



RIVER CROSSINGS: SILVERTOWN TUNNEL

SUPPORTING TECHNICAL DOCUMENTATION

SILVERTOWN CROSSING ASSESSMENT OF NEEDS AND OPTIONS

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October 2014

This report sets out in detail the need for a new river crossing at Silvertown, examines and assesses eight possible crossing options and identifies the preferred option.

This report is part of a wider suite of documents which outline our approach to traffic, environmental, optioneering and engineering disciplines, amongst others. We would like to know if you have any comments on our approach to this work. To give us your views, please respond to our consultation at www.tfl.gov.uk/silvertown-tunnel

Please note that consultation on the Silvertown Tunnel is running from October – December 2014.



This report (or note) forms part of a suite of documents that support the public consultation for Silvertown Tunnel in Autumn 2014. This document should be read in conjunction with other documents in the suite that provide evidential inputs and/or rely on outputs or findings.

The suite of documents with brief descriptions is listed below:-

- **Silvertown Crossing Assessment of Needs and Options**

This report sets out in detail, the need for a new river crossing at Silvertown, examines and assesses eight possible crossing options and identifies the preferred option.

- **Outline strategy for user charging at Blackwall and Silvertown Tunnels**

This note sets out TfL's emerging approach to charging at Blackwall and Silvertown Tunnels.

- **Silvertown Tunnel Traffic Forecasting Report**

This report presents the traffic impacts that the Silvertown Tunnel would have on the highway network.

- **Silvertown Tunnel Introductory Transport Assessment**

This report presents the existing transport network and travel demand and assesses the transport impacts of the proposed Silvertown Tunnel.

- **Silvertown Tunnel Outline Business Case, including:**

- **Economic Assessment Report**
- **Distributional Impact Appraisal**
- **Social Impact Assessment**

Sets out the evidence for intervening in the transport system to address the issues of congestion and road network resilience at the Blackwall Tunnel.

- **Silvertown Tunnel Introductory Environmental Assessment Report**

This report summarises the environmental work undertaken to date and presents an early indication of the potential impacts of the proposal and the mitigation measures being considered.

- **Silvertown Tunnel Introductory Equalities Impact Assessment Report**

This report presents an early indication of the potential impacts of the proposal on gender, race and age groups. It also outlines potential mitigation measures to encourage a positive impact.

- **Silvertown Tunnel Introductory Health Impact Assessment Report**

This report presents an early indication of the potential impacts of the proposal on health and wellbeing. It also outlines potential mitigation measures to encourage a positive impact.



Silvertown Crossing: Assessment of Needs and Options

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Executive Summary

Background and purpose

London is growing rapidly and needs many more jobs and homes to support the rising population – and this growth will generate travel. The east and southeast London sub-region is expected to see a lot of this anticipated growth. Growth needs various types of transport infrastructure as set out in the London Plan – this includes both public transport and road infrastructure.

Transport for London (TfL) has already consulted on east London river crossings in general and there was overwhelming support for a new road tunnel between North Greenwich and the Royal Docks. In 2012, the Secretary of State for Transport designated the proposed Silvertown Tunnel a Nationally Significant Infrastructure Project. Having considered the range of views expressed during the public consultation, TfL together with the Mayor of London decided to continue the development of the Silvertown Tunnel proposal, with a view to submitting a development consent order application to construct and operate the tunnel.

Policy

Existing national, regional and local policies give general and specific support to new road-based river crossings in east London, particularly at Silvertown, to address strategic and local needs for cross-river accessibility and to relieve congestion and improve resilience. A number of the national and regional policy documents contain ‘criteria’ that are required to be taken into account in the assessment of a new river crossing at Silvertown.

Assessment of existing needs

Sustained investment in public transport in east London has resulted in a step change in cross-river rail connectivity over the last 20 years and a further high-capacity rail crossing in the form of Crossrail is under construction. However, while much investment has been made in rail-based cross-river public transport, there is currently only one cross-river bus link in east London, largely due to the lack of suitable road crossings.

Local pedestrian and cyclist trips across the river can be undertaken by one of several public transport links, including the Silvertown pedestrian and cycle crossing, the Emirates Air Line (running parallel to the proposed Silvertown crossing) as well as ferries and the recently re-furbished foot tunnels. In line with MTS policies and to support recent and future riverside growth, TfL is committed to investigating providing additional cross-river walking and cycling links.

However, there are only three east London road crossings between Tower Bridge and the Dartford Crossing (a 23 km distance); the low-capacity Woolwich Ferry (which does not operate 24/7) and the Rotherhithe and Blackwall Tunnels, which have restrictions on use by large vehicles and are over capacity, particularly in peak directions at peak periods.

Incidents at these crossings causing delay are excessively frequent, particularly at the Blackwall Tunnel and have adverse impacts across the wider road network, including:

- Unreliable journey times across a major Thames gateway affecting freight and commuter traffic;

- Congestion on approach roads to the tunnel affecting local residents and businesses;
- Lack of road network resilience over a wide area, with recovery from conditions of severe congestion taking, on occasions, many hours; and
- A considerable cost to the economy arising from drivers caught in congestion and goods taking (much) longer than planned to be delivered.

Despite recent reductions in private vehicle mode share, road-based travel is still very important in connecting people to employment in the local boroughs and given the growth of population and employment expected in east London, further growth in highway travel is forecast. In addition, the vast majority of freight in London is carried by road and predictions are for this to increase over the coming decades.

Assessment of future needs

East London is one of the largest regeneration areas in the UK - the east and southeast sub-region contains 12 Opportunity Areas and two Areas for Intensification.

The delivery of sustainable development in this area is fundamental to maximising London's economic potential. However, road traffic movements within the sub-region are constrained by the 'barrier effect' of the Thames. This 'barrier effect' limits local firm's access to markets, the size of retail and leisure catchments and residents' access to employment opportunities in a way that is unique to the eastern half of the capital. This constraint on economic activity makes delivering the scale of development planned for the area more difficult.

Population growth in the east and southeast sub-region and in Greenwich, Newham and Tower Hamlets in particular, is happening more quickly than previously anticipated and is predicted to significantly increase the volumes of road traffic in the study area together with the levels of congestion, particularly at the approaches to the Blackwall Tunnel.

Assessment of needs conclusion

The overall conclusion is that the existing river crossings in east London are inadequate to cater for current and forecast future demand for cross-river road traffic movement; they are operating at or over capacity and there are severe resilience problems, particularly at the Blackwall Tunnel. While public transport, walking and cycling are important, road travel is also vital for the proper functioning of the study area, traffic modelling undertaken by TfL using Greater London Authority growth predictions are for continuing increases in road travel and congestion. A solution to relieve congestion and improve resilience in the area around the Blackwall Tunnel is not only needed now to relieve existing conditions but also to ensure that the population and economic growth planned in the area can be accommodated and supported.

Project objectives

Taking account of the draft NPS for National Networks, Mayoral policy as set out in the London Plan and MTS, information gathered from the assessment of needs (including the latest information on population growth) and responses to consultation, the following are identified and adopted as the project objectives for the Silvertown crossing:

- PO1: to improve the resilience of the river crossings in the highway network in east and

southeast London to cope with planned and unplanned events and incidents

- PO2: to improve the road network performance of the Blackwall Tunnel and its approach roads
- PO3: to support growth in east and southeast London by providing improved cross-river transport links for business and services (including public transport)
- PO4: to integrate with local and strategic land use policies
- PO5: to minimise any adverse impacts of any proposals on health, safety and the environment
- PO6: to ensure where possible that any proposals are acceptable in principle to key stakeholders, including affected boroughs
- PO7: to achieve value for money

Strategic Options

The following eight river crossing options have been assessed against the project objectives:

- Do Nothing (Option A)
- Manage demand and maximise public transport use (Option B)
 - Congestion charging at Blackwall Tunnel (Option B1)
 - DLR extension to Falconwood (Option B2)
- Lower cost road crossings (Option C)
 - Silvertown Ferry (Option C1)
- Fixed links (Option D)
 - Blackwall Tunnel third bore (Option D1)
 - Silvertown lifting bridge (Option D2)
 - Silvertown bored tunnel (Option D3)
 - Silvertown immersed tunnel (Option D4)

Preferred option

Of the eight options considered, a fixed link in the form of a tunnel is the only river crossing option that would address the congestion and resilience problems experienced at the Blackwall Tunnel and support the growth planned for the area and accordingly, performs strongly against all of the project objectives.

The bored / immersed tunnel would:

- Reduce congestion at the Blackwall Tunnel
- Provide a highly resilient river crossing (based on its size)
- Reduce the number of incidents occurring at the Blackwall Tunnel
- Eliminate the (up to 20 minute) delays at the Blackwall Tunnel
- Provide additional river crossing capacity in east London
- Enable opportunities for new cross-river bus services

- Provide improved connectivity to Opportunity Areas including Canary Wharf and Royal Docks

The accompanying Outline Strategy for User Charging sets out the rationale for imposing user charging at the new crossing and the Blackwall Tunnel and explains TfL's initial proposals for how such a charge would operate.

Recommended tunnel option

A detailed examination of eight tunnel sub-options has been undertaken, analysing the impacts of the bored and immersed tunnel options, as well as short and long tunnel options.

The recommended tunnel option is a twin bored (long length) tunnel at Silvertown (with cross-passages between 100 and 350 metres).

1. Introduction

Introduction

- 1.1. Proposals for a river crossing from the Greenwich Peninsula to the north side of the River Thames at Silvertown have existed for a long time and a formal safeguarded zone for its construction has been in place since 1997¹.
- 1.2. The London Plan and the Mayor's Transport Strategy, in setting out how much of London's growth can be accommodated in the east and southeast sub-region, have identified the need for investment in new infrastructure to support this growth, including road infrastructure and improving cross-river connectivity. A crossing at Silvertown is specifically identified as part of the package of river crossings needed to support and accommodate this growth.
- 1.3. A package of river crossings was consulted on in 2012 and there was overwhelming support for a new crossing at Silvertown. Following this an application was made to the Secretary of State for a tunnel at Silvertown to be designated as a Nationally Significant Infrastructure Project (NSIP). The Secretary of State gave the project this designation on 26 June 2012, meaning that the tunnel would require authorisation under the development consent process established by the Planning Act 2008.
- 1.4. This report draws out information about the Silvertown crossing from earlier consultation materials and updates this information (where necessary) to provide a single concise report on the need for a new river crossing at Silvertown. It examines and assesses the possible options for addressing this need and outlines why the tunnel option is being progressed.

Strategic policy context

- 1.5. There is a strategic planning and transport policy framework for London which looks forward to 2031 and defines the key challenges that London has to address over this period. This is set out in the Mayor's spatial development strategy, the London Plan and the Mayor's Transport Strategy (MTS), published in 2011 and 2010 respectively. These documents contain strategic policies and proposals that guide the provision of infrastructure by TfL. In addition, an Infrastructure Plan is being developed with a view to 2050.
- 1.6. The overall thrust of the London Plan and the MTS is that London is a growing city and in order to support this growth, new infrastructure is needed. These documents identify that the provision of transport infrastructure is critical to support London's rising population and the associated new jobs and housing, particularly in the east and southeast sub-region.
- 1.7. While the Mayor is fully committed to continuing the shift from private to public transport across London and delivering the associated infrastructure, he also recognises that there are certain types of trips – freight trips and many business-related trips for example – which have no practical alternative but to take place by road. The scale of existing and future forecast growth in London and, in particular, the eastern parts,

¹ Government Office for London: Safeguarding direction under articles 10 and 27 of the Town and Country Planning Act 1990 relating to potential corridors for east Thames river crossings, transferred to the Mayor of London in 2001

together with current capacity constraints, combine to indicate that further investment in the road network is also required.

- 1.8. East London is one of the largest regeneration areas in the UK. The seven boroughs that make up the sub-region are expected to accommodate the largest proportion of new homes and jobs in London, 37 and 22 percent respectively, making the delivery of development in this area essential to maximising London's economic potential. However, movements within the sub-region are constrained by the 'barrier effect' of the Thames which is compounded by the greater river width of the river in east London and the need to maintain navigational clearances for large sea-going vessels. There are only three road crossings east of Tower Bridge in London - the Rotherhithe and Blackwall Tunnels and the Woolwich Ferry - and these all suffer from capacity constraints and in the case of the Blackwall Tunnel, severe resilience problems. This 'barrier effect' limits businesses' access to markets and residents' access to employment and other opportunities. This constraint on economic activity makes delivering the scale of development planned for the area very challenging.
- 1.9. The MTS sets out a long-term programme for investment in river crossings in east London. This package of river crossings includes the proposed road crossing at Silvertown and the now built Emirates Air Line, providing a pedestrian and cycle link between the Greenwich Peninsula and the Royal Docks along the same alignment as the Silvertown crossing, as well as options for improving connectivity further east including a new ferry at Gallions Reach and a longer-term fixed link at this location. TfL has recently consulted on options for developing crossings east of Silvertown and these are set out in a separate report as noted below.

Project history

- 1.10. In February 2012, TfL held an initial four-week consultation with stakeholders and members of the public on proposals for a new road tunnel at Silvertown and a new vehicle ferry at Gallions Reach. Approximately 3,900 responses were received, with 93 percent agreeing that more river crossings were required. Support for the Silvertown Tunnel was strong, with over 80 percent of respondents supporting this scheme.
- 1.11. A second consultation was held over a 14 week period (29 Oct 2012 - 1 Feb 2013). This consultation sought the views of the public and stakeholders on six key issues about the River Crossings programme of which one was the introduction of a road tunnel between Silvertown and the Greenwich peninsula (further details are set out in the Consultation Report²). There was a high level of support for this tunnel, with 76 percent of respondents (out of approximately 6400 responses) supporting it³. The consultation results from the relevant boroughs (including the three host boroughs of Greenwich, Newham and Tower Hamlets) and key business stakeholders (79 responses) showed that there was generally strong support for a new crossing at Silvertown⁴.
- 1.12. Having considered the range of views expressed during the public consultation, TfL together with the Mayor of London continued the development of the Silvertown Tunnel proposal separately but in tandem with other elements of the River Crossings programme

² Accent: [River Crossings Consultation - Report](#), 2013

³ Ibid

⁴ Ibid

(as set out in more detail in the East of Silvertown Needs and Options report⁵). The Silvertown Tunnel element is being taken forward and consulted on separately as a different planning process will need to be followed due to its designation as a Nationally Significant Infrastructure Project (NSIP) and because it is at a more advanced stage of development than other possible river crossings further east.

Purpose of report

- 1.13. The purpose of this report is to set out in detail the need for a new river crossing at Silvertown, to provide the context for this, to examine and assess the possible options for addressing this need and to outline the preferred option and the reasons for its selection. This report compiles and summarises information that relates to the Silvertown crossing into one concise report and together with the East of Silvertown Needs and Options report, supersedes the initial 'Assessment of Need'⁶ and 'Assessment of Options'⁷ reports.

Study area

- 1.14. The study area is highlighted in orange in Figure 1 and includes the three Silvertown crossing host boroughs of Greenwich, Newham and Tower Hamlets. The proposed alignment of the crossing is located in the Royal Borough of Greenwich and the London Borough of Newham. However, it is located immediately adjacent to, and is proposed to be operated in conjunction with, the Blackwall Tunnel which is partly located in the London Borough of Tower Hamlets. Accordingly, all three boroughs are classified as host boroughs.
- 1.15. A wider area that includes the boroughs that immediately adjoin the host boroughs - Barking and Dagenham, Bexley, Bromley, City of London, Hackney, Lewisham, Redbridge, Southwark and Waltham Forest - has been highlighted with a black border.
- 1.16. The east and southeast sub-region is also referred to in this report and includes the boroughs of Barking and Dagenham, Bexley, Greenwich, Hackney, Havering, Lewisham, Newham, Redbridge and Tower Hamlets⁸.

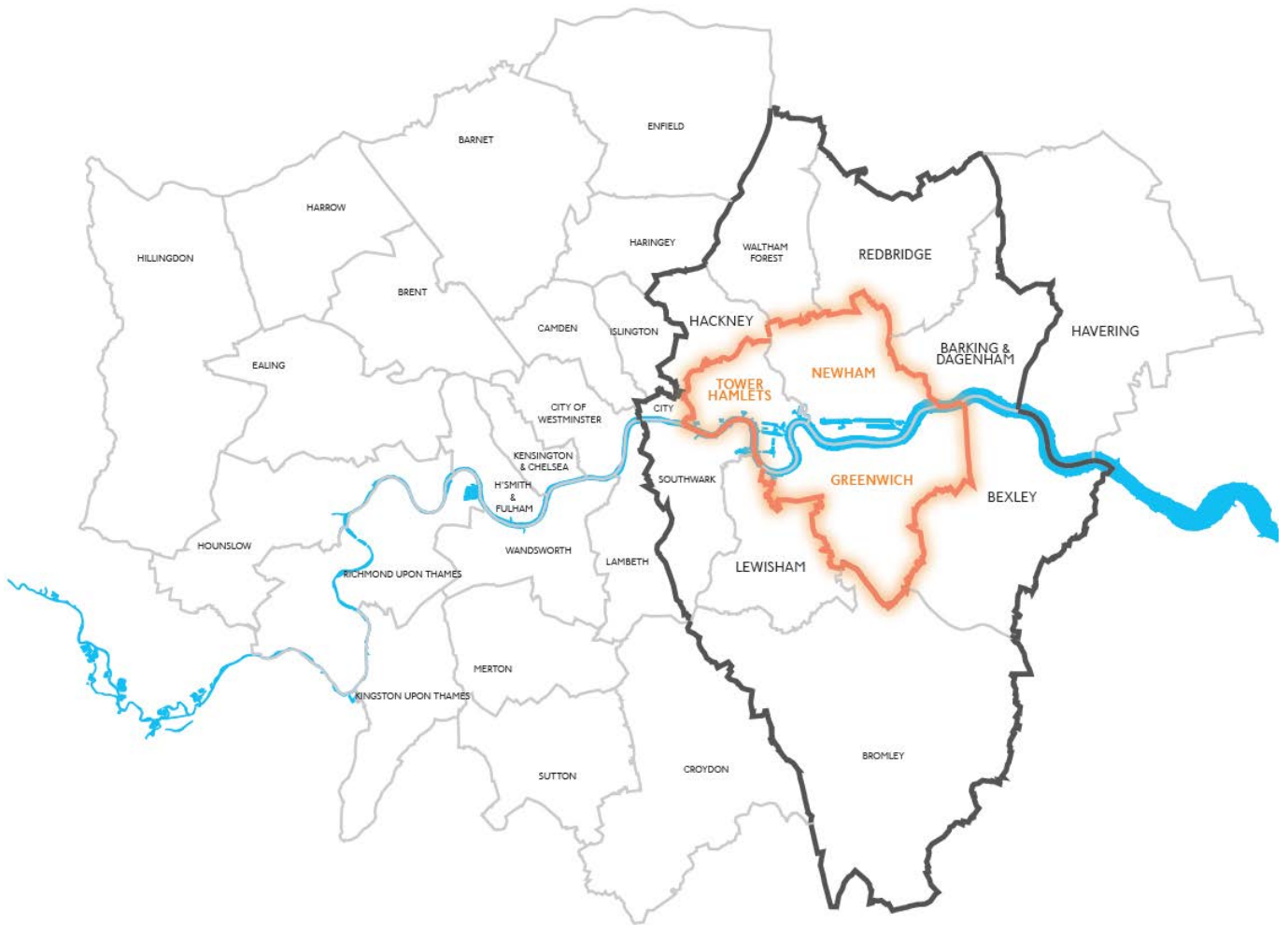
⁵ TfL: [East London River Crossings – Assessment of Need & Options East of Silvertown](#), July 2014

⁶ TfL: East London River Crossings – Assessment of Need, 2012

⁷ TfL: East London River Crossings – Assessment of Options, 2012

⁸ As set out in TfL's [East London Sub-regional Transport Plan](#), 2010

Figure 1 : Study area and adjoining boroughs



Structure of this report

- 1.17. Chapter 2 of this report summarises the statutory planning context for the study area including relevant policy and the implications of the project's NSIP status. Chapter 3 provides a detailed analysis of the need for a new river crossing at Silvertown and Chapter 4 outlines the objectives to be met by this element of the River Crossings programme. Chapter 5 describes the river crossing options that have been assessed at Silvertown, summarises consultation responses on these, assesses the performance of each against the project objectives and presents justifications for the tunnel option being progressed for further investigation which are set out in Chapter 6. Key findings and conclusions are provided in Chapter 7.

Key issues for further consideration and key points are highlighted in grey boxes throughout this report.

2. Policy Context

Introduction

- 2.1. This section provides a summary of relevant key national, regional and local plans and policies that have informed the development of a new river crossing in the study area and may be considered in the determination of a planning application for a new river crossing.

Nationally Significant Infrastructure Project

- 2.2. Following a submission by TfL in 2012, the Secretary of State for Transport issued a direction under section 35 of the Planning Act 2008 that the proposed Silvertown Tunnel be treated as a nationally significant infrastructure project (NSIP). The NSIP designation means that the project may only be authorised by means of a development consent order (DCO) made under the Planning Act 2008. Applications for a DCO are made to the Secretary of State under section 37 of the Planning Act 2008.
- 2.3. Whilst the tunnel will not form part of the national road network (instead forming part of the Transport for London Road Network (TLRN)) the tunnel was deemed to be of national significance as it will support the economic development of London and the wider UK economy. In giving the reasons for the decision, the Secretary of State for Transport also noted that ‘current congestion at the Blackwall Tunnel is having a direct impact on the strategic road network’.
- 2.4. The National Policy Statement for National Networks (once designated) will be used as the primary basis for decision making on DCO applications for nationally significant highways projects, such as the Silvertown Tunnel. The National Planning Policy Framework (examined in more detail below) may also be considered as a matter of importance and relevance by the Secretary of State.
- 2.5. The spatial development and transport policies and plans for London as a whole, as well as those of the host boroughs where the Silvertown crossing is to be located, will also be of relevance in the consideration of this project, as will those of adjoining boroughs (but to a lesser extent).

National policies

Draft National Policy Statement for National Networks

- 2.6. The National Policy Statement (NPS) for National Networks⁹ was published in draft by the Department for Transport (DfT) in December 2013. The NPS sets out the Government's vision and policy for the future development of NSIPs on the national road and rail networks. It gives guidance for promoters of NSIPs, and provides the primary basis for the examination of those projects by the Examining Authority and decisions by the Secretary of State.
- 2.7. The draft NPS explicitly notes at paragraph 2.23 that new links that cross a river or estuary may be needed to support increased capacity and connectivity to meet the needs created by economic and demographic growth.

⁹ Department for Transport: [Draft National Policy Statement for National Networks](#), December 2013

2.8. The draft NPS contains the following statement in Section 2 setting out the Government's vision and strategic objectives for nationally significant networks:

'The Government will deliver national networks that meet the country's long-term needs; supporting a prosperous and competitive economy and improving overall quality of life, as part of a wider transport system. This means:

- *Networks with the capacity and connectivity to support national and local economic activity and facilitate growth and create jobs*
- *Networks which support and improve journey quality, reliability and safety*
- *Networks which support the delivery of environmental goals and the move to a low carbon economy*
- *Networks which join up our communities and link effectively to each other'*

2.9. The proposed Silvertown Tunnel aligns with these strategic objectives, as set out in Chapter 5.

2.10. The DfT aims to publish the finalised NPS for National Networks later in 2014. Although the Silvertown Tunnel is not part of the national road network, as a result of the section 35 direction it must be treated as a nationally significant highways project and therefore the National Networks NPS will guide the Secretary of State's decision in respect of the DCO application.¹⁰

National Planning Policy Framework

2.11. The National Planning Policy Framework¹¹ (NPPF) sets out the Government's national planning policies for England and outlines how these are expected to be applied by local authorities and others. It must be taken into account in the preparation of local authorities' development plan documents (DPDs) and may also be a material consideration in the determination of planning applications.

2.12. The framework was published in March 2012 and replaces a large number of Planning Policy Guidance notes (PPGs) and Planning Policy Statements (PPSs), including PPG13 (Transport). Paragraph 3 of the NPPF states that whilst it does not contain specific policies for NSIPs, it may be considered by a Secretary of State to be a matter that is important and relevant.

2.13. Section 1 of the NPPF 'Delivering sustainable development' promotes the building of a strong, competitive economy. The Government is committed to securing economic growth in order to create jobs and prosperity, and the framework states that 'significant weight should be placed on the need to support economic growth through the planning system' (paragraph 19).

2.14. Paragraph 32 sets out the requirement for developments that generate significant amounts of movement to be supported by a Transport Statement or Transport Assessment.

¹⁰ Section 104, Planning Act 2008

¹¹ Department for Communities and Local Government: [National Planning Policy Framework](#), March 2012

London-wide strategies

London Plan

- 2.15. The London Plan¹², published in 2011, is the statutory spatial plan for London, which sets out the strategic vision for Greater London up to 2031. Draft Further Alterations to the London Plan (FALP)¹³ were publicly consulted on during January–April 2014 and following the examination in public planned for September 2014, changes are expected to be adopted in Spring 2015.
- 2.16. The London Plan (including the FALP) considers the strategic issues arising from the scale of growth that London would need to accommodate over the next two decades, and puts forward alternative spatial development policies which could be adopted to meet the forecasts for population and employment growth. The conclusion is that east London, with its large areas of ex-industrial brownfield land, the focus of the sub-region's Opportunity Areas and improving transport links, should play a major role in London's growth and that with investment in infrastructure, many of London's new jobs and homes can be accommodated in the east and southeast sub-region. This sub-region is projected to increase by 650,000 people with 286,000 more jobs by 2036, which is nearly a third of London's projected growth overall¹⁴. However, it is recognised that achieving this growth is likely to require investment in infrastructure, including road infrastructure and improving cross-river connectivity (paragraph 6.41 – see below).
- 2.17. Section 6 of the London Plan is focused on transport and the need for additional east London river crossings as set out in Policy 6.1 (Strategic Approach). This states that the Mayor will work with all relevant partners to encourage the closer integration of transport and development through schemes and proposals including 'new and enhanced road vehicle river crossings(s) in east London (package of measures)' – described as a 'programme of works under development to improve cross-Thames links in east London' (Table 6.1).
- 2.18. A new Silvertown crossing is specifically referred to in paragraph 6.20 which states that the Mayor is developing proposals for further new and enhanced river crossings in east London to improve accessibility and the resilience of local transport networks, supporting economic growth in the area and linking local communities. One of the four specific proposals is a 'new road-based tunnel crossing between the Greenwich Peninsula and Silvertown'.
- 2.19. Policy 6.4 refers to enhancing London's transport connectivity and states that 'the Mayor will work with strategic partners to improve the public transport system in London, including cross-London and orbital rail links to support future development and regeneration priority areas, and increase public transport capacity'. One of the ways it will do this is by providing new river crossings.

¹² Greater London Authority: [The London Plan – Spatial Development Strategy for Greater London](#), July 2011

¹³ Greater London Authority: [Draft Further Alterations to the London Plan](#), January 2014

¹⁴ Greater London Authority: [Draft Further Alterations to the London Plan](#), January 2014

- 2.20. Paragraph 6.41 highlights the need for additional road-based river crossings in east London to address resilience and congestion issues at existing crossings, particularly for commercial traffic, the movement of goods and the provision of services to support a growing economy in east London:
- 2.21. 'The Mayor is investigating the possibility of additional road-based river crossings in East London. He is committed to improving cross-river pedestrian, cycle and public transport links, to promoting a shift from private cars to more sustainable modes, and to encouraging freight journeys to avoid peak hours through improved journey planning, supply chain measures and support for consolidation centres and modal shift to rail and water in order to reduce pressure on congested crossings. There will, however, continue to be a need for some journeys to be undertaken by vehicle, in particular commercial traffic, the movement of goods and the provision of services to support a growing economy in east London. Drivers are heavily dependent on the congested Blackwall and Rotherhithe tunnels, each of which has restrictions on the size of vehicle which can use them, and the Woolwich Ferry. Beyond London, the Dartford Crossing, forming part of the M25 orbital motorway, also regularly operates at, or close to, capacity. There is little resilience in the event of an incident at one of these crossings, and local businesses, particularly in southeast London, suffer from this unreliability. The projected increases in jobs and population in the Thames Gateway will increase the problem of highway congestion and road network resilience at river crossings further. The Mayor is therefore supportive of additional road-based river crossings in east London as part of a package of transport improvements.'
- 2.22. Policy 6.12 (Road Network Capacity) states that the Mayor supports the need for limited improvements to London's road network, whether in improving or extending existing capacity, or providing new links, to 'address clearly identified significant strategic or local needs', and sets out the criteria (Policy 6.12B) that should be taken into account when assessing these proposals, as follows:
- The contribution to London's sustainable development and regeneration including improved connectivity
 - The extent of any additional traffic and any effects it may have on the locality, and the extent to which congestion is reduced
 - How net benefit to London's environment can be provided
 - How conditions for pedestrians, cyclists, public transport users, freight and local residents can be improved
 - How safety for all is improved
- 2.23. Policy 6.12C states that proposals should show, overall, a net benefit across these criteria when taken as a whole. All proposals must show how any dis-benefits will be mitigated.

Mayor's Economic Development Strategy

- 2.24. The Mayor's Economic Development Strategy (MEDS)¹⁵ sets out how the Mayor's vision for London to be the best big city in the world, can be realised with respect to the London economy.
- 2.25. Paragraph 5.9 states 'East London will continue to be a particular spatial priority, to ensure existing development and regeneration needs are met and in particular to promote greater convergence of social and economic chances with the rest of the capital. The most substantial accumulative growth opportunities are to the east, along the Thames Gateway, a national priority area for regeneration and an area with many low-income households, which would benefit from economic growth. The Thames Gateway corridor links through central London to the 'Western Wedge', whose growth opportunities include the wider Heathrow area. This east-west axis will be an engine of growth and this explains why Crossrail, which will provide a new east-west spine running through central London, is so vital to the economic future of the city and the UK'.

Mayor's Transport Strategy

- 2.26. The Mayor's Transport Strategy (MTS)¹⁶ was developed in tandem with the London Plan and was published in 2010 following wide consultation. The MTS sets out the transport strategy for London up to 2031 including the strategy for delivering the transport infrastructure needed to facilitate growth in the east and southeast sub-region, a key part of the London Plan's strategic vision.
- 2.27. The six goals the MTS seeks to achieve are:
1. To support economic development and population growth
 2. Enhance the quality of life for all Londoners
 3. Improve the safety and security of all Londoners
 4. Improve transport opportunities for all Londoners
 5. Reduce transport's contribution to climate change, and improve its resilience
 6. Support delivery of the London 2012 Olympic and Paralympic Games and its legacy
- 2.28. Overall, the implementation of the Strategy would see the increasing public transport and cycling usage of recent years continue, along with a corresponding decrease in car mode share across London. As with the London Plan, the MTS identifies a clear need to progress a package of river crossings for east London, to help deliver growth and to meet its overall objectives. The London Plan notes both the need to address the existing problems with the current infrastructure as well as the need to plan for the substantial growth anticipated for the surrounding area.
- 2.29. The strategic need and case for improving river crossings in east London is set out in Section 5.8 of the MTS. This section contains MTS Proposal 39 (set out below) which specifically references a new fixed link crossing at Silvertown to relieve Blackwall Tunnel congestion:

¹⁵ Greater London Authority: [The Mayor's Economic Development Strategy for London](#), May 2010

¹⁶ Greater London Authority: [Mayor's Transport Strategy](#), May 2010

Proposal 39

The Mayor, through TfL, and working with the London boroughs and other stakeholders, will take forward a package of river crossings in east London, including:

- a) A new fixed link at Silvertown to provide congestion relief to the Blackwall Tunnel and provide local links for vehicle traffic

- 2.30. Proposal 35 contains policy tests similar to those set out in policy 6.12 of the London Plan (and included above in paragraph 2.22) for new road infrastructure.
- 2.31. In Proposal 130 the MTS sets out the circumstances in which the Mayor may consider imposing road user charging. Charges or tolls to support specific infrastructure improvements, such as river crossings, are specifically referenced.
- 2.32. Since the publication of the London Plan and the MTS, more up-to-date information has become available from the 2011 Census on the extent of forecast growth in London, showing higher population growth earlier than expected. The impact of this on the application of relevant policy is discussed in Chapter 3.

Roads Task Force

- 2.33. TfL's new approach to roads policy is based on the conclusions of the Mayor's Roads Task Force (RTF) set out in the report 'The Vision and Direction for London's streets and roads'¹⁷ published in July 2013.
- 2.34. In Chapter 1, the RTF sets out a vision for how London's roads and streets should be planned, managed and developed, based around three core priorities (which are consistent with the statutory policy frameworks of the London Plan and the MTS):
 1. To enable people and vehicles to move more efficiently on London's roads
 2. To transform the environment for walking, cycling and public transport
 3. To improve the public realm and quality of life on our streets
- 2.35. One of the key elements of the vision (set out in Chapter 1) is 'unlocking major growth and regeneration across London' particularly in east London, and the report notes that enhanced road links to connect areas, for example river crossings, are needed to achieve this.
- 2.36. Figure 7 in Chapter 1 highlights 'inadequate cross Thames connectivity and capacity' as a key connectivity issue that inhibits growth and regeneration in the east and southeast sub-region.
- 2.37. Chapter 3 of the report examines the need for new infrastructure and notes that while a greater shift to public transport, walking and cycling, and demand management measures,

¹⁷ Roads Task Force: [The Vision and Direction for London's streets and roads](#), July 2013

must be a core part of the strategy, capacity measures such as river crossings to support the ongoing regeneration and growth of east London, must also play a role.

London Infrastructure Plan 2050

2.38. The London Infrastructure Plan 2050¹⁸ sets out the Mayor's long-term aspirations for the infrastructure to support London's future growth. It notes that the road network caters for 80 percent of people's journeys and 90 percent of freight journeys; and it is vital for the continued economic success and functioning of the city. The Silvertown Tunnel is identified in the plan (Challenge 1 – What Infrastructure Will We Need?) as a potential piece of transport infrastructure that will support the economy. The plan is currently being publicly consulted on, with comments due at the end of October 2014.

Sub-regional transport policies

East and South East London Sub-Regional Transport Plan

2.39. The sub-regional Transport Plan (SRTP) for East London¹⁹ (later versions known as the East and south east London SRTP) was originally published in 2010 and has subsequently been updated in 2012/13 and 2014.

2.40. A series of specific challenges for the sub-region have been identified in consultation between TfL and the relevant boroughs and these are reflected in the measures in the plan. The east and southeast sub-region's specific challenges (taken from the 2014 update are to):

- Manage highway congestion and public transport crowding and make efficient use of the transport network
- Reduce physical barriers to travel (including proximity to the River Thames in east London) and improve resilience of the transport network
- Ensure that the benefits of existing and funded transport investment are maximised
- Support the efficient movement of goods and encourage sustainable freight movement
- Improve connectivity to, from and within key locations to support existing communities and growth

2.41. The SRTP states that 'improvements are under way to improve connectivity, crowding and congestion across the sub-region, particularly in light of the expected growth. These include the construction of Crossrail, extra carriages on the London Overground and a programme of station upgrades. The recommendations of the Mayor's Roads Task Force provide direction for making more efficient use of the sub-region's road network for the movement of people and goods. A proposed future river crossings package would complement the additional capacity recently added by the Emirates Air Line and make it easier to cross the River Thames'.

2.42. The Silvertown Tunnel is listed in the plan as a scheme that will improve connectivity in east and southeast London. The SRTP notes that proposals are being progressed for a

¹⁸ GLA: [London Infrastructure Plan 2050 – A Consultation](#), 2014

¹⁹ TfL: [East and south east London sub-regional Transport Plan, 2014 update](#), 2014

new full-gauge road tunnel at Silvertown using safeguarded land adjacent to the Blackwall Tunnel. The STRP goes on to state that the tunnel would alleviate the congestion routinely experienced at the Blackwall crossing as well as reduce both the frequency and impact of closures due to the attempted use of the tunnel by over-height vehicles.

Local plans and policies – host boroughs

- 2.43. The London Plan and the MTS provide the statutory framework for London boroughs to develop their own local plans. The local plans and other policy documents of the three host boroughs (as shown in the study area Figure 1) have been reviewed below.

Royal Borough of Greenwich

- 2.44. The Royal Borough of Greenwich submitted its Core Strategy²⁰ to the Secretary of State for Communities and Local Government in September 2013. Consultation on modifications to the Core Strategy including Development Management Policies²¹ was completed in April 2014.
- 2.45. The Core Strategy sets out how the borough is committed to supporting transport schemes that are critical to the borough's development and states that they will 'advocate and work in partnership with relevant agencies to deliver a new package of Thames river crossings in east London, including the continued safeguarding of the Silvertown Link Tunnel (Core Strategy policy IM3). The Core Strategy states that this new river crossing will improve connectivity between the Greenwich Peninsula (the focus of development in Greenwich, with 14,000 new homes planned) and the north side of the Thames (paragraph 3.3.20).
- 2.46. The Core Strategy notes the need to improve cross-river links and supports a package of measures to deliver this improvement and states 'land for a road-based tunnel crossing, known as the Silvertown Link, will continue to be safeguarded, crossing the Thames on the eastern side of Greenwich Peninsula and which could provide a local crossing to reduce congestion at Blackwall Tunnel' (paragraph 4.8.17).
- 2.47. Until the Core Strategy is adopted, the 'saved' policies²² of the Royal Borough of Greenwich's Unitary Development Plan (UDP)²³ remain relevant for planning purposes. Saved policies of relevance include:
- SM6 which states that the Council will have regard to notification requirements in respect of a third Blackwall crossing between North Greenwich and Silvertown
 - M15 which states that the Council supports a number of road schemes, for which lands will be safeguarded including a third Blackwall crossing (iii)
- 2.48. Paragraph 7.33 of the UDP which provides the context to Policy M15 states that the Royal Borough of Greenwich is supportive of river crossings including 'a third Blackwall

²⁰ Royal Borough of Greenwich: [Core Strategy with Development Management Policies \(Submission Version\) with proposed modifications](#), 2013

²¹ Royal Borough of Greenwich: [Core Strategy with Development Management Policies \(Submission Version\) - with proposed further modifications](#), 2014

²² Royal Borough of Greenwich: [Schedule of saved UDP policies](#)

²³ Royal Borough of Greenwich: [Greenwich Unitary Development Plan](#), 2006

crossing between North Greenwich and Silvertown. Should this crossing proceed the Council will require a tunnel, not a bridge’.

- 2.49. Greenwich’s Second²⁴ Local Implementation Plan (LIP)²⁵ discusses river crossings in Section 3 and gives support in principle to ‘a vehicle tunnel from the A102 on Greenwich Peninsula to Silvertown’. In Section 4, the LIP sets out the need for road-based river crossings to support the population and employment growth planned for the borough, particularly to improve radial connectivity into London. The LIP states that ‘the proposed package of three crossings at Silvertown, Woolwich and Thamesmead remains critical to successful economic development through improved access to employment opportunities north of the river’.
- 2.50. The Greenwich Peninsula West Masterplan Supplementary Planning Document (SPD)²⁶ was adopted in April 2012. The SPD provides a masterplan to guide the development planned for this area. Section 4 of the SPD discusses key movements in the area and notes that the A102 which forms the entryway to the Blackwall Tunnel is a major traffic artery linking both sides of the Thames. The SPD goes on to state that ‘proposals for an additional road link from [the] Peninsula to Silvertown should ideally be below ground to minimise the impact of increased traffic in the area’.
- 2.51. The Greenwich Peninsula Development Framework²⁷ has been superseded in part by the Greenwich Peninsula West Masterplan SPD. Paragraph 12.11 of this document makes reference to the proposed Blackwall-Silvertown Crossing and sets out the Council’s preference for a tunnel as opposed to a bridge. Paragraph 20.19 states that ‘the development of the Blackwall-Silvertown Tunnel would further increase accessibility to the Peninsula’.

London Borough of Newham

- 2.52. The London Borough of Newham’s Core Strategy²⁸ was adopted in January 2012. The Core Strategy gives support for new river crossings that will contribute towards Newham’s regeneration and economic and physical development. It states that ‘the Council supports the development of bridge, tunnel or ferry crossings at these locations [Silvertown and Gallions Reach] to provide resilience to the Blackwall Tunnel and to support future growth’ (paragraph 6.197).
- 2.53. Newham’s Second LIP²⁹ states that the council has a ‘serious concern that its [east London’s] further development will be hindered by the lack of a suitable road-based river crossing ensuring the efficient flow of both goods and visitors to the Centre both north and south of the Thames’ (paragraph 2.6.32). The LIP sets out the Council’s support for strategic transport proposals that will contribute towards Newham’s regeneration and economic and physical development and specifically notes a new river crossing at Silvertown in paragraph 2.6.100. The Council notes that its support for this crossing is

²⁴ All LIP documents in this Section cover the period to 2031 with Delivery Plans to 2013/2014 unless stated

²⁵ Royal Borough of Greenwich: [Keeping Greenwich Moving – Greenwich Council’s Second Local Implementation Plan for Transportation](#) (June 2011)

²⁶ Royal Borough of Greenwich: [Greenwich Peninsula West Masterplan SPD](#), April 2012

²⁷ Royal Borough of Greenwich: Greenwich Peninsula Development Framework, 2002 (online version not available)

²⁸ London Borough of Newham: [Newham 2027 Newham’s Local Plan – The Core Strategy](#), January 2012

²⁹ London Borough of Newham: 2nd Local Implementation Plan – Transport Policies and Programmes Document, April 2011 (online version not available)

subject to its delivery as part of a package (along with a crossing at Gallions Reach) and the mitigation of impacts on the Canning Town area (paragraph 3.2.8).

- 2.54. The Canning Town and Custom House SPD³⁰ was adopted in July 2008 and identifies the Council's strategic aspirations for the regeneration of this area and reflects the masterplan that has been developed. The SPD contains no reference to Silvertown or other new road-based river crossings in east London but the Council's website³¹ notes that some of the SPD information may be out of date.

London Borough of Tower Hamlets

- 2.55. The London Borough of Tower Hamlets' Core Strategy³² was adopted in September 2010. The Core Strategy provides support for river crossings to North Greenwich for the improved accessibility, permeability and connectivity that will be provided to Leamouth, a regeneration area adjacent to the north side of the proposed Silvertown crossing where new homes and jobs are being delivered (LAP 7&8, Leamouth).
- 2.56. Tower Hamlets' Second LIP³³ (containing a Delivery Plan extending to 2016/17 for major schemes) was adopted in May 2011. The LIP includes details of schemes of relevance to Tower Hamlets set out in TfL's East London SRTP (2010 version), including 'Silvertown Crossing' proposals and notes that these have been taken into account in the preparation of the Borough's Transport Objectives and Delivery Plan. The LIP sets out the Council's support for improving the provision of river crossings to relieve pressure on the borough's road network, particularly the Blackwall Tunnel (page 38).
- 2.57. There is no supplementary planning guidance making specific reference to, or covering the area immediately adjacent to, the Blackwall and proposed Silvertown crossings in Tower Hamlets. However, it is worth noting that there is outline planning permission for a major regeneration scheme in Blackwall Reach, which is located immediately adjacent to the existing Blackwall Tunnel portal. Furthermore, while they do not specifically reference the Silvertown crossing, the Fish Island Area Action Plan and the Bromley by Bow Masterplan constitute adopted SPDs with spatial policies covering areas adjacent to the A12 to the north of the Blackwall Tunnel.

Local planning documents – adjoining boroughs and other interested authorities

- 2.58. The local plans and other policy documents of the London Boroughs (LB) that immediately adjoin the host boroughs (as shown in the study area - see Figure 1) have also been reviewed, as have those of other local authorities deemed to have an interest in river crossings in east London. A summary of references made to river crossings in these plans and policy documents is set out in Table 1.

³⁰ London Borough of Newham: [Canning Town and Custom House Supplementary Planning Document](#) (July 2008)

³¹ <http://www.newham.gov.uk/Pages/Services/Local-plan.aspx?l1=100006&l2=200074> (accessed 22.09.14)

³² London Borough of Tower Hamlets: [Core Strategy 2025](#), September 2010

³³ London Borough of Tower Hamlets: [Second Local Implementation Plan \(LIP2\) 2011-2031](#), May 2011

Table 1 : Local plans and policies of adjoining and interested local authorities

Local authority	Core Strategy	LIP / Local Transport Plan
LB Barking and Dagenham	Support for Thames Gateway Bridge - critical to deliver growth and will improve accessibility to, from and within borough (Policy CM4) ³⁴	Support for Thames Gateway Bridge ³⁵
LB Bexley	Support for improvements to ease congestion, improve connectivity and enhance resilience at Blackwall. Support new river crossings providing local traffic flows not increased (para 4.7.12) ³⁶	Support for a crossing at Silvertown in principle (paragraph 2.51) ³⁷
LB Bromley	Not mentioned ^{38 39 40}	Not mentioned ⁴¹
City of London	Not mentioned ⁴²	Not mentioned ⁴³
LB Hackney	Not mentioned ⁴⁴	References 'East London SRTP (2010)' including need to reduce physical barriers including River Thames and improving resilience (para 3.2.14) ⁴⁵ .
LB Havering	Commitment to working with relevant authorities to secure provision of the Thames Gateway Bridge (section 1.3) ⁴⁶	Notes road freight congestion challenges caused by severance and few river crossings (section 2.5) ⁴⁷
LB Lewisham	Not mentioned ⁴⁸	Not mentioned ⁴⁹
LB Redbridge	Not mentioned ⁵⁰	Not mentioned ⁵¹
LB Southwark	Not mentioned ⁵²	Not mentioned ⁵³
LB Waltham Forest	Not mentioned ⁵⁴	Not mentioned ⁵⁵
Thurrock Council	Not mentioned ⁵⁶	Transport Strategy ⁵⁷ references Local Enterprise Partnership's priority to increase capacity on Dartford Crossing.

³⁴ LB Barking & Dagenham: [Planning for the future of Barking & Dagenham – Core Strategy](#), July 2010

³⁵ LB Barking & Dagenham: [Second Local Implementation Plan 2011/12-2013/14](#), July 2011

³⁶ LB Bexley: [Bexley Core Strategy](#), February 2012

³⁷ LB Bexley: [Bexley Local Implementation Plan 2014/15 to 2016/17](#), June 2014

³⁸ LB Bromley: [Local Plan Draft Policies and Designations Document](#), February 2014

³⁹ LB Bromley: [Adopted UDP Written Statement](#), July 2006

⁴⁰ LB Bromley's Core Strategy has not yet been adopted. Majority of policies within adopted UDP are 'saved'.

⁴¹ LB Bromley: [Bromley's Second Local implementation Plan](#), updated October 2013

⁴² City of London: [Core Strategy – Delivering a World Class City](#), September 2011

⁴³ City of London: Local Implementation Plan, 2011 (online version not available)

⁴⁴ LB Hackney: [Core Strategy – Hackney's strategic planning policies for 2010-2025](#), Nov 2010

⁴⁵ LB Hackney: [Hackney Local Implementation Plan 2 2011/12 – 2013/14](#), October 2011

⁴⁶ LB Havering: [Core Strategy and Development Control Policies Development Plan Document](#), 2008

⁴⁷ LB Havering: [Local Implementation Plan](#), December 2011

⁴⁸ LB Lewisham: [Core Strategy](#), June 2011

⁴⁹ LB Lewisham: [Local Implementation Plan 2011-2031](#), April 2011

⁵⁰ LB Redbridge: [Core Strategy – Development Plan Document](#), March 2008

⁵¹ LB Redbridge: [Local Implementation Plan](#), April 2011

⁵² LB Southwark: [Core Strategy](#), April 2011

⁵³ LB Southwark: [Transport Plan](#), 2011

⁵⁴ LB Waltham Forest: [Core Strategy](#), March 2012

⁵⁵ LB Waltham Forest: [Local Implementation Plan 2011-14](#), October 2011

⁵⁶ Thurrock Council: [Core Strategy and Policies for Management of Development](#), December 2011

- 2.59. As shown in Table I, the majority of these documents make no mention of river crossings. The London Borough of Bexley's Core Strategy is the only document that specifically refers to a crossing at Silvertown, setting out the Council's support 'in principle' for this. The local plans of the London Borough of Havering and the London Borough of Barking and Dagenham outline their support for a river crossing in the form of the Thames Gateway Bridge (no longer being progressed⁵⁸). The London Borough of Havering's LIP highlights the congestion challenges that road freight experiences in the east and southeast sub-region due to the severance caused by the Thames and the lack of suitable river crossings.
- 2.60. A number of these boroughs submitted responses to the 2012/13 consultation on river crossing options (including a tunnel at Silvertown)⁵⁹. These responses were largely supportive of a new tunnel at Silvertown with concerns mainly focused on potential local traffic impacts, as set out in paragraph 5.68.

Opportunity area documents

Lower Lea Valley / Olympic Legacy Supplementary Planning Guidance

- 2.61. The Lower Lea Valley Opportunity Area Planning Framework and Olympic Legacy Supplementary Planning Guidance (OLSPG) aims to guide development for the area around the QEOP and wider Lower Lea Valley area. Section 3.4 of the OLSPG Strategic Transport Study sets out the approach to river crossings as:
- '...the barrier of the Thames acts as the major constraint on the sub-region's development and economic potential, not just in geographical terms but also in terms of congestion due to lack of capacity at the three existing road vehicle river crossings (Rotherhithe Tunnel, Blackwall Tunnel and Woolwich Ferry). A significant challenge is therefore to both increase and improve existing river crossings in East London in order to mitigate the severance effects of the river both on communities (including those within the OLSPG area) and on the region's economy'*
- 2.62. The SPG goes on to list the Silvertown crossing as one of the river package options which will need to be considered further in the development plans for the area.

Royal Docks Parameters for Development

- 2.63. The Royal Docks Parameters for Development⁶⁰ is intended to set out a clear, concise and comprehensive overview of the opportunities and constraints that impact on the regeneration of the area and to support and inform development. The document follows on from the Vision for the Royal Docks⁶¹ produced in July 2010 which sets out the

⁵⁷ Thurrock Council: [Thurrock Transport Strategy 2013-2026](#), 2013 (strategy element of Thurrock's third Local Transport Plan (LTP))

⁵⁸ In 2004, the then Mayor of London proposed a bridge at Gallions Reach called the Thames Gateway Bridge (TGB), a dual carriageway river crossing between Beckton (London Borough of Newham) and Thamesmead (Royal Borough of Greenwich). Following his election in 2008, the Mayor Boris Johnson confirmed that he would not progress the scheme.

⁵⁹ Accent: [River Crossings Consultation - Report](#), 2013

⁶⁰ Greater London Authority / LB Newham: [Royal Docks Parameters for Development](#), March 2011

⁶¹ Greater London Authority / LB Newham: [Vision for the Royal Docks](#), July 2010

Greater London Authority and the London Borough of Newham's joint ten-point strategy for the transformation of the Royal Docks.

- 2.64. Section 4.3 of this document discusses accessibility and movement in the area (one of the key development parameters) and notes in the future river crossings section that land has been safeguarded to deliver the Silvertown crossing to improve strategic highways connections to the south and to supplement the existing Blackwall Tunnel. Section 5.3 is specifically concerned with West Silvertown (one of five areas that make up the Royal Docks) and notes that 'a new river crossing [Silvertown], for which land is already safeguarded, will significantly increase connectivity across the Thames'.

The proposed Silvertown Tunnel has been designated as a Nationally Significant Infrastructure Project (NSIP) by the Secretary of State for Transport for the role it will play in supporting the economic development of London and the wider UK economy. This NSIP designation means that the project will require development consent under the Planning Act 2008. The application for development consent will be determined in accordance with the National Policy Statement for National Networks.

Existing national, regional and local policies give general and specific support to new road-based river crossings in east London, particularly at Silvertown, to address strategic and local needs for cross-river accessibility and to relieve congestion and improve resilience. A number of the national and regional policy documents contain 'criteria' that are required to be taken into account in the assessment of a new river crossing at Silvertown.

3. Needs Analysis

Introduction

- 3.1. The needs analysis begins by describing existing cross-river provision for public transport, walking and cycling, and road traffic in the study area and sets this within a historical context. It then summarises the existing patterns of movement in the study area and the future drivers of highway demand in relation to population, employment and resulting travel. The section concludes by describing committed enhancements to transport provision and identifying residual needs and, in particular, gaps in cross-river highway provision.

East London river crossings – historical context

- 3.2. The River Thames historically provided the essential means by which London was linked to the rest of the world. At the same time, it has acted as a barrier to travel between north and south London.
- 3.3. In west London, the Thames is narrower than it is in east London and there is no right of navigation for tall ships. This means that in west London, bridges over the river have been relatively straightforward and low cost to provide, their spans being short and capable of support with frequent in-river piers and lower clearances above the river. By contrast in east London, where the river is wider and large and tall ships have a right of navigation, there are more difficult design constraints for potential bridge crossings in terms of minimum clearances above the river, lengthy crossing spans, and restrictions on in-river obstructions (for piers). More recently, the flight paths of aircraft to/from London City Airport in the Royal Docks have created height constraints for new structures in this area.
- 3.4. A result of these factors is that there are fewer bridge crossings in east than west London (as set out further in paragraphs 3.30 and 3.32).
- 3.5. The constraints on bridge building to the east of Tower Bridge have led to the construction of numerous tunnels under the Thames. The Thames Tunnel was the world's first underwater tunnel (completed in 1843) linking Rotherhithe to Wapping and now forms part of the London Overground line (see reference G, Figure 2). Other tunnels in the study area include the Greenwich and Woolwich foot tunnels (see references F and K, Figure 8), the Blackwall and Rotherhithe Tunnels (see Figure 12 and paragraph 3.34 onwards) as well as tunnels constructed more recently as part of the Docklands Light Railway (DLR) and Jubilee line (see Figure 2).

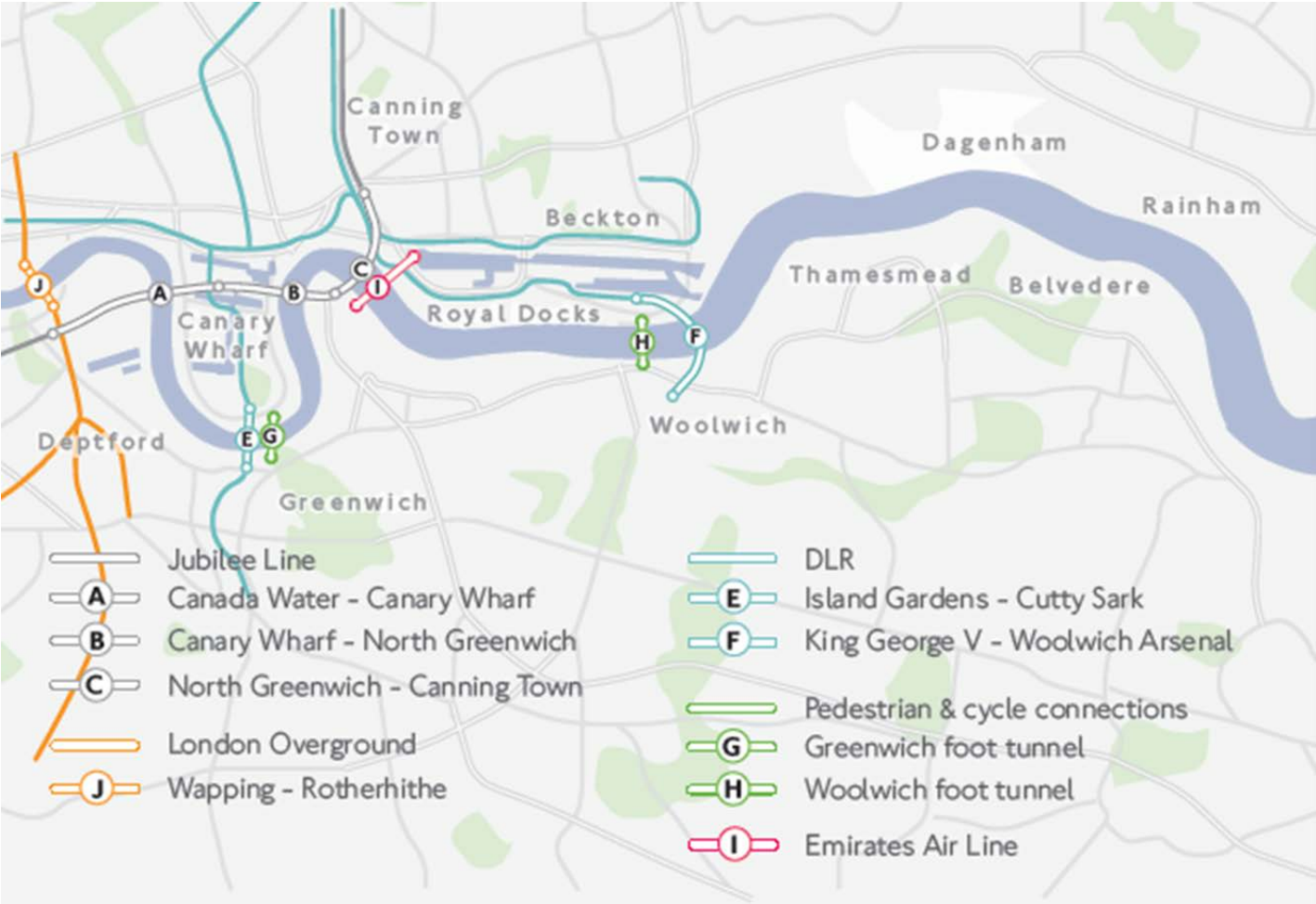
Current cross-river public transport provision

- 3.6. There has been a period of sustained investment in public transport capacity across the whole of east London over the past 20 years and this will continue with the introduction of Crossrail services from 2018. Prior to 1999, London Underground's East London line represented the only rail crossing of the River Thames in east London, providing a local shuttle from New Cross to Shoreditch.

3.7. Since 1999, new cross-river rail links have been provided on the following routes (see Figure 2):

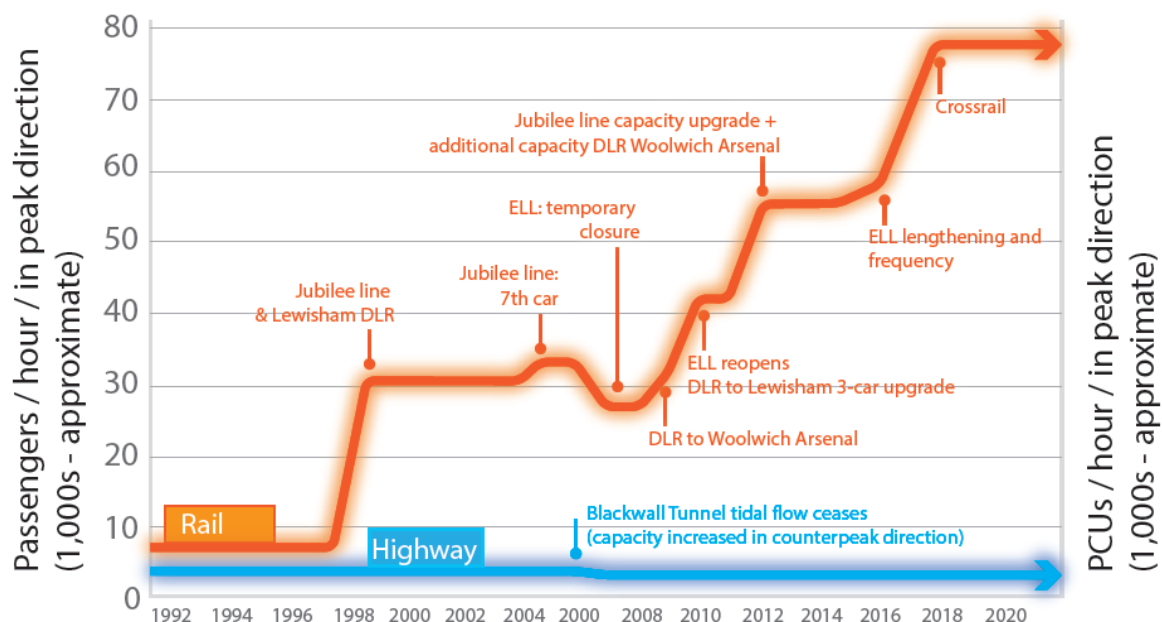
- Jubilee line opened 1999 and was subsequently upgraded with more frequent and longer trains
- DLR extended to Greenwich and Lewisham in 1999 and was subsequently enhanced with longer trains, and extended to Woolwich in 2009
- High Speed 1 started operating frequent high speed trains between Kent and east London in 2009
- London Underground's East London line was transferred to the London Overground network, providing new services to a wider range of destinations from 2010 and further services from 2012
- Emirates Air Line (cable car) opened in 2012 (as set out in paragraph 3.23)
- Crossrail, now under construction, will provide a new high frequency service from Woolwich and Abbey Wood to the Royal Docks, Canary Wharf and beyond from 2018

Figure 2: Recent or planned cross river public transport improvements



3.8. Figure 3 illustrates the scale of increased public transport capacity across the Thames in east London from 1992 compared with a lack of new highway capacity.

Figure 3 : Public transport and highway capacity, 1992-2022



3.9. These existing and committed public transport crossings have considerable levels of capacity and there is potential to increase capacity without major infrastructure works, through provision of additional and/or longer trains, as shown in Table 2.

Table 2 : Existing and potential capacity of study area public transport crossings

Crossing	Existing capacity (pax/hr) ⁶²	Potential max. capacity~ (pax/hr) ⁶³
DLR: Island Gardens - Cutty Sark	11,900	17,900 ⁶⁴
Jubilee Line: Canary Wharf - North Greenwich	24,700	29,600 ⁶⁵
Jubilee Line: North Greenwich - Canning Town	19,800	29,600 ⁶⁶
DLR: King George V - Woolwich Arsenal	7,400	17,900 ⁶⁷
Crossrail: Custom House – Woolwich	12,000	18,000 ⁶⁸
Emirates Air Line	2,500	2,500 ⁶⁹
TOTAL	78,300	115,500

⁶² If standardised at seated plus four standees per square metre

⁶³ Ibid

⁶⁴ With additional vehicles and north route (Bow-Stratford) double tracking in place

⁶⁵ 36 trains per hour (tph) service at peak continuing to Stratford, by 2020 - www.tfl.gov.uk/travel-information/improvements-and-projects/tube-improvement/jubilee (accessed 22.09.14)

⁶⁶ Ibid

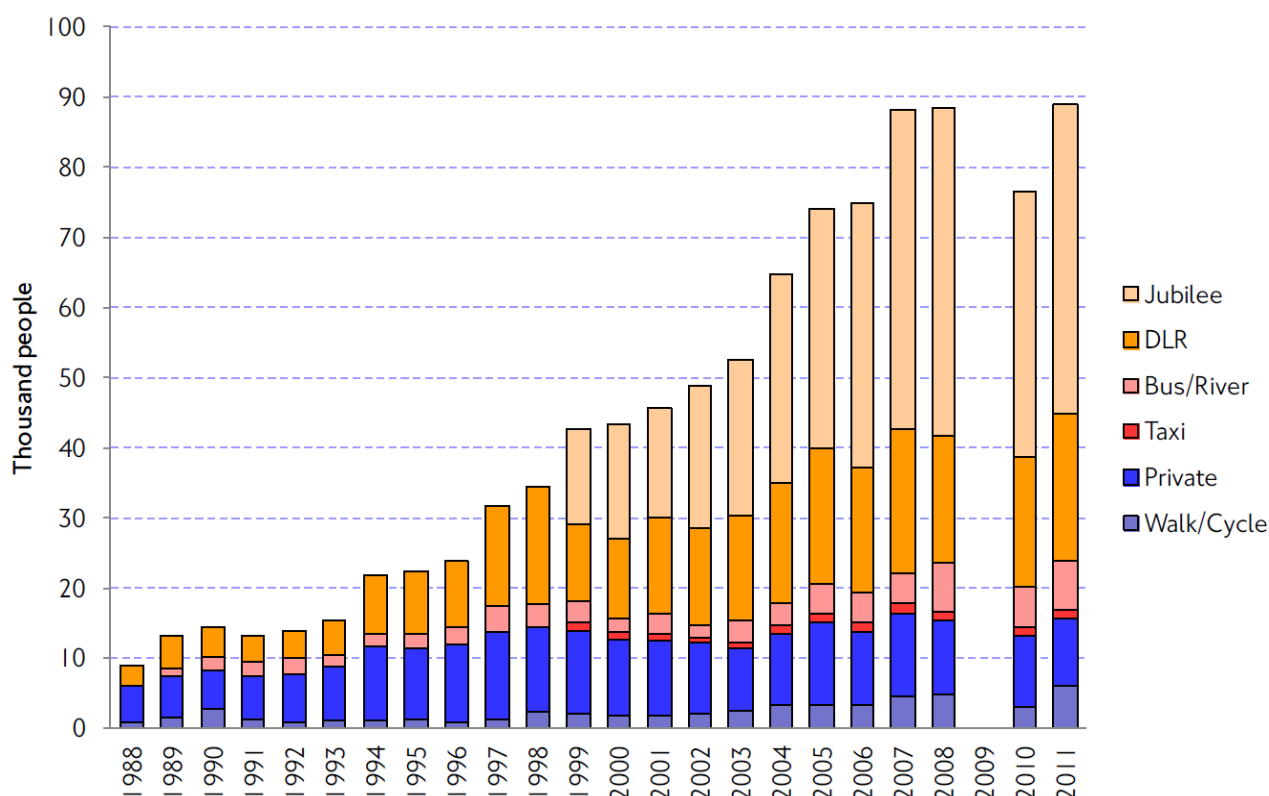
⁶⁷ With additional vehicles and higher frequencies

⁶⁸ With 30tph core service, 18tph on Abbey Wood branch

⁶⁹ Theoretical maximum, all cabins full, system at full speed

- 3.10. Figure 4 shows that there is potential additional capacity available on existing public transport in the study area of approximately 37,200 people per hour.
- 3.11. The positive impact that the increase in public transport capacity has had on public transport mode share is apparent in the Isle of Dogs Cordon Survey⁷⁰, an annual survey of people travelling to and from the Isle of Dogs, including Canary Wharf. As Figure 4 illustrates, there has been a very significant increase in trips as the level of employment has increased in the area. However, the new trips are overwhelmingly undertaken on public transport, with car use falling from over half of all trips in the early 1990s to little over 10% by 2011.

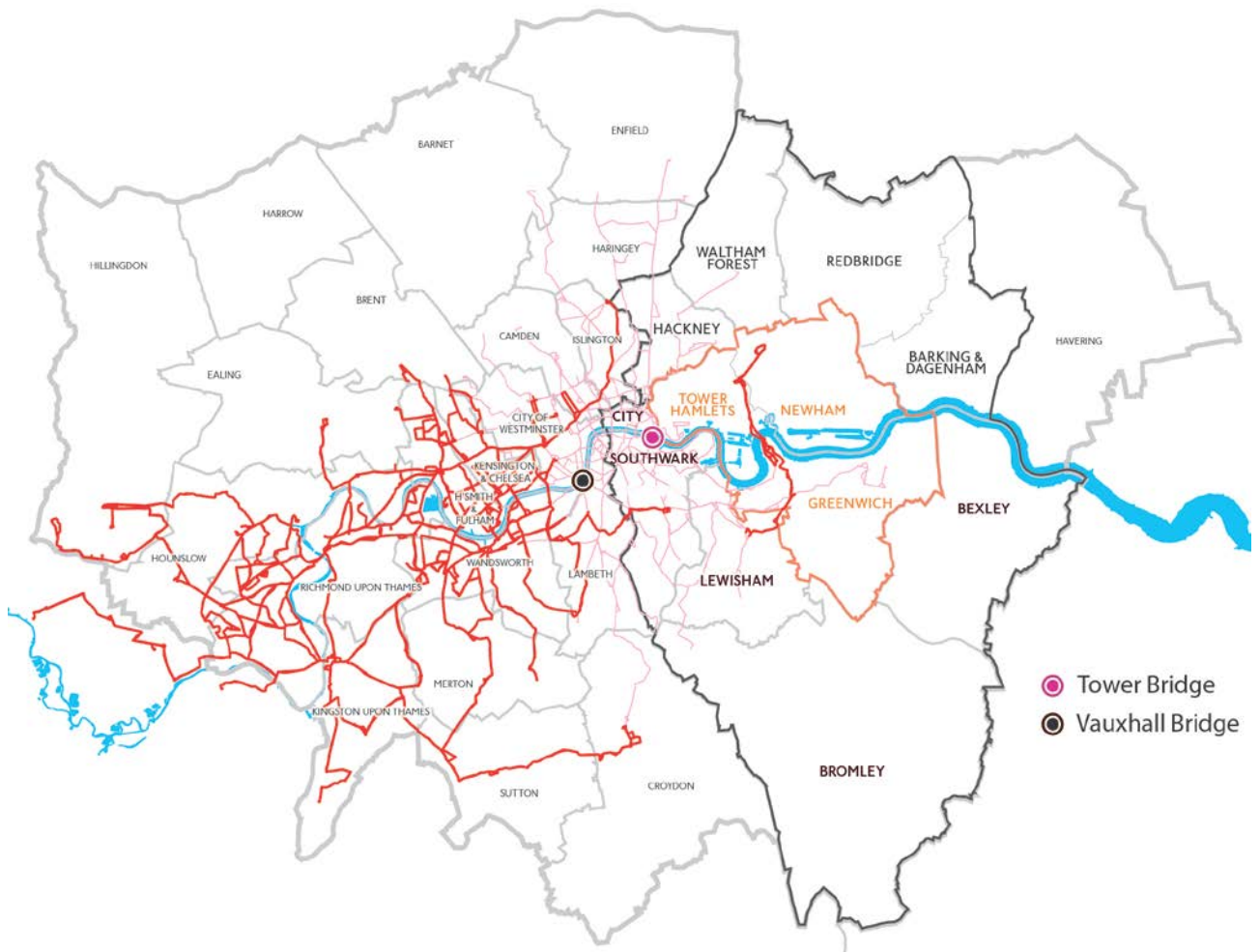
Figure 4 : Morning peak travel to the Isle of Dogs (including Canary Wharf) by mode of transport, 1988 to 2011



- 3.12. London's existing cross-river bus network reflects the limited highway crossing provision to the east of Tower Bridge. There are comprehensive networks of services on either side of the river in east and southeast London, but these networks operate largely independently of one another.
- 3.13. Figure 5 shows all bus routes in Greater London which at some point cross the River Thames (it excludes night time only bus routes and school services). Routes which cross the river in central London, using Vauxhall Bridge, Tower Bridge, or crossing points in between these two are coloured light pink. Routes which cross the river outside these two bridges are coloured red.

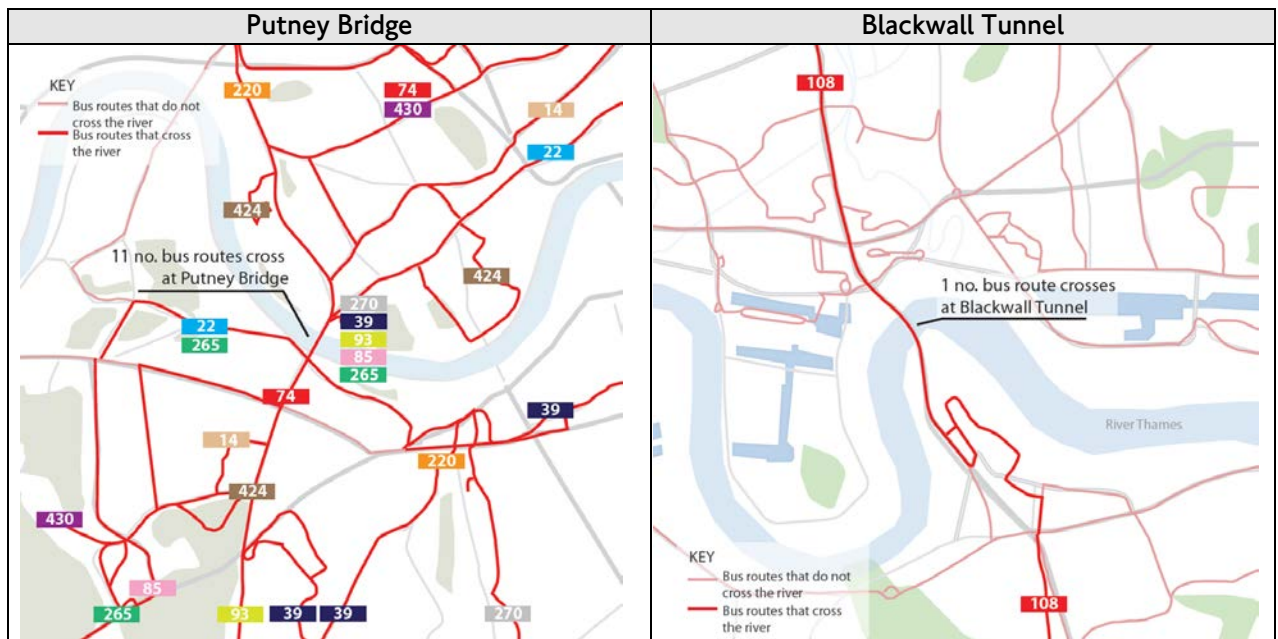
⁷⁰ TfL: [Travel to London's Docklands: TfL's Isle of Dogs Cordon Survey](#), February 2013

Figure 5: Cross-river bus services in London



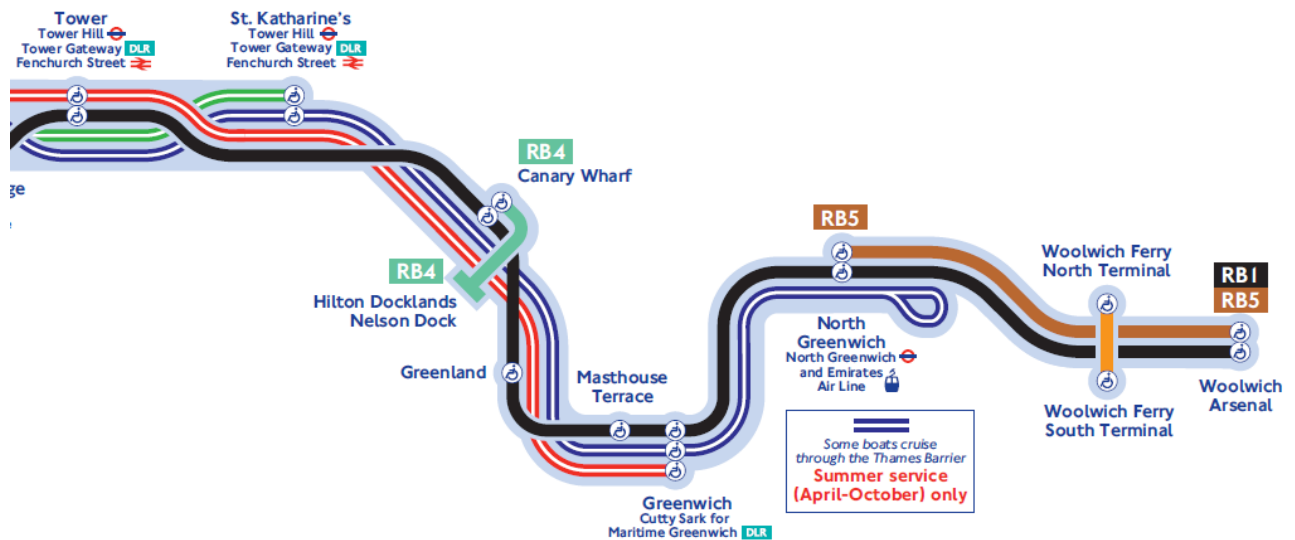
- 3.14. Figure 5 highlights the notable disparity in cross-river bus routes between east and west London, which is a consequence of the very limited cross-river road connections. There are 47 bus routes which cross the river west of Vauxhall Bridge and only a single route crossing the river east of Tower Bridge; the 108 between Stratford and Lewisham via the Blackwall Tunnel. This service can suffer from disruption when the Blackwall Tunnel is congested or temporarily closed (as examined further in paragraph 3.52 onwards).
- 3.15. The disparity between cross-river bus routes in east and west London is further illustrated in
- 3.16. Figure 6 which shows cross-river bus routes in the vicinity of Putney Bridge compared to in the vicinity of the proposed Silvertown Tunnel.

Figure 6: Bus routes in the vicinity of Putney Bridge and Blackwall Tunnel



- 3.17. Bus connections are available at both ends of the foot tunnel and ferry at Woolwich and at stations with cross-river services. Blackwall Tunnel closures also have an impact on the large number of commuter coaches that travel between Kent and central London at peak times.
- 3.18. Thus, the barrier to the provision of cross-river bus services in east London is two-fold; physical restrictions on crossing options and congestion impacting on journey times and service reliability. A new river crossing will address both of these constraints and provide a range of options for new bus connections.
- 3.19. In addition to road and rail-based public transport, some river bus services operate in the eastern section of the Thames as illustrated in Figure 7.

Figure 7: River bus services in the study area



- 3.20. While the river bus services primarily provide a radial link between east London and parts of central London, they also serve cross-river trips along the inner section of the Thames. In the study area, river buses 1 and 4 connect the eastern side of Rotherhithe, in Southwark, to Canary Wharf (via Greenland Pier and the Hilton Docklands Pier respectively).
- 3.21. It should be noted that while existing cross-river public transport services are well used, current forecasts show that there is spare capacity (or additional capacity that can be provided on existing services) to meet long term needs. This contrasts with cross-river highway capacity which is highly constrained, with all the existing crossings needing to accommodate demand at levels equal to, or above, their full capacity throughout peak periods (as shown in Table 5).

Sustained investment in public transport in east London has resulted in a step change in cross-river rail connectivity over the last 20 years and a further high-capacity rail crossing in the form of Crossrail is under construction. However, while much investment has been made in rail-based cross-river public transport, there is currently only one cross-river bus link in east London, largely due to the lack of suitable road crossings.

Current cross-river walking and cycling provision

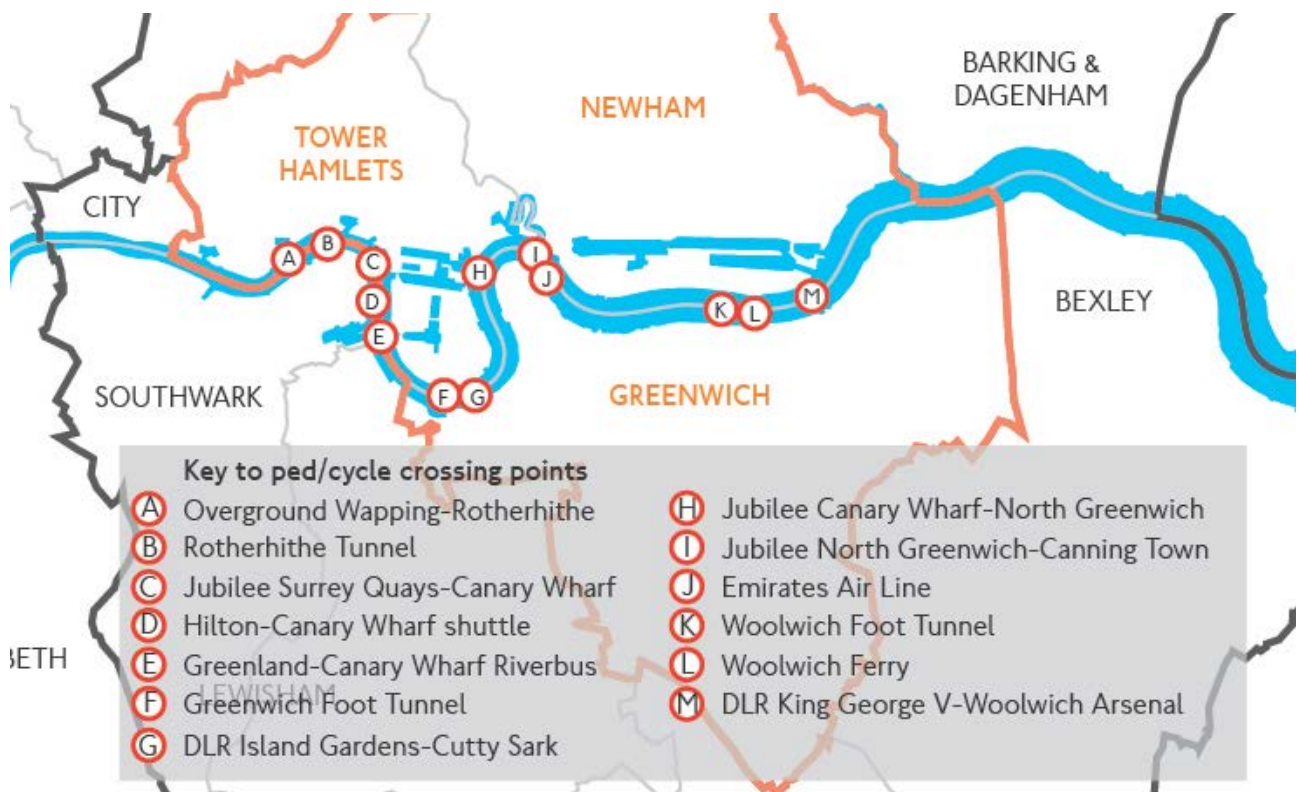
- 3.22. The width of the River Thames in east London and its role as a major shipping navigation channel make the provision of convenient pedestrian and cycle links across the river more challenging and costly compared with such proposals to the west of Tower Bridge. However, improving conditions for pedestrians and cyclists is a key part of the MTS and work to improve cross-river links in recent years has included a dedicated crossing for pedestrians and cyclists at Silvertown by way of the Emirates Air Line, as well as new and enhanced London Underground, Overground and DLR links (as set out in detail in the next

section). In addition, the Woolwich and Greenwich foot tunnels have recently been refurbished by the Royal Borough of Greenwich, including the installation of new lifts.

- 3.23. The Emirates Air Line is a cable car that opened in 2012 with the aim of directly addressing pedestrian and cycle connectivity between the rapidly developing Greenwich Peninsula and Royal Docks areas. The cable car forms part of the package of river crossings set out in Proposal 39 of the MTS to provide ‘local links to improve connections for pedestrians and cyclists’⁷¹ and was one of the earlier elements of the package to be delivered. The cable car runs parallel to the route of the proposed Silvertown crossing.
- 3.24. The full list of cross-river routes for cyclists and pedestrians in the study area is provided below and shown in Figure 8:
- Rotherhithe Tunnel (B) – walking and cycling permitted but limited use
 - London Overground (A)- restrictions on non-folded cycles
 - Hilton Docklands – Canary Wharf river bus (D)
 - Greenland Pier – Canary Wharf river bus (E)
 - Greenwich foot tunnel (F) - cyclists must dismount
 - Jubilee line (C), (H) and (I) – non-folded cycles not permitted
 - DLR (G) and (L) – restrictions on non-folded cycles at peak times
 - Emirates Air Line – runs parallel to the proposed Silvertown crossing
 - Woolwich foot tunnel (J) - cyclists must dismount
 - Woolwich Ferry (K)

⁷¹ Greater London Authority: [Mayor’s Transport Strategy](#), May 2010 – referenced as package ‘c’

Figure 8: River crossings in the study area for pedestrians and cyclists



3.25. Table 3 shows the estimated (two-way) pedestrian and cycle flows at crossings in the study area on a weekday between 7am and 7pm. The highest flows are on the Emirates Air Line followed closely by the Greenwich foot tunnel.

Table 3: Estimated pedestrian/cycle crossing movements, weekday 7am to 7pm (2013)

River crossing	Modes	Total
Rotherhithe Tunnel	Cyclists	232
	Pedestrians	9
Hilton Docklands - Canary Wharf river bus*	Ferry passengers ⁷²	852
Greenland Pier - Canary Wharf river bus*	Ferry passengers	193
Emirates Air Line**	Cable Car passengers	3995
Greenwich foot tunnel	Cyclists	1481
	Pedestrians	2255
Woolwich foot tunnel	Cyclists	112
	Pedestrians	173
Woolwich Ferry	Cyclists	117
	Pedestrians	616

* 2012 data, all TfL estimates

** Emirates Air Line passenger data (2012)

⁷² Cyclist numbers have not been counted separately for river buses or the Cable Car

- 3.26. All of the crossing options shown in Table 3 are considered to have capacity for additional pedestrian and cyclist movements. However, TfL is continuing to investigate greater use of the river for walking and cycling cross-river trips to ensure demand associated with recent and planned growth along the River Thames (see **Figure 31**) can be met, including through the provision of additional river bus services, as set out in the River Action Plan⁷³ and through additional road crossings, as set out in the East of Silvertown Needs and Options report⁷⁴.

Local pedestrian and cyclist trips across the river can be undertaken by one of several public transport links, including the dedicated Silvertown pedestrian and cycle crossing, the Emirates Air Line (running parallel to the proposed Silvertown crossing) as well as ferries and the recently re-furbished foot tunnels. In line with MTS policies and to support recent and future riverside growth, TfL is committed to investigating providing additional cross-river walking and cycling links.

CURRENT HIGHWAYS PROVISION

Strategic highways network

- 3.27. Figure 9 illustrates the extent of the DfT's Strategic National Network around London. The principal routes for long distance traffic bypass London using the M25 and none of the river crossings in the study area form part of the national strategic road network (including the proposed Silvertown crossing, as noted in Chapter 2).

⁷³ TfL: [River Action Plan](#), 2013

⁷⁴ TfL: [East London River Crossings - Assessment of Need & Options East of Silvertown](#), July 2014

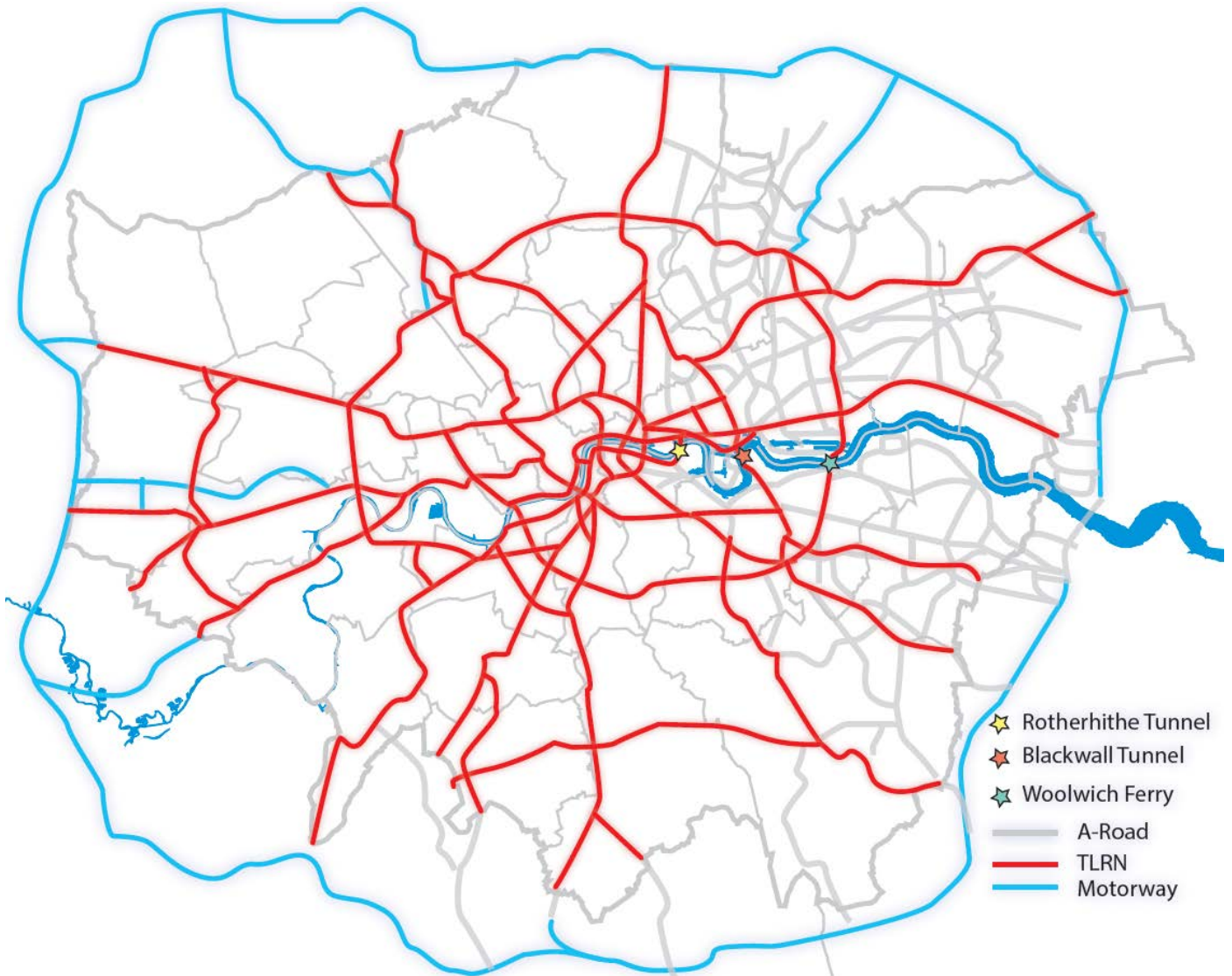
Figure 9: Strategic national road network in and around London⁷⁵



3.28. Within the M25, the London-wide road network caters for trips across London, as well as providing a means of accessing the national and international road networks. London's strategic road network is principally composed of the Transport for London Road Network (TLRN) as shown in Figure 10, which at 580km covers 4 percent of London's road length and carries over 30 percent of its traffic.

⁷⁵ <http://www.highways.gov.uk/our-road-network/managing-our-roads/operating-our-network/how-we-manage-our-roads/area-teams/area-5>

Figure 10: Transport for London Road Network (TLRN)



3.29. In the study area, the Rotherhithe and Blackwall Tunnels and the Woolwich ferry all lie on the TLRN (these crossings are described in more detail later in this Chapter). However in terms of use by longer-distance traffic and high volumes, the only current 'strategic' cross-river highway link is the Blackwall Tunnel.

Current cross-river highway infrastructure in east and west London

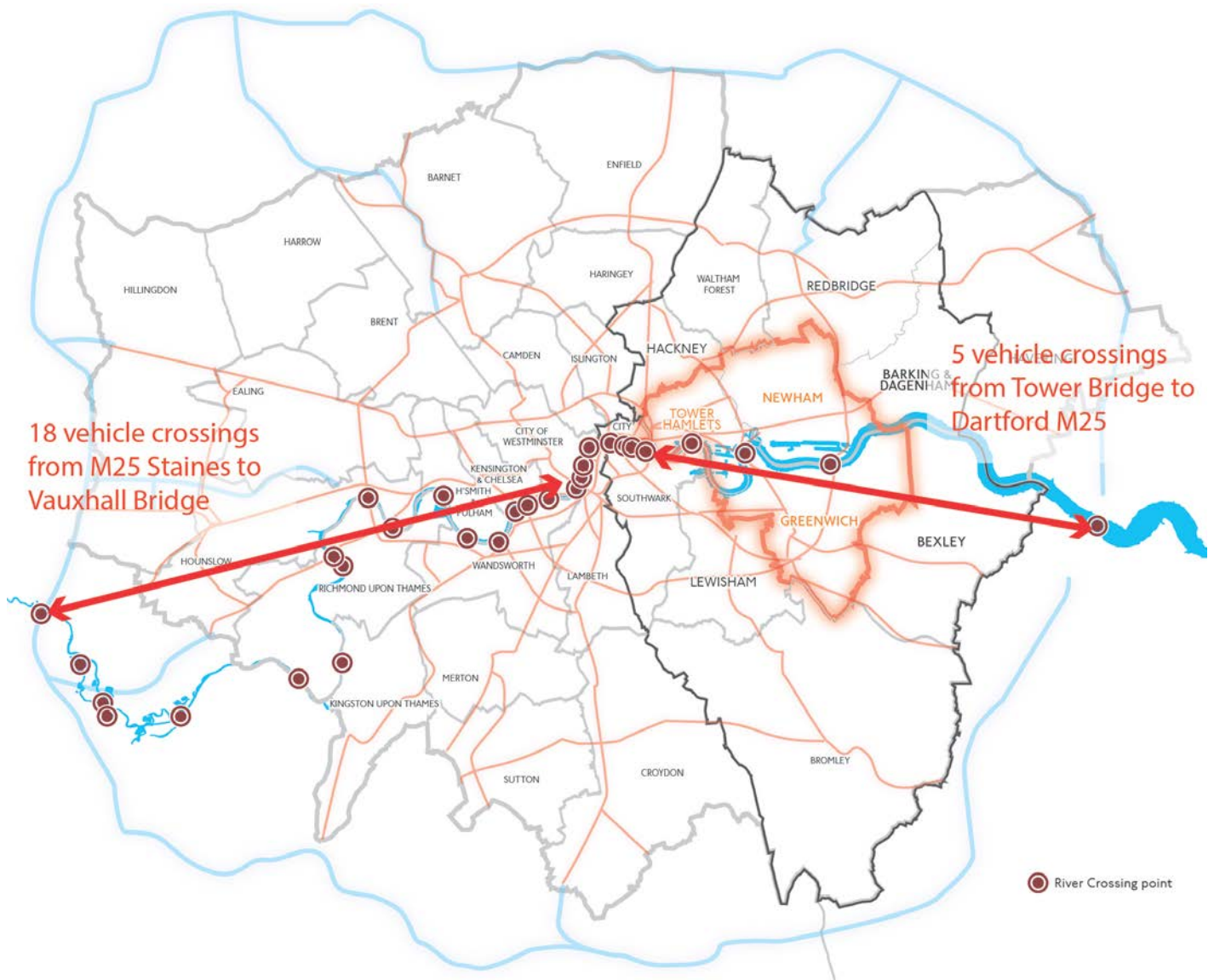
3.30. As set out at the start of this Chapter, for historical and navigational reasons there are only two bridges east of London Bridge: Tower Bridge, with its famous bascule lifting section, and the Queen Elizabeth II Bridge at Dartford with 54 metres of clearance above high water (located outside the Greater London boundary). There are three tunnelled road crossings, the Rotherhithe Tunnel, the twin bore Blackwall Tunnel (both of these tunnels have height and width restrictions) and the twin bore tunnel at the Dartford Crossing.

3.31. While there have been considerable improvements in cross-river public transport provision in recent years (as set out in paragraph 3.6), there have been no corresponding increases in cross-river highway provision within London.

3.32. Figure 11 illustrates the difference in the availability of road crossings of the Thames in east and west London, from the edge of the Central London Congestion Charging zone to the M25 (noting those with restrictions on use):

- West London: **18 crossings** in 29 km from Vauxhall Bridge to the M25 (Staines)
- East London: **5 crossings** in 23 km from Tower Bridge to the M25 (Dartford)

Figure 11 : Tower Bridge to M25: five crossings in 23 km



3.33. The three east London crossings between Tower Bridge and the Dartford Crossing are the Rotherhithe and Blackwall Tunnels and the Woolwich Ferry. The location of these three

crossings is shown in Figure 12 and more detail on each crossing has been provided below.

Figure 12 : Location of three existing river crossings in the study area



Rotherhithe Tunnel

- 3.34. The Rotherhithe Tunnel consists of a single bored tunnel providing one traffic lane in each direction. It connects the A200 in Rotherhithe with the A13 at Limehouse. It was originally designed to serve foot and horse-drawn traffic and the roadways are narrow as a result, with each lane only 2.4m wide, and two footways of between 1.2 and 2m wide on either side (as shown in Figure 13). It includes sharp bends at the points where the tunnel goes under the river bed which are unsuitable for large vehicles. Further restrictions on use of the Rotherhithe Tunnel are set out in Table 4.

Figure 13 : Inside the Rotherhithe Tunnel, showing a bend and the narrow footway



Blackwall Tunnel

- 3.35. The Blackwall Tunnel passes under the River Thames between the Greenwich Peninsula and Blackwall, approximately three miles east of Tower Bridge. It forms a primary route link (the A102) between the A2 to the south (which connects to the A205 South Circular) and the A12 / A13 to the north (which connects to the A406 North Circular).
- 3.36. The Blackwall Tunnel comprises twin bored tunnels carrying two lanes of traffic northbound and two lanes southbound. The northbound tunnel was constructed first, opening in 1897 and has a slightly smaller diameter than the southbound tunnel which opened in 1967, as it was originally designed with horse-drawn traffic in mind (the northbound bore height restrictions are shown in Figure 14).

Figure 14 : Blackwall Tunnel northbound bore height restrictions



3.37. The restrictions on the use of the Blackwall Tunnel by large vehicles are set out in Table 4.

Woolwich Ferry

3.38. The Woolwich Ferry links the A406 North Circular and the A205 South Circular. A ferry service has existed at Woolwich for centuries but the current ferry infrastructure dates from 1963, when the boats used today were introduced. There are three ferries, of which two are normally in service on weekdays which provide a service approximately every ten minutes.

3.39. The Woolwich Ferry only operates from 6.10am to 8pm Monday to Saturday (including most public holidays) and from 11.30am to 7.30pm on Sundays and places some restrictions on use by large vehicles, as set out in Table 4.

Table 4 : Usage restrictions for commercial vehicles on crossings in the study area

River crossing	Max height	Max width	Max length	Max weight	Load restriction ⁷⁶
Rotherhithe	4.4 m	2.0 m	10.0 m	None	Cat E
Blackwall NB	4.0 m ⁷⁷	None	None	None	Cat E

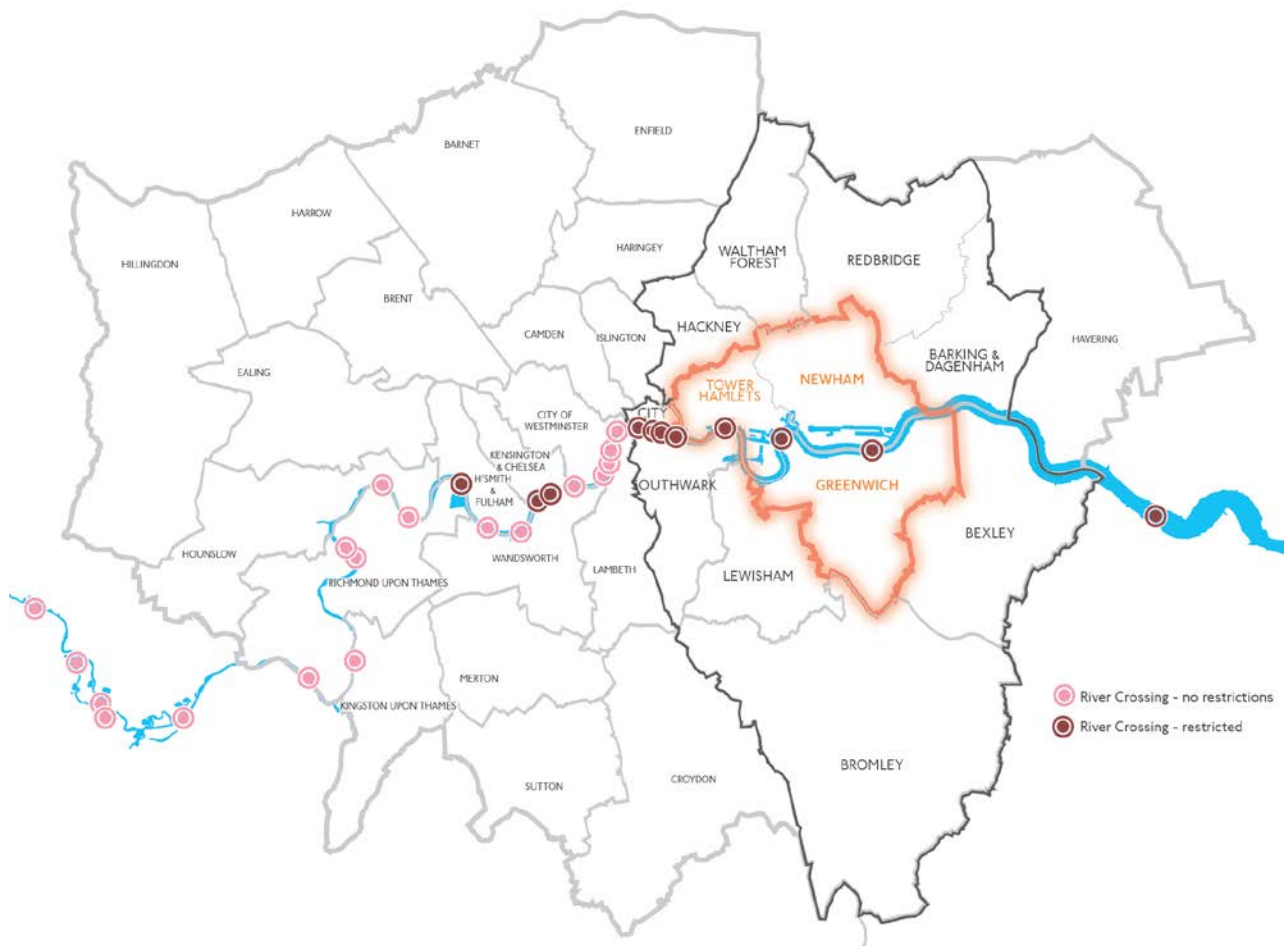
⁷⁶ Load restriction categories denote the type and quantities of dangerous goods that are allowed to enter the UK's larger road tunnels. Each regulated tunnel is assigned a particular category, A to E, with A being the least restrictive and E being the most restrictive. New restrictions were put in place in January 2010. For more information: http://www.roadSAFEurope.com/useful_info/Tunnel_Restrictions

⁷⁷ Left lane only, the right lane has a height restriction of 2.8m

River crossing	Max height	Max width	Max length	Max weight	Load restriction ⁷⁶
Blackwall SB	4.7 m	None	None	None	Cat E
Woolwich Ferry	4.8 m	3.5 m	None	None	None

3.40. The restrictions highlighted in Table 4 mean that for certain categories of road users, commercial traffic in particular, the highway river crossings available in the study area are limited not only by number but also by restrictions on weights, heights, lengths and/or widths (as shown in Figure 15). For safety reasons, there are also restrictions on the nature of loads which may be carried in tunnels under the European Agreement on the International Carriage of Dangerous Goods.

Figure 15: River crossings with and without restrictions



- 3.41. An implication of this is that vehicles with origins or destinations in east London which are restricted from using certain crossings may need to take very lengthy diversionary routes, possibly on inappropriate roads, in order to cross the River Thames.
- 3.42. The London Lorry Control Scheme represents a further impediment for some road traffic in restricting Heavy Goods Vehicles (HGVs) to a network of main roads for the majority of their trip during the night time to limit noise impacts. During scheme operating hours, the

Blackwall Tunnel is the only permitted river crossing route between Richmond and the Dartford Crossing (a crow-fly distance of some 40 km).

- 3.43. As the analysis presented from paragraph 3.72 demonstrates, this differential in cross-river highway provision has had an effect on the relative extent of cross-river travel in the eastern and western halves of the capital by influencing whether, how and where people travel. The limited number and location of crossings in east London is likely to have had an influence on the type of land uses established there.

Current capacity, demand and resilience of highway crossings

- 3.44. Table 5 shows the approximate capacity and morning peak demand on the three river crossings in the study area. The actual capacity varies both within and between days due to fluctuations in vehicle flow volumes, speeds and vehicle mix, so this is a guideline only.

Table 5 : 2012 demand and estimated capacities of road crossings in study area

Crossing	Capacity (PCUs ⁷⁸ /hr) ⁷⁹	Flow in PCUs (08:00-09:00) ⁸⁰	% capacity used (AM peak hour)
Rotherhithe Tunnel NB	1210	877	73%
Rotherhithe Tunnel SB	1210	885	73%
Blackwall Tunnel NB	3236	3190	99%
Blackwall Tunnel SB	3842	2934	76%
Woolwich Ferry NB	164	161	98%
Woolwich Ferry SB	164	158	96%

- 3.45. While Table 5 shows that Blackwall Tunnel has the greatest capacity, it also shows that the tunnel's maximum capacity in the northbound (peak) direction in the AM peak hour has been reached. The data also indicates that the Woolwich Ferry is at capacity in the peak direction throughout the morning peak period. Delays on the approaches to all three crossings are a regular occurrence, particularly to the Blackwall Tunnel (as shown in Figure 16) where current delays are some 20 minutes or more, as examined in detail in paragraphs 3.52 onwards.

⁷⁸ Passenger Car Units – a measure of the road capacity taken up by different types of vehicle

⁷⁹ Mott McDonald: River Crossing Modelling Base Year Development and Validation Report, 2014

⁸⁰ TfL Highway Assignment Model (HAM) baseline traffic counts (2012)

Figure 16 : Queuing on the approach to the Blackwall Tunnel (northbound)



- 3.46. In a transport context the term ‘resilience’ describes the ability of transport networks to provide and maintain an acceptable level of service in the face of both planned and unplanned incidents. In the case of the cross-river highway network this is a function of:
- The number of crossings and the distance between them
 - Their capacity to meet demand and the consequent implications should full or partial closure of one or more crossings be necessary, including the ability of operating crossings to handle traffic diverted from non-operational crossings
 - Their susceptibility to closure; for instance, an inability to accommodate all vehicle types (the height limit on the northbound bore of the Blackwall Tunnel is particularly relevant), maintenance needs for old assets and susceptibility to adverse weather
- 3.47. Resilience is an important issue for businesses, increasing costs and uncertainty – recent research on behalf of TfL found that 65 percent of firms located in and around the study area consider that poor reliability of cross-river travel acts as a constraint on or disruption to their business⁸¹.
- 3.48. In east London the overall resilience of the road network is sub-optimal due, in part, to the small number of river crossings and the considerable distances between them. The lack of crossings means traffic from across the entire southern area of east London seeking to cross the river converges at only three crossings, which reduces resilience and

⁸¹ WSP: [East London River Crossings – Business Survey](#), May 2014 - firms surveyed in boroughs of Greenwich, Newham, Tower Hamlets, Barking and Dagenham, Southwark, Lewisham, Bexley and Havering

compounds traffic congestion and safety concerns when incidents occur. These problems have a pronounced adverse impact on commercial traffic, which, as noted above, faces restrictions on the crossings it can use.

- 3.49. Incidents at crossings causing delay are excessively frequent (particularly at the Blackwall Tunnel) and have adverse impacts across the wider road network, as set out in detail below.

Rotherhithe Tunnel

- 3.50. The Rotherhithe Tunnel experiences relatively few unplanned incidents and closures. Between January and September 2012, there were between 9 and 26 incidents each month, mainly as a result of vehicle breakdowns or emergency road works.
- 3.51. With the forecast increases in population and employment within the east and southeast sub-region, it is expected that demand for the Rotherhithe Tunnel will increase. However, the tunnel is already operating at close to maximum capacity and there is limited scope to improve the ability of the local road network to feed additional traffic into the crossing.

Blackwall Tunnel

- 3.52. In addition to the Blackwall Tunnel capacity issues noted above, unplanned closures of the tunnel regularly have an impact on network resilience. There were a total of 1,087 unplanned incidents in the northbound bore of the Blackwall Tunnel and 401 in the southbound bore in the 2013 calendar year⁸².
- 3.53. Unplanned tunnel closures can result from:
- Overheight vehicles attempting to use the height restricted tunnel, especially the northbound bore which is restricted to vehicles up to 4 metres in height (60 percent of incidents in 2013)
 - Other incidents such as accidents, pedestrians entering the tunnels and broken down vehicles (28 percent of incidents in the northbound bore in 2013)
- 3.54. Despite multiple signs warning of the height limit displayed on the network of roads approaching the Blackwall Tunnel (as shown in Figure 17), drivers of HGVs over four metres tall still attempt to use it. In general these vehicles are led away up a dedicated slip road after triggering traffic signals set some way back from the tunnel (as shown in Figure 17). In extreme cases, HGVs have been known to strike the tunnel mouth itself.

⁸² Jacobs: Blackwall Tunnel Incident Note, 2014

Figure 17 : Blackwall Tunnel height limit signs



Figure 18 : Northbound tunnel entry control



3.55. Even when an overheight HGV is identified before reaching the tunnel mouth, the process of removing it is not straightforward and the need to stop all traffic to accomplish it imposes delays on other road users (new measures have been introduced to reduce the impact of such incidents, as set out further from paragraph 3.64 onwards).

- 3.56. The impact of these closures on the daily availability of the tunnel is such that northbound during 2013, there were only 10 days which were unaffected by a tunnel closure.
- 3.57. TfL's Surface Transport team monitors journey times on an hourly basis for traffic using the northbound A102/A12 through the Blackwall Tunnel (between A2 'Sun in the Sands' junction and A11 Bow interchange). Northbound during the morning peak (6am to 10am) typical journey times vary between 20 and 30 minutes. This is in contrast to weekend journey times during the same four-hour period of between 7 and 10 minutes. The impact of tunnel closures for overheight vehicles in the northbound direction will typically add around 15 minutes to journey times while the impact of broken down vehicles is just less than 30 minutes on average⁸³.
- 3.58. Trafficmaster journey time data for trips along the A102 leading to the Blackwall Tunnel and other roads in the network linking to the A102, show that traffic delays during peak periods are in excess of 1.5 minutes per kilometre - the highest delay category recorded by TfL.
- 3.59. Both the journey time data recorded by TfL and the independently recorded Trafficmaster data illustrate that the Blackwall Tunnel approaches are among the most congested roads in London during peak hours resulting in considerable delays to traffic. TfL has estimated the daily (Monday to Friday) economic cost of delays to traffic on the A102 alone to be around £50,000 northbound and £20,000 southbound and rising year-on-year. This equates to around £17.5 million every year⁸⁴.
- 3.60. On occasions when the Blackwall Tunnel suffers from one of the longer unplanned closures, the impact on traffic can be substantial. The four principal alternative routes for traffic are shown in Figure 19.

⁸³ Jacobs: Blackwall Tunnel Incident Note, 2014

⁸⁴ Atkins: River Crossings Development Study – Final Report, Version 2.0, June 2014

Figure 19 : Alternative Cross-River Routes to the Blackwall Tunnel



- 3.61. The shorter routes via Tower Bridge, the Rotherhithe Tunnel and the Woolwich Ferry are not suited to substantial additional volumes of traffic. A more appropriate route is the longer one via the Dartford Crossing but even that would be overloaded with an additional 2,000+ vehicles per hour. In fact, a recent study examining 315 km of the strategic road network that includes the M25 (London Orbital) and the A282 Dartford Crossing⁸⁵ (among other routes) states that the approaches to the Dartford Crossing are some of the most unreliable sections of the route and the worst performing sections of the M25. Average speeds in the peak period fall below 30 mph, well below the 50 mph speed limit.
- 3.62. This illustrates that, when the tunnel is closed for significant lengths of time, there are no practical and realistic alternatives for the majority of cross-river trips using the Blackwall Tunnel at the current level of demand.
- 3.63. The potential for Blackwall Tunnel incidents to have far-reaching impacts on London's road network can be illustrated through analysis of an incident which occurred on the morning of Thursday 11 September 2014.

⁸⁵ Highways Agency: London Orbital and M23 to Gatwick Rout Strategy Evidence Report, April 2014

Blackwall Tunnel Incident: 11 September 2014

On 11 September 2014, it was necessary to close the northbound bore of the Blackwall Tunnel from around 6.45am until just before 7am while we carried out emergency repairs to fix a loose panel.

Traffic began to queue as soon as the closure was put into place. At just before 7am, and even though the tunnel had been fully reopened, the volume of traffic trying to cross the river was so great that the queue for the tunnel extended as far back as the A206 Woolwich Road (a distance of approximately two kilometres). Signs were posted on the approach to the tunnel and social media was used to warn drivers to avoid the area.

The traffic queue continued to build however, and by just before 7.30am it had extended as far back as the A2 Kidbrooke Interchange (a distance of approximately five kilometres). The queuing affected local bus services, delaying bus passengers.

The queue did not fully clear until just after 9am, when traffic flow returned to normal levels for this area. The lack of an alternative crossing for vehicles meant that a closure of the Blackwall Tunnel lasting less than 15 minutes caused over two hours of disruption to the travelling public.

Blackwall Tunnel - Traffic management

- 3.64. Over the last three years a package of measures has been implemented at the Blackwall Tunnel to minimise the number of incidents affecting traffic and the severity of the resulting impacts. The measures include a dedicated Roads Response Team (RRT), new overheight detection system (shown in Figure 20) and overnight improvement works.

Figure 20 : Overheight vehicle detection sign



- 3.65. Officers from the Driver and Vehicle Standards Agency (DVSA) and Metropolitan Police Service Safer Transport Command work closely together to improve traffic flow and take dangerous vehicles off the road. They also keep in constant contact with TfL's London Streets Tunnel Operation Centre (LSTOC).
- 3.66. A comparison of before and after implementation of the RRT (Feb 2009 to Jan 2011 versus Feb 2012 to Nov 2013⁸⁶) reveals the following:
- In the northbound direction in the AM peak, journey time reliability has improved 0.8 percent despite journey times deteriorating by about 40 seconds. However it is believed that this deterioration would have been worse without the presence of the RRT
 - In the southbound direction in the PM peak, journey time reliability has improved 0.4 percent and journey times improved considerably, by about 2 minutes. Both are associated with a 4 percent drop in flows between 2009-10, with a marginal drop since
 - For both directions across the whole day the numbers killed or seriously injured dropped from 18 to 8 (first two years only), the number of incidents recorded by LSTOC fell by 39 percent (primarily overheight vehicles (46 percent) and breakdowns (34 percent)) and Road Traffic Incidents decreased by 13 percent, with the average duration falling from 48 to 25 minutes

⁸⁶ Excluding the London 2012 Olympic and Paralympic Games

3.67. TfL has implemented all reasonable measures to improve performance and minimise the number and impact of incidents at the Blackwall Tunnel and must now look at alternative options including major infrastructure improvements to existing assets or new crossings, as set out in detail in Chapter 5.

Woolwich Ferry

3.68. There are also current network resilience issues relating to the Woolwich Ferry. At busy times, the queue for traffic wishing to board the ferry can build up considerably, sometimes obstructing and delaying other road users, particularly on the southern side of the river.

3.69. Figure 21 illustrates an occasion where the queue for the ferry extended back through the roundabout and caused queuing on the eastbound and northbound approaches to the junction. A large majority of traffic on these roads is not seeking to use the ferry. Ferry queuing and associated congestion is causing delays to other local traffic around Woolwich town centre. Other analysis⁸⁷ shows that bus journey times in the area can be seriously affected by this queuing, which impacts on bus users over a wide area.

Figure 21 : Woolwich Ferry queues blocking back through the roundabout (south side)



⁸⁷ TfL iBus data

- 3.70. The ferry is also subject to other disruptive factors including the weather and interaction with river traffic.
- 3.71. The Woolwich Ferry is approaching the end of its useful life and a decision need to be made on its future – this is examined in the East of Silvertown Needs and Options report⁸⁸.

The nature and use of the Thames in east London necessitates road bridge river crossings to be higher, longer and have fewer in-river piers than those in the west. As a result, there have been historically and are today far fewer river crossings in east London than in west London.

Of the only three east London road crossings between Tower Bridge and the Dartford Crossing (a 23 km distance), one is the low-capacity Woolwich Ferry (which does not operate 24/7) and the other two are the Rotherhithe and Blackwall Tunnels, which have restrictions on use by large vehicles and are operating over capacity, particularly in peak directions at peak periods.

The lack of resilience of existing cross-river highway links is a major issue, given the lack of crossings, the distance between them, the restrictions on their use and the demand on them which exceeds current capacity. Incidents at crossings causing delay are excessively frequent, particularly at the Blackwall Tunnel and have adverse impacts across the wider road network, including:

- Unreliable journey times across a major Thames gateway affecting freight and commuter traffic;
- Congestion on approach roads to the tunnel affecting local residents and businesses;
- Lack of road network resilience over a wide area, with recovery from conditions of severe congestion taking, on occasions, many hours; and
- A considerable cost to the economy arising from drivers caught in congestion and goods taking (much) longer than planned to be delivered.

All reasonable traffic management measures have been implemented at the Blackwall Tunnel to minimise the number of incidents and the severity of the resulting impacts.

⁸⁸ TfL: [East London River Crossings - Assessment of Need & Options East of Silvertown](#), July 2014

Current cross-river patterns of movement

Current mode share

- 3.72. In examining the modes that residents in the study area use to travel, it is clear that private vehicle use (including those driving a car or van and those travelling as passengers) continues to play an important role in enabling access to employment in the host boroughs, though this mode share has changed over time, as shown in Table 6.

Table 6: Changes in study area residents commuting by private vehicle (2001-11)⁸⁹

Resident Borough	2001 car and van use		2011 car and van use		Change in number / mode share 2001-11
	Number of residents	Mode share (%)	Number of residents	Mode share (%)	
Greenwich	33,500	(39%)	34,900	(30%)	+1,400 / (-9%)
Newham	25,300	(32%)	27,700	(21%)	+2,400 / (-11%)
Tower Hamlets	13,200	(19%)	14,400	(12%)	+1,200 / (-7%)
Totals	72,000		76,000		+4,000 (6%)

- 3.73. The proportion of residents using a private vehicle to travel to work has reduced between 2001 and 2011 in all three of the Silvertown crossing host boroughs, indicating the impact of considerable investment in rail infrastructure and possibly the level of congestion and unreliability of the road network. While the share of commuting taking place by private vehicle has fallen, the absolute number of residents commuting by private vehicle has risen in all boroughs, by a total of 6 percent, as a result of population and employment growth.
- 3.74. Another commuting mode reliant on the road network in London is bus / coach travel and this mode also plays an important role in enabling access to employment in the host boroughs and has also changed over time, as shown in Table 7.

Table 7 : Changes in study area residents commuting by bus (2001-11)⁹⁰

Resident Borough	2001 bus use		2011 bus use		Change in number / mode share 2001-11
	Number of residents	Mode share (%)	Number of residents	Mode share (%)	
Greenwich	12,400	(15%)	19,100	(17%)	+6,700 / (+2%)
Newham	10,500	(13%)	17,500	(14%)	+7,000 / (+1%)
Tower Hamlets	7,700	(11%)	14,800	(13%)	+7,100 / (+2%)
Totals	30,600		51,400		+20,800 (68%)

⁸⁹ 2001 and 2011 Census data (datasets UV39 and QS701EW), see <http://www.neighbourhood.statistics.gov.uk> – responses from residents not in employment have been excluded from calculations

⁹⁰ 2001 and 2011 Census data (datasets UV39 and QS701EW), see <http://www.neighbourhood.statistics.gov.uk>

- 3.75. The proportion of residents travelling to work by bus has increased between 2001 and 2011 in all three of the Silvertown crossing host boroughs. While the increase appears small (between 1-2 percent) the absolute number of residents commuting by bus has risen substantially, by approximately 21,000 people or 68 percent. These bus passengers are currently provided with only one cross-river bus route between Tower Bridge and the Dartford Crossing which can suffer from major disruption when the Blackwall Tunnel is closed (as noted in paragraph 3.14).

Freight in the east and southeast sub-region

- 3.76. Freight and servicing trips in the east and southeast sub-region are mostly undertaken by road, as disclosed in recent TfL studies⁹¹ that indicate that 89 percent of all goods moved in London are reliant on road transport. The sector is subject to the same issues as other road users, including congestion (notably on the A12, A13, A20, and A102), severance (including across the Thames) and journey time unreliability (exacerbated by the scarcity of Thames crossings). These issues are passed on through higher business costs to consumers.
- 3.77. There is high freight / business use of the existing crossings – traffic counts undertaken in 2012 for TfL’s river crossings Highway Assignment Model found that 35 percent of PCUs at Blackwall Tunnel during the peak hour were goods vehicles (LGVs and HGVs); results for the Woolwich ferry showed that 52 percent of PCUs were LGVs/HGVs.
- 3.78. The East London SRTP (2010 version)⁹² notes that freight movement in the sub-region is expected to grow in the future as it adapts to serve a growing and increasingly prosperous population and as a result of the strategic role of the sub-region within an international gateway. This is also the finding of the Roads Task Force report which predicts demand for freight movement in London to increase over the medium to long term⁹³.
- 3.79. While alternatives and mitigation measures are being explored and encouraged it is predicted that London will remain heavily dependent on roads for freight and goods movement and business servicing⁹⁴; and the lack of adequate road access and connectivity across the river in east London are perceived as constraints on economic activity.

Despite recent reductions in private vehicle mode share, road-based travel is still very important in connecting people to employment in east London. While the proportion using a private vehicle to travel to work has decreased over the past ten years, the absolute number of residents commuting by private vehicle has risen in all three of the Silvertown crossing host boroughs due to population growth. In addition, the absolute number of residents commuting by bus in the three Silvertown crossing host boroughs has risen substantially. These increases generate additional demand for highway capacity and for more effective links between growing economic and residential areas and this demand is expected to increase further as population and employment are forecast to grow rapidly in the period 2011-2031.

⁹¹ TfL: [Roads Task Force – Technical Note 3](#), 2013

⁹² TfL: [East London Sub-regional Transport Plan](#), 2010

⁹³ TfL: [Roads Task Force – Technical Note 3](#), 2013

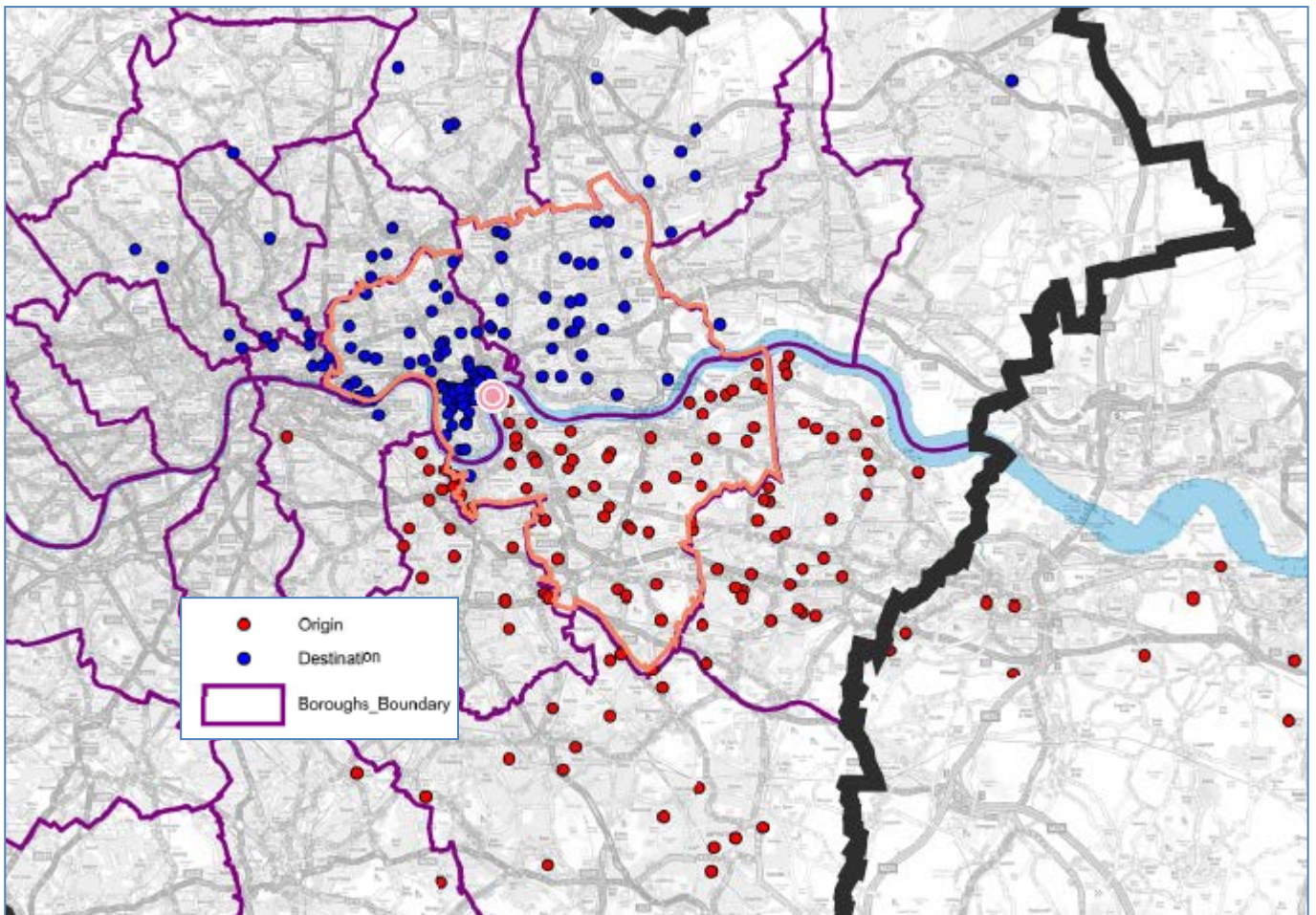
⁹⁴ Ibid

In addition, the vast majority of freight in London is carried by road and predictions are for this to increase over the coming decades⁹⁵.

Local and Strategic needs: current river crossing use

3.80. The three river crossings in the study area carry a mix of both local and long distance road traffic and can therefore be described as currently serving both 'local' and 'strategic' needs. This is illustrated in Figure 22 and Figure 23 which show the surveyed origins and destinations of traffic using the Blackwall Tunnel and the Woolwich Ferry northbound during the morning peak hour⁹⁶. The figures show a spread of movement at both crossings, some local, some more strategic, with a focus on origins and destinations in the study area as well as the adjoining boroughs and beyond. As would be expected given the lack of crossings, origins are focused on the eastern sub-region.

Figure 22 : Origins/destinations – Blackwall Tunnel northbound morning peak hour⁹⁷

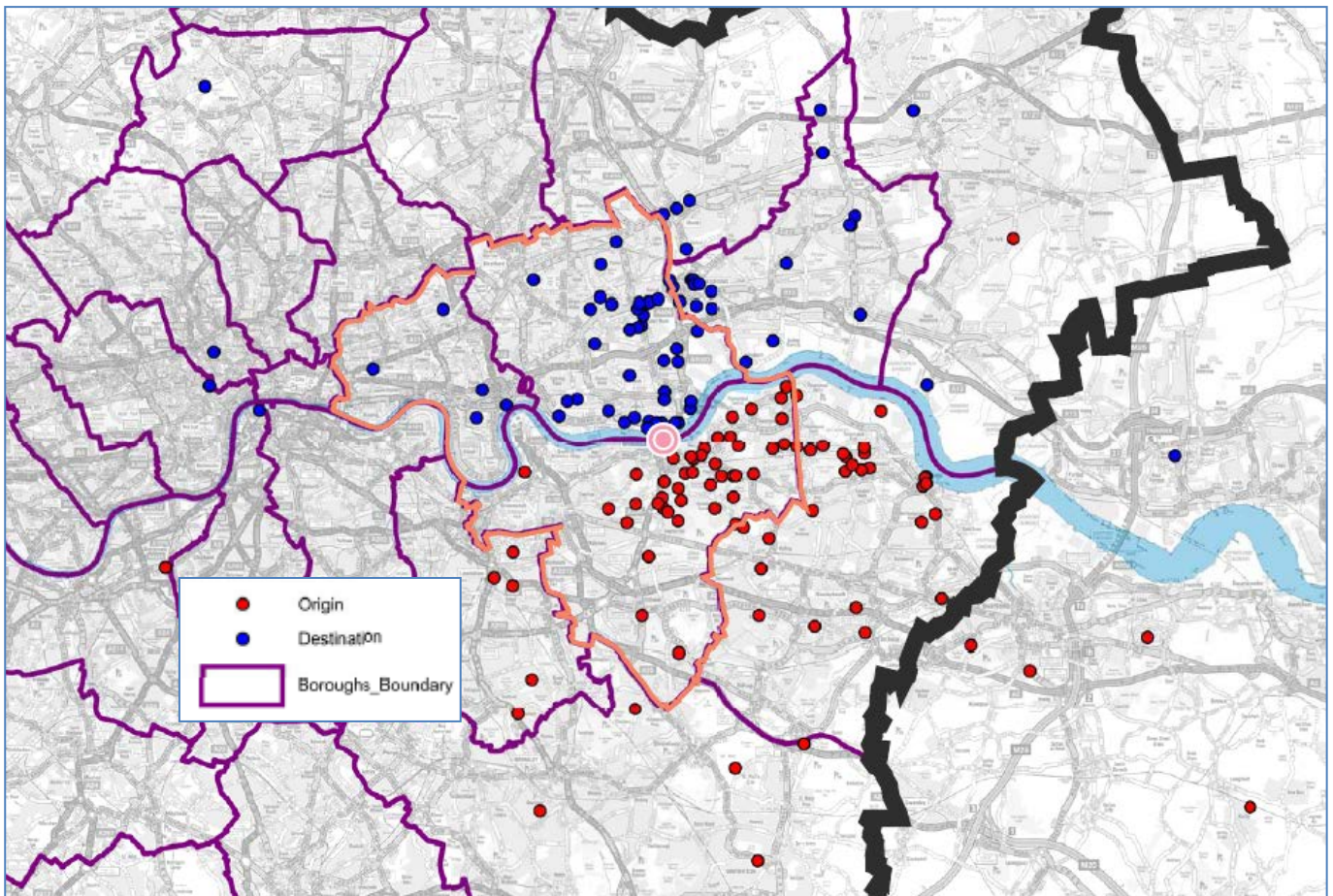


⁹⁵ TfL: [Roads Task Force – Technical Note 3](#), 2013

⁹⁶ Each dot represents an individual survey response

⁹⁷ TfL roadside interview surveys, 2012

Figure 23: Origins/destinations – Woolwich Ferry northbound morning peak hour



- 3.81. Analysis of the origins and destinations of users of the Woolwich Ferry suggests that the service has a very local catchment, with a slight bias to the east⁹⁸. The majority (86 percent) of northbound journeys surveyed in 2011 started in a London Borough south of the river, most notably Greenwich (59 percent) or Bexley (15 percent). Three fifths (62 percent) of southbound journeys started in a London borough north of the river, primarily Newham (31 percent). Greenwich stood out as the most common southbound destination making up more than half of trips (52 percent).
- 3.82. Figure 24 to Figure 26 show the routes and volumes of traffic using the Blackwall Tunnel, Rotherhithe Tunnel and Woolwich Ferry in the morning peak hour in 2012 (for ease of comparison the same scale has been used, whereby the thickness of the line – the green showing northbound flows and the red showing southbound - represents relative traffic flow). While carrying a mix of traffic, each crossing can be described in terms of the main function it performs in the London context. TfL has identified three types of crossing:
- I. National / Regional Strategic – traffic carried mostly has an origin and/or destination outside London; the crossing is of relatively minor importance for local, sub-regional or London-wide trips.

⁹⁸ TNS RI: Woolwich Ferry Customer Survey - September/October 2011, 2011

The Dartford Crossing has this role (outside London and study area). Though it is noted that the Blackwall Tunnel is the diversion route for the Dartford Crossing on the London Orbital (M25) and its 4m vehicle height restriction forces many lorry drivers to drive the opposite way around the M25 instead⁹⁹.

2. London Strategic – most traffic carried has an origin and/or destination in the east and southeast sub-region or wider London.

In the study area, the Blackwall Tunnel most closely fits this description with 75 percent of all trip origins and 83 percent of all trip destinations lying within Greater London (see Figure 24). While many of the trips using it are local and sub-regional trips, serving origins and destinations entirely within the east and southeast sub-region, many longer distance trips also use this crossing, with sizeable flows appearing on the M11 to the north east and the A2 to the southeast. Thus, the congestion and incident problems noted previously at the Blackwall Tunnel and the lack of alternative crossings, have an impact on the reliability and resilience of the strategic road network in east and south-east London.

The Rotherhithe Tunnel also plays a strategic role though to a lesser extent and with much lower flows than the Blackwall Tunnel (see Figure 25). Some longer distance traffic uses the crossing, though the greatest density of trip ends is close to the crossing itself.

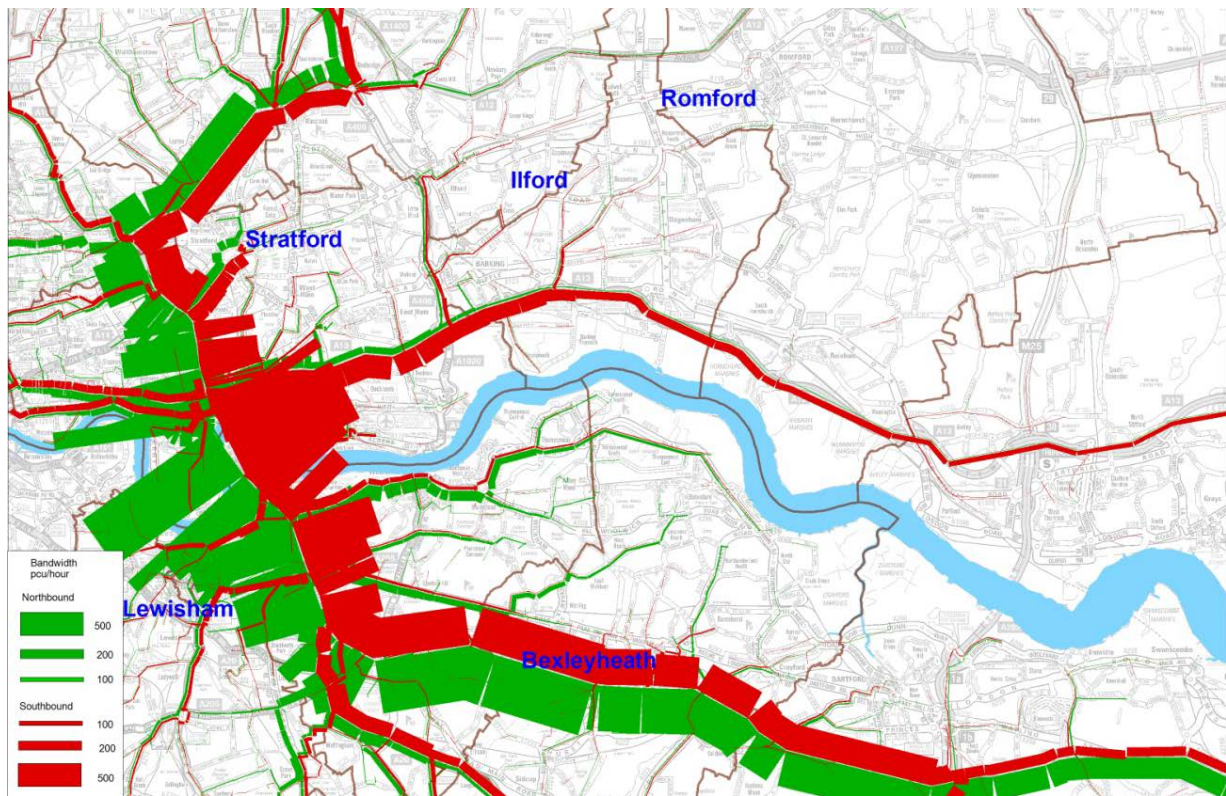
3. Local

The Woolwich Ferry is the crossing in the study area which most closely fits this description (see Figure 26). A high proportion of its traffic has an origin and/or a destination in Greenwich or Bexley. There is an axis of demand following the A406, some of which then uses the M11, but most traffic using it appears to be local or sub-regional in nature. The East of Silvertown Needs and Options report¹⁰⁰ looks more specifically at solutions to address local demand issues.

⁹⁹ Highways Agency: London Orbital and M23 to Gatwick Rout Strategy Evidence Report, April 2014

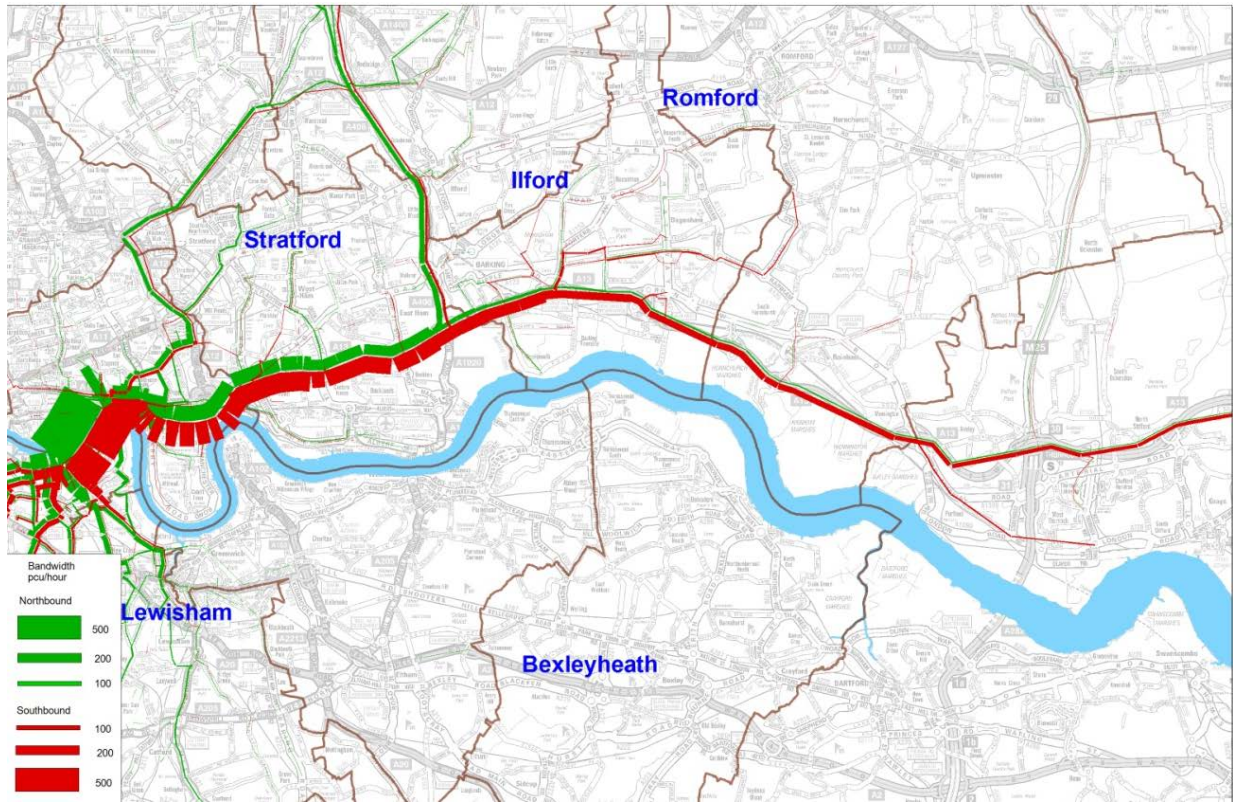
¹⁰⁰ TfL: [East London River Crossings – Assessment of Need & Options East of Silvertown](#), July 2014

Figure 24 : Blackwall Tunnel traffic in AM peak hour (0800-0900), modelled 2012¹⁰¹



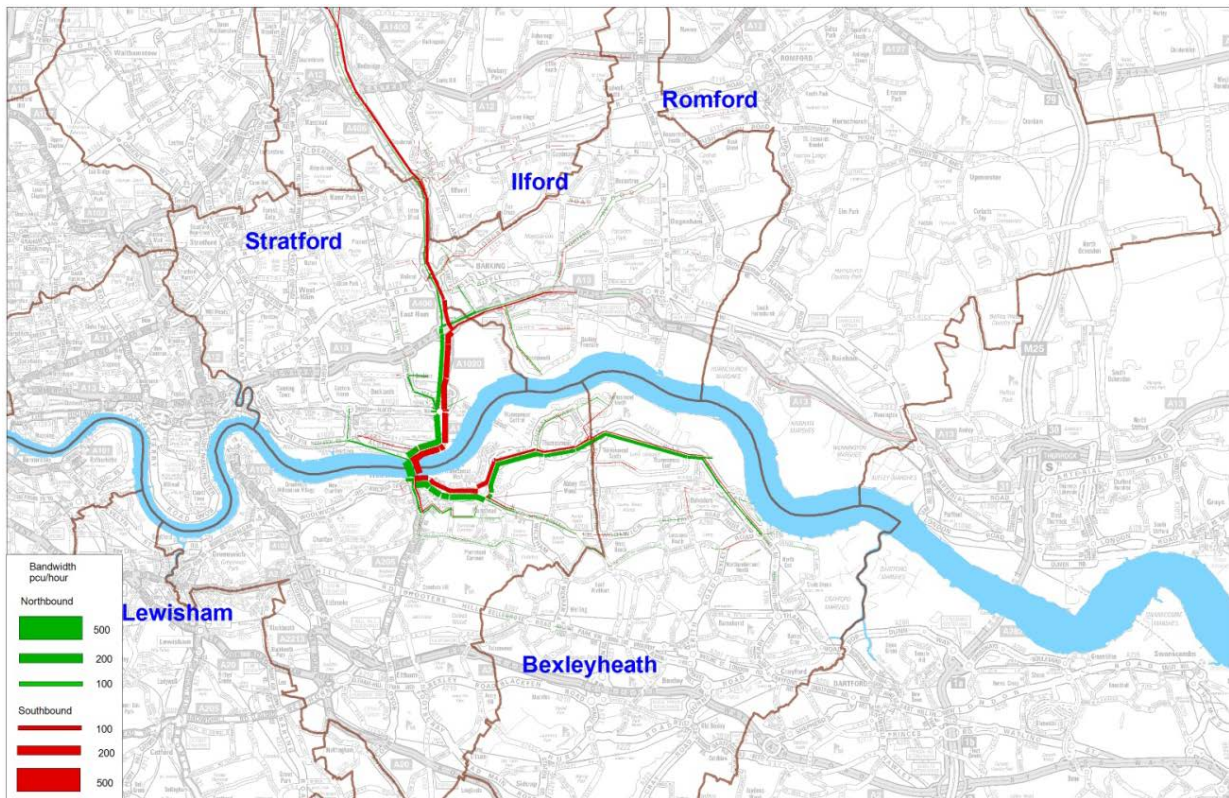
¹⁰¹ Source: TfL Highway Assignment Model output

Figure 25 : Rotherhithe Tunnel traffic in AM peak hour (0800-0900) modelled 2012¹⁰²



¹⁰² Ibid

Figure 26 : Woolwich Ferry traffic in AM peak hour (0800-0900), modelled 2012¹⁰³



3.83. Figure 24 to Figure 26 show that Blackwall Tunnel users come from a far greater catchment area than either Rotherhithe Tunnel or Woolwich Ferry users (during the morning peak hour in 2012). These three figures also indicate the impact the location of the crossing has, in terms of the ease of connections to and from the wider transport network. These figures also show the much greater flows of traffic using the Blackwall Tunnel compared to the other two river crossings (as shown by the thickness of the red and green lines) which is also shown in the figures.

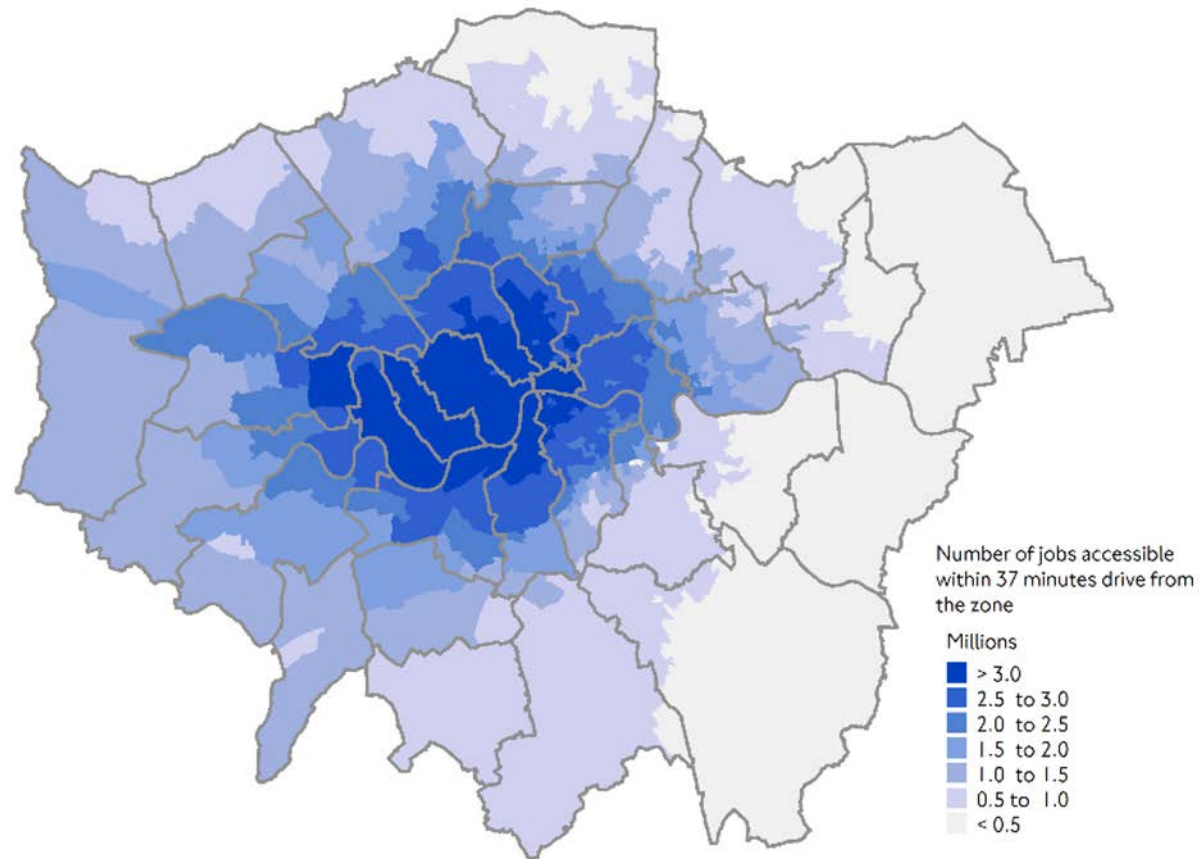
The Blackwall Tunnel has a different function compared to the other two east London river crossings, providing a more strategic role with a much wider catchment area and connections to the wider transport network. Thus, Blackwall Tunnel and its adjoining network's lack of resilience, due its infrastructural limitations, its operating capacities and the lack of alternative high capacity crossings has impacts on the Strategic London road network.

¹⁰³ Ibid

Current highway accessibility – opportunities for travel

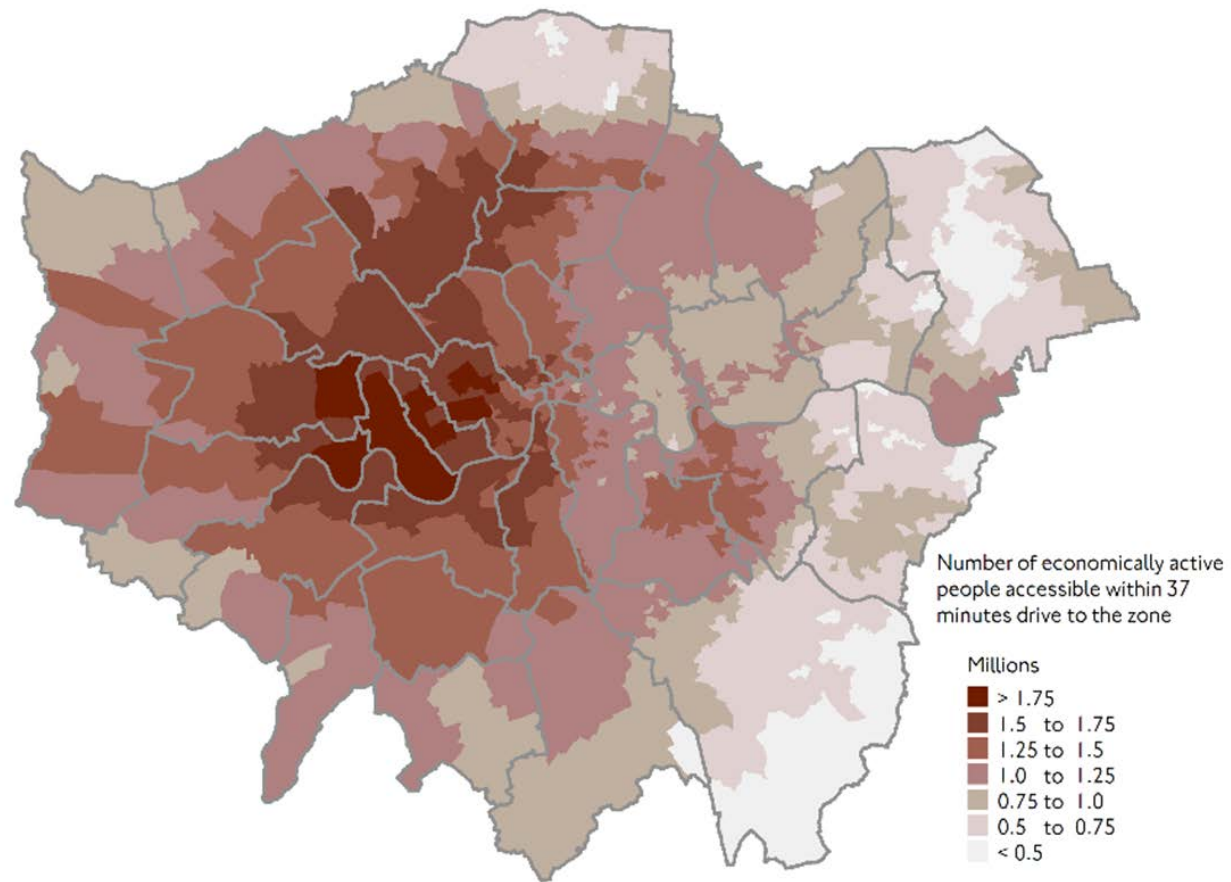
- 3.84. The transport connections and conditions described above strongly influence the degree to which residents and businesses in the study area can access economic opportunities.
- 3.85. Using models and accessibility analysis, estimates of accessibility to economic opportunities can be derived. Two measures of accessibility are:
- Access to jobs – an indication of how attractive a place might be as a residential location
 - Access to economically active population – an indication of how attractive a place might be to businesses in terms of their potential labour catchment
- 3.86. Figure 27 shows current highway accessibility to jobs in London from each transport model 'zone', with areas from which jobs are increasingly accessible shaded progressively darker blue. It shows how east London's accessibility to jobs is relatively poor, and the 'barrier effect' of the river in east London is immediately visible as it forms a divide between areas of good and much weaker accessibility. By contrast, accessibility graduates relatively smoothly downwards in west London and no 'barrier effect' is visible.
- 3.87. Figure 28 shows the current highway accessibility to the economically active population in London. It shows much poorer accessibility in east London, particularly south of the river, and the river clearly divides areas of good from areas of much weaker accessibility. Again by contrast, no river 'barrier effect' is visible in the west.
- 3.88. In essence what Figure 27 shows is that if you live in east London and drive to work, there are less jobs within a 37 minute drive than if you live in other parts of London. Similarly, for businesses in east London there are less employees living within car commuting distance than for businesses in other parts of London.

Figure 27 : Current highway accessibility to jobs¹⁰⁴



¹⁰⁴ TfL: London Regional Demand Model (LoRDM) analysis

Figure 28 : Current highway accessibility to economically active population¹⁰⁵



¹⁰⁵ TfL: London Regional Demand Model (LoRDM) analysis

Accessibility comparisons show that the barrier created by the river constrains the employment and commercial opportunities, as well as social opportunities, available to residents and businesses on both sides of the river east of Tower Bridge, whereas no river effect is visible to the west in central and west London.

Future drivers of demand

3.89. The following section looks at forecast population and employment growth in east London and the potential impacts on highway demand arising from this. Two trends were identified earlier in this section. Firstly, the numbers travelling by private vehicle continues to grow due to population growth (as highlighted in Table 6) despite car mode share decreasing across London (particularly inner London) in line with MTS mode shift objectives. Secondly, demand for freight movement in London continues to increase over the medium to long term (as highlighted in paragraph 3.78) as does the trend in the use of smaller vans for servicing and delivery¹⁰⁶.

Population

3.90. The London Plan anticipates that population growth between 2011 and 2031 in the east and southeast sub-region will be considerably more rapid than in the other sub-regions. GLA forecasts (shown in Table 8) predict that London's population will grow by around 1,150,000 people (or 14 percent) between 2011 and 2031.

Table 8 : Forecast growth in population in east and southeast London sub-region

Resident Population:	2011	2031	% growth
Greenwich	245,586	313,282	28%
Newham	295,777	361,181	22%
Tower Hamlets	245,710	325,723	33%
Bexley	223,811	240,254	7%
Hackney	235,334	273,496	16%
Havering	233,207	269,676	16%
Barking and Dagenham	180,895	233,462	29%
Redbridge	266,175	300,212	13%
Lewisham	271,275	311,853	15%
<i>East and southeast sub-region</i>	<i>2,197,770</i>	<i>2,629,139</i>	<i>20%</i>
<i>Greater London</i>	<i>7,991,889</i>	<i>9,144,126</i>	<i>14%</i>

Source: GLA Population Projections 2011 Round, SHLAA, High Fertility, Borough SYA (Jan 2012, GLA)¹⁰⁷

¹⁰⁶ TfL: [Roads Task Force – Technical Note 3](#), 2013

¹⁰⁷ <http://data.london.gov.uk/datastore/package/gla-population-projections-2011-round-shlaa-borough-sya>

- 3.91. Table 9 shows that the forecast population growth in all but two of the nine boroughs in the east and southeast sub-region is expected to exceed the London average of 14 percent. Together, the boroughs in the east and southeast sub-region are expected to account for 37 percent of London's total population growth over this period, while the four with the highest rates of growth (the three Silvertown crossing host boroughs of Tower Hamlets, Newham, Greenwich as well as Barking and Dagenham) are expected to account for 23 percent of London's growth.
- 3.92. Since the GLA forecasts were published, more recent information from the 2011 Census has become available, as shown in Table 9. The data reveals that the 2011 London population was already around 180,000, or 2 percent higher than had been forecast by the GLA; and the east and southeast sub-region alone accounted for 75,000, or 42 percent of that additional population. This is clearly a substantial increase in the number of additional residents in a short space of time.

Table 9 : Comparing GLA 2011 population forecasts with 2011 Census data

Resident Population:	2011 (GLA)	2011 (Census)	Difference (absolute)	Difference (% of GLA forecast)
Greenwich	245,600	254,600	9,000	4%
Newham	295,800	308,000	12,200	4%
Tower Hamlets	245,700	254,100	8,400	3%
Bexley	223,800	232,000	8,200	4%
Hackney	235,300	246,300	11,000	5%
Havering	233,200	237,200	4,000	2%
Barking and Dagenham	180,900	185,900	5,000	3%
Redbridge	266,200	279,000	12,800	5%
Lewisham	271,300	275,900	4,600	2%
<i>East and southeast sub-region</i>	<i>2,197,800</i>	<i>2,273,000</i>	<i>75,200</i>	<i>3%</i>
<i>Greater London</i>	<i>7,991,900</i>	<i>8,173,900</i>	<i>182,000</i>	<i>2%</i>

Source: GLA Population Projections 2011 Round, SHLAA, High Fertility, Borough SYA (Jan 2012, GLA) and the Census (2011)¹⁰⁸

- 3.93. Further work will be required to understand whether this is growth in population coming forward earlier than expected, or whether this means that the 2031 population is likely to be higher than forecast. For either scenario, the implication is that the infrastructure forecast to be required to accommodate growth by 2031 is now likely to be needed far sooner. If, as now seems likely, population growth exceeds the forecast then future road travel and congestion is also likely to be greater than forecast in London.

¹⁰⁸ <http://www.ons.gov.uk/ons/publications/re-reference-tables.html?edition=tcm%3A77-274670>

Employment

- 3.94. In contrast to the 37 percent share of London's total population growth which the east and southeast sub-region is expected to accommodate, the share of total employment growth expected to take place in the sub-region is smaller at around 22 percent, as shown in Table 10.

Table 10 : Current and forecast employment in east and southeast sub-region

Employment forecasts:	2011	2031	% growth
Greenwich	80,000	87,000	9%
Newham	88,000	107,000	22%
Tower Hamlets	227,000	301,000	33%
Bexley	74,000	79,000	7%
Hackney	95,000	111,000	17%
Havering	83,000	89,000	7%
Barking and Dagenham	51,000	56,000	10%
Redbridge	74,000	81,000	9%
Lewisham	77,000	83,000	8%
<i>East and southeast sub-region</i>	<i>849,000</i>	<i>994,000</i>	<i>17%</i>
<i>Greater London</i>	<i>4,797,000</i>	<i>5,452,000</i>	<i>14%</i>

Source: Borough Employment Projections, 2009, GLA (presented in the London Plan, 2011)

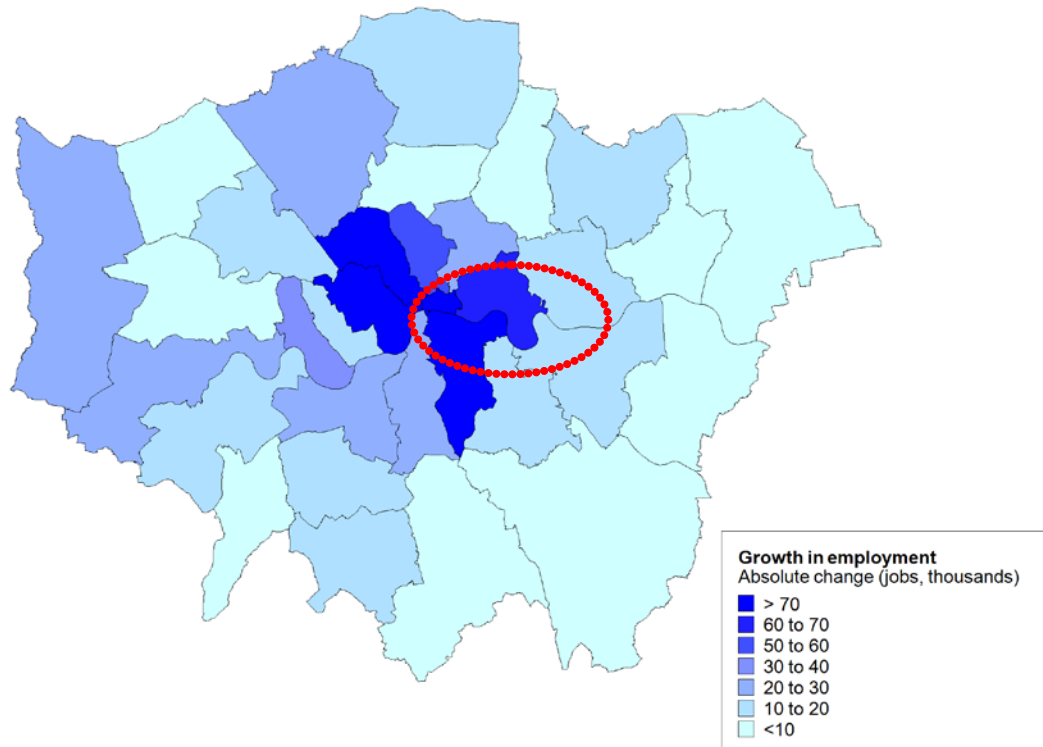
- 3.95. As shown in Table 10, this employment growth is highly concentrated, with three of the nine boroughs in the east and southeast sub-region forecast to experience growth rates above the London average; growth of some 33 and 22 percent is envisaged in Tower Hamlets and Newham respectively (two of the Silvertown crossing host boroughs), while Hackney is expected to experience growth of around 17 percent (all these boroughs lie north of the River Thames).
- 3.96. Together the three Silvertown crossing host boroughs account for over two-thirds of the employment growth forecast in the east and southeast sub-region (100,000 of the 145,000 new jobs forecast).
- 3.97. Some boroughs in the east and southeast sub-region, in particular those boroughs south of the river and in outer east London (Greenwich, Lewisham, Barking and Dagenham, Havering) are expected to experience greater growth in population than employment over the next twenty years. Figure 29 and Figure 30¹⁰⁹ illustrate these differences in growth patterns. Figure 29 shows that employment growth is concentrated in areas north of, and relatively near, the River Thames as well as in central London. The numbers of jobs in certain areas further north and east are actually expected to decline. In contrast, Figure

¹⁰⁹ The figures have been developed using recent GLA growth estimates prepared prior to the Further Alterations to the London Plan (January 2014)

30 shows higher population growth across a broader area of the sub-region, including more areas south of the river and in outer east London.

3.98. The ellipses highlight the areas considered to be most directly affected by the Silvertown crossing proposal and highlight the scale of growth anticipated there.

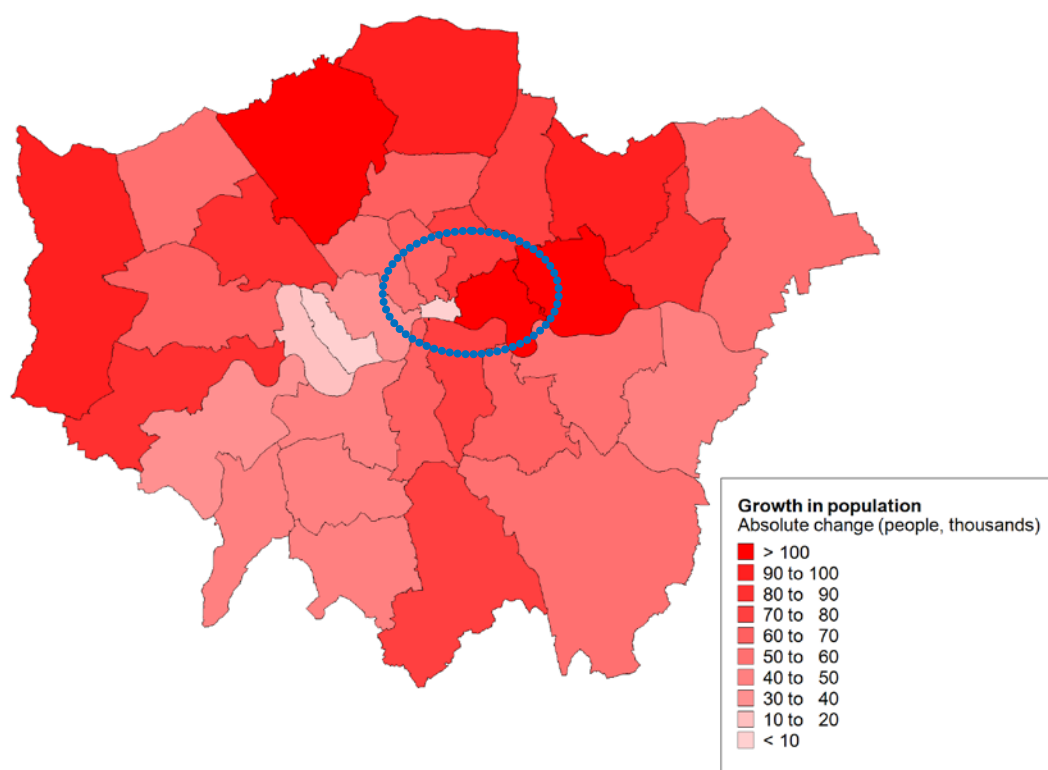
Figure 29 : Forecast changes in London's employment, 2006 to 2031



Source: GLA: FALP 2013 Employment projections by borough

3.99. A likely consequence of this disparity is that if employment rates are to be maintained or increased, residents in the east and southeast sub-region will increasingly need to travel to find employment outside their home borough, leading to an increased need for travel within and beyond the study area – including increased cross-river travel.

Figure 30 : Forecast changes in London's population, 2006 to 2031



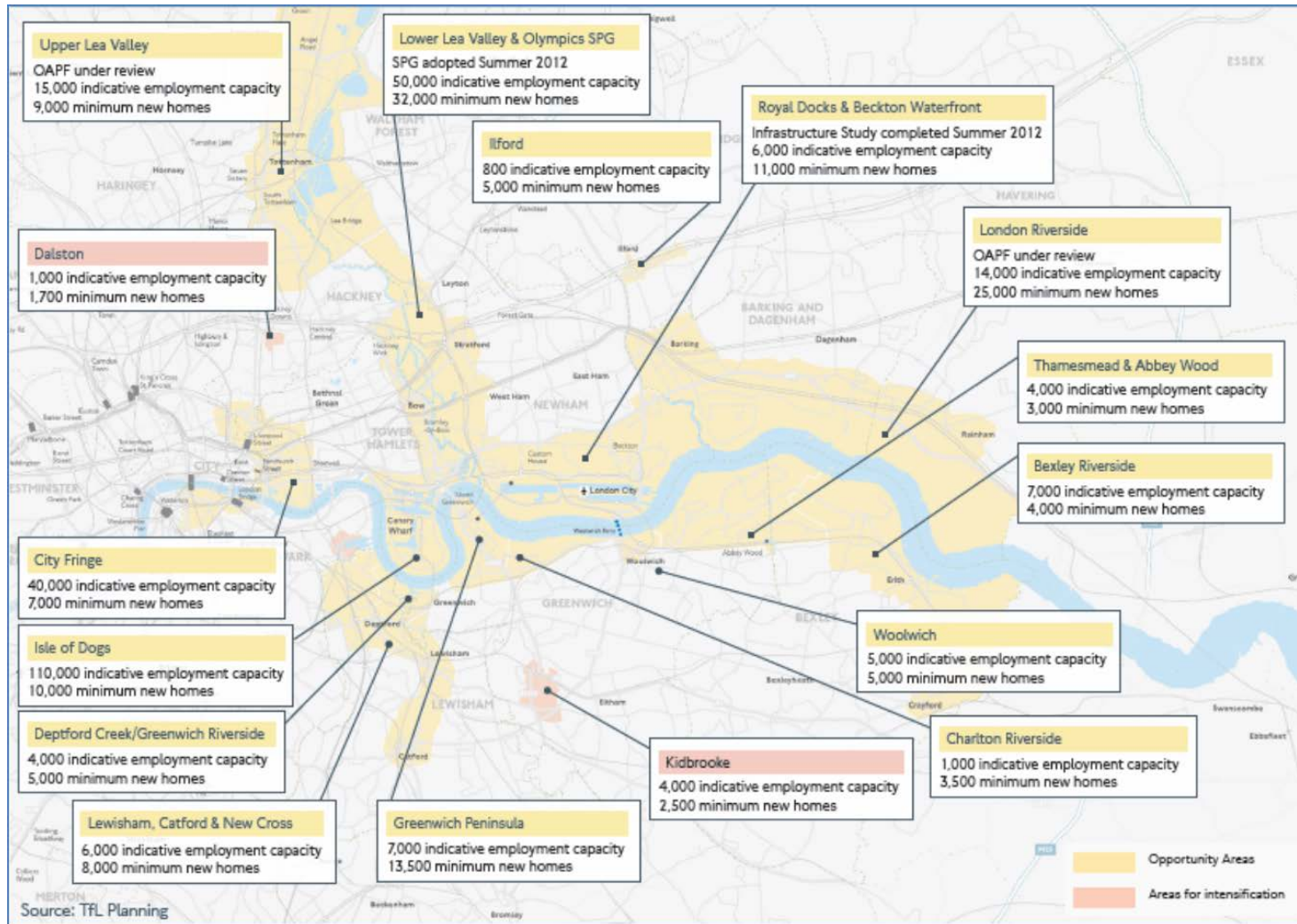
Source: GLA 2013 round population projections (update 04-2014)

Development and regeneration

- 3.100. The London Plan states that ‘growth will be supported and managed across all parts of London to ensure it takes place within the current boundaries of Greater London without: a) encroaching on the Green Belt, or on London’s protected open spaces, and b) having unacceptable impacts on the environment’ (Policy 1.1B). The plan goes on to state that ‘in spatial terms, this will mean renewed attention to the large areas of unused land in east London where there are both the potential and need for development and regeneration’ (paragraph 2.4).
- 3.101. The London Plan therefore identifies London’s reservoir of brownfield land and particularly, the larger sites in the east as principal locations for accommodating its growth requirements over the next 20 years (paragraph 2.58). The east and southeast sub-region contains 12 Opportunity Areas and two Areas for Intensification, of which the majority are located in the study area as shown in Figure 31, with indicative capacities for new homes and jobs from 2011 to 2031 (subject to provision of infrastructure)¹¹⁰.

¹¹⁰ East and South East London Sub-regional Transport Plan update report, 2012/13

Figure 31 : Opportunity Areas in the east and southeast sub region growth potential 2011 to 2031



3.102. Within the immediate catchment area of the Silvertown crossing there is potential capacity for over 130,000 new jobs and 50,000 new homes (as shown in Figure 31) which could be created in the period to 2031 if the necessary infrastructure is provided. Resilient cross-river linkages will be important in linking these new and enlarged communities. The River Crossings Development Study¹¹¹ concludes that the realisation of this housing growth depends firstly on public transport capacity (most notably Crossrail) and secondly on highways connectivity for servicing needs.

Increased demand for highway travel

3.103. TfL has modelled the changes in population and employment¹¹² from 2012 to 2021 and 2031 and the implications of this on demand to travel by road. The transport model forecasts the change in the number of car journeys (car drivers and passengers) which will end in a particular area - there is predicted to be a greater increase in trips ending in the study area than other parts of London. For example, in the Greenwich Peninsula there are anticipated to be between 2,000 and 3,500 more car journeys ending in the area in the morning peak period, while in Charlton Riverside (to the east of the Greenwich Peninsula), the Royal Docks and Woolwich there are anticipated to be between 1,000 and 2,000 more car journeys ending in these locations.

3.104. TfL's traffic forecasts also indicate that there will be increased traffic delays in the morning and evening peak hours in the east and southeast sub-region, in particular in the host boroughs, as shown in Table 11.

Table 11 : Borough-level journey delay statistics (2012 to 2021 reference case)¹¹³

Borough	Change in total PCU-delay-hours (morning peak hour, 2012-21)	Change in total PCU-delay-hours (evening peak hour, 2012-21)
Greenwich	+26%	+28%
Newham	+15%	+18%
Tower Hamlets	+29%	+29%
<i>Host boroughs</i>	+24%	+30%
Barking & Dagenham	+31%	+32%
Bexley	+27%	+23%
Hackney	+19%	+10%
Havering	+19%	+25%
Lewisham	+23%	+32%
Redbridge	+29%	+43%
Waltham Forest	+15%	+24%
East sub-region	+24%	+27%

¹¹¹ Atkins: River Crossings Development Study - Final Report, 2014

¹¹²TfL: London Regional Demand Model (LoRDM) analysis

¹¹³ Ibid

Background traffic changes from 2012 to 2021

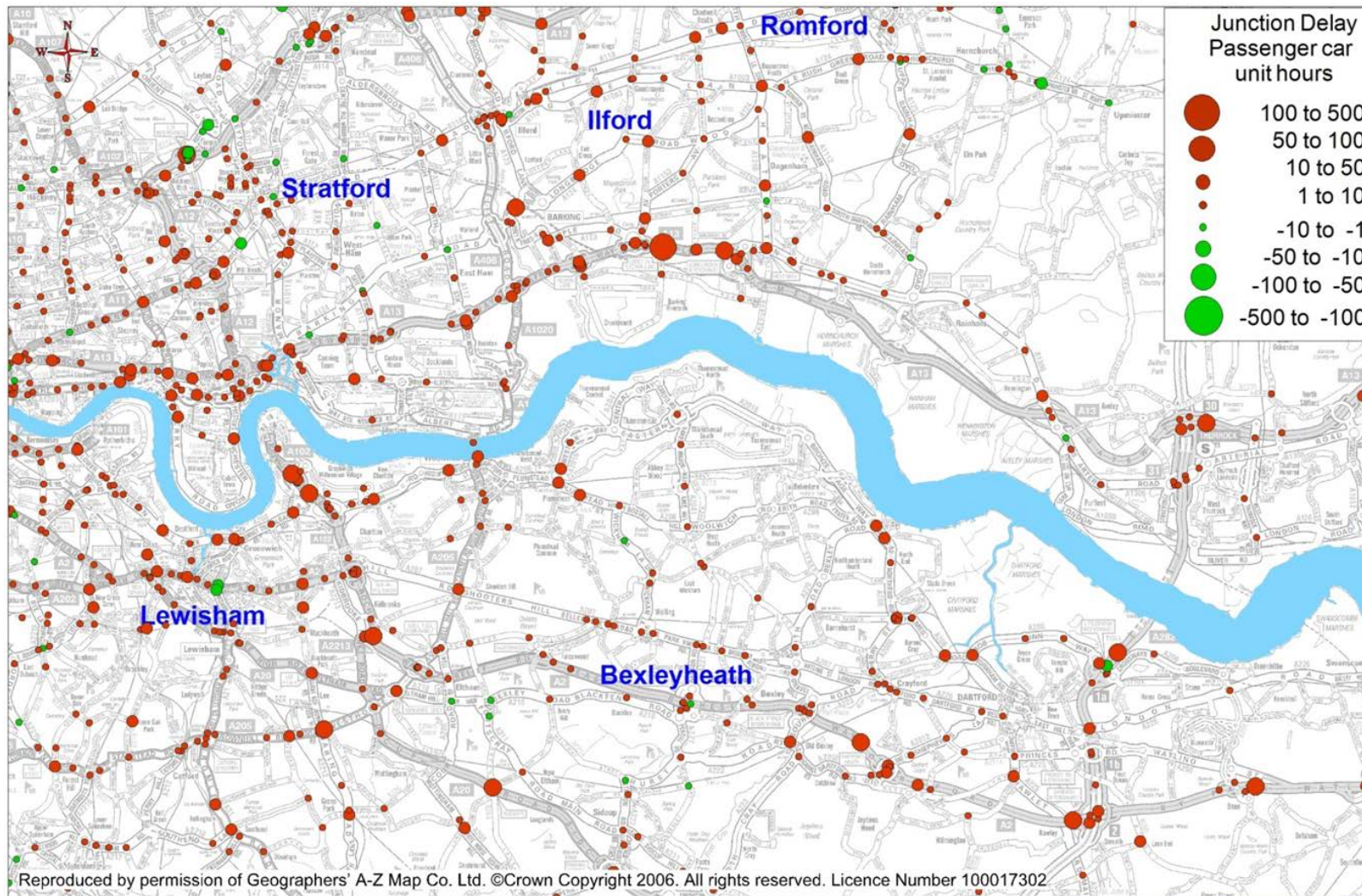
- 3.105. Further modelling by TfL¹¹⁴ has used the estimates of population and employment growth to provide estimates of future highway demand in the study area.
- 3.106. Figure 32 shows the modelled change in traffic flows in the morning peak hour across east London from 2012 to 2021. It can be seen that there are large increases in flows across the strategic road network and particularly on the approaches to the Blackwall Tunnel (A102, A2, A13 and A12). These increases are driven primarily by the forecast increase in population and employment.
- 3.107. Figure 33 shows the impact such increases in traffic flow would have on junction delay in the morning peak hour between 2012 and 2021. Projected increases in delay can be seen across the highway network as a result of increased traffic flows. Increases in junction delay are shown on the Blackwall Tunnel approaches.

¹¹⁴ Mott McDonald: River Crossing Modelling, Base Year Development and Validation Report, February 2014

Figure 32 : Flow changes (2012 to 2011) on road network in morning peak hour (0800-0900)



Figure 33 : Junction delay changes in the morning peak hour (0800-0900) from 2012 to 2021



3.108. Table 12 shows the number of morning peak trips with an origin or destination in Greenwich, Newham or Tower Hamlets by mode, with and without the Silvertown Tunnel. The definition of car trips includes those driving a car or van and those travelling as passengers. The definition of public transport (PT) trips includes travel by bus, DLR, Underground and National Rail. The mode share proportions refer to share of travel excluding active travel modes.

Table 12 : Morning peak trips with an origin in Greenwich, Newham and Tower Hamlets

	2012 base trips (and mode share %)		2021 reference case trips (and mode share %)		2021 central case trips (and mode share %)	
	Car	PT	Car	PT	Car	PT
Greenwich	26,200 (61.5%)	16,400 (38.5%)	29,700 (57.7%)	21,700 (42.3%)	29,700 (57.9%)	21,600 (42.1%)
Newham	20,000 (49.2%)	20,600 (50.8%)	22,400 (45.5%)	26,900 (54.5%)	22,300 (45.4%)	26,900 (54.6%)
Tower Hamlets	13,800 (39.9%)	20,900 (60.1%)	15,600 (37.9%)	25,500 (62.1%)	15,600 (37.8%)	25,600 (62.2%)
Sub-total	60,000 (50.9%)	57,900 (49.1%)	67,600 (47.7%)	74,100 (52.3%)	67,600 (47.7%)	74,100 (52.3%)
East sub-region¹¹⁵	218,800 (56.4%)	169,200 (43.6%)	236,200 (54.2%)	199,300 (45.8%)	236,200 (54.2%)	199,300 (45.8%)

3.109. The total volume of travel will continue to rise in line with increases in the number of residents and jobs in east and southeast London. Between 2012 and 2021 the rise in public transport trips is forecast to be greater than car trips due to the ongoing improvements in connectivity and capacity. The number of morning peak hour public transport trips originating in the three host boroughs is expected to increase from around 58,000 to almost 75,000. The impact of the Silvertown Tunnel is very small in contrast to these background changes in travel behaviour.

3.110. The data and information set out within this Chapter demonstrates that despite the forecast mode shift from car to public transport trips in the east and southeast sub-region, there is still predicted to be a growth in car and other road-based trips (e.g. freight) arising from the population increases forecast, and already being realised, in the area.

¹¹⁵ Barking & Dagenham, Bexley, Greenwich, Lewisham, Hackney, Havering, Newham, Redbridge, Tower Hamlets, Waltham Forest

Population growth in the east and southeast sub-region, and in Greenwich, Newham and Tower Hamlets in particular, is happening more quickly than previously anticipated and traffic modelling predictions¹¹⁶ are for significant increases in the volumes of road traffic in the study area together with levels of congestion, particularly at the approaches to the Blackwall Tunnel.

Disparities between the amount and location of forecast population and employment growth will generate increased commuter travel demands outside residents' home boroughs, including increased cross-river travel demand and, if not addressed, could exacerbate levels of deprivation in Greenwich, Newham and Tower Hamlets (which have high unemployment rates).

Even with a sustained shift towards public transport, the increase in population is still predicted to lead to an absolute rise in car travel. The rising population will lead to rising servicing and freight needs which are still set to follow current road-based trends with increasing LGV trip rates in the short- to medium-term.

Business needs survey

3.111. Between 24 September and 15 October 2013 700 telephone surveys¹¹⁷ of businesses were conducted on behalf of TfL (on a sampling frame designed to cover boroughs, sectors and sizes - number of employees) concerning the East London River Crossings Package¹¹⁸.

3.112. The key findings of the survey are:

- Improvements to cross-river journeys are seen as important to businesses. 64 percent of firms regard the ability to cross the River Thames as important to the successful operation of their business. Only 18 percent of businesses agree or strongly agree that current crossing options are adequate.
- The predictability of cross-river journey times is a particular issue. 65 percent of firms consider that poor reliability of cross-river travel acts as a constraint or disruption to their business. 44 percent of firms think predictability of journey times is poor or very poor. This is of most concern to firms in Greenwich (80 percent).
- Businesses expect a strong positive economic effect from the East London River Crossings Package. 83 percent expect it to improve the local economy overall.
- 44 percent of firms agree that a new tunnel at Silvertown would have a positive impact on their business.
- A number of businesses see the river as a barrier to the development of their business on the other side. Overall around a third of all businesses agreed with this statement, although the level of agreement was higher for businesses in Greenwich

¹¹⁶ Mott McDonald: River Crossing Modelling, Base Year Development and Validation Report, February 2014

¹¹⁷ WSP: [East London River Crossings – Business Survey](#), May 2014

¹¹⁸ Defined in the survey as a new tunnel at Silvertown (with no height restrictions); a new ferry, tunnel or bridge at Gallions Reach, or an upgrade to existing Woolwich Ferry

(49 percent) and Newham (47 percent).

- Longer-term recruitment trends are expected to be stronger if the East London River Crossings Package is implemented. Almost half of businesses (49 percent) expect to recruit additional staff as a result of the investment, with firms in boroughs closest to the planned new crossings - Greenwich (57 percent) and Newham (54 percent) - anticipating the biggest effect.
- Freight and logistics are expected to benefit from the East London River Crossings Package. More efficient use of supplies and deliveries is anticipated by 65 percent of firms as a result of the package.
- Over half of firms would be happy to pay a reasonable charge to cross the river if journey times became more reliable. Smartcard payment for freight was supported by 73 percent of respondents.

Overall, two thirds of local businesses report that the ability to cross the river by road in east London is important to their business, with a third rating it as very important or essential. Only 18 percent feel current crossings are adequate.

Two thirds of businesses also report that poor reliability of cross-river travel acts as a constraint or disruption to their business and almost half rate predictability of current journey times as poor or very poor, particularly those in Greenwich.

Almost half of businesses agree that a new tunnel at Silvertown will have a positive impact on their business.

Almost 60% of businesses would be prepared to pay a user charge for a more reliable crossing.

Committed transport enhancements

3.113. There are a number of enhancements planned to assist in meeting demand that have been identified and developed in partnership with boroughs and other stakeholders. The East and South East London Sub-Regional Transport Plan¹¹⁹ sets out a wide variety of public transport, walking, cycling and highways projects to meet identified needs in east and southeast London.

3.114. Some of the more significant schemes are:

- Crossrail (2018)
- Devolution of West Anglia suburban services to TfL control (2015)
- New stations at Lea Bridge (2014) and DLR Pudding Mill Lane
- Stratford to Upper Lea Valley rail enhancements (2018)
- Jubilee line capacity enhancements

¹¹⁹ TfL: [East and South East London Sub-Regional Transport Plan, 2014 update](#), 2014

- Electrification of the Gospel Oak to Barking line and extension to a new station at Barking Riverside
- Hackney Wick and Bromley-by-Bow station improvements
- Train lengthening to five cars on London Overground (2015)
- Implementation of the Mayor's Vision for Cycling

3.115. A new tunnel at Silvertown is also included in this list (as noted earlier in paragraph 2.42).

3.116. The MTS identifies the need for additional crossings in east London including options at Woolwich, Gallions Reach and Belvedere. Whilst these crossings are essential to delivery of the overall package of river crossings, they do not constitute alternatives to the Silvertown Tunnel. These crossings are necessary to provide the levels of connectivity required to support the long term growth of the area.

3.117. Similarly, the Department for Transport is currently considering proposals for a new Lower Thames Crossing to alleviate congestion associated with the Dartford Crossing¹²⁰. The Dartford Crossing provides a strategic function as part of the UK motorway network and any enhancements here would not remove the need for enhancements in east London.

Needs gap analysis

3.118. Having regard to the constraints on the existing transport network in the study area including the lack of connectivity and resilience in road-based river-crossings, the ways residents and businesses will choose to travel, the growth factors which are anticipated to change the area's travel needs and the programme of committed investment, the following conclusions can be reached:

1. Population growth in the east and southeast sub-region and in Greenwich, Newham and Tower Hamlets in particular, is happening more quickly than previously anticipated and traffic modelling predictions¹²¹ are for significant increases in the volumes of road traffic in the study area together with levels of congestion, particularly on the approaches to the Blackwall Tunnel.
2. Disparities between the volume and location of forecast population and employment growth will generate increased commuter travel demands outside residents' home boroughs, including increased cross-river travel demand and, if not addressed, could exacerbate levels of deprivation in the study area (in boroughs that already have high unemployment rates).
3. Sustained investment in public transport in east London has resulted in a step change in cross-river rail connectivity over the last 20 years and a further high-capacity rail crossing in the form of Crossrail is under construction. However, while much investment has been made in rail-based cross-river public transport, there is currently

¹²⁰ DfT: [Options for a New Lower Thames Crossing - Consultation Document](#), May 2013

¹²¹ Mott MacDonald: River Crossing Modelling, Base Year Development and Validation Report, February 2014

only one cross-river bus link in east London, largely due to the lack of suitable road crossings.

4. New public transport routes and connections will be necessary to ensure adequate links are provided between areas of population growth and jobs. In addition to the network of rail crossings, new cross-river bus connections will be necessary in the future.
5. Local pedestrian and cyclist trips across the river can be undertaken by one of several public transport links, including the dedicated Silvertown pedestrian and cycle crossing, the Emirates Air Line (running parallel to the proposed Silvertown crossing) as well as ferries and the recently re-furbished foot tunnels. In line with MTS policies and to support recent and future riverside growth, TfL is committed to investigating providing additional cross-river walking and cycling links.
6. Of the three east London road crossings between Tower Bridge and the Dartford Crossing (a 23 km distance); one is the low-capacity Woolwich Ferry (which does not operate 24/7) and the other two are the Rotherhithe and Blackwall Tunnels. These have restrictions on use by large vehicles and are operating over capacity, particularly in peak directions at peak periods. The Blackwall Tunnel currently provides the principal strategic traffic carrying function in the study area.
7. The lack of resilience of existing cross-river highway links is a major issue, given the lack of crossings, the distance between them, the restrictions on their use and the demand on them which exceeds current capacity. Incidents at crossings causing delay are excessively frequent, particularly at the Blackwall Tunnel and have adverse impacts across the wider road network, including:
 - Unreliable journey times across a major Thames gateway affecting freight and commuter traffic;
 - Congestion on approach roads to the tunnel affecting local residents and businesses;
 - Lack of road network resilience over a wide area, with recovery from conditions of severe congestion taking, on occasions, many hours; and
 - A considerable cost to the economy arising from drivers caught in congestion and goods taking (much) longer than planned to be delivered.
8. Despite recent reductions in private vehicle mode share, road-based travel remains important in connecting people to employment in the host boroughs and given the growth of population and employment expected in east London, further growth in highway travel is forecast. In addition, the vast majority of freight in London is carried by road and predictions are for this to increase over the coming decades.
9. East London is one of the largest regeneration areas in the UK. The delivery of development in this area is fundamental to maximising London's economic potential. However, road traffic movements within the sub-region are constrained by the 'barrier effect' of the Thames. This 'barrier effect' limits local firms' access to markets, the size of retail and leisure catchments and residents' access to employment opportunities in a way that is unique to the eastern parts of the capital. This

constraint on economic activity makes delivering the scale of development planned for the area more difficult.

10. Overall, two thirds of local businesses report that the ability to cross the river by road in east London is important to their business and only 18 percent feel current crossings are adequate. Two thirds of businesses also report that poor reliability of cross-river travel acts as a constraint or disruption to their business and almost half rate predictability of current journey times as poor or very poor, particularly those in Greenwich.

The overall conclusion is that the existing river crossings in east London are inadequate to cater for current and forecast future demand for cross-river road traffic movement; they are operating at or over capacity and there are severe resilience problems, particularly at the Blackwall Tunnel. While public transport, walking and cycling are important, road travel is also vital for the proper functioning of the study area, traffic modelling undertaken by TfL using Greater London Authority growth predictions are for continuing increases in road travel and congestion. A solution to relieve congestion and improve resilience in the area around the Blackwall Tunnel is not only needed now to relieve existing conditions but also to ensure that the population and economic growth planned in the area can be accommodated and supported.

4. Project Objectives

Introduction

- 4.1. Project objectives have been developed (paragraph 4.3) that are consistent with the draft NPS for National Networks, the Mayor's river crossing policies as set out in the MTS (and the principles of the TfL Strategic Appraisal Framework) and in the London Plan.

River Crossings programme

- 4.2. As described in Chapter 2, the Silvertown crossing forms one element of the wider River Crossings programme. Objectives have developed for the River Crossings programme that are aligned with the London Plan objectives for east London and the policies set out in Proposal 39 of the MTS¹²². These objectives are as follows:

- OB1: to improve the efficiency of the highway network in the London Thames Gateway, especially at river crossings, and provide greater resilience for all transport users
- OB2: to support the needs of existing businesses in the area and to encourage new business investment
- OB3: To support the provision of public transport services in the London Thames Gateway
- OB4: to integrate with local and strategic land use policies
- OB5: to minimise any adverse impacts of any proposals on health, safety and the environment
- OB6: to ensure where possible that any proposals are acceptable in principle to key stakeholders, including affected boroughs
- OB7: to achieve value for money

Silvertown crossing project objectives

- 4.3. The project objectives for the Silvertown crossing draw from the draft NPS for National Networks (see Chapter 2) Mayoral policy as set out in the London Plan and MTS, specifically Proposal 39 (see Chapter 2) information gathered from the assessment of needs including the latest information on population growth (see Chapter 3) and responses to consultation. Based on a broad view of policy, the transport and economic context and the identified needs, the following project objectives have been adopted and will be used to assess the strategic river crossing options at Silvertown.
- 4.4. The Silvertown crossing project objectives are:
- PO1: to improve the resilience of the river crossings in the highway network in east and southeast London to cope with planned and unplanned events and incidents
 - PO2: to improve the road network performance of the Blackwall Tunnel and its approach roads

¹²² Greater London Authority: [Mayor's Transport Strategy](#), May 2010

- PO3: to support growth in east and southeast London by providing improved cross-river transport links for business and services (including public transport)
 - PO4: to integrate with local and strategic land use policies
 - PO5: to minimise any adverse impacts of any proposals on health, safety and the environment
 - PO6: to ensure where possible that any proposals are acceptable in principle to key stakeholders, including affected boroughs
 - PO7: to achieve value for money
- 4.5. The first three project objectives for Silvertown (PO1 to PO3) reflect the specific needs that TfL is seeking to address with a new crossing at Silvertown (as identified in Chapter 3). These objectives are used to assess the different strategic options set out in Chapter 5 and identify a preferred option for addressing these needs.
- 4.6. The four remaining project objectives, PO4 to PO7, mirror OB4 to OB7 of the wider River Crossing programme. These objectives will be used to refine the development of the preferred river crossing option taken forward.

Silvertown crossing project requirements

- 4.7. A successful crossing option will also need to meet a number of core project requirements, as follows:
- PR1: to provide a fixed link river crossing at Silvertown to relieve congestion and improve resilience at Blackwall Tunnel.
 - PR2: design for future cross-river traffic demand associated with planned economic growth in the East London sub-region, giving specific consideration for:
 - Commercial traffic and the movement of goods; and
 - Bus and coach services.
 - PR3: To provide safe links with the local highway networks for all road users (incl. pedestrians and cyclists) and ensure adverse traffic impacts are mitigated.
 - PR4: To provide effective travel demand management by a combination of road user charging and strategic road space management (incl. Blackwall Tunnel).
 - PR5: Project should be fundable from user charging revenue.
 - PR6: To integrate known land-use and transport development proposals and minimise impacts on developable land and the environment.
- 4.8. The full list of project requirements is likely to evolve during the full period of planning and consultation.

5. Strategic Options

Introduction

- 5.1. The needs analysis set out in Chapter 3 concludes that a new river crossing is needed in the vicinity of the Blackwall Tunnel to relieve congestion and address the severe resilience problems that currently exist and to ensure that the population and economic growth planned and forecast in the area can be adequately accommodated and supported. Accordingly, a new river crossing at Blackwall needs to provide comprehensive solutions to meeting these challenges.
- 5.2. As set out in the previous Chapter, the project objectives for the Silvertown crossing are:
- PO1: to improve the resilience of the river crossings in the highway network in east and southeast London to cope with planned and unplanned events and incidents
 - PO2: to improve the road network performance of the Blackwall Tunnel and its approach roads
 - PO3: to support growth in east and southeast London by providing improved cross-river transport links for business and services
- 5.3. The full range of possible options for additional river crossings in east London was presented as part of the East London River Crossings consultation in 2012/13. The following options which were presented as part of that consultation are not taken forward in the option assessment set out in this Chapter:
- Woolwich Ferry (Option C2)
 - Gallions Reach Ferry (Option C3)
 - Woolwich lifting bridge (Option D5)
 - Woolwich Tunnel (Option D6)
 - Thames Gateway Bridge (Option D7)
 - Local bridge at Gallions Reach (Option D8)
 - Local tunnel at Gallions Reach (Option D9)
- 5.4. The main reason these options have not been included in the option assessment in this Chapter is due to their geographic location. As set out in the needs analysis and highlighted above, a new river crossing is needed at Blackwall. Paragraph 3.82 identifies how the Blackwall Tunnel forms part of London's strategic road network whereas the Woolwich Ferry (and accordingly, any subsequent replacement) connects the local road network. Similarly the options listed above, along with others which have subsequently been identified, are examined as part of the East of Silvertown Needs and Options report¹²³ which formed part of the River Crossings programme consultation (July to September 2014) and are not directly related to meeting the strategic highway objectives at Blackwall. While options located further afield, such as a new Lower Thames Crossing¹²⁴ (in the vicinity of the Dartford Crossing) could also address a strategic need,

¹²³ TfL: [East London River Crossings – Assessment of Need & Options East of Silvertown](#), July 2014

¹²⁴ DfT: [Options for a New Lower Thames Crossing – Consultation Document](#), May 2013

they would not resolve the resilience problems at the Blackwall Tunnel and would require HGVs in particular, to take very lengthy diversionary routes as shown in Figure 19.

5.5. The river crossing options that have been assessed in this Chapter include:

- Do Nothing (Option A)
- Manage demand and maximise public transport use (Option B)
 - Congestion charging at Blackwall Tunnel (Option B1)
 - DLR extension to Falconwood (Option B2)
- Lower cost road crossings (Option C)
 - Silvertown Ferry (Option C1)
- Fixed links (Option D)
 - Blackwall Tunnel third bore (Option D1)
 - Silvertown lifting bridge (Option D2)
 - Silvertown bored tunnel (Option D3)
 - Silvertown immersed tunnel (Option D4)

5.6. This Chapter describes and assesses each of these options in turn, summarises relevant consultation responses, assesses the performance of each option against the project objectives and presents justifications for the preferred option being progressed for further investigation (as set out in Chapter 6).

DO NOTHING (Option A)

Description

5.7. The Do Nothing option assumes that the Rotherhithe and Blackwall Tunnels and the Woolwich Ferry continue to operate as at present – noting that the Woolwich Ferry will require substantial maintenance and refurbishment over time.

Assessment against project objectives

5.8. As set out in detail in Chapter 3, the Rotherhithe and Blackwall Tunnels and the Woolwich Ferry are all operating at capacity and all reasonable traffic management measures to increase capacity and improve resilience have been undertaken at all three crossings. Despite the success of these measures in reducing the number and impact of incidents, incidents at the Blackwall Tunnel causing delay are still excessively frequent with adverse impacts across the wider road network.

5.9. With the population and employment growth forecasts in the east and southeast sub-region and in Greenwich, Newham and Tower Hamlets in particular, happening more quickly than previously anticipated, the volumes of road traffic together with levels of congestion are predicted to increase considerably, particularly at the approaches to the Blackwall Tunnel.

5.10. The Do Nothing option will not improve resilience in the study area, improve the operational performance of the Blackwall Tunnel or support the planned growth by

providing improved cross-river transport links. In addition, this option would not accord with London Plan policy to allow for growth in east London.

- 5.11. There would be strong opposition from local boroughs, particularly the three host boroughs, to remaining with the status quo, as highlighted in their policies in Chapter 2 and in their responses to the 2012/13 consultation¹²⁵. The London Borough of Newham in particular, noted their support for the Silvertown Tunnel and the resilience it will provide to the Blackwall Tunnel (see Table 19). Opposition from local residents and businesses would also be expected. Whilst the 2012/13 consultation questionnaire did not specifically ask respondents about the Do Nothing option, there was over 70 percent support given to each of the six river crossing options proposed (with 76 percent supporting the Silvertown Tunnel option).

Conclusion

- 5.12. This option does not satisfy any of the project objectives (as summarised in Table 13). The practical effect of the Do Nothing option will be that the long-standing congestion, network reliability and resilience problems in the study area will persist and worsen, and act as a constraint on economic growth in east and south-east London.

Table 13 : Performance of Do Nothing option against project objectives

Options / Project objectives	PO1 (resilience)	PO2 (performance)	PO3 (growth)
A: Do Nothing	Negative	Negative	Negative

MANAGE DEMAND AND MAXIMISE PUBLIC TRANSPORT USE (Option B)

- 5.13. This option proposes that no new road crossings are built and instead there is a strategy for managing demand and maximising modal shift to public transport. Two sub-options are examined: whether the introduction of a charge at the Blackwall Tunnel would affect travel habits substantially (Option B1) and whether further investment in new public transport connectivity to Eltham and Falconwood (in the Royal Borough of Greenwich) would reduce demand to improve journey times for the most time-critical traffic (Option B2).
- 5.14. As has been set out in detail in Chapter 3, considerable improvements to public transport in the study area have been implemented over recent years and a major new public transport river crossing (Crossrail) is currently under construction. There is capacity available on existing cross-river services and there is scope to increase the capacity of several of these to meet demand in future years, without major infrastructure works.
- 5.15. These existing public transport cross-river links are already widely promoted by TfL and London boroughs in accordance with the MTS (paragraphs 626-631). This is achieved through the provision of good quality information about the services and via smarter travel initiatives that promote and encourage greater use of these services, particularly by those who travel by private car, as highlighted in Proposal 116 of the MTS.

¹²⁵ Accent: [River Crossings Consultation - Report](#), 2013

Proposal 116

The Mayor, through TfL, and working with the London boroughs and other stakeholders, will use smarter travel initiatives across London to facilitate more efficient use of the transport system, achieve mode shift to cycling, walking and public transport and encourage the take-up of healthier travel options.

- 5.16. The Mayor is reviewing public transport opportunities and needs in London as a result of revised growth projections and will consider future enhancements, including a further extension of Crossrail east of Abbey Wood into Bexley Riverside and on into Kent, which will improve cross-river rail connectivity. As noted in Chapter 3, TfL is also examining the provision of additional river bus services to meet demand associated with the recent and planned growth along the Thames (see **Figure 31**).

Congestion charging at Blackwall Tunnel (Option B1)

Description

- 5.17. One option to encourage drivers to switch to public transport, or re-route or re-time journeys away from the busiest periods and thereby reduce congestion, would be to manage traffic demand through the use of road user charging, or congestion charging. This has successfully reduced traffic demand in central London and could in theory be applied at the Blackwall Tunnel to reduce the levels of congestion. This option is considered to have a greater impact than other demand management measures that rely on drivers voluntarily switching modes or re-routing or re-timing journeys.
- 5.18. The Mayor's Transport Strategy (MTS) sets out the Mayor's policy on road user charging:

Proposal 130

The Mayor, through TfL, and working with the London boroughs and other stakeholders, if other measures are deemed insufficient to meet the strategy's goals, may consider managing the demand for travel through pricing incentives (such as parking charges or road user charging schemes). This would depend upon there being a reasonable balance between the objectives of any scheme and its costs and other impacts. Any scheme would need to take account of local conditions, as well as the impact on surrounding regions, and to be fair and flexible relating charges to the external costs of travel with sensitivity to time of day, and with scope for discounts or exemptions for specific user groups. The Mayor will also consider imposing charges or tolls to support specific infrastructure improvements, such as river crossings.

Assessment against project objectives

- 5.19. TfL has tested the concept of user charging at the Blackwall Tunnel in its Highway Assignment Model and found that a reduction in demand could be achieved. However, given the very high mismatch of demand to capacity (as noted in paragraph 3.45 current delays are some 20 minutes) charges would need to be very high in the peak direction

(northbound in the morning, southbound in the evening) to bring demand down to a level which eliminated or substantially reduced congestion and this is unlikely to be politically acceptable or practical.

- 5.20. Road user charging at the Blackwall Tunnel could also make a contribution to improved resilience as reducing the overall demand would reduce the likelihood of incidents occurring and the volume of traffic diverting when incidents do occur. However, it could not eliminate incidents, only reduce their occurrence slightly and would provide no alternative crossing option in the event of planned or unplanned closures of the Blackwall Tunnel. Road user charging alone is also unlikely to address the continuing and growing need for road traffic to cross the Thames in east London, particularly at peak times.

Conclusion

- 5.21. As outlined above and summarised in Table 14, introducing a road user charge at the Blackwall Tunnel would slightly improve resilience and reduce congestion but is unlikely (on its own) to be able to support planned growth. In addition, the high user charges needed may not be supported and the proposals are unlikely to be politically acceptable or practical.
- 5.22. However, consideration has been given to road user charging at the Blackwall Tunnel as a complementary measure to a new tunnel at Silvertown (Options D3 and D4) and has been examined in detail in the accompanying Outline Strategy for User Charging¹²⁶.

Table 14 : Performance of Blackwall Tunnel charging option against project objectives

Options / Project objectives	PO1 (resilience)	PO2 (performance)	PO3 (growth)
BI : Blackwall Tunnel charge	Slight positive	Slight positive	Neutral

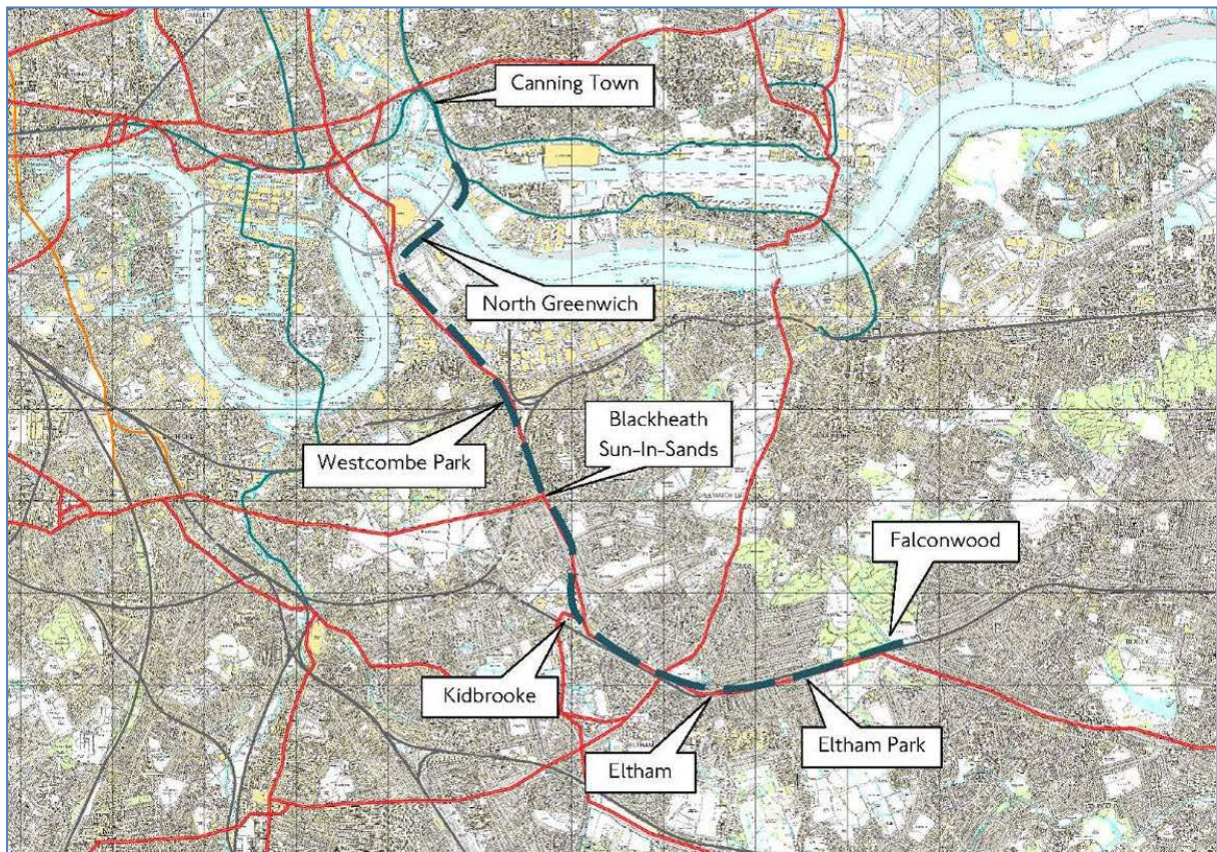
DLR extension to Falconwood (Option B2)

Description

- 5.23. A proposal put forward by the Royal Borough of Greenwich is to extend the DLR from Canning Town southward via a tunnel at Silvertown to provide better connections to the Greenwich Peninsula and the Royal Docks from the Eltham and Kidbrooke areas. The proposed route follows the A102 and A2 to Falconwood, as shown in Figure 34.

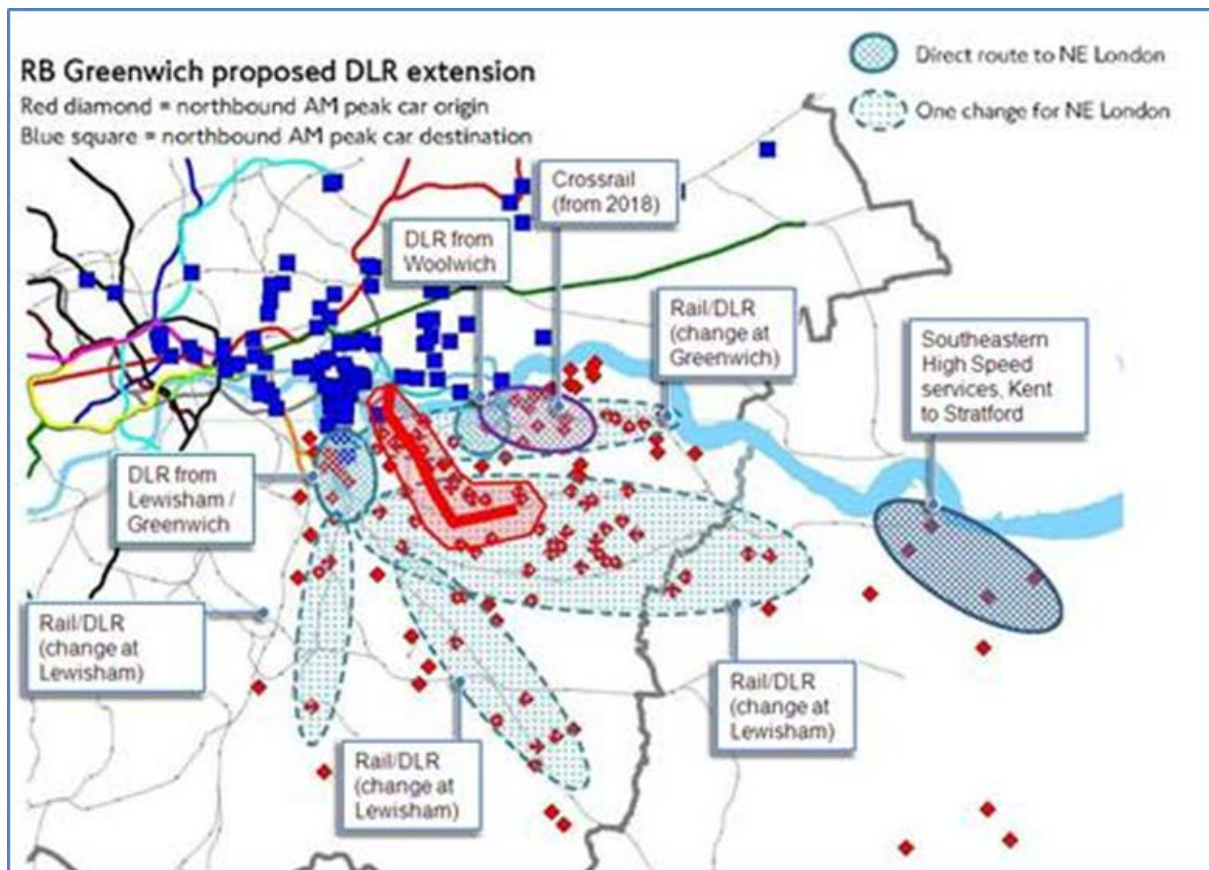
¹²⁶ TfL: Outline Strategy for User Charging at Blackwall and Silvertown Tunnels, 2014

Figure 34 : Proposed extension of the DLR to Falconwood



- 5.24. The results of roadside interview surveys with users of the Blackwall Tunnel (northbound only for safety reasons) undertaken in 2008 and 2009 have been analysed to establish whether the proposed extension covers a substantial proportion of the trip origins of current tunnel users and accordingly, could enable modal shift from private car to public transport. This analysis found that the proposed extension does fill some gaps in the existing public transport network, as shown in Figure 35 and could provide an alternative option for some Blackwall Tunnel users.

Figure 35 : Blackwall Tunnel car driver origin / destination and proposed DLR extension



- 5.25. The results of the roadside interview surveys have been analysed to determine the potential impact of the DLR extension on traffic demand at the Blackwall Tunnel. In total, 104 of the 694 surveyed car drivers had an origin within one kilometre of the proposed DLR extension route, which represents 15 percent of the sample of car traffic using the Blackwall Tunnel. However, only 39 of these (5.6 percent of the sample) had a destination within the area that would be served by the DLR (Docklands, Bow and Stratford).
- 5.26. This 5.6 percent is the maximum proportion of Blackwall Tunnel car users who could be expected to switch to the new DLR route. In reality numbers would be likely to be much less as many of these drivers already have a public transport alternative and accordingly, the mode choice of car is being made for other reasons.

Assessment against project objectives

- 5.27. If all 5.6 percent of Blackwall Tunnel car users did switch modes this level would not materially reduce congestion at the Blackwall Tunnel which has a demand well in excess of its capacity in the peak (the excess demand being held in the queue on the approach to the tunnel).
- 5.28. The proposed extension is also unlikely to have a notable effect on road network resilience, as it will only reduce the occurrence of incidents slightly and it does not provide an alternative road crossing option in the event of a Blackwall Tunnel closure.

- 5.29. The option would however, support growth in east and southeast London as it would result in a new public transport link, enabling higher density development along its route.

Conclusion

- 5.30. The proposed DLR extension would have a very minimal impact on the project objectives, as summarised in Table 15, being dependent on Blackwall Tunnel users living within one kilometre of the proposed route switching modes.
- 5.31. As highlighted in the needs analysis set out in Chapter 3, public transport options cannot entirely address demand for cross-river movement as road-based travel remains very important in the host boroughs and given the population and employment growth expected in east London, more highway travel will need to be accommodated. In addition, the vast majority of freight in London is carried by road and predictions are for this to increase over the coming decades.
- 5.32. This public transport option also does not provide for travel by bus and as set out in Chapter 3, there is currently only one cross-river bus route in the study area. Other options discussed later in this Chapter, including proposed tunnel options, are able to effectively provide new bus connections, in addition to meeting the project objectives. New bus connections from Greenwich that utilise a new river crossing are also considered a more cost-effective solution to the demand for travel along this particular route with the reduced delays that an additional road river crossing will bring, this option will become much more attractive.

Table 15 : Performance of DLR extension option against project objectives

Options / Project objectives	PO1 (resilience)	PO2 (performance)	PO3 (growth)
B2: DLR extension	Neutral	Neutral	Slight positive

LOWER COST ROAD CROSSINGS (Option C)

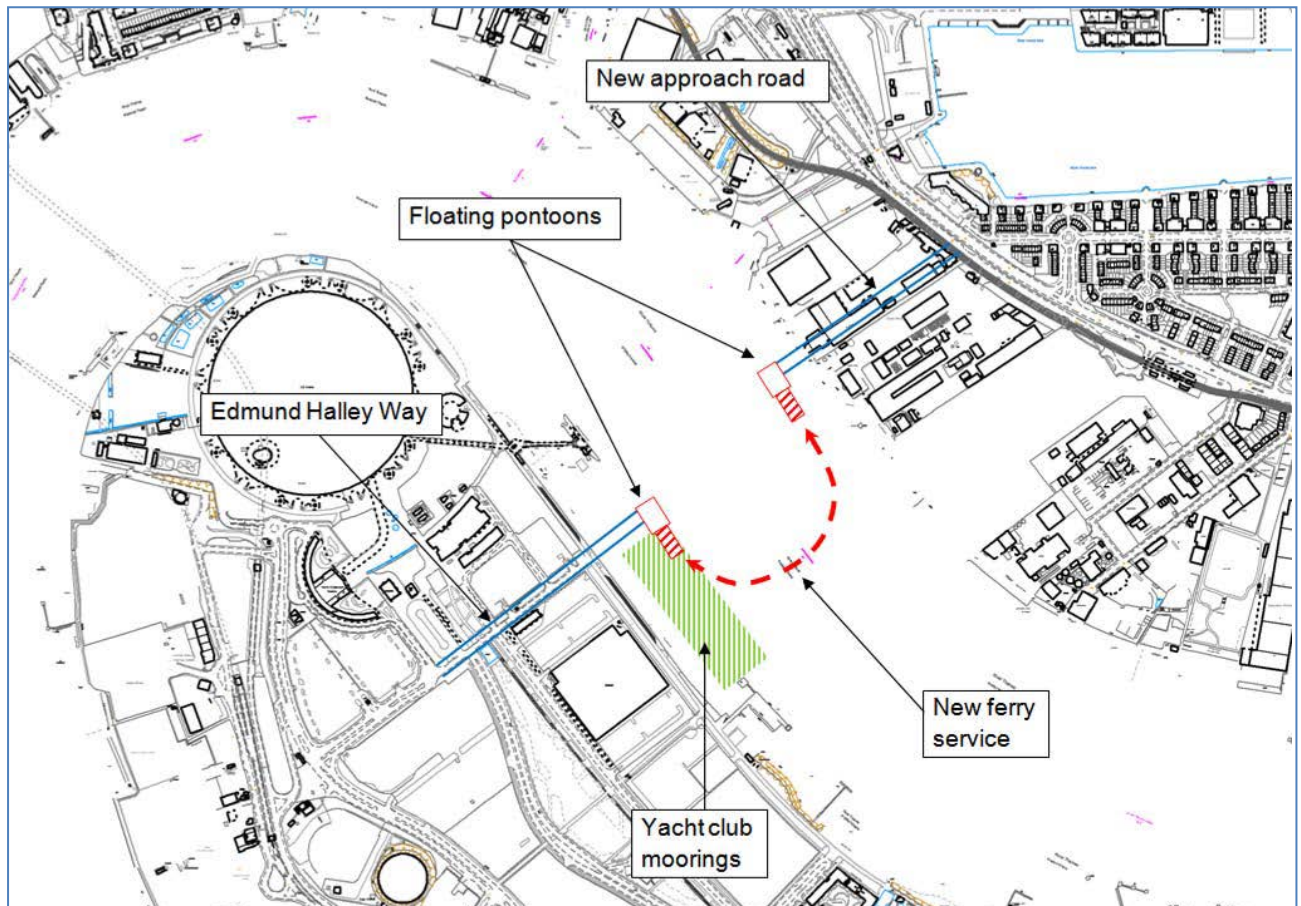
- 5.33. A relatively low cost way of adding new capacity and connectivity is to provide a vehicle ferry, similar to the service provided at Woolwich. While ferries are less attractive than a fixed link (such as a bridge or tunnel), it may be possible to introduce a ferry service at a lower cost and also to provide a crossing at a location that a fixed link cannot be provided, due to physical constraints or due to the much greater traffic impacts of a bridge or tunnel.

Silvertown Ferry (Option C1)

Description

- 5.34. This option is for a new cross-river vehicle ferry¹²⁷ between North Greenwich and Silvertown, immediately south of the Emirates Air Line, as shown in Figure 36.

Figure 36 : Sketch of Silvertown Ferry option



Assessment against project objectives

- 5.35. A vehicle ferry is a very low capacity link compared to a fixed link. The almost adjacent Blackwall Tunnel can carry over 3,200 vehicles per hour in the peak direction (see Table 5) while a ferry service could only carry around 200. In addition, a vehicle ferry here would be likely to attract almost no traffic based on journey times (taking into account boarding / alighting delays and an estimated ten minute service frequency) compared with the adjacent Blackwall Tunnel.
- 5.36. A key advantage of a vehicle ferry at this location is that it provides a nearby alternative crossing point for vehicles unable to use the Blackwall Tunnel due to their size or cargo. Accordingly, a ferry here could reduce the number of overheight vehicle incidents at Blackwall.

¹²⁷ It is anticipated the ferry service would cater for pedestrians and cyclists as well as vehicular traffic.

- 5.37. However, during closures of the tunnel, the ferry would be unable to cater for the level of diverted traffic and widespread congestion would be inevitable. This would be similar to the current problems at the Blackwall Tunnel but would cause the disruption to spread to the ferry approaches as well. A vehicle ferry would therefore provide little or no additional resilience for the highway network.
- 5.38. Further to this, a ferry in this location would not support planned growth and would instead conflict with development plans for the areas on both sides of the river, particularly on the Greenwich Peninsula. The approach road would pass across the Greenwich Peninsula masterplan area, which is a major regeneration site with around 13,500 new homes built, under construction or planned. Any access road crossing the peninsula carrying through and queuing traffic (including HGVs) would impose problems for the implementation of the masterplan, would not meet local planning policies and would be opposed by stakeholders including host boroughs. Indeed the Royal Borough of Greenwich noted in their response to the 2012/13 consultation¹²⁸ that they strongly opposed all the ferry options (including Silvertown) which they believe would not provide capacity needed to support the necessary growth and regeneration of the sub-region.

Conclusion

- 5.39. As outlined above and summarised in Table 16, a low capacity ferry at Silvertown would have a very minimal, if any, impact on congestion and resilience and would conflict with land use policies and the growth planned for the area. In addition, it would be opposed by key stakeholders including the Royal Borough of Greenwich.

Table 16 : Performance of Silvertown Ferry option against project objectives

Options / Project objectives	PO1 (resilience)	PO2 (performance)	PO3 (growth)
CI: Silvertown Ferry	Negative	Slight positive	Negative

FIXED LINKS (Option D)

- 5.40. The final river crossing option examined is to provide a fixed road link, in the form of a tunnel or bridge. These have a much higher capital cost compared with vehicle ferries, but have the advantages of much greater carrying capacity, much faster journey times, ability to carry public transport vehicles (especially cross-river bus services), are available to traffic 24 hours a day and are less prone to weather disruptions.
- 5.41. Two locations for a new fixed road link have been examined in this section, at Blackwall (Option D1) and at Silvertown. In the case of a fixed road link at Silvertown, three further sub-options have been examined including a lifting bridge (D2) a bored tunnel (D3) and an immersed tunnel (D4).

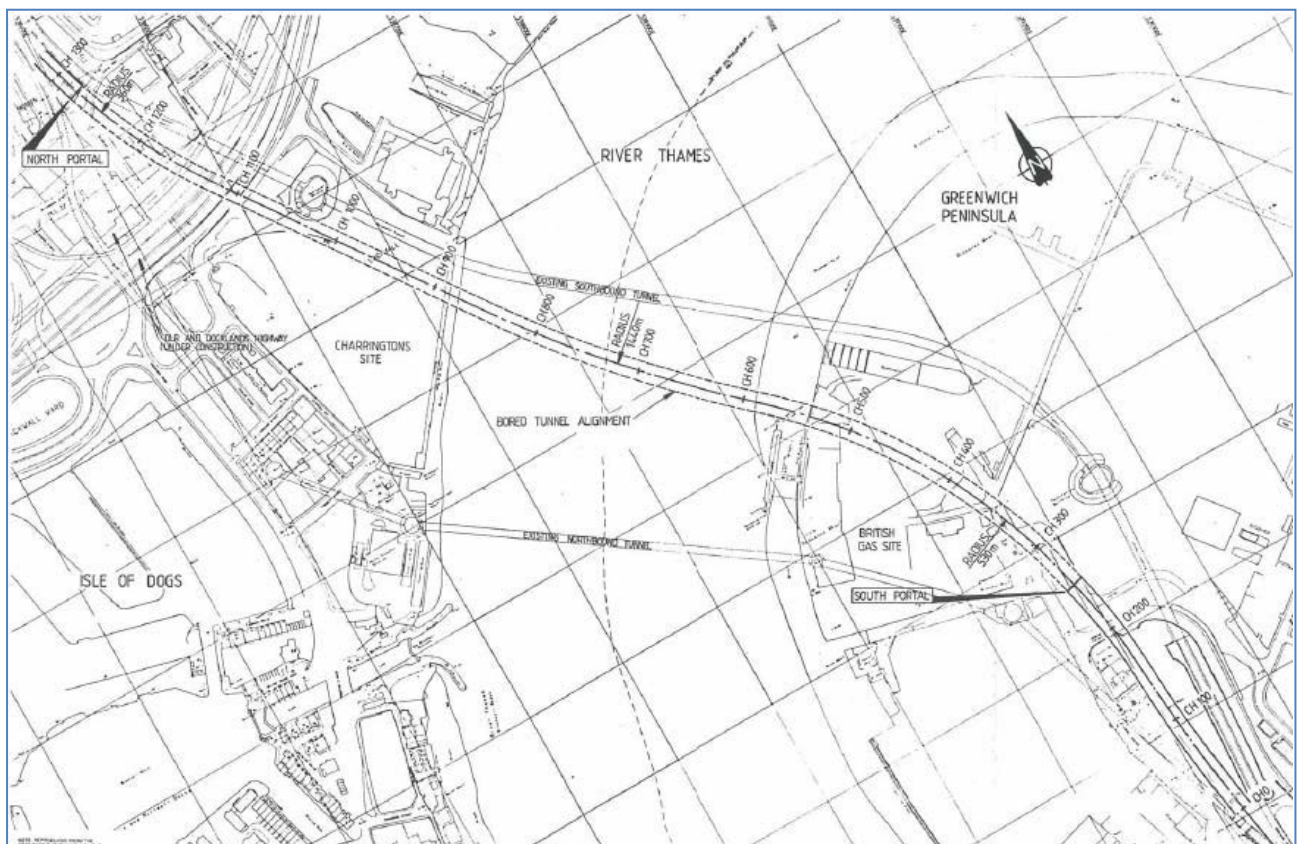
¹²⁸ Accent: [River Crossings Consultation - Report](#), 2013

Blackwall Tunnel third bore (Option D1)

Description

- 5.42. A third tunnel alongside the existing twin tunnels at Blackwall to be used either:
- As an additional bore to provide additional capacity at peak periods with direction of traffic flow reversible
 - To replace the oldest (northbound) tunnel with a more modern tunnel incorporating full vehicle clearance
- 5.43. Figure 37 illustrates the concept of a third bore at Blackwall.

Figure 37 : Blackwall Tunnel third bore



- 5.44. There are considerable engineering constraints associated with a third bore that were not envisaged when this idea was originally proposed in the 1990s. One major issue is that there has been substantial development in the area, much of which has entailed construction of tall buildings with deep foundation piles which have been constructed on sites above the identified potential tunnel alignment. Another issue is that current standards around emergency intervention and escape have changed since the construction of the previous tunnels and the planning of the third bore and require more points of intervention and escape which may not be technically feasible. New standards and legislation were introduced across Europe in the wake of the Mont Blanc tunnel fire in 1999 which impose a more rigorous approach to fire safety in the design of road tunnels.

- 5.45. It is to be noted that a bridge at Blackwall is not considered feasible given the lack of a route through the densely built-up area for an elevated approach road. The sharp bend in the River Thames is also likely to place onerous requirements on such a structure, to accommodate the large ships passing in this area.
- 5.46. A new bore could not operate as a two-way tunnel without substantial additional costs in terms of providing a hard barrier between opposing movements and widening to provide room for vehicles to pass a stationary vehicle etc. Therefore, if the bore is additional to the current northbound tunnel, it is likely to have to operate in one direction only, perhaps tidally (northbound in the morning, southbound in the evening).

Assessment against project objectives

- 5.47. This proposal is likely to give rise to congestion in the contra-peak direction (as it already reaches capacity at the height of the peak and is expected to increase with the planned growth) as well as downstream of the tunnel in the peak direction. A previous scheme to operate the Blackwall Tunnel tidally in the peak became very problematic due to safety concerns and because the counter-peak flows increased greatly over time; southbound delays and queues in the morning peak became as problematic as in the northbound peak direction.
- 5.48. Journey times through the Blackwall Tunnel in the peak direction would be cut if the crossing capacity were to double in the peak direction. However, there would be the potential for more congestion on the wider road network. The proposed scheme would have a limited impact on growth as no new connectivity would be provided.
- 5.49. Operating tidally would result in different vehicle restrictions at different times of day (e.g. vehicles over 4 metres high only when the new tunnel is operating northbound) and is likely to present a complex message to users. There is a high potential for drivers of overheight vehicle to arrive and cause difficulties when the new tunnel is running southbound and they are unable to use the existing Blackwall Tunnel northbound bore, increasing the risk of incidents and thus impacting on the resilience of the tunnel.
- 5.50. Replacing the small diameter northbound tunnel with a full gauge tunnel has great potential to address the reliability issues which currently affect the northbound tunnel. However, some incidents will inevitably occur (e.g. breakdowns not directly related to the tunnel itself) and in these circumstances there would be no means of diverting Blackwall Tunnel users to another crossing.

Conclusion

- 5.51. As summarised in Table 17, the construction of a third bore at the Blackwall Tunnel would partially address congestion and resilience problems but operationally it would be very difficult to manage. This option would not provide new connectivity and so its contribution to economic growth is limited. The feasibility of constructing a third bore is very uncertain due to development of tall buildings on piled foundations.

Table 17 : Performance of Blackwall Tunnel third bore option against project objectives

Options / Project objectives	PO1 (resilience)	PO2 (performance)	PO3 (growth)
DI: Blackwall Tunnel third bore	Slight positive	Positive	Slight positive

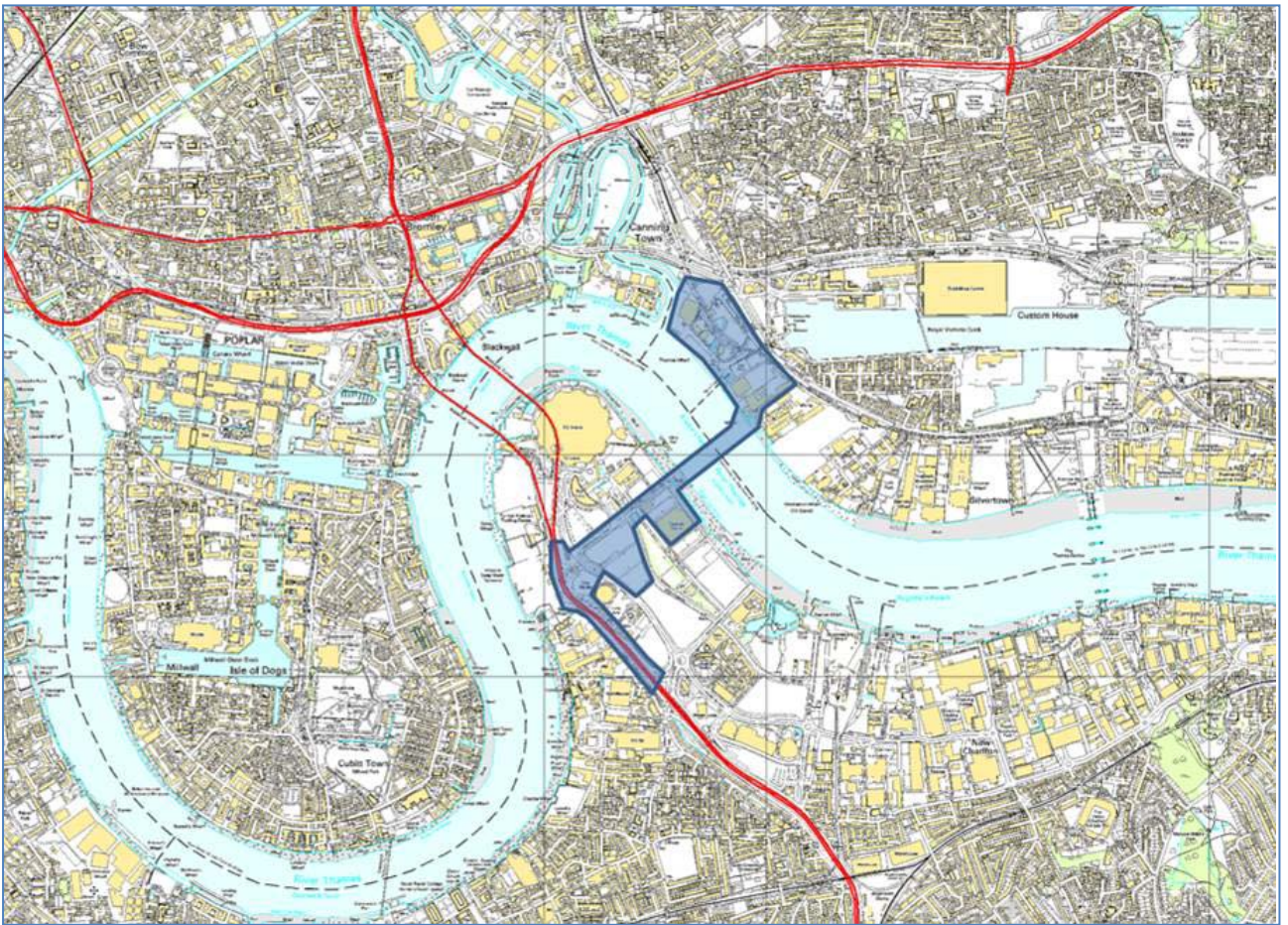
Silvertown low-level lifting bridge (Option D2)

Description

- 5.52. This option would involve the construction of a road bridge between Silvertown and North Greenwich with a central lifting section which is raised to permit transit of shipping. The bridge would be located within the formal safeguarded zone¹²⁹ as shown in Figure 38.

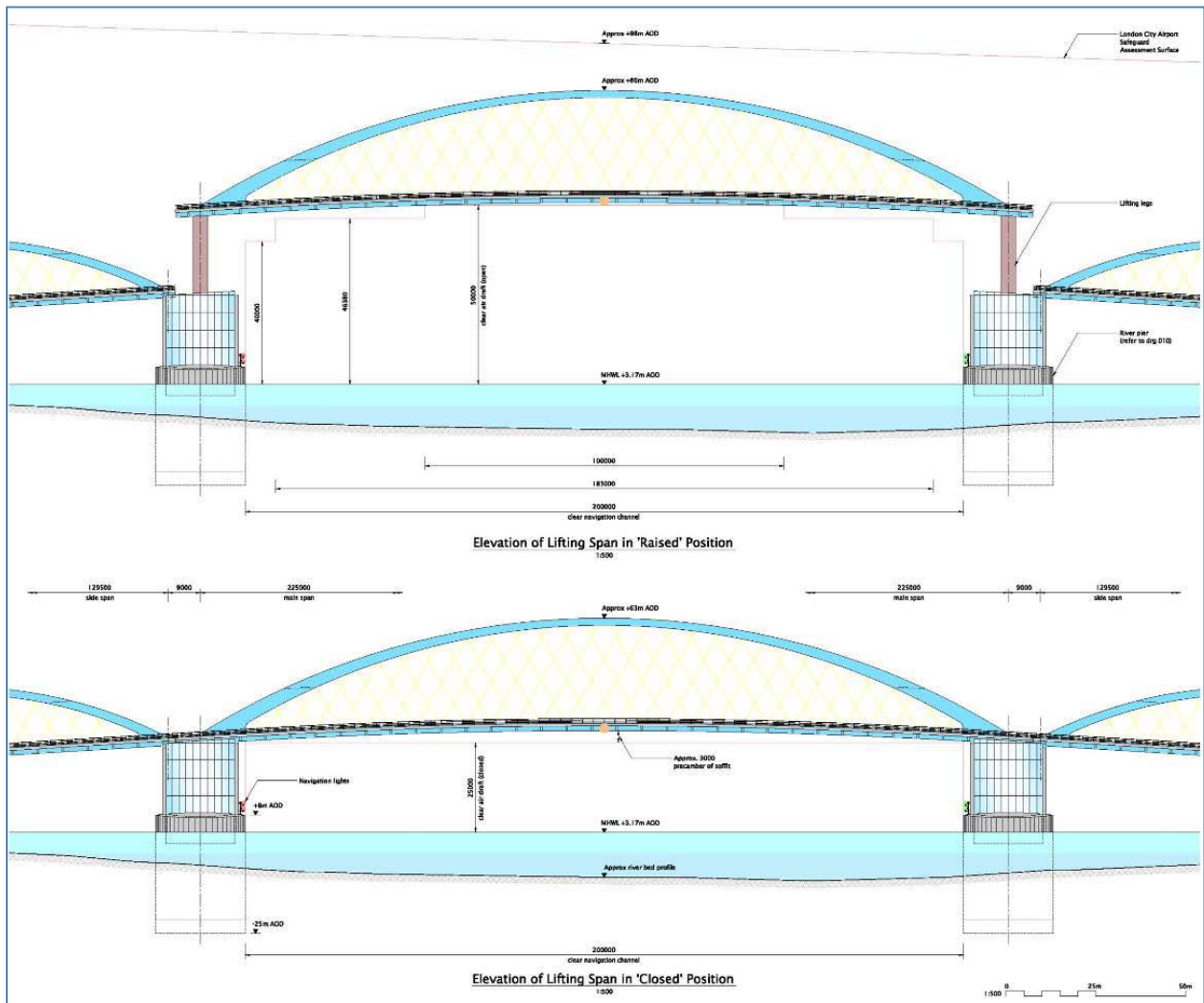
¹²⁹ Set by the Secretary of State for Transport in the 1990s and now managed by the Mayor of London

Figure 38 : Silvertown safeguarded area



- 5.53. A fixed high-level bridge is not considered feasible at this location due to the height needed to maintain navigation on the River Thames (at least 50 metres above high water) and the approach ramps that would be needed to enable vehicles to reach this height. The ramps would require extensive areas of land on both sides of the river which would be difficult to accommodate within the constraints of local highway connections, the DLR line and existing residential development. Such a large structure could not tie into the local road networks as the approaches would need to commence beyond the closest junctions, so connectivity to the Royal Docks and Greenwich Peninsula would be poor.
- 5.54. In contrast, a low-level lifting bridge with a road deck of up to 15 metres above high water is considered feasible, with low level approach roads with interfaces with local roads on the Greenwich Peninsula and the Royal Docks. Figure 39 illustrates the type of structure which could be constructed in this area and would maintain the navigability of the Thames.

Figure 39 : Silvertown lifting bridge concept



Assessment against project objectives

- 5.55. A lifting bridge at this location would reduce congestion at the Blackwall Tunnel, by providing another high capacity crossing adjacent to it. However, this would only occur during the periods it is open to traffic as the bridge would need to close to traffic to accommodate shipping movements and this could occur at any time depending on tides (ships generally enter the Thames on an incoming tide and exit on a receding tide). Closures coinciding with peak periods would lead to a major drop in capacity across the pair of crossings (Blackwall / Silvertown) and would greatly exacerbate congestion. Large vehicles unable to use the Blackwall Tunnel would be unable to cross the Thames during these closures or would have to divert to an alternative crossing. A bridge would also be susceptible to temporary closures due to adverse weather conditions such as high winds or fog.
- 5.56. There is considerable shipping activity upstream of the Silvertown crossing and a review of shipping data suggests that the lifting bridge would need to open for 10-15 vessels a day. Analysis suggests that closures would last 20 minutes (or longer) to allow for the bridge to open (including time for pedestrians to clear the bridge) and for large ships to pass.

- 5.57. As shown in Figure 31, the Greenwich Peninsula is designated as an Opportunity Area in the London Plan with a target of 13,500 new homes. Key to delivering the London Plan’s ambitions for the peninsula is the development of a high quality public realm to support the attractiveness of the area as a place to visit and live, as set out in the Greenwich Peninsula Development Framework¹³⁰ and Greenwich Peninsula West Masterplan SPD¹³¹ referred to in Chapter 2.
- 5.58. If the Silvertown crossing was to be taken forward as a fixed bridge, it would require the construction of a large viaduct carrying the elevated highway across the peninsula, through the heart of the new urban centre and would be incompatible with the London Plan’s vision for the area. Alternatively for a lifting bridge, a major highway would be built at ground level, conflicting with local movement for pedestrians, buses and local traffic and would lead to congestion and rat-running around the peninsula to avoid queues during closures for shipping movements. Both options would have a severe impact on the development potential of the land surrounding the crossing.
- 5.59. As a result of the impacts on the Greenwich Peninsula, the Royal Borough of Greenwich is strongly opposed to the construction of a bridge. The Core Strategy¹³² and LIP¹³³ refer only to support for a tunnel being constructed in the safeguarded area and the UDP (paragraph 7.33) states ‘the Council will require a tunnel, not a bridge’ at this location.

Conclusion

- 5.60. A lifting bridge at Silvertown would partially address resilience and congestion problems but the bridge would have its own resilience issues with regular closures due to shipping which would undermine its effectiveness. The bridge would have a considerable physical and visual impact on surrounding urban areas which would not be compatible with the London Plan’s vision for the peninsula and would be contrary to local planning policy which only provides support for a tunnel, as summarised in Table 18.

Table 18 : Performance of Silvertown lifting bridge against project objectives

Options / Project objectives	PO1 (resilience)	PO2 (performance)	PO3 (growth)
D2: Silvertown lifting bridge	Slight positive	Slight positive	Neutral

Silvertown bored tunnel (Option D3)

Description

- 5.61. This option involves the construction of a twin bored tunnel at Silvertown, following the safeguarded alignment between Silvertown and North Greenwich, as shown in Figure 40.

¹³⁰ Royal Borough of Greenwich: Greenwich Peninsula Development Framework, 2002 (online version not available)

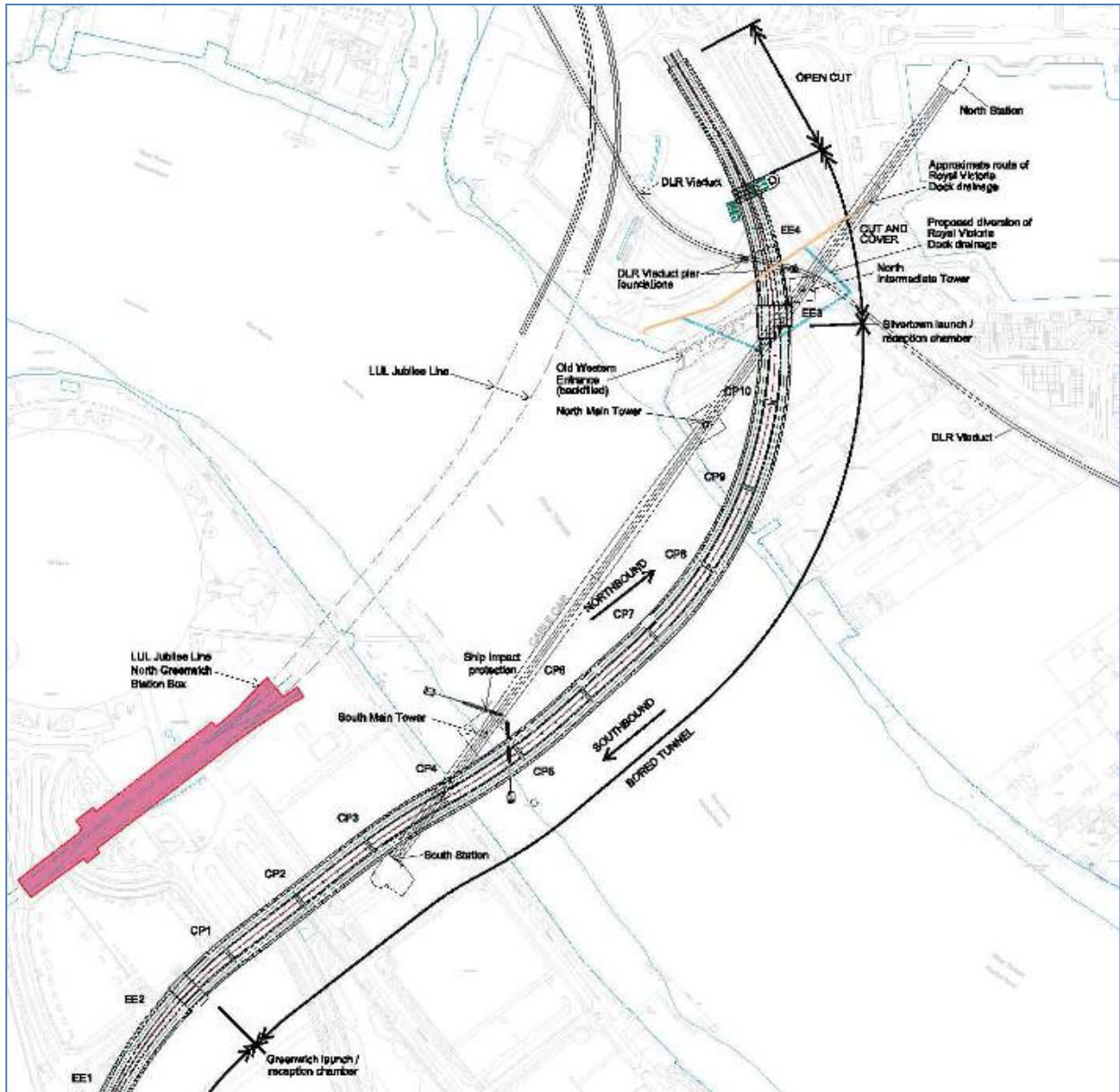
¹³¹ Royal Borough of Greenwich: [Greenwich Peninsula West Masterplan SPD](#), April 2012

¹³² Royal Borough of Greenwich: [Core Strategy with Development Management Policies \(Submission Version\) with proposed modifications](#), 2013

¹³³ Royal Borough of Greenwich: [Keeping Greenwich Moving - Greenwich Council’s Second Local Implementation Plan for Transportation](#) (June 2011)

- 5.62. The tunnel would provide two lanes in each direction and be built to full highway gauge of just over five metres headroom and full standard lane widths of 3.65 metres, which would accommodate all overhead vehicles as well as double-decker buses.
- 5.63. The bored tunnel option would take the crossing below the bed of the River Thames and is unlikely to require any river works.

Figure 40 : Silvertown as a bored tunnel



Assessment against project objectives

- 5.64. A tunnel at this location would reduce congestion at the Blackwall Tunnel, by providing another high capacity crossing adjacent to it.
- 5.65. The size of the tunnel would ensure it is highly resilient and the tunnel would make a contribution to a reduction in the number of incidents occurring at the Blackwall Tunnel; clear signing would be provided to guide overhead vehicles towards the Silvertown

Tunnel. When incidents do occur at the Blackwall Tunnel, the Silvertown Tunnel would provide a very clear diversionary route for traffic, to ensure that the effects are contained and do not cause such major congestion as currently occurs. Whilst there would be a loss of capacity across the network at these times, resulting in some queuing at the approaches, the impacts of these may only be felt during peak periods. Regardless, the delays would be very small compared to the current position where no feasible diversion route exists.

- 5.66. Journey times in the peak direction would be greatly reduced under this option and the delays for current Blackwall Tunnel users (of around 20 minutes during peak periods) are likely to be effectively eliminated.
- 5.67. A tunnel would offer a relatively fast and direct route into the Canary Wharf and Royal Docks areas from the south, offering connectivity benefits to these Opportunity Areas. With levels of local congestion at the Blackwall Tunnel reduced, and resilience greatly improved, there would be general transport and associated benefits for a large area of east and southeast London. In addition, a full gauge road tunnel between the Greenwich Peninsula and the Royal Docks enables opportunities for new cross-river bus services, further improving connectivity.
- 5.68. Further to the above and in line with project objective PO6, the tunnel option is well supported by stakeholders generally and features in the host boroughs' local plans (as set out in Chapter 2). Specific comments made by boroughs in response to the 2012/13 consultation about a tunnel at Silvertown are summarised in Table 19.

Table 19 : 2012/13 consultation – London Borough responses¹³⁴

Borough responses	Consultation response
Greenwich	Strongly supports Silvertown Tunnel. Strongly opposes ferry options - would not provide capacity to support growth
Newham	Welcomes resilience for Blackwall that Silvertown Tunnel would provide, subject to concerns over traffic impacts in borough
Tower Hamlets	Supports the proposed tunnel at Silvertown, in principle
Barking & Dagenham	Broadly supportive of new Thames river crossings. Concerned that Silvertown Tunnel will 'clog up the local road network'
Bexley	Supports the proposed tunnel at Silvertown, in principle
Lewisham	Supports the principle of increasing capacity across the river but has concerns that traffic impacts will result from Silvertown Tunnel
Corporation of London	Supports a new crossing at Silvertown
Hackney	Concerned about impacts of increased traffic on the approaches to Silvertown Tunnel and lack of cross-river links for cyclists
Havering	Supports proposals for new river crossings but notes they should include provision for pedestrians and cyclists
Redbridge	Neither support nor oppose – further traffic flow information needed

¹³⁴ Accent: [River Crossings Consultation - Report](#), 2013

Southwark	Concerned about traffic impacts from Silvertown Tunnel and believe tolling could increase traffic levels at Rotherhithe Tunnel
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- 5.69. The comments noted in Table 19 are largely supportive of a new tunnel at Silvertown with concerns mainly focused on potential local traffic impacts. These impacts would be influenced by the eventual charging strategy (see paragraph 5.84) and the associated network management strategy.
- 5.70. The feasibility of incorporating a tunnel for pedestrians and cyclists (dismounted) within the Silvertown crossing was previously explored as part of the River Crossings programme. It was agreed to adopt an innovative cable car solution instead, which was more cost-effective than other fixed links and was largely funded by sponsorship and regeneration funding, reflecting its role in helping to develop the visitor economy in the Royal Docks and Greenwich Peninsula. TfL is still actively exploring the potential for frequent cross-river pedestrian / cycle ferries to the east of Canary Wharf.
- 5.71. The feasibility of including rail-based public transport, such as the DLR extension described in Option B2, within the Silvertown Tunnel has also previously been examined. From an engineering perspective, it is feasible to construct tunnels to accommodate both road vehicles and rail-based public transport. However, the engineering and operational challenges associated with a rail tunnel on the safeguarded Silvertown alignment would be extremely challenging for a number of reasons:
- The ability to provide an additional spur off the DLR network at Canning Town is unproven, and if a solution is found it is likely to have a major impact on development land;
 - An additional DLR branch in this area would reduce the capacity potential of the lines serving the Royal Docks and Woolwich;
 - The substantial descent from surface level down to the Silvertown Tunnel may not be achievable;
 - A shared tunnel would pose a number of practicably intractable issues concerning horizontal and vertical alignment, fire / smoke risks and operational protocols;
 - The options for siting a station within reasonable proximity of North Greenwich would be limited.
- 5.72. Additionally, such a line would directly duplicate the existing Jubilee line, which currently provides around 30 trains per hour between North Greenwich and Canning Town, while new/extended bus services would use the new highway link and could provide links to a wider area around the tunnel on both sides at a much more economical cost. Accordingly, the road-rail tunnel option has not been progressed in further detail at this stage.

Assessment against NPS vision and strategic objectives for nationally significant networks

- 5.73. As set out in Chapter 2, the draft NPS for National Networks contains the following vision and strategic objectives for nationally significant networks:

'The Government will deliver national networks that meet the country's long-term needs; supporting a prosperous and competitive economy and improving overall quality of life, as part of a wider transport system. This means:

- *Networks with the capacity and connectivity to support national and local economic activity and facilitate growth and create jobs*
- *Networks which support and improve journey quality, reliability and safety*
- *Networks which support the delivery of environmental goals and the move to a low carbon economy*
- *Networks which join up our communities and link effectively to each other'*

5.74. The bored tunnel option aligns with these strategic objectives, as it would:

- Provide a high capacity river crossing (two full highway gauge and width lanes in each direction) and connectivity between key east and southeast London Opportunity Areas (key housing and employment growth areas) including Canary Wharf, the Greenwich Peninsula and the Royal Docks
- Reduce congestion, improve journey times and reduce the number of incidents at the Blackwall Tunnel
- Reduce air quality impacts associated with traffic congestion and have an associated demand management strategy to ensure that tunnel users are encouraged to travel by more sustainable modes, where possible
- Provide a new river crossing in east London, connecting communities immediately adjacent to the crossing, as well as those further afield across the east and southeast London sub-region

Conclusion

5.75. The Silvertown bored tunnel option effectively addresses existing congestion and resilience problems and supports economic and population growth. This option has minimal adverse impacts on surrounding urban areas and the river environment (as summarised in Table 20).

Table 20 : Performance of Silvertown bored tunnel against project objectives

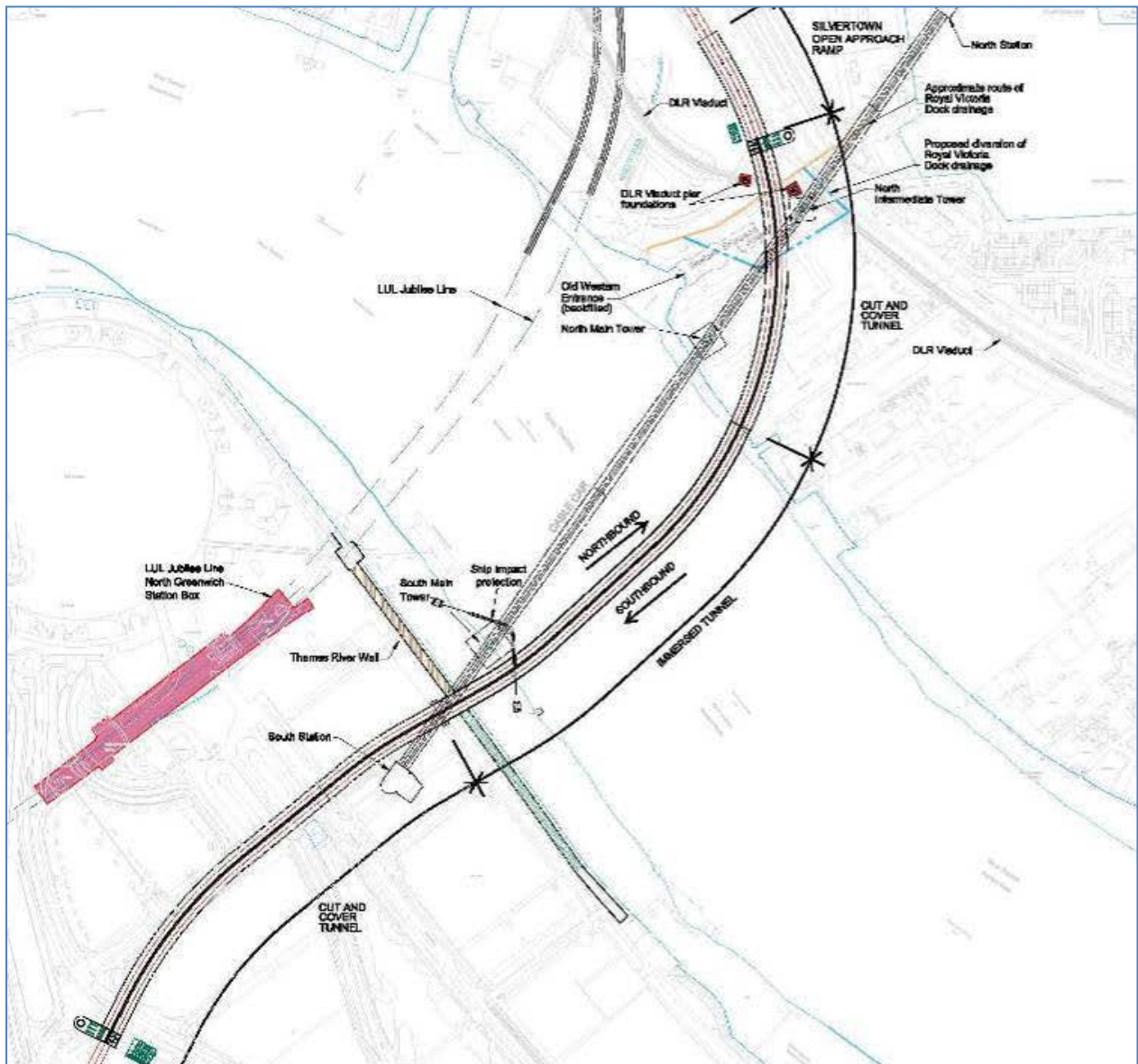
Options / Project objectives	PO1 (resilience)	PO2 (performance)	PO3 (growth)
D3: Silvertown bored tunnel	Strong positive	Strong positive	Strong positive

Silvertown immersed tunnel (Option D4)

Description

5.76. This option involves a tunnel between Silvertown and North Greenwich (following the safeguarded alignment) constructed using prefabricated sections floated into position and then immersed into a trench cut into the riverbed as shown in Figure 41. The immersed tunnel would also provide two lanes in each direction and be built to accommodate full highway gauge of just over five metres headroom and standard lane widths.

Figure 41 : Silvertown Tunnel as an immersed tunnel



Assessment against project objectives

5.77. The immersed tunnel option would have the same impacts on the project objectives as the bored tunnel option, as described in the previous section. In particular, the tunnel would:

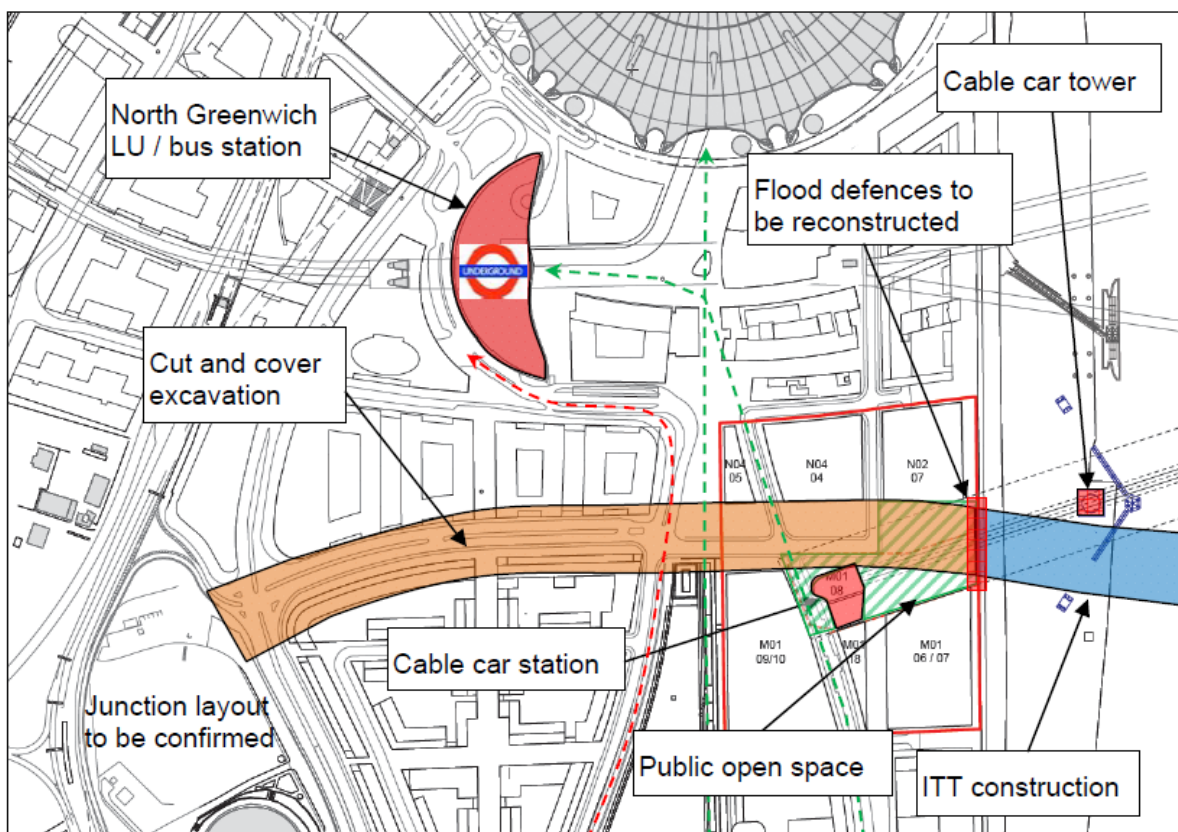
- Reduce congestion at the Blackwall Tunnel
- Provide a highly resilient river crossing (based on its size)
- Reduce the number of incidents occurring at the Blackwall Tunnel
- Eliminate the (up to 20 minute) delays at the Blackwall Tunnel
- Provide additional river crossing capacity in east London
- Enable opportunities for new cross-river bus services

- Provide improved connectivity to Opportunity Areas including Canary Wharf and Royal Docks

5.78. The key difference between the bored and immersed tunnel options is the river works required. The immersed tunnel option would require the construction of a deep trench in the Thames and this would be likely to generate significant opposition from key stakeholders including the Port of London Authority (responsible for managing and protecting the right of navigation on the river) and other organisations responsible for protecting the marine environment including the Environment Agency and the Marine Management Organisation. These statutory bodies would be likely to prefer the bored tunnel option as it would have a negligible impact on the river, which would outweigh any marginal cost difference.

5.79. In addition, the immersed tunnel option would require a cut and cover excavation which would cause considerably more disruption to the Greenwich Peninsula regeneration area (as shown in Figure 42). This option would have an impact on the circulation of people and vehicles in the area, particularly around Edmond Halley Way which provides a key pedestrian route, access to the cable car and is a busway. As a result, this option is unlikely to be supported by the Royal Borough of Greenwich.

Figure 42 : Silvertown immersed tunnel construction impacts (Greenwich Peninsula)



Assessment against NPS vision and strategic objectives for nationally significant networks

5.80. The immersed tunnel option also aligns with the draft NPS strategic objectives for the same reasons set out in paragraph 5.73. Though it is noted that this option does not perform as well in relation to environmental goals for the reasons set out above in paragraph 5.78.

Conclusion

5.81. The Silvertown immersed tunnel option effectively addresses existing congestion and resilience problems and supports economic growth and thus meets the three project objectives as summarised in Table 21. However, this option would adversely impact on the surrounding urban area and the river environment and accordingly, not meet project objectives PO4 and PO6.

Table 21 : Performance of Silvertown immersed tunnel against project objectives

Options / Project objectives	PO1 (resilience)	PO2 (performance)	PO3 (growth)
	Strong positive	Strong positive	Strong positive

Preferred option

5.82. As set out in the analysis above and summarised in Table 22, the Silvertown Tunnel options (bored or immersed) located in the safeguarded area between the Greenwich Peninsula and the Royal Docks, are the only options that fully address all three project objectives. Both tunnel options provide comprehensive solutions to relieve congestion and address the severe resilience problems that exist now at the Blackwall Tunnel and provide additional capacity to ensure that the growth planned in the area can be accommodated and supported.

Table 22 : Summary of performance of each option against project objectives

Options / Project objectives	PO1 (resilience)	PO2 (performance)	PO3 (growth)
A: Do Nothing	Negative	Negative	Negative
B1: Blackwall Tunnel charge	Slight positive	Slight positive	Neutral
B2: DLR extension	Neutral	Neutral	Slight positive
C1: Silvertown Ferry	Negative	Slight positive	Negative
D1: Blackwall Tunnel third bore	Slight positive	Positive	Slight positive
D2: Silvertown lifting bridge	Slight positive	Slight positive	Neutral
D3: Silvertown bored tunnel	Strong positive	Strong positive	Strong positive
D4: Silvertown immersed tunnel	Strong positive	Strong positive	Strong positive

- 5.83. While there are some issues associated with the immersed tunnel option, in terms of construction impacts on the river and on a key Greenwich Peninsula route (Edmond Halley Way) following the consultation where strong support was shown for a tunnel at Silvertown (including by the host boroughs – as set out in paragraph 5.68), it was agreed that further detailed examinations of these two options would be undertaken. The result of this has been that eight tunnel sub-options have been assessed, analysing the impacts of the bored and immersed options and of short and long tunnel options and this analysis is set out in detail in Chapter 6.
- 5.84. A tunnel at this location would reduce congestion at the Blackwall Tunnel, by providing another high capacity crossing adjacent to it. The extent of this relief would depend on whether a user charging regime is applied as widespread congestion in the area is forecast if this crossing is not charged. While the extra tunnel capacity provides resilience, the approach roads cannot accommodate both tunnels operating at capacity and the host boroughs would not accept the resulting large traffic volumes in surrounding areas.
- 5.85. However, with the new crossing and the Blackwall Tunnel both subject to a user charge, there is the potential to manage traffic generation to ensure that any demand growth is constrained to a level appropriate to the network capacity (as set out in further detail in the Outline Strategy for User Charging¹³⁵).

Conclusion

A fixed link in the form of a tunnel (either bored or immersed) is the only river crossing option that would address the congestion and resilience problems experienced at the Blackwall Tunnel and support the growth planned for the area and accordingly, performs strongly against all of the project objectives.

The bored / immersed tunnel option would:

- Reduce congestion at the Blackwall Tunnel
- Provide a highly resilient river crossing (based on its size)
- Reduce the number of incidents occurring at the Blackwall Tunnel
- Eliminate the (up to 20 minute) delays at the Blackwall Tunnel
- Provide additional river crossing capacity in east London
- Enable opportunities for new cross-river bus services
- Provide improved connectivity to Opportunity Areas including Canary Wharf and Royal Docks

A detailed examination of eight tunnel sub-options has been undertaken, analysing the impacts of the bored and immersed tunnel options, as well as short and long tunnel options, and this is set out in Chapter 6.

¹³⁵ TfL: Outline Strategy for User Charging at Blackwall and Silvertown Tunnels, 2014

6. Tunnel Sub-Options

Introduction

- 6.1. This section examines the eight tunnel sub-options for the Silvertown Tunnel which includes bored and immersed tunnel options, as well as short and long tunnel options, as follows:
1. Immersed tube – long option with on-site casting ('base' Option)
 2. Immersed tube – long option with off-site casting (Option A)
 3. Immersed tube - short option with on-site casting (Option B)
 4. Immersed tube - short option with off-site casting (Option A + B)
 5. Bored – long option with cross-passages at 350 metre spacing ('base' Option)
 6. Bored - short option with cross-passages at 350 metre spacing (Option C)
 7. Bored - short option with cross-passages at 100 metre spacing (Option D)
 8. Bored – long option with cross-passages at 100 metre spacing (Option E)
- 6.2. Detailed studies that have been undertaken to analyse the impacts of these tunnel sub-options are summarised and the preferred option for the Silvertown Tunnel is identified.

Identification of eight tunnel options

- 6.3. Eight tunnel sub-options have been identified for comparison on the basis that they are feasible in engineering terms but present contrasting impacts. There are four immersed tunnel sub-options and four bored tunnel sub-options, both of which include both short and long tunnel variations.
- 6.4. The engineering feasibility, risk and cost assessment of the long bored and immersed tube options were examined in three initial studies:
- Mott MacDonald: Tunnel Engineering report, June 2012
 - TfL: East London River Crossings - Assessment of Options Report, December 2012
 - Mott MacDonald: Tunnel Engineering report, July 2013
- 6.5. The Tunnel Engineering report (June 2012) identified two potential cost saving opportunities:
1. Use of an off-site casting facility for the immersed tube construction to save the cost of constructing an on-site casting yard and its eventual reinstatement
 2. Potential to substantially shorten the tunnel on the Greenwich Peninsula side, reducing the length of border tunnel or cut and cover tunnel for the immersed tube option
- 6.6. The long tunnel options respect the agreed Greenwich Peninsula masterplan¹³⁶ layout; with a southern tunnel portal to the west of Millennium Way to ensure there is a physical

¹³⁶ Royal Borough of Greenwich: [Greenwich Peninsula West Masterplan SPD](#), April 2012

separation between tunnel traffic and the areas of the masterplan identified for residential and commercial developments.

- 6.7. The short tunnel options relocate the southern tunnel portal to the east of Millennium Way into the areas of the masterplan identified for residential and commercial developments. The positioning of the short tunnel position is restricted by the maximum desirable tunnel gradient (which is 4%) and the proposed road layout of the masterplan area. There is no opportunity to shorten the tunnel on the Silvertown side as the tunnel gradient is already at the maximum desirable gradient from the mid-river position to the northern portal.
- 6.8. In addition to the above opportunities to reduce costs, a need was identified to evaluate the costs, risks and impacts of complying with the maximum 100 metre cross-passage spacing as required by Highways Agency standard BD78/99 for the bored tunnel options. This was addressed in the Tunnel Engineering report (July 2013) which recommended a spacing of up to 350 metres, as a result of a detailed Fire Life Safety assessment.
- 6.9. The eight tunnel sub-options are examined in detail in the remainder of this chapter and summarised in Table 23 below.

Table 23 : Eight tunnel sub-options for the Silvertown Tunnel

Option name	Tunnel type	Length	Details
Base	Immersed tube	Long	on-site casting
A	Immersed tube	Long	off-site casting
B	Immersed tube	Short	on-site casting
A + B	Immersed tube	Short	off-site casting
Base	Bored	Long	350 metre spacing
C	Bored	Short	350 metre spacing
D	Bored	Short	100 metre spacing
E	Bored	Long	100 metre spacing

Assessment of sub-options

- 6.10. Three further studies were undertaken to assess the eight sub-options and enable a direct comparison of their costs, risks and impacts:
- Mott MacDonald: Tunnel Engineering Addendum Report, October 2013 – investigated feasibility and layout of short tunnel options and produced cost estimates (including quantified risks) on a comparable basis
 - Atkins: Silvertown Tunnel Development Impacts Study, November 2013 – assessed the land-use and development planning impacts of the long and short options for the bored and immersed tube variants and where possible, quantified the impacts in cost and time terms

- Hyder: Silvertown Tunnel Options Study, November 2013 – assessed the relative environmental impacts of the long and short options for bored and immersed tube variants using a qualitative scale
- 6.11. The outputs and findings from these studies were then compared use the following process to compare the eight sub-options and identify the preferred option for the Silvertown Tunnel.
- Step 1: Comparison of option costs, impacts and risks – set out the base costs for each option and summarise the qualitative land use and environmental impacts and risks
 - Step 2: Convert land-use and environmental risks into additional time/ delay to the planning process and evaluate associated costs
 - Step 3: Quantitative comparison – combine the base and differential land costs from Step 1 with the evaluations of additional planning stage delays from Step 2
 - Step 4: Based upon the quantitative comparison in Step 3, determine conclusions and recommendation for the preferred option to be taken forward to the concept design stage
- 6.12. The differences between the options in terms of costs and risks from land-use and environmental impacts were set out in Summary and Comparison of Tunnel Options December 2013.

Conclusions

- 6.13. The quantified comparison indicated that the short tunnel options involved significant planning risks likely to result in a significant delay to the programme and therefore add to the outturn costs. The Silvertown Tunnel Options Study¹³⁷ also concluded that the environmental risks associated with the short options are higher than the long options. On this basis, the short tunnel options were de-selected leaving only the long tunnel options.
- 6.14. Of the long tunnel options the lowest cost bored and immersed tube variants are as follows:
- Immersed tube – Option A
 - Bored – Option Base (cross-passages at up to 350 metre)
- 6.15. However, in view of the potential safety related objections related to cross-passage spacing in bored tunnels, Option E (with 100 metre spacing) has also been included, as a worst case option. The eventual design solution may result in acceptable cross-passage spacing between 100 and 350 metres (100 metre spacing has been assumed for cost purposes).
- 6.16. The assessment of immersed tube against bored reveals that the immersed tube option poses higher environmental risks resulting from the additional land take and excavation works required for the construction phase, the construction methods which will be used

¹³⁷ Hyder: Silvertown Tunnel Options Study, November 2013

and the vertical alignment of the immersed tube tunnel. Higher environmental risks were identified with regards to:

- Land take
- Loss of archaeological assets
- Temporary loss of habitats
- Deterioration of water quality, elevated suspended sediments in the river and the loss of intertidal mudflats
- Contamination of controlled waters
- Large volumes of waste and fewer opportunities to re-use key waste materials
- Changes to water level, flow paths and dynamics and the movement of sediment within the River Thames

6.17. As noted in paragraph 5.78, key stakeholders including the Port of London Authority, the Environment Agency and the Marine Management Organisation are likely to prefer the bored tunnel option as it would have a negligible impact on the river.

Recommended tunnel option

6.18. In light of the above conclusions, the recommended tunnel option is a twin bored (long length) tunnel at Silvertown (with cross-passages between 100 and 350 metres).

7. Findings and Conclusions

Policy conclusions

- 7.1. The proposed Silvertown Tunnel has been designated as a Nationally Significant Infrastructure Project (NSIP) by the Secretary of State for Transport for the role it will play supporting the economic development of London and the wider UK economy. This NSIP designation means that the project will require development consent under the Planning Act 2008. The application for development consent will be determined in accordance with the National Policy Statement for National Networks.
- 7.2. Existing national, regional and local policies give general and specific support to new road-based river crossings in east London, including at Silvertown, to address strategic and local needs for cross-river accessibility and to relieve congestion and improve resilience. A number of the national and regional policy documents contain 'criteria' that are required to be taken into account in the assessment of a new river crossing at Silvertown.

Needs in the study area

- 7.3. Population growth in the east and southeast sub-region and in Greenwich, Newham and Tower Hamlets in particular, is happening more quickly than previously anticipated and traffic modelling predictions¹³⁸ are for significant increases in the volumes of road traffic in the study area together with levels of congestion, particularly on the approaches to the Blackwall Tunnel.
- 7.4. Disparities between the amount and location of forecast population and employment growth will generate increased commuter travel demands outside residents' home boroughs, including increased cross-river travel demand and, if not addressed, could exacerbate levels of deprivation in the study area (in boroughs that already have high unemployment rates).
- 7.5. Local pedestrian and cyclist trips across the river can be undertaken by one of several public transport links, including the dedicated Silvertown pedestrian and cycle crossing, the Emirates Air Line (running parallel to the proposed Silvertown crossing) as well as ferries and the recently re-furbished foot tunnels. In line with MTS policies and to support recent and future riverside growth, TfL is committed to investigating providing additional cross-river walking and cycling links.
- 7.6. Sustained investment in public transport in east London has resulted in a step change in cross-river rail connectivity over the last 20 years and a further high-capacity rail crossing in the form of Crossrail is under construction. There is no evidence of unduly limited capacity arising in the foreseeable future east of Canary Wharf. In terms of bus connectivity, there is only one cross-river link in east London, largely due to the lack of suitable road crossings.
- 7.7. Of the three east London road crossings between Tower Bridge and the Dartford Crossing (a 23 km distance); one is the low-capacity Woolwich Ferry (which does not operate 24/7) and the other two are the Rotherhithe and Blackwall Tunnels, which have

¹³⁸ Mott McDonald: River Crossing Modelling, Base Year Development and Validation Report, February 2014

restrictions on use by large vehicles and are operating over capacity, particularly in peak directions at peak periods. The Blackwall Tunnel currently provides the principal strategic traffic carrying function in the study area.

- 7.8. The lack of resilience of existing cross-river highway links is a major issue, given the lack of crossings, the distance between them, the restrictions on their use and the demand on them which exceeds current capacity. Incidents at crossings causing delay are excessively frequent, particularly at the Blackwall Tunnel and have adverse impacts across the wider road network, including:
- Unreliable journey times across a major Thames gateway affecting freight and commuter traffic;
 - Congestion on approach roads to the tunnel affecting local residents and businesses;
 - Lack of road network resilience over a wide area, with recovery from conditions of severe congestion taking, on occasions, many hours; and
 - A considerable cost to the economy arising from drivers caught in congestion and goods taking (much) longer than planned to be delivered.
- 7.9. Despite recent reductions in private vehicle mode share, road-based travel is still very important in connecting people to employment in the host boroughs and given the growth of population and employment expected in east London, further growth in highway travel is forecast. In addition, the vast majority of freight in London is carried by road and predictions are for this to continue to increase over the coming decades.
- 7.10. East London is one of the largest regeneration areas in the UK. The delivery of development in this area is fundamental to maximising London's economic potential. However, road traffic movements within the sub-region are constrained by the 'barrier effect' of the Thames. This 'barrier effect' limits local firms' access to markets, the size of retail and leisure catchments and residents' access to employment opportunities in a way that is unique to the eastern half of the capital. This constraint on economic activity makes delivering the scale of development planned for the area more difficult.
- 7.11. Overall, two thirds of local businesses report that the ability to cross the river by road in east London is important to their business and only 18 percent feel current crossings are adequate. Two thirds of businesses also report that poor reliability of cross-river travel acts as a constraint or disruption to their business and almost half rate predictability of current journey times as poor or very poor, particularly those in Greenwich.
- 7.12. The overall conclusion is that the existing river crossings in east London are inadequate to cater for current and forecast future demand for cross-river road traffic movement; they are operating at or over capacity and there are severe resilience problems, particularly at the Blackwall Tunnel. While public transport, walking and cycling are important, road travel is also vital for the proper functioning of the study area, traffic modelling undertaken by TfL using Greater London Authority growth predictions are for continuing increases in road travel and congestion. A solution to relieve congestion and improve resilience in the area around the Blackwall Tunnel is not only needed now to relieve existing conditions but also to ensure that the population and economic growth planned in the area can be accommodated and supported.

Project objectives

- 7.13. Taking account of the draft NPS for National Networks, the Mayor's policy as set out in the London Plan and MTS, information gathered from the assessment of needs (including the latest information on population growth) and responses to consultation, the following project objectives are identified and adopted for the Silvertown crossing:
- PO1: to improve the resilience of the river crossings in the highway network in east and southeast London to cope with planned and unplanned events and incidents
 - PO2: to improve the road network performance of the Blackwall Tunnel and its approach roads
 - PO3: to support growth in east and southeast London by providing improved cross-river transport links for business and services

Preferred option

- 7.14. Of the eight options considered, a fixed link in the form of a tunnel (either bored or immersed) is the only river crossing option that would address the congestion and resilience problems experienced at the Blackwall Tunnel and support the growth planned for the area and accordingly, performs strongly against all of the project objectives.
- 7.15. The bored / immersed tunnel would:
- Reduce congestion at the Blackwall Tunnel
 - Provide a highly resilient river crossing (based on its size)
 - Reduce the number of incidents occurring at the Blackwall Tunnel
 - Eliminate the (up to 20 minute) delays at the Blackwall Tunnel
 - Provide additional river crossing capacity in east London
 - Enable opportunities for new cross-river bus services
 - Provide improved connectivity to Opportunity Areas including Canary Wharf and Royal Docks
- 7.16. The Outline Strategy for User Charging¹³⁹ sets out the rationale for imposing user charging at the new crossing and the Blackwall Tunnel, and explains TfL's initial proposals for how such a charge would operate.

Recommended tunnel option

- 7.17. A detailed examination of eight tunnel sub-options has been undertaken, analysing the impacts of the bored and immersed tunnel options, as well as short and long tunnel options.
- 7.18. The recommended tunnel option is a twin bored (long length) tunnel at Silvertown (with cross-passages between 100 and 350 metres).

¹³⁹ TfL: Outline Strategy for User Charging at Blackwall and Silvertown Tunnels, 2014