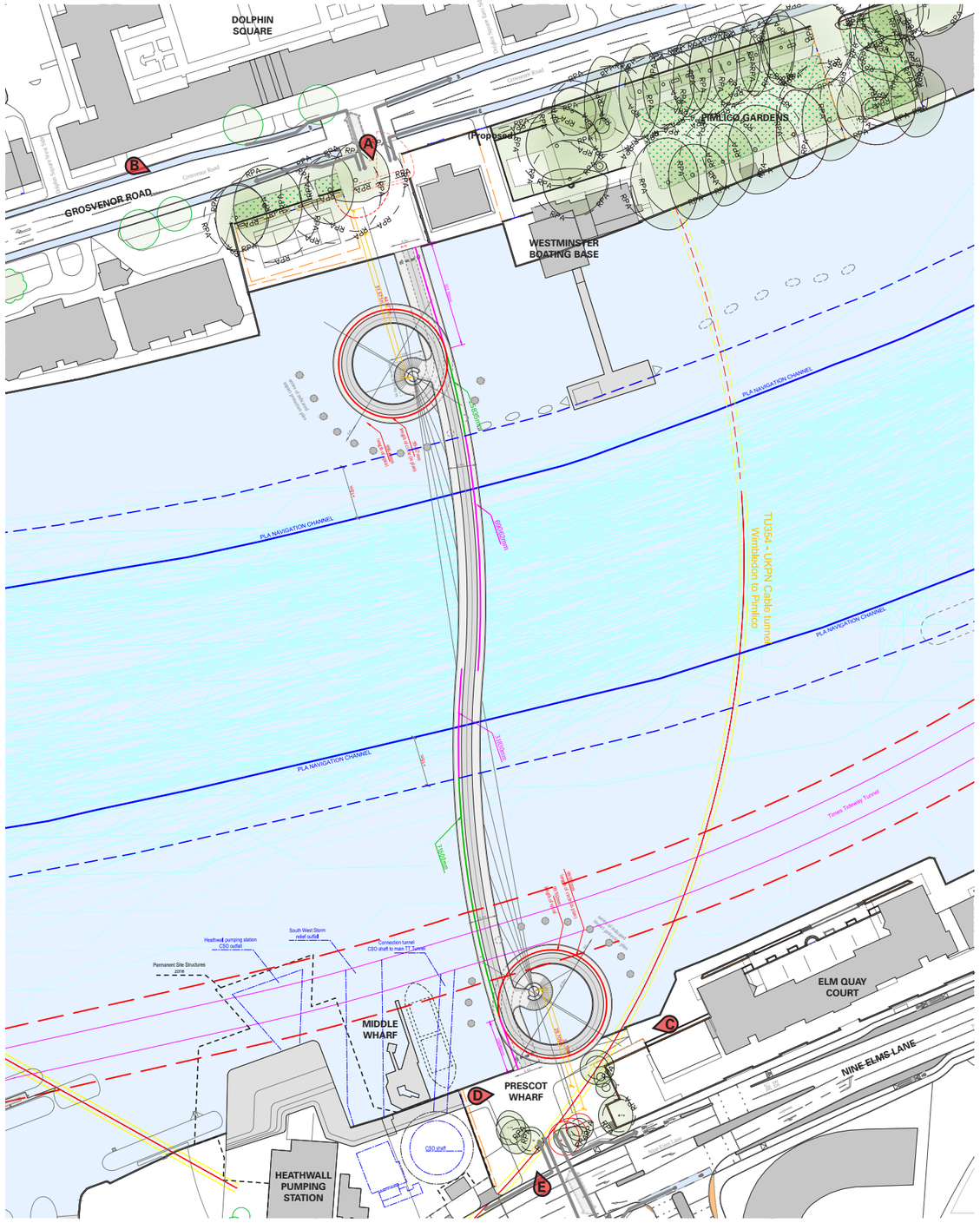
The bridge would connect directly into Grosvenor Road at a new crossing point in front of Dolphin Square, between the Claverton Street and St George's Square junctions. Initial proposals have been developed for how the crossing would interface with Grosvenor Road based on the predominant cycle and pedestrian movements. The detail of these crossing arrangements will need to be developed in the next stage but the initial proposals have been reviewed with TfL who are content that a feasible solution can be achieved for both local and wider connections. Consultation with stakeholders will be required as part of this design development to mitigate any impacts on amenity including for example the possible loss or relocation of on-street loading/parking bays in front of Dolphin Square.

South Bank Arrangement

The south ramp spiral is on the eastern, downstream side of the landing point, on the opposite side of the alignment to the safeguarded Middle Wharf. In this arrangement the ramp spiral is towards the north western most corner of Elm Quay Court. The position of the Thames Tideway Tunnel at this location necessitates the arrangement of the mast close to the river bank and consequently the ramp, which overhangs the river bank at this location.

There is a direct connection with Nine Elms Lane at this location, to the east of Ponton Road. Initial proposals have been developed for how the crossing would interface with Nine Elms Lane based on the cycle and pedestrian movements. The detail of these crossing arrangements will need to be developed in the next stage, but initial proposals have been reviewed with TfL who are content that a feasible solution can be achieved for both the local and wider connections at this crossing point and integrated with the wider Nine Elms Lane improvements which are currently been developed.

Location 3 photographs of existing north bank and south bank (see plan opposite for view location points)



Concept Design General Arrangement Plan for Location 3

Opposite Page: Visualisation of Nine Elms Pimlico Bridge at Location 3 looking towards Battersea Power Station from the south bank riverside walk

6.2.2 Location 3 [Dolphin Square to Prescot Wharf]

Design

The design proposal developed for Location 3 is based on the same 'S' shape arrangement concept as at Location 2, between landing sites directly across the river from one another and with immediate access from main transport routes on each bank. The constraints and characteristics of the landing sites of Location 3 however, do not allow for such successful implementation of the design concept. Although this proposal is able to achieve many of the design objectives, it does not differentiate itself by exhibiting specific design opportunities that are not also or better offered by the other options. There is sufficient space on both banks for landing access, however the sites are more confined than others which limits the opportunity for public riverside space, particularly considering the proposed retention of the privately owned tennis court at the north bank. The design proposal is based on minimum acquisition of private land (a narrow strip by the tennis court) to access the bridge. This limits the public space design scope at this landing, but does create new public realm access to the riverfront which would be of public benefit in any case.

The merit of the design proposal at this location is limited by technical constraints. The south landing arrangement is tightly restricted by underground utilities, necessitating placement of the mast close to the edge of the river channel, with the spiral landing overhanging the south riverbank. This arrangement is less desirable than at other locations, since the bridge placement is less balanced in the riverscape. Furthermore, the condition of the spiral landing on the north bank has the converse situation, where the mast and ramp are more isolated in the river channel with a weak relation to the riverbank.

The crossing experience at this location offers views of the city in all directions from alternating perspectives across the bridge, and from a central location on this reach of the river between adjacent crossings. This arrangement is however less well placed to maximise views of the bridge itself from its surroundings, due to a weaker architectural setting in the townscape. The masts and landings are set against the built masses of Dolphin Square and Embassy Gardens, rather than benefiting from alignment with more open spaces.

Visualisation of initial concept design, general arrangement for Location 3 (from south)

Visualisation of concept design landing arrangements for Location 3, (north landing above and south below)

Environmental

The initial environmental assessments identified that with regard to ground conditions, water resources and flood risk, aquatic, terrestrial ecology, archaeology and noise there are no specific environmental constraints identified that would preclude development at this location, subject to appropriate (standard) mitigation being applied.

Like the other location options under investigation the largest identified environmental constraint is trees. However, according to the Stage 2 arboricultural analysis, Location 3 has the lowest arboricultural impact of the locations investigated.

At its north landing, the removal of one low quality tree and part of a low quality hedgerow is likely to be required and acceptable. Pruning of one high quality tree is also likely to be required, though impact may be minimised via careful alignment of back stays.

At the south landing of Location 3 the proposal would likely require the removal of one low quality tree. The potential loss of an additional two low quality trees is also identified as a risk, dependant on the extent of excavation required though this may be mitigated with carefully designed retaining walls. Pruning would likely be required to one additional low quality tree.

Heritage

A bridge at Location 3 could have a strong positive impact on the townscape in that it would be visible from Vauxhall Bridge and from a designated key view at St. George Wharf Pier, providing an effective visual counterpoint to the chimneys of Battersea Power Station and potentially enhancing these views. However it would not have as strong a positive impact on the townscape of the immediate vicinity of the bridge as Locations 2 and 4C. This is because its landing on the north bank would be in front of Dolphin Square, an unlisted building which presents a long, tall and relatively uniform elevation to Grosvenor Road and which would prevent the bridge being visible in longer views from the surrounding area.

The northern landing of Location 3 lies in the Dolphin Square Conservation Area. Location 3 therefore has some heritage implications related to the character and appearance of the conservation areas on the north bank, and a designated key view of the Dolphin Square Conservation Area from the south bank. However, there would be no impact on listed buildings and overall, the impact on heritage assets would be low.

Overall analysis suggests that this option has some potential to enhance the townscape overall, in views from Vauxhall Bridge and from the Thames Path, but does not have the same potential as Location 2 or 4C. The option has some potential to enhance the conservation area, but, again, not as much as in Locations 2 or 4C.

Planning Constraints

It is considered that Location 3 has significant constraints both north and south of the River. To the north, the proximity of Dolphin Square and the location of existing social infrastructure (the Tennis Court) pose considerable constraints in planning terms, and would likely be considered as contrary to Westminster City Council's policies regarding these matters.

Dolphin Square is subject to an ongoing Planning Application for refurbishment and extension which is understood to include an ambition to provide public pedestrian access through the central courtyard. Whilst this may be an appealing desire line for users of the crossing it would need careful consideration in terms of any potential impact on residents.

Location 3 has fewer constraints in the south, and like Location 2, a significant opportunity to provide a connection to Nine Elms Lane while utilising the existing area of public realm located next to the Riverside Walk. However, the adjacency of the Safeguarded Wharf (Middle Wharf) is likely to be a key material constraint, with any proposal needing to ensure that the operation of the wharf is not jeopardised. This would be a key point of assessment by the relevant planning authority.

On this basis, and out of the three proposed options, Location 3 is not considered to be favourable in planning terms.

6.2.2 Location 3 [Dolphin Square to Prescot Wharf]

Engineering

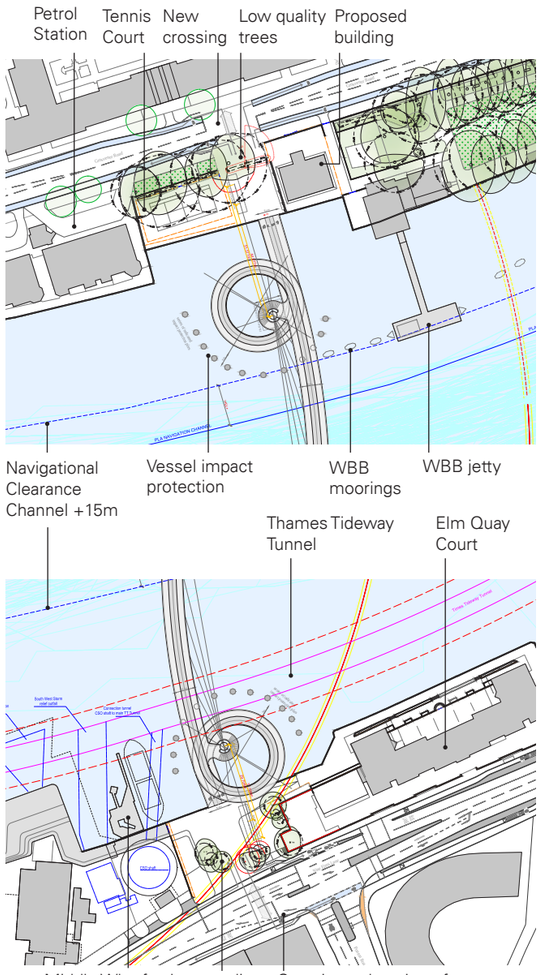
Location 3 is extremely congested at the south side of the river by virtue of its close proximity to Thames Tideway, Middle Wharf, underground utilities (UKPN 354) and Nine Elms Lane. These combine to create very challenging constraints and result in high risks and potentially high costs associated with constructing the piled foundations.

The site on the south side is extremely congested for both the mast and backstay anchorage foundations. The close proximity of the Thames Tideway Tunnel and the UKPN 354 cable tunnel, whose exclusion zone is yet to be defined and will only make things worse, together represent very significant design and construction risks. The protected Middle Wharf jetty will also need modification to allow vessel access if this option is chosen.

To the north, the site is also very constrained, with relatively little space available for construction of the backstay foundations and anchorage. The extra length of the north approach ramp also creates additional difficulties, with the possible need for additional supports in the river and potentially greater risks at the interface between the abutment and the river wall.

The mast foundation is clear of obstructions but there is very limited space on the north bank to construct the backstay foundations. Some impact on the tennis court is inevitable. An extended low level approach span is needed which would be disruptive to small river craft, and the supports to this may involve either an extended abutment, with potential implications for the river wall or an additional support in the water.

Space for construction equipment and plant at both north and south ends is extremely restricted, and it is expected that floating plant and river transport will need to be used extensively to minimise disruption to surrounding properties and highways.



Location 3 Landing Constraints Plan (North above, south below)

River / Vessel Impact Protection

The bridge arrangement at Location 3 is clear of the vessel manoeuvring areas close to Cringle Dock, Nine Elms Pier and Battersea Pier and whilst within the sweeping bend of the reach it is positioned within a small straight section of the navigation channel.

The position of the navigational channel is not a critical spatial constraint to the general arrangement of a bridge at this location. The north landing and vessel impact protection arrangement is aligned with the Westminster Boating Base jetty, which offers it some protection on the downstream side.

Positioning the bridge immediately to the West of the Boating Base will cause significant impact on the operations of the boating base. The use of the river fetch to the West will require dinghies, powerboats and kayaks to pass the bridge. The North landing area will occupy a space currently utilised as a sheltered holding area for kayaks.

Alternative Middle Wharf berth arrangement

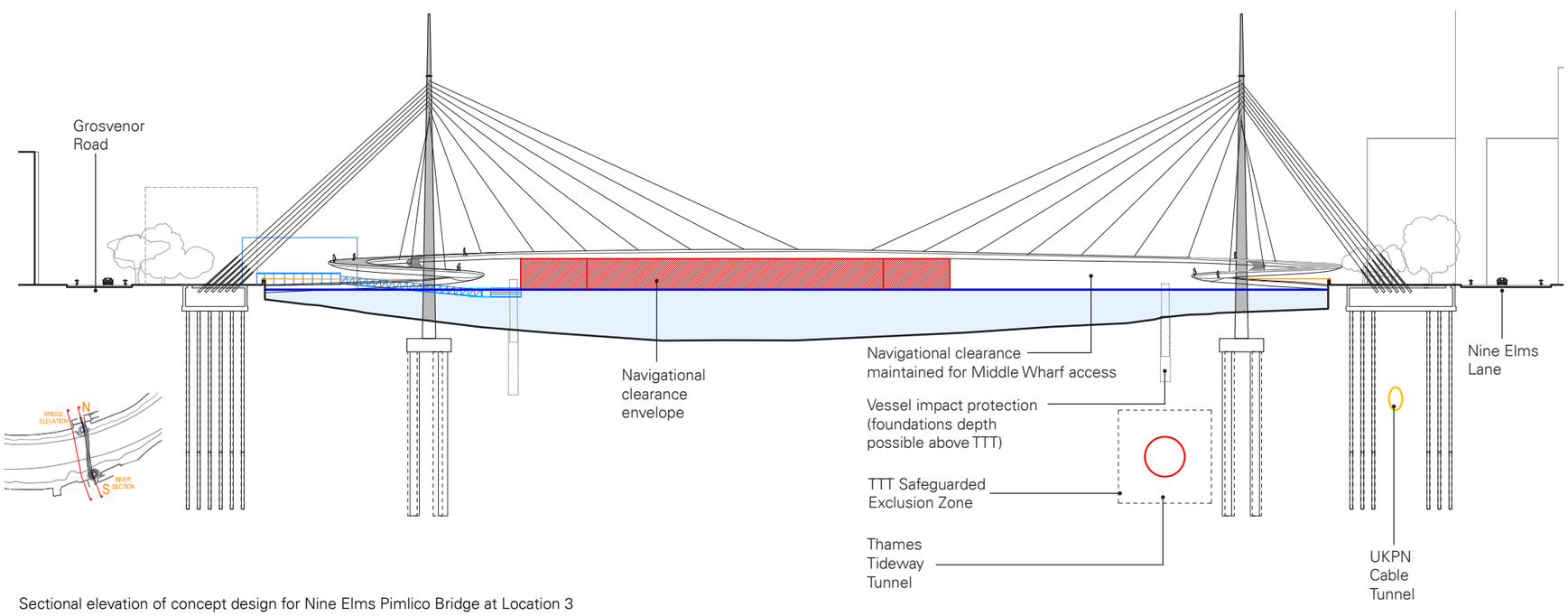
Initial studies have identified that exposed areas of the bridge will require protection from vessel impact. The bridge ramp orientation at this location provides protection from the right-hand-side of the navigation channel.

The southern landing ramp is positioned within a relatively wide and shallow area adjacent to the river wall which means that it is well clear of the navigation channel and the majority of vessel paths tracked.

The southern landing location is located immediately adjacent to Middle Wharf, a Port of London Authority (PLA) safeguarded wharf, and will impact the potential future use of the wharf.

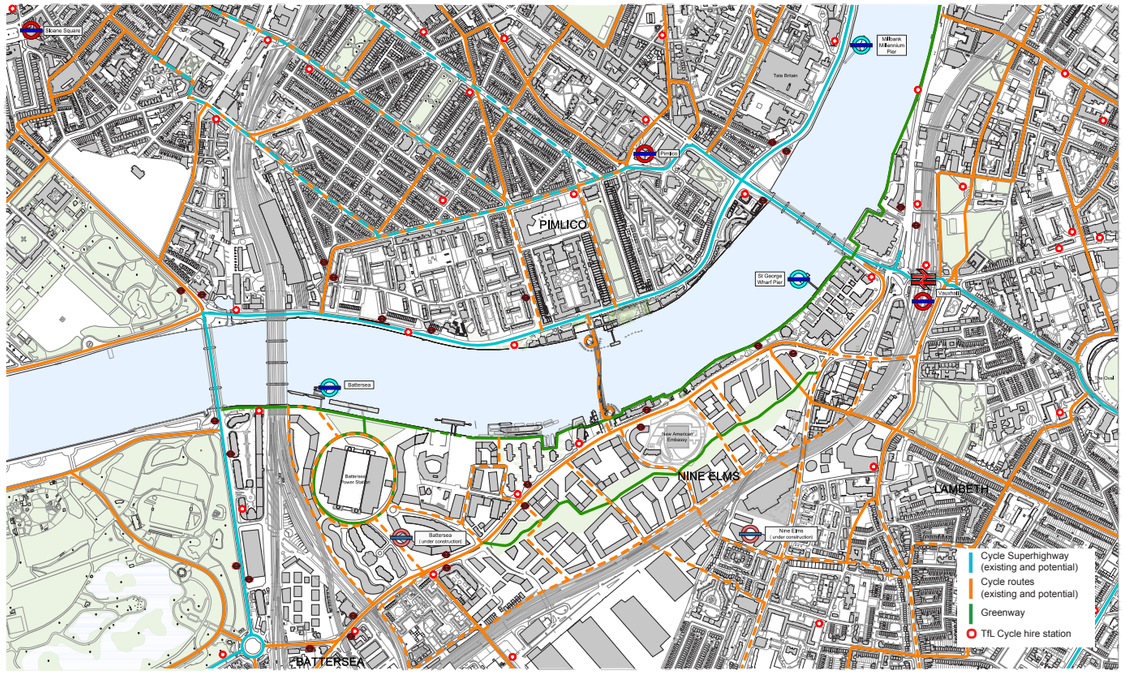
Whilst not currently in use Middle Wharf is due to be reactivated following the construction of Thames Tideway, for cargo handling and use as a barge berthing facility. Once in operation an increase in barge and tug vessel movements in this area may conflict with the location of a bridge at this point.

However, due to the likely upgrade works required to enable the use of Middle Wharf, it is feasible, subject to further agreement with the PLA over the specific design and programme to amend the berth arrangement for better compatibility with a bridge landing to East of the wharf. This could involve an arrangement similar to that shown above with a new berth to the west of a berthing dolphin or jetty which would further protect the bridge.



Sectional elevation of concept design for Nine Elms Pimlico Bridge at Location 3

6.2.2 Location 3 [Dolphin Square to Prescot Wharf]



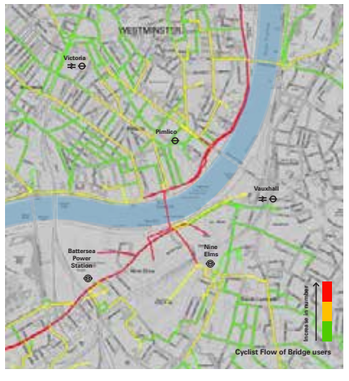
Location Plan showing local public transport and active travel connections with Location 3

Connectivity

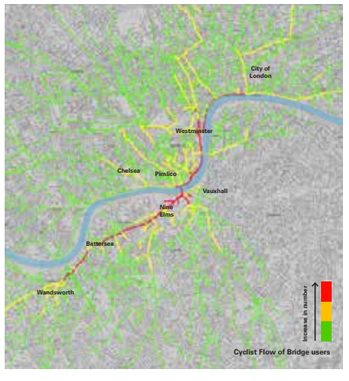
Location 3 offers good potential connectivity directly to existing routes on Grosvenor Road on the north bank and Nine Elms Lane to the south. Cycle superhighway 8 on Grosvenor Road serves demand towards the City to the north east. The proposed improved route for Nine Elms Lane connects with Cycle Superhighways 5 and 8 at Vauxhall and Queens Circus roundabout respectively, as well as to Battersea and residential areas to the south west.

Northward connections opened up by a bridge at Location 3 are less directly accessible to the north than at Location 2. There is an aspiration to provide public access through Dolphin Square as part of an ongoing planning application. However the principle pedestrian and cyclist routes north must circumvent Dolphin Square, joining Grosvenor Road before heading north on either Claverton Street to the west, or St George's Square to the east. Connections to the south via Ponton Road link directly via Arch 42 under the railway viaduct toward the Nine Elms Underground Station, Lambeth and South London.

Projected user demand - Pedestrians (12 hour weekday flows)



Projected user demand - Local cyclists (12 hour weekday flows)



Projected user demand - City wide cyclists (12 hour weekday flows)

Forecast Demand

The comparative Transport Demand Assessment undertaken in Stage 2 indicates that in 2031 between 3,000 (main test) and 5,500 (maximum sensitivity test result) pedestrian trips are forecast per 12-hour average weekday and 4,800 to 6,900 cycling trips. That equates to a total of between 7,800 and 12,400 combined cycle and pedestrian trips over this period. This represents the highest level of demand relative to the other potential locations, although it should be noted that the variation in demand between the main test and the maximum sensitivity test is greater than the variation between locations on a like for like basis.

This remains a comparative assessment of alternative locations. The absolute level of demand projected is to be confirmed in later stages as the assessment is further refined and parameters updated. However, to give this comparative context, the existing (2017) level of demand on Lambeth Bridge is 8,728 combined pedestrian and cyclists (although the split of pedestrians and cyclists is different).

Deliverability

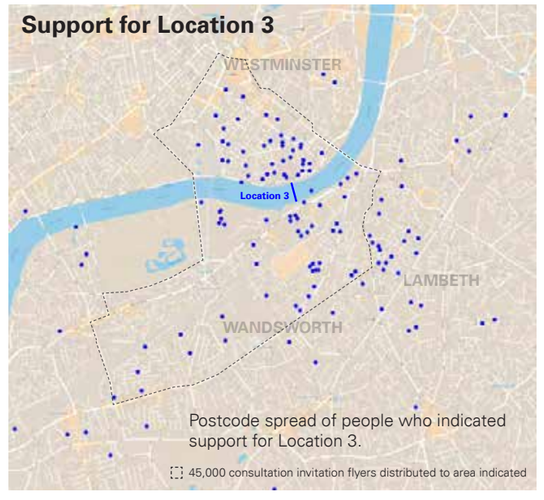
A site where the owner is unwilling to sell or surrender the land, could lead to complications for the delivery of the project and the analysis has identified that Location 3 would likely be less constrained than Location 2 but more constrained than Location 4C in this regard.

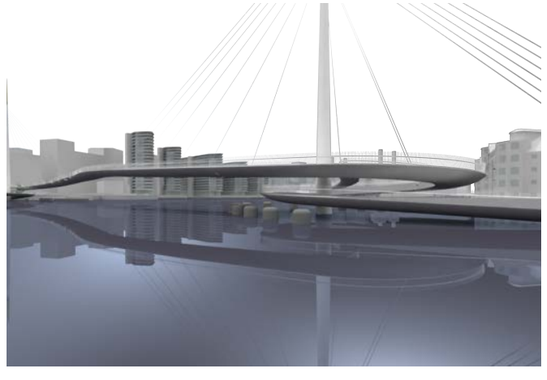
The final costs will be confirmed as the design solution develops, however, preliminary analysis undertaken at this stage indicates the spread of construction cost between the three locations is relatively narrow, at approximately 5% and so should not be a major differentiating factor in selecting the preferred location. However it is notable that Location 3 is predicted to have the highest construction risk of the three identified locations.

The future programme for the project at this location would need to be carefully coordinated with surrounding developments, including Nine Elms Lane improvement works to help deliver an integrated solution.

Consultation

- 40% of the public feedback received indicated support for Location 2
- Opposed locally due to perceived impacts on Dolphin Square.
- Concern about potential negative impact on traffic congestion on Grosvenor Road.
- Supported due to connectivity, central location between Vauxhall and Chelsea bridges and benefits for Riverlight and Embassy Gardens residents.
- Location 3 was the second most supported location by respondents in Westminster, Wandsworth and Lambeth.

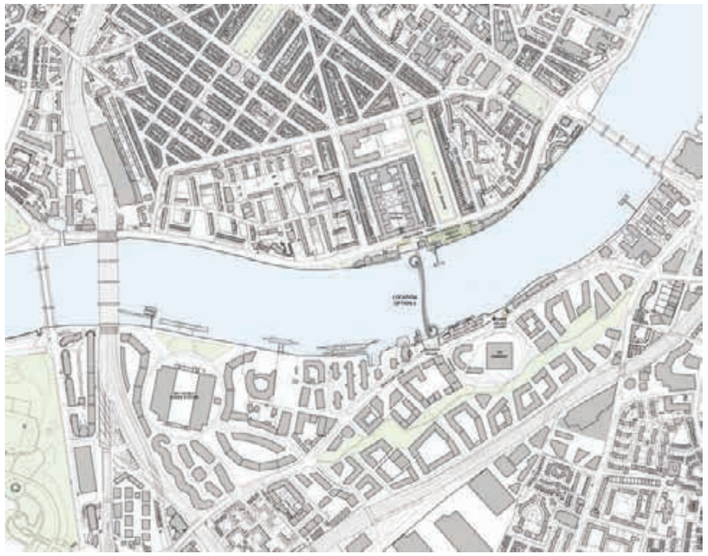




Visual impact at north landing viewed from Westminster Boating Base.

Visual impact at south landing viewed from Elm Quay Court residences.

6.2.2 Location 3 [Dolphin Square to Prescot Wharf]



Assessment	Pros	Cons
Design Team	• Very good transport demand. • Good connectivity at the north and south bank • Good landing space availability. • Potential to create a new public space on the north bank. • Lowest impact on green spaces and trees, no loss of moderate or high quality trees. • Allows for continued river operations. • Good riverside amenity space with public access at south bank.	• North bank landing on publicly inaccessible private land. • Potential impact on Tennis Court / private amenity. • Proximity to Westminster Boating Base. • Proximity of utilities at the south bank complicates engineering and results in highest construction risk. • Proximity and impact on to Middle Wharf. • Thames Tideway Tunnel location constrains positioning of south mast and foundations. • Possible loss or relocation of on-street loading/ parking bays in front of Dolphin Square. • Some resident concern of impact of cyclists and pedestrians on local streets (e.g. St George's Square and Claverton Street).
Stakeholders	• TfL, LBL and GLA note the strong strategic connectivity to the south, (via Arch 42 under the railway viaduct) and to the north. • WBB noted that close collaboration will be required to minimise impact on operations, but potential mutual benefits possible. • TfL, LBL, HE, note no significant constraints to this location option. • PLA comment that Middle Wharf requires redevelopment and could see possible solutions of mutual benefit. • Embassy Gardens residents supportive and commented that this location balances focus in the Nine Elms area with the Power Station.	• WCC and Westminster Residents oppose the location for the perceived impact of cyclists and pedestrians on St George's Square, Claverton Street and Dolphin Square. • Westminster residents note that the potential north landing is privately owned by Dolphin Square who would stand to lose this private amenity space. • Wandsworth residents note concerns regarding the proximity of a bridge landing adjacent to Elm Quay Court. • GLA note potential impact on private open space at riverside. • PLA concerns due to proximity of Middle Wharf.

Technical Appraisal - Opportunity and Constraint Assessment

	Transport			Spatial			Environment							River Use		Planning and Heritage					
	Local Transport Connectivity	City Wide Transport Connectivity	Demand	Landing Condition	Engineering Feasibility: Structure	Engineering Feasibility: Utilities	Arborioculture	Archaeology	Ground Conditions	Ground Water and Flood Risk	Aquatic Ecology	Terrestrial Ecology	Noise	Navigation and operations	Vessel impact	Impact on Residential Amenity	Relationship to non-residential uses	Land Ownership	Townscape and visual impact	Conservation and Heritage	Planning Policy
N																					
S																					

Objectives Appraisal

Connective			Sustainable		Innovative				Deliverable		
Respond to demand / desire lines	Quality user experience	Equal treatment to both sides of the river	Improve user safety	Minimise impact at landings	Enhance public realm	Enhance heritage setting	Provide level and open access for all from river banks	Meet technical stakeholder requirements	Cost	Minimise disruption from construction	Maximise planning acceptability

KEY **Assessment**

- Very Good Opportunity / No Constraint / Fully Acheivable
- Good Opportunity / Minor Constarint / Predominantly Achievable
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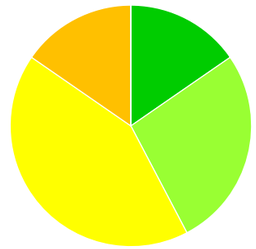


Location 3 - Appraisal Criteria Assessment Summary

FEASIBLE ALTERNATIVE TO PREFERRED LOCATION

Appraisal Summary

- Good location technically for a bridge with sufficient space north and south of the river for landing and integrating users directly with main routes.
- Given the narrow north landing space which is faced by significant mass of Dolphin square in close proximity, users experience a more confined landing space with restricted visibility to Grosvenor Road junction and surroundings.
- Assessment at this stage shows this location has marginally the highest transport demand.
- Good connectivity south of the river with connection via Arch 42 under the railway viaduct to the new Nine Elms underground station.
- Further investigation would be required to determine the impact of cycle and pedestrian demand on routes connecting to the north via St George's Square and Claverton Street.
- Challenging utility and Thames Tideway Tunnel constraints to the engineering arrangement of backstay and mast foundations on the south bank.
- Challenge to mitigate against potential impact on the operations of safeguarded Middle Wharf; however a solution of mutual benefit combining vessel impact protection for the bridge and a berthing structure for the wharf could be investigated.
- The position and relationship of the landing ramps to the banks is different at the north and south.

6.2.3 Location 4C [Grosvenor Road (Claverton Street) to Kirtling Street]

General Alignment

The north bank landing is a triangular paved public space alongside Grosvenor Road. It is the width of the pedestrian riverside footway at its western end and opens up towards its eastern end as Grosvenor Road diverges from the river front and is met by Claverton Street just beyond. The site contains street furniture, a telephone box and a TfL cycle hire station.

The south bank landing is at the undeveloped 88 Kirtling Street. The site has outline planning consent as the final phase 7 of the Battersea Power Station development. The Riverlight development, Nine Elms Pier and houseboat moorings are to the east of the site. The safeguarded Kirtling Wharf, is adjacent to the west of the landing point.

Kirtling Wharf, 88 Kirtling Street and two further plots of land to the south are currently the Kirtling Street construction site for the Thames Tideway project.

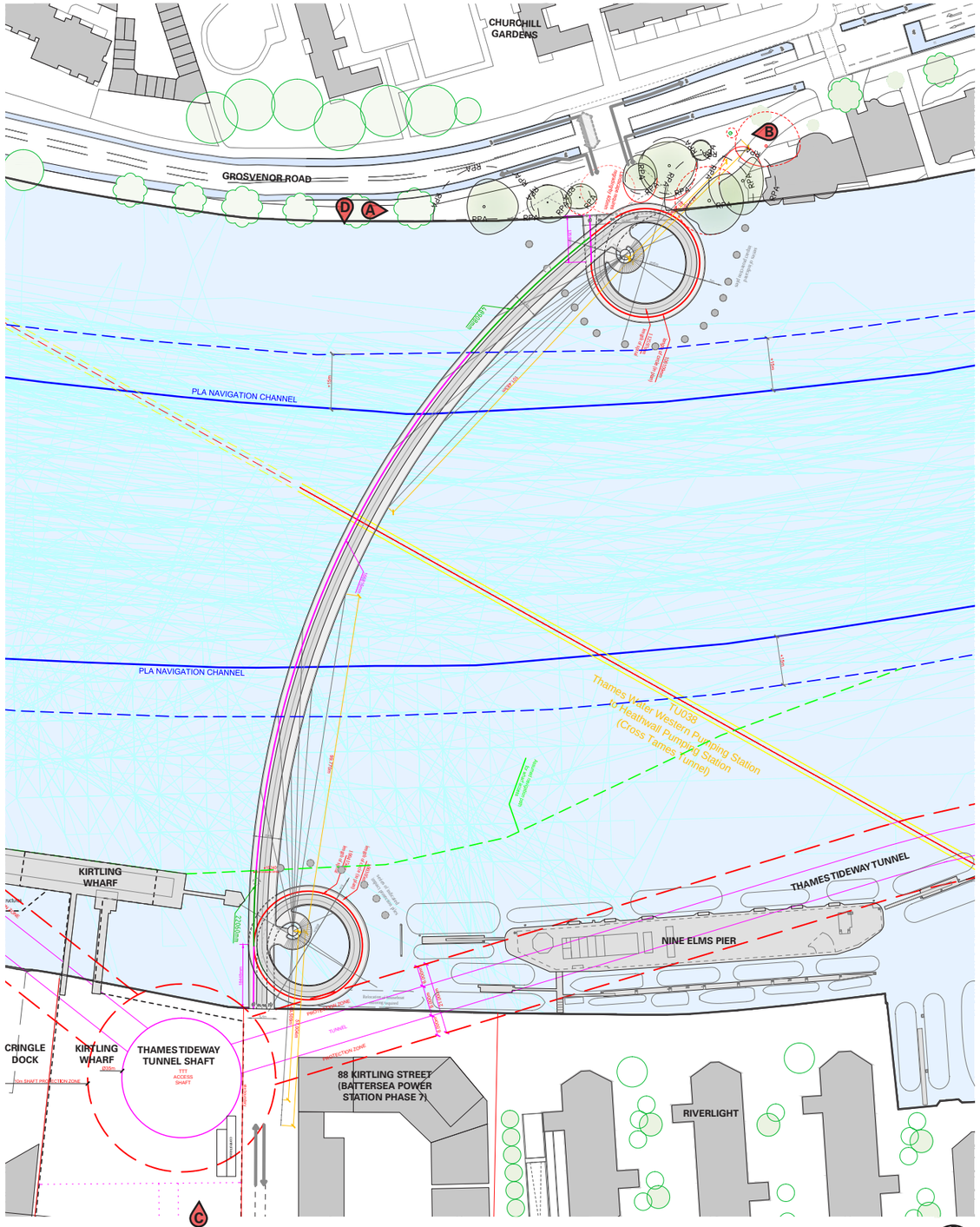
The spiral ramp landing concept rotating about the mast structure is common to the proposed landing arrangements at all three location options. The access ramps are positioned over the river minimising impact on the banks. A spiral staircase about the mast between the base and top of the spiral ramp is included in the general arrangement of both landings at this location. This may provide a shorter more attractive crossing for some pedestrians and is therefore likely to result in higher pedestrian demand.

A concept design for Location 4C has been developed which maintains the fundamental design and user experience concepts for the bridge but optimises the arrangement to respond to the specific geometry and situation of the landing sites.

The north bank landing site of Location 4C is approximately 90 metres down river (east) of the south bank landing, giving the crossing a diagonal alignment across the river. This alignment and the landing site characteristics have informed the development of an arced deck plan across the river. The spiral landing ramps and stairs circle about the masts on the eastern, down river, side of main span and landing points.

There is significant potential at Location 4C to enhance the riverside public realm with high quality public spaces created at north and south bank landings connecting into riverside walks. Outline proposals exist for a high level walkway extending from Battersea Power Station crossing Cringle Dock on the River front . Whilst details of this scheme are not currently available, there is a possibility of a direct connection between the bridge and the raised deck level. Subject to further investigation at future stages there may be an opportunity to develop an integrated landing solution for both.

Location 4C photographs of existing north bank and south bank (see plan opposite for view location points)



Concept Design General Arrangement Plan for Location 4C

Opposite Page: Visualisation of Nine Elms Pimlico Bridge at Location 4C looking towards Battersea Power Station from the south bank riverside walk

6.2.3 Location 4C [Grosvenor Road (Claverton Street) to Kirtling Street]

North Bank Arrangement

The geometry of the north bank landing arrangement is informed by the plan of the landing site. The arced alignment proposed lands at an acute angle to the river bank and uses the length of the landing site along the river to accommodate user access and the anchoring structure, given its relatively narrow width.

The Thames navigational channel passes relatively close to the north bank at this location. The C-shaped plan crosses the narrow space available between the riverbank and the navigational channel at a diagonal angle. This alignment maximises the distance of the ascending ramp which can be accommodated before the navigational channel and also allows for a smaller diameter deck spiral than other options, since a smaller proportion of the ascent to the full clearance height is provided by the spiral. The spiral ramp (and impact protection) are outside the navigational zone and with a small overhang to the bank. The ramps are designed to provide slopes of the same accessible gradient at all location options.

The existing north landing site is effectively a paved extension to the Grosvenor Road pavement. It is an under used piece of riverside amenity with significant potential to improve the public realm at this location for the benefit of local communities.

In the concept design, a new crossing is proposed on Grosvenor Road to the west of the junction with Claverton Street. This initial proposal is considered feasible in principle following consultation with TfL, however it would be subject to further investigation and development to determine the impact of the crossing on Grosvenor Road and the best connection with Claverton Street. Consultation with stakeholders will be required as part of this design development to mitigate any impacts on amenity including, for example, the possible loss or relocation of on-street parking bays.

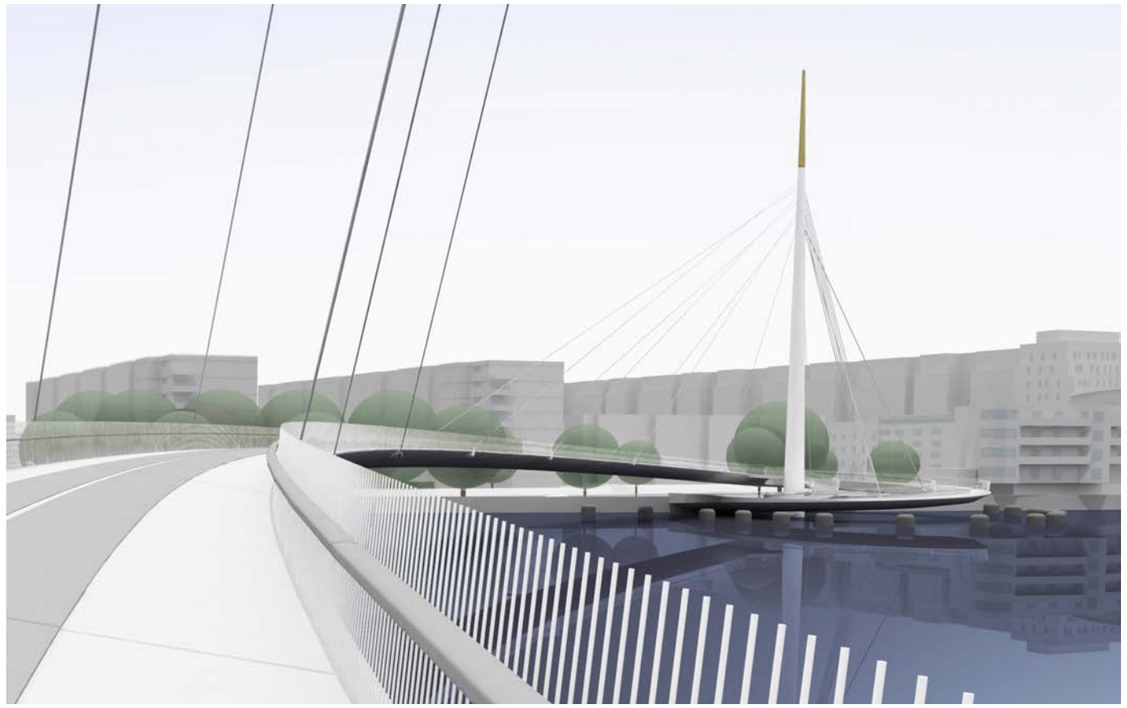
South Bank Arrangement

The proposed C-shaped plan arrangement of Location 4C meets the south bank perpendicular to the riverbank between the Nine Elms Pier structure and the Kirtling Wharf jetty structure. There are moorings close by where houseboats are due to return following Thames Tideway works, however the western-most mooring at the riverbank would likely require relocation from the post Thames Tideway end state mooring arrangement.

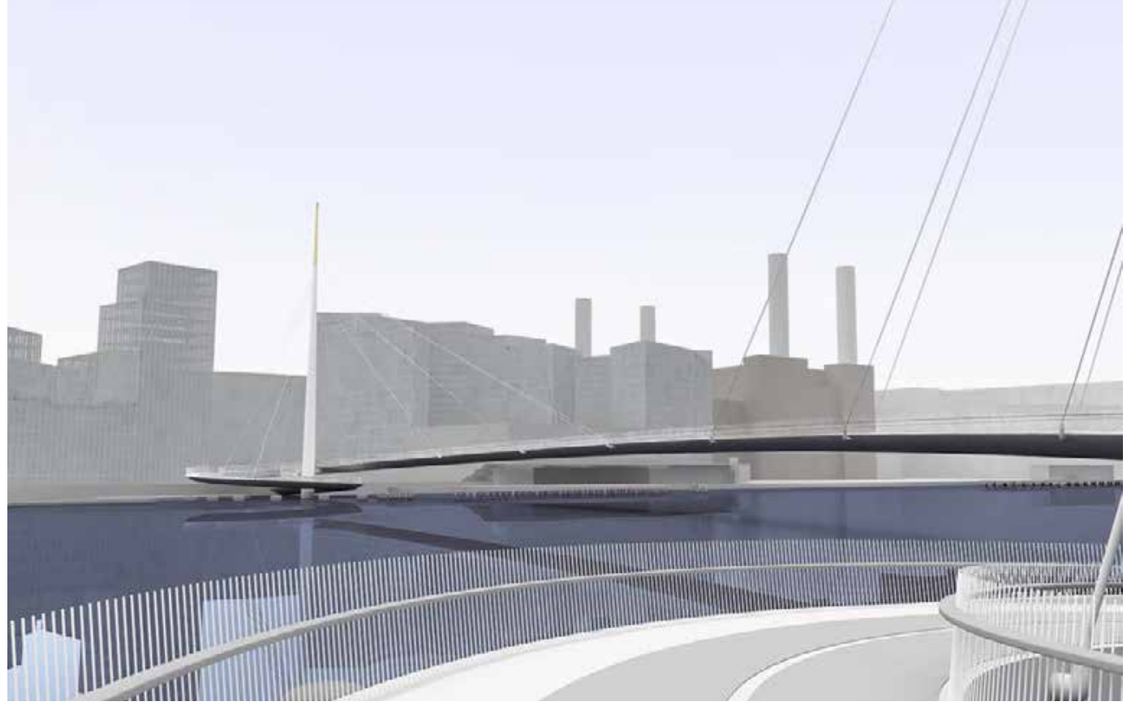
The landing site is 88 Kirtling Street, a currently undeveloped part of the Battersea Power Station masterplan. There is a potential opportunity to work with BPS and other stakeholders to develop a coordinated scheme marrying the bridge with their outline planning consented Phase 7 scheme.

To the west of the site is Kirtling Wharf which is currently a construction site for the Thames Tideway Tunnel. The Tunnel shaft is surrounded by a safeguarded exclusion zone, which limits the positioning of backstay foundations since construction is prohibited within this area and above the shaft. Access for the bridge however can cross the exclusion zone along the western boundary of the Phase 7 site. The bridge landing at this point offers an opportunity to integrate into the wider Battersea development, with outline plans to construct a high-level walkway along the south bank to the front of Cringle Dock.

The initial concept designs proposes that pedestrians and cyclists use the existing Cringle Street junction to access and cross Nine Elms Lane. An area of pavement has been safeguarded for transport which may help safely integrate cyclists into this junction. This initial proposal is subject to further coordination with TfL proposals for Nine Elms Lane to determine the optimal integration into the surrounding transport network.



View from main span of Location 4C bridge deck looking north towards north landing.



View from north spiral of Location 4C bridge deck looking south towards south landing.

6.2.3 Location 4C [Grosvenor Road (Claverton Street) to Kirtling Street]

Integration with future development on the southern bank

The south landing at Location 4C differs from others investigated since it does not have an immediate connection to existing transport routes at the riverbank. A bridge landing at this location offers the opportunity to develop the masterplan and connectivity of this area, particularly with regards to access to the river from Kirtling Street (and Nine Elms Lane), and to integrate a bridge with proposals for a High Level Walkway completing the riverside walk connection along this reach of the Thames.

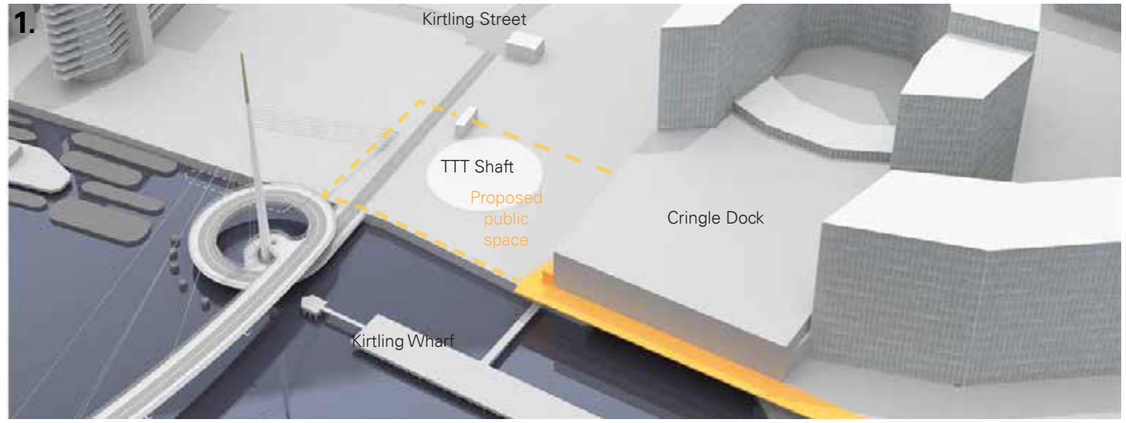
The following constraints and opportunities of the surroundings of the south landing have been investigated to consider possible modifications to the 4C arrangement which may be considered at future stages as part of a coordinated masterplan:

- Thames Tideway Tunnel
- Nine Elms Pier
- High Level Walkway
- Greenspace
- Kirtling Wharf
- Transport Connections
- Development sites and land use
- Cringle Dock Waste Centre
- Nine Elms Lane
- Land Ownership

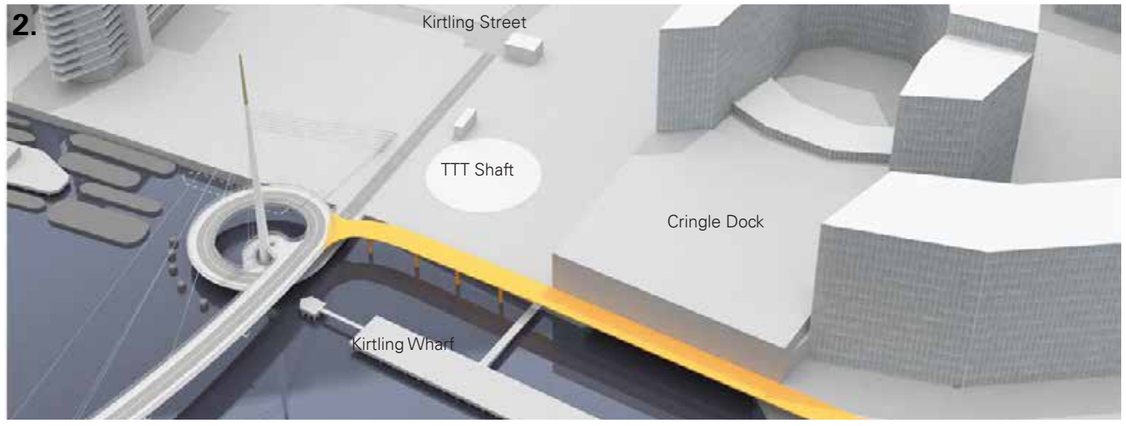
In addition to the general arrangement proposed for Location 4C during Stage 2, conceptual options for the south landing arrangement have been developed which could integrate a bridge at this location with various scenarios for the future of the area.

Three options for concept arrangements at the south landing which respond to the constraints and opportunities of the area are illustrated on this page. Although there are unknowns in the future development of this site, these studies consider that this site is a good and viable location option for a bridge, with each option benefitting future placemaking and connectivity of the area.

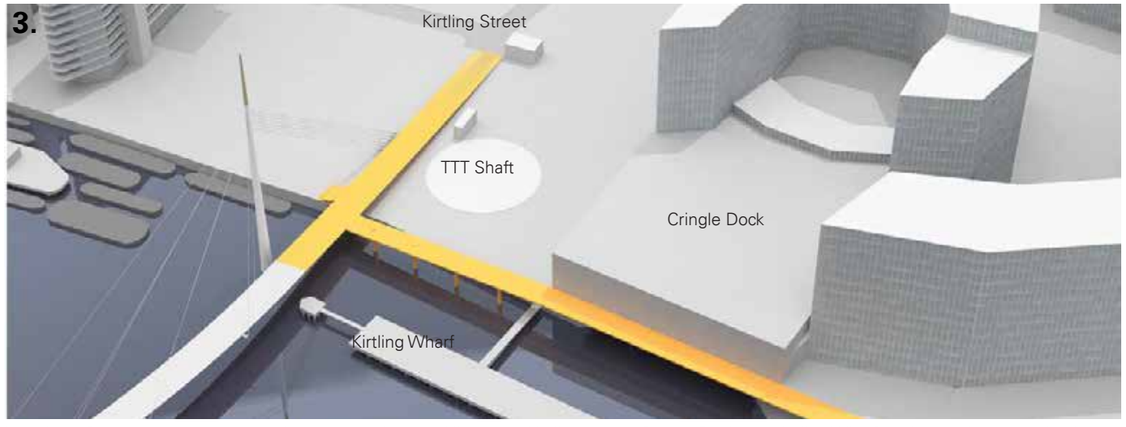
High Level Walkway connecting the Kirtling Wharf site and Battersea Power Station Park, proposed as a part of Cringle Dock and BPS Masterplan Proposals.



Location 4C concept arrangement with no connection between the bridge and a High Level Walkway over Cringle Dock.



Location 4C concept arrangement with a connection to a High Level Walkway over Cringle Dock and Kirtling Wharf, at the top of the deck spiral.



Location 4C concept arrangement with a connection to a High Level Walkway over Cringle Dock and Kirtling Wharf, with a straight ramp landing at Kirtling Street and riverfront access via staircase.

6.2.3 Location 4C [Grosvenor Road (Claverton Street) to Kirtling Street]

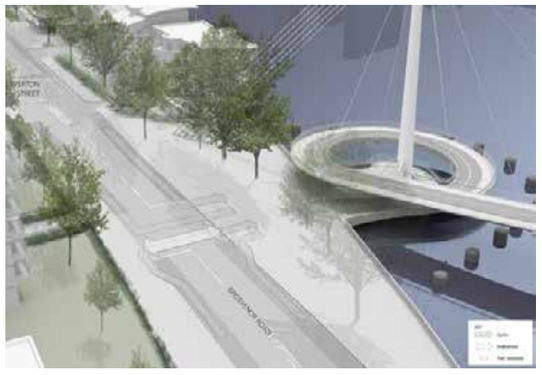
Design

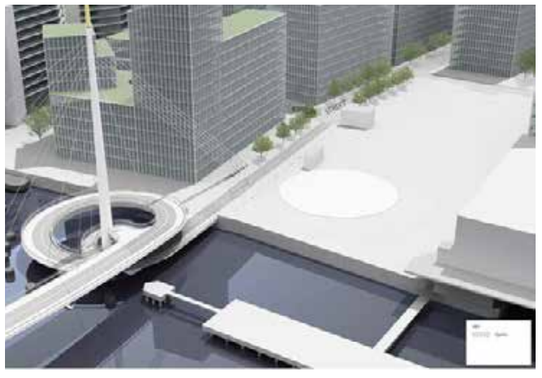
The 'C' shape bridge arrangement proposed for Location 4C is a modification of the original 'S' shape concept to best fit the alignment of the site landings which are not directly across the river from each other. The arced alignment is technically feasible and responds well to the necessary oblique landing arrangement of the north landing site and to the perpendicular landing at the south bank. The design concept at Location 4C has differing aspects up and downstream and does not appear as an individual balanced element in the townscape in the same way as at the alternative locations. Rather, the smooth arc integrates with Grosvenor Road as a branch connection to the flow of traffic along this route. The presence in the townscape for user wayfinding is less clear to the south, since the landing it is not immediately visible from Nine Elms Lane. This could however encourage a better user experience by managing the dispersal of bridge users.

The arc arrangement with spiral landings on the same side of the deck means that users on the path of shallowest gradient can cross the bridge without having to cross the cycle lane, which is advantageous for user access.

Location 4C offers the greatest opportunity for contribution and benefit to the future townscape emerging on the Nine Elms Reach of the Thames. Valuable new views of Battersea Power Station would be created from the river crossing, as well as views of the bridge from new and existing public riverfront space along the full length of the reach. The symmetrical arc arrangement appears consistently smooth from all viewing perspectives since there is no point of inflection in the deck at mid-span, as there is with 'S' shaped deck which can create a 'kink' in the deck when viewed from certain perspectives.

Visualisation of initial concept design arrangement for Location 4C (from north)





Visualisation of concept design landing arrangements for Location 4C (north landing above and south below)

The existing landing sites both north and south are currently of low amenity value to the public, representing significant design opportunity for public realm improvement and future place-making. This is particularly the case at the undeveloped south bank where a coordinated solution for integration with the prospective high level walkway could improve public access along the south bank and complete the river walk connection to Battersea Power Station Park. It should be noted however that the design opportunity to provide optimal public realm space for a bridge at the South landing would require careful collaboration and planning with developers, and that potential connection to the high level walkway could be a risk to the elegance of the design concept if not integrated with proper consideration.

Location 4C offers the greatest further design opportunity but also has the most unknowns due to ongoing future development. Further coordinated design investigations would be necessary for the south landing at Kirtling Street in the context of the Vauxhall Nine Elms Battersea Opportunity Area Planning Framework. Initial studies have been undertaken at this stage to investigate the opportunities for integration with public space and connectivity in the emerging district.

Environmental

The initial environmental assessments identified that with regard to ground conditions, water resources and flood risk, aquatic, terrestrial ecology, archaeology and noise there are no specific environmental constraints that would preclude development at this location, subject to appropriate (standard) mitigation being applied.

Like the other location options under investigation the largest identified environmental constraint are trees.

According to the arboricultural analysis undertaken at this stage it is likely that two moderate quality trees and one low quality tree would need to be removed at the north landing. It would likely also be necessary to carry out extensive pruning on a high quality tree and a moderate quality tree depending on the final backstay arrangement. In addition less significant pruning would be required for two additional moderate quality trees and incursions will be required within the Root Protection Area's of two moderate quality trees and one high quality tree.

There are no trees affected by the southern landing point of the bridge for Location 4C.

Heritage

Location 4C forms part of the setting of listed buildings and the northern landing lies on the border between Churchill Gardens and Dolphin Square Conservation Areas. The design of the bridge could complement the post-war aesthetic of the listed Churchill Gardens on the north bank and the proposals have the potential to enhance their setting. A bridge at this location also has the potential to enhance the setting of the Grade II* listed Battersea Power Station and the surrounding townscape on the south bank.

There are designated views towards Battersea Power Station from the Dolphin Square Conservation Area, but the potential for harm to these designated views from the conservation areas north of the river is limited. Indeed, Location 4C has the potential to benefit this section of river and townscape overall, and in particular to improve the townscape in the vicinity of both Battersea Power Station and Churchill Gardens. The more open character of the townscape in this location, in comparison to Location 3, leads to greater potential for enhancement.

Overall Location 4C does not adversely impact on heritage assets and has potential to enhance the setting of a series of listed buildings and the Conservation Area. It also has potential to enhance the townscape overall, in views from Churchill Gardens, Battersea Power Station and from the Thames Path.

Planning Constraints

It is considered that Location 4C presents the most favourable option from a planning policy perspective. On the northern bank, the proposed landing location is well positioned in terms of accessibility due to its close proximity and visual access to Claverton Street.

While the site is located in close proximity to a number of heritage assets, the impact is not considered to be overtly harmful to this setting. This also applies to the impact on residential amenity, which is likely to be considered more neighbourly in light of the draft new Westminster City Plan's policies than Locations 2 and 3.

The southern landing location is located adjacent to a safeguarded wharf which will be a key consideration if this option is progressed. The site is well positioned within the Opportunity Area allowing permeability southwards towards Nine Elms Lane and beyond. It is located in the closest adjacency to Battersea Power Station, one of the key strategic sites within the London Borough of Wandsworth, which is set to drive footfall considerably in the Opportunity Area.

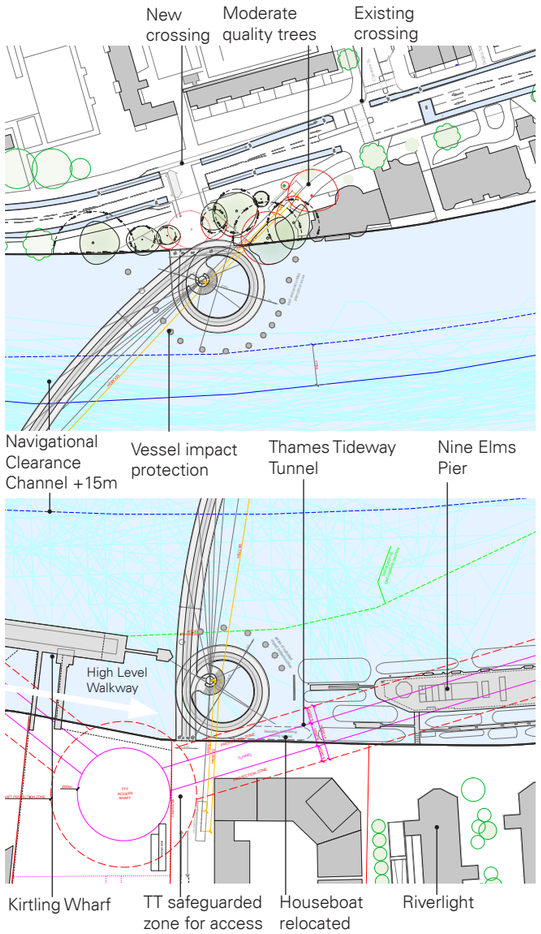
6.2.3 Location 4C [Grosvenor Road (Claverton Street) to Kirtling Street]

Engineering

Location 4C is the longest of the three crossings but is nevertheless an attractive option. At the north end, the proximity of the Navigation Channel to the river bank restricts the space available for the spiral ramp. The bridge is located in an area of the river that experiences a significant number of manoeuvring and turning vessels, including those accessing Cringle Dock and the safeguarded Kirtling Street Wharf on the south bank. These will present some constraints during construction, but feasible mitigation measures have been proposed to alleviate them. Conversely, construction access and the space available for the land-based works is much better at this site, particularly to the south. The route also offers opportunities to integrate the bridge into the wider Battersea development, with plans for a possible high-level walkway along the south bank. The south abutment and approaches to the bridge will need to be considered alongside proposals for the new building at 88 Kirtling Street to ensure a co-ordinated and coherent overall solution.

This location generates the longest of the bridge solutions, and requires a modification to the competition design concept. The longer span means that the individual sections of bridge deck that need to be handled during construction will be longer, and therefore heavier, unless additional temporary river piers are used. However, this is not considered to be a particular problem.

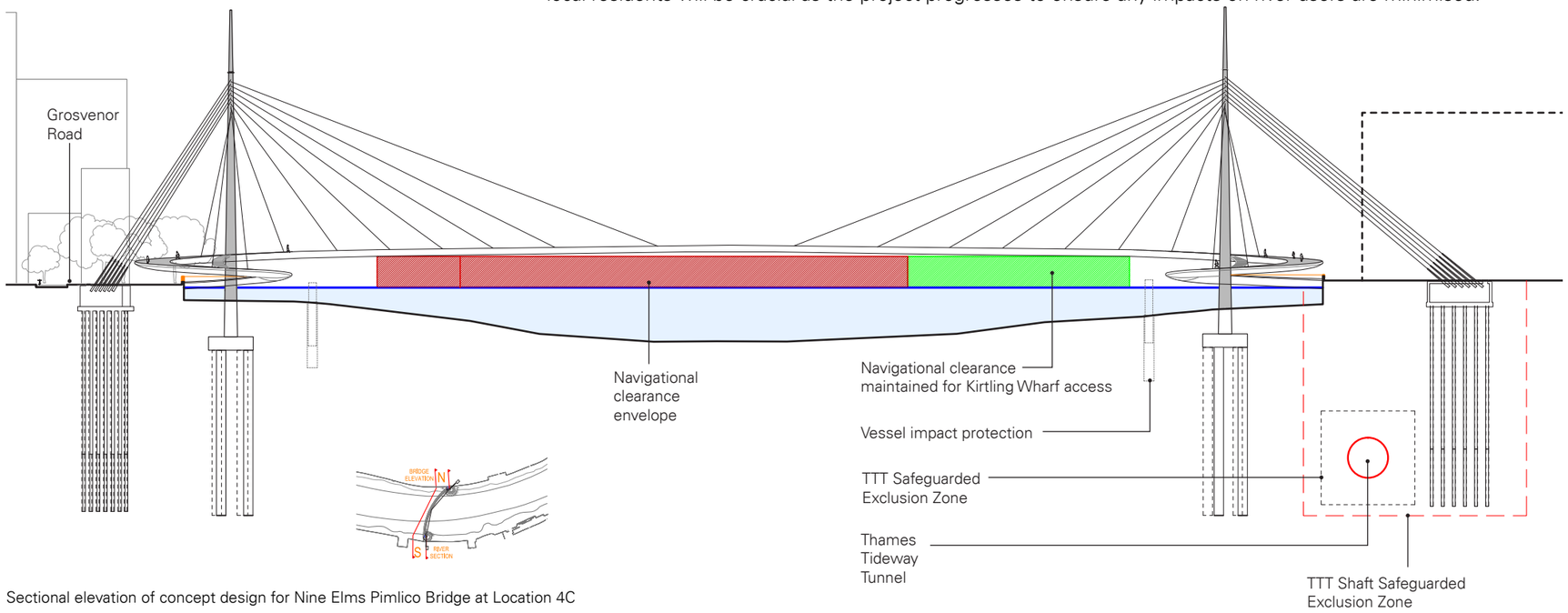
The south side backstay anchorage location is constrained by the new building at 88 Kirtling Street and the Thames Tideway tunnel and access shaft, but not in any way affecting construction feasibility. The possibility of a high level riverside walkway may introduce modifications to the bridge access.



Location 4C Landing Constraints Plan (North above, south below)

The Navigation Channel is close to the north bank, resulting in the mast foundations being close to the river wall and a small overhang of the spiral ramp over the river wall.

Space and access for construction is considerably better at this site than for options 2 and 3. On the south side, there is much more space and access is straightforward, assuming construction of the new building at 88 Kirtling Street has not yet started. On the north side the space is similar but slightly better.



Sectional elevation of concept design for Nine Elms Pimlico Bridge at Location 4C

River / Vessel Impact Protection

Location 4C demonstrates a slightly smaller overall impact on river users and marine operations in comparison to the other locations. Following consideration of impact to navigation, the impact to the operations at and adjacent to the proposed bridge landing locations and the relative risks of vessel impact Location 4C is identified as the preferred location.

In terms of vessel navigation the northern landing is close to the area currently being used by barges turning in the river to use Cringle Wharf. The landing area is slightly exposed to this but is unlikely to have a dramatic impact on this operation. Kirtling Street is also a safeguarded wharf which will be impacted by the landing area at the South. However, the existing arrangement (meaning the arrangement without Tideway's temporary works) into Kirtling Wharf is very restricted by the adjacent wharves. In consultation, the PLA noted that while the concept design for Location 4C allows access to the outer berth of Kirtling Wharf it would restrict access to the inner berth. This inner berth was not used when Kirtling was last in operation, but careful design in consultation with the PLA will be required at future stages of the project to ensure Kirtling Wharf remains operational. Cringle Wharf will also be impacted by the southern landing, however, as Cringle Wharf projects a reasonable distance into the river, the landing area is generally landward of the wharf and hence the impact on the operations at the wharf is not anticipated to be highly significant.

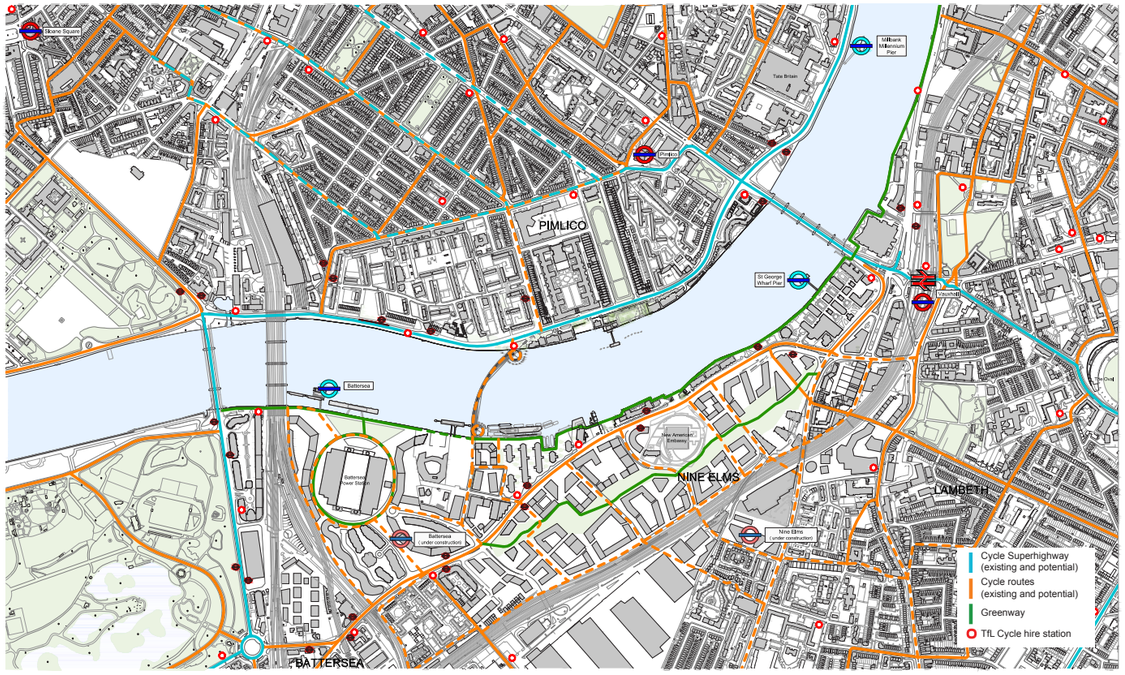
From a vessel impact risk perspective, the Location 4C northern ramp is considered to be the highest risk in the current form of the assessed sites due to the closer proximity to the navigation channel in a part of the channel which is shown to be frequently used by manoeuvring vessels due to the turn toward Cringle Dock and Kirtling Wharf.

However, it is noted that the design may be altered or refined based on site specific requirements which may mitigate the issues raised and vessel impact risks are not considered to be significantly worse at Location 4C than at the other locations assessed. Indeed the southern landing is well protected by the adjacent Kirtling Wharf jetty and Nine Elms Pier with its houseboats and is therefore at least risk of impact of all six of the landing zones considered.

Five houseboats at the western end of Nine Elms Pier are currently relocated due to Thames Tideway works, however in accordance to the Tideway Development Consent Order they are due to be returned at the completion of the works. According to the current concept design for Location 4C one of the houseboats which is due to be returned in the Tideway end state would need to be relocated to allow the bridge to land at this point. Westminster Boating Base also use a mixture of small sailing boats, kayaks and powerboats within the local vicinity of the Nine Elms Reach of the Thames and careful collaboration will be required to minimise any impact to their operations.

Continued consultation with Port of London Authority, Nine Elms Pier residents, Westminster Boating Base and other local residents will be crucial as the project progresses to ensure any impacts on river users are minimised.

6.2.3 Location 4C [Grosvenor Road (Claverton Street) to Kirtling Street]



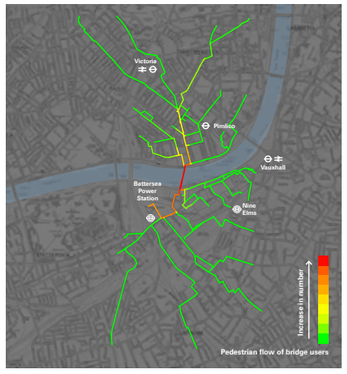
Location Plan showing local public transport and active travel connections with Location 4C

Connectivity

Location 4C offers good potential connectivity directly to the existing Cycle Superhighway 8 on Grosvenor Road serving demand towards the City in the north east. A connection to the proposed improved route on Nine Elms Lane and Battersea Park Road links with Cycle Superhighways 5 and 8 at Vauxhall and Queens Circus roundabout respectively, as well as to Battersea and residential areas to the south west.

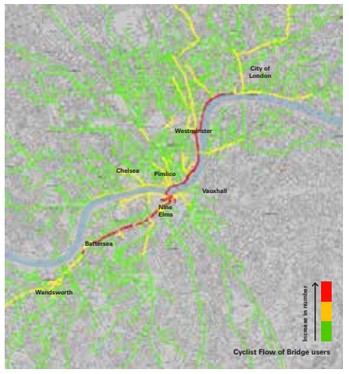
Claverton Street offers direct connectivity northwards from Location 4C. As a wide and relatively quiet road, this street offers strong potential for a high level of pedestrian and cycle service connecting towards Victoria.

A safe and attractive route south can potentially be provided through the Royal Mail Group site by connecting into the south-western end of Ponton Road running parallel to the railway and through Arch 42 under the viaduct toward the Nine Elms Underground Station, Lambeth and South London. A good alternative route to the south is also available past the new Battersea Underground Station and via Thessaly Road.



Projected user demand - Pedestrians (12 hour weekday flows)

Projected user demand - Local cyclists (12 hour weekday flows)



Projected user demand - City wide cyclists (12 hour weekday flows)

Forecast Demand

The comparative Transport Demand Assessment undertaken in Stage 2 indicates that in 2031 between 3,200 (main test) and 5,700 (maximum sensitivity test) pedestrian trips are forecast per 12-hour average weekday and 3,200-4,900 cycling trips. That equates to a total of between 6,400 and 10,600 combined cycle and pedestrian trips per average day. This represents a similar level of demand to Location 2, but lower than Location 3.

It should be noted that this assessment still represents a comparative assessment of alternative locations and the absolute level of demand projected is to be confirmed in later stages as the assessment is further refined and parameters updated. However, to give this comparative context, the existing (2017) level of demand on Lambeth Bridge is 8,728 combined pedestrian and cyclists (although the split of pedestrians and cyclists is different).

Deliverability

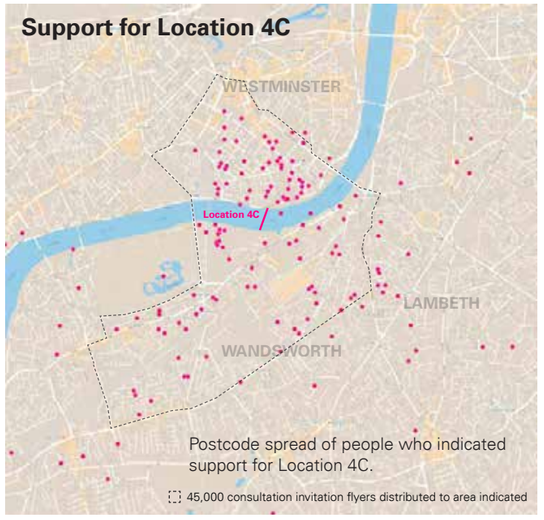
A site where the owner is unwilling to sell or surrender the land, could lead to complications for delivery of the project and the analysis has identified that Location 4C could potentially be the least constrained in this regard.

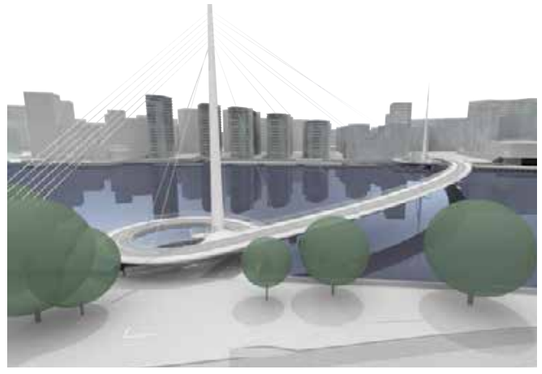
The final costs will be confirmed as the design solution develops, however, preliminary analysis undertaken at this stage indicates the spread of construction cost between the three locations is relatively narrow, at approximately 5% and so should not be a major differentiating factor in selecting the preferred location. However it is notable that Location 4C is predicted to have a lower construction risk than Location 3.

The future programme for the project at this location would need to be carefully coordinated with surrounding developments including Thames Tideway Tunnel, Nine Elms Lane improvement works and Battersea Power Station Phase 7 to help deliver an integrated solution.

Consultation

- 45% of public feedback indicated support for Location 4C
- Most supported and least opposed of the three locations, with overall net support.
- Supported due to improved access to Battersea Power Station, connections to transport links, minimal impact on riverbank landings and a positive relationship with employment and amenities including retail, leisure and transport.
- Some opposition due to perceived close proximity to Chelsea Bridge and benefit focussed towards the western end of the Nine Elms reach.
- Location 4C was the most supported location in Wandsworth and Westminster, although still with net opposition in Westminster. Strong net support in Wandsworth and Lambeth, although it is Lambeth respondents least preferred option.

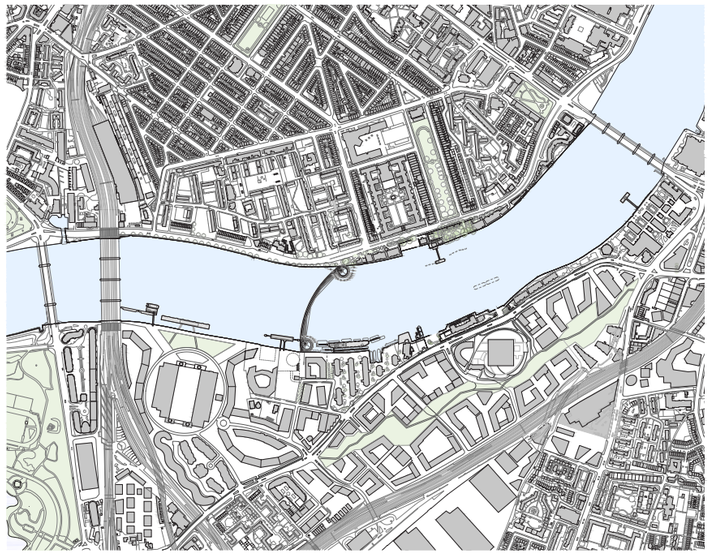




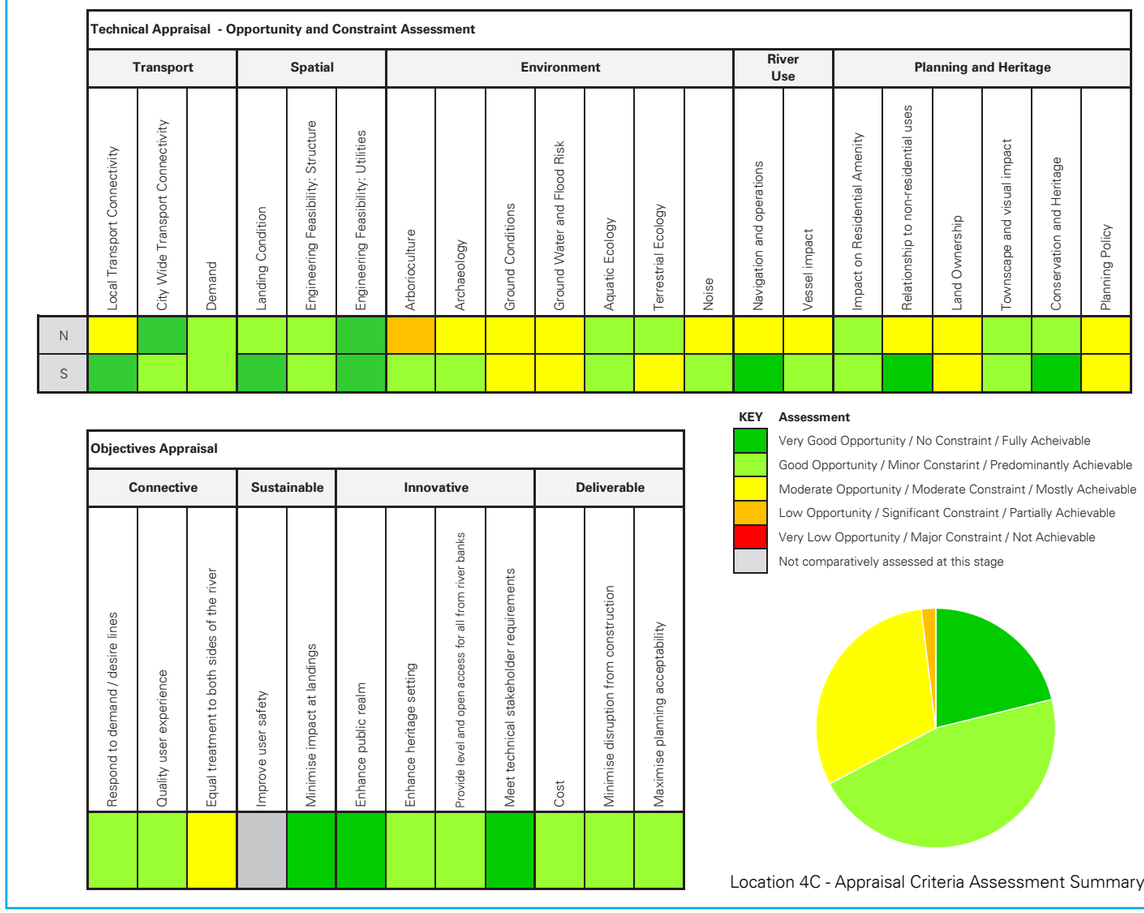
Visual impact at north landing viewed from Churchill Gardens Keats House residences.

Visual impact at south landing viewed from houseboat moorings at western end of Nine Elms Pier.

6.2.3 Location 4C [Grosvenor Road (Claverton Street) to Kirtling Street]



Assessment	Pros	Cons
Design Team	• Good transport demand. • Highest proportion of pedestrian demand. • Excellent local connectivity to Battersea Power Station attractor/destination. • Good wider connectivity at the north and south bank. • Good route dispersal network at landings to moderate user flows. • Good landing space availability at north and south. • Allows for continued river operations. • Excellent opportunity to shape public realm and place making and contribute positively to current plans. • Potential to benefit south bank river walk. • High quality, safe, mixed user experience. • Central location between existing bridges for pedestrian and cycle use. • Strongest public support - the only option which has a net positive support. • Likely lower planning risk associated with this location in Westminster.	• Likely removal of one moderate, and two low quality trees at the north bank landing. • Possible loss or relocation of on-street parking bays at the north landing. • Some impact on the houseboat community at the south bank, re-configuration of one mooring required from Tideway end-state. • Proximity and impact on safeguarded Kirtling Wharf. • Impact on Westminster Boating Base operations to be considered. • Relatively long span. • Architecturally less prominent in the townscape than other options. • Uncertainty of future urban development context at the south landing represents some risk to the design.
Stakeholders	• TfL, LBL and GLA note good potential pedestrian and cycle connectivity to both north and south. • TfL, BPS, GLA note good strategic connection into Power Station at heart of VNEB Opportunity Area. • GLA note significant potential benefits for development on the south bank to be explored. • The TT diverts out of the river channel at this location and its access shaft protection zone could provide an access route. • WCC and Westminster residents acknowledge potential north landing as under used public space. • GLA note lowest impact on existing public realm. • BPS note potential to integrate with Thames Path • TfL, LBL, GLA, HE note no significant constraints.	• WBB noted careful collaboration required as north landing of a bridge at this location could have an impact to their operations. • Nine Elms Pier residents concerned by proximity and impact on houseboat moorings. • Westminster Residents are concerned about the impact of cyclists and pedestrians crossing Grosvenor Road and the perceived impact on Claverton Street and further connections north. • PLA note careful consideration required to maintain Kirtling Wharf operation.



Location 4C - Appraisal Criteria Assessment Summary

RECOMMENDED PREFERRED LOCATION

Appraisal Summary

- Sufficient space north and south of the river for landings to integrate pedestrians and cyclists into the transport network, with good connections and route dispersal to safely manage user traffic.
- Good connectivity north and south of the river, however further investigation required to determine the impact of cycle and pedestrian demand on Claverton Street and further connections north.
- Crossing location is central on the Nine Elms Reach of the Thames with excellent connectivity and townscape relation to Battersea Power Station, a destination and attractor of local demand.
- The connection at the heart of the VNEB Opportunity Area with a mix of users presents the best opportunity to meet the aspirations of a healthy, safe and enjoyable bridge crossing experience for all.
- Opportunity to develop a coordinated scheme marrying the bridge with BPS's outline planning consent for Phase 7, which has the potential for significant public realm and place making benefits, but close coordination with development plans would be essential.
- Potential for significant benefit to the south bank river walk by completing the connection of the proposed high level walkway, however without careful integration this may pose a risk to the clarity and design concept of the bridge.
- The diagonal crossing alignment and fitting of the south landing between adjacent river structures means that architecturally, the proposal may be considered less prominent in its surroundings than at other locations.
- Strongest overall support from the public consultation.
- Arboricultural impact on north bank only, with potential loss of one tree of moderate quality and two of low quality.
- Outline structural arrangement and access routes proposed comply and coordinate with Thames Tideway Tunnel safeguarding.

Technical Appraisal - Constraints and Opportunities

The constraints and opportunities of the three locations have been appraised by considering a range of factors which are likely to have a significant bearing on the relative feasibility of constructing a bridge at each location.

The analysis has been supported by the detailed technical studies undertaken by specialists from a variety of disciplines including design, heritage, engineering, river use, transport, environment, planning and deliverability and developed in consultation with stakeholders.

This appraisal utilises a colour coded rating system to comparatively assess each location against the identified criteria set out below. The outcomes of the technical appraisals for each location are compared and summarised in the matrix below:

Ability to Meet Objectives Appraisal

The objectives of the project were defined in the initial project brief at Stage 1. The ability to achieve each of the identified Project Objectives for each location have been assessed using a colour coded rating system set out below.

The analysis has been developed in consultation with stakeholders and has been supported by detailed technical studies undertaken by specialists in design, engineering, access, river use, transport, environment, cost, planning and heritage.

The assessment of each location's ability to achieve the project objectives is summarised in the matrix below:

KEY **Technical Assessment**

- Very Good Opportunity / No Constraint
- Good Opportunity / Minor Constarint
- Moderate Opportunity / Constraint
- Low Opportunity / Significant Constraint
- Very Low Opportunity / Major Constraint
- Not comparatively assessed at this stage

KEY **Objectives Assessment**

- Fully Achievable
- Predominantly Achievable
- Mostly Acheivable
- Partially Achievable
- Not Achievable
- Assessment not differentiating comparison at this stage

		Technical Appraisal - Opportunity and Constraint Assessment																				Objectives Appraisal											
		Transport			Spatial			Environment							River Use		Planning and Heritage						Connective			Sustainable		Innovative				Deliverable		
		Local Transport Connectivity	City Wide Transport Connectivity	Demand	Landing Condition	Engineering Feasibility: Structure	Engineering Feasibility: Utilities	Arboriculture	Archaeology	Ground Conditions	Ground Water and Flood Risk	Aquatic Ecology	Terrestrial Ecology	Noise	Navigation and operations	Vessel impact	Impact on Residential Amenity	Relationship to non-residential uses	Land Ownership	Townscape and visual impact	Conservation and Heritage	Planning Policy	Respond to demand / desire lines	Quality user experience	Equal treatment to both sides of the river	Improve user safety	Minimise impact at landings	Enhance public realm	Enhance heritage setting	Provide level and open access for all from river banks	Meet technical stakeholder requirements	Cost	Minimise disruption from construction	Maximise planning acceptability
Location 2	N																																
	S																																
Location 3	N																																
	S																																
Location 4c	N																																
	S																																

For each location option the majority of the technical and objective criteria assessments are positive, i.e. all locations show predominantly moderate to very good levels of opportunity, relatively few constraints, and a good ability to achieve the project objectives. It is therefore recommended that on this balance, all three locations are feasible, viable options for a bridge, that would provide a net benefit and support the scheme's objectives.

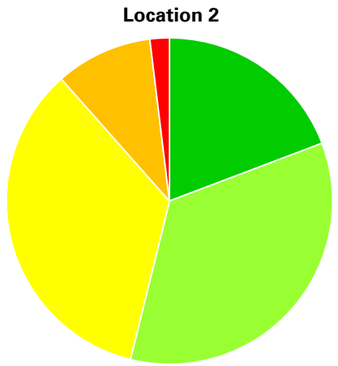
The overall appraisals of the three options are closely balanced in their outcomes, however each offers different relative strengths and challenges in comparison with the others. The appraisal methodology assesses each of the criteria equally using a consistent scale.

By comparing the overall appraisal outcomes and weighing up the most challenging factors and greatest opportunities unique to individual locations, it is recommended on balance that Location 4C be taken forward as the preferred location. The recommendations for each location are summarised below and supported by the appraisal summary charts.

FEASIBLE ALTERNATIVE TO PREFERRED LOCATION

Location 2
[Pimlico Gardens to Bourne Valley Wharf]

Location 2 is considered to have a strong architectural response to the townscape and existing built environment context; a bridge here would fully achieve the design and user experience objectives, although it is the closest location option to an existing crossing. It has the shortest crossing distance between open and accessible riverside landing spaces and crosses a section of river not in direct proximity to operating wharves. Despite this strong technical case, Location 2 is considered to face the greatest planning challenges and have the highest environmental impact. The arboricultural impact on high quality trees and the public amenity of Pimlico Gardens (a designated Asset of Community Value in a conservation area), are material planning considerations and local public opposition to this location in Westminster reflects this. Therefore, on balance, Location 2 is recognised as a feasible and technically good alternative to Location 4C, but is not preferred due to the potential impact on neighbours and potential environmental impacts.

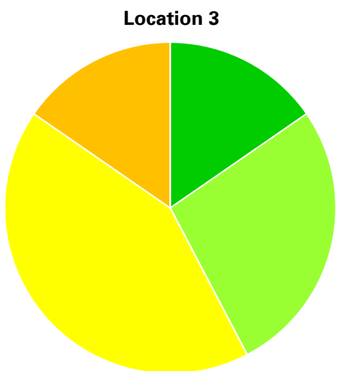


Appraisal Criteria Assessment Summary Chart

FEASIBLE ALTERNATIVE TO PREFERRED LOCATION

Location 3
[Dolphin Square to Prescot Wharf]

Location 3 has the best transport demand case, although this is marginal across all three options. It also has the lowest environmental impact due to its low arboricultural constraint. However it faces the greatest technical challenges of the three options at its south landing, where the position of underground utilities, the Thames Tideway Tunnel and the adjacent safeguarded Middle Wharf combine to significantly restrict the design arrangement. This also introduces significant risk in this option. Architecturally, this location has the weakest relationship to the townscape, and the landing conditions do not allow for the most successful expression of the design concept, either locally at the banks or in the riverscape. On balance, Location 3 is recognised as a feasible alternative to Location 4C, but is not preferred as it does not exhibit any clear differentiating opportunities over the other options, and the engineering challenges are more complicated.

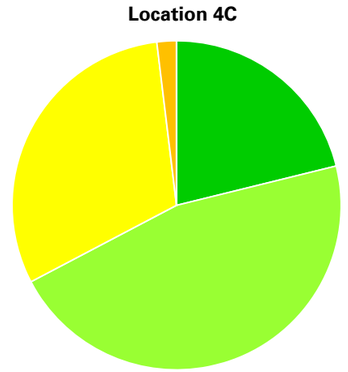


Appraisal Criteria Assessment Summary Chart

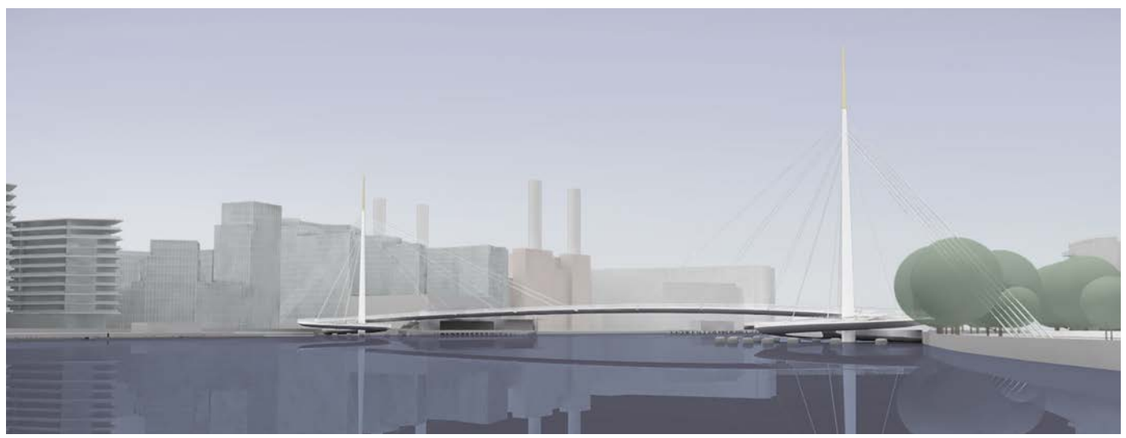
RECOMMENDED PREFERRED LOCATION

Location 4C
[Grosvenor Road (Claverton Street) to Kirtling Street]

Location 4C provides a clear link to the growing development within and around Battersea Power Station as a strong new destination at the heart of the Vauxhall Nine Elms Battersea Opportunity Area. The location is central between adjacent bridges. It would support safe, healthier travel for communities on both sides of the river by providing good local and wider connectivity at both the north and south bank for an approximately equal demand of pedestrians and cyclists. This option is of slightly greater length than the others which will affect transport benefits, but modelling suggests this impact is marginal. Whilst a longer bridge will cost more, the relatively favourable landing conditions on each bank together with the opportunities for construction compounds and reduced requirement for impact protection on the south side, suggest that construction costs would be similar to the other options. This location links to the Power Station as a destination, but does not impact adversely on its heritage setting. Indeed analysis suggests that the design could positively enhance the riverscape, local views and the heritage setting. The southern landing is complicated and the site specific design which is developed at the next stage must carefully address the challenges and impacts together with stakeholders and local communities. However it also provides the best opportunity for the bridge to help shape the public realm around this landing site, contributing to and enhancing the provision of a co-ordinated public realm treatment which would link the Power Station and adjacent developments, and the Thames Path. It has the strongest public support of the three options. Overall, Location 4C provides the greatest advantages when compared to all other alternatives offering the best opportunity to connect the developing Opportunity Area to new and existing onward routes locally and to the wider city. It also provides the opportunity to positively shape the riverside public realm on both sides of the river whilst reducing any negative impacts that our analysis and consultation with stakeholders and local communities has identified.



Appraisal Criteria Assessment Summary Chart



Visualisation of the recommended preferred location 4C with Battersea Power Station in the background

7.0 Next Steps

7.1 Stage 3 (Developed Design)

Identification of the preferred location allows the project to move on to Stage 3, working towards the submission of a Consents Application.

Arriving at a developed design will mean the construction costs can be more accurately determined and incorporated within the wider Nine Elms infrastructure programme and allow consents, deliverability, and procurement and funding strategies to be developed in conjunction with key stakeholders.

A preferred location will also then enable further development of the case for the bridge and detailed assessment of impacts. It is envisaged that this will include the following additional services:

Transport

Conduct a more detailed transport demand assessment of the selected location to feed into the further design of the bridge, its landings and onward connectivity. The assessment may also be used to investigate how the bridge can provide relief to predicted congestion on other networks.

During this stage it is expected that a change in methodology will be required to improve the robustness of the analysis moving from a comparative to absolute prediction of demand.

A full transport assessment is expected to be required to accompany a Consents Application which would be based on the findings of this detailed assessment, set out the impact of the proposals, inform the strategic case for the bridge and inform the development of proposals for integration to surrounding roads and wider transport network at the landing points.

Environment

It is considered likely that any application for consent would have to be supported by an Environmental Impact Assessment (EIA), including further study to describe the likely environmental effects, as well as possible mitigation measures. In order to fully determine this and to define the precise scope and methodology of this work a formal EIA screening would need to be undertaken with the relevant planning authorities after the identification of a preferred location.

7.2 Recommendations

It is recommended that:

- The Client formally adopt Location 4C - Grosvenor Road (Claverton Street) to Kirtling Street as the location for the Nine Elms Pimlico Bridge.
- The Design Team further refine the case for the recommended location and further develop the design proposals to demonstrate buildability and address stakeholder concerns and develop an outline programme that addresses the constraints of the Tideway site, and Battersea Power Station's Phase 7 plans to ensure that if the project is taken forward the opportunity for placemaking, particularly at the southern side is not lost.
- The Design Team is instructed to undertake Stage 3 works on the preferred location identified above. It is expected that this work will include:
  - Preparation of Developed Design including co-ordinated outline engineering design and outline specifications to enable a Consents Application to be made.
  - Preparation of a Consents Application.
  - Public consultation on developed design proposals as part of the Consents Application process.

Opposite Page: Aerial visualisatiion showing the the preferred location on the Nine Elms Reach of the Thames