



RIVER CROSSINGS: SILVERTOWN TUNNEL

SUPPORTING TECHNICAL DOCUMENTATION

INTRODUCTORY TRANSPORT ASSESSMENT

Transport for London

October 2014

This report presents the existing transport network and travel demand by all transport modes in east and southeast London with a specific focus on river crossings. It assesses the transport impacts of the proposed Silvertown Tunnel:

- Construction impacts;
- Impacts on all transport modes;
- Traffic impacts on users of the tunnel and the surrounding road network;
- Potential cross-river public transport improvements.

The report sets out potential measures to mitigate any negative impacts identified.

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.

Transport for London



Silvertown Tunnel: Introductory Transport Assessment

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JACOBS®

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1. Introduction

Purpose

- 1.1. As part of the River Crossings Programme outlined in the London Plan and the Mayor's Transport Strategy, Transport for London is proposing to construct twin bored road tunnels under the river Thames between the Greenwich Peninsula and Silvertown ("the Silvertown Tunnel").
- 1.2. This transport assessment has been prepared in line with current guidance, namely Department for Transport (2007) *Guidance on Transport Assessment* and Transport for London (2010) *Transport assessment best practice guidance document*.
- 1.3. The report first summarises relevant policy and then describes the existing conditions in terms of transport provision, demand and network performance issues for all transport modes. It then assesses the impacts of the proposed scheme and its construction impacts. Potential measures to mitigate negative construction impacts are outlined.
- 1.4. This report is an *Introductory Transport Assessment* and forms one of several documents for public consultation commencing in October 2014. It will be updated prior to the statutory consultation on the scheme to be undertaken in 2015 and the submission of the DCO application.
- 1.5. It should be read in conjunction with the other documents, and most specifically with the *Silvertown Crossing Assessment of Needs and Options* and the *Silvertown Tunnel Traffic Forecasting Report*.

Transport Assessment Scope

- 1.6. The non-statutory consultation provides an opportunity for stakeholders to comment on the scope of the Transport Assessment prior to its completion for the DCO submission.
- 1.7. The assessment sits within a suite of documents for public consultation on the Silvertown Tunnel project. The proposal for a tunnel at this location was reached following an assessment of a number of strategic options described in the *Silvertown Crossing Assessment of Needs and Options*. Included in the suite of documents, Appendix A of the *Silvertown Tunnel Outline Business Case* comprises an assessment of the technical aspects of different tunnel engineering options. The accompanying *Outline strategy for user charging at Blackwall and Silvertown Tunnels* describes the work undertaken to develop an appropriate user charging strategy.
- 1.8. This Introductory Transport Assessment does not include a discussion of the different scheme options. Its scope is to set out all of the transport-related impacts of the proposed Silvertown Tunnel scheme and identify potential mitigation measures where appropriate.
- 1.9. A separate consultation has recently concluded on proposals for replacement of the Woolwich Ferry and new crossings east of Silvertown. These proposals are outside the scope of the assessment in this report.

Project objectives

1.10. The project objectives used to assess the strategic river crossing options at Silvertown are defined in the Silvertown Crossing Assessment of Needs and Options. These objectives draw from the draft National Policy Statement 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 project objectives have been adopted:

- 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
- 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

Project description

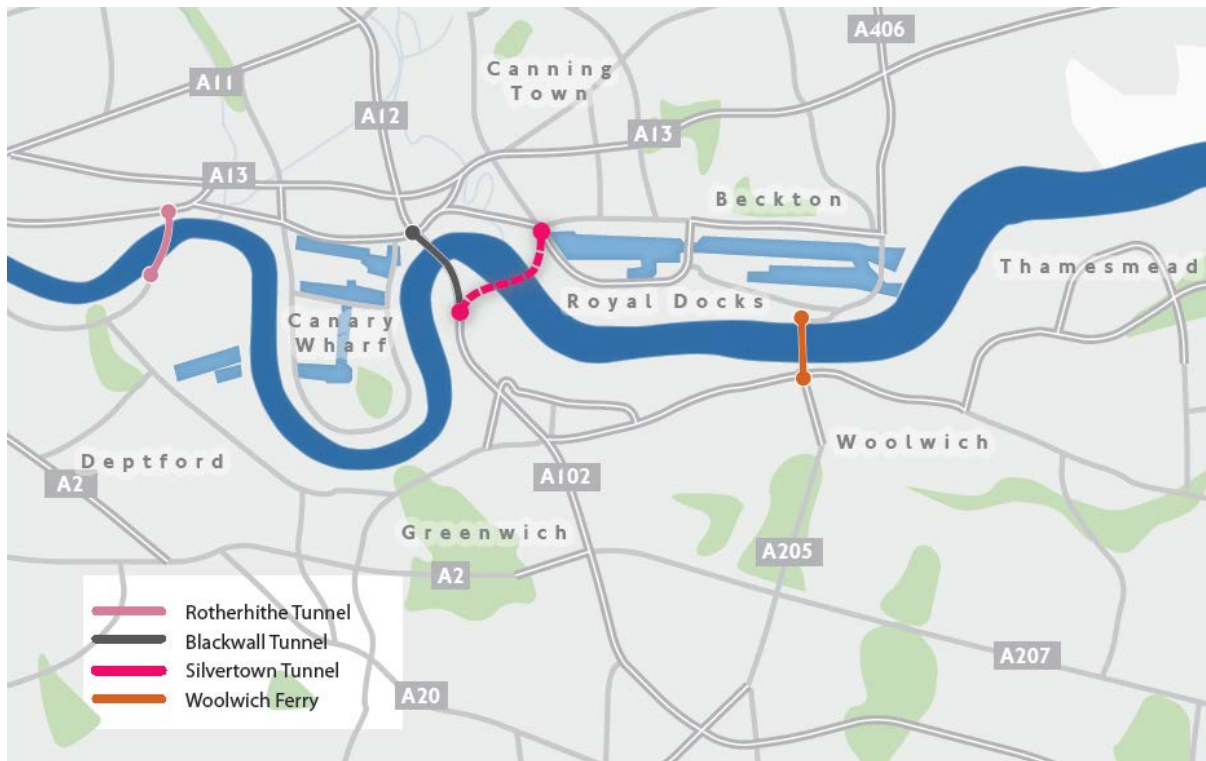
1.11. The Silvertown Tunnel scheme comprises a new tunnel running between the Blackwall Tunnel Southern Approach on the Greenwich Peninsula and the Tidal Basin roundabout in the Royal Docks area. Figure 1-1 shows a map of the proposed tunnel location.

1.12. This assessment assumes:

- twin tunnels creating a dual two-lane cross-river connection;
- one lane in each direction used by any type of vehicle, the other by buses and good vehicles only;
- user charging of the Blackwall and Silvertown Tunnels to manage demand for the crossings and their approach routes; and
- full dimensional clearance in the Silvertown Tunnel providing unrestricted access to most vehicle types including double-decker buses and goods vehicles.

I.13. It is assumed for the purpose of this assessment that the Woolwich Ferry continues to operate, albeit as a new ferry with 30% extra capacity and charges consistent with the Blackwall and Silvertown tunnels¹.

Figure I-1: Overview of Silvertown Tunnel location



I.14. Strategic transport modelling of the Silvertown Tunnel scheme has been undertaken to predict the scheme impacts, as set out in the *Silvertown Tunnel Traffic Forecasting Report*. Transport models have been prepared for 2021 and 2031 to assess the transport impacts in the light of population growth and background changes in travel behaviour. For the purpose of this assessment, the earliest planned opening year for the tunnel is 2021.

I.15. The Silvertown Tunnel scheme is evaluated against an assumed future reference case (“Do-Minimum”) scenario. While proposals to the east of Silvertown are outside the scope of this assessment, the reference case includes an assumption that the Woolwich ferry will be replaced (retained as a free service with 30% additional capacity).

¹ For the purpose of traffic modelling, the reason for this assumption is that by 2031 Woolwich Ferry would need to either be upgraded at its existing location or replaced with a new crossing. Other crossings east of Silvertown Tunnel are subject to a separate decision-making process. If the Woolwich Ferry were to be upgraded at its existing location, the modelling assumes that it would be charged to ensure consistency with the Blackwall, Silvertown and Dartford Crossings. The assumption about the existing and potential future capacity of the Woolwich Ferry has little material impact on the forecasts for Silvertown Tunnel.

- I.16. The rationale for charging the Silvertown and Blackwall Tunnels is set out in the accompanying *Draft Outline strategy for user charging at Blackwall and Silvertown Tunnels*. At this point in time the proposed charging strategy is under development. Therefore the central case model charges do not represent a preferred strategy but instead a reasonable estimate for the purpose of assessing the wider traffic, environmental and other impacts.
- I.17. The proposed user charges have been defined using the charges paid at the Dartford Crossing as a benchmark. In the central case traffic model, both the Silvertown and Blackwall Tunnels are charged at the same level as the Dartford Crossing in the morning peak northbound and the evening peak southbound. A charge of 50% of the Dartford charge is applied to vehicles travelling in the contra-peak directions, and in both directions in the inter-peak period.
- I.18. This central case traffic model forms the basis for all of the assessments prepared for the October 2014 consultation. However, further testing of alternative charges is being undertaken to assess the various impacts.
- I.19. The *Silvertown Tunnel Traffic Forecasting Report* outlines the findings of other traffic models. These include model tests relating to user charging and a sensitivity test with the Silvertown Tunnel and a new fixed link crossing east of Silvertown.

2. Relevant transport policy

Introduction

- 2.1. This chapter sets out the framework of national, regional and local plans and policies that have informed the development of, and will be considered when a decision is made on, plans for a new river crossing at Silvertown.

Nationally Significant Infrastructure Project (NSIP)

- 2.2. Following a submission by TfL in 2012, the Secretary of State for Transport gave 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 by the Secretary of State 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 her 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 draft 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 policy

Draft National Policy Statement for National Networks

- 2.6. The National Policy Statement (NPS) for National Networks² 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

² Department for Transport: [Draft National Policy Statement for National Networks](#), December 2013

primary basis for the examination of those projects by the Examining Authority and decisions by the Secretary of State.

2.7. The NPS explicitly notes at paragraph 2.23 that new links that cross a river or estuary (such as the Silvertown Tunnel), may be needed to increase capacity and connectivity to meet the needs created by economic and demographic growth.

2.8. The 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 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 be used as the primary basis for the Secretary of State's decision in respect of the DCO application.

National Planning Policy Framework

2.10. The National Planning Policy Framework (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.

2.11. 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.

2.12. 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).

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

London-wide policy

London Plan

- 2.14. The London Plan³, 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 Plan⁴ 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.
- 2.15. The London Plan 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 south-east sub-region (ESR). The ESR 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 overall. However, it is recognised that achieving this growth is likely to require investment in infrastructure, including road infrastructure and improving cross-river connectivity (paragraph 6.4.1).
- 2.16. Section 6 of the London Plan is focused on transport and the need for additional east London river crossings as set out clearly 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 crossing(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).
- 2.17. Policy 6.4 refers to enhancing London's transport connectivity stating:
- '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 by: []*
- k) providing new river crossings'.*
- 2.18. A new Silvertown Tunnel 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'.

³ Greater London Authority: [The London Plan – Spatial Development Strategy for Greater London](#), July 2011

⁴ Greater London Authority: [Draft Further Alterations to the London Plan](#), January 2014

2.19. 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:

‘Drivers are heavily dependent on the congested Blackwall and Rotherhithe tunnels, each of which have 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.’

2.20. 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

2.21. 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 Transport Strategy

2.22. The Mayor’s Transport Strategy (MTS)⁵ 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 accommodate growth in the ESR, a key part of the London Plan’s strategic vision.

⁵ Greater London Authority: [Mayor’s Transport Strategy](#), May 2010

2.23. 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

2.24. Overall, the implementation of the Strategy would see the increase in 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, however, 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.

2.25. 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:

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
- b) An upgraded Woolwich Ferry and consideration of a new vehicle ferry at Gallions Reach to improve connectivity
- c) Local links to improve connections for pedestrians and cyclists
- d) Consideration of a longer-term fixed link at Gallions Reach to improve connectivity for local traffic, buses, cyclists and to support economic development in this area
- e) The encouragement of modal shift from private cars to public transport, using new rail links including High Speed One domestic services, Crossrail and the DLR extension to Woolwich, reducing road demand, and so road congestion at river crossings, where possible
- f) Support for Government proposals to reduce congestion at the Dartford crossing

2.26. Proposal 35 contains policy tests similar to those set out in policy 6.12 of the London Plan (and included above in paragraph 2.20) for new road infrastructure.

2.27. 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.

- 2.28. Since the publication of the London Plan and the MTS, more up-to-date information has become available on the forecast extent of forecast growth in London, showing higher historic population growth earlier than expected.
- 2.29. The impact of this on the application of relevant policy is discussed in chapter 3.

Roads Task Force

- 2.30. 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' published in July 2013⁶.
- 2.31. 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
- 2.32. 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.
- 2.33. Figure 7 in Chapter 1 flags up 'inadequate cross Thames connectivity and capacity' to support the ESR growth agenda.
- 2.34. 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, 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

- 2.35. The London Infrastructure Plan⁷ sets out the Mayor's long-term (to 2050) aspirations for the infrastructure to support London's future growth. The central projection is a 37 per cent increase in population from 2011 to 2050, with a resident population of 11.3 million by mid-century. It notes that the road network caters for 80 per cent of people's journeys and 90 per cent of freight journeys; and it is vital for the continued economic success and functioning of the city. The Plan notes the proposed Silvertown Tunnel project and sets out aspirations for a series of further new river crossings in East London beyond this current scheme to help overcome the major barrier effect of the river.

⁶ Roads Task Force: [The Vision and Direction for London's streets and roads](#), July 2013

⁷ GLA: [London Infrastructure Plan 2050](#), July 2014

Sub-regional transport policies

East and South East London Sub-Regional Transport Plan

- 2.36. The sub-regional transport plan (SRTP) for East London (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 2014⁸.
- 2.37. 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 2014 update are):
- 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
- 2.38. 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'.
- 2.39. The Silvertown Tunnel is specifically listed as a scheme that will improve east and southeast London. The SRTP notes that proposals are being progressed for a 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 to 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 overheight vehicles.

Local plans and policies – host boroughs

- 2.40. The London Plan and the MTS provide the statutory policy framework for London boroughs to develop their own local plans. The local plans and other policy
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⁸ Transport for London: [East and south east London sub-regional Transport Plan, 2014 update](#), 2014

documents of the three host boroughs (as shown in the study area are reviewed below.

Royal Borough of Greenwich

- 2.41. The Royal Borough of Greenwich submitted its Core Strategy⁹ to the Secretary of State for Communities and Local Government in September 2013. Consultation on modifications to the Core Strategy including Development Management Policies¹⁰ was completed in April 2014.
- 2.42. 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).
- 2.43. 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).
- 2.44. Greenwich's Second Local Implementation Plan (LIP)¹¹ 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'.
- 2.45. The Greenwich Peninsula West Masterplan Supplementary Planning Document (SPD)¹² 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

⁹ Royal Borough of Greenwich: [Core Strategy with Development Management Policies \(Submission Version\) with proposed modifications](#), 2013

¹⁰ Royal Borough of Greenwich: [Core Strategy with Development Management Policies \(Submission Version\) - with proposed further modifications](#), 2014

¹¹ Royal Borough of Greenwich: [Keeping Greenwich Moving - Greenwich Council's Second Local Implementation Plan for Transportation](#) (June 2011)

¹² Royal Borough of Greenwich: [Greenwich Peninsula West Masterplan SPD](#), April 2012

be below ground to minimise the impact of increased traffic in the area'. SPDs can be used as a material consideration in the assessment of planning applications.

London Borough of Newham

- 2.46. The London Borough of Newham's Core Strategy¹³ 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 Blackwell Tunnel and to support future growth' (paragraph 6.197).
- 2.47. Newham's Second LIP¹⁴ 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's notes that its support for this crossing is 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).
- 2.48. The Canning Town and Custom House SPD¹⁵ 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 website notes that some of the SPD information may be out of date.

London Borough of Tower Hamlets

- 2.49. The London Borough of Tower Hamlets' Core Strategy¹⁶ 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 Tunnel where new homes and jobs are being delivered (LAP 7&8, Leamouth).
- 2.50. Tower Hamlets' Second LIP¹⁷ (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 Sub-Regional Transport

¹³ London Borough of Newham: [Newham 2027 Newham's Local Plan – The Core Strategy](#), January 2012

¹⁴ London Borough of Newham: 2nd Local Implementation Plan - Transport Policies and Programmes Document, April 2011 (online version not available)

¹⁵ London Borough of Newham: [Canning Town and Custom House Supplementary Planning Document](#) (July 2008)

¹⁶ London Borough of Tower Hamlets: [Core Strategy 2025](#), September 2010

¹⁷ London Borough of Tower Hamlets: [Second Local Implementation Plan \(LIP2\) 2011-2031](#), May 2011

Plan, including ‘Silvertown Tunnel’ 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 Blackwall Tunnel (page 38).

Local planning documents – adjoining boroughs and other interested authorities

- 2.51. The local plans and other policy documents of the London boroughs that immediately adjoin the host boroughs have also been reviewed, as have those of other local authorities deemed to have a potential interest in river crossings in east London.
- 2.52. A summary table of references can be found in the Needs and Options report. The only document to specifically mention the Blackwall crossing is the Bexley Core Strategy, which references support for improvements to resilience at Blackwall and Dartford.

Lower Lea Valley / Olympic Legacy Supplementary Planning Guidance

- 2.53. The Lower Lea Valley Opportunity Area Planning Framework and Olympic Legacy Supplementary Planning Guidance (OLSPG) aims to guide development for the area around the Queen Elizabeth Olympic Park 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’*
- 2.54. The SPG goes on to list the Silvertown Tunnel as one of the river package options which will need to be considered further in the development plans for the area.

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. Current transport networks

Introduction

- 3.1. This section describes the existing transport and movement networks in the vicinity of the proposed Silvertown Tunnel and describes in summary the role of the Blackwall Tunnel in the existing road network.
- 3.2. For a more detailed analysis of the operational issues encountered at the Blackwall Tunnel, please refer to the *Silvertown Crossing Assessment of Needs and Options* and the *Silvertown Tunnel Outline Business Case*.

Local walking network

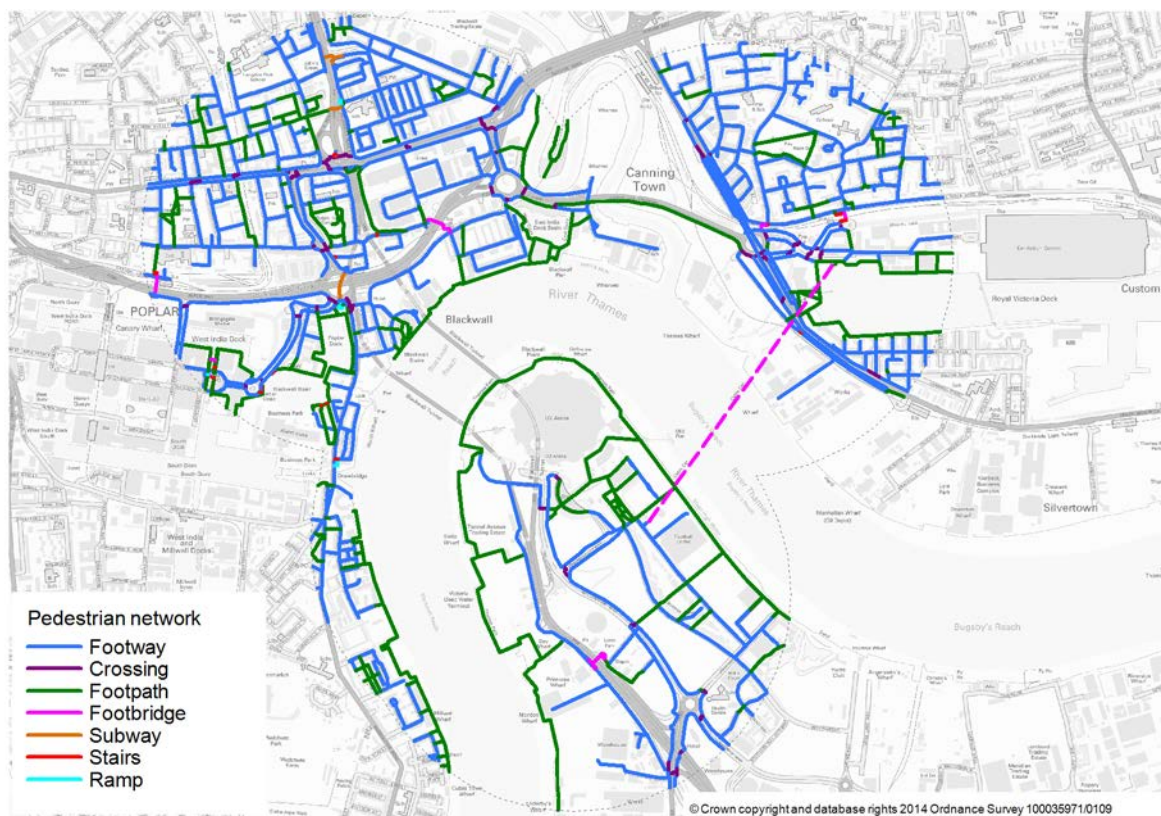
- 3.3. MTS proposal 39 on river crossings specifically references the need for “local links to improve connections for pedestrians and cyclists”. The Emirates Air Line cable car was the first part of the river crossings programme to be delivered and provides a high quality link along the alignment of the proposed Silvertown Tunnel, catering for pedestrians seeking to travel between the Greenwich Peninsula and the Silvertown end of the Royal Docks. This brings passengers past the riverside and close to the main centres of activity on either side, Millennium Square for the O2 on the southern side, and ExCel and the Siemens Crystal on the northern side.
- 3.4. Elsewhere in this area, there are only a limited number of pedestrian cross-river links for pedestrians. The dedicated foot tunnels at Greenwich and Woolwich, built in the early years of the twentieth century, have recently been refurbished by Greenwich Council. The Rotherhithe tunnel is also open to pedestrians but in practice constitutes an uninviting walking environment and is only used by a handful of pedestrians each day.

Figure 3-1: Emirates Air Line crossing of the Thames



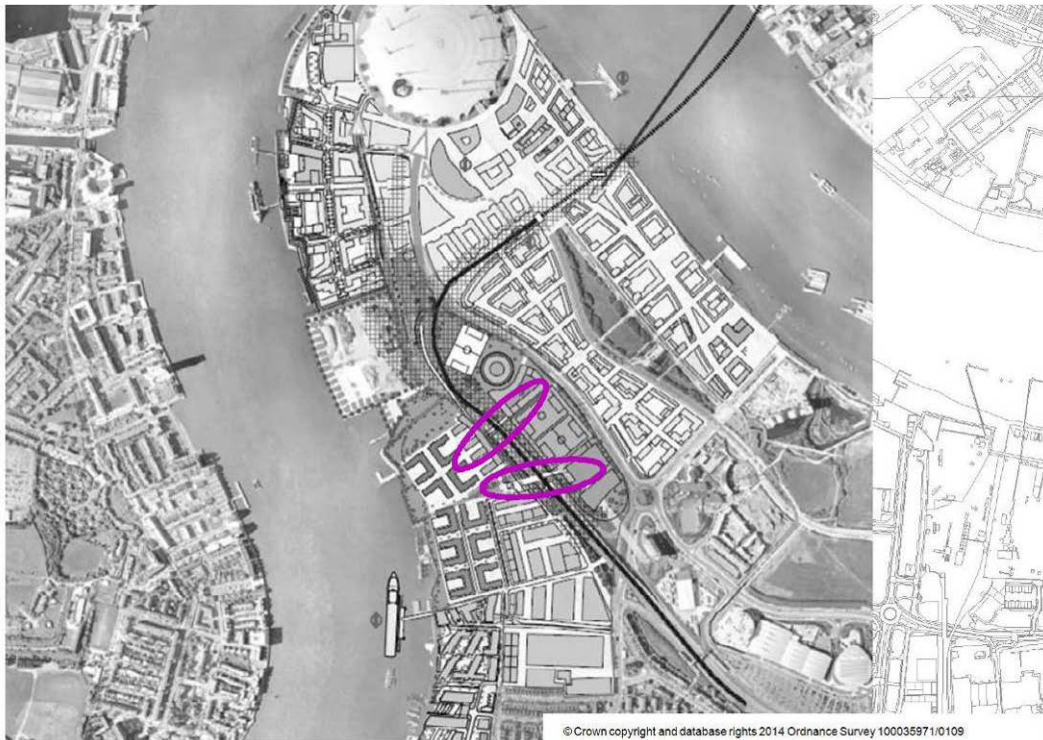
- 3.5. Pedestrians can also use other public transport links in the area to cross the river (Overground, Jubilee line, DLR) or the Woolwich ferry.
- 3.6. The current walking network up to 800 metres (or about a 10-minute walk) from the existing Blackwall and proposed Silvertown tunnel portals is shown in Figure 3-2, with the Emirates Air Line link shown in a dashed pink line.

Figure 3-2: Existing walking network within 800m of the Blackwall and proposed Silvertown tunnel portals



- 3.7. The walking network in this area is expected to change significantly before the proposed tunnel opening year as a result of several major developments. As described in chapter 2 the Greenwich Peninsula Masterplan and the Greenwich Peninsula West Masterplan highlight the continuing phases of development on the peninsula. The latter document is of particular significance to the Silvertown Tunnel project due to the need to coordinate planning of pedestrian access over the A102 Blackwall Tunnel Approach. Figure 3-3 shows an indicative plan of the future walking network taking into account these developments with potential crossing alignments highlighted in purple.

Figure 3-3: Greenwich Peninsula and Peninsula West Masterplans



- 3.8. On the northern side of the river, adjacent to the northern Blackwall tunnel portal, London Borough of Tower Hamlets has granted outline planning permission to the Blackwall Reach development, which will re-configure the local movement network in this area. There are also a number of major developments planned that will alter the nature of the local movement network around Silvertown.
- 3.9. Around the northern end of the Silvertown tunnel, the pedestrian network is currently poor as the immediate area is currently dominated by light industry. East of Silvertown Way there is a high quality pedestrian environment and the Emirates Air Line allows people to pass over the industrial area and arrive in the area around Royal Victoria Dock.
- 3.10. In the medium term, the area around the northern portal will be subject of redevelopment and potentially a new DLR station, which will create new pedestrian routes.

Cycling network

- 3.11. The current cycling network around the existing Blackwall and proposed Silvertown tunnel portals includes several designated cycle routes. Cycle Superhighway 3 is a well-used commuter route, which follows the A13 before cutting south to Naval Row, crossing Cotton Street and continuing along Poplar High Street towards Limehouse. An equivalent Cycle Superhighway 4 route is planned to broadly follow the A206 between Woolwich and Greenwich to the south of the Greenwich Peninsula.
- 3.12. The Thames Path, in particular on the eastern side of Greenwich Peninsula, is a very popular leisure cycle route. National Cycle Network route 1, which also forms part of the European EuroVelo route network, crosses the Thames at the Greenwich foot tunnel. Overall there is a relatively dense network of cycle routes in this area using off-road infrastructure and quieter roads.
- 3.13. Cyclists have slightly fewer public transport options than pedestrians, due to restrictions on the carriage of (non-folded) cycles on the Jubilee line at all times and DLR at peak times. Cyclists can use the foot tunnels (but must do so on foot) and Woolwich Ferry free of charge. Cycles may also be taken on the Emirates Air Line, which provides an important link for the Greenwich peninsula as neither cyclists nor pedestrians can use the Blackwall Tunnel.

Figure 3-4: Cyclist using the Emirates Air Line



Public transport network

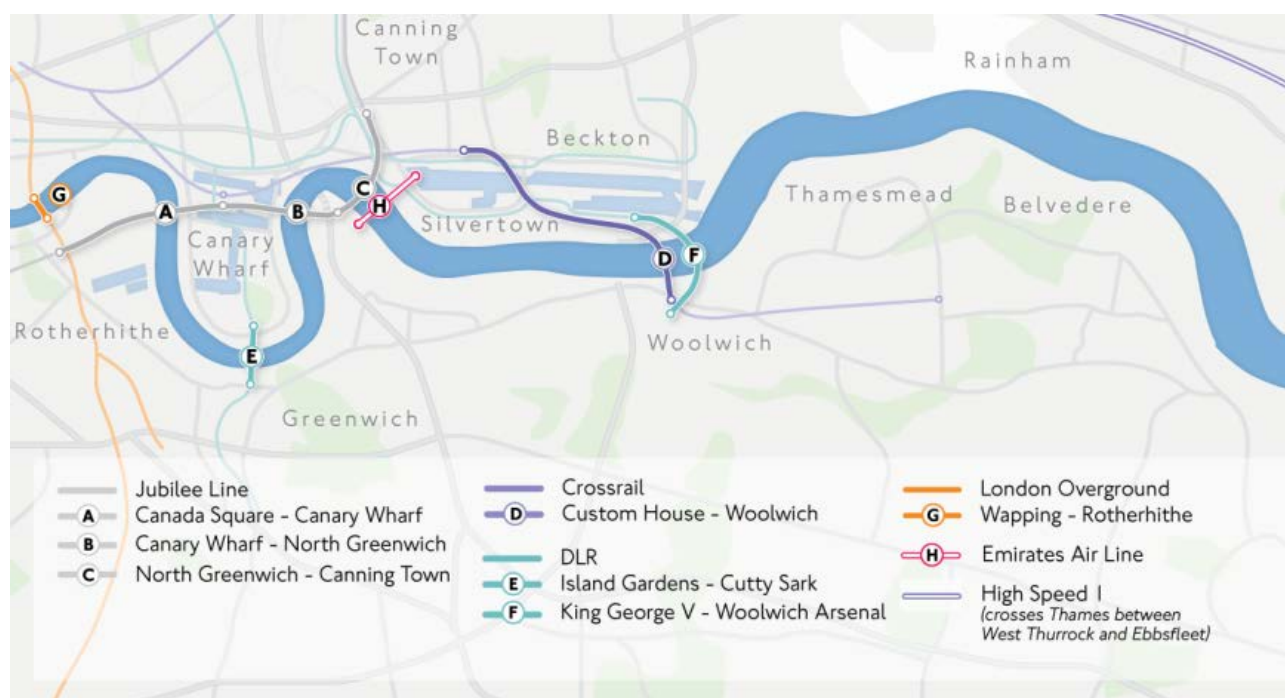
Rail-based public transport

3.14. 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 there was only one rail crossing of the River Thames in east London in the form of London Underground's East London line, which provided only a local shuttle from New Cross/New Cross Gate to Shoreditch.

3.15. Since 1999, new cross-river rail links have been provided on these routes:

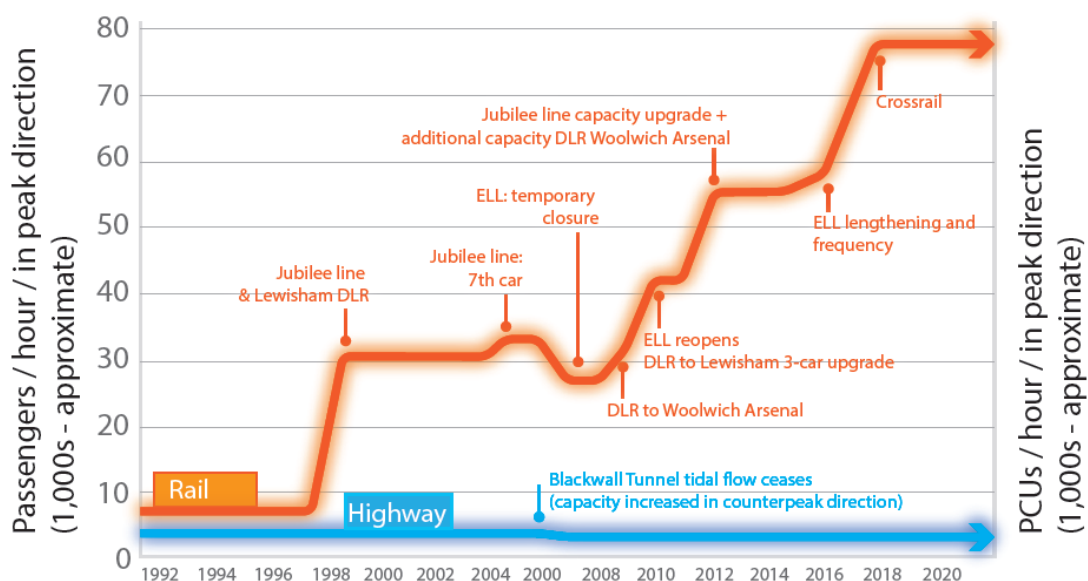
- (i) Jubilee line (opened 1999, and subsequently enhanced with more frequent and longer trains) (A, B and C on Figure 3-5);
- (ii) Docklands Light Railway (extended to Greenwich and Lewisham in 1999, and subsequently enhanced with longer trains, and to Woolwich in 2009) (E and F on Figure 3-5);
- (iii) High Speed 1, which started operating frequent high speed trains between Kent and east London in 2009 (to the east of Figure 3-5);
- (iv) London Underground's East London line was transferred to the London Overground network, with new services to a much wider range of destinations from 2010, and further services from 2012 (G on Figure 3-5);
- (v) Crossrail, now under construction and which will provide a new high frequency cross-river link to Woolwich from 2018 (D on Figure 3-5); and
- (vi) Emirates Air Line, which opened in 2012 provides an additional cross-river shuttle service for pedestrians and cyclists between North Greenwich and Royal Victoria (H on Figure 3-5).

Figure 3-5: Public transport routes across the Thames east of Tower Bridge



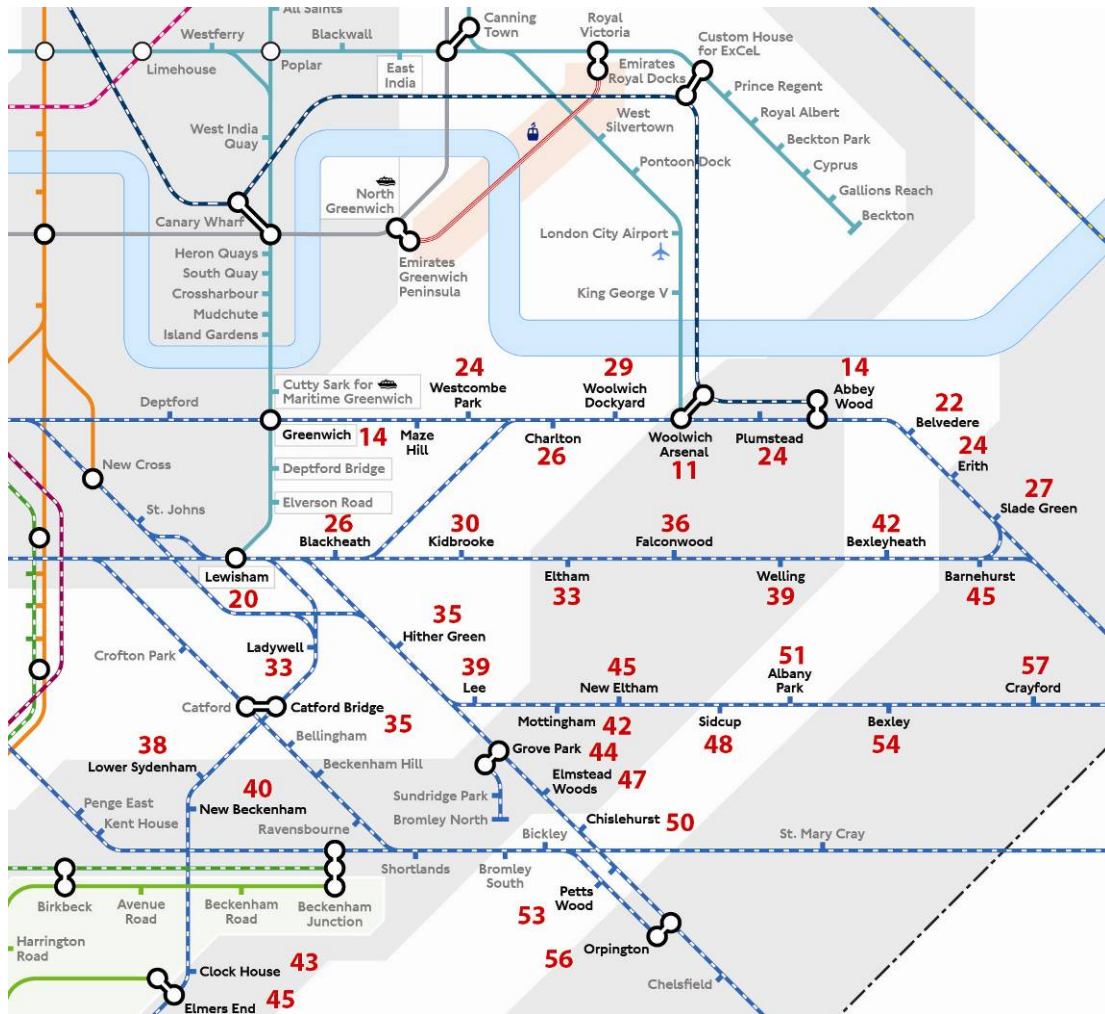
3.16. The additional rail capacity will see total public transport cross-river capacity rise to 60,000 northbound passengers in the morning peak hour (Figure 3-6), and further capacity enhancements could be achieved through provision of additional and/or longer trains.

Figure 3-6: Northbound cross-river capacity in the AM peak hour, east of Tower Bridge within London (1992-2022)



3.17. While the investment in cross-river rail links has vastly improved public transport connectivity between east and southeast London, previous responses to the river crossings consultation highlighted some disparity between communities in southeast London in terms of access to employment growth in the Docklands area. For example, Figure 3-7 shows morning peak hour journey time to Canary Wharf from different stations in southeast London. This shows that the new links have or will greatly reduced journey times to Canary Wharf from the areas served, and areas such as Erith and Kidbrooke benefit from good connections to the new links at Abbey Wood, Greenwich or Lewisham. Lines with lower frequencies to those interchange stations (such as those with trains which bypass Lewisham) have much higher average journey times into Canary Wharf.

Figure 3-7: Approx rail journey times to Canary Wharf from SE London (peak hour, 2021)



Note: based on average wait times taking account of line frequencies through interchange stations. Journeys may be quicker or slower depending on route choice and connections (e.g. some faster but more expensive/congested routes are available via London Bridge, and for infrequent lines some connections between lines will be more efficient if trip start times are planned around known timetabled connections, or may be slower if connections are missed). Stations shown have direct or single change access to Canary Wharf; for other lines/stations the journey times are less straightforward as an additional change is required.

3.18. With regard to station access, the proposed southern Silvertown tunnel portal is located close to the North Greenwich public transport interchange and its impact on pedestrian access routes is therefore assessed in this report. The proposed northern Silvertown tunnel portal is located close to the site safeguarded for a potential Thames Wharf DLR station and its potential impact on pedestrian access routes to the station needs to be considered.

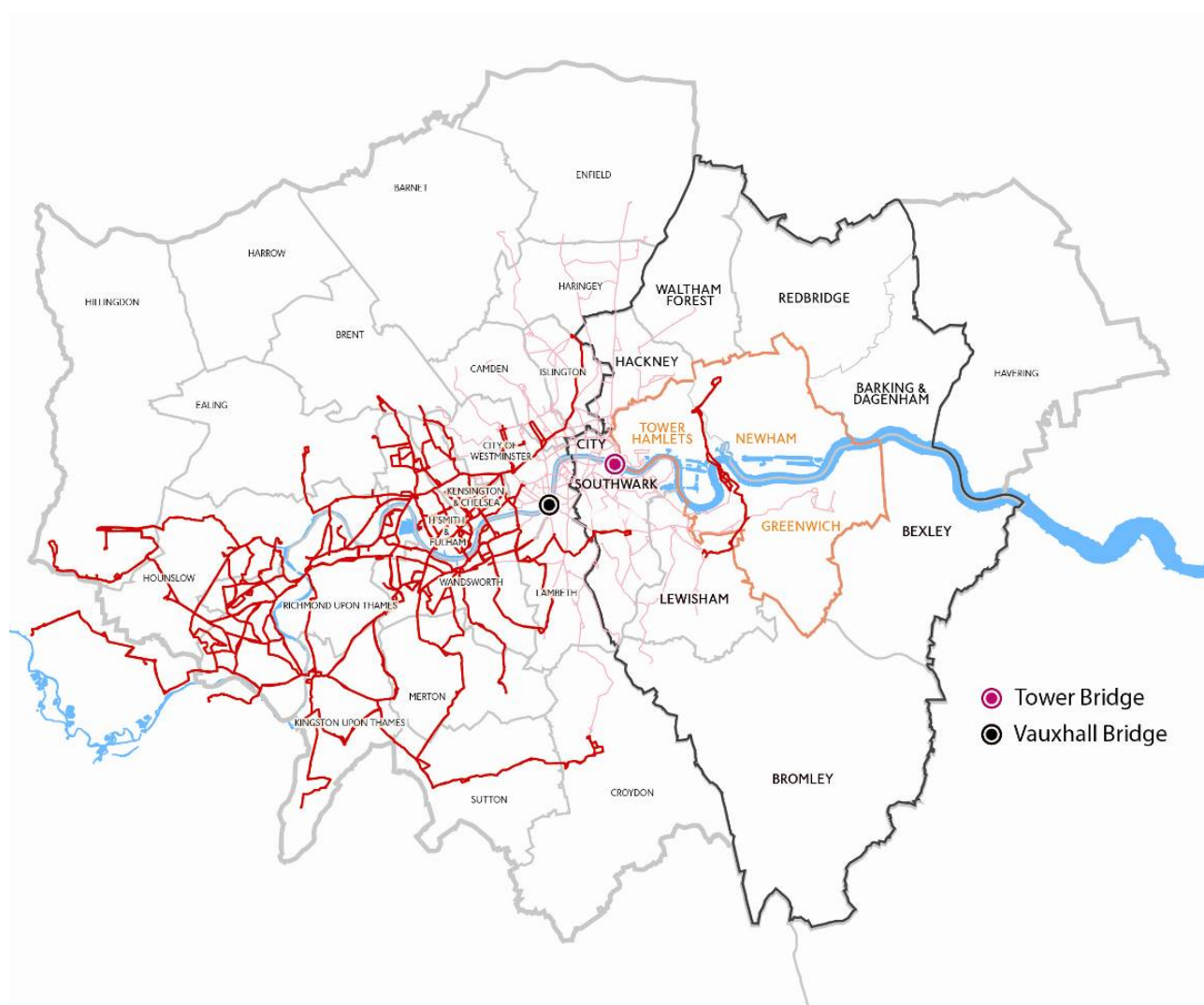
Buses

3.19. East London's very limited existing cross-river bus network reflects the relative lack of highway crossing provision to the east of Tower Bridge. Overall there are

comprehensive networks of bus services on either side of the river in east and southeast London, but these networks operate largely independently of one another.

3.20. Figure 3-8 shows all standard 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 grey. Routes which cross the river outside these crossings are coloured red. There are 47 bus routes which cross the river west of Vauxhall Bridge, and a single route (the 108) crossing the river east of Tower Bridge (using Blackwall Tunnel). The figure highlights the notable disparity in cross-river bus provision in cross-river bus routes between east and west London, which is a consequence of the very limited cross-river road connections.

Figure 3-8 Cross-river bus services in London

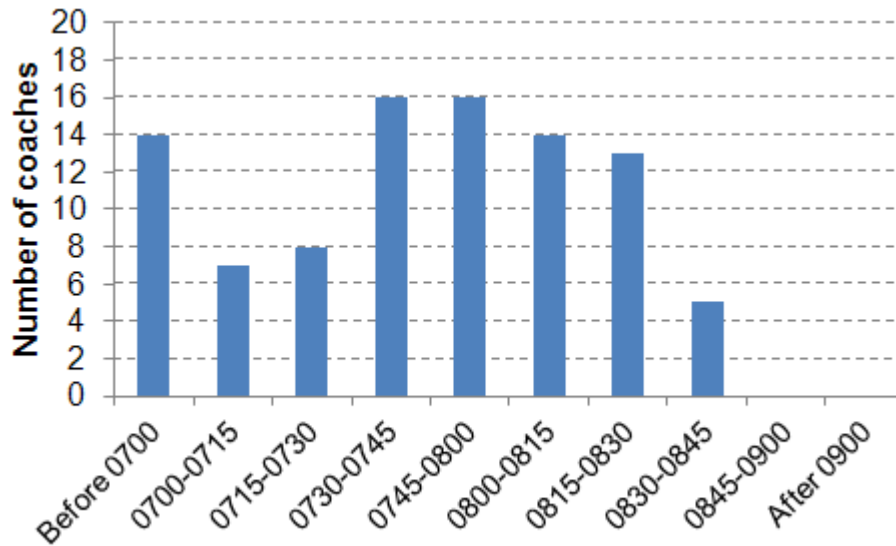


3.21. Route 108 is a 24-hour service scheduled to operate around every 10 minutes during the day between Stratford and Lewisham via the Blackwall Tunnel. This service can suffer from major disruption when the Blackwall Tunnel is closed. Bus connections are available at both ends of the foot tunnel and ferry at Woolwich, and via stations with cross-river services.

Coaches

3.22. The Blackwall Tunnel carries a large number of commuter coaches between Kent and central London at peak times. The peak movement is northbound in the morning peak with 59 coaches scheduled to pass through the Blackwall Tunnel between 07:30 and 08:30 (Figure 3-9).

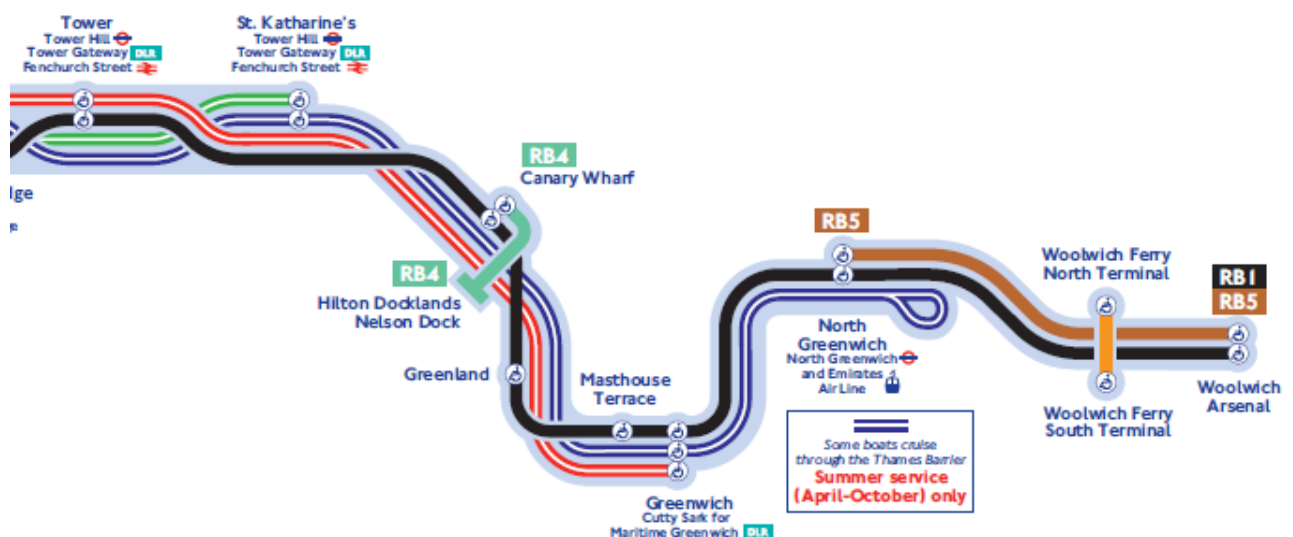
Figure 3-9: Scheduled commuter coaches (northbound, AM peak, 15-minute periods)



River bus services

3.23. Scheduled passenger river bus services operate on this section of the Thames as illustrated in Figure 3-10. The main RB1 service operates at a 20-minute frequency between North Greenwich pier and central London. While the majority of trips are along the river rather than across it, the river services cater for some cross-river movements on the western side of Canary Wharf (RB4 Hilton-Canary Wharf and RB1 Greenland-Canary Wharf).

Figure 3-10: Scheduled river bus services in east London



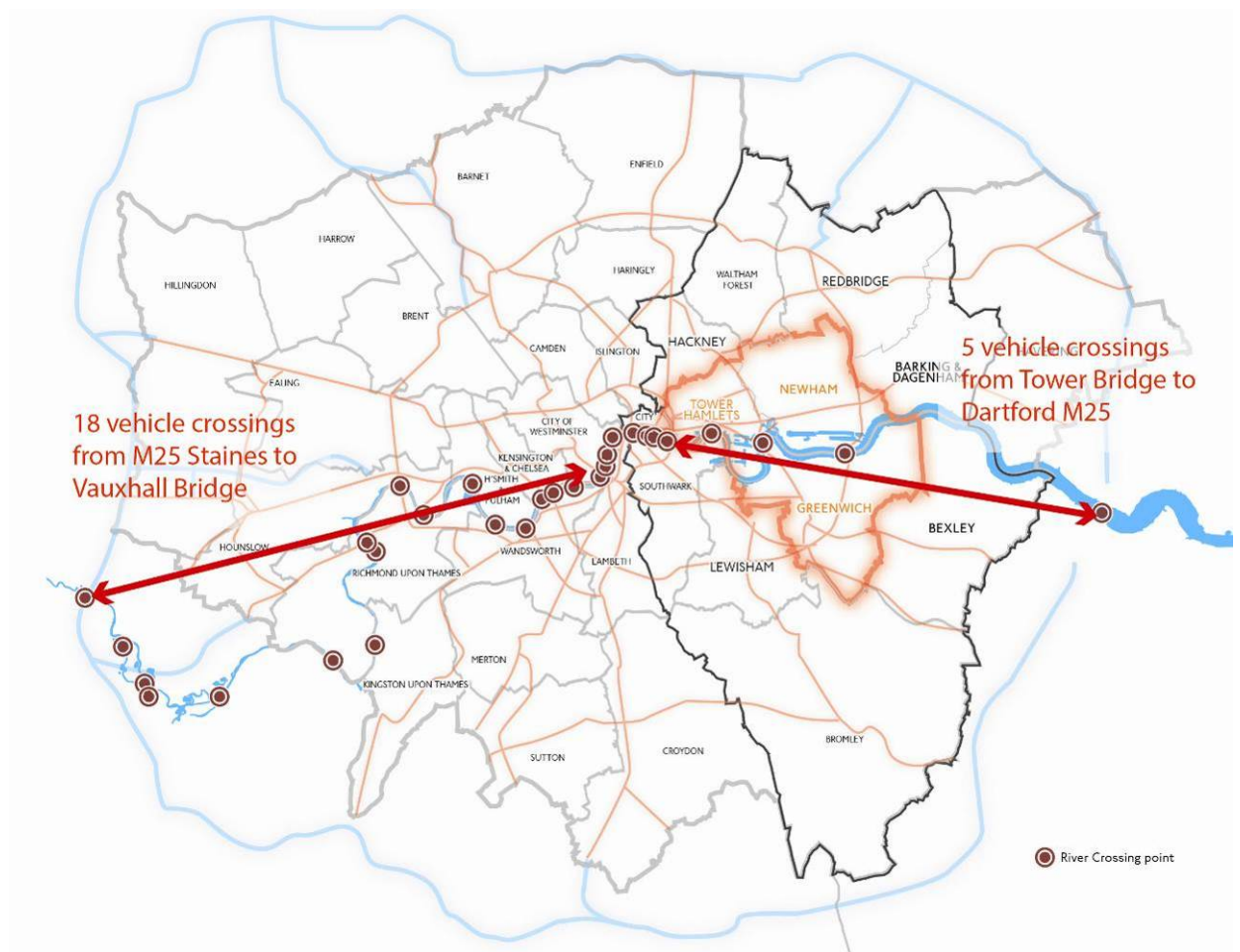
Road network

3.24. Chapter 3 of the Silvertown Tunnel Needs and Options report describes the context of the strategic highway network in east and southeast London. Some of the key points are repeated in summary here but for more detailed information refer to the Needs and Options report.

3.25. Figure 3-11 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):

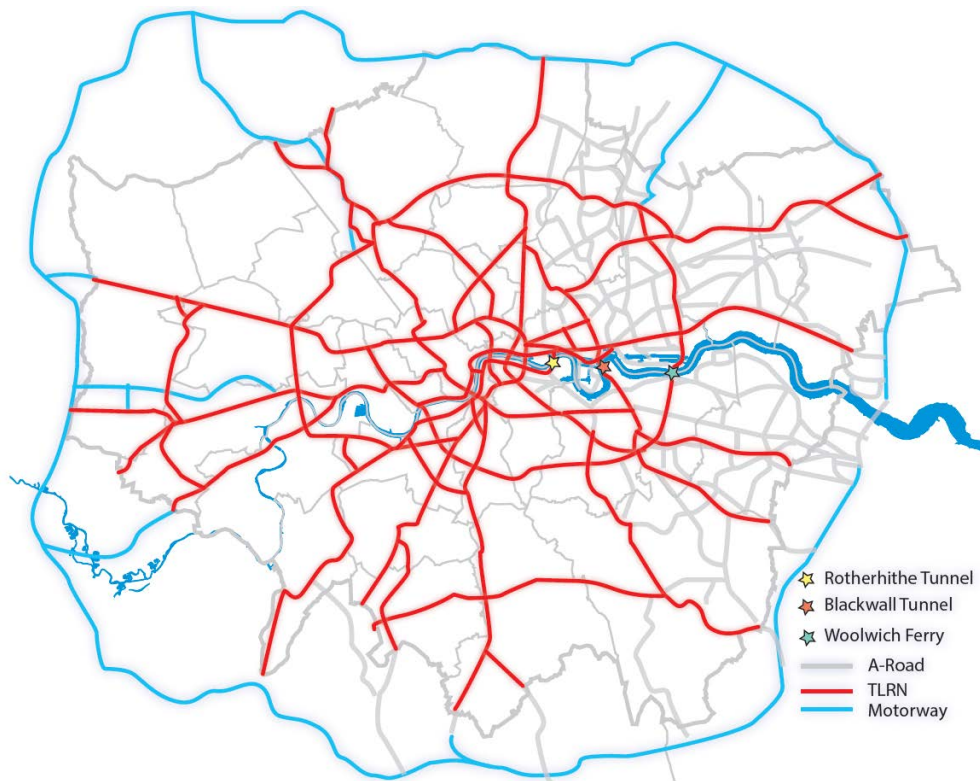
- West London: 18 crossings in 29 km from Vauxhall Bridge to the M25 (Staines)
- East London: 5 crossings in 23 km from Tower Bridge to the M25 (Dartford)

Figure 3-11 Tower Bridge to M25: five crossings in 23 km



3.26. The Rotherhithe and Blackwall Tunnels and the Woolwich ferry all lie on the Transport for London Road Network (TLRN). However, in terms of use by longer-distance traffic and high volumes, the only current 'strategic' cross-river highway link is the Blackwall Tunnel.

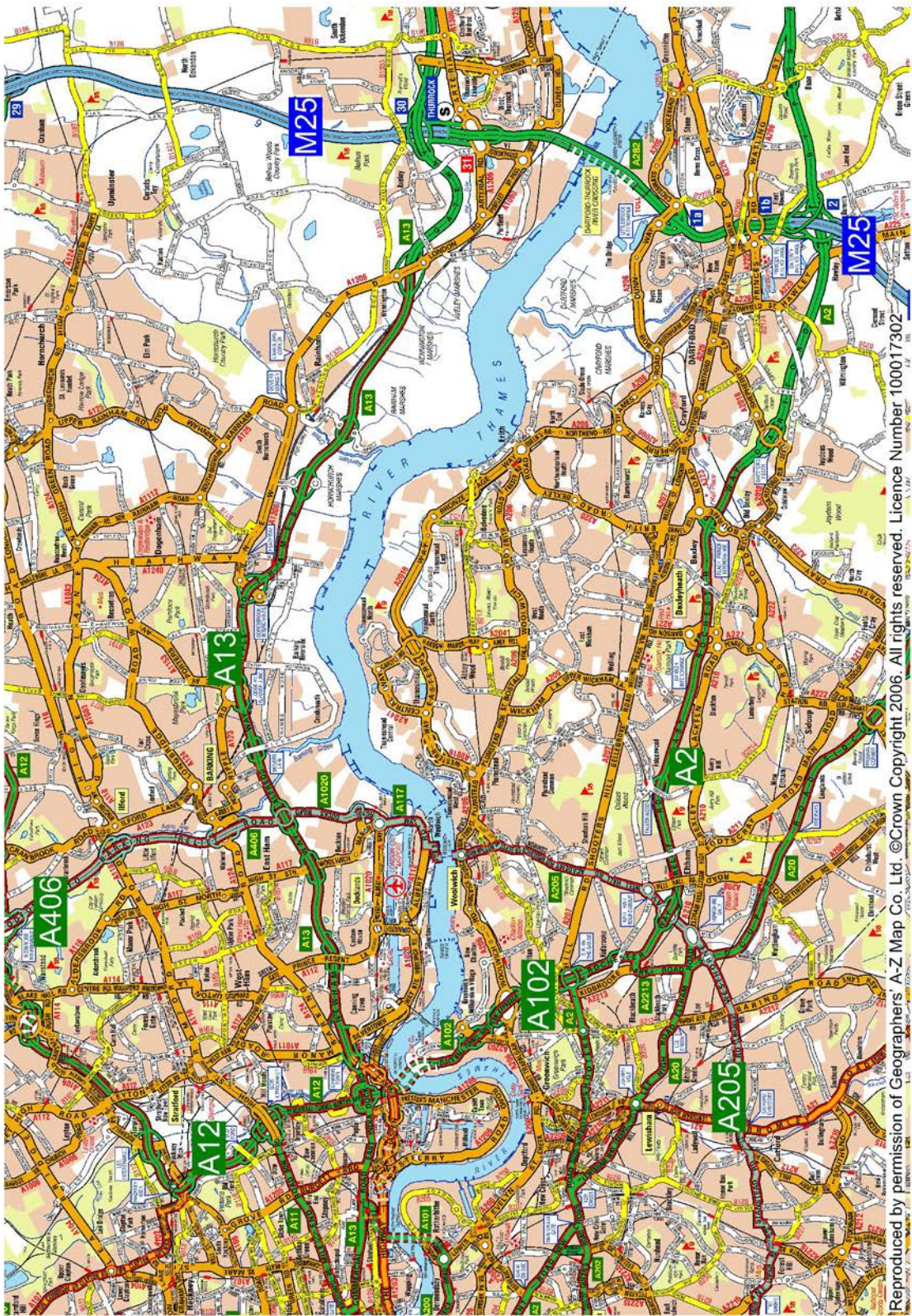
Figure 3-3-12: River crossings on the Transport for London Road Network (TLRN)



3.27. Figure 3-3-13 shows an overview of the road network in east and southeast London. 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).

3.28. 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 smaller diameter than the southbound tunnel which opened in 1967, as it was originally designed for horse-drawn traffic.

Figure 3-3-13: Road network overview plan



3.29. The highway capacity issues are compounded for freight operators by the restrictions on use of certain types of heavy goods vehicles. The restrictions on the use of the Rotherhithe and Blackwall Tunnels and the Woolwich ferry by large vehicles are set out in Table 3.1.

Table 3.1: Usage restrictions for commercial vehicles on crossings in the study area

River crossing	Max height	Max width	Max length	Max weight	Load restriction ¹⁸
Rotherhithe	4.4 m	2.0 m	10.0 m	None	Cat E
Blackwall NB	4.0 m ¹⁹	None	None	None	Cat E
Blackwall SB	4.7 m	None	None	None	Cat E
Woolwich Ferry	4.8 m	3.5 m	None	None	None

3.30. An implication of the above restrictions is that vehicles with origins or destinations in east and southeast 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.

3.31. The London Lorry Control Scheme represents a further constraint 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 22 km).

There has been a period of sustained investment in public transport capacity across east and southeast London over the past 20 years, with new cross-river links added through the Jubilee Line, Docklands Light Railway, High Speed 1 and Overground (East London line), and this will continue with the introduction of Crossrail services from 2018. There is only a single cross-river London bus route operating east of Tower Bridge.

The Emirates Air Line cable car provides a high quality cross-river link along the alignment of the proposed Silvertown Tunnel, catering for pedestrians and cyclists.

There is limited cross-river road capacity in London to the east of Tower Bridge, namely the Rotherhithe and Blackwall Tunnels and the Woolwich Ferry, all of which have some restrictions on use for certain types of heavy goods vehicles.

¹⁸ 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.roadsafeeurope.com/useful_info/Tunnel_Restrictions

¹⁹ Left lane only, the right lane has a height restriction of 2.8m

4. Current travel patterns

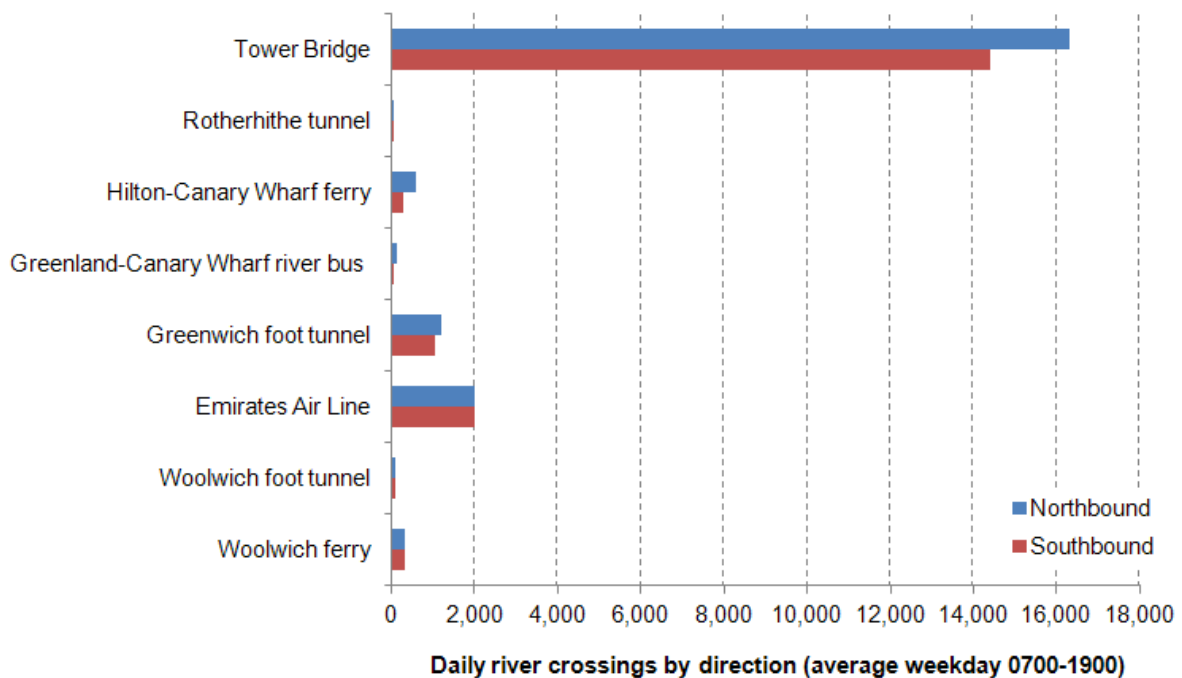
Introduction

4.1. The previous section outlined the shape of the existing transport networks in the study area, particularly as they relate to cross-river movements. This section summarises how those networks are used. To provide context about cross-river transport flows, existing volumes of cross-river movements by all modes are presented, expressed in both the number of person trips and the number of vehicles.

Pedestrians

4.2. Tower Bridge carries around 15,000 pedestrians a day in both directions. The pedestrian crossings to the east are used less; the Emirates Air Line and Greenwich foot tunnel each carry over 1,000 pedestrians per day in both directions (Figure 4-1). Smaller numbers of people use passenger ferries as river crossings as part of their journey, including the Rotherhithe Hilton to Canary Wharf ferry and the Woolwich ferry.

Figure 4-1: Daily pedestrian cross-river trips to the east of London Bridge (2012-13)²⁰



²⁰ Data sources:

TfL: Pedestrian and cyclist Thames screenline crossings count (2013)

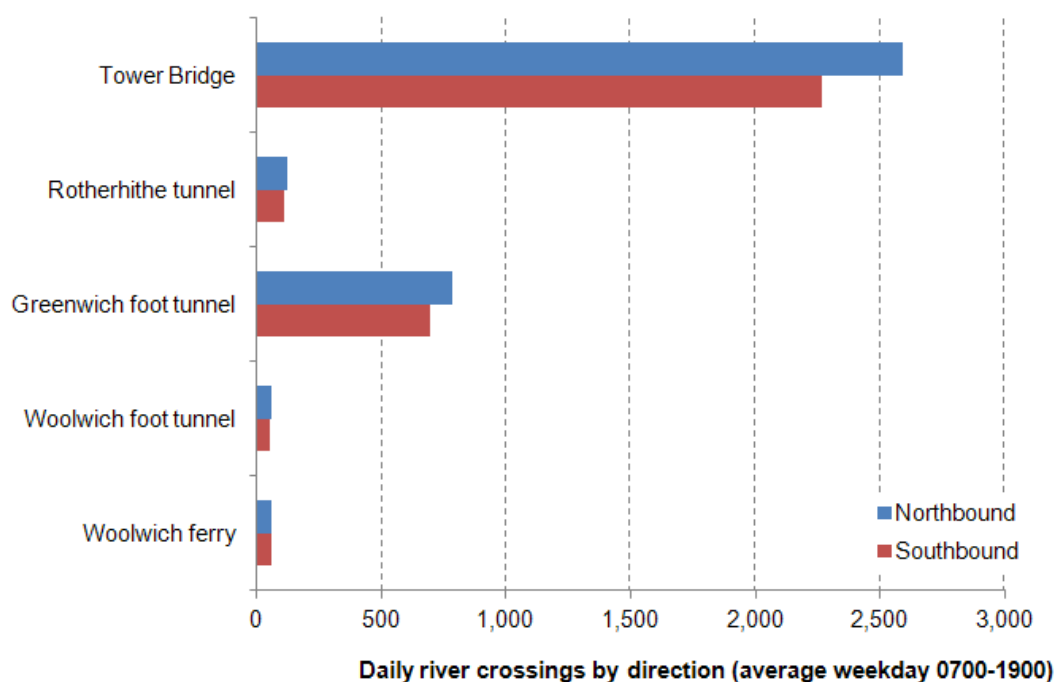
TfL: River Bus Origin Destination Survey (2012)

Emirates Air Line passenger data (2012)

Cyclists

- 4.3. Figure 4-2 shows the daily cross-river cycle flows in the study area. Tower Bridge carries around 5,000 cyclists on an average weekday, and the peak cycling commuter movement is northbound in the morning peak hour (700 cyclists). Cyclists are permitted to push their bicycles through the Greenwich and Woolwich foot tunnels, and the Greenwich tunnel is used heavily by commuters to Canary Wharf (580 cyclists in the morning peak). Although the Rotherhithe Tunnel constitutes a relatively inhospitable environment for cyclists, there are still over 200 cycle trips a day at this crossing.
- 4.4. Cyclists on the Emirates Air Line and passenger ferries have not been counted separately and these trips have been recorded as pedestrian cross-river trips.
- 4.5. The Dartford Crossing is also not included in the data below. Cyclists can cross the river here and are transported by means of a specially converted Land Rover.

Figure 4-2: Daily cycling cross-river trips to the east of London Bridge (2012-13)^{21,22}



- 4.6. The number of cross-river cycling trips can be expected to increase rapidly in the years before the opening of the Silvertown Tunnel. This increase is being driven by the

²¹ Data sources:

TfL: Pedestrian and cyclist Thames screenline crossings count (2013)

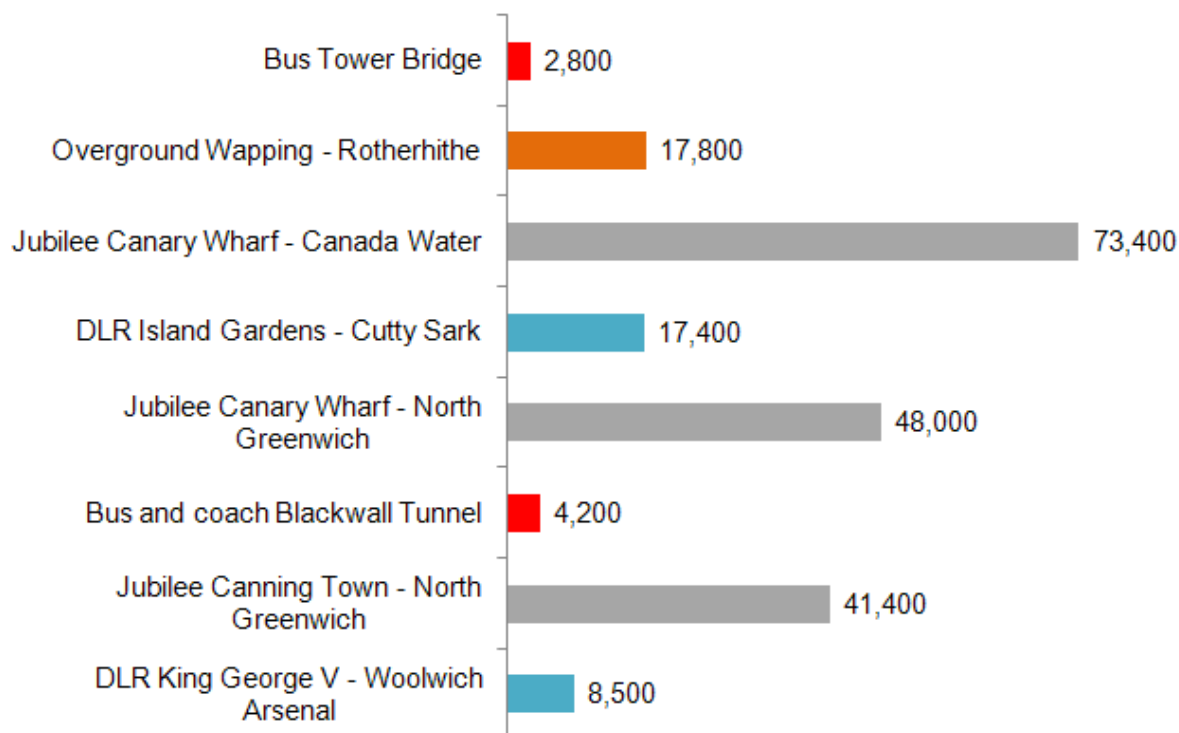
²² Cyclists on the Emirates Air Line and Thames Clippers services are not counted separately and appear in the pedestrian figures above

background growth in cycling in London, combined with population and employment growth in the wider east and southeast sub-region.

Public transport users

4.7. In a typical morning peak period there are over 200,000 cross-river public transport trips from Tower Bridge eastwards. The Jubilee Line crosses the river three times carrying large volumes of commuters.

Figure 4-3: Morning peak period (0700-1000) cross-river public transport trips to the east of London Bridge (2012-13)²³



4.8. The change in use of public transport in the years since 1988 is apparent in the Isle of Dogs Cordon Survey, a survey of people travelling to and from the Isle of Dogs, including Canary Wharf.

4.9. As illustrated in Figure 4-4, there has been a very significant increase in trips as the level of employment has increased. The new trips are overwhelmingly undertaken on

²³ Data sources:

Bus Origin Destination Surveys for routes 42, 78, RV1 and 108 (2013)

London Overground passenger data (2014)

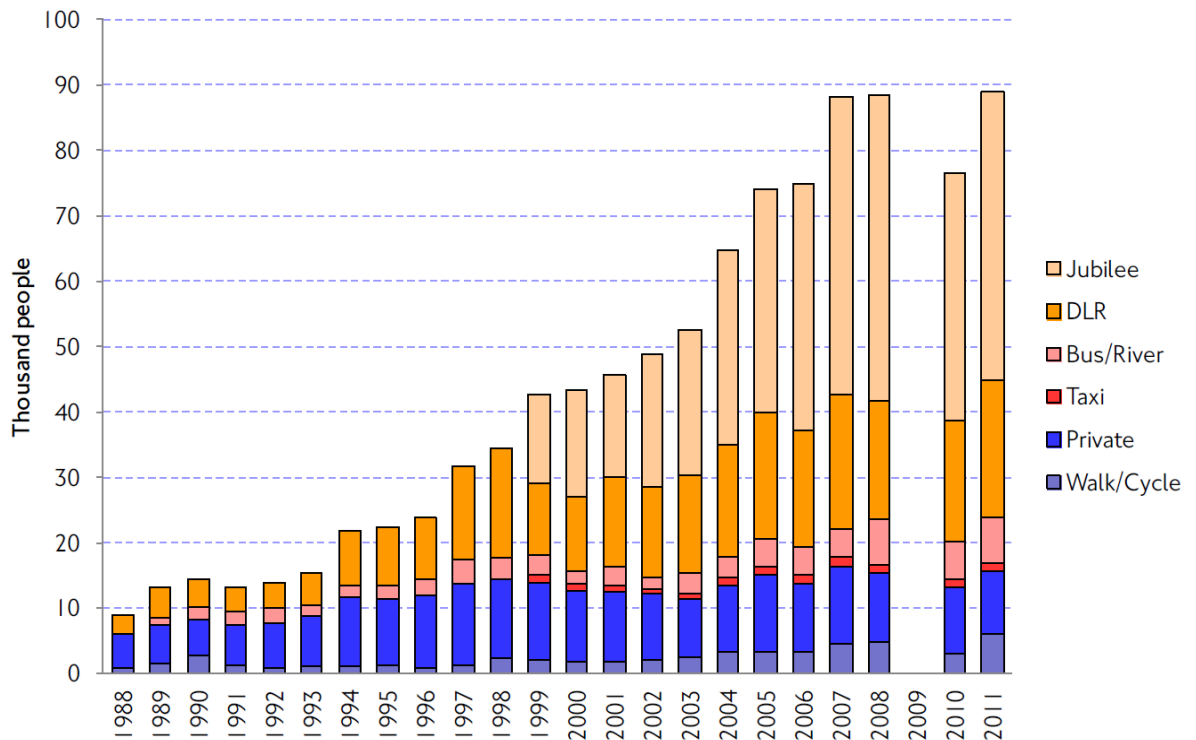
London Underground Rail Origin-Destination Surveys (2012)

Docklands Light Railway Passenger Origin-Destination Matrix (2013)

Scheduled coach services with an estimated average passenger occupancy of 48

public transport, with car use falling from over half of all trips in the early 1990s to little over 10% by 2011.

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



4.10. The 2011 levels of crowding on the London Underground and DLR networks is shown in Figure 4-5, with colours representing the level of crowding on each section of line. This shows that there is capacity on the cross-river Underground and DLR links east of Canary Wharf, but higher levels of crowding to the west.

4.11. Figure 4-6 shows levels of crowding on the National Rail and London Overground networks.

Figure 4-5: Morning peak period (0700-1000) London Underground and DLR crowding (2011)

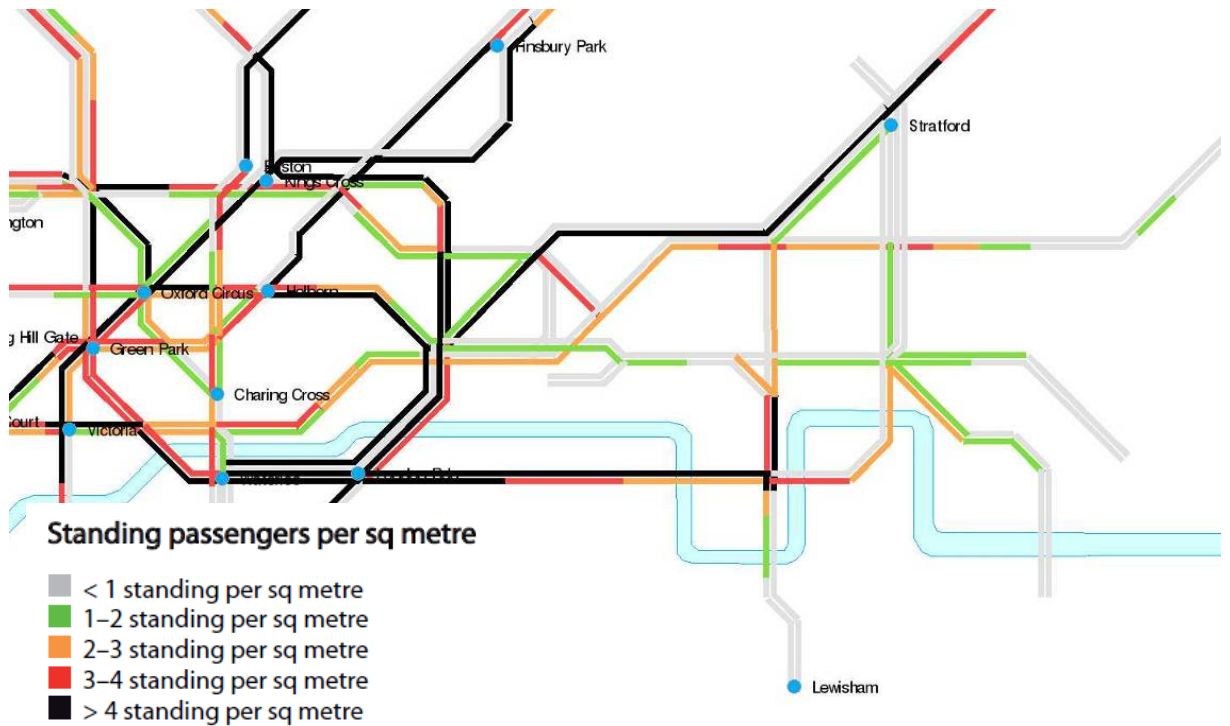
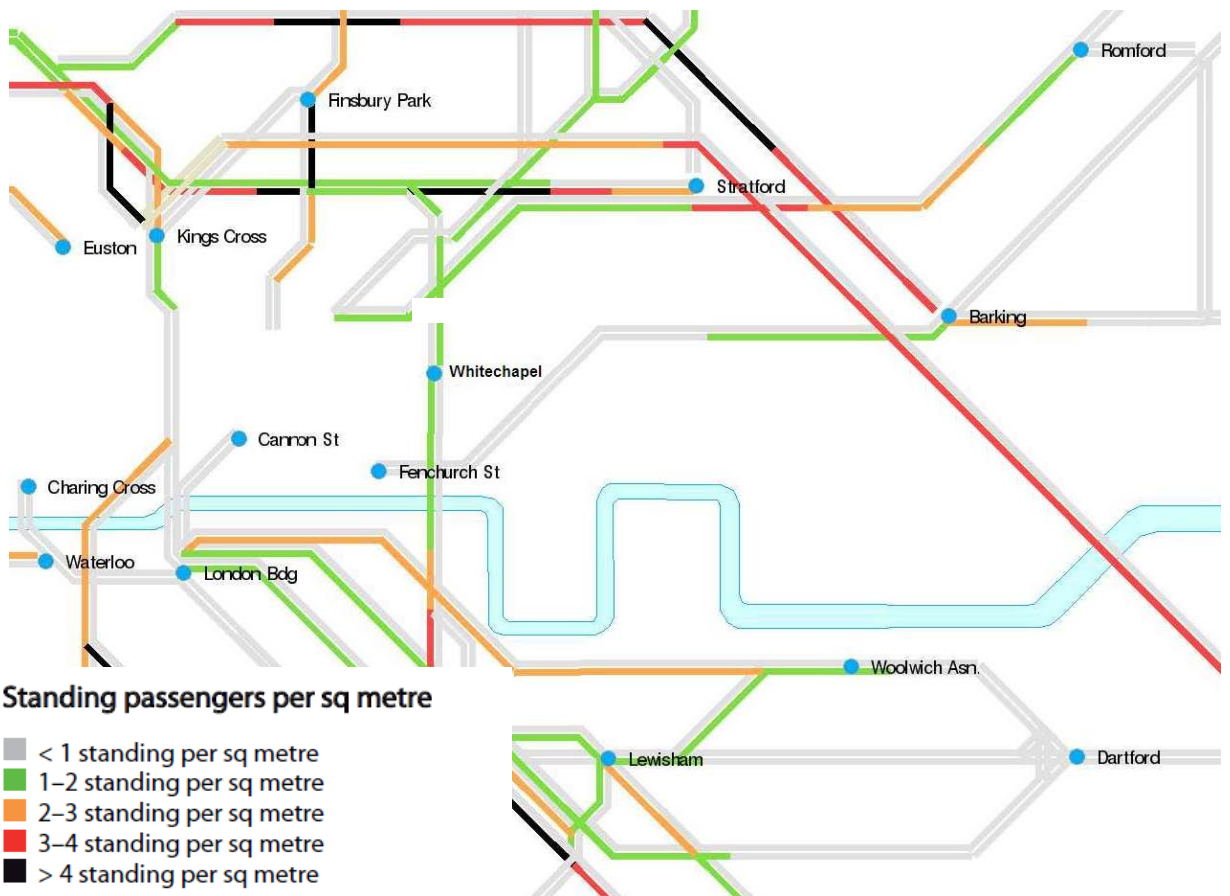


Figure 4-6: Morning peak period (0700-1000) National Rail and London Overground crowding (2011)



Road traffic

Cross-river highway capacity

- 4.12. All of the road crossings of the Thames in east London operate at, or close to, their practical capacity at peak times.
- 4.13. Table 4.1 shows the approximate capacity and morning peak demand through the Blackwall Tunnel and adjacent crossings. The actual capacity varies both within and between days due to fluctuations in vehicle flow volumes, speeds and vehicle mix, as well as the capacity of the road network to feed traffic to the crossing, so this is a guideline only.

Table 4.1 2012 demand and estimated capacities of road crossings in study area

Crossing	Capacity (PCUs/hr) ^{24 25}	Flow in PCUs (08:00-09:00) ²⁶	% capacity used (morning peak hour)
Rotherhithe Tunnel NB	1,210	877	73%
Rotherhithe Tunnel SB	1,210	885	73%
Blackwall Tunnel NB	3,236	3,190	99%
Blackwall Tunnel SB	3,842	2,934	76%
Woolwich Ferry NB	164	161	98%
Woolwich Ferry SB	164	158	96%

- 4.14. Table 4.1 shows that Blackwall Tunnel has the greatest capacity with an estimated maximum throughput of 3,236 PCUs northbound and 3,842 PCUs southbound. It also shows that the tunnel's maximum capacity in the northbound (peak) direction in the morning peak hour has been reached. Analysis of northbound peak hour congestion shows that delays of around 20 minutes are typical, and that full use of the available tunnel capacity is not made under these constrained operating conditions.
- 4.15. The lack of cross-river links does appear to constrain the volume and proportion of cross-river road travel between east and southeast London. An analysis of the London Travel Demand Survey (LTDS) covering the years between 2005 and 2011 sought to understand the extent to which travel in these boroughs might be constrained by the presence of the river and the limited options available for travelling across the river. The findings demonstrate that the proportion of cross-river travel in the eastern boroughs is much lower than in the western boroughs (Table

²⁴ Passenger Car Units – a measure of the road capacity taken up by different types of vehicle

²⁵ Mott McDonald: River Crossing Modelling Base Year Development and Validation Report, 2014

²⁶ TfL Highway Assignment Model (HAM) baseline traffic counts (2012)

4.2). The volumes of trips presented are based on annual average daily trips and central London trips are excluded.

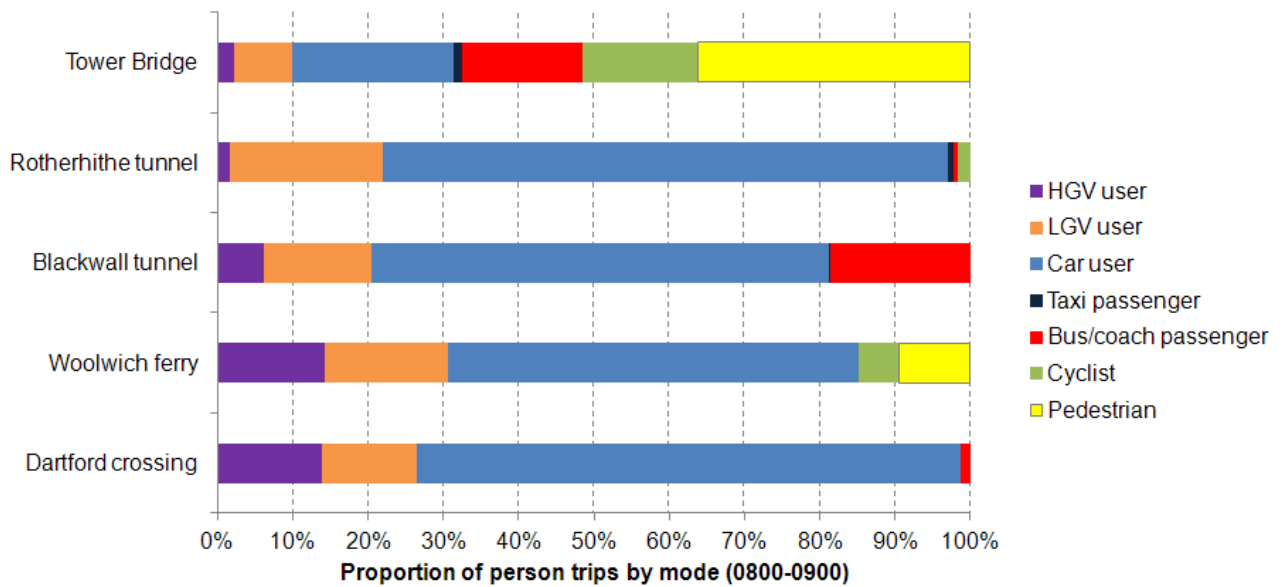
Table 4.2: Summary of all inter-borough road trips made (excluding Central London)²⁷

All trips	Number of inter-borough trips (east London boroughs)	%	Number of inter-borough trips (comparable west London boroughs)	%
Entirely north	268,200	44.6%	317,900	32.7%
Entirely south	299,600	49.8%	339,300	34.9%
North-south crossing	17,000	2.8%	150,900	15.5%
South-north crossing	16,900	2.8%	162,800	16.8%
Total	601,600	100%	970,900	100%

4.16. The following section presents the volumes of cross-river flows by vehicle type in detail. Figure 4-7 first shows the nature of person trips carried on the road network. It can be seen, unsurprisingly, that two-thirds of person trips on Tower Bridge are travelling on foot, by bicycle or on public transport. Blackwall Tunnel, however, also carries a significant volume of bus and, in particular, commuter coach passengers. 19% of total person trips in the AM peak hour are travelling by public transport, the vast majority in the northbound peak direction.

²⁷ TfL: London Travel Demand Survey 2005-2011

Figure 4-7 Proportion of person trips by mode on road crossings east of London Bridge (morning peak hour, both directions, 2012)²⁸



Cross-river travel demand (road vehicles)

4.17. This section presents the cross-river flows by road vehicle type. In a typical morning peak hour there are around 9,000 northbound vehicles crossing the Thames to the east of London Bridge, almost half of which are using the Dartford crossing. The Dartford crossing carries large volumes of strategic traffic including over 750 northbound HGVs in the peak hour. However, the Blackwall Tunnel plays an important role for smaller servicing and delivery traffic, and hence it carries the highest volume of northbound LGVs (greater than 500 in the peak hour). Black cab taxis make up over 6% of vehicles on Tower Bridge but do not make up a significant proportion of traffic on the remaining crossings (note that private hire vehicles are classified as cars).

²⁸ Data sources:

Highway Assignment Model baseline traffic counts (2012)

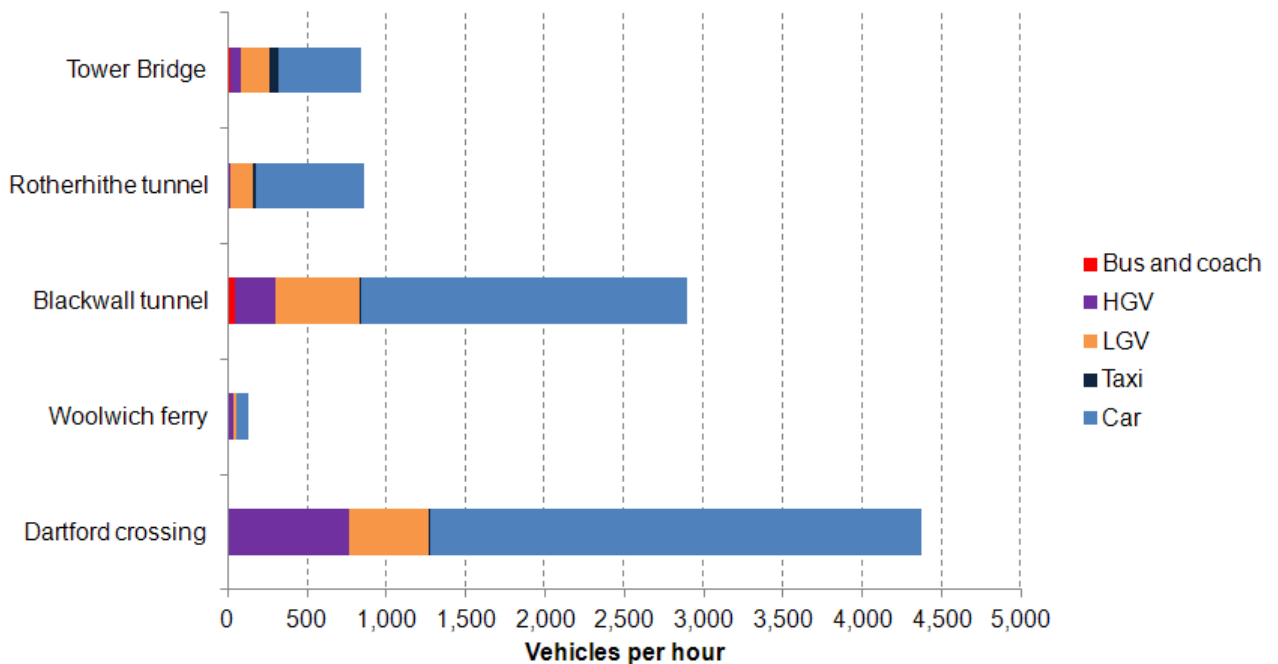
Bus Origin Destination Surveys for routes 42, 78, RV1 and 108 (2013)

TfL: Pedestrian and cyclist Thames screenline crossings count (2013)

Scheduled coach services with an estimated average passenger occupancy of 48

Other passenger occupancy assumptions from TAG data book

Figure 4-8 AM peak hour (0800-0900) northbound cross-river road vehicle trips to the east of London Bridge (2012)



- 4.18. In the southbound evening peak hour, the total volume of cross-river vehicle trips is higher than the morning peak hour at just over 10,000 vehicles. However, the proportion of vehicle types per crossing remains relatively stable.
- 4.19. The Blackwall Tunnel is heavily used at most times of the day and week. Based on analysis of two years of data (Dec 2011 to Nov 2013), Figure 4-9 and Figure 4-10 show the hourly average flows for a typical weekday, Saturday and Sunday. The constraints encountered in the northbound tunnel bore in the morning peak result in a situation where vehicle flows through the tunnel actually fall through the morning peak period as a result of the congested conditions. The southbound tunnel bore does not face the same operational difficulties and the evening peak throughput is significantly higher reaching around 3,600 vehicles.
- 4.20. In line with many sections of London’s road network the Blackwall Tunnel is heavily used at the weekend. Weekend demand is relatively flat in both directions between 11:00 and 18:00, operating at average flows of around 2,700 vehicles northbound and 3,000 vehicles southbound.

Figure 4-9: Blackwall Tunnel northbound - average hourly flows by day type

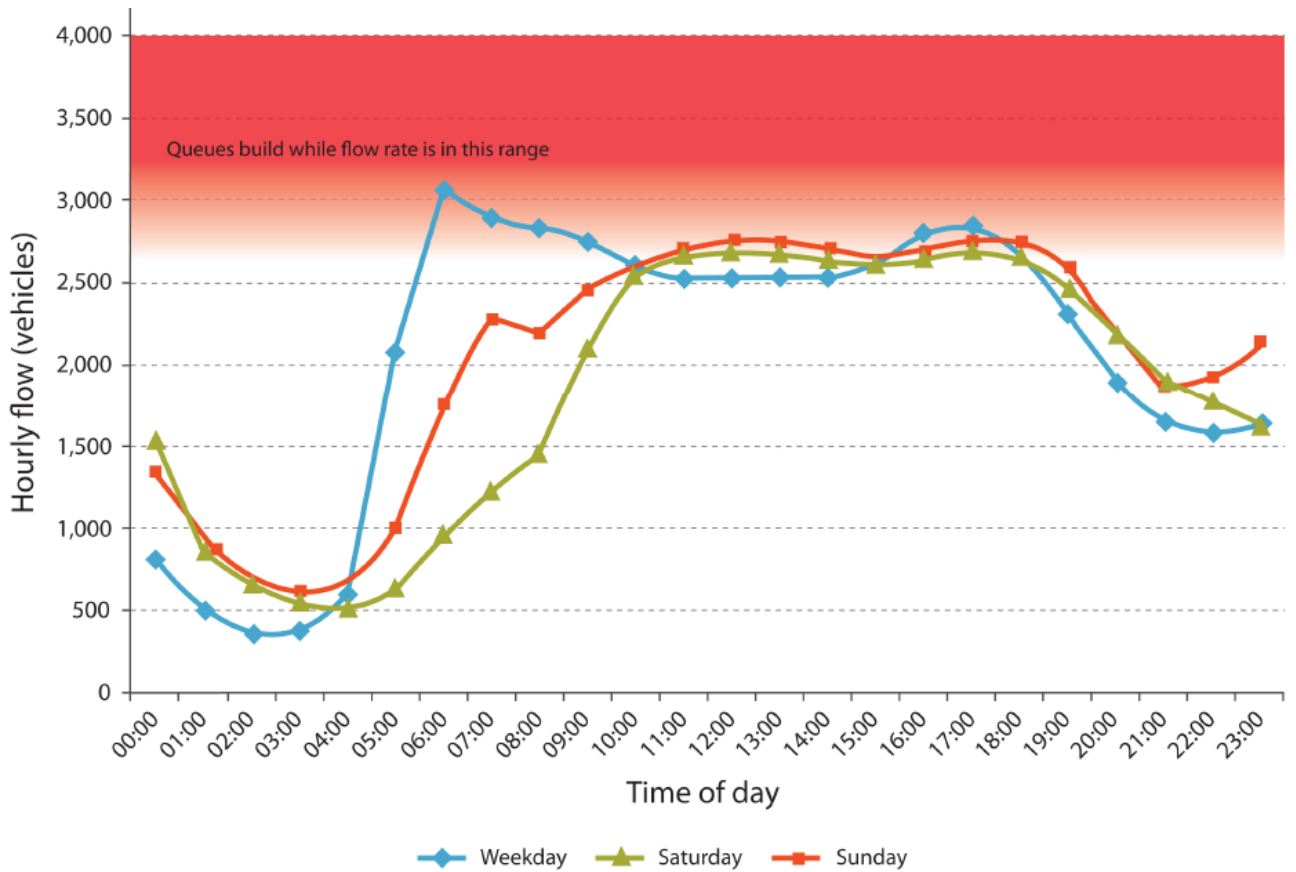
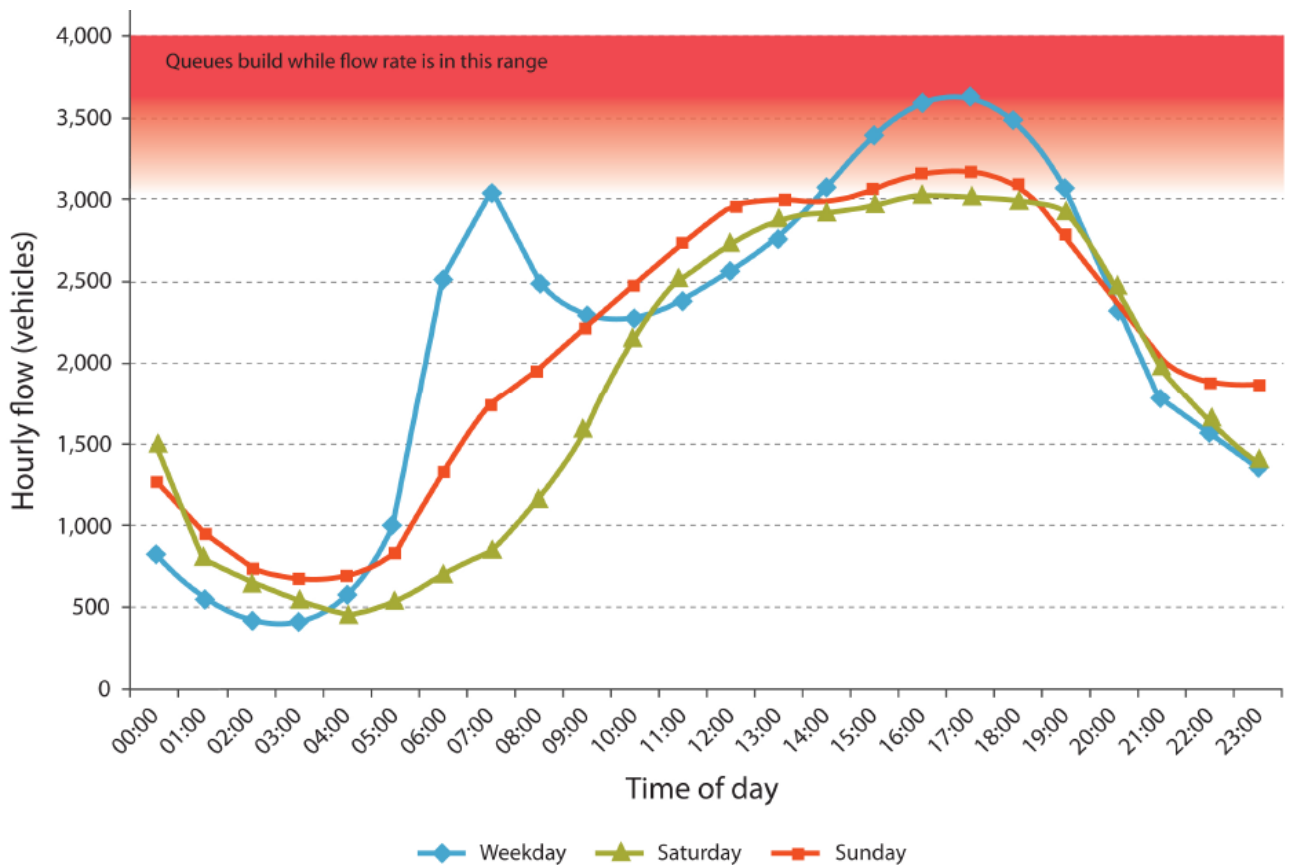


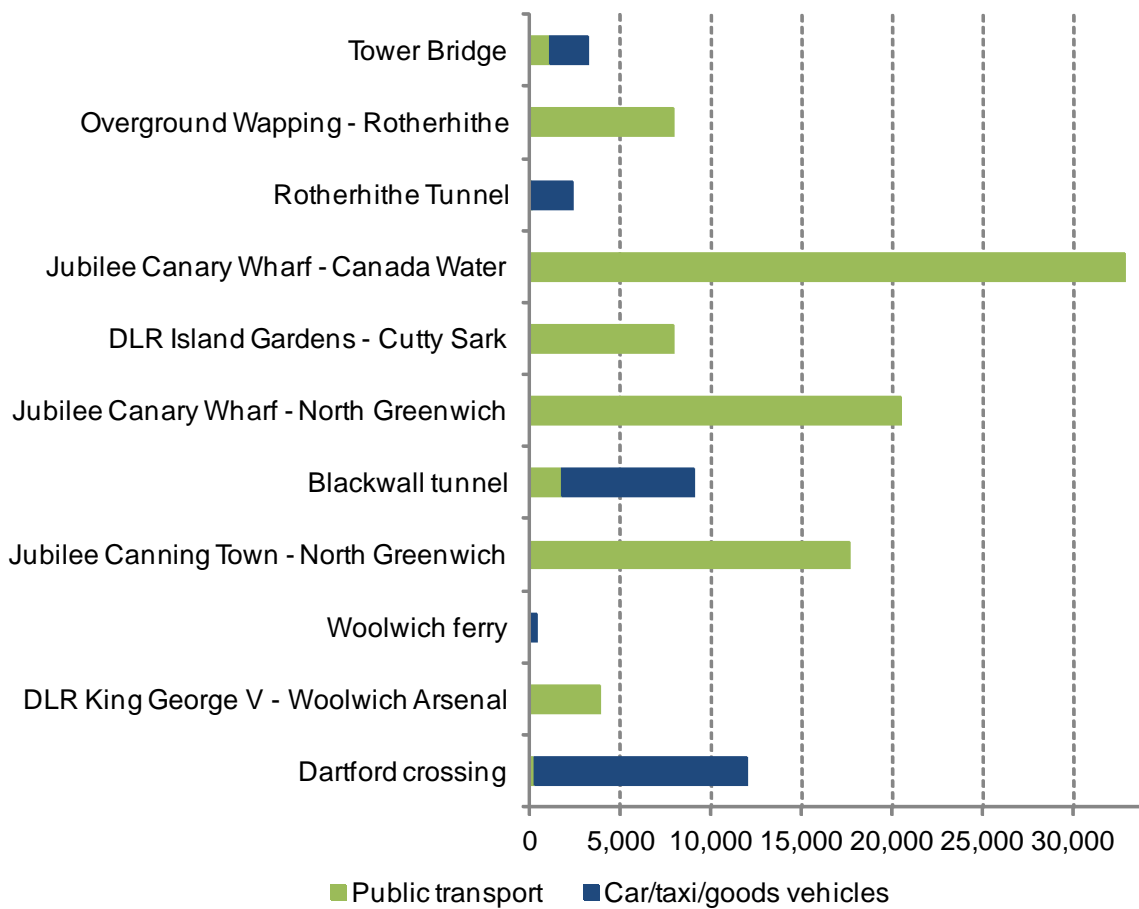
Figure 4-10: Blackwall Tunnel southbound - average hourly flows by day type



Summary

4.21. In summary in the morning peak hour, there are over 69,000 cross-river trips in the (peak) northbound direction, of which over 55,000 are by public transport modes. The limited number of road crossings east of London Bridge carry just over 12,000 northbound car, taxi or goods vehicle person trips. While the Blackwall Tunnel is an essential river crossing for freight and servicing vehicles, it also carries a significant number of peak commuter coach trips to Canary Wharf and central London.

Figure 4-11 Morning peak hour (0800-0900) northbound cross-river road and public transport trips to the east of London Bridge (2012-13)



In a typical morning peak period there are over 200,000 cross-river public transport trips from Tower Bridge eastwards, the majority of which are carried on the Jubilee line. The Blackwall Tunnel carries over 4,000 bus and coach trips in the morning peak period.

The volume of cross-river walking and cycling trips between east and southeast London ranges from over 15,000 trips per day at Tower Bridge to around 2,000 in the Greenwich foot tunnel or Emirates Air Line.

All of the road crossings of the Thames between east and southeast London operate at, or close to, their practical capacity at peak times. In the morning peak period, hourly flows peak at around 9,000 northbound vehicles crossing the Thames to the east of London Bridge, almost half of which are using the Dartford crossing. The Dartford crossing carries large volumes of strategic traffic including over 750 northbound HGVs in the peak hour. However, the Blackwall Tunnel plays an important role for smaller servicing and delivery traffic.

5. Current network performance issues

Introduction

- 5.1. The previous section highlighted the usage of the existing river crossings in east London; this section summarises the known network performance issues.

Walking and cycling networks

- 5.2. The Emirates Air Line provides a crossing at this location which is accessible to both pedestrians and cyclists. The service is high quality and carries pedestrians close to the most likely onward destinations (e.g. on the north side, between the Crystal and the ExCel centre rather than the industrial river frontage) and there is adequate capacity most of the time, especially on weekdays. Although queues do occur at the busiest times (e.g. when there are major events at the O2 or ExCel), and a charge is levied to use the crossing.
- 5.3. Other improved links for pedestrians and cyclists across the river would be beneficial, for example towards Canary Wharf, but incorporation of pedestrian and cycle facilities within the Silvertown tunnel would not be necessary given the advance provision of the Emirates Air Line on the same corridor.

Public transport networks

- 5.4. The rail network performance in terms of usage and capacity is described in the previous section. Bus route 108, which uses the Blackwall tunnel, can be subject to disruption when the tunnel is closed, whether planned or unplanned, causing inconvenience to passengers. The queues experienced by bus route 108 cause delays to passenger journeys and increase the cost of operating the service.
- 5.5. In addition, other bus services in the areas affected by the queues which form when the tunnel is disrupted are impacted by the congestion.

Road network

- 5.6. 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 existing cross-river highway network in east London 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 of the crossings be necessary, including the ability of the operational crossings to handle traffic diverted from non-operational crossings
 - Their susceptibility to closure including their closure to certain classes of traffic (for example the height limitation in the northbound bore of the Blackwall Tunnel) and due to the maintenance needs of ageing assets and by reason of adverse weather conditions
- 5.7. Resilience is a significant 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 businesses.

- 5.8. 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 significant distances between them. The lack of crossings means traffic from across the entire southern area of east London converges at only three crossings, which reduces resilience and compounds traffic congestion and safety issues when incidents occur. These problems are likely to have a pronounced impact on commercial traffic, which, as noted above, faces restrictions on the crossings it can use.
- 5.9. Incidents at crossings causing obstruction and delay are excessively frequent (particularly at the Blackwall Tunnel) and have significant adverse impacts across the wider road network. Unplanned closures of the Blackwall 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 2013.
- 5.10. Unplanned tunnel closures can result from:
 - Overheight vehicles attempting to use the height restricted northbound Blackwall tunnel which is restricted to vehicles up to 4 metres in height (60 percent of incidents in 2013); and
 - Other incidents such as accidents, pedestrians entering the tunnels and broken down vehicles (28 percent of incidents in the northbound bore in 2013)
- 5.11. 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 average²⁹.
- 5.12. In the event of an incident there are limited alternative diversion routes, as shown in Figure 5-1. The closest routes are Tower Bridge, Rotherhithe Tunnel and Woolwich Ferry, all of which have little spare capacity to accommodate diverted traffic. The diversion to Dartford Crossing results in a substantial distance away and has a direct impact on a very congested section of the motorway network.

²⁹ 1. Jacobs: Blackwall Tunnel Incident Note, 2014

Figure 5-1: Blackwall Tunnel diversion routes



The existing cross-river highway network in east London experiences poor resilience because alternative crossings to the Blackwall Tunnel are very limited with the Tunnel Rotherhithe the closest crossing to the west with width restrictions, and towards the east limited capacity at the Woolwich Ferry or a 30 mile journey via the Dartford Crossing. The Blackwall Tunnel is susceptible to closure due to the frequent occurrence of incidents, in particular those associated with overheight vehicles attempting to enter the northbound tunnel bore.

Bus route 108, which uses the Blackwall tunnel, is characterised by slow peak journey speed and poor reliability, and is frequently subject to disruption when the tunnel is closed.

6. Future transport networks and performance

Introduction

6.1. This section outlines how the transport networks and their performance is anticipated to change in future, without the Silvertown tunnel scheme in place.

Changes in population and employment

Population

6.2. The population and number of jobs, in the study area is expected to rise rapidly in the coming years. The *Silvertown Crossing Assessment of Needs and Options* outlines the forecasts in more detail, with the key points repeated below.

6.3. 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 6.1) predict that London's population will grow by around 1,150,000 people (or 14 percent) between 2011 and 2031.

Table 6.1: 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)³⁰

6.4. Table 6.1 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

³⁰ <http://data.london.gov.uk/datastore/package/gla-population-projections-2011-round-shlaa-borough-sya>

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 Tunnel host boroughs of Tower Hamlets, Newham, Greenwich as well as Barking and Dagenham) are expected to account for 23 percent of London's growth.

- 6.5. Since the GLA forecasts were published, more recent information from the 2011 Census has become available. The data reveals that the 2011 London population was already 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 6.2: 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)³¹

Employment

- 6.6. 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 the table below.

³¹ <http://www.ons.gov.uk/ons/publications/re-reference-tables.html?edition=tcM%3A77-274670>

Table 6.3: 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)

- 6.7. 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 Tunnel host boroughs), while Hackney is expected to experience growth of around 17 percent (all these boroughs lie north of the River Thames).
- 6.8. Together the three Silvertown Tunnel 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).
- 6.9. As the resident and working populations grow, additional trips can be expected to impact on the operation of the transport networks.

Walking and cycling

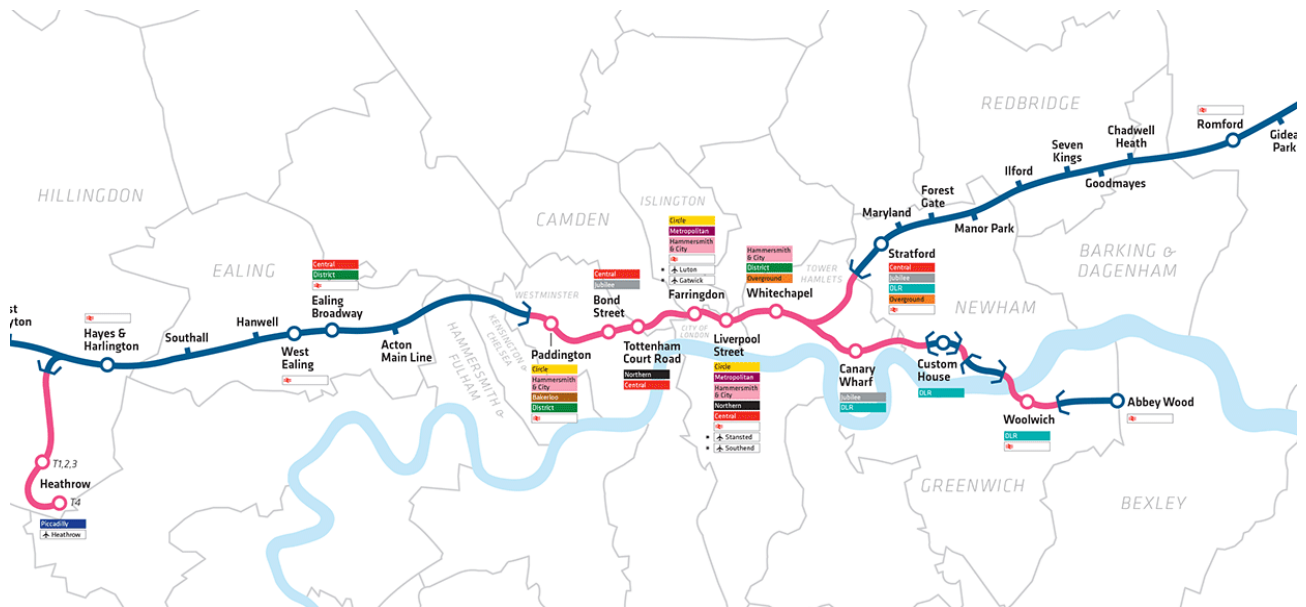
- 6.10. Due to the increases in population and employment outlined above, a large increase in overall trips undertaken in the study area is expected to occur over the coming years. This will result in an increase in local pedestrian and cycling trips above current numbers.
- 6.11. However, there are no committed pedestrian or cycle schemes which would have a material effect on the usage of crossings in the study area.

Public transport

- 6.12. The large increase in population and employment in the local area forecast to occur will result in an increase in trips on the local public transport networks.

6.13. In addition, the network in the area will be enhanced within the next few years by the addition of Crossrail, a major new cross-London railway currently under construction which will provide a new crossing of the Thames at Woolwich. This will increase capacity as well as significantly reducing journey times to Canary Wharf and central London from its stations in southeast London, Woolwich and Abbey Wood, and from those areas with walking, bus or rail connections to those stations.

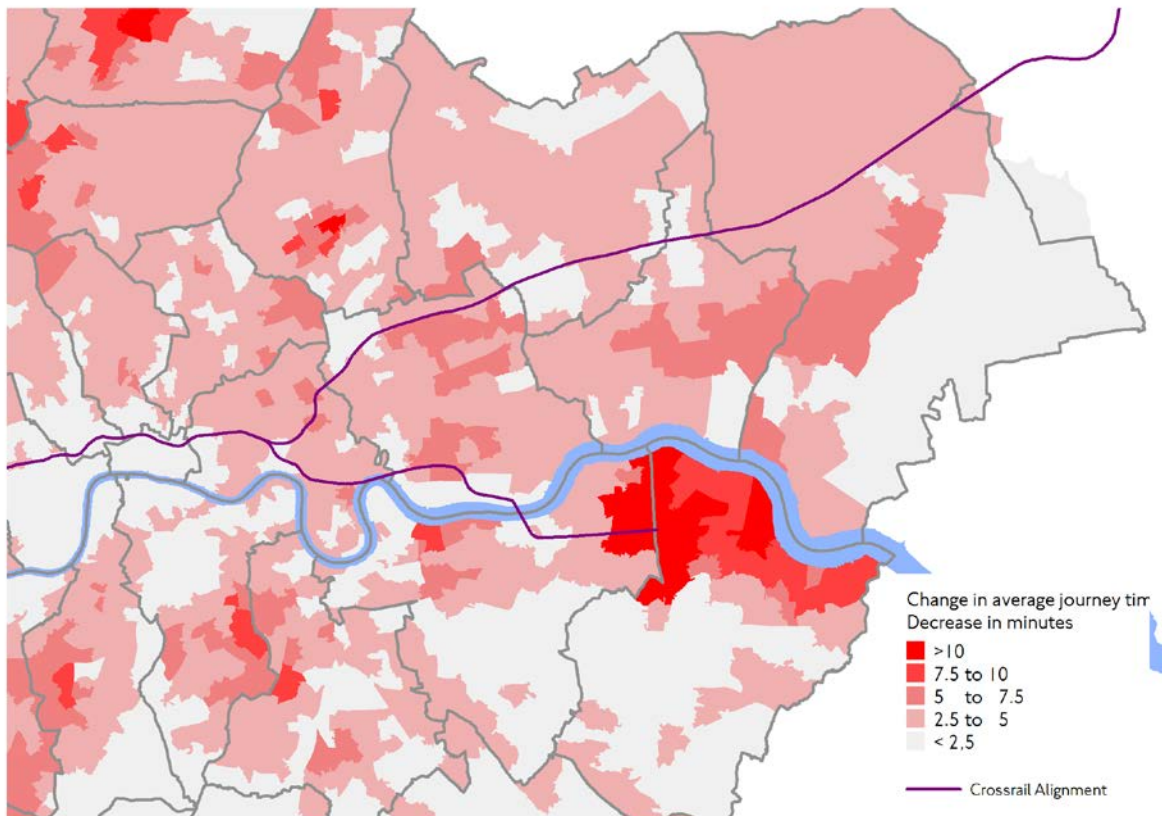
Figure 6-1: Crossrail route map



6.14. Other planned enhancements include increasing service levels on the London Underground Jubilee line, and on the DLR.

6.15. Figure 6-2 shows the change in public transport connectivity expected in the period prior to the opening of the Silvertown Tunnel. The largest improvements in journey time are seen along the Crossrail alignment, particularly in southeast London.

Figure 6-2: Public Transport change in journey times to each zone (morning peak hour, change from 2012 to 2021)



- 6.16. As a result of this investment, it is forecast that peak demand can generally be accommodated on cross-river public transport links in future, albeit with some degree of standing and crowding, despite the growth in population. Figure 6-3 shows the expected crowding levels on the Underground network in 2031 after the implementation of the Mayor’s Transport Strategy. The Jubilee line between Canary Wharf and Canada Water, in particular, is expected to remain among the busiest sections of London’s Underground network.
- 6.17. Figure 6-4 shows levels of crowding on the National Rail, London Overground and Crossrail networks.

Figure 6-3: Forecast morning peak (0700-1000) crowding levels on the London Underground and DLR networks (2031)

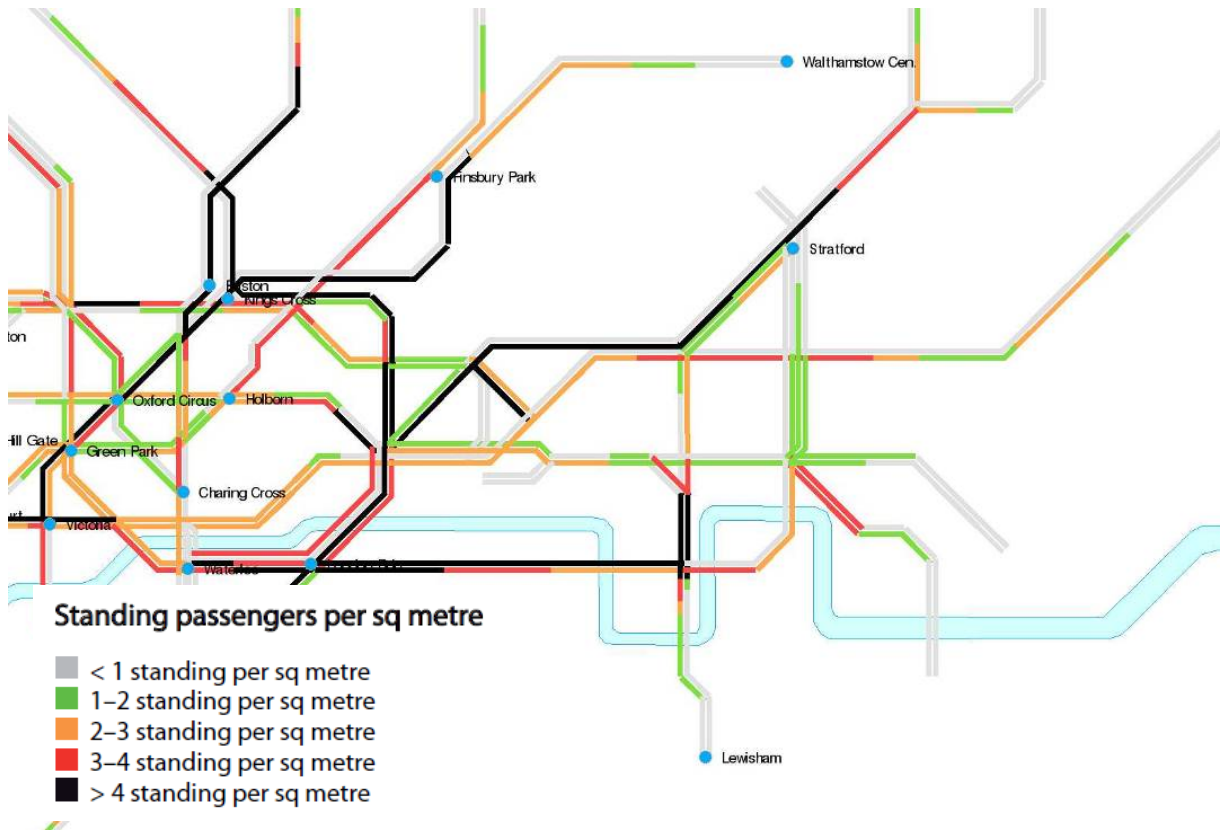
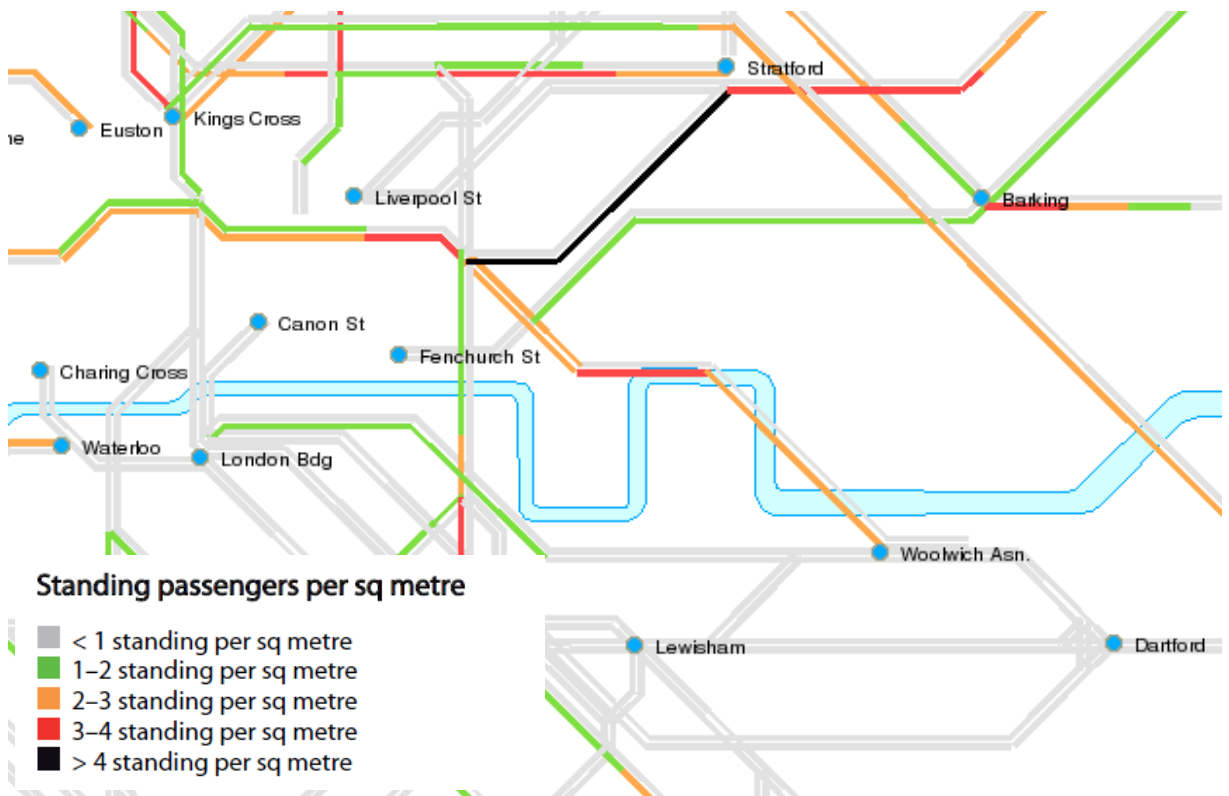


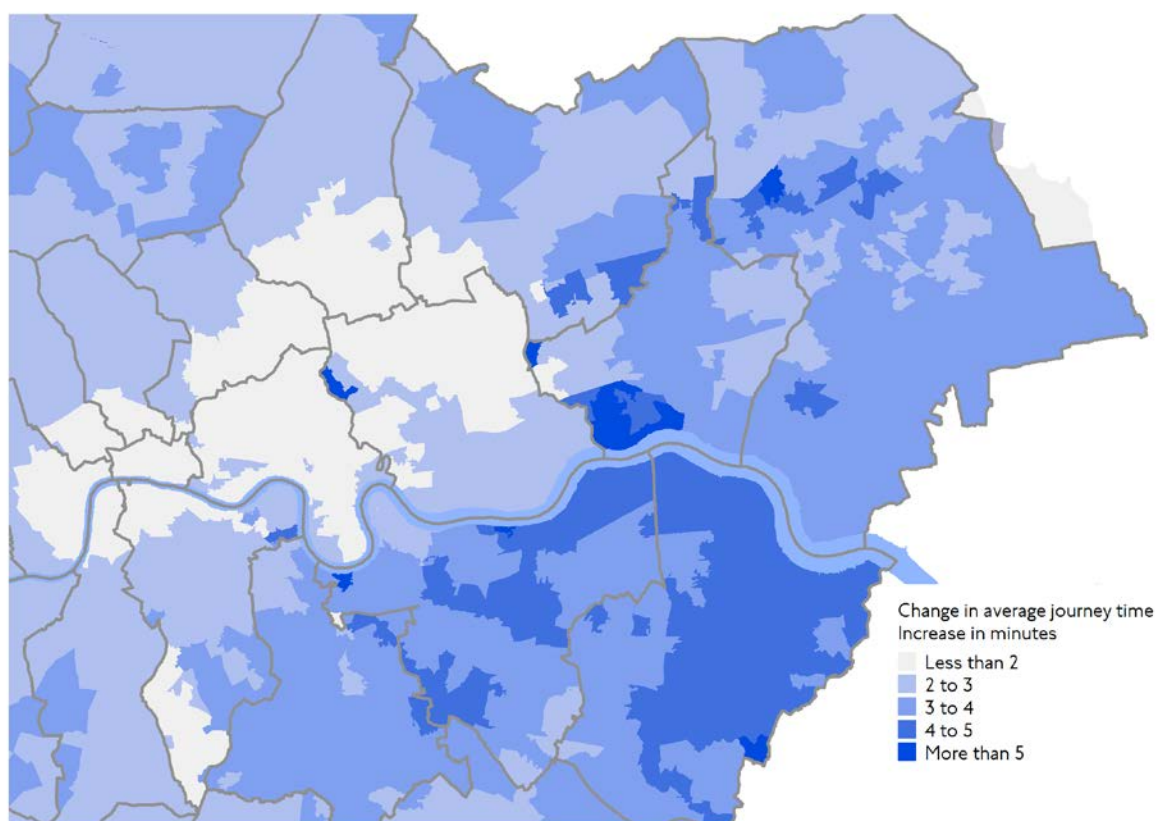
Figure 6-4: Forecast morning peak (0700-1000) crowding levels on the National Rail, London Overground and Crossrail networks (2031)



Road network

- 6.18. The heavy investments in public transport mean that even with a large increase in population and employment in the local area, the local public transport networks are forecast to largely keep pace with growth in demand though the investment currently under way in increasing capacity.
- 6.19. However, despite increasing the share of trips being made by public transport, walking and cycling, the growth in population is such that growth in vehicle trips is forecast to occur.
- 6.20. Figure 6-5 shows the change in highway connectivity expected in the period from 2012 to 2021, without the Silvertown tunnel. Average journey times to each zone generally increase in east London due to increased congestion³².

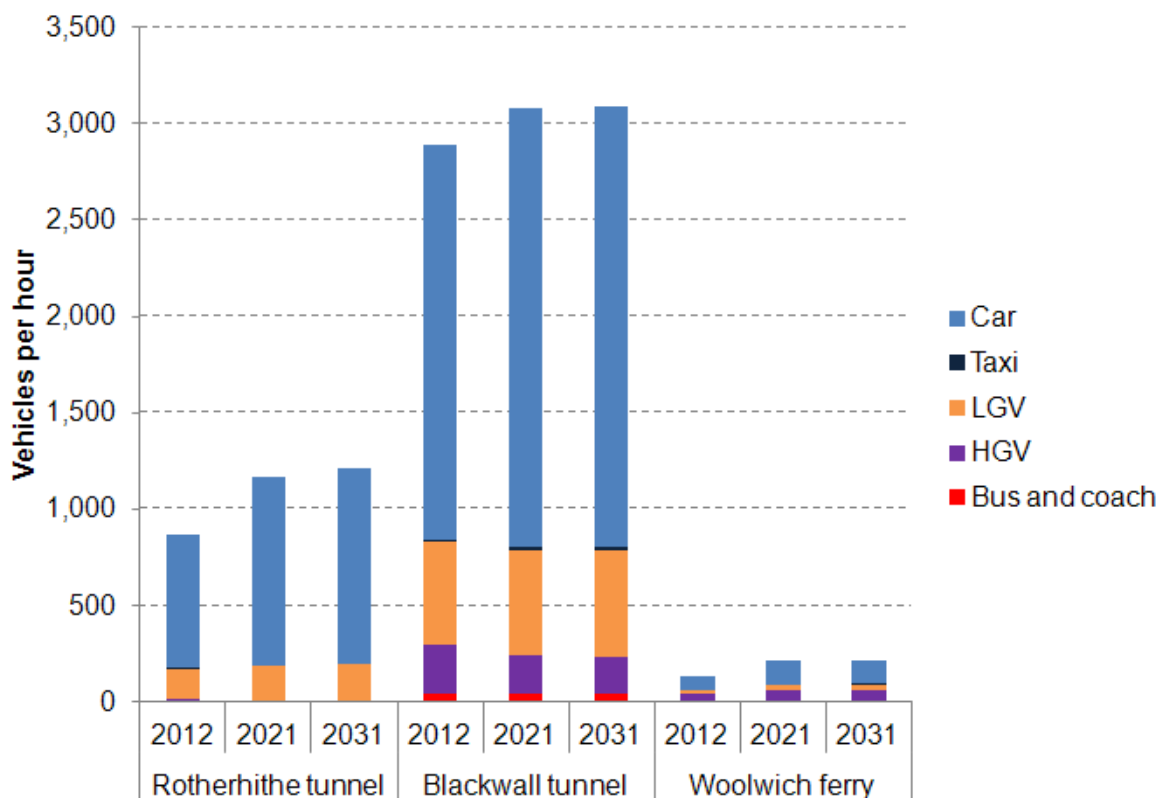
Figure 6-5: Highway change in average journey time to each zone (morning peak hour, change from 2012 to 2021)



³² Excludes the potential impact of Cycle Superhighways; now that programme is better defined, the effects on congestion of Cycle Superhighways and associated traffic management could be modelled in the next phase of work

6.21. In the absence of new road crossings in east London there will be limited capacity for this growth in road vehicle trips. Figure 6-6 shows the expected growth in demand in the morning peak northbound at the Rotherhithe Tunnel, Blackwall Tunnel and Woolwich Ferry. Since all crossings have current capacity constraints, their potential to accommodate this growth will be very limited.

Figure 6-6: Morning peak hour (0800-0900) northbound cross-river road vehicle trips (base 2012 and reference case 2021 and 2031)



6.22. Due to the introduction of free-flow tolling, there will be some additional peak capacity growth on the Dartford crossings prior to the opening year of the Silvertown Tunnel. The strategic modelling indicates that this will not have a material impact on demand for the river crossings in east London.

The population and number of jobs is expected to rise rapidly in the coming years (by 20% and 17% respectively in the east and southeast London sub-region between 2011 and 2031).

As a result of this investment in public transport (Crossrail, Jubilee Line and Docklands Light Railway upgrades), it is forecast that peak travel demand can generally be accommodated on cross-river public transport links in future, albeit with some degree of standing and crowding.

In the absence of new road crossings there will be limited capacity for growth in road vehicle trips between east and southeast London. Average journey times and delays are expected to increase across the area due to increased congestion.

7. Impacts of the proposed scheme

Introduction

- 7.1. The proposed scheme will have different impacts on different types of traveller, with few impacts on pedestrians and cyclists, a moderate impact on public transport users, in particular bus users, and a major impact on road traffic. This section summarises these impacts. Much more detailed analysis of the traffic impacts can be found in the Traffic Forecasting Report.

Walking network

- 7.2. Pedestrians seeking to cross the river in the location are able to do so using the Emirates Air Line, a gondola cable car system which follows the alignment of the Silvertown tunnel. This provides a high quality experience for pedestrians compared to provision within a road tunnel.
- 7.3. One of the requirements for the Silvertown Tunnel project is to ensure that all walking routes in the vicinity of the tunnel portals are re-instated or are replaced with direct, safe and comfortable alternative routes. Pedestrian routes around the Tidal Basin roundabout at the northern portal will be re-instated, including access to Dock Road (closed during construction) and future access to Thames Wharf.
- 7.4. The pedestrian routes affected during construction at the southern portal, namely Millennium Way and Tunnel Avenue, will be re-instated as walking routes. The Boord Street footbridge will be replaced in approximately the same location.

Cycling network

- 7.5. As with pedestrians, cyclists seeking to cross the river in this location are able to do so using the Emirates Air Line, a gondola cable car system which follows the alignment of the Silvertown tunnel. This provides a high quality experience for cyclists compared to provision within a road tunnel. Cycles can be carried on the Emirates Air Line and lifts are provided which can be used to carry lifts to and from platform level.
- 7.6. A project requirement for the Silvertown Tunnel is to ensure that all cycling routes in the vicinity of the tunnel portals are re-instated or replaced with a direct, safe and comfortable alternative route.
- 7.7. The exact design of cycling facilities at the Tidal Basin roundabout has not yet been confirmed. However, it is assumed that the current off-street cycle tracks will be maintained or enhanced, with appropriate crossing facilities provided in line with current good practice.
- 7.8. The cycling routes affected during construction at the southern portal, namely Millennium Way and Tunnel Avenue, will be re-instated as through-routes. The Boord Street crossing will be replaced.

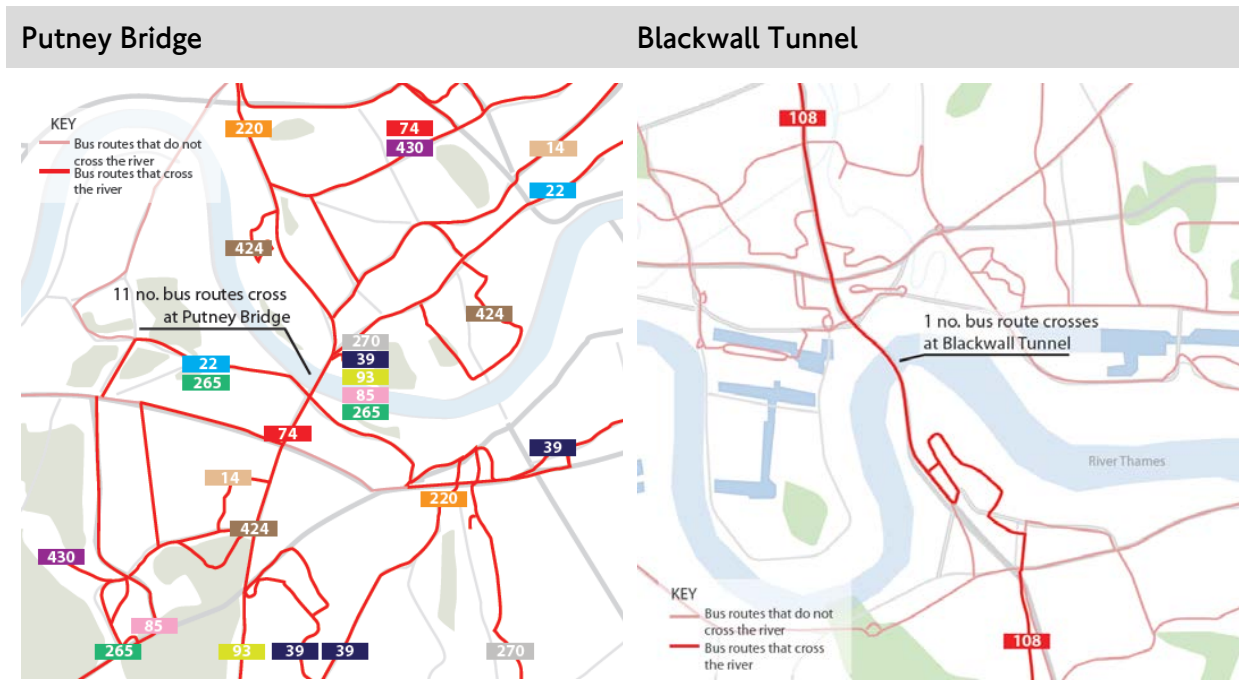
Public transport networks

- 7.9. The Silvertown Tunnel does not have any material impacts on the operation of the Jubilee Line, Docklands Light Railway or Emirates Air Line services. After completion

of construction works, the tunnel portals do not have a material impact on the pedestrian access routes to nearby stations. The access routes to a potential new DLR station at Thames Wharf would remain unobstructed.

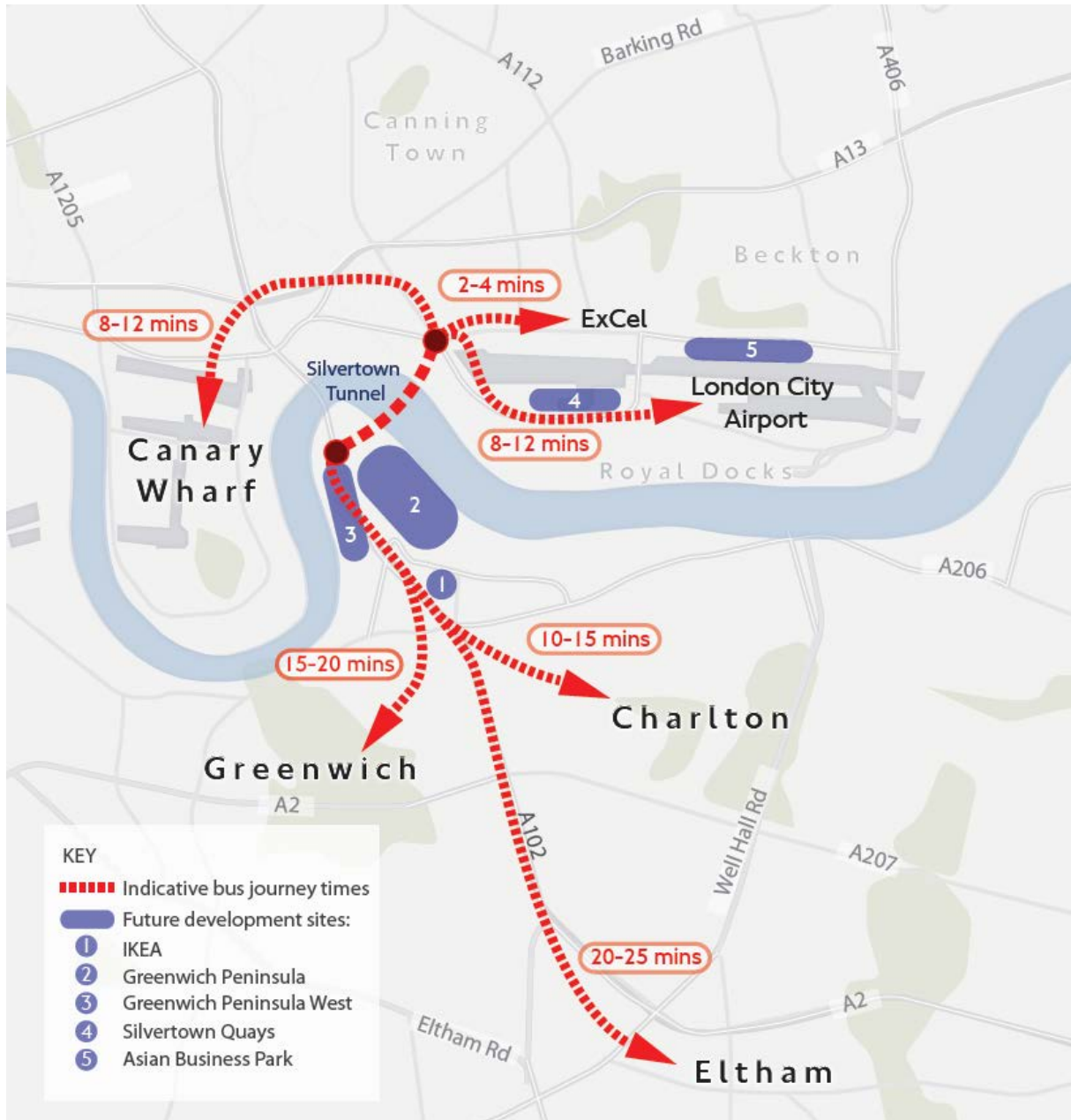
- 7.10. Two key objectives of the Silvertown Tunnel project are to improve resilience and road network performance around the Blackwall Tunnel, which will benefit local bus services. The existing route 108 will benefit from improved performance in terms of reliability and journey times arising from reduced congestion at the Blackwall Tunnel. At present, closures of the Blackwall tunnel can result in route 108 being operated in two sections either side of the Thames, or a lengthy diversion via Tower Bridge, including for night-time maintenance closures (route 108 operates 24 hours a day). With the Silvertown tunnel in place, route 108 can be diverted via the new tunnel in the event of closures of the Blackwall.
- 7.11. Many other local bus routes which currently suffer delays on the surrounding road network when the Blackwall tunnel is closed or congested will benefit from the more reliable network.
- 7.12. In addition, the proposed design of the southern tunnel portal seeks to facilitate bus movements between both tunnels and North Greenwich bus station:
- Blackwall Tunnel southbound - There will be a bus-only slip road after the tunnel portal enabling buses to exit to Millennium Way.
 - Blackwall Tunnel northbound - There will be a bus-only slip road from the northern section of Tunnel Avenue onto the tunnel approach enabling buses to access the tunnel without passing through Blackwall Lane.
 - Silvertown Tunnel southbound - There will be a bus-only slip road at Boord Street enabling buses to exit to Millennium Way.
 - Silvertown tunnel northbound - There will be a bus-only slip road from Millennium Way directly onto the tunnel approach.
- 7.13. The bus-only access road could also be used by commuter coaches if operators wish to serve the Greenwich Peninsula.
- 7.14. The most important impact on public transport is the opportunities the tunnel will create for new cross-river bus services to improve public transport links between east and southeast London. The Silvertown Tunnel is designed to accommodate double-decker buses, thus providing operational flexibility in the bus routes that could be extended across the Thames, although this decision will also depend on London Buses operational planning for Silvertown Tunnel incidents since double-decker buses cannot use the Blackwall Tunnel.
- 7.15. As discussed in paragraph 3.20, there is only one existing bus route using Blackwall Tunnel. The congestion at this location significantly disrupts bus services, so there is currently little scope to introduce additional cross-river buses in east London without disrupting the reliability of these services. In the western area of Inner London where there are more bridges, there are many more cross-river bus services. Figure 7-1 shows cross-river bus routes in the vicinity of Putney Bridge compared to in the vicinity of the proposed Silvertown Tunnel.

Figure 7-1: Bus routes in the vicinity of Putney Bridge and Blackwall Tunnel



- 7.16. While the Silvertown Tunnel provides the opportunity to improve cross-river bus links, the typical lead time for London Buses to implement bus service changes is around two years. Therefore, since the Silvertown Tunnel has an assumed opening date of 2021, any plans for the bus network at this time can only be indicative and for the purpose of assessing operational feasibility.
- 7.17. The ongoing study of public transport options will highlight gaps in public transport provision around the Silvertown Tunnel area. The provision of the Silvertown Tunnel provides opportunities to consider cross-river bus route options, providing direct access to sites on the other side of the river, such as more direct links between southeast London and the growing employment areas in the Royal Docks and Canary Wharf.
- 7.18. In considering bus route options, TfL needs to be mindful of emerging new developments to be served. This could also assist in relieving peak crowding on the Jubilee Line and provide affordable journey options for people on lower incomes.

Figure 7-2: Future development and indicative bus journey times to Silvertown Tunnel



Road network

7.19. Current users of the Blackwall Tunnel will be familiar with the length of time spent waiting in queues on the approach to the tunnel in peak periods, which results from daily congestion at peak times and also from the impact of unplanned incidents. The Silvertown Tunnel project objectives include both its resilience in the face of planned and unplanned events and improving the everyday operational performance of the Blackwall Tunnel.

Resilience

7.20. Paragraph 5.11 outlines the current situation where regular incidents can have major impacts, which have been quantified in terms of the excess journey time incurred by Blackwall Tunnel users. The results of the analysis of these impacts are expressed in excess link times, which is a measure of the additional journey time incurred (compared to an incident-free day) multiplied by the number of users affected. This is a conservative measure of the impact since it does not include the impacts on users of the wider road network affected.

7.21. The Silvertown Tunnel is expected to reduce the impacts of incidents through

- (a) a reduction in the occurrence of certain types of incidents;
- (b) improved incident clearance times; and
- (c) the ability to divert vehicles to the second tunnel.

Incident occurrence

7.22. The provision of a signage strategy to guide high vehicles into the Silvertown Tunnel is expected to remove the vast majority of overheight vehicle incidents at Blackwall Tunnel. If 95% of overheight vehicle incidents were avoided, an annual reduction of almost 700 incidents could be achieved. This in turn is estimated to lead to a cumulative annual reduction in excess link times for Blackwall Tunnel users of around 33,000 hours.

7.23. The occurrence of incidents classed as vehicle breakdowns and Road Traffic Incidents can be assumed to increase proportionally with the vehicle flow in the Blackwall and Silvertown Tunnels. In practice the northbound tunnel bore has a greater number of certain types of incidents due to the tight geometry

Incident clearance

7.24. Analysis of the excess link times caused by incidents in the Blackwall northbound and southbound tunnels shows that the clearance time for vehicle breakdowns in the northbound tunnel are higher than in the southbound tunnel. The constrained geometry of the northbound tunnel means that an incident in a single lane has a greater impact on flows in the second lane (especially if higher vehicles are restricted from passing the incident), and can make the removal of broken down vehicles more challenging.

7.25. The Silvertown Tunnel is expected to display the same, if not improved, incident clearance as those in the Blackwall southbound tunnel.

Incident diversions

- 7.26. The above calculations do not yet take into account the impact of being able to divert traffic into the second tunnel in case of incidents. Under the proposed charging scenario, traffic flows through both tunnels are below the capacity of a single tunnel outside of the peak periods. This means that in the case of an incident, all traffic should be able to be diverted into the second tunnel. As a result the excess link times of diverted vehicles should only be marginally higher than an incident-free day.
- 7.27. During the peak periods, the ability to divert traffic away from an incident is more constrained since the combined peak direction flows exceeds the capacity of a single tunnel and the surrounding road network. There are no additional constraints on the A102 approach on the south side of the tunnels since this operates as a combined facility. However, diversions in the event of an incident will have a greater impact on the surrounding network on the north side. VISSIM micro-simulation modelling is currently being undertaken to estimate how the surrounding junctions could be optimised to accommodate increased flows through either of the tunnels in the event of an incident.
- 7.28. The Silvertown Tunnel is also expected to improve network resilience through improved asset maintenance. The lack of alternative crossings makes maintenance of the Blackwall Tunnel extremely difficult. Yet in the absence of the Silvertown Tunnel it can be expected that periodic closures of a matter of days or weeks would still be required at regular intervals. The operational flexibility provided by the Silvertown Tunnel allows for planned maintenance closures of either tunnel at regular intervals. The resulting effects upon traffic will be much improved compared to those of the present maintenance arrangements.

Road network performance

- 7.29. The current adverse impacts of congestion at the Blackwall Tunnel are described earlier in this report. The strategic traffic models show that the morning and evening peak queues are set to increase in the future as the population and employment opportunities increase in east and southeast London.

7.30. Table 7.1 shows the modelled change in selected journey times through the tunnels in 2021 with the Silvertown Tunnel. The highest impact in the morning is in the northbound direction where the combination of the Silvertown Tunnel and charging of the Blackwall and Silvertown Tunnels results in the elimination of most of the queues on the Blackwall Tunnel Approach. Trips to the Royal Docks benefit most of all due to the availability of a more direct route.

Table 7.1: Journey time savings with the Silvertown Tunnel (morning peak hour, 2021, in minutes)

Northbound	To Stratford	To Royals	To Canary Wharf
Lewisham	13	22	16
Charlton	15	23	17

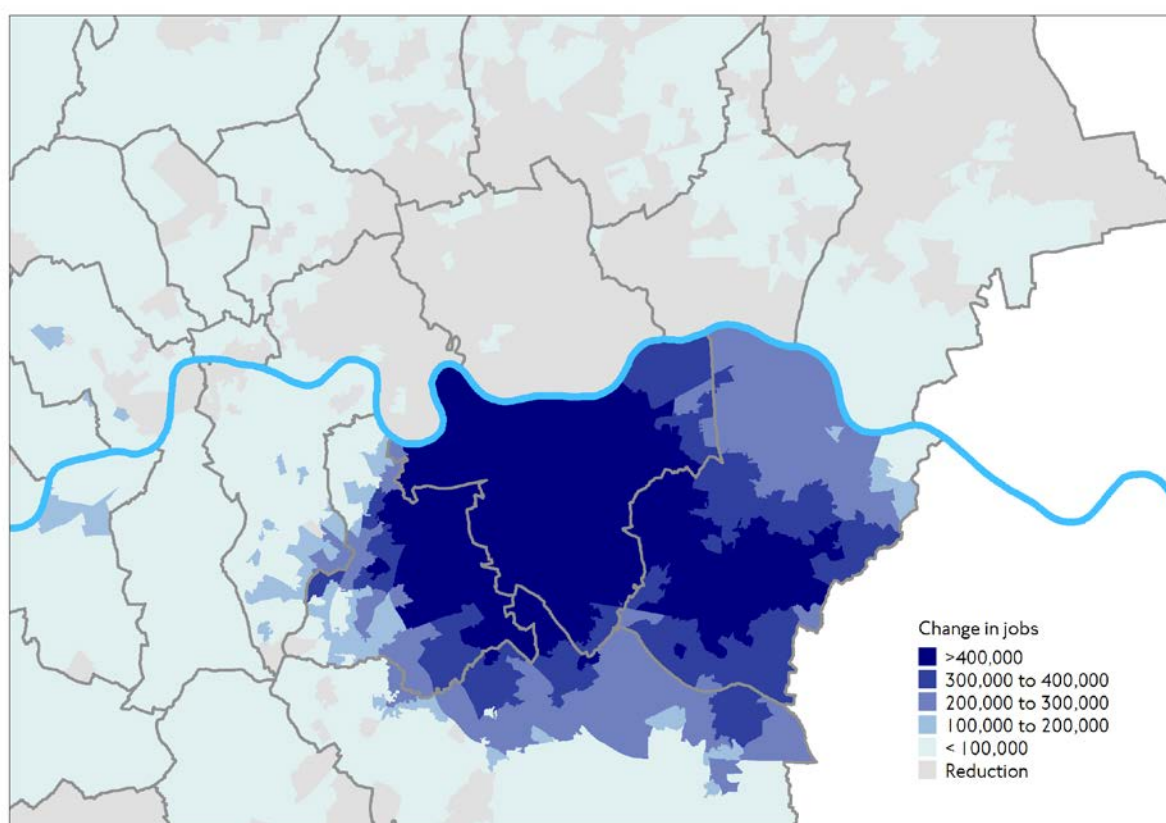
Southbound	To Lewisham	To Charlton
Stratford	1	1
Royals	4	3
Canary Wharf	3	2

7.31. The reductions in peak time delays on the tunnel approaches have wider impacts on road connectivity in east and southeast London as a whole (see paragraph 7.34 below).

Cross-river connectivity

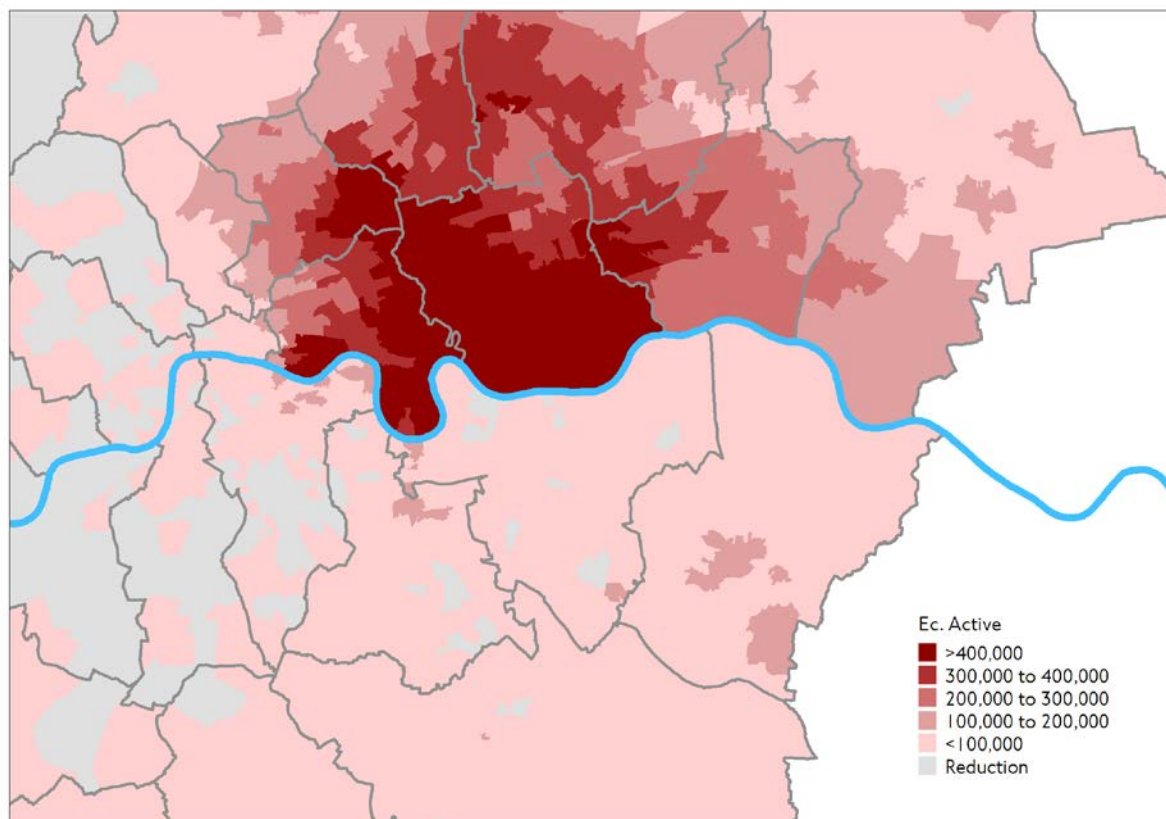
- 7.32. The river crossings programme as a whole aims to support planned population and economic growth in east and southeast London by providing improved cross-river transport links. The growth in population and employment in the area is supported by high levels of investment in additional public transport infrastructure. As shown previously in Figure 6-2, this will improve connectivity levels especially around the Crossrail alignment.
- 7.33. A specific objective of the Silvertown Tunnel project is to provide improved cross-river road links to support business and services. The following plans compare the Silvertown Tunnel central case scenario with the reference case scenario. The first set of outputs show the change in the number of jobs accessible within 45 minutes travel time by road, and the second set the number of economically active persons within 45 minutes by road. Due to the tidal nature of peak congestion at the Blackwall Tunnel, the connectivity impacts are presented for the peak periods separately.
- 7.34. Figure 7-3 shows the change in access to jobs in the morning peak hour. With the reduction in queues on the northbound approach to the Blackwall Tunnel, it can be seen that the greatest increases in connectivity occur south of the Thames in Greenwich, Lewisham, Bexley and Bromley. A significant proportion of Greenwich is estimated to see over 600,000 additional potential jobs accessible within 45 minutes. There are smaller but still quite significant changes in parts of Lewisham and Bexley of between 200,000 and 600,000 potential jobs within 45 minutes.

Figure 7-3: Change in jobs accessible within 45 mins by zone with the Silvertown Tunnel (central case, AM peak, 2021)



7.35. Figure 7-4 (below) shows the change in access to the labour market in the morning peak hour. The largest gain is experienced by businesses located in the Royal Docks area, with an additional 600,000 potential employees within 45 minutes travel time by road.

Figure 7-4: Change in economically active population within 45 mins by zone with the Silvertown Tunnel (central case, AM peak, 2021)



Freight connectivity

7.36. These connectivity analyses do not factor in the additional benefits to freight operations from the Silvertown Tunnel. While the current river crossing restrictions set out in Table 3.1 place considerable constraints on vehicle types and their operations, the proposed Silvertown Tunnel will provide a river crossing that is available to most vehicle types, including HGVs over 4m in height and double-deck buses.

7.37. The highway capacity issues are compounded for freight operators by the restrictions on use of certain types of heavy goods vehicles. The restrictions on the use of the Rotherhithe and Blackwall Tunnels and the Woolwich ferry by large vehicles are set out in Table 3.1.

Trip generation, distribution and mode shift

7.38. The *Silvertown Tunnel Traffic Forecasting Report* describes the likely transport impacts of the new infrastructure, including the changes in the destinations people will travel to (trip distribution) and changes in the transport modes people will use (mode shift).

The key findings need to be seen within the context of a forecast shift in travel behaviour from private car to public transport expected between now and 2021.

7.39. Table 7.2 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 7.2: 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-region³³	218,800 (56.4%)	169,200 (43.6%)	236,200 (54.2%)	199,300 (45.8%)	236,200 (54.2%)	199,300 (45.8%)

7.40. 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.

³³ Barking & Dagenham, Bexley, Greenwich, Lewisham, Hackney, Havering, Newham, Redbridge, Tower Hamlets, Waltham Forest

Distribution

- 7.41. While the Silvertown Tunnel is not predicted to have a significant impact on the total volume or proportion of personal travel by car, there is expected to be a change in the distribution of trips. This is the effect of people changing the places between which they travel to go to places that are better connected, and hence an increase in the number of cross-river trips by car (or bus) where destinations on the other side of the river become more convenient to travel to.
- 7.42. Figure 7-5 shows the change in cross-river traffic flows in east London with the Silvertown Tunnel in the AM peak in 2021 in both directions. The increase in traffic flows in the peak direction across Blackwall and Silvertown Tunnels combined is estimated to be around 1,200 vehicles more than the reference case. This increase is due in part to the impact of re-distribution, which is expected to increase total river crossing by around 200 vehicles. This means that the majority of the increased traffic flow estimated on the Blackwall and Silvertown Tunnels is due to a combination of formerly queuing traffic that is now able to cross the river in the peak hour with the Silvertown Tunnel and re-routeing traffic. As a result delays are almost eliminated from the Blackwall Tunnel approach in the time period.
- 7.43. In the southbound direction the total traffic crossing the river falls slightly. This is because there is less congestion in the reference case and the modelling indicates that fewer users would be willing to pay the charge to use the crossings. This leads to an overall reduction of around 250 vehicles or 10% in traffic on Blackwall and Silvertown Tunnels combined.
- 7.44. Figure 7-6 shows the change in cross-river traffic flows in east London in 2021 with the Silvertown Tunnel in an average inter-peak hour in both directions. It can be seen that for the Blackwall and Silvertown Tunnels combined, northbound traffic is estimated to reduce by around 200 vehicles. In the southbound direction there is a reduction of around 300 vehicles or around 10%.

Figure 7-5: Cross river traffic flows in the morning peak hour, 2021 (central case and reference case)

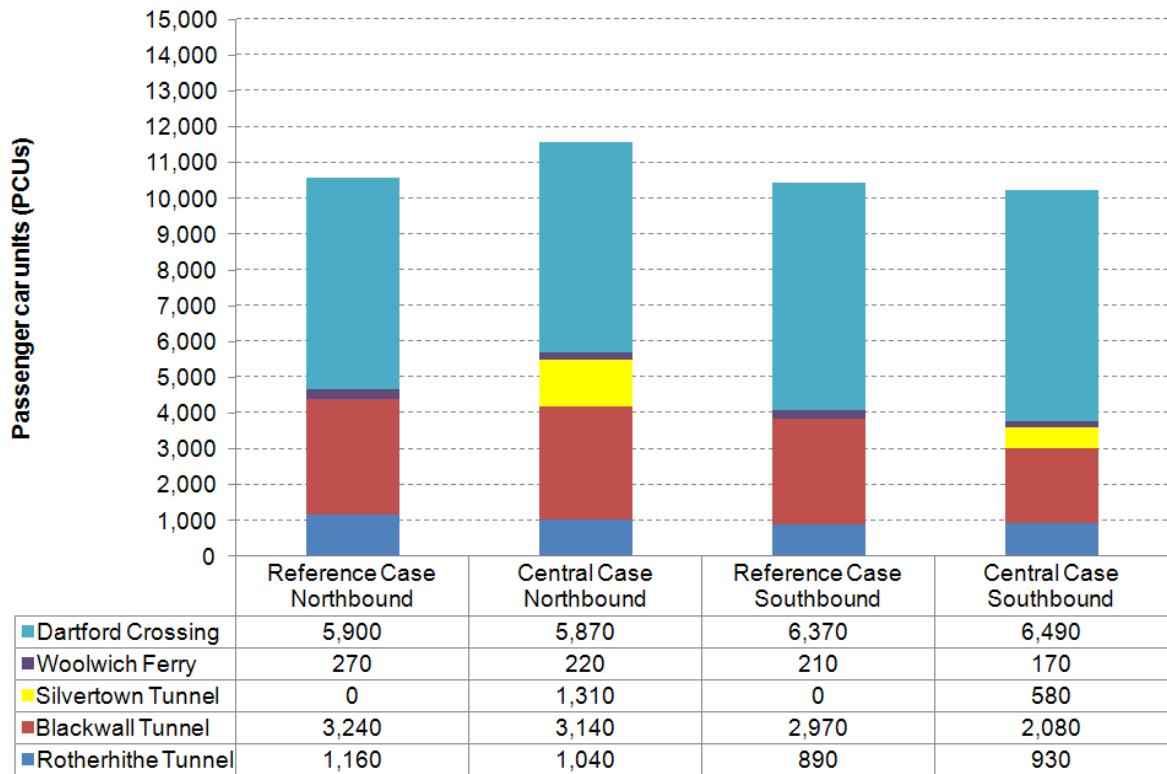
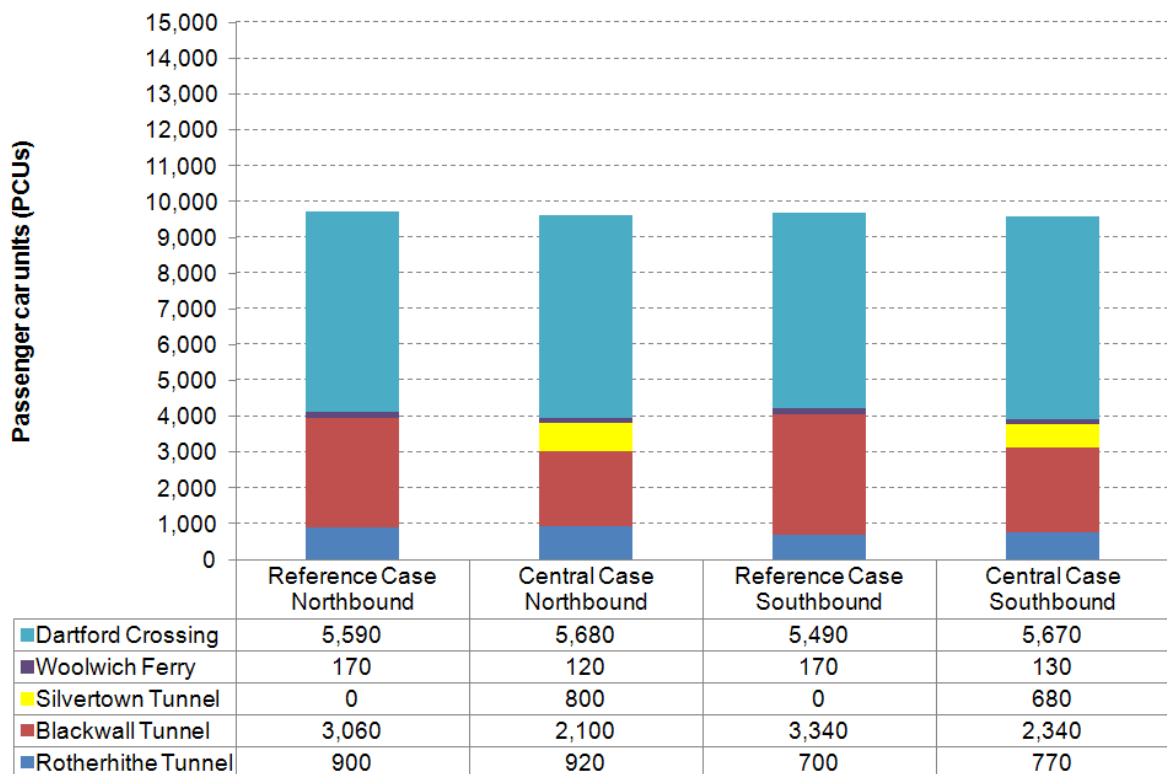
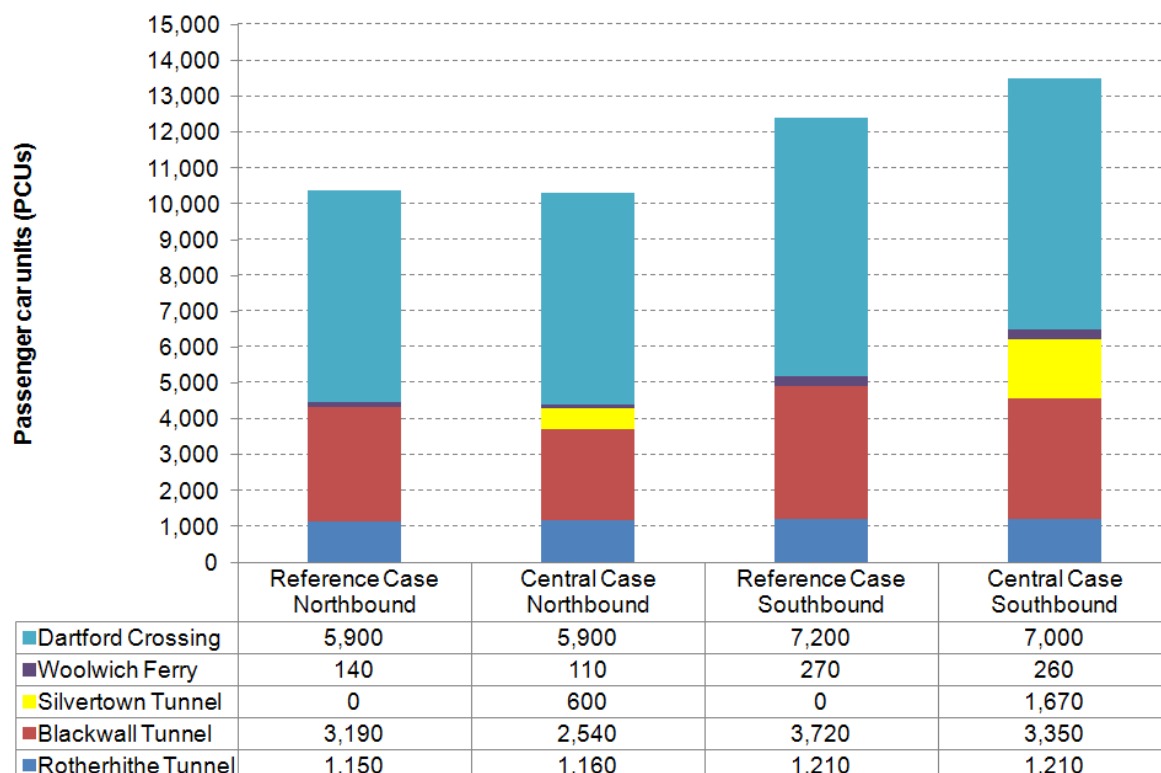


Figure 7-6: Cross river traffic flows in the inter peak average hour, 2021 (central case and reference case)



7.45. Figure 7-7 shows the change in cross-river traffic flows in east London in 2021 in both directions for the evening peak hour. For the Blackwall and Silvertown Tunnels combined, the increase in traffic flows in the southbound direction is around 1,300 vehicles or just over a third higher than the reference case. The majority of the increased traffic flow estimated on the Blackwall and Silvertown Tunnels is due to a combination of formerly queuing traffic that is able to cross the river in the peak hour the Silvertown Tunnel and re-routeing of traffic that previously used other crossings, rather than additional crossing demand.

Figure 7-7: Cross river traffic flows in the PM peak hour, 2021 (central case and reference case)



7.46. These results show the modelled split between usage of the Blackwall and Silvertown Tunnels. This split should be treated as indicative only and the impact of changes to vehicle restrictions has not been considered yet.

Vehicle routing

7.47. Figure 7-8 shows the routing and number of trips that are forecast to use the Blackwall Tunnel in the morning peak hour in 2021. Green represents northbound traffic and red southbound traffic. The Blackwall Tunnel is forecast to continue serving strategic and local movements in southeast London due to its direct connections to the A12 and A13. The key corridor served is that from the A2 to the A12 and A406.

7.48. Figure 7-9 shows the routing and number of trips that are forecast to use the Silvertown Tunnel in the morning peak hour in 2021.

Figure 7-8: Routing of trips using Blackwall Tunnel (central case, morning peak hour, 2021)

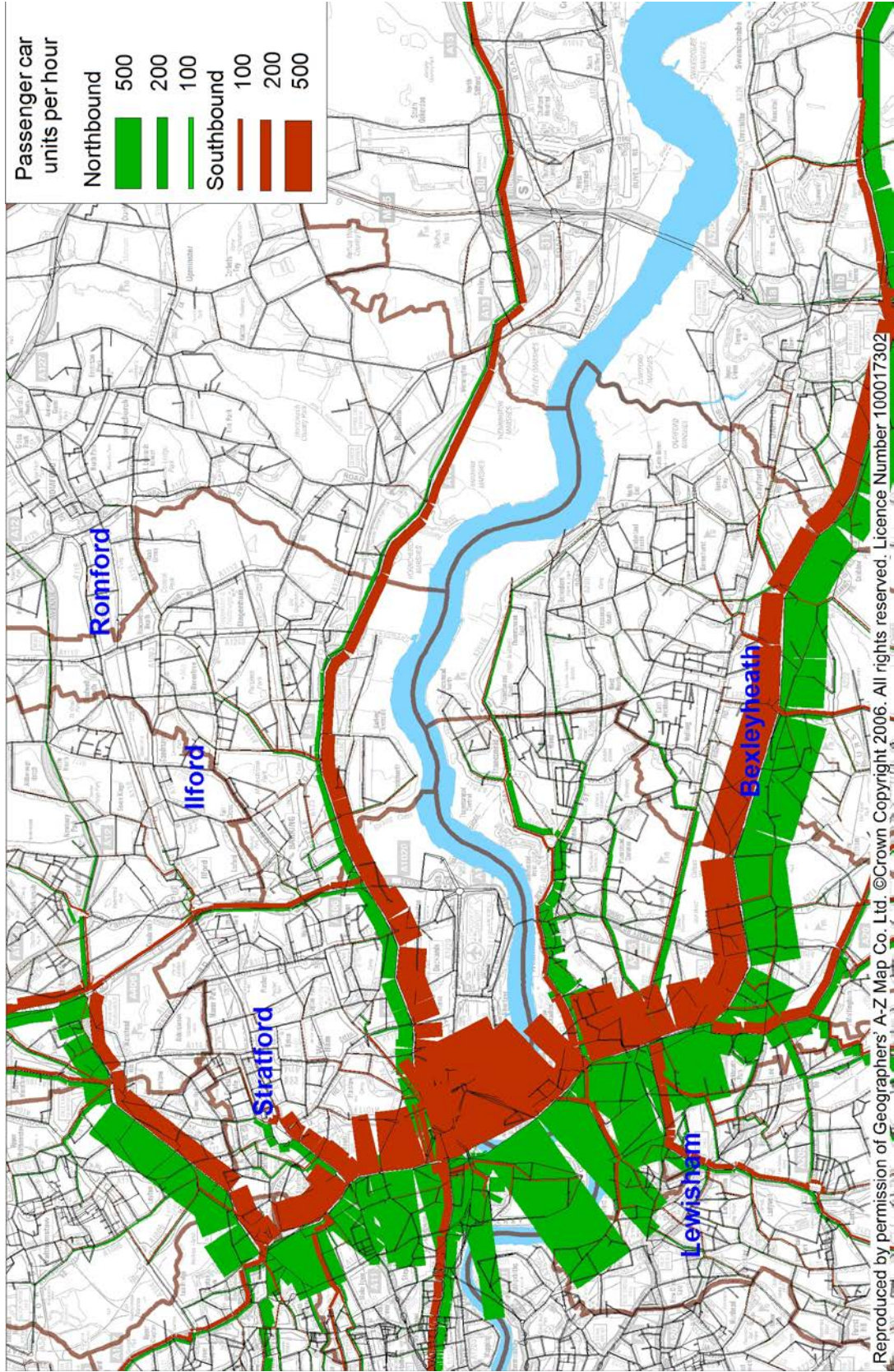
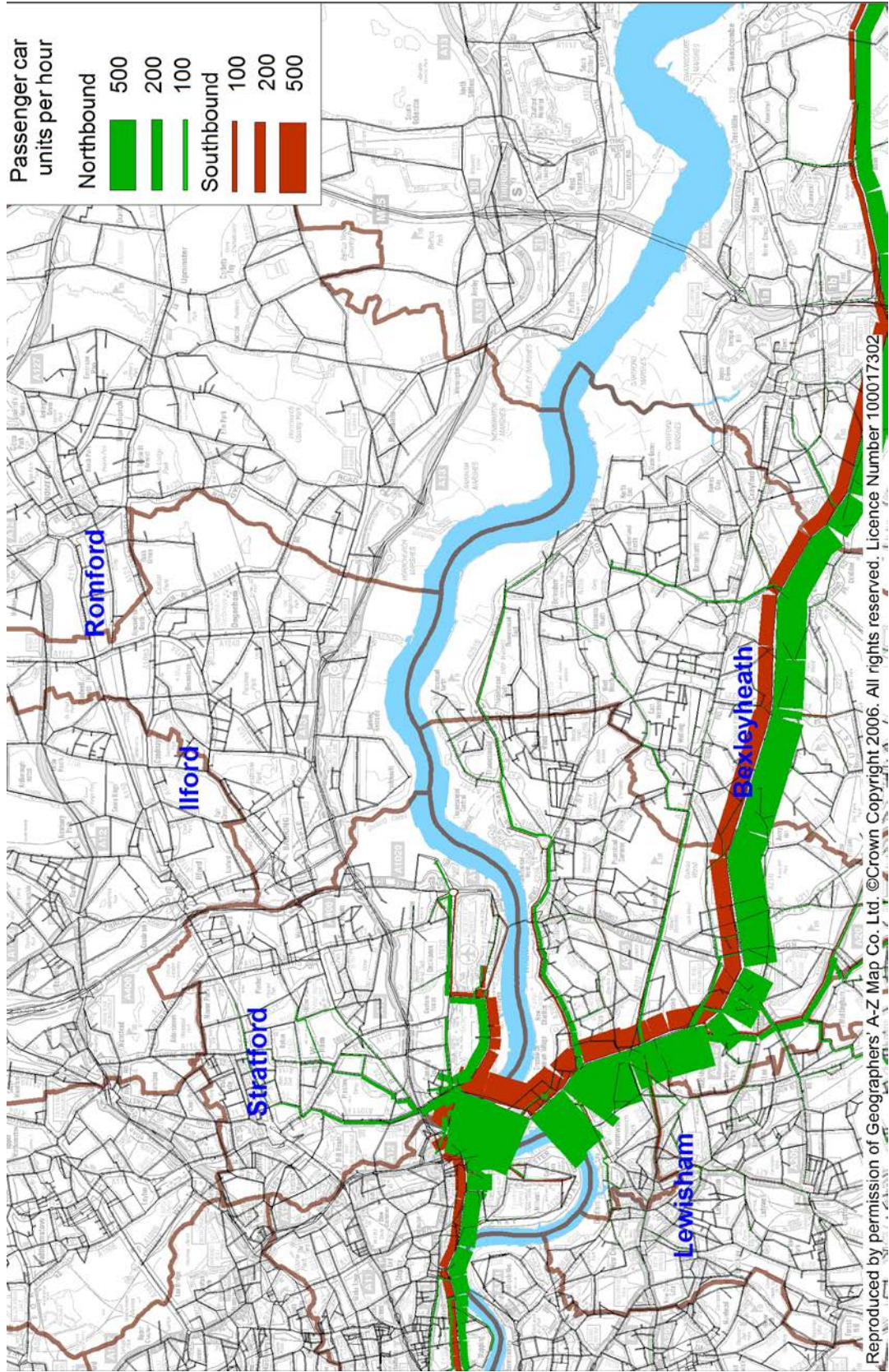


Figure 7-9: Routing of trips using Silvertown Tunnel (central case, morning peak hour, 2021)



7.49. Due to the direct link to Silvertown Way and the Lower Lea crossing on the northern side, the Silvertown Tunnel forms a convenient route for traffic destined for the Royal Docks, Canary Wharf, the city and parts of Stratford. On the southern side some movements from Bexley, Lewisham and Bromley are better served but most traffic comes from the A2 corridor.

Strategic road network

7.50. The *Silvertown Tunnel Traffic Forecasting Report* provides an indication of how traffic flows will change as a result of the Silvertown Tunnel. However, it should be noted that the modelling undertaken to date uses strategic transport models, which are used to identify broad changes in traffic patterns across the highway network, as well as the magnitude of this change. The results should not be taken as a definitive forecast of future flows on roads, especially on minor roads or at individual junctions for which local traffic modelling tools exist. Also the model does not yet assume any network mitigation measures that might be introduced such as changes to junction capacities or new traffic management or calming measures. Work is under way to investigate these issues in greater detail using micro-simulation traffic modelling, which will more accurately represent traffic flows and individual junctions in the locality of the river crossings.

7.51. Figure 7-10 shows the forecast change in traffic flows in the AM peak hour in 2021. There are increases in flows northbound on the Blackwall and Silvertown tunnel approach roads due to the extra capacity that Silvertown Tunnel provides. Decreases in flows southbound are due to the introduction of the user charge.

7.52. The largest changes in traffic flows are close to the crossings. On the northern side, there are increased flows on the approaches to the new crossing, namely on North Woolwich Road and the Lower Lea Crossing. Conversely, the switching city-bound traffic to the Silvertown Tunnel alignment is predicted to result in a reduction in traffic accessing the A13 westbound from Blackwall Tunnel. The model also highlights some wider impacts, notably flows increasing slightly on the A13 going east and the M25 going south due to traffic shifting away from the newly charged Blackwall Tunnel.

7.53. Figure 7-11 shows the forecast change in junction delay in the AM peak hour in 2021. The plot shows that significant reductions in junction delay are achieved on the northbound approaches to the Blackwall and Silvertown Tunnels.

Figure 7-10: Traffic flow changes with the Silvertown tunnel (central case, AM peak hour, 2021)

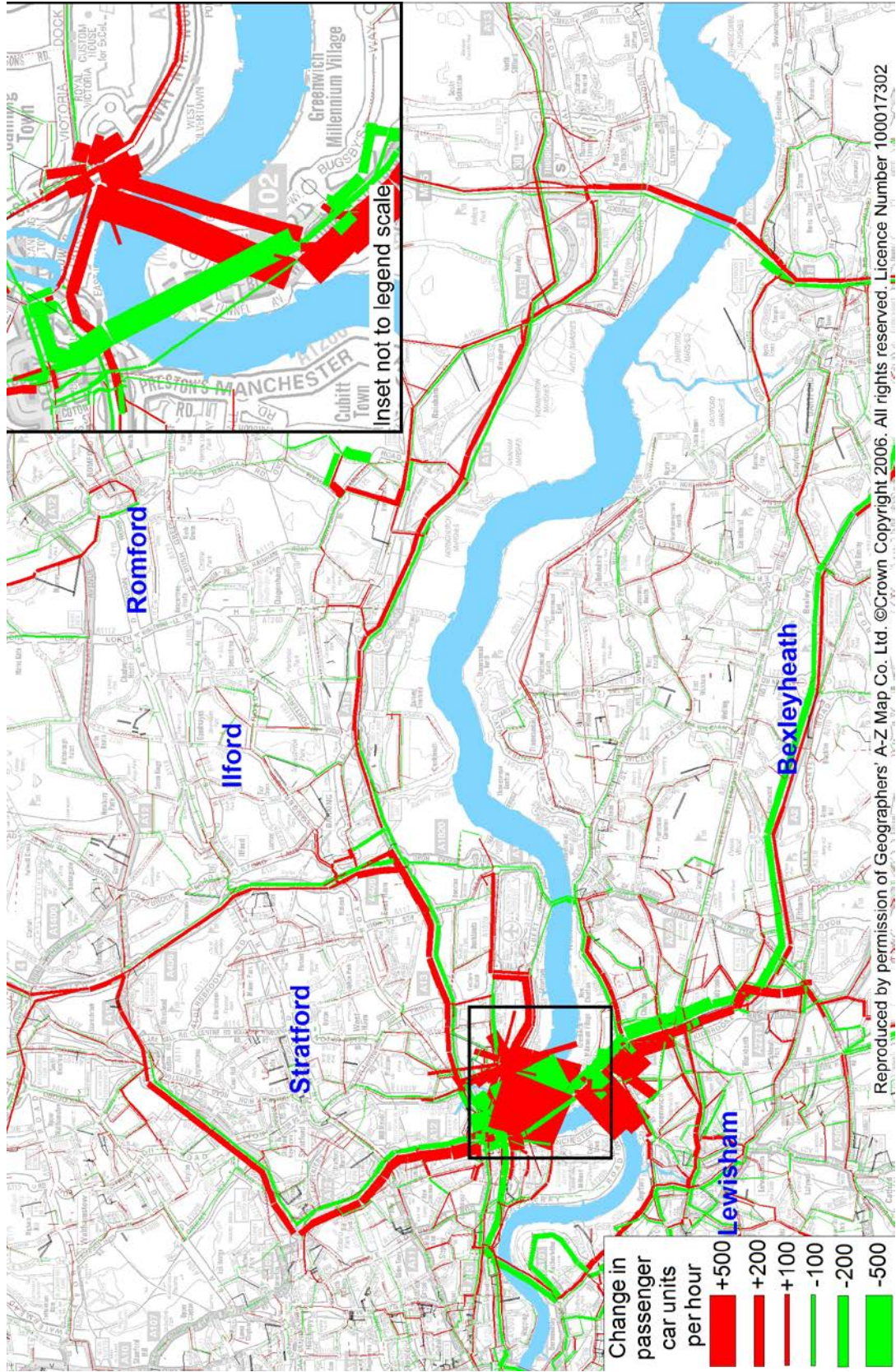


Figure 7-11: Junction delay changes with the Silvertown tunnel (central case, AM peak hour, 2021)

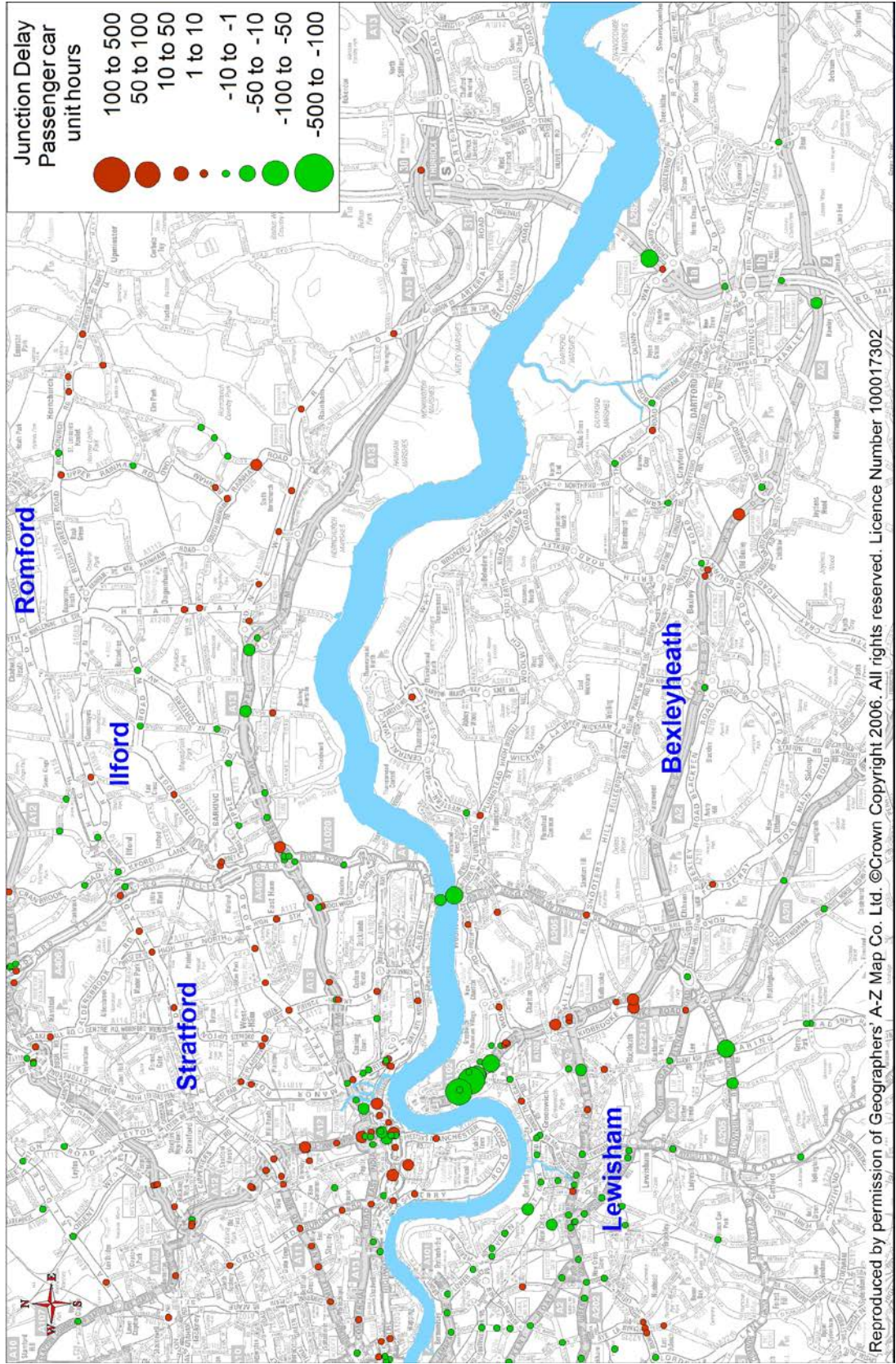


Figure 7-13: Junction delay changes with the Silvertown tunnel (central case, average inter-peak hour, 2021)

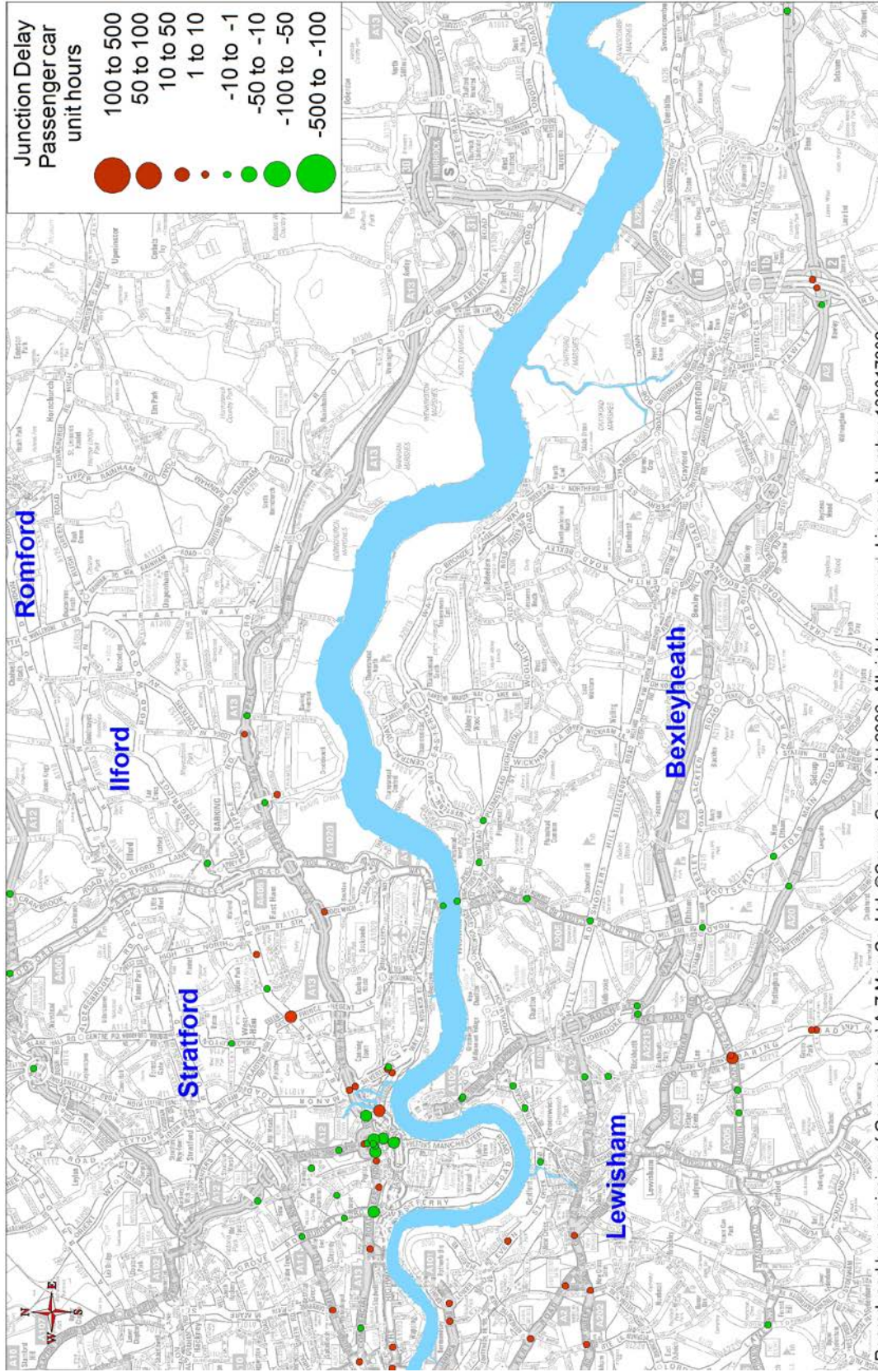
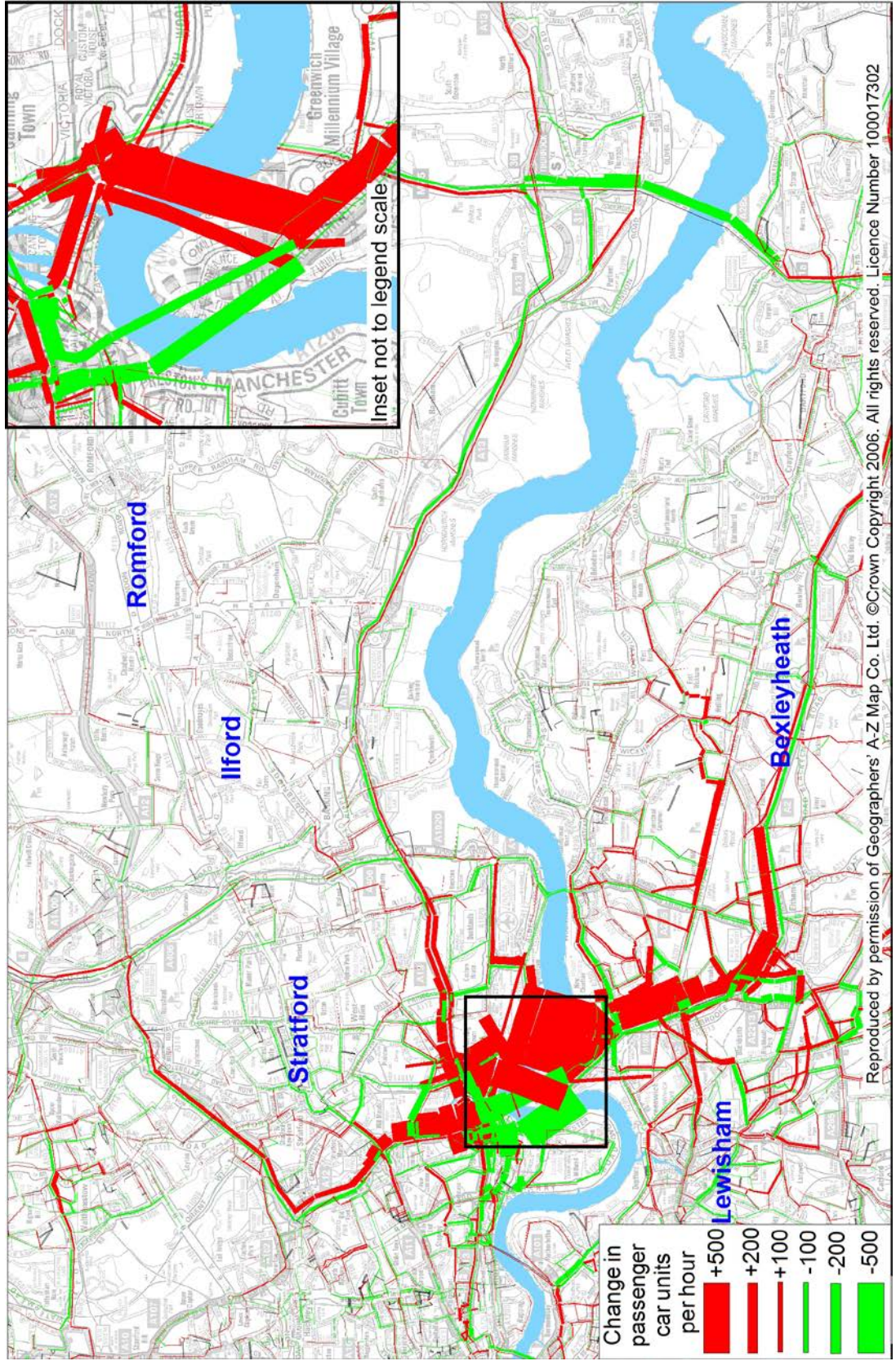


Figure 7-14: Traffic flow changes with the Silvertown tunnel (central case, PM peak hour, 2021)



- 7.54. Figure 7-12 shows the change in traffic flows in the average inter-peak hour in 2021. The introduction of charging leads to a small re-distribution of traffic flows from the Blackwall and Silvertown tunnels to the Dartford Crossings.
- 7.55. Figure 7-13 shows the change in junction delay in the average inter-peak hour in 2021. Junction delay decreases on the immediate approaches to the Blackwall and Silvertown Tunnels.
- 7.56. Figure 7-14 shows the change in traffic flows in the evening peak hour in 2021. There are increases in flows southbound on the Blackwall and Silvertown approach roads due to the extra capacity that Silvertown Tunnel provides. This also results in a small reduction in southbound flows on the Dartford Crossing.
- 7.57. Figure 7-15 shows the change in junction delay in the evening peak hour in 2021. Significant reductions in junction delay are achieved on the southbound approaches to Blackwall and Silvertown Tunnels. It can be seen that additional minor delays occur at a range of junctions south of the River Thames due to heavier flows of traffic being able to cross the river at this location.
- 7.58. Once further modelling work to investigate localised traffic issues is complete, the Transport Assessment will report on the impacts on the surrounding road network. All links and junctions forecast to experience an increase in traffic flows of 10% or more compared to reference case traffic will be flagged in the Transport Assessment document (5% on the strategic road network).
- 7.59. The *Silvertown Tunnel Introductory Environmental Assessment Report* quantifies the impacts of changes in traffic flows and changes in queues on local environmental conditions in the surrounding areas.

Figure 7-12: Traffic flow changes with the Silvertown tunnel (central case, average inter-peak hour, 2021)

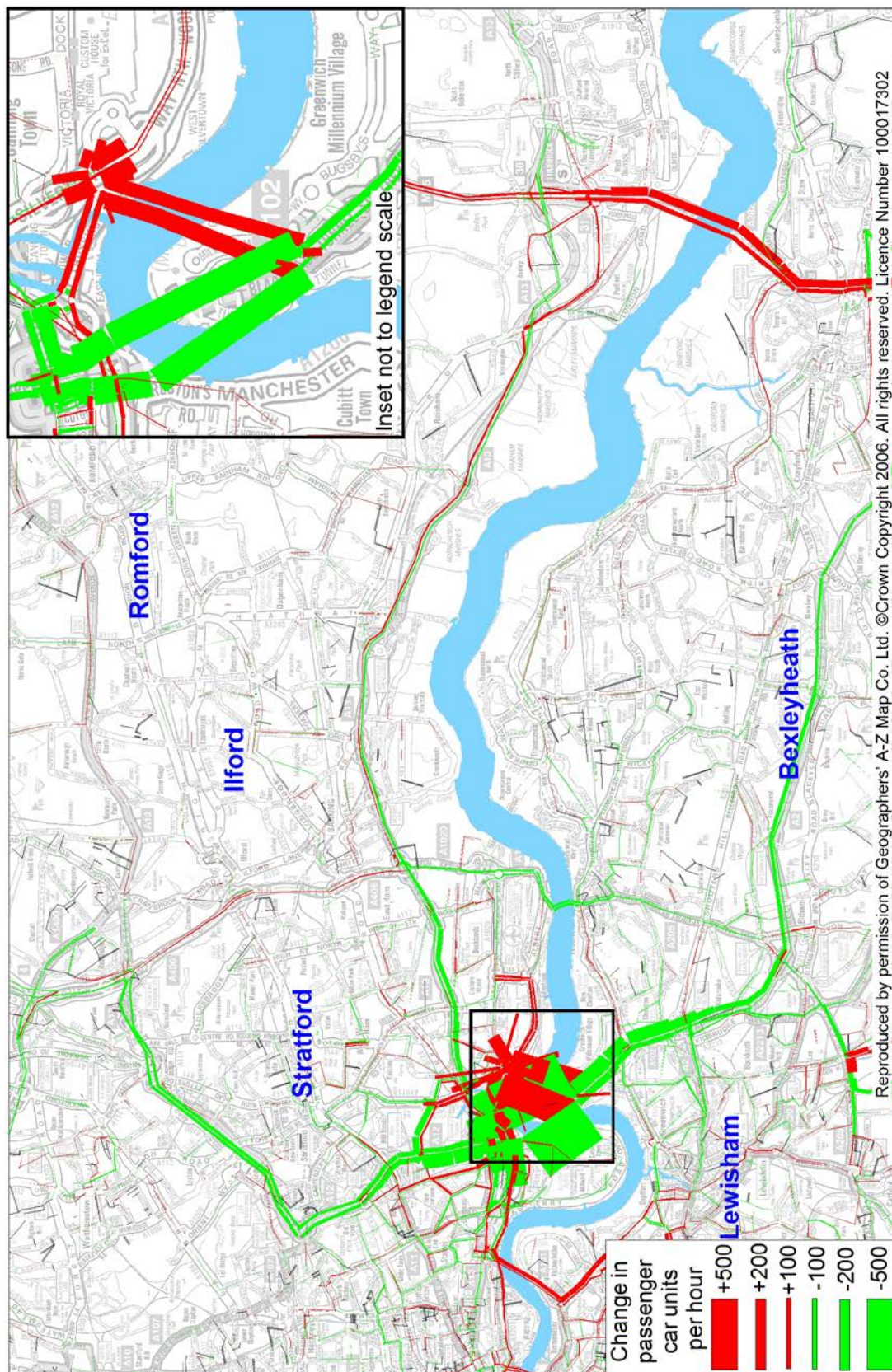


Figure 7-13: Junction delay changes with the Silvertown tunnel (central case, average inter-peak hour, 2021)

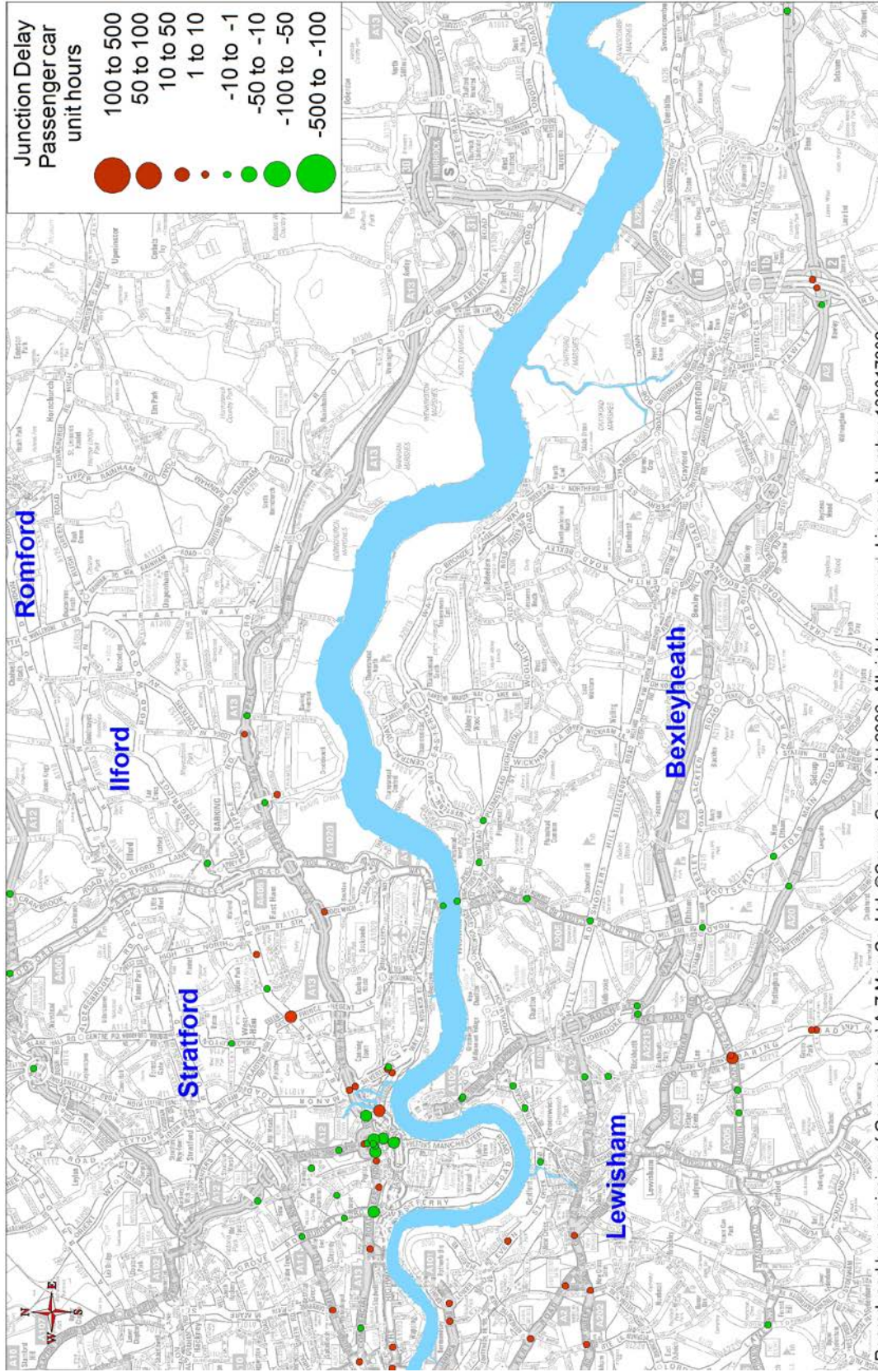


Figure 7-14: Traffic flow changes with the Silvertown tunnel (central case, PM peak hour, 2021)

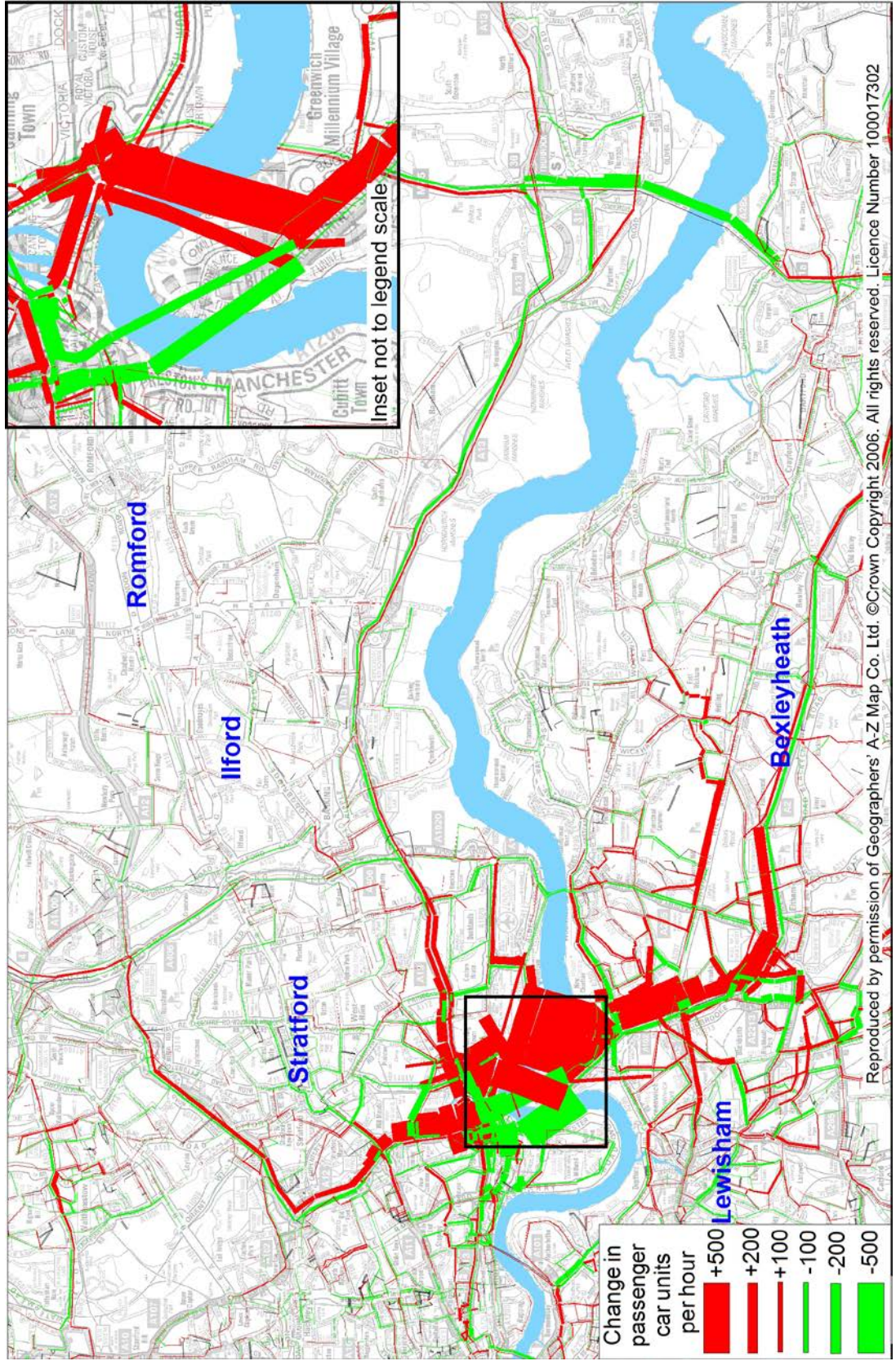
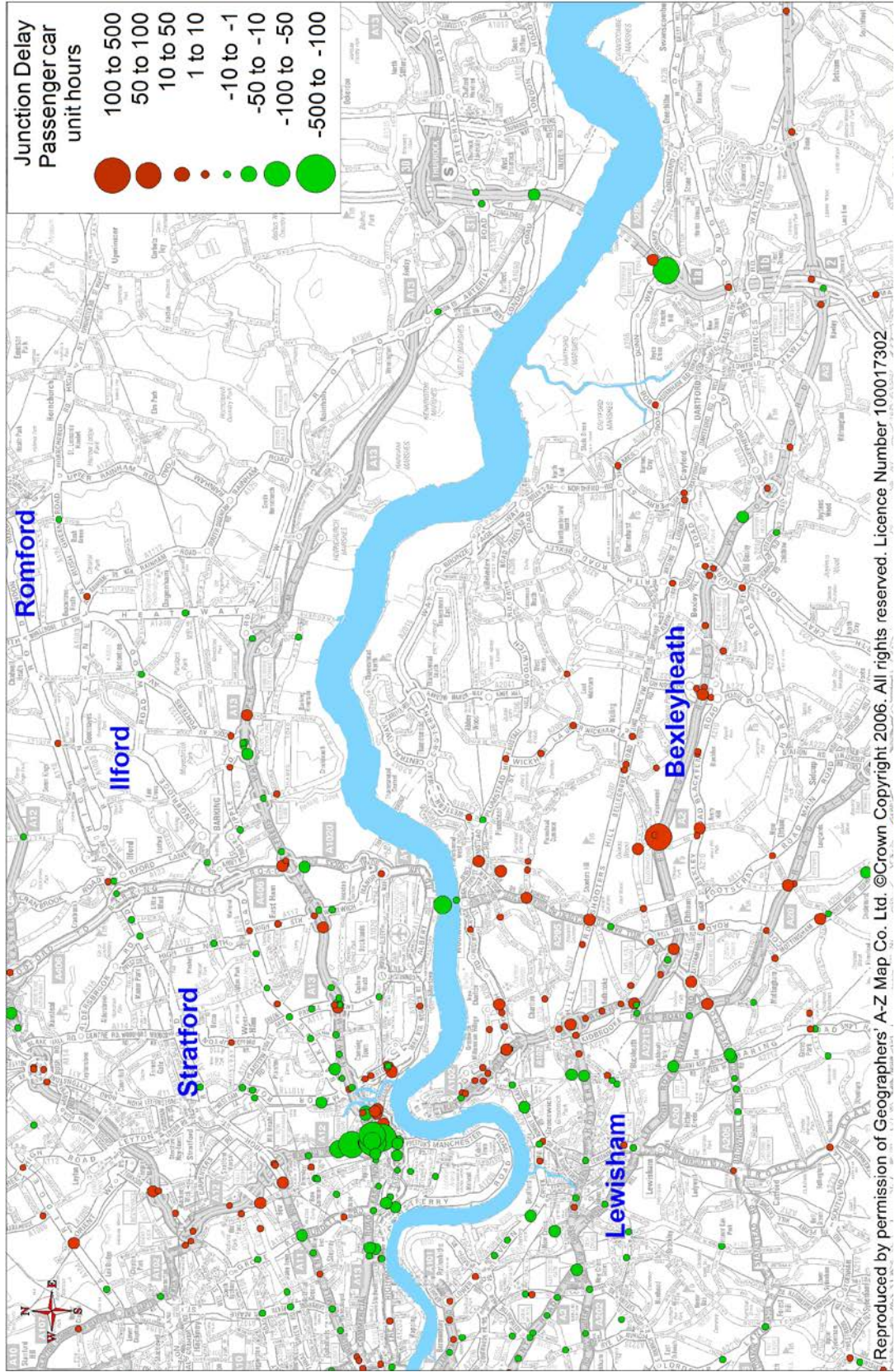


Figure 7-15: Junction delay changes with the Silvertown tunnel (central case, PM peak hour, 2021)



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Local road network

- 7.60. The road layout at either of the tunnel portals is designed to link into the existing network and maintain local access routes wherever possible. There will be no significant impacts around the northern tunnel portal in Silvertown. The re-configured Tidal Basin roundabout will continue to provide local access to Dock Road. Access to the Thames Wharf site is also maintained.
- 7.61. The impacts to local road access around the southern tunnel portal will also be limited. The main change will be that there will no longer be direct access from Tunnel Avenue to the Blackwall Tunnel Approach. Vehicles travelling between businesses on Tunnel Avenue and the Blackwall Tunnel will need to enter the Blackwall Tunnel Approach via Blackwall Lane. This represents a very marginal increase in journey distance for the vehicles affected, which is more than offset by the reduction in queues encountered at peak periods.
- 7.62. Work is still continuing to investigate localised traffic issues in greater detail using micro-simulation traffic modelling. This will identify any localised congestion issues and potential mitigation measures.

The Silvertown Tunnel will have a positive impact on road users through improved resilience due to fewer incidents, as well as improved mitigation and new diversionary routes in the event of an incident. Journey times through the Blackwall Tunnel in peak periods and peak directions will be reduced by around 20 minutes, leading to improved connectivity for residents and businesses in east and southeast London.

The forecast increase in northbound traffic flows in the peak direction across Blackwall and Silvertown Tunnels combined is around 1,200 in the morning peak hour as a result of the re-distribution of trips and the 'release' of formerly queued traffic. At other times of the day combined flows are forecast to be slightly lower in response to user charging.

The most important impact on public transport is the opportunities the tunnel will create for new cross-river bus services to improve public transport links between east and southeast London.

One of the requirements for the Silvertown Tunnel project is to ensure that all walking and cycling routes in the vicinity of the tunnel portals are re-instated or are replaced with direct, safe and comfortable alternative routes.

8. Impacts of construction of the proposed scheme

Construction programme

- 8.1. This section describes the potential transport impacts that will arise as a result of Silvertown Tunnel construction activities. The indicative construction programme is around four years. The tunnel boring machine (TBM) will be installed at Silvertown and work towards Greenwich, where it will turn and work back to Silvertown. All excavated material will be extracted through the Silvertown works site.
- 8.2. Much of the first year of the construction programme is taken up with preparatory works. The main tunnel bore will commence in the second year of the programme and will last for over 18 months from delivery of the TBM to its removal. The highways elements of the tunnel construction programme can be divided into a series of three phases at the Silvertown tunnel portal site (timed to start after the TBM has been removed) and four phases at the Greenwich tunnel portal site (starting during the main tunnel bore). These phases are described later in this section.

Construction traffic

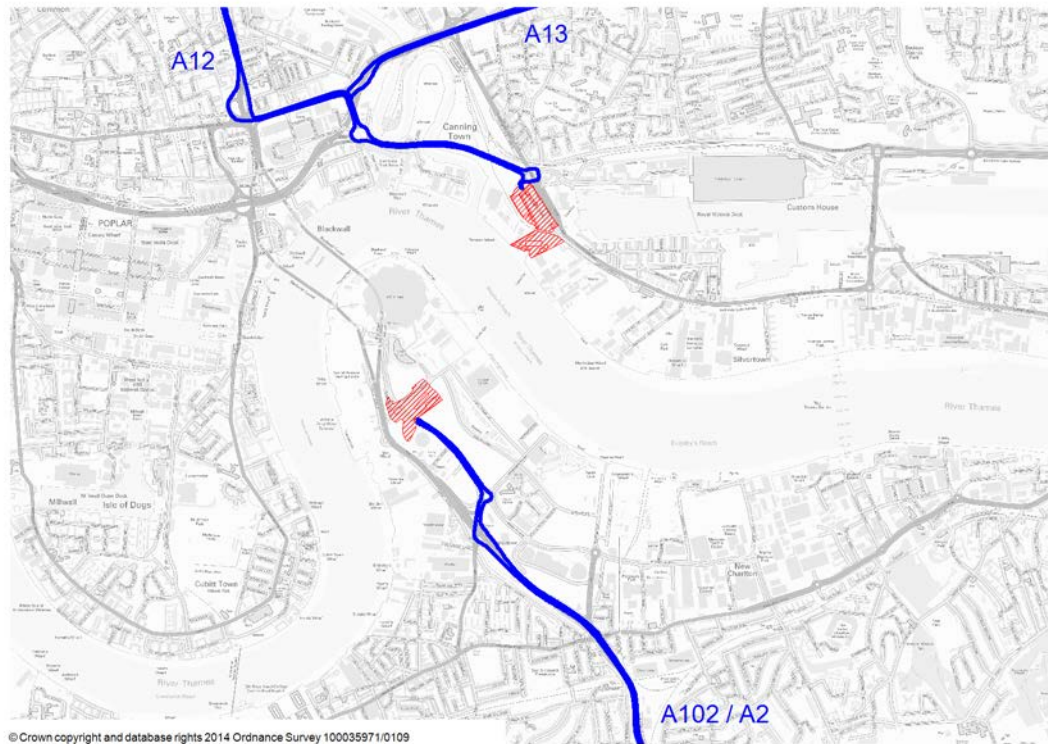
- 8.3. An indicative estimate of the number of lorry movements associated with the works has been calculated. The Silvertown works site has a dedicated quay facility at Thames Wharf, from which the majority of excavated material from both tunnel bores and some from the highways works can be transported away. For a number of similar construction projects, Wallasea Island has been the designated disposal site for the spoil generated, as part of the Royal Society for the Protection of Birds (RSPB) project to transform the whole island into a wetland habitat.
- 8.4. The total predicted volume of spoil for disposal is 550,000m³ or 840,000 tonnes. The duration of the tunnel bore (excluding installation, turnaround at Greenwich and removal) will be around 12 months. It is forecast that the TBM will operate five days per week with two days per maintenance. During this period tunnelling is estimated to produce 3,400 tonnes of material per operational day, which will be temporarily stored and sorted at the wharf prior to disposal. Over a full week as a whole, the average volume of spoil to remove per day will equate to 2,300 tonnes.
- 8.5. River transport could therefore be used to minimise the number of heavy vehicle movements on the local road network. It is estimated that spoil removal by barge would remove over 110,000 lorry movements over the duration of the works. The remaining lorry movements are estimated to total 73,400 over the 4-year construction schedule. The approximate number of lorry movements by works element and site are presented in
- 8.6. Table 8.1. This shows both the lower Silvertown works site estimate (with river transport of the excavated material) and the worst case scenario where all material is transported by road. The volume of spoil that could be transported by river barge to Wallasea Island also depends on whether there are contamination issues. Ground Investigation surveys are currently being undertaken.

Table 8.1: Estimated lorry movements over 4-year construction period (with river transport and worst case)

Works element	Silvertown site (with river transport)	Silvertown site (worst case)	Greenwich site
Site buildings	1,800	1,800	1,100
Cut and Cover Tunnel	7,100	23,200	7,100
Bored Tunnel	30,700	50,300	50,400
Highways	4,400	30,200	4,400
Mechanical & Electrical	3,000	3,000	2,000
Landscaping	1,000	1,000	1,000
Site Establishment	6,000	6,000	2,800
TBM Delivery/Removal	1,000	1,000	-
Total	55,000	116,500	68,800

- 8.7. Construction Management Plans (CMPs) will be prepared for both working sites and these will include further details of the expected number of lorry movements per day during the construction phases.
- 8.8. The Silvertown works site will require a larger number of lorry movements due large working areas. The vehicular access point to this works site will be via the current alignment of Dock Road from the Tidal Basin roundabout, shared with access to Scarab Close/Thames Wharf. The Construction Management Plan will include HGV routes from the strategic road network to the site. The principal HGV route from the A13 and A12 to the site should be via Leamouth Road and the Lower Lea Crossing (Figure 8-1). HGV drivers should be advised to avoid Canning Town to minimise the impact on residential areas and to avoid Silvertown Way, which does not offer a direct route into the Tidal Basin roundabout.
- 8.9. The CMP will also confirm arrangements for a lorry holding facility near to the site entrance, which could be located on Scarab Close or on part of the current Crossrail site accessed from the Lower Lea Crossing.

Figure 8-1: proposed HGV works site access routes

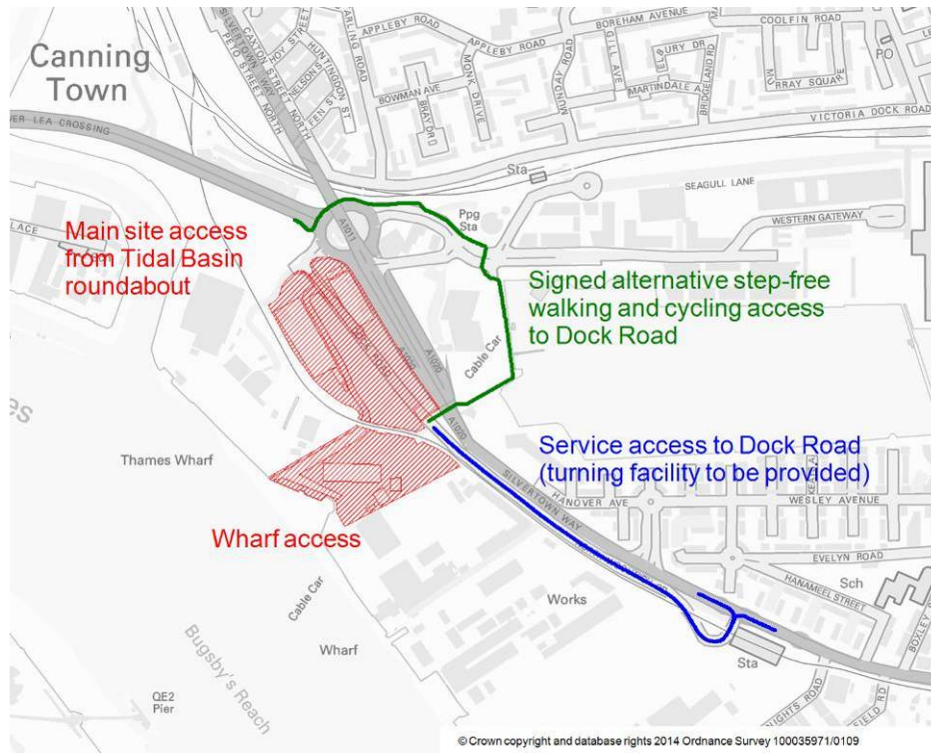


- 8.10. The Greenwich site will require a smaller number of lorry movements, and the vehicular access point to the site will be from Millennium Way. HGVs can access the site from the A102 Blackwall Tunnel Approach via Blackwall Lane and there is space for a small lorry holding facility near to the site entrance if required.
- 8.11. The estimate of lorry movements does not relate to workforce access. The construction workforce will be discouraged from travelling by car by means of a Site Travel Plan.

Silvertown highways work phases

- 8.12. The proposed Silvertown works site area is shown in Figure 8-2 along with key site access points and alternative access routes to Dock Road.

Figure 8-2: Proposed Silvertown works site



8.13. Based upon initial construction planning the works can be divided into 3 distinct phases as described in Table 8.2 below.

Table 8.2: Silvertown work site phases

Phase 1	<ul style="list-style-type: none"> • This is programmed to commence after the main tunnel bore is complete and the TBM has been removed. Access to Dock Road will remain closed. • New sections of the elongated roundabout will be constructed adjacent to the existing Tidal Basin roundabout • A new link will be constructed between Lower Lea Crossing and Tidal Basin roundabout
Phase 2	<ul style="list-style-type: none"> • Tidal Basin roundabout will be connected to the new section of carriageway, creating the elongated roundabout • Traffic exiting the roundabout to the Lower Lea Crossing will switch to the new link
Phase 3	<ul style="list-style-type: none"> • The tunnel portal access roads will be completed • The new alignment for Dock Road will be instated

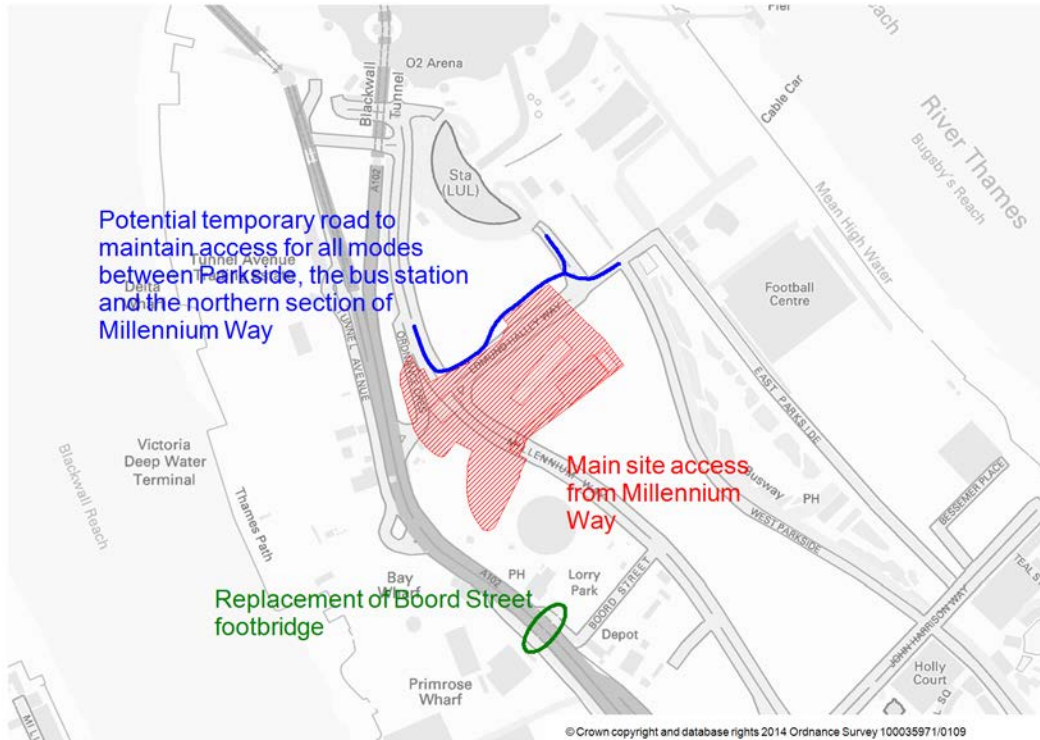
8.14. There will be no access to properties via Dock Road from the Tidal Basin roundabout for the majority of the construction works since the main tunnel portal works site will be located here. The eastern access to Dock Road from North Woolwich Road will be maintained at all times. Access to Scarab Close/Thames Wharf from the Tidal Basin roundabout will also be maintained to properties that are not affected by the works site.

8.15. There will be no impact on DLR or Crossrail infrastructure as part of the works.

Greenwich highways work phases

8.16. The proposed Greenwich works site area is shown in Figure 8-3 along with the main site access point and the temporary road required for the duration of the works.

Figure 8-3: Proposed Greenwich works site



8.17. Based upon initial construction planning the works can be divided into 4 distinct phases as described in Table 8.3 below.

Table 8.3: Greenwich work site phases

Phase 1	<ul style="list-style-type: none"> • The temporary route to replace Edmund Halley Way will be installed as part of the creation of the Greenwich works site to provide an alternative to the severed Millennium Way • The existing Boord Street footbridge will be demolished before the main highway works commence and replaced with either a temporary structure or the permanent replacement footbridge • The Silvertown tunnel portal access roads will be constructed, including a new southbound alignment for the Blackwall Tunnel Approach on a bridge over the northbound Silvertown Tunnel Approach • Boord Street will be subject to a temporary closure except for access • The bus-only exit slip road to Boord Street and bus stop MA will be closed • The new bus link between the southbound Blackwall Tunnel Approach and Millennium Way will be partially constructed
Phase 2	<ul style="list-style-type: none"> • Traffic on the southbound Blackwall Tunnel Approach will move to the new alignment

	<ul style="list-style-type: none"> • The bus-only exit slip road to Boord Street and bus stop MA will re-open
Phase 3	<ul style="list-style-type: none"> • Traffic on the northbound Blackwall Tunnel Approach will move to a temporary alignment to allow construction of the upgraded northbound Tunnel Approach • There will be construction works on some sections of Tunnel Avenue (although access will be maintained) and bus stop MV will be closed • The entry slip roads from Tunnel Avenue to the Blackwall northbound approach will also be closed
Phase 4	<ul style="list-style-type: none"> • Traffic on the northbound Blackwall Tunnel Approach will move to the new alignment • The new bus link between the southbound Blackwall Tunnel Approach and Millennium Way will be completed • A new bus-only entry slip road from Tunnel Avenue to the Blackwall northbound approach will be opened.

- 8.18. For the duration of the works, the A102 Blackwall Tunnel Approach will be operational at all times, with the exception of some night closures at key stages in the construction process such as for traffic management changeovers to facilitate tie-in works.
- 8.19. Edmund Halley Way and a section of Millennium Way to the south thereof will be closed for a period during the construction works to enable cut and cover section of the tunnel to be constructed. The exact diversion routes during this road closure are yet to be determined and efforts will be made to minimise disruption to highways users. However a possible temporary diversion route to provide access between the north section of Millennium Way, the bus station and West Parkside is shown in Figure 8-3 and would be designed to cater for likely traffic type and demand.
- 8.20. The existing footbridge over the A102 Blackwall Tunnel Approach at Boord Street will need to be demolished at the start of the works to enable construction of the realigned A102 Blackwall Tunnel Approach northbound carriageway. An alternative footbridge will be available for the duration of the construction works either in the form of the permanent replacement bridge or a temporary bridge whilst the permanent bridge is being constructed.

Walking network

Silvertown

- 8.21. Pedestrian routes around the Tidal Basin roundabout will remain open for the duration of the works, although there may be minor temporary route diversions during this time. For the duration of the works, pedestrian access to Dock Road from the roundabout will be closed. The alternative pedestrian route is along the Silvertown Way roundabout slip road and down a stairwell. The nearest step-free access route would be via The Crystal and through a shared path passage under Silvertown Way.

Greenwich

- 8.22. The pedestrian route along Millennium Way will be closed for a considerable period due to the construction of the cut and cover tunnel. The exact pedestrian diversion routes have not yet been determined but a potential alternative route into North Greenwich station and the O2 via West Parkside is only marginally longer and is a safe and comfortable walking route.
- 8.23. Although the existing Boord Street footbridge will be demolished as part of the works, a footbridge will be maintained at or adjacent to this location for the duration of the construction works either in the form of the permanent replacement bridge or a temporary bridge until the permanent replacement is constructed.
- 8.24. The pedestrian route along the Thames Path will be unaffected by the works. During phase 3 pedestrian access to properties on the closed section of Tunnel Avenue may be restricted at times. Engagement with the affected businesses will be required to ensure business continuity.

Cycling network

Silvertown

- 8.25. The off-street cycle route linking the Lower Lea Crossing and Tidal Basin Road around the south of roundabout will remain open for the duration of the works, although there may be minor temporary route diversions during the junction tie-in works. However, for the duration of the works, cycle access via Dock Road from the roundabout will be closed. The alternative cycle access routes are via the Silvertown Way and North Woolwich Road, or alternatively via The Crystal and through a shared path passage under Silvertown Way.

Greenwich

- 8.26. The cycle route along Millennium Way will be closed for a considerable period due to the construction of the cut and cover tunnel. The exact diversion routes are yet to be determined. A potential alternative cycle route into North Greenwich station and the O2 could utilise the existing dedicated cycle track on West Parkside, which is a relatively convenient diversion.
- 8.27. Although the existing Boord Street footbridge, which is used by cyclists, will be demolished as part of the works, a footbridge will be maintained at or adjacent to this location for the duration of the construction works either in the form of the permanent replacement bridge or a temporary bridge until the permanent replacement is constructed.
- 8.28. The cycle route along the Thames Path will be unaffected by the works. During phase 3 cycle access to properties on the closed section of Tunnel Avenue will be restricted at times although access to businesses should be guaranteed through the management of pedestrian access points.

Public transport network

Silvertown

- 8.29. The Silvertown works will not impact upon the operation of DLR services or the Emirates Air Line. There are currently no scheduled bus services on the Tidal Basin roundabout.
- 8.30. For the duration of the works, key public transport access routes will remain open. This includes the stairwell between the Tidal Basin roundabout and the Charrington Steps bus stop on Silvertown Way situated above the roundabout. The pedestrian access route between West Silvertown DLR station and the employment sites around Dock Road will also remain open.

Greenwich

- 8.31. The closure of Millennium Way will have a relatively minor impact on pedestrian and cycle access routes to North Greenwich station due to the convenient alternative routes via West Parkside.
- 8.32. The Greenwich works will not impact upon the operation of North Greenwich bus station, Jubilee Line station or the Emirates Air Line. However, there will be some diversions to existing bus routes during the works as set out in the table below.

Table 8.4: Bus route diversions during Greenwich construction phases

<p>Route 108 towards Stratford</p>	<ul style="list-style-type: none"> • Departing North Greenwich, buses will divert from Millennium Way and not serve bus stop MT. They will be routed via the West Parkside busway and John Harrison Way to Blackwall Lane, serving bus stop MN • The access route to the northbound Blackwall Tunnel Approach via Tunnel Avenue will remain open until the end of phase 2 and bus stop MV will continue to be served. • During phase 3 an alternative bus access route via the northern section of Tunnel Avenue will be constructed. It is likely that northbound buses will be able to divert to this route at the beginning of phase 3. This will be confirmed in the detailed programme of construction works.
<p>Route 108 towards Molesworth Street</p>	<ul style="list-style-type: none"> • During phase 1 buses will not be able to exit the southbound Blackwall Tunnel Approach at Boord Street. They will be diverted via the main slip road to reach Blackwall Lane. • For the duration of the works buses will not access North Greenwich via Millennium Way, but will be diverted via John Harrison Way and the West Parkside busway, serving bus stop MS. • Note that from phase 2 they will be able to exit the southbound Blackwall Tunnel Approach at Boord Street, serving bus stops MA, MT and MN.

Route 188 towards North Greenwich	Buses will be diverted from Millennium Way to access North Greenwich bus station via John Harrison Way and the West Parkside busway. As a result it will not serve the Boord Street bus stop on Millennium Way (MW) but will serve bus stop MS on John Harrison Way.
Route 188 towards Russell Square	Buses will be diverted from Millennium Way to depart from North Greenwich bus station via the West Parkside busway and John Harrison Way. As a result it will not serve the Boord Street bus stop on Millennium Way (MT) but will serve bus stop MN on John Harrison Way.

8.33. Bus stop MV on Tunnel Avenue is also used by some northbound commuter coaches from Kent. This facility will be removed at phase 3 of the construction works, and coach operators wishing to stop near to North Greenwich will need to seek alternative arrangements.

Road network

Silvertown

8.34. Vehicular access around the Tidal Basin roundabout will be maintained for the duration of the works, although there will be periods where certain movements will be subject to minor diversions. It is also possible that temporary weekend or overnight closures will be necessary at key stages in the construction of the highway tie-in at Tidal Basin roundabout and Lower Lea Crossing.

8.35. Vehicular access to Dock Road from the Tidal Basin roundabout will be closed for the majority of the works duration. All vehicles will need to access Dock Road from the junction of North Woolwich Road and Silvertown Way. Work is under way to identify a turning facility on Dock Road and appropriate kerbside restrictions to ensure that it remains clear of parked vehicles.

Greenwich

8.36. The closure of Millennium Way will have an impact on the local road network around the Greenwich works site. This is currently an important north-south link for servicing the O2 and for construction traffic serving businesses around the northern section of Tunnel Avenue. Although exact diversion routes are yet to be determined traffic from Blackwall Lane could be re-routed via John Harrison Way, West Parkside and a temporary road running parallel to Edmund Halley Way to re-join Millennium Way to the north of the works site. This diversion will result in slightly longer journey times for the affected vehicles but overall it is not expected to lead to major congestion. Detailed traffic modelling of the temporary road layout and the impacts on the junction of West Parkside, East Parkside and the entrance to North Greenwich bus station will be undertaken in due course.

8.37. The works site itself will require changes to parking arrangements at the O2. The size of the car parks to the north and south of Edmund Halley Way will be reduced to accommodate the works site and the temporary road layout. A more detailed

assessment of O2 event management plans will be required to understand the impact of the closure of Millennium Way and assess the need for replacement car parking facilities. However, since there is scope to manage access to the remaining southern car park and coach park from both West Parkside and Millennium Way, the overall impact on local roads is likely to be minor.

- 8.38. Access to all other sites along Millennium Way will be maintained during the works. A suitable turning facility at the closed end of Millennium Way will be built when the construction works start.
- 8.39. There will be no impact on local access to Tunnel Avenue during the first two phases of construction. During phase 3 access along Tunnel Avenue will be closed from the junction with Salutation Road to the entrance to the wharf adjacent to the northbound Blackwall tunnel arch. During this phase of construction works, access to sites along Tunnel Avenue will be from Blackwall Tunnel Approach itself and will need to be actively managed. At the start of phase 4, access through Tunnel Avenue in both directions will be re-opened and there will no longer will direct access from Tunnel Avenue to the northbound Blackwall Tunnel Approach.

River network

- 8.40. TfL is exploring the use of river vessels to transport construction materials and waste. The proposed construction site layout has been configured to make use of the existing mooring at Thames Wharf. While the exact configuration of the mooring has not been determined, current indications are that spoil and materials could be carried by ship, large barge (1000 t) or a single tug pulling two smaller barges. The mooring of barges at Thames Wharf is not expected to have a direct operational impact on other river barge or passenger services at any of the nearby piers. This report does not look at navigational issues or preliminary risk assessment for navigation, and separate assessments will be required as plans for the river operations are drawn up.
- 8.41. There are a number of other planned or current construction-related river freight operations on the Thames. In determining the cumulative impact of river barge movements, the assessment methodology has made use of the Thames Tideway Tunnel (TTT) Transport Assessment as a reference case because the TTT project represents by far the largest river freight operation planned in the near future. The TTT assessment includes scheduled river passenger services and surveyed river freight services in its reference case.
- 8.42. Table 8.5 shows the estimated number of river transit movements passing the Thames Wharf site. The easternmost river site in the TTT assessment is King Edward Memorial Park on the busy stretch of the Thames between Tower Bridge and Canary Wharf. River transit movements to the east of Greenwich are lower in number since some of the passenger services terminate there. It should also be noted that the current Crossrail river operation, e.g. carrying tunnel segments from Chatham in Kent to Limmo Peninsula, will have terminated prior to the start of the Silvertown tunnel bore.
- 8.43. The probable number of daily barge movements will be around 2.3 assuming that 1000 t barges can be used. However, as a worst case it is assumed that spoil is carried in pairs of 350 t barges, which would require around 7 transit movements per day.

Table 8.5: Estimated daily and peak hourly river transit movements at Thames Wharf

	Daily	Peak hourly
King Edward Memorial Park	185	33
(adjustment for services terminating at Greenwich)	-44	-4
Estimated river transit movements at Thames Wharf	141	29
Maximum Silvertown river transit movements to and from Thames Wharf	7	2

Construction mitigation

- 8.44. The assessment of both construction and scheme impacts has highlighted a number of potentially adverse impacts. This section addresses the measures that will be appropriate to mitigate the impacts identified.
- 8.45. TfL will ensure that **Construction Management Plans (CMPs)** are produced for the works sites at the northern and southern portals. The CMPs will address mitigation of a variety of environmental impacts of the construction activities, including construction traffic-related impacts.
- 8.46. While it is TfL's intention that spoil and materials should be transported by river wherever possible, and the use of a safeguarded wharf is available for this purpose, the use of river barges cannot be guaranteed at present. The worst case scenario therefore requires **lorry route mapping** to facilitate the arrival of a total of around 170,000 lorry movements over the four year construction period with an absolute minimum level of adverse impacts on the surrounding residential communities.
- 8.47. The CMPs will also set out a **business engagement strategy** to ensure that local businesses can be actively involved in minimising the impact of construction activities on their businesses.
- 8.48. Measures to ensure continuation of **business access at Dock Road** in Silvertown will include:
- Any complementary measures required to ensure that all delivery and servicing access can take place from the junction of Dock Road and North Woolwich Road;
 - Provision and management of a turning facility for large vehicles in Dock Road; and
 - Signage of alternative pedestrian and cycle access routes between the Tidal Basin roundabout and Dock Road (via The Crystal).
- 8.49. Measures to ensure continuation of business access on the Greenwich Peninsula will include:
- Preparation of a strategy to manage the impact of the works site on events parking and access at The O2;
 - Signage of alternative pedestrian and cycle access routes around the works site (Millennium Way and Boord Street footbridge); and
 - Active management of access arrangements to Tunnel Avenue during the construction phase where access will be severely restricted.

8.50. TfL will also ensure that **Site Travel Plans** are prepared to plan for the travel of construction staff and contractors to the works sites. While materials and equipment will be delivered to site using goods vehicles, both sites are easily accessible by public transport and TfL will insist on an ambitious mode share target for travel by sustainable modes. The success of the London 2012 Olympic Park Construction Travel Plan highlights what can be achieved through early planning and rigorous targets.

The construction of the Silvertown Tunnel will require the transport of a large volume of excavated material. River transport could therefore be used to minimise the number of heavy vehicle movements on the local road network, and it is estimated that spoil removal by barge would remove over 110,000 lorry movements from the road network.

The tunnel works sites at Greenwich and Silvertown will lead to some localised impacts affecting access to businesses in the immediate area, and a range of mitigation measures have been identified. Otherwise the impacts on the surrounding networks for all transport modes will be small for a scheme of this size.

9. Summary of impacts

Summary of impacts

9.1. The assessment of both construction and scheme aspects has highlighted both positive and negative impacts upon users of the transport system. Table 9.1 summarises the scheme impacts described above by type.

Table 9.1: Summary of impacts

Impact	Positive/negative	Comment
Freight, servicing and business travel	Strong positive	Improved journey times and fewer delays caused by incidents, but also introduction of a user charge
Car users (non-business)	Positive	Improved journey times and fewer delays caused by incidents, but also introduction of a user charge
Bus passengers	Strong positive	Improved reliability, journey times and more cross-river links
Underground and DLR passengers	Neutral	No material impact (potentially bus service improvements could lead to crowding reduction in peak times)
Pedestrians	Neutral	No material impact (potentially a marginal benefit if the Boord Street crossing is improved) and controlled crossings at Tidal Basin roundabout
Cyclists	Neutral	No material impact (potentially a marginal benefit if the Boord Street crossing is improved) and controlled crossings at Tidal Basin roundabout
Coach passengers	Slight positive	Improved reliability and journey times, but slight negative from the removal of coach stops on the Blackwall Tunnel Approach
River users	Neutral	No impact
Emirates Air Line passengers	Neutral	Provides a crossing of the river for pedestrians and cyclists, complementing the road tunnel

9.2. This section addresses the measures that will be appropriate to mitigate the negative impacts.

Walking and Cycling networks

- 9.3. The construction work sites will have several temporary impacts on pedestrian and cycling access, and mitigation measures are discussed above.
- 9.4. The timing and alignment of the replacement of the **Boord Street footbridge** over the Blackwall Tunnel Approach are crucial to not only re-providing a public right of way but facilitating the development of the Greenwich Peninsula West Masterplan. TfL will retain a footbridge at all times during the construction works and will engage with the Royal Borough of Greenwich and adjacent landowners to ensure that the permanent re- instatement of the footbridge meets local needs.
- 9.5. The cycling infrastructure implemented around the northern portal at the **Tidal Basin roundabout** will play a key role in determining the nature of cycling access provided to the new residential and employment sites in the Royal Docks. TfL will ensure that safe and direct cycling routes between Canning Town, the Lower Lea Crossing and the Royal Docks are maintained.

Public transport

- 9.6. During the construction phases, there will be some impacts on public transport users through the need to re-route buses and temporarily close road access routes to North Greenwich interchange and to bus stops. These impacts can be mitigated through a **coordinated information** campaign targeting the affected routes, stations and stops. TfL will employ its Travel Information communications channels to deliver this campaign.
- 9.7. No detailed discussions with coach operators have yet taken place. However, it is assumed that Kent commuter coaches would choose to use Silvertown Tunnel instead of Blackwall Tunnel since it provides an easier access route to Canary Wharf via the Lower Lea Crossing and the Preston Road roundabout flyover. While some of the commuter coach routes currently stop on the Blackwall Tunnel Approach, this option will not be available under the proposed design for the tunnel approaches. If coach operators wish to continue serving North Greenwich, **alternative coach stops** may be required near to the Silvertown Tunnel slip roads.

Local road network

- 9.8. Work is still ongoing to understand the detailed traffic routeings of vehicles accessing the Blackwall and Silvertown Tunnels. Once this work is completed, a more detailed assessment of the streets and junctions that will experience higher or lower volumes of traffic will be produced. If this analysis shows increases in through-traffic using local residential streets, a range of **localised traffic management and traffic calming measures** can be employed to mitigate these impacts.
- 9.9. The provision of reliable journey times for freight on the strategic road network is one of the objectives of the Silvertown Tunnel. However, appropriate mitigation is required to ensure that any increase in goods vehicle traffic does not adversely impact upon local residential streets. This could include measures targeted at restricting access by large vehicles on certain streets.
- 9.10. Additionally there is scope for a range of **sustainable freight measures** to be explored with key stakeholders. There are several large employment clusters with common

management (Canary Wharf, Greenwich Peninsula, Mulberry Place) that would be suited to freight consolidation measures, which could in turn reduce the number of lorry movements on local roads.