SILVERTOWN TUNNEL

SUPPORTING TECHNICAL DOCUMENTATION

PRELIMINARY TRANSPORT ASSESSMENT

October 2015

This report details the main transport impacts of the Scheme for all forms of travel and what measures would be taken to minimise any adverse impacts. It examines road network impacts and impacts on public transport networks and walking and cycling.

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This report forms part of a suite of documents that support the statutory public consultation for Silvertown Tunnel in October – November 2015. This document should be read in conjunction with other documents in the suite that provide evidential inputs and/or rely on outputs or findings.

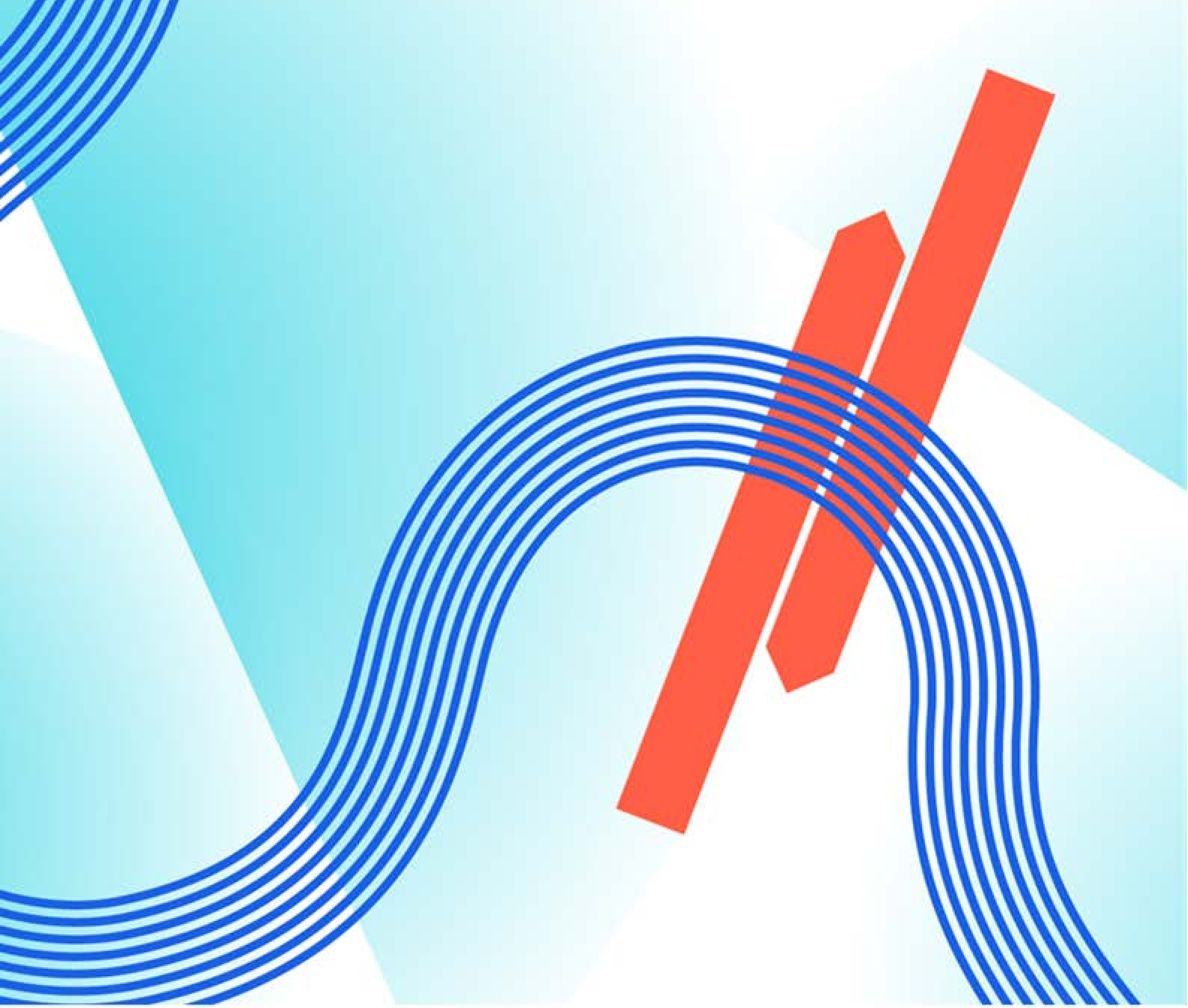
The suite of documents with brief descriptions is listed below:-

- **Preliminary Case for the Scheme**
    - Preliminary Monitoring and Mitigation Strategy
- **Preliminary Charging Report**
- **Preliminary Transport Assessment**
- **Preliminary Design and Access Statement**
- **Preliminary Engineering Report**
- **Preliminary Maps, Plans and Drawings**
- **Preliminary Environmental Information Report (PEIR)**
    - Preliminary Non Technical Summary
    - Preliminary Code of Construction Practice
    - Preliminary Site Waste Management Plan
    - Preliminary Energy Statement
- **Preliminary Sustainability Statement**
- **Preliminary Equality Impact Assessment**
- **Preliminary Health Impact Assessment**
- **Preliminary Outline Business Case**
    - Preliminary Distributional Impacts Appraisal
    - Preliminary Social Impacts Appraisal
    - Preliminary Economic Assessment Report
    - Preliminary Regeneration and Development Impact Assessment

SILVERTOWN TUNNEL

Preliminary Transport Assessment

October 2015



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Silvertown Tunnel

Preliminary Transport Assessment

Planning Act 2008

Infrastructure Planning

The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

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1	02/10/2015	David Rowe (TfL Lead Sponsor)		For Consultation
		Richard De Cani (TfL MD Planning)		

Contents

List of Abbreviations

Abbreviation	Full name
AADT	Average Annual Daily Traffic
AAWT	Average Annual Weekday Traffic
ADS	Advance Directional Sign
AMCB	Analysis of Monetised Costs and Benefits
ANPR	Automatic Number Plate Recognition
AQMA	Air Quality Management Area
ATC	Automated Traffic Counts
BCR	Benefit to Cost Ratio
BTP	British Transport Police
CABE	Commission for Architecture and the Built Environment
CAZ	Central Activities Zone
CC	Congestion Charging
CCTV	Closed Circuit Television
CLOS	Cyclist Level of Service
CMP	Construction Management Plan
COBA-LT	Cost and Benefit to Accidents - Light Touch
CoCP	Code of Construction Practice
CRRN	Compliance Risk Road Network
CS	Construction Statement
CSH	Cycle Superhighway
CTMP	Construction Traffic Management Plan
DAS	Design and Access Statement
DCO	Development Consent Order
DfT	Department for Transport
DLR	Docklands Light Railway
DMRB	Design Manual for Roads and Bridges
EAL	Emirates Air Line
EAR	Economic Assessment Report
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
ELHAM	East London Highway Assignment Model
ES	Environmental Statement
ESR	East and South-East Sub-Region
EWT	Excess Wait Time
FALP	Further Alterations to the London Plan
GLA	Greater London Authority
HGV	Heavy Goods Vehicle
IER	Introductory Environmental Report
IoD	Index of Deprivation
IoMD	Index of Multiple Deprivation
KPI	Key Performance Indicator

Abbreviation	Full name
LA	Local Authority
LB	London Borough
LCAP	London Congestion Analysis Project
LDF	Local Development Framework
LEZ	Low Emission Zone
LGV	Light Goods Vehicle
LIP	Local Implementation Plan
LMVR	Local Model Validation Report
LoRDM	London Regional Demand Model
LSOA	Lower Super Output Area
LSTOC	London Streets Tunnel Operations Centre
LTDS	London Travel Demand Survey
LTS	London Transportation Studies
MCA	Maritime and Coastguard Agency
MCC	Manual Classified Counts
MTS	Mayor's Transport Strategy
MWC	Main Works Contractor
NMU	Non-Motorised Users
NNNPS	National Networks National Policy Statement
NPPF	National Planning Policy Framework
NPPG	National Planning Practice Guidance
NPV	Net Present Value
NSIP	Nationally Significant Infrastructure Project
NTEM	National Trip End Model
OAPF	Opportunity Area Planning Framework
OBC	Outline Business Case
OLSPG	Olympic Legacy Supplementary Planning Guidance
ONS	Office for National Statistics
PCN	Penalty Charge Notice
PCU	Passenger Car Unit
PEIR	Preliminary Environmental Information Report
PERS	Pedestrian Environment Review System
PHV	Private Hire Vehicle
PINS	Planning Inspectorate
PLA	Port of London Authority
PPG	Planning Policy Guidance
PPS	Planning Policy Statement
PTAL	Public Transport Accessibility Level
PTWA	Public Transport Waiting Area
PVB	Present Value of Benefits
PVC	Present Value of Costs
PT	Public Transport
QUADRO	Queues and Delays at Road Works

Abbreviation	Full name
RB	Royal Borough
RRT	Roads Response Team
RSI	Road Side Interview
RSM	Road Space Management
RSPB	Royal Society for the Protection of Birds
RTF	Roads Task Force
RTI	Road Traffic Incident
RXHAM	River Crossings Highway Assignment Model
SACTRA	Standing Advisory Committee on Trunk Road Assessment
SATURN	Simulation and Assignment of Traffic to Urban Road Networks
SCOOT	Split Cycle Offset Optimisation Technique
SoS	Secretary of State
SPD	Supplementary Planning Document
SPG	Supplementary Planning Guidance
SRTP	Sub-Regional Transport Plan
TA	Transport Assessment
TAG	Transport Analysis Guidance
TBM	Tunnel Boring Machine
TDSCG	Tunnel Design and Safety Control Group
TEE	Transport Economic Efficiency
TfL	Transport for London
TLRN	Transport for London Road Network
TMP	Traffic Management Plan
TRL	Transport Research Laboratory
TTT	Thames Tideway Tunnel
TUBA	Transport User Benefit Appraisal
TWAO	Transport and Works Act Order
ULEZ	Ultra Low Emission Zone
UTC	Urban Traffic Control
VMS	Variable Message Sign
VCR	Volume/Capacity Ratio
WI	Wider Impacts
WebTAG	DfT Web-based Transport Analysis Guidance

Glossary of Terms

Term	Explanation
Base year	For the purpose of this Preliminary Transport Assessment, observed conditions on the transport network for 2012 have been used to inform the base year (i.e. the current situation). The base year is frequently used as a comparator with the Reference Case.
Blackwall Tunnel	A road tunnel underneath the River Thames in east London, linking the London Borough of Tower Hamlets with the Royal Borough of Greenwich, comprising two bores each with two lanes of traffic. The tunnel was originally opened as a single bore in 1897, as a major transport project to improve commerce and trade in London's east end. By the 1930s, capacity was becoming inadequate, and consequently, a second bore opened in 1967, handling southbound traffic while the earlier 19th century tunnel handled northbound.
Bus Gate	Bus gates are traffic signals often provided within bus priority schemes to assist buses and other permitted traffic when leaving a bus lane to enter or cross the general flow of traffic or to meter the flow of general traffic as it enters the road link downstream of the bus lane. Depending on their purpose, bus gates can be located remote from other signals or they can be positioned immediately upstream of a signal controlled junction, as a bus pre-signal.
CDM (2015)	The Construction (Design and Management) Regulations 2015 set out the roles and responsibilities of parties involved in construction projects in relation to health and safety during the project life cycle including design, construction operation and maintenance stages.
Contractor	Anyone who directly employs or engages construction workers or manages construction work. Contractors include sub-contractors, any individual self-employed worker or business that carries out, manages or controls construction work
Control Centre	Facility to deal with issues with over-height, illegal and unsafe vehicles going through Blackwall and Silvertown tunnels, and help manage traffic
Cut and Cover	A method of construction for shallow tunnels where a trench is excavated and roofed over with an overhead support system strong enough to carry the load of what is to be built above the tunnel

Term	Explanation
Design, Build, Finance and Maintain (DBFM)	A DBFM company is typically a consortium of private sector companies, formed for the specific purpose of providing the services under the DBFM contract. This is also technically known as a Special Purpose Vehicle (SPV). The DBFM Company will obtain funding to design and build the new facilities and then undertake routine maintenance and capital replacement during the contract period, which is typically 25 to 30 years. The DBFO Company will repay funders from payments received from TfL during the lifespan of the contract. Receipt of payments from TfL will depend on the ability of the DBFO Company to deliver the services in accordance with the output specified in the contract and will be subject to deductions if performance is not satisfactory.
Department for Transport (DfT)	The government department responsible for the English transport network and a limited number of transport matters in Scotland, Wales and Northern Ireland that have not been devolved.
Detailed Design	Design that delivers the required outcomes and is used as the basis of a contract for delivery of the physical outputs
Development Consent Order (DCO)	This is a statutory Order which, if granted, would provide comprehensive consent for the Scheme so that other consents including planning permission and listed building consent, would not be required. A DCO can also include provisions authorising the compulsory acquisition of land or of interests in or rights over land the subject of an application. http://infrastructure.planninginspectorate.gov.uk/help/glossary-of-terms/
Docklands Light Railway (DLR)	An automated light metro system serving the Docklands and east London area. The DLR is operated under concession awarded by Transport for London to KeolisAmey Docklands, a joint venture between transport operator Keolis and infrastructure specialists Amey plc
Emirates Air Line (EAL)	A cable car service across the River Thames in east London, linking the Greenwich peninsula to the Royal Victoria Dock. The service is managed by TfL, and is part of the TfL transport network
Gasholder	A large container in which natural gas is stored near atmospheric pressure at ambient temperatures
Greenwave	Coordinated control of a series of traffic signals to allow continuous traffic flow in a given direction.
Heavy Goods Vehicle (HGV)	European Union term for any vehicle with a gross combination mass of over 3500kg

Term	Explanation
Illustrative Design	An example of how the proposals could be developed at the next stage of design as a result of engagement with the DBFM contractor, planning authority and other relevant stakeholders.
London Streets Tunnel Operations Centre (LSTOC)	LSTOC operates the traffic and tunnel safety systems for various road tunnels in London operated by Transport for London. LSTOC operations are fundamental to the safe and reliable operation of TfL's tunnels and the performance of the wider traffic corridors
Outline Design	Defines the design principles and freezes the scope of the project
Bus and goods vehicle lane	A dedicated highway lane that has restricted occupancy, available for use by buses, HGVs and taxis.
Reference Case	An assumed 'future baseline' scenario, which represents the circumstances and conditions that we would anticipate in the future year without the implementation of the Scheme, taking account of trends (for example in population and employment growth) and relevant developments (such as other committed transport schemes). The Reference Case is frequently used as a comparator for the 'with scheme' (Assessed) Case, to show the effect of the Scheme against the appropriate reference point.
Reference Design	Design proposals that the consultation and DCO application will refer to.
Service Building, Tunnel Service Building, Portal Building	The building housing all control, power supply, and other essential equipment for the operation of the tunnel. Also houses firefighting control and ventilation equipment. Serves as a maintenance base and has the facility to become a standby operations room.
Strategic Road Network	Terminology used by the government to describe the approximately 4,300 miles of motorways and major 'trunk' A-roads in England managed by the Highways England on behalf of the Secretary of State.
The O2	A large entertainment district on the Greenwich peninsular, including an indoor arena, cinema, bars and restaurants. It is built largely within the former Millennium Dome.
The Scheme	The construction of a new bored tunnel under the River Thames between the Greenwich Peninsula and Silvertown, as well as necessary alterations to the connecting road network and the introduction of user charging at both Silvertown and Blackwall tunnels.
Toucan Crossing	A signal controlled crossing that allows pedestrians and cyclists to cross a road safety.

Term	Explanation
Transport for London (TfL)	A local government body responsible for most aspects of the transport system in Greater London. Its role is to implement the Mayor's Transport Strategy and to manage transport services across London. These services include: buses, the London Underground network, Docklands Light Railway, Overground and Trams. TfL also runs Santander Cycles, London River Services, Victoria Coach Station and the Emirates Air Line. As well as controlling a 580km network of main roads known as the Transport for London Road Network (TLRN) and the city's 6,000 traffic lights, TfL regulates London's private hire vehicles and the Congestion Charge scheme.
The Tunnel, Silvertown Tunnel	A new bored tunnel under the River Thames between the Greenwich peninsula and Silvertown.
Tunnel Boring Machine (TBM)	A machine used to excavate tunnels with a circular cross section. There are two main types of closed face TBMs: Earth Pressure Balance (EPB) and Slurry Shield (SS).
User charging	The charge to be paid by users of the Silvertown Tunnel and Blackwall Tunnel that is to be imposed in order to manage demand and help pay for the scheme.
Ventilation Building	Surface level structure of a ventilation equipment, fans and an exhaust shaft, used to move fresh air underground by drawing air from the tunnel and venting it to the atmosphere. Located adjacent to and integral with the Service Buildings.

SUMMARY

S.1 Purpose of this Preliminary Transport Assessment

S.1.1 The Silvertown Tunnel would comprise a new dual two-lane connection between the A102 Blackwall Tunnel Approach on Greenwich Peninsula (Royal Borough of Greenwich) and the Tidal Basin Roundabout junction on the A1020 Lower Lea Crossing/Silvertown Way (London Borough of Newham) by means of twin tunnel bores under the River Thames and associated approach roads.

S.1.2 Transport for London (TfL) is also proposing to introduce free-flow user charging on both the Blackwall and Silvertown Tunnels, which would play a fundamental part in managing traffic demand and support the financing of the construction and operation of the Silvertown Tunnel. The proposed new tunnel and user charging are referred to as 'the Scheme' throughout this document.

S.1.3 The purpose of this Preliminary Transport Assessment (TA) is to describe the transport-related impacts of the Scheme, both on completion and during its construction. Where appropriate it also identifies mitigation measures which are proposed by TfL to address significant impacts. It has been prepared with reference to current guidance produced by both TfL and the Department for Transport (DfT).

S.1.4 The Preliminary TA has been produced with the use of extensive data collection and analysis to determine current transport needs and usage of the network, and extensive traffic modelling has been used to determine the likely future situation with and without the Scheme (referred to within the document as the Assessed Case and Reference Case respectively). It is the primary source of information on the Scheme's traffic and wider transport impacts.

S.2 Scheme description

S.2.1 The Silvertown Tunnel would be approximately 1.4km long and would be able to accommodate large vehicles including double-deck buses. The design of the tunnel would also include a dedicated bus/coach and HGV lane. The Scheme therefore provides opportunities for TfL to significantly enhance cross-river bus routes.

S.2.2 On the north side, the tunnel approach road connects to the Tidal Basin Roundabout, which would be altered to create a new signal-controlled roundabout linking Silvertown Way, Dock Road and Lower Lea Crossing. On the south side, the A102 would be widened to create new slip-road links to the Silvertown Tunnel. A new flyover would be built to take southbound traffic exiting the Blackwall Tunnel over the northbound approach to the Silvertown Tunnel. The Boord Street footbridge over the A102 would be replaced with a new pedestrian and cycle bridge. Main construction works would likely commence in 2018 and would last approximately four years with the new tunnel opening in 2022/23.

S.2.3 Free-flow user charging would be introduced on both the Blackwall and Silvertown Tunnels to help manage the demand for both crossings and keep traffic levels within acceptable limits, and to help raise money to pay for the construction and operation of the new tunnel.

S.3 Policy context

S.3.1 Within the framework of the Planning Act 2008, the proposed Silvertown Tunnel was designated as a Nationally Significant Infrastructure Project (NSIP) by the Secretary of State for Transport. This designation recognised the projected growth of London, and that London is an engine for economic growth nationally. It was also recognised that current congestion at the Blackwall Tunnel is having a significant adverse impact on the strategic road network. Importantly, the size and scale of the Silvertown project was also explicitly stated as a reason for granting NSIP status.

S.3.2 The NSIP designation means that the project will require development consent from the Secretary of State for Transport. The application for a Development Consent Order (DCO) to build and maintain a new tunnel with user charging will be determined in accordance with the National Networks National Policy Statement (NNNPS).

S.3.3 Existing national, regional and local plans and policies give general and specific support to new road-based river crossings in east London, including at Silvertown, to address strategic and local needs for cross-river accessibility and to relieve congestion and improve resilience. A number of national and regional policy documents contain criteria that must be taken into account in the assessment of a new river crossing at Silvertown.

S.4 Current transport networks and performance issues

S.4.1 There are a number of strategically important radial roads in east and south-east London, several of which converge at the Blackwall Tunnel. This makes the Tunnel one of the busiest links on London’s road network, and currently carries an average of around 45,000 daily northbound trips.

S.4.2 The Blackwall Tunnel is however only one of three highway crossings in east London within the GLA area, and is the most strategically important with a capacity around three times that of the Rotherhithe Tunnel and twenty times that of the Woolwich Ferry. The Blackwall Tunnel essentially functions as the lynchpin of the strategic road network in east London, and is heavily used at most times of the day and week.

S.4.3 There has been a period of sustained investment in public transport (PT) capacity across east and southeast London over the past 20 years, with new cross-river links added through the Jubilee Line, DLR, High Speed 1 and the London Overground, and Crossrail will add further to this from 2018. The Emirates Air Line (EAL) also provides a high quality cross-river link along the alignment of the proposed Silvertown Tunnel, catering for pedestrians and cyclists. East of Tower Bridge, the overwhelming majority of cross-river trips are made by rail. However, because of the scarcity of highway crossings there is only a single cross-river bus route operating east of Tower Bridge (via the Blackwall Tunnel), compared to 47 bus routes that cross the river west of Vauxhall Bridge.

S.4.4 In terms of network performance, the Blackwall Tunnel is one of the most heavily congested major traffic routes in the whole of London. Whilst all of the three highway crossings in east London are operating at or close to capacity, high levels of demand at the Blackwall Tunnel in particular mean that there are long queues on the approach roads to the Tunnel particularly in peak periods and average speeds are low. In the northbound direction in the AM peak, queues routinely stretch back 3.2km whilst in the southbound direction in the PM peak queues can often stretch back 2.7km. This congestion can add, on average, around 20 minutes to users' journey times and often more.

S.4.5 Coupled with the day-to-day congestion issues, the cross-river highway network is notoriously unreliable. Whilst congestion and the scarcity of existing crossings are key factors which underlie the sub-optimal performance of the network, another factor is the unusually high susceptibility of the Blackwall Tunnel to incidents and closures which often cause additional delay and congestion. In 2013 there were almost 2,200 incidents recorded at the Tunnel, of which over 1,200 resulted in an unplanned closure. A significant proportion of these incidents were associated with over-height vehicles attempting to use the northbound tunnel bore, which has a height restriction.

S.4.6 When incidents and closures do occur, the adjacent crossings are some distance away (particularly the Dartford Crossing which has the highest capacity). Moreover, these alternative crossings have little spare capacity to accommodate diverted traffic, hence the impact of incidents at the Blackwall Tunnel on the wider network can be significant.

S.4.7 A consequence of these issues is that there is significant variability in journey times for journeys made via the Blackwall Tunnel, in particular in the northbound direction in the AM peak. In fact, journey time reliability on the

Blackwall Tunnel corridor is notably lower than for any other radial corridor on the TLRN both in the AM and PM peak periods. This often has knock on impacts on other strategic road corridors, as users re-route away from the Blackwall Tunnel when congestion is particularly heavy and when there are closures.

S.4.8 The PT network is better able to accommodate demand; however access to PT (and particularly bus services) is relatively poor in some parts of east and south-east London as a result of the very limited cross-river bus network. Bus route 108, the one bus service which uses the Blackwall Tunnel, can suffer from slow peak journey speed, poor reliability and major disruption during times the Tunnel is closed. It also has to operate with single deck vehicles due to the height restriction on the northbound tunnel bore.

S.5 Future 'baseline' growth and impacts

S.5.1 Population and employment is forecast to rise rapidly across London between 2011 and 2031, but particularly in the East and South-East Sub Region (ESR). Population in ESR boroughs is forecast to grow by 20% over this period (compared to 14% across London) while employment is forecast to grow by 17% (compared to 14% across London). Forecast growth is higher still in the three Silvertown Tunnel host boroughs of Greenwich, Newham and Tower Hamlets, with population rising by 27% and employment rising by 25%.

S.5.2 As a result of this growth, it is forecast that between 2012 and 2021 the total volume of trips will continue to rise across the ESR by over 10%. Most of these new trips will be made on the PT network, and the planned investment in PT capacity and connectivity means these trips can be accommodated on the PT network albeit with some degree of standing and crowding. PT mode share in the host boroughs is forecast to increase from 48% to 52%.

S.5.3 Nonetheless, because not all journeys can be made by PT and levels of freight traffic will increase, there will inevitably be some growth in trips made by private vehicles. Demand for the existing river crossings will hence increase further. At the Blackwall Tunnel, demand relative to capacity will increase significantly at peak times, and in particular in the southbound direction of the PM peak where demand relative to actual flow is forecast to increase from 104% in 2012 to 142% in the Reference Case. The resultant levels of delay and congestion on the approaches to the Blackwall Tunnel would be significantly higher than current levels.

S.5.4 In a future year scenario without the Silvertown Tunnel scheme therefore, the absence of new road crossings means there will be limited capacity for growth in road vehicle trips between east and south-east London, which will lead to increased levels of queuing and congestion on the approaches to existing crossings. As a result average journey times and delays – which are already significant – are expected to increase significantly across the area, with knock-on negative impacts for network resilience, thereby exacerbating existing network performance problems, and connectivity to labour markets (for businesses) and jobs (for residents).

S.6 Impacts of the Scheme during construction

S.6.1 The indicative construction programme for the Scheme is around four years, and the programme would require the establishment of a works site around each proposed tunnel portal location.

S.6.2 The Silvertown works site north of the River Thames is likely to be the main works site as it would minimise the impact on current land uses and maximise the potential use of river transport, as the construction of the Silvertown Tunnel would require the transport of a large volume of excavated material. River transport of excavated material, know as spoil, and construction materials and goods could therefore be used as far as practical to minimise the number of HGV movements on the road network, and it is estimated that spoil removal by barge could avoid over 178,000 two-way lorry movements over the four year construction period.

S.6.3 However, even assuming a worst case scenario where all spoil and other construction-related equipment and materials would need to be transported by road, it is not expected that there would be a significant adverse impact on the surrounding networks. Construction traffic routes to the works sites would primarily be along strategic routes such as the A12, the A13, the A102 and the A2, and forecast construction traffic would constitute a small proportion of total flow expected on these routes during the construction work phases.

S.6.4 The tunnel works sites at Greenwich and Silvertown would lead to some localised impacts e.g. access to residences and businesses in the immediate area. A range of mitigation measures have been identified as a result, including temporary diversions for vehicular traffic, pedestrians and cyclists.

S.6.5 In general, the impacts on the surrounding networks for all transport modes would be relatively small for a scheme of this size as the construction sites would be conveniently located in relation to river and main road access.

S.7 Impacts of the Scheme on completion

S.7.1 The most pronounced transport impacts of the Silvertown Tunnel scheme once open would generally be seen in the local area surrounding the scheme (i.e. the Blackwall and Silvertown Tunnels and their approach roads).

S.7.2 At the busiest times of the day, when levels of demand to use the Blackwall Tunnel are at their highest, traffic flows in 2021 through the Blackwall and Silvertown Tunnels combined (the Assessed Case) are forecast to be higher than would be the case through the Blackwall Tunnel alone without the Scheme (the Reference Case). Small reductions in traffic flow are forecast for the majority of the day outside of these times, and the net result is no significant change in daily cross-river traffic flows.

S.7.3 The increase in traffic flow through the tunnels at the busiest times – namely the northbound directions in both AM peak hour and the southbound direction in the PM peak hour – is made possible through the additional cross-river capacity that would be provided by the Silvertown Tunnel. However, in the Assessed Case the actual demand to use the tunnels reduces in these periods and, unlike the Reference Case, traffic flows match demand in all periods, which illustrates that congestion and delay on the approaches to the tunnels are virtually eliminated. This demonstrates the potential of the Scheme to increase the throughput of vehicles through the tunnels at the busiest times without causing overall increases in traffic, through a combination of new capacity and demand management. Overall the user charge is assessed as providing an effective mechanism for avoiding induced traffic.

S.7.4 The ability to use the Blackwall and Silvertown Tunnels without encountering significant delay and congestion means that drivers are more likely to travel at the time of their choosing, rather than earlier or later in order to avoid the worst of the traffic (provided they are prepared to pay the relevant user charge). The peak periods – which are currently very extended – could therefore contract at the Blackwall and Silvertown Tunnels, so that the distribution of trips across peak periods would come more into line with other major routes in London.

S.7.5 Journey times through the Blackwall Tunnel in peak periods and peak directions would be reduced by around 20 minutes or more, leading to improved connectivity for residents and businesses in east and southeast London. As well as significantly improving journey times and the day-to-day reliability of the road network, the Scheme would considerably enhance network resilience through reducing the number of over-height vehicle incidents and the impact of incidents at the Blackwall Tunnel when they do occur. The scheme would also significantly enhance the resilience of the network in the event of a long-term closure of the Blackwall Tunnel (e.g. for planned maintenance work).

S.7.6 Changes elsewhere on the network and at all other crossings in east London are minimal across all three modelled time periods, suggesting that the overall pattern of traffic would not be significantly impacted by the Scheme.

Where increases in traffic flows at other crossings are forecast, these increases are small relative to total flows and occur at times when the crossings are operating with spare capacity.

S.7.7 At the overall level, across the ESR as a whole and the three host boroughs, the total number of trips made by private vehicles is not forecast to change as a result of the Scheme. In fact, a marginal decrease in private trips is forecast as cross-river trips switch to PT modes (most notably the enhanced cross-river bus services that would be made possible by the Scheme). Noticeable reductions in Volume to Capacity Ratio (VCR) and junction delay are forecast on the approaches to the Blackwall Tunnel; where negative changes are identified at junctions across the wider network the impacts are generally minimal and not at a scale that warrants proposals for mitigation. It is proposed that these junctions would be monitored and appropriate mitigation implemented as necessary. Further information on this is available in the Preliminary Monitoring and Mitigation Strategy.

S.7.8 A major benefit of the Scheme is the opportunity it provides to significantly enhance the bus network. Through reducing delay and providing a full-height tunnel with designated lanes for buses and HGVs, new and extended cross-river bus routes, amounting to around forty buses per hour per direction, could be provided which would considerably improve public transport accessibility in the areas served. In 2021 it is forecast that almost 30% of trips made through the Blackwall and Silvertown Tunnels could be made via bus or coach, compared to just over 10% today.

S.7.9 The Scheme provides the opportunity for improving conditions for pedestrians and cyclists in the vicinity of the Silvertown Tunnel, for instance through enhancing access to the EAL. One of the requirements for the 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.

S.7.10 Access to the labour market and jobs would, on the whole, be significantly improved with the Scheme. Accessibility to jobs by public transport would improve in all time periods as a result of the enhanced bus network made possible by the Scheme and the journey time and reliability benefits it would bring for bus users. Accessibility by private vehicle would also improve significantly in journey time terms, with residents south of the River Thames estimated to see over 200,000 additional potential jobs accessible within a 45 minute journey time in the AM peak. Whilst the introduction of the user charge would mean accessibility for car commuters would be negatively impacted in terms of generalised cost, car-based business trips would generally see a significant improvement due to the higher values of time for these trips. Businesses and freight users would particularly benefit from the accessibility improvements provided by the Scheme.

S.8 Next steps

S.8.1 Following the statutory consultation, it is planned that this Preliminary TA will be updated to take into account the feedback received and to reflect modifications to the proposed scheme that are included in the DCO application to the Secretary of State for Transport, which is expected to be submitted in 2016.

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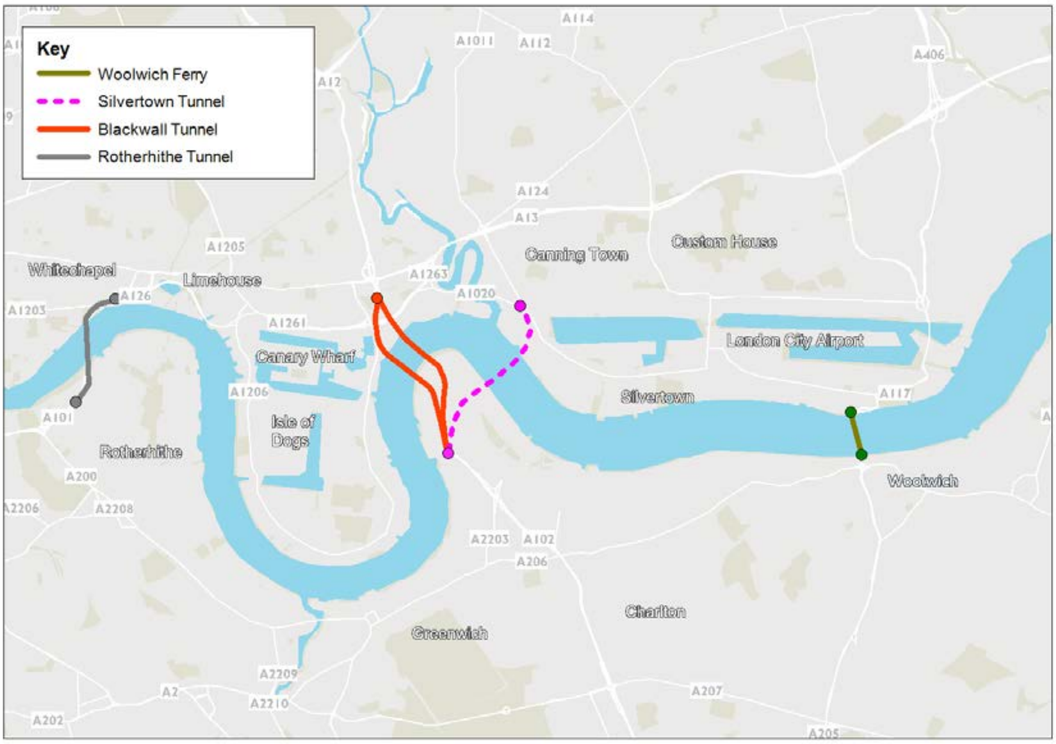
1 INTRODUCTION

1.1 Purpose of Transport Assessment

1.1.1 The Silvertown Tunnel would comprise a new dual two-lane connection between the A102 Blackwall Tunnel Approach on Greenwich Peninsula (Royal Borough of Greenwich) and the Tidal Basin Roundabout junction on the A1020 Lower Lea Crossing/Silvertown Way (London Borough of Newham) by means of twin tunnel bores under the River Thames and associated approach roads. The location of the proposed tunnel is shown in Figure 1-1.

Figure 1-1: Overview of proposed Silvertown Tunnel location



1.1.2 TfL is also proposing to introduce free-flow user charging on both the Blackwall and Silvertown Tunnels[1], which would play a fundamental part in managing traffic demand and support the financing of the construction and operation of the Silvertown Tunnel. The proposed new tunnel and user charging are referred to as 'the Scheme' throughout this document.

1.1.3 The purpose of this Transport Assessment (TA) is to summarise the transport-related impacts of the Scheme and the mitigation measures proposed by TfL to address significant impacts. It has been prepared with

[1] It not proposed that user charges are implemented at the Rotherhithe Tunnel or the Woolwich Ferry as part of the Scheme.

reference to current guidance produced by both TfL[2] and the Department for Transport (DfT)[3].

1.1.4 TfL has published a suite of documents covering different aspects of the Scheme for statutory consultation in October 2015. These documents are sign-posted at the beginning of this document, and the TA should be read in conjunction with the other documents listed for a full understanding of the Scheme and its implications.

1.1.5 Following the statutory consultation, the TA will be updated to take into account the feedback received and to reflect modifications to the proposed scheme that are included in the Development Consent Order (DCO) application to the Secretary of State for Transport, which is expected to be submitted in 2016. The requirement for a DCO is a result of the classification of the scheme as a Nationally Significant Infrastructure Project (NSIP) – further details are provided in Chapter 2.

1.2 The need for the scheme

1.2.1 The Scheme is proposed in response to the three transport problems that exist currently at the Blackwall Tunnel: congestion, frequent closures and a lack of resilience (owing to the lack of proximate alternative crossings). These issues lead to adverse effects on the economy and local environment. In the context of continued significant growth, these problems can only get worse, and in turn their secondary impacts will increase. Failing to address these problems could hamper the sustainable and optimal growth of London and the UK.

1.2.2 The importance of an effective river crossing in east London for national growth is recognised in the designation of the Scheme as a NSIP. The designation letter states that congestion at the Blackwall Tunnel is having an impact on the national road network that the Scheme could address. Critically, it highlights why the proposal has national significance: given the position of London as an economic driver nationally, any decrease in efficiency in London's transport network may have a consequential detrimental impact nationally.

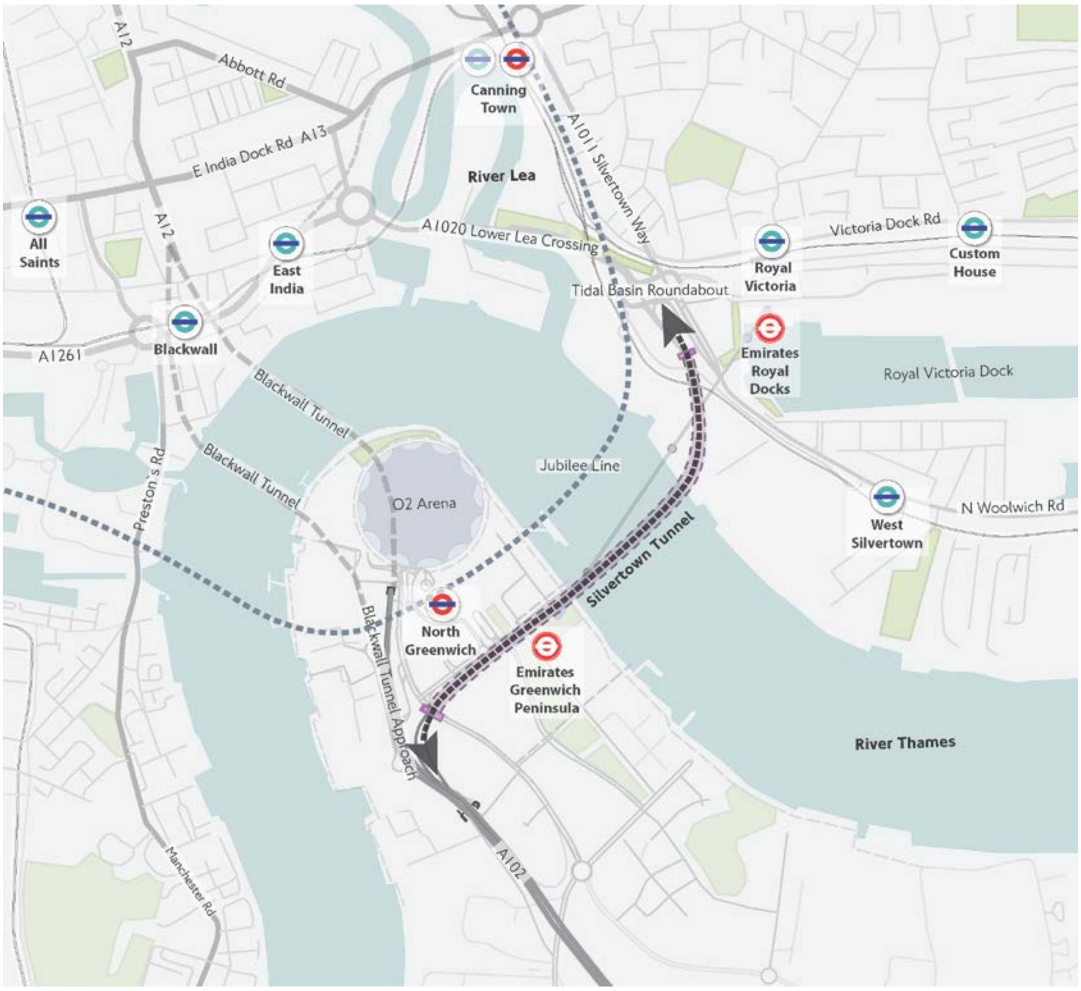
[2] http://www.tfl.gov.uk/info-for/urban-planning-and-construction/transport-assessment-guidance
[3] http://planningguidance.planningportal.gov.uk/blog/guidance/transport-evidence-bases-in-plan-making/transport-evidence-bases-in-plan-making-guidance/; http://planningguidance.planningportal.gov.uk/blog/guidance/travel-plans-transport-assessments-and-statements-in-decision-taking/transport-assessments-and-statements/; https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/237412/dft-circular-strategic-road.pdf

1.2.3 The need to act becomes more pressing as London continues to grow and land-uses in east London have changed to reflect a developing economy and growing population. Much of the land around the safeguarded area for the Scheme is now high-density residential, and more development is forthcoming both on the Greenwich Peninsula and at Royal Docks, major Opportunity Areas which are both in close proximity to the Scheme. Although the safeguarding means that it is feasible to build a tunnel, competing demands for space will make this more difficult in the future. There exists now a window of opportunity to construct the tunnel, but it will not stay open for long.

1.3 Scheme description and objectives

1.3.1 The Silvertown Tunnel would be approximately 1.4km long and would be able to accommodate large vehicles including double-deck buses. The design of the tunnel would include a dedicated bus/coach and HGV lane, which would provide opportunities for TfL to provide additional cross-river bus routes. Figure 1-2 shows the proposed alignment in more detail.

Figure 1-2: Proposed Silvertown Tunnel alignment



1.3.2 On the north side, the tunnel approach road connects to the Tidal Basin Roundabout, which would be altered to create a new signal-controlled roundabout linking Silvertown Way, Dock Road and Lower Lea Crossing. Dock Road would be realigned to accommodate the new tunnel and approach road. On the south side, the A102 would be widened to create new slip-road links to the Silvertown Tunnel. A new flyover would be built to take southbound traffic exiting the Blackwall Tunnel over the northbound approach to the Silvertown Tunnel. The Boord Street footbridge over the A102 would be replaced with a pedestrian and cycle bridge.

1.3.3 New portal buildings would be located close to each portal to house the plant and equipment necessary to operate the tunnel, including ventilation equipment.

1.3.4 Main construction works would likely commence in 2018 and would last approximately four years with the new tunnel opening in 2022/23. A Tunnel Boring Machine (TBM) would be used to bore the main tunnel sections under the river with shorter sections of cut and cover tunnel at either end linking to the portals. The proposal is to erect and launch the TBM from a specially constructed chambers at Silvertown and Greenwich Peninsula where the bored and cut and cover sections connect. The main site construction compound would be located at Silvertown to utilise Thames Wharf to facilitate the removal of spoil and delivery of materials by river. A secondary site compound would be located adjacent to the alignment of the proposed cut and cover tunnel on the Greenwich peninsula.

User charging

1.3.5 Free-flow user charging would be introduced on both the Blackwall and Silvertown Tunnels, for two principal reasons:

- to help manage the demand for both crossings and keep traffic levels within acceptable limits; and
- to help raise money to pay for the construction and operation of the new tunnel.

1.3.6 With regard to managing demand, the Silvertown Tunnel on its own would add highway capacity that would go some way towards addressing the three transport problems of the Blackwall Tunnel. However, the provision of additional highway capacity to address congestion in urban areas can prove to be of short-lived benefit. This reflects a effect known as ‘induced traffic’, when the increased convenience of driving (for example owing to reduced journey times) attracts additional traffic to the point where queues eventually reach their former levels. At this point, congestion on the road network surrounding the crossing would increase, offsetting the benefits of the scheme. Further discussion of changing demand as a result if the Scheme and induced traffic specifically can be found in Chapter 7 and Appendix B of this document respectively.

1.3.7 This potentially negative effect can be removed with a user charge, which locks in the benefits of the additional highway capacity for the long-term by controlling demand for the tunnel. It is important to apply a charge at both tunnels in order to prevent drivers switching from a single charged tunnel to a 'free' tunnel and so maintain the decongestion benefits overall. Charging would only be implemented at the Blackwall Tunnel once the Silvertown Tunnel is operational, and TfL anticipates that it would be a long-term measure, continuing for at least as long as its traffic-management effects were required.

1.3.8 The user charge also provides a means of helping to pay for the construction and operation of the tunnel. Charging users generates a relatively stable long-term source of revenue that can support both the servicing and repayment of construction finance (either publically or privately raised) and ongoing operation and maintenance costs. It is an approach that has been adopted for similar schemes around the world and there is an established market for financing on this basis (the Mersey Gateway Bridge being a recent example). Charging can also mitigate some of the environmental and social effects of the Scheme and support growth.

1.3.9 In the previous Silvertown Tunnel public consultation (October 2014), TfL made available its Outline Strategy for user charging. TfL has now set out an indicative charging regime for the opening year of the scheme, summarised in Table 1-1. Views on this proposal are being sought in the consultation and TfL will take these into account.

1.3.10 The assessment of the Scheme impacts described in this document was all based on the charging regime summarised in the table. However, many of the benefits of a user charge described above are contingent on the way that the charge is defined and managed and for this reason it is proposed that TfL can vary its approach to charging in future, to ensure that it continues to meet its objectives and maintain a balance between its different effects.

1.3.11 This power to vary encompasses many aspects of the charge: its level, the time of travel, vehicle type direction of travel and any discounts and exemptions, for example. This multi-dimensional quality increases the flexibility and responsiveness of the charge which is critical if it is to remain effective in the future.

Table 1-1: Assessed charge per trip in 2014/15 prices[4]

	Charging hours are 6am to 10pm		
	Account holder (registered for auto pay)		Non-account holder
User type	**Off peak charge[5]**	**Peak charge[6]**	**All times**
Motorcycle, moped, motor tricycle	c.£1.00	c.£2.00	c.£3.00
Car and small van	c.£1.00	c.£3.00	c.£4.00
Large van and minibus	c.£1.65	c.£5.00	c.£6.00
HGVs	c.£4.00	c.£7.50	c.£8.50
Bus and Coach	Free (100% discount)	Free (100% discount)	Free (100% discount)

Scheme objectives

1.3.12 Scheme objectives were identified with reference to the need for the scheme summarised above, and also draw from the National Policy Statement for National Networks, Mayoral policy as defined in the London Plan and Mayor's Transport Strategy (MTS), and scheme development work undertaken to-date. The following scheme 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 economic and population growth, in particular in east and southeast London by providing improved cross-river transport links;
- PO4: to integrate with local and strategic land use policies;
- PO5: to minimise any adverse impacts of any proposals on communities, 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 and, through road user charging, to manage congestion.

[4] Assessed charges stated in today's prices, the assumption is that these would increase for general inflation between now and tunnel opening. After the tunnel opens, the charge would increase for general inflation on a periodic basis.
[5] Weekdays outside of peak period and all times on weekend.
[6] Weekday peak periods between 6-10 am (northbound only) and 4-7 pm (southbound only).

1.3.13 The Preliminary Case for the Scheme document contains an appraisal of all scheme options against the above project objectives.

1.4 Previous consultations

1.4.1 As part of the development of the Scheme, TfL published a suite of documents for consultation in October 2014. A separate consultation was also undertaken on proposals for replacement of the Woolwich Ferry and new crossings east of Silvertown. These proposals were, and remain, outside the scope of the Scheme.

1.4.2 The consultation, which ran until December 2014, resulted in over 4,600 responses from businesses, organisations, local authorities, government departments and members of the public. Two separate reports were subsequently published by TfL, addressing the outcomes:

- The Consultation Analysis Report[7], published in March 2015 detailing all the issues raised by respondents to the consultation; and
- The Responses to Issues Raised Report[8], published in June 2015 detailing TfL's response to the aforementioned issues.

1.5 Assessment tools, modelling and data

1.5.1 For the purpose of assessment and quantification, a number of transport planning tools and models were used to assess future year scenarios with and without the Scheme in place.

1.5.2 The River Crossings Highway Assignment Model (RXHAM) was used to assess strategic highway network conditions in the following scenarios:

- Base year (2012 was used);
- Future Reference Cases (for 2021, 2031 and 2041) without the Scheme ('do minimum'); and
- Future Assessed Cases (for 2021, 2031 and 2041) with the Scheme ('do something').

1.5.3 The use of 2012 as a base year and 2021 as a future year for the Assessed Case (with the Scheme in place) conforms to WebTAG guidance on the selection of base and forecast years.

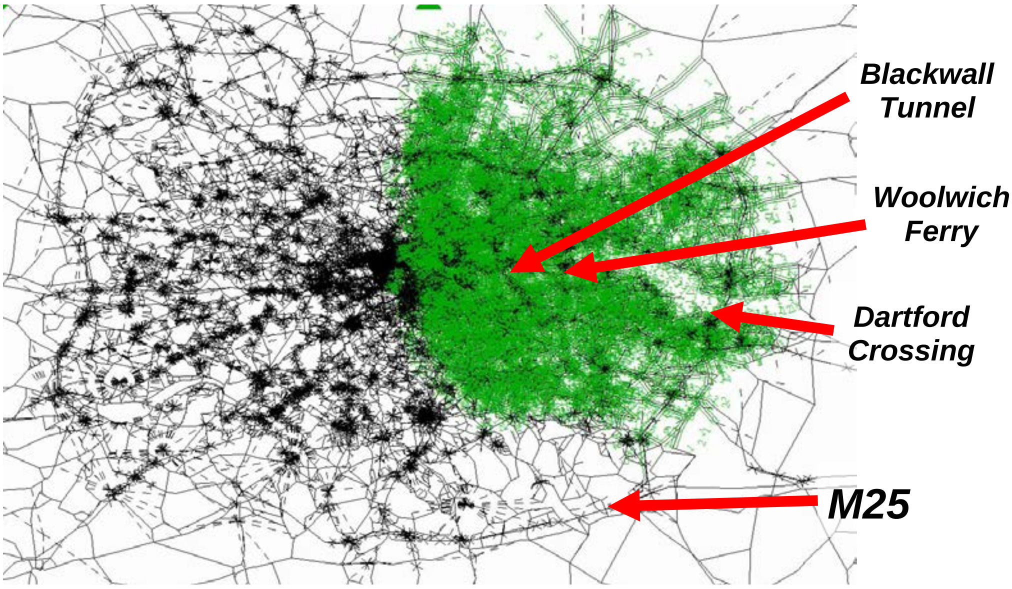
1.5.4 RXHAM was developed using industry-standard SATURN strategic traffic modelling software to assess the impact of new river crossings on highway

[7] https://consultations.tfl.gov.uk/rivercrossings/silvertown-consultation/user_uploads/silvertown-tunnel-consultation-report.pdf
[8] https://consultations.tfl.gov.uk/rivercrossings/silvertown-consultation/user_uploads/silvertown-responses-to-issues-raised-report.pdf-1

network performance in the wider East/South-East London area. The model was based on TfL's existing sub-regional East London Highway Assignment Model (ELHAM), with amendments made to enhance the model in the vicinity of river crossings[9].

1.5.5 The RXHAM simulation area is shown in green on the plan in Figure 1-3 and represents the area where all modelled junctions are coded in detail including signal timings etc. – the surrounding buffer area shown in black does not include detailed junction coding, and traffic assignment is based on indicative link capacity.

Figure 1-3: RXHAM simulation area (shown in green)



1.5.6 In order to assess more localised highway impacts, TRANSYT and LINSIG models were used to assess individual junctions.

1.5.7 Proposals for new river crossings to the east of Silvertown were outside the scope of the assessment as they are not committed. The Reference Cases included an assumption that the Woolwich Ferry will be retained as a free service and that the Rotherhithe Tunnel will remain un-charged.

1.5.8 TfL's Railplan Public Transport (PT) Assignment Model was used to assess the impact of potential enhancements to the cross-river bus network facilitated by the Scheme. Railplan is a PT model that predicts the PT mode (rail, underground, bus) and route that a person would choose to get to their destination, as well as the associated crowding impacts.

[9] Further information on TfL's strategic models is available at: https://tfl.gov.uk/corporate/publications-and-reports/strategic-transport-and-land-use-models

1.5.9 Estimates of trip generation and distribution for the future year assessments were derived from TfL's London Transportation Studies (LTS) model and the London Regional Demand Model (LoRDM). LTS uses population and employment forecasts and other inputs to predict the number of trips to be made in London in future, while LoRDM is a demand balancing model that is similar to LTS but uses the RXHAM and Railplan to model route choice.

1.5.10 A Public Transport Accessibility Level (PTAL) assessment was also undertaken to measure the impact on accessibility of potential enhancements to the bus network as a result of the Scheme. PTAL measures the accessibility of a location to the PT network, taking into account walk access times to stops and stations and service frequencies. The method provides a way of measuring the density of the PT network at any location in Greater London. Scoring ranges from 0 to 40+, with scores then banded into levels from 1a (very poor accessibility by London standards) to 6b (very good accessibility by London standards).

1.5.11 The assessment of impacts of the Scheme on pedestrians and cyclists was informed by the completion of a 'Pedestrian Environment Review System' (PERS) assessment and a 'Cycling Level of Service' (CLoS)-style assessment. PERS is a tool that measures the quality of the pedestrian environment through subjective review, and generates a measure of the quality and condition of pedestrian facilities. CLoS is a tool that focuses on the 'rideability' of cycling infrastructure and provides a common standard for assessing the performance of links and junctions.

1.5.12 Data was obtained from a range of sources, including traffic counts, centrally held databases, road side interviews and bespoke assessments. Wherever possible the sources of data used in this TA have been referenced.

1.6 Transport Assessment document structure

1.6.1 The structure of this TA is as follows:

- Chapter 2 summarises the national, regional and local policy and plans relevant to delivery of the Silvertown Tunnel scheme;
- Chapter 3 describes the current transport networks in the vicinity of the tunnel and describes the current travel patterns on the aforementioned networks, covering all modes of transport;
- Chapter 4 highlights current issues concerned with poor network performance and quality of provision, informed by the review of transport networks and travel patterns;
- Chapter 5 describes how those issues are likely to evolve in a future Reference Case scenario without the Scheme in place;
- Chapter 6 identifies the transport-related impacts of the construction

phases of the scheme, including forecasts of construction-related traffic and associated impacts on the road network in the vicinity of the tunnel work-sites;

- Chapter 7 identifies the transport-related impacts of the scheme following its completion, covering all modes of transport in an opening year of 2021 plus assessments of 2031 and 2041 – the analysis in this chapter is focussed on the Assessed Case proposal summarised earlier;
- Chapter 8 summarises the findings of the TA and potential mitigation measures.

2 RELEVANT TRANSPORT POLICY AND PLANS

2.1 Overview

2.1.1 This chapter sets out the key national, regional and local planning policy documents that are relevant to the Scheme. A detailed appraisal of the Scheme against these policies is set out in the Case for the Scheme document.

2.2 National policy

National Networks National Policy Statement (NNNPS)

2.2.1 On 17 December 2014 the final version of the NNNPS was published with formal designation occurring in January 2015. The Planning Act 2008 requires applications to be decided in accordance with the relevant National Policy Statement (NPS).

2.2.2 The NNNPS deals with road and rail at a strategic level. Section 2 of the NNNPS sets out what road and rail NSIP schemes such as Silvertown Tunnel need to deliver:

- "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 and resilience 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".

2.2.3 The NNNPS also gives consideration of user charging 'to fund new capacity and/or manage demands on roads or proposed roads' (paragraph 3.26).

National Planning Policy Framework (NPPF)

2.2.4 The 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. Paragraph 3 states that, while the NPPF 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.

2.2.5 The NPPF highlights a 'presumption in favour of sustainable development', which should be seen as a 'golden thread' running through both plan-making and decision-taking.

Nationally Significant Infrastructure Projects (NSIPs)

2.2.6 In June 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 and must be determined in accordance with the relevant national policy statement and any other matters which the Secretary of State thinks are both important and relevant. The NNNPS notes that, in the context of section 35 schemes, the relevant development plan is likely to be an important and relevant matter especially in establishing the need for the development.

2.2.7 The Scheme was considered to be of national significance for the following reasons:

- London as an engine for economic growth nationally;
- the projected growth of London;
- current congestion at the Blackwall Tunnel is having a direct impact on the strategic road network;
- the size and nature of the Silvertown Tunnel scheme and comparison to other NSIPs.

2.2.8 The Secretary of State for Transport must have regard to the NNNPS in determining the application for the Silvertown Tunnel scheme.

2.3 Regional policy

London Plan

2.3.1 The London Plan is the overall strategic plan for London. The document sets the economic, environmental, transport and social framework for London. It forms part of the development plan for London and London Boroughs' local plans need to be in general conformity with it. This version was first published in July 2011. It was updated in 2013 to ensure conformity with the NPPF and draft further alterations were consulted on in 2014 with the consolidated plan published in March 2015.

2.3.2 Chapter 3 of the London Plan (2015) sets out the need for river crossings in east London, which include:

- “a new road-based tunnel crossing between the Greenwich Peninsula and Silvertown” (6.20).

2.3.3 Policy 6.12 outlines the assessment criteria for new roads or increasing road capacity in London. This includes:

- 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, PT users, freight and local residents can be improved; and
- how safety for all is improved.

2.3.4 Policy 6.12 also states that ‘proposals 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 (MTS)

2.3.5 The MTS (2010) is part of the strategic policy framework to support and shape the economic and social development of London over the next 20 years. It sets out the Mayor’s transport vision for London. It also includes details on how Transport for London and partners will deliver the plan over the next 20 years.

2.3.6 The MTS at 5.8 sets out the need for new river crossings in east London and the need for:

- “additional road-based river crossings in east London as part of a package of transport improvements” (394).

2.3.7 Proposal 39 sets out that the Mayor will take forward a package of river crossings that will include:

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

2.3.8 MTS proposal 130 refers to consideration of managing demand through pricing. It states that:

- “the Mayor will also consider imposing charges or tolls to support specific infrastructure improvements, such as river crossings”.

2.4 Local policy

2.4.1 Each of the three host boroughs has a suite of documents that form the development plan for the borough.

Royal Borough of Greenwich

2.4.2 The current relevant development plan documents for Greenwich comprise:

- Core Strategy with Detailed Policies, July 2014;
- Greenwich Peninsula West Masterplan SPD 2012.

2.4.3 Royal Borough of Greenwich's Core strategy policy IM3 states that they will work to:

- "deliver a new package of Thames river crossings in East London including the continued safeguarding of the Silvertown Link Tunnel".

London Borough of Newham

2.4.4 The current relevant development plan documents for Newham comprise:

- Core Strategy, January 2012;
- Saved Unitary Development Plan policies, February 2012;
- Royal Docks Vision, March 2011;
- Canning Town and Custom House SPD, July 2008;
- Royal Docks OAPF, anticipated for adoption during 2016.

2.4.5 LB Newham's Core strategy policy S1 supports improving connectivity including new river crossings. Policy INF1 states that support will be given to safeguarded river crossings at West Silvertown and Gallions Reach as well as to other river crossings.

London Borough of Tower Hamlets

2.4.6 The current development plan documents for Tower Hamlets comprise:

- Core Strategy, September 2010; and
- Managing Development Document, April 2013.

2.5 Key points

2.5.1 The proposed Silvertown Tunnel has been designated as a 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 from the Secretary of State for Transport under the Planning Act 2008. The application for development consent must be determined in accordance with the NNNPS.

2.5.2 Existing national, regional and local plans and 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 must be taken into account in the assessment of a new river crossing at Silvertown.

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3 CURRENT TRANSPORT NETWORKS AND TRAVEL BEHAVIOUR

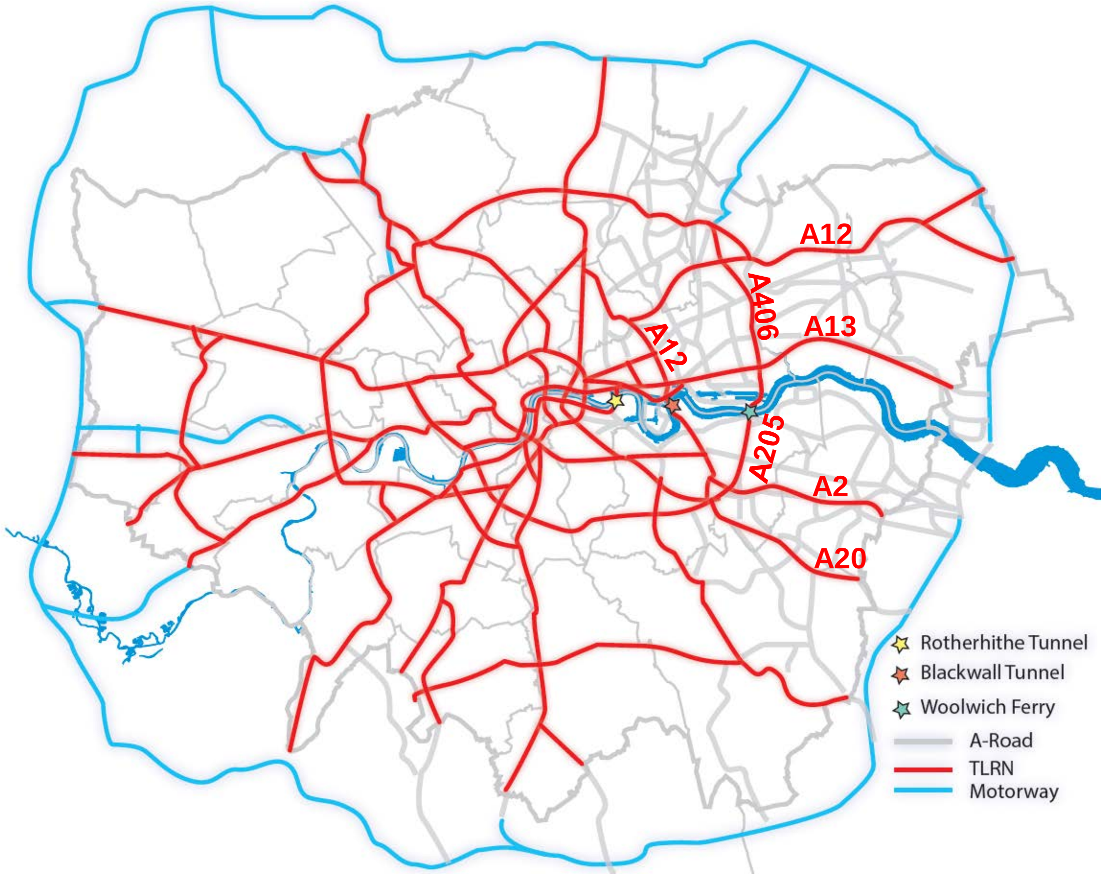
3.1 Overview

3.1.1 This chapter describes the transport networks that facilitate existing movement 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 Road network

3.2.1 As in other parts of London, TfL has responsibility for managing the strategic roads of east and south-east London, in the form of the Transport for London Road Network (TLRN). The TLRN and (for east and south-east London) the A-road network under the responsibility of the Boroughs are highlighted in Figure 3-1, which also identifies the locations of the three highway river crossings in the GLA area east of Tower Bridge.

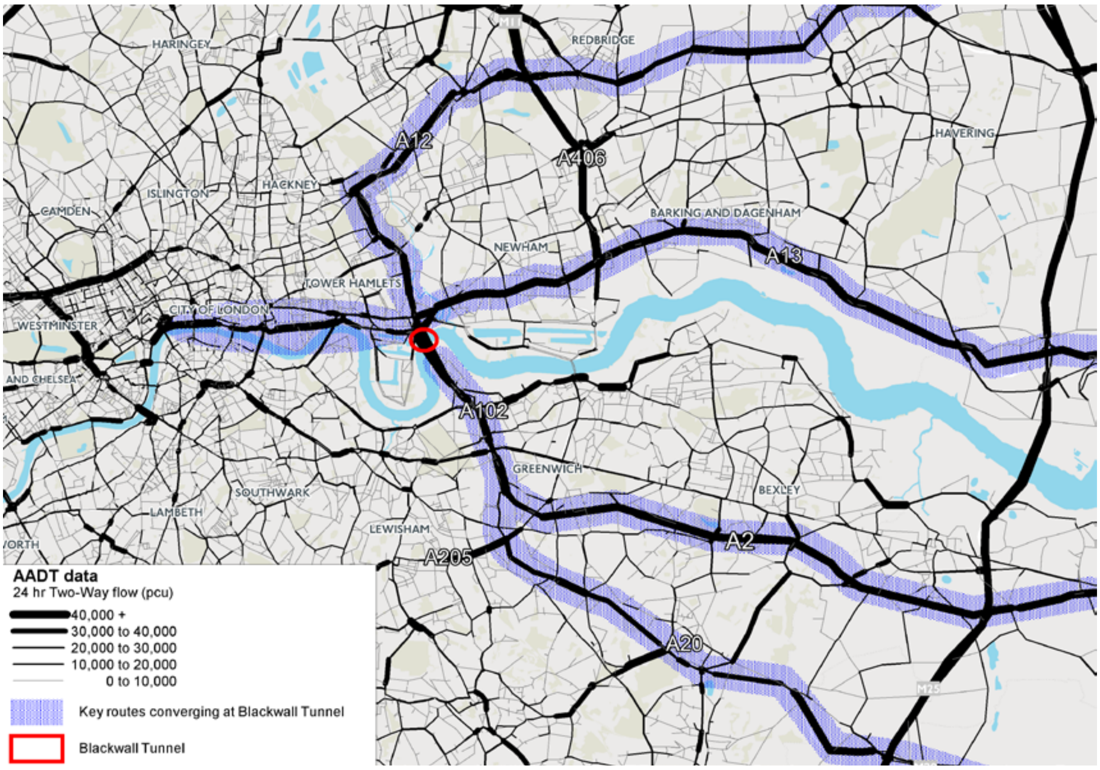
Figure 3-1: East London river crossings on the TLRN



3.2.2 The map shows that there are a number of strategically important radial routes that serve traffic travelling to and from the centre of London, as well as a smaller number of orbital routes. Several of these roads converge at the

Blackwall Tunnel. The strategic importance of the TLRN, and to a lesser extent the borough A-road network, is emphasised by an analysis of the total flows of traffic across the area. Figure 3-2 indicates two-way Annual Average Daily Traffic (AADT) on the strategic road network in east London in 2012, highlighting the significance of the A13, the A2, the A20, and the A12 in particular, as well as the A406 and the M25.

Figure 3-2: 2012 two-way Annual Average Daily Traffic (AADT) on the strategic road network in east London[10]



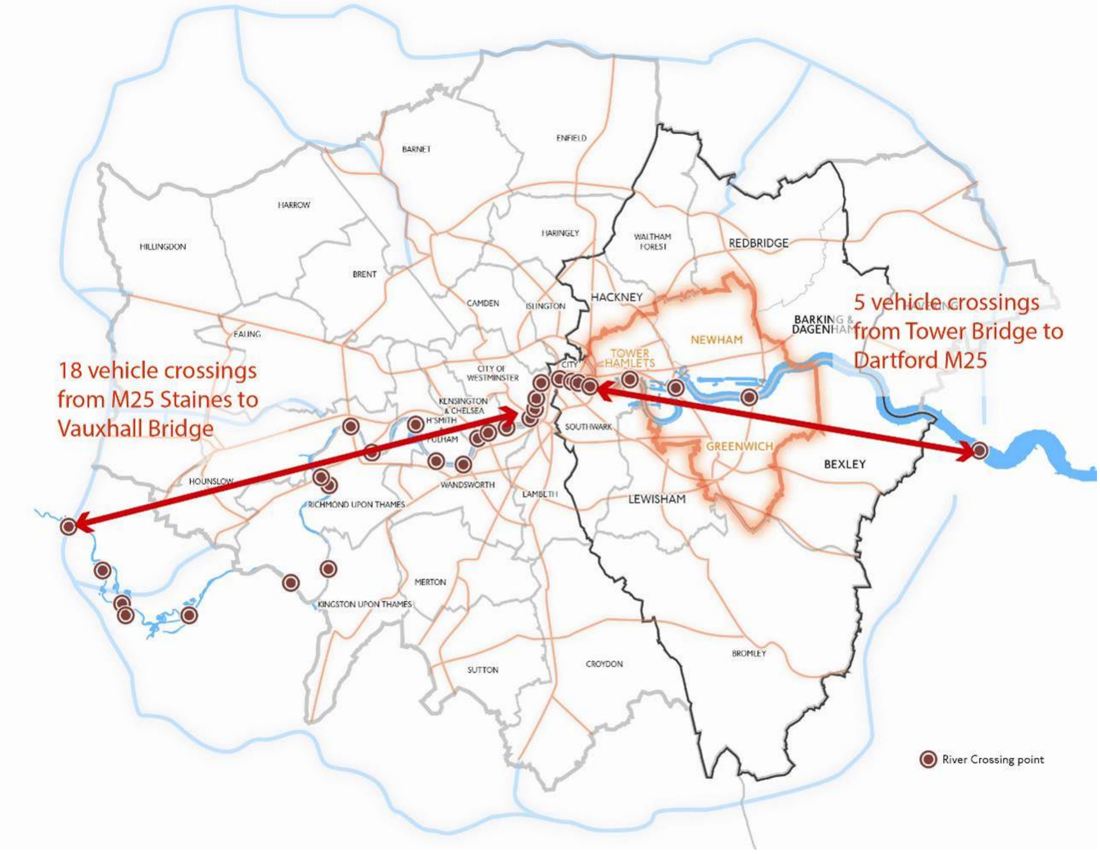
3.2.3 As Figure 3-2 also makes clear, several of these very busy routes converge at the Blackwall Tunnel, making the tunnel itself one of the busiest links on the network. It carries around 45,000 average northbound daily trips in comparison to around 66,000 at the Dartford crossing. Notably, the Woolwich Ferry carries comparatively little traffic with fewer than 3,000 average northbound daily trips, despite its location between the A406 North Circular and the A205 South Circular routes.

Existing highway river crossings

3.2.4 Figure 3-3 illustrates the availability of road crossings of the River Thames in east and west London, from the edge of the Congestion Charging zone to the M25.

[10] Source: annualised RXHAM base year traffic model data

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



3.2.5 Figure 3-3 shows that there are 18 crossings in 29km from Vauxhall Bridge to the M25 (Staines) in west London, but only five crossings in the 23km from Tower Bridge to the M25 (Dartford) in East London (inclusive). Highway river crossings of the Thames are accordingly, about four times as prevalent (by distance) west of Vauxhall Bridge as they are east of Tower Bridge.

3.2.6 As indicated above, the only strategically significant cross-river highway link (in terms of traffic volumes and use by longer-distance traffic) between Tower Bridge and the Dartford Crossing is the Blackwall Tunnel.

3.2.7 The capacities of each of the three east London crossings are summarised in Table 3-1. This shows that the Woolwich Ferry can currently carry approximately 160-210 passenger car units (PCUs) per hour in each direction, making it a very minor link in comparison.

Table 3-1: Estimated one-way maximum capacities of road crossings in east London[11]

Crossing	Direction	Approx. capacity (*PCUs*/hr)
Rotherhithe Tunnel	Both	1,200
Blackwall Tunnel	Northbound	3,200
	Southbound	3,700-3,800
Woolwich Ferry	Both	160-210

3.2.8 The Blackwall Tunnel has by far the greatest capacity of the three crossings, with an estimated maximum throughput around three times greater than the Rotherhithe Tunnel and some twenty times greater than the Woolwich Ferry. However, it also serves as a constraint on network capacity since it only carries two lanes of traffic in either direction (with additional restrictions on vehicle height, width and speed northbound due to the sub-standard dimensions of the northbound bore), while the A2 and A12 both carry three-lanes of traffic in each direction for much of their lengths.

3.2.9 Taking the above into account, it is clear that the Blackwall Tunnel essentially functions as the lynchpin of the strategic road network in east London, for the following reasons:

- it is one of only three highway crossings east of Tower Bridge within the GLA area;
- it lies at the convergence of two key radial traffic routes to the north of the River Thames (the A12 and the A13) and two key radial routes to the south (the A2 and the A20);
- it can carry nearly three times more traffic than the two neighbouring crossings combined.

3.3 Existing public transport network

Rail-based public transport

3.3.1 There has been a period of sustained investment in PT capacity across the whole of east London over the past 20 years. Prior to 1999 there was only one rail crossing of the River Thames in east London in the form of the London Underground East London Line, which provided only a local shuttle from New Cross/New Cross Gate to Shoreditch.

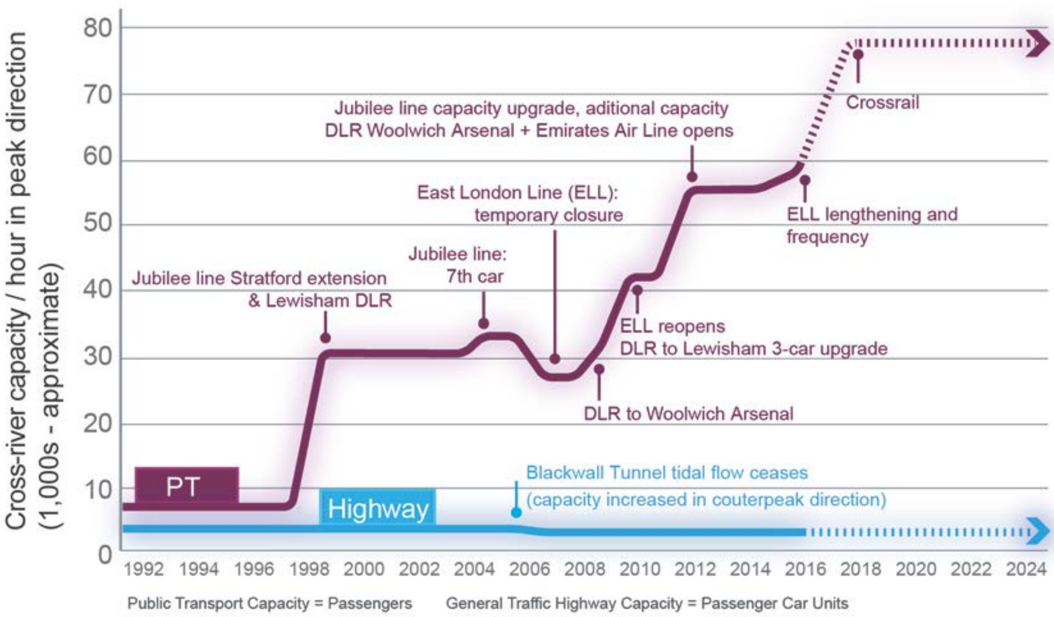
[11] Mott MacDonald: River Crossing Modelling Base Year Development and Validation Report, 2014. Note the capacities of these crossings vary both within and between days due to fluctuations in vehicle flow volumes, speeds and vehicle mix, as well as the ability of the road network to deliver traffic to the crossings, so the data should be treated as a guideline only. The capacity of the Woolwich Ferry is particularly variable due to the relatively high proportion of HGVs carried relative to overall traffic.

3.3.2 Since 1999, the following new cross-river PT links have been provided within the GLA area:

- Jubilee Line – opened 1999, and subsequently enhanced with more frequent and longer trains;
- Docklands Light Railway (DLR) – extended to Greenwich and Lewisham in 1999, and subsequently enhanced with longer trains, and to Woolwich in 2009;
- the London Underground 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;
- the Emirates Air Line (EAL) – opened in 2012 provides an additional cross-river shuttle service for pedestrians and cyclists between North Greenwich and Royal Victoria.

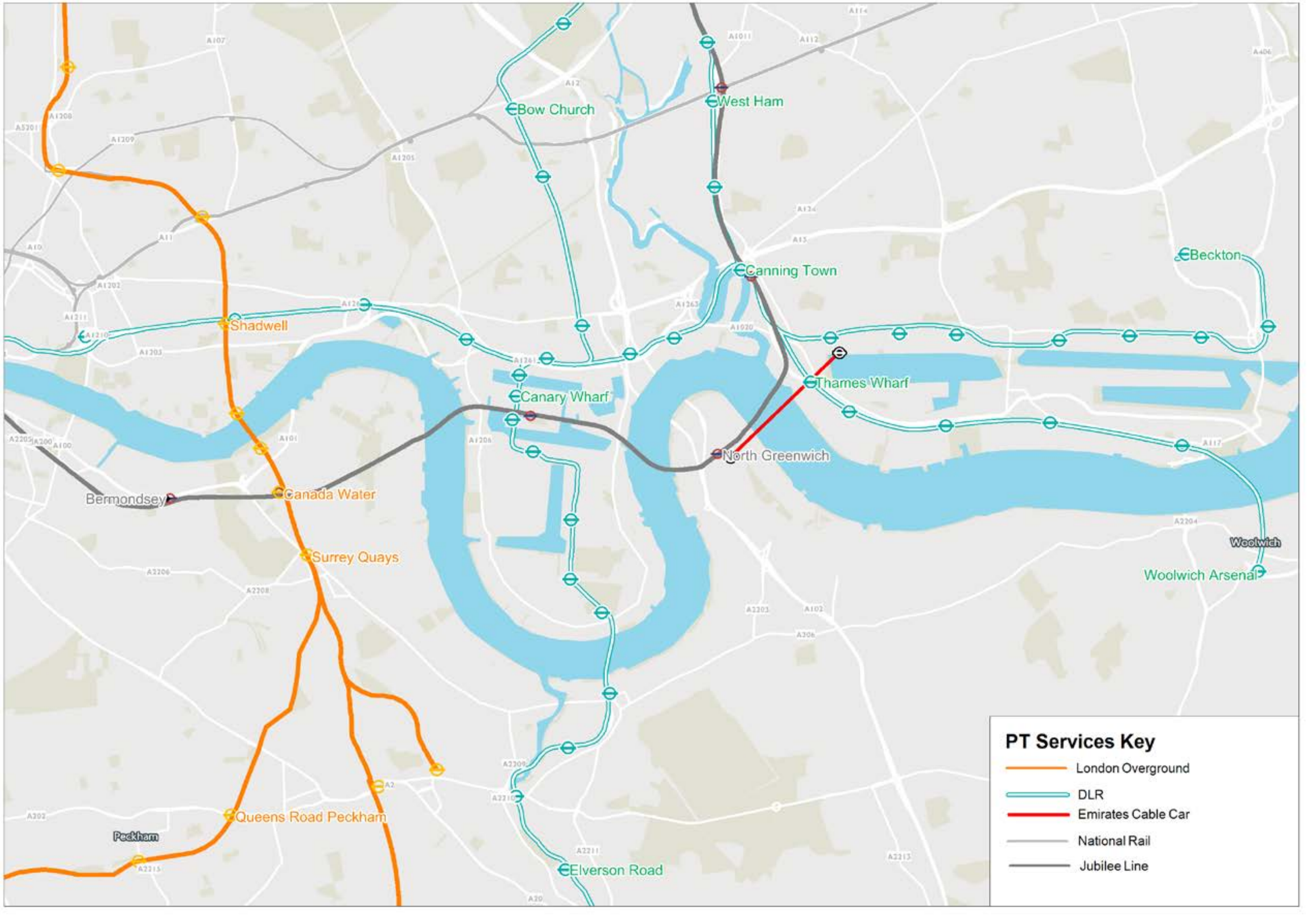
3.3.3 The significant increase in cross-river PT capacity in east London is illustrated in Figure 3-4, which clearly shows a marked increase in capacity in 1999 with the opening of the Jubilee line extension and the DLR extension to Lewisham. A further significant rise in PT capacity will be realised when Crossrail opens in 2018. The change in cross-river highway capacity in east London is also shown in the figure for comparison.

Figure 3-4: Cross-river PT and highway capacity change since 1992, east of Tower Bridge within London



3.3.4 The new cross-river links that have been implemented since 1999 are shown in . In addition, High Speed 1 started operating frequent high speed trains between Kent and east London in 2009, crossing the river through a tunnel just to the east of the Dartford Crossing.

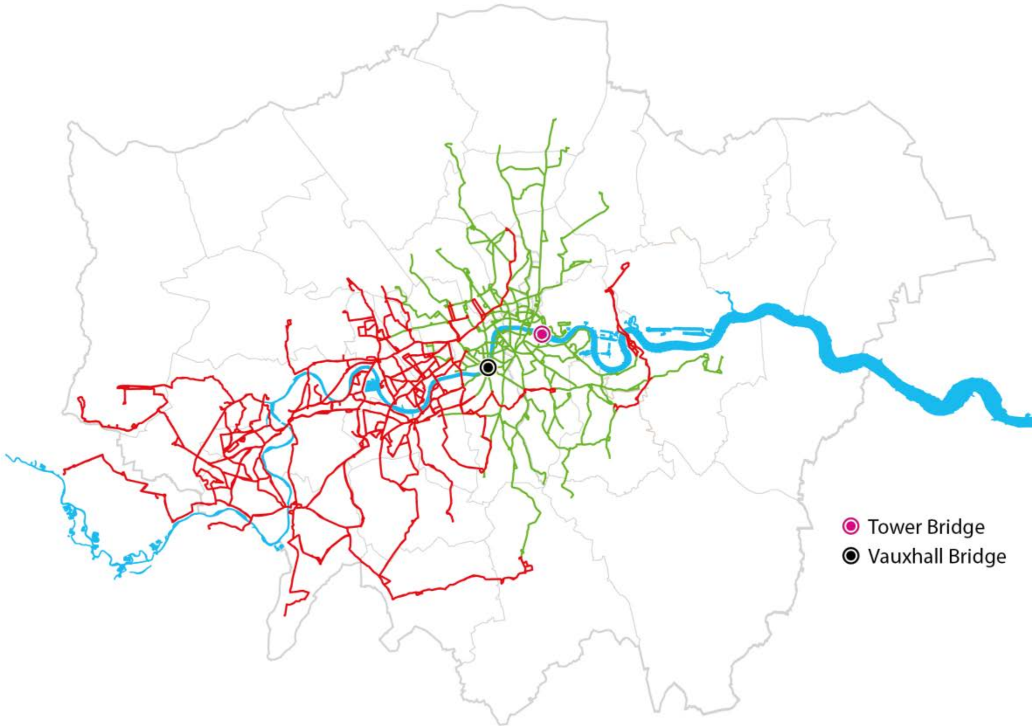
Figure 3-5: Cross-river rail-based PT network east of Tower Bridge (including EAL)



Buses

3.3.5 Figure 3-6 shows all standard bus routes in Greater London that at some point cross the River Thames. It excludes night time only bus routes and school services. Routes that cross the river in central London, using Vauxhall Bridge, Tower Bridge, or crossing points in between these two are coloured green. Routes which cross the river outside these crossings are coloured red.

Figure 3-6: Cross-river bus services in London



3.3.6 The figure highlights the notable disparity in cross-river bus provision between east and west London, which is a consequence of the very limited cross-river road connections. There are 47 bus routes that cross the river west of Vauxhall Bridge, and a single route (route 108) crossing the river east of Tower Bridge (using the Blackwall Tunnel).

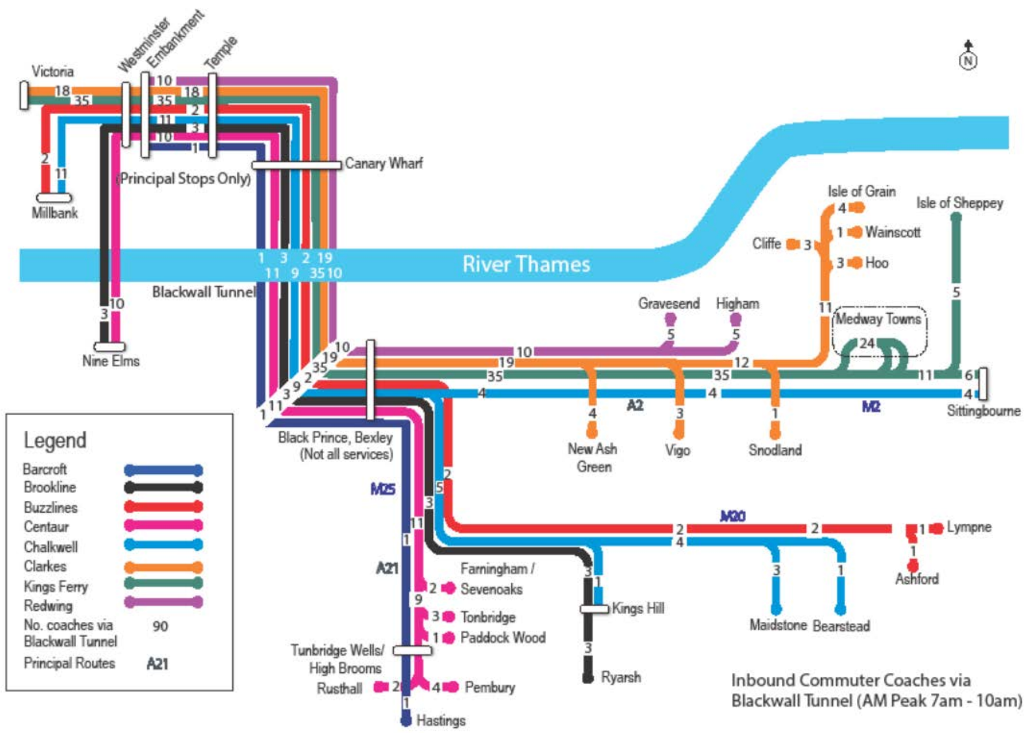
3.3.7 Route 108 is a 24-hour service scheduled to operate around every ten minutes during the day between Stratford and Lewisham via the Blackwall Tunnel.

Coaches

3.3.8 The Blackwall Tunnel is also currently used by eight coach companies that (as at September 2015) between them operate 90 inbound services to central London in the AM peak period (07:00-10:00), with a similar number of return services operating in the PM peak (16:00-19:00).

3.3.9 As shown in Figure 3-7, these routes cover a wide range of areas in Kent and south east London, with services running from as far away as the Isle of Sheppey, Sittingbourne and Folkestone. The service pattern indicated dates from September 2015 and is subject to regular change, with services being added and withdrawn on a commercial basis.

Figure 3-7: Inbound commuter coach services using the Blackwall Tunnel (AM peak period, 07:00-10:00, May 2015)

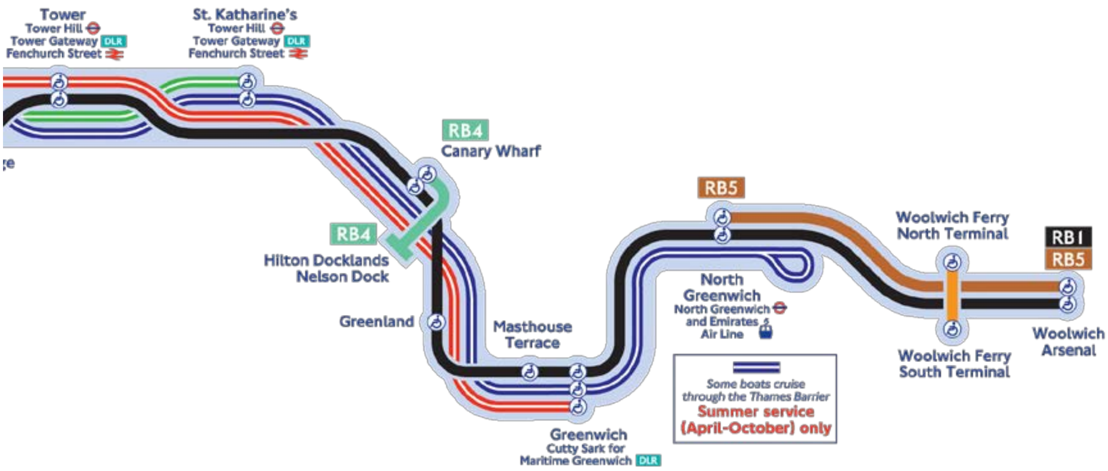


3.3.10 Coach operators endeavour to utilise the spare capacity in the daytime period by undertaking private hire work, such as school-related services. These services link urban areas throughout the north Kent region with central London, via the Blackwall Tunnel.

River bus services

3.3.11 A number of scheduled river bus services operate on the River Thames east of Tower Bridge as illustrated in Figure 3-8. 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 3-8: Scheduled river bus services in east London[12]



3.4 Existing local walking and cycling network

3.4.1 The EAL was the first part of the MTS river crossings programme to be delivered and provides a high quality link along the alignment of the proposed Silvertown Tunnel, catering for pedestrians and cyclists 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.

3.4.2 Elsewhere in this area, there are only a limited number of dedicated 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.

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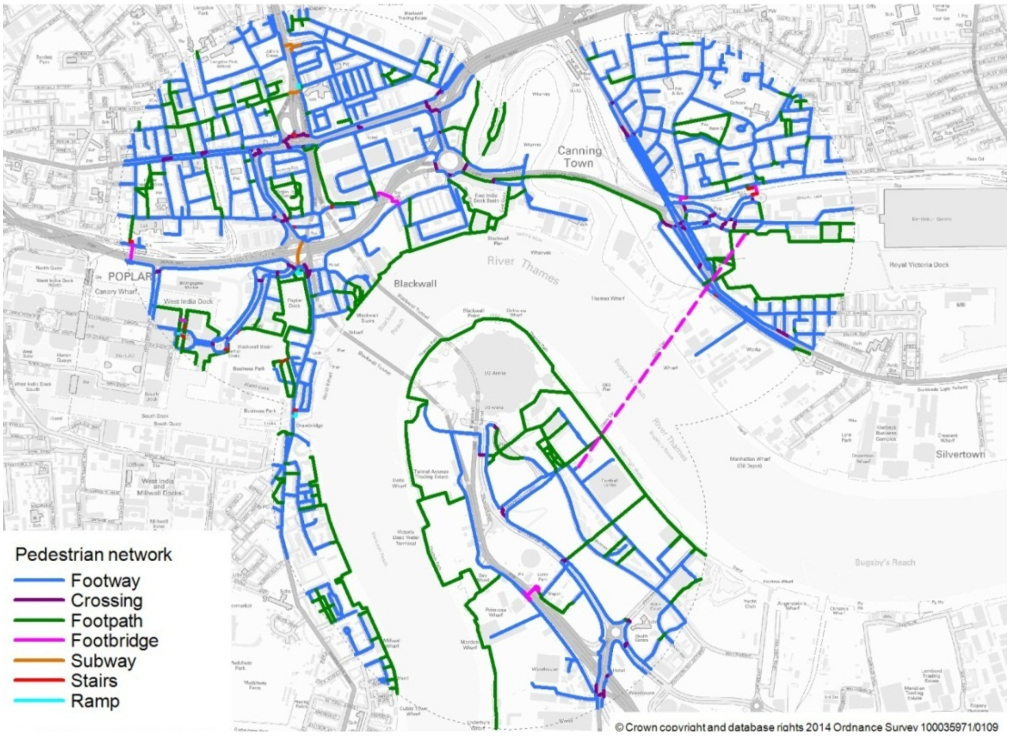
[12] Map of Scheduled River services, https://www.tfl.gov.uk/cdn/static/cms/documents/river-bus-tours-map.pdf

3.4.3 Pedestrians can also use other PT links in the area to cross the river (Overground, Jubilee line, DLR) or the Woolwich Ferry.

Figure 3-9: Emirates Air Line (EAL) crossing of the Thames

3.4.4 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 3-10, with the EAL link shown in a dashed pink line.

Figure 3-10: Existing walking network within 800m of the Blackwall and proposed Silvertown tunnel portals[13]



3.4.5 The current cycling network in the vicinity of 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.

3.4.6 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 River 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.

3.4.7 Cyclists have fewer PT 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. On payment of a fare, cyclists may also use the EAL, which provides an important link for the Greenwich peninsula as neither cyclists nor pedestrians can use the Blackwall Tunnel.

13 OS, 2014, Integrated Transport Layer (ITN)

Figure 3-11: Cyclist using the Emirates Air Line

3.5 Analysis of current cross-river travel in east London

3.5.1 This section summarises how the cross-river transport networks in east London are currently used.

3.5.2 Table 3-2 summarises average observed 2012/3 weekday cross-river person trips by private vehicle and PT in east London in an AM peak hour (08:00-09:00), an average inter-peak (IP) hour (10:00-16:00), and a PM peak hour (17:00-18:00).

Table 3-2: Weekday cross-river person trips between (and including) Tower Bridge and the Dartford Crossing, by time period (2012/3)[14]

	Northbound			Southbound			Two-way		
Time period	**Private vehicle**	**PT**	**Total**	**Private vehicle**	**PT**	**Total**	**Private vehicle**	**PT**	**Total**
AM peak hour	12,100	56,700	**68,800**	11,900	37,000	**48,900**	24,000	93,700	**117,700**
IP average hour	11,300	14,800	**26,100**	11,000	15,000	**26,000**	22,300	29,800	**52,100**
PM peak hour	13,400	36,500	**49,900**	14,300	51,400	**65,700**	27,700	87,900	**115,600**

3.5.3 The table shows that PT accounts for the overwhelming proportion of all cross river trips between Tower Bridge and the Dartford Crossing

[14] HAM model validation observed flows, (2012)); LU Rail Origin Destination Surveys (RODS) (2012); Pedestrian and cyclist Thames screenline crossings, (2013); Scheduled coach services with an estimated average passenger occupancy of 48

(80% in the AM peak hour, 76% in the PM peak hour and 57% in the IP average hour).

3.5.4 Overall, cross-river trips exhibit a highly tidal nature, with northbound trips significantly outnumbering southbound trips in the AM peak hour, and vice versa in the PM peak hour. IP average hour flow is evenly balanced, with 50% travelling in each direction.

3.5.5 In terms of observed flows, the tidal pattern described above is driven entirely by PT trips. For private vehicles, observed trips are split almost evenly between north- and southbound movements across all periods of the day. This even split is primarily a consequence of the limited capacity on road crossings in east London, which constrains throughput and results in delay and queuing in the peak direction. In effect, while the number of vehicles actually crossing the river in both directions is similar during the peak hours, the overall demand for road crossings during these time periods is tidal in nature. This is discussed in more depth later in this chapter and in Chapter 4.

3.5.6 The graphs below provide a breakdown of the data in the table above by crossing, illustrating the small differences in peak and counter-peak flow observed at all road crossings during the AM and PM peaks.

Figure 3-12: AM peak hour (08:00-09:00) cross-river road and PT person trips in east London (2012-13)

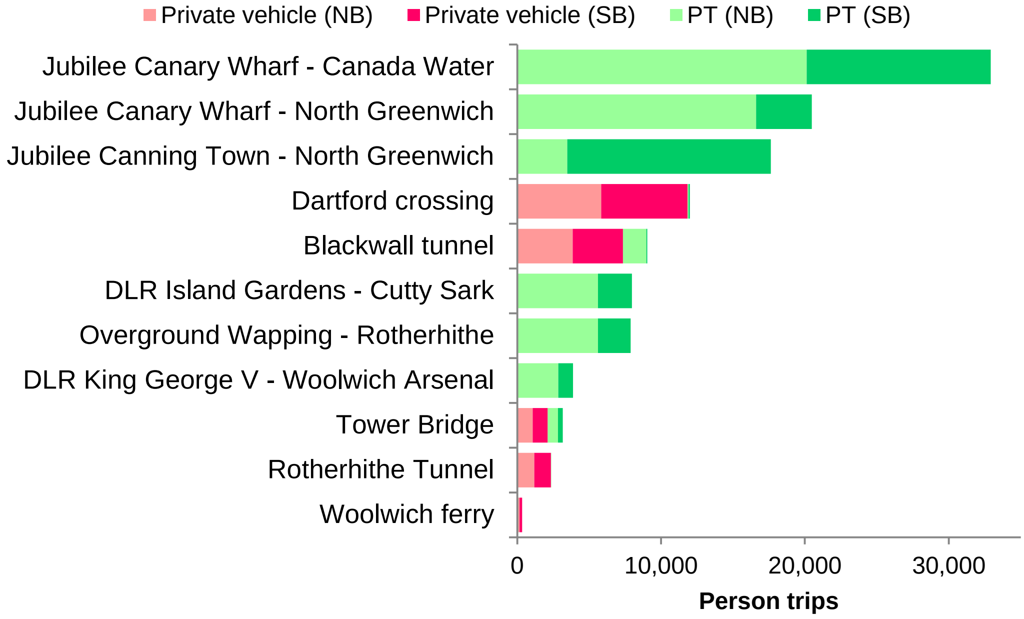


Figure 3-13: IP average hour (10:00-16:00) cross-river road and PT person trips in east London (2012-13)

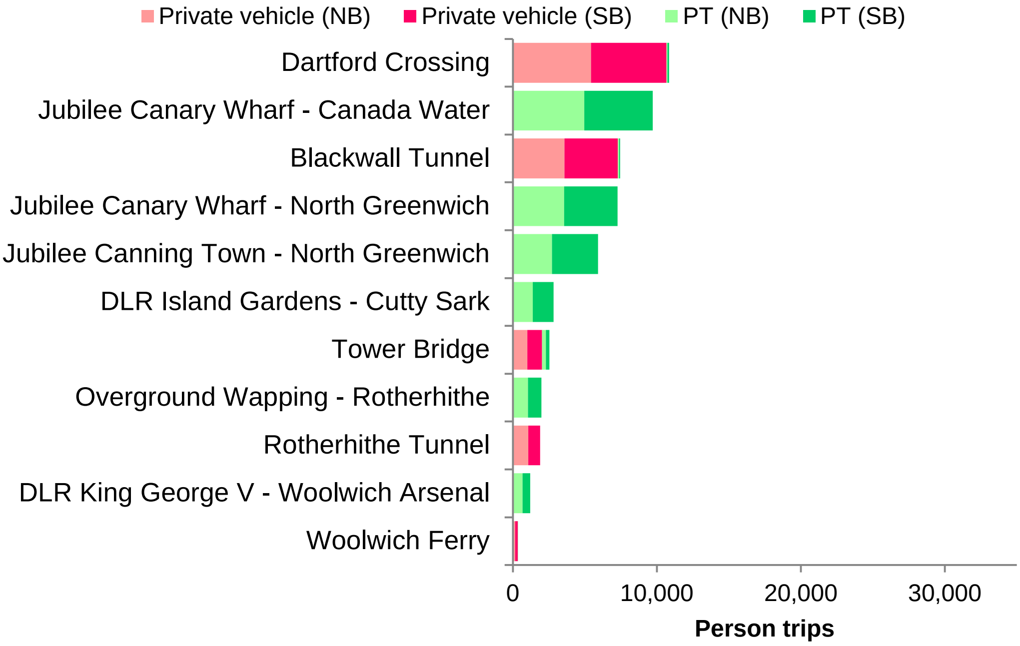
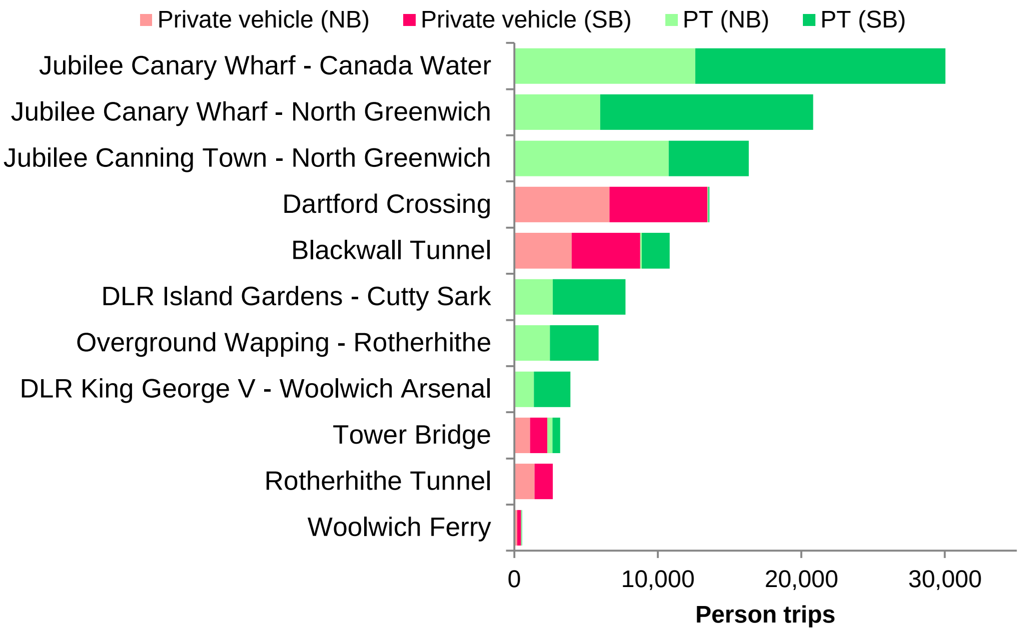


Figure 3-14: PM peak hour (17:00-18:00) cross-river road and PT person trips in east London (2012-13)



3.5.7 The graphs above reveal that the Jubilee Line alone carries more than half of all cross-river person trips in east London in both the AM and PM peak hours (accounting for 60% and 58% respectively) and accounts for 44% of all trips in the IP average hour[15]. The DLR

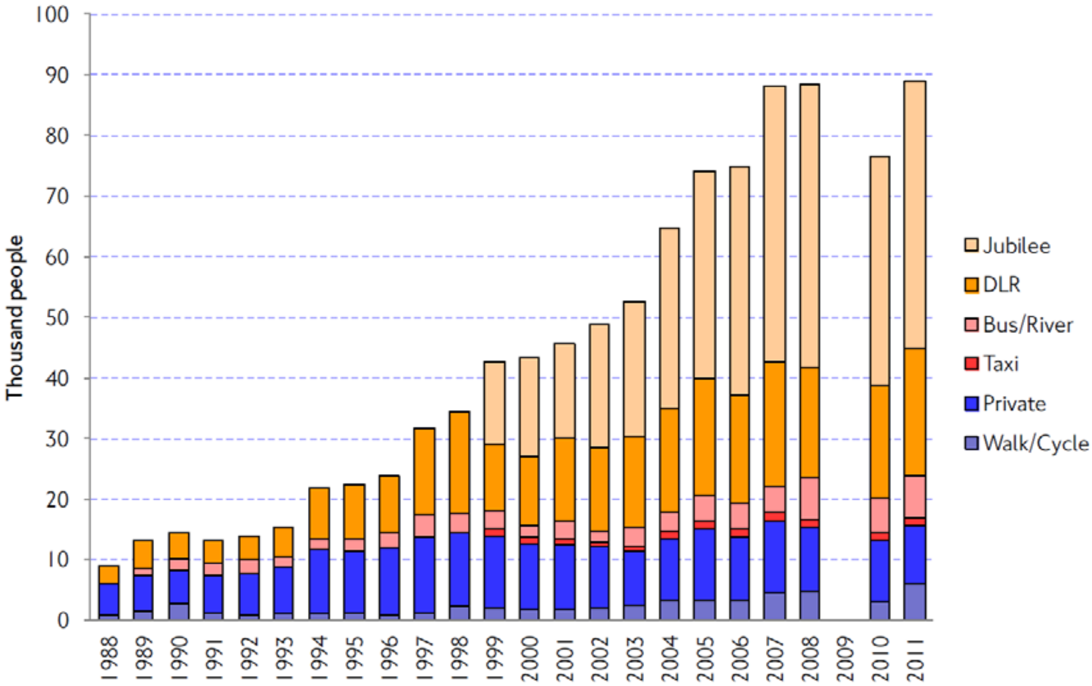
[15] It is acknowledged that many trips on the Jubilee Line will be the same people crossing at multiple locations on journeys to and from central London

accounts for a further 10% in both peaks and 8% in the IP average hour.

3.5.8 Meanwhile, as the above makes clear, private cross-river transport makes up a much smaller share of all trips (one in five). In large part, this reflects an exponential increase in the availability and use of PT in the years since 1992, which has eclipsed the importance of private transport for many trips. This increase in PT capacity is shown in Figure 3-4, whilst the increase in PT trips is clearly visible in a review of historical data on travel to the Isle of Dogs (the Isle of Dogs Cordon Survey).

3.5.9 As illustrated in Figure 3-15, there has been a very significant increase in overall travel to the Isle of Dogs, corresponding with a rapid increase in the number of jobs located there. However, while in 1998 trips to the Isle of Dogs were made mostly by private vehicle, the tens of thousands of new daily trips added since then are overwhelmingly made using PT, with relatively stable absolute levels of car use falling to a little over 10% of the overall mix by 2011.

Figure 3-15: AM peak travel to the Isle of Dogs (including Canary Wharf) by mode of transport, 1988 to 2011[16]



3.5.10 An analysis of the London Travel Demand Survey (LTDS) covering the years between 2005 and 2011 confirms that this is not an exceptional case. In fact, the overall level of cross-river road travel is

[16] TfL, January 2015, Isle of Dogs Cordon Survey – note: no survey was undertaken in 2009

significantly lower in the east of London than in comparable areas of west London where there are many more highway crossings. The findings are summarised in Table 3-3.

3.5.11 This shows that roughly one in three highway trips in the west crosses the river (trips are split roughly equally between south/south, south/north, and north/north), but in contrast, only around one in twenty highway trips in the east crosses the river. The total number of cross-river highway trips in the west is some ten times greater than in the east – a discrepancy that far exceeds the relatively modest differences in total highway travel.

Table 3-3: Summary of all inter-borough annual average daily highway trips made (excluding Central London)[17]

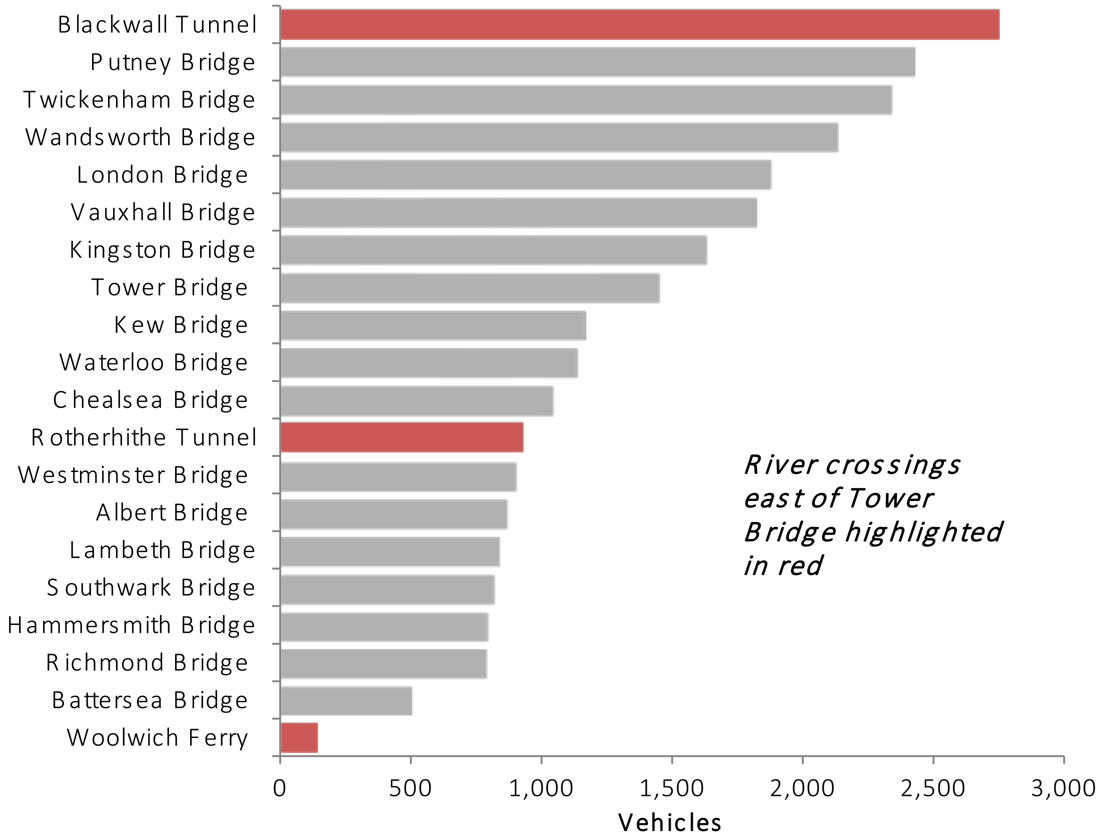
	East London		West London	
Inter-borough trip type	**Trips**	**%**	**Trips**	**%**
Entirely north of the River Thames	268,000	45%	318,000	33%
Entirely south of the River Thames	300,000	50%	339,000	35%
Involved crossing the River Thames	34,000	6%	314,000	32%
Total	**602,000**	**100%**	**971,000**	**100%**

3.5.12 The scale of the difference in cross-river highway trip flows suggests that the scarcity of cross-river highway links in east London is having a major impact not just in terms of constraining cross-river connectivity, but also fundamentally on the overall pattern of movement and consequently the relationship between different areas either side of the river in east London. Within this wider context however, the significance of the Blackwall Tunnel in east London (and indeed even in London) is clear.

3.5.13 Including the Dartford Crossing, the Blackwall Tunnel carries over 30% of all private highway trips across the River Thames in east London in the AM peak hour, the IP average hour, and the PM peak hour. If the Dartford Crossing is excluded, the proportion increases to 60% or more in each period. Figure 3-16 indicates that within the GLA area overall, the tunnel carried around 10% of all cross-river highway traffic northbound in weekday AM peak hours in 2012, and was the single busiest crossing.

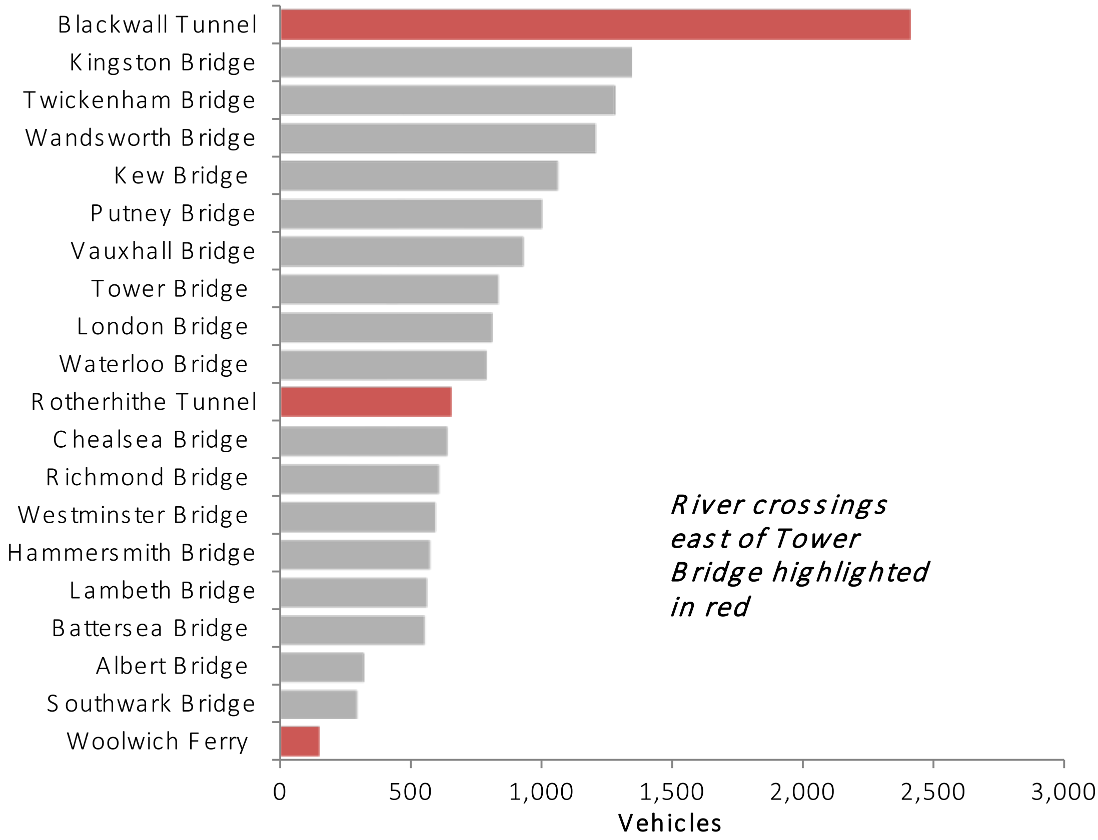
[17] TfL: London Travel Demand Survey 2005-2011.

Figure 3-16: Weekday AM peak hour northbound traffic on GLA river crossings (2012)



3.5.14 The share of all traffic carried by the Blackwall Tunnel and how this compares with other crossings is similar in the weekday PM peak hours. However, the share of all traffic increases to 15% in an average weekday IP hour, as shown in Figure 3-17, again making the Blackwall Tunnel the busiest of all London crossings.

Figure 3-17: Weekday IP average hour northbound traffic on GLA river crossings (2012)



3.5.15 The Blackwall Tunnel is heavily used at most times of the day and week. Based on an analysis of two years of data (December 2011 to November 2013), Figure 3-18 and Figure 3-19 show the hourly average flows for a typical weekday, Saturday and Sunday.

3.5.16 In line with many sections of London's road network the Blackwall Tunnel is also heavily used at the weekend. Weekend demand is relatively flat in both directions between 11:00 and 18:00, operating at average hourly flows of around 2,700 vehicles northbound and 3,000 vehicles southbound.

Figure 3-18: Blackwall Tunnel northbound - average hourly flows by day type[18]

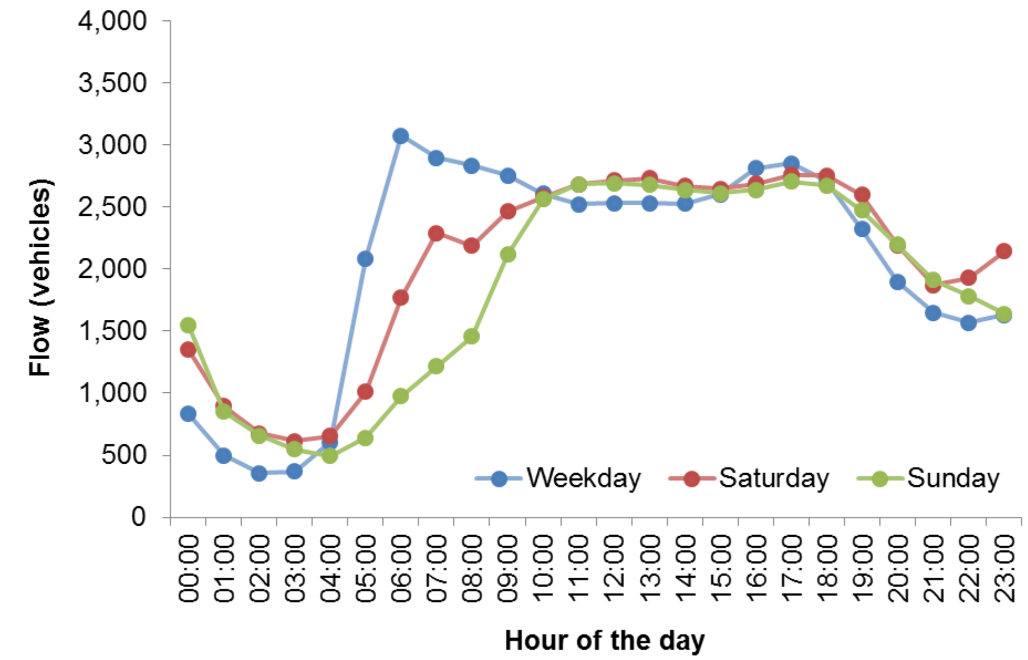
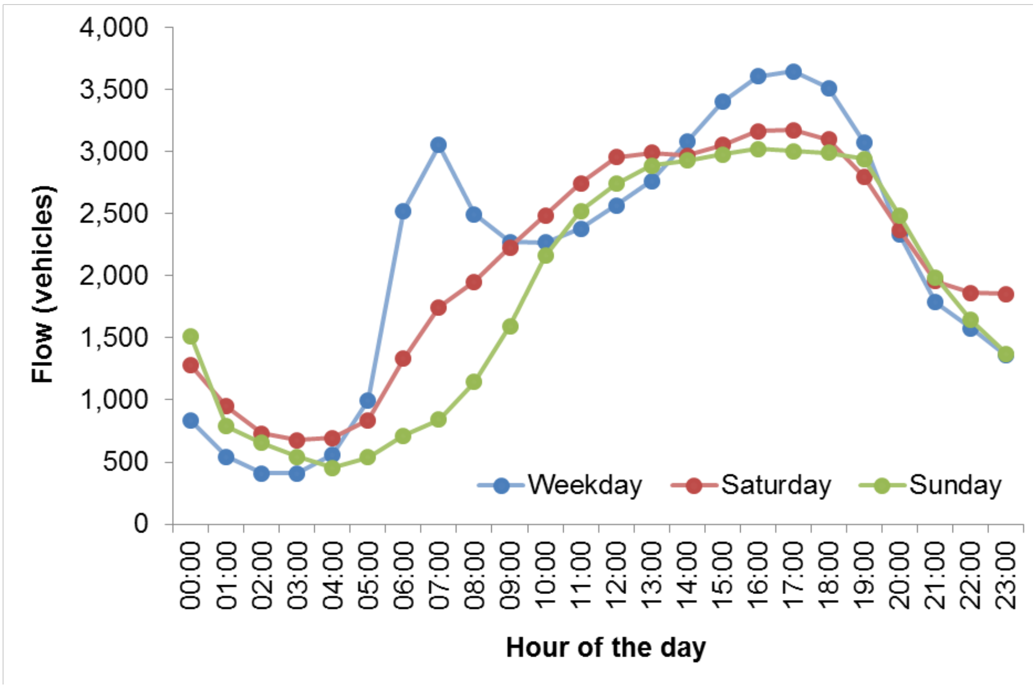


Figure 3-19: Blackwall Tunnel southbound - average hourly flows by day type



[18] Blackwall Tunnel Flows, 01/12/2011 to 28/11/2013

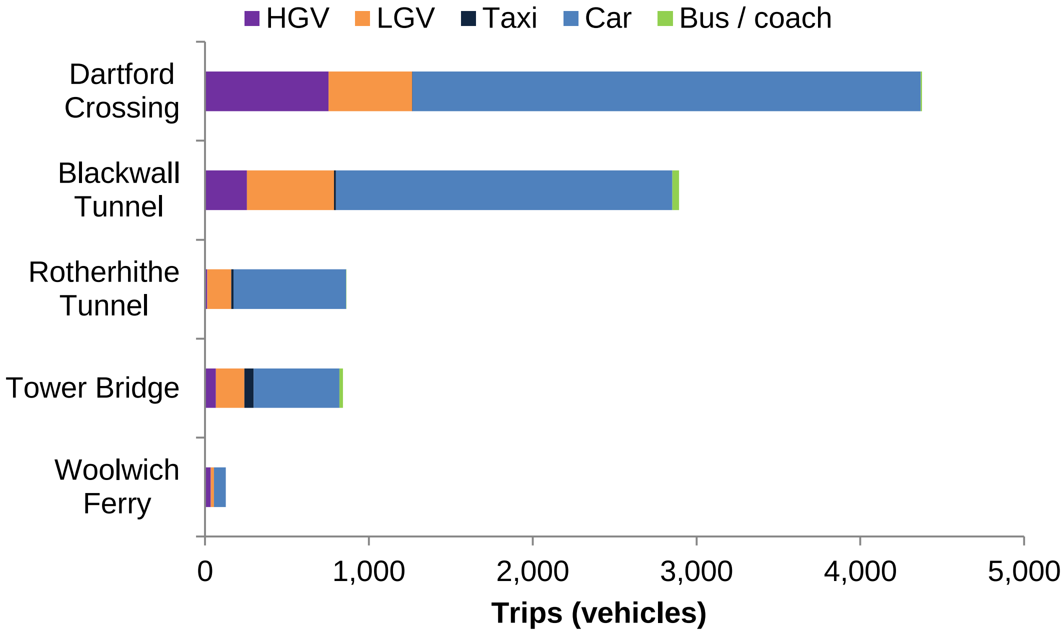
3.6 Users of the Blackwall Tunnel

3.6.1 As the sections above have demonstrated, the Blackwall Tunnel is a strategically important link in the east London road network, the busiest of all London's highway crossings, and by far the most important of the three highway crossing in the GLA area east of Tower Bridge. As a consequence, it is very busy at most times of the day, including at weekends.

3.6.2 A more detailed analysis of users of the Blackwall Tunnel can assist in understanding its wide-ranging importance.

3.6.3 While private car users make up the majority of users of all highway crossings, the Blackwall Tunnel is an especially important crossing for HGVs, which cannot use the Rotherhithe Tunnel. It also caries far more freight than Tower Bridge, the Rotherhithe Tunnel or the Woolwich Ferry, and only marginally less than the Dartford Crossing (in fact it carries more LGV traffic than Dartford). This data is summarised in Figure 3-20. The totals presented in the graph are numbers of vehicles, as opposed to PCUs, which are reported earlier in this chapter.

Figure 3-20: AM peak hour (08:00-09:00) northbound cross-river road vehicle trips to the east of London Bridge (2012)[19]



3.6.4 To gain a more detailed understanding of their travel and behavioural characteristics, TfL commissioned a survey in 2013 of users of river

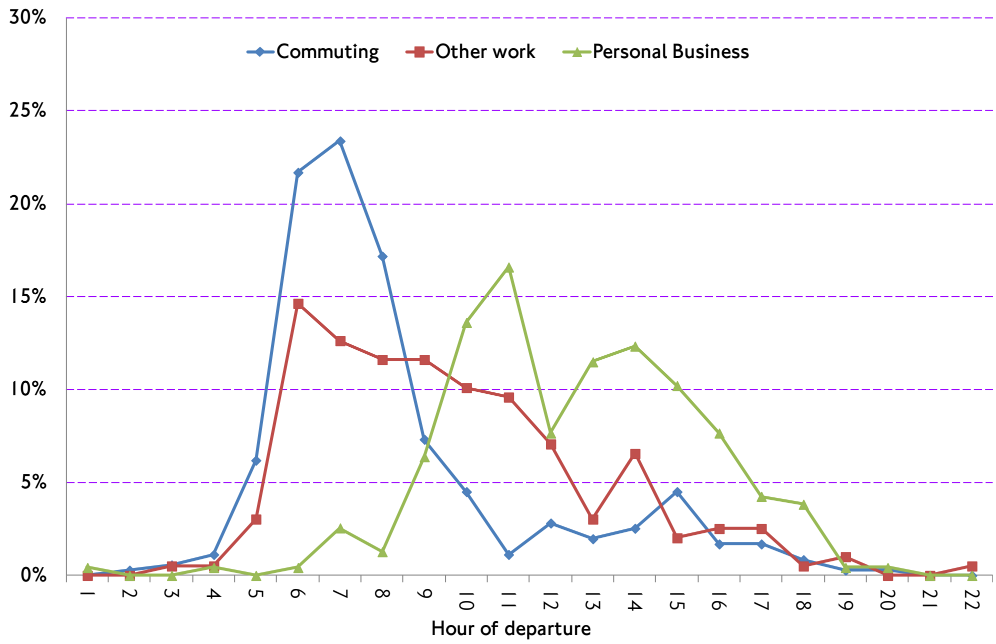
[19] HAM model Validation observed flows (2012) – note: private hire vehicles classified as cars

crossings in the east of London. Road-side sampling at the Blackwall Tunnel was undertaken on both the northbound and southbound approaches with recruitment shifts designed to match actual flows. Postcards with a link to an internet survey were distributed to drivers at traffic lights as they approached the tunnel. In total, 30,134 surveys were distributed at the Blackwall Tunnel approaches and 788 surveys were completed by drivers of LGVs and cars.

3.6.5 The survey sample revealed that nearly 45% of all drivers travelling through the Blackwall Tunnel in 2013 made the trip for commuting purposes, with 25% travelling for other work purposes and 30% for other purposes. Figure 3-21 shows how the journey purpose of drivers through the tunnel changes across the day (for the northbound direction only).

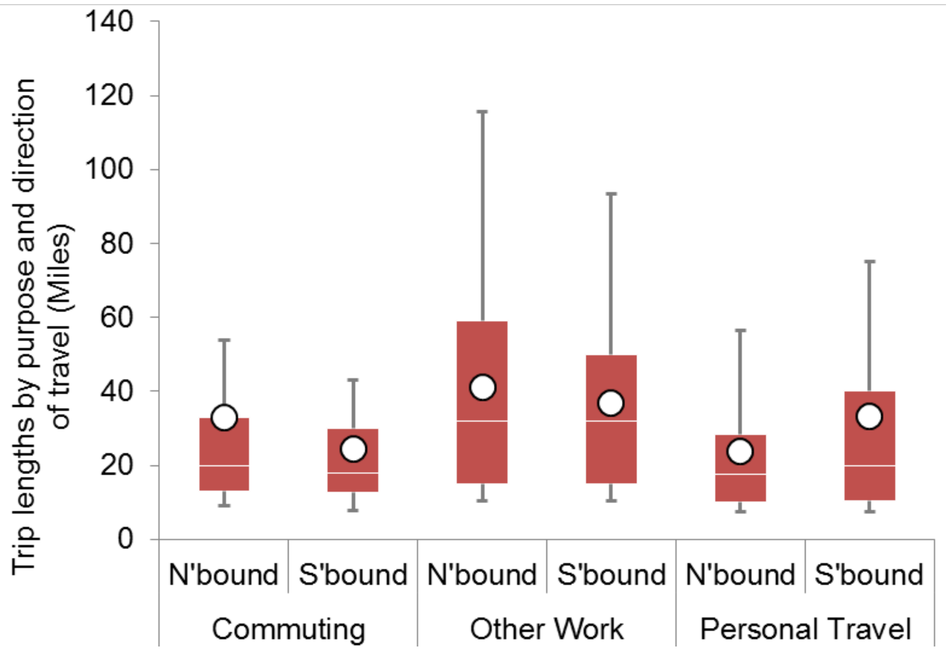
3.6.6 In the early part of the day, *commuting* trips predominate. Nearly two thirds of commuters depart between 06:00 and 09:00. However, later in the day, *other work* and *personal business* purposes make up the majority of departing trips. For other work trips the most common departure time is 06:00 to 07:00 at 15% but the peak is far less pronounced than for commuting trips and there is a more gradual decline in the proportion of trips undertaken throughout the day.

Figure 3-21: Proportion of northbound driving trips departing by hour and by journey purpose, roadside sample 2013



3.6.7 Reported trip lengths were long by London standards, with a mean of some 48km and a median of 32km, compared to around 8km and just over 3km respectively across the whole of London. Figure 3-22 summarises the trip lengths of Blackwall Tunnel users.

Figure 3-22: Trip length by journey purpose



3.6.8 In terms of trip length, the longest recorded on average were made for ‘other work’ purposes, while trips for Commuting or Personal purposes were significantly shorted. Southbound personal travel trips tended to be significantly longer than northbound personal travel trips,

3.6.9 85% of all users made a return trip through the Blackwall Tunnel on the same day, while 8% used Dartford for one leg of their trip.

3.6.10 Kent was the most common origin point for commuting trips (21%) and other work trips (22%) but less common for personal travel (7%). The Royal Borough of Greenwich made up 15%of known origins for commuting trips, just eight per cent of other work trips and was ten percentage points higher than the next most common origin for personal travel trips at 17%.

3.6.11 Elsewhere in London the London Borough of Bexley accounted for 12% of origins and 16% of commuting trips. For those trips which originated north of the Thames, the most common origins were the London Borough of Redbridge (7% of trips) and the London Borough of Tower Hamlets (6% of trips). Newham and Hackney both accounted for five per cent of trips.

3.6.12 Greenwich accounted for 17% of destinations, similar across all three journey purposes. The Boroughs of Newham and Tower Hamlets both accounted for around 10% of trip destinations, accounting for a higher proportion of commuting trip destinations than for other purposes.

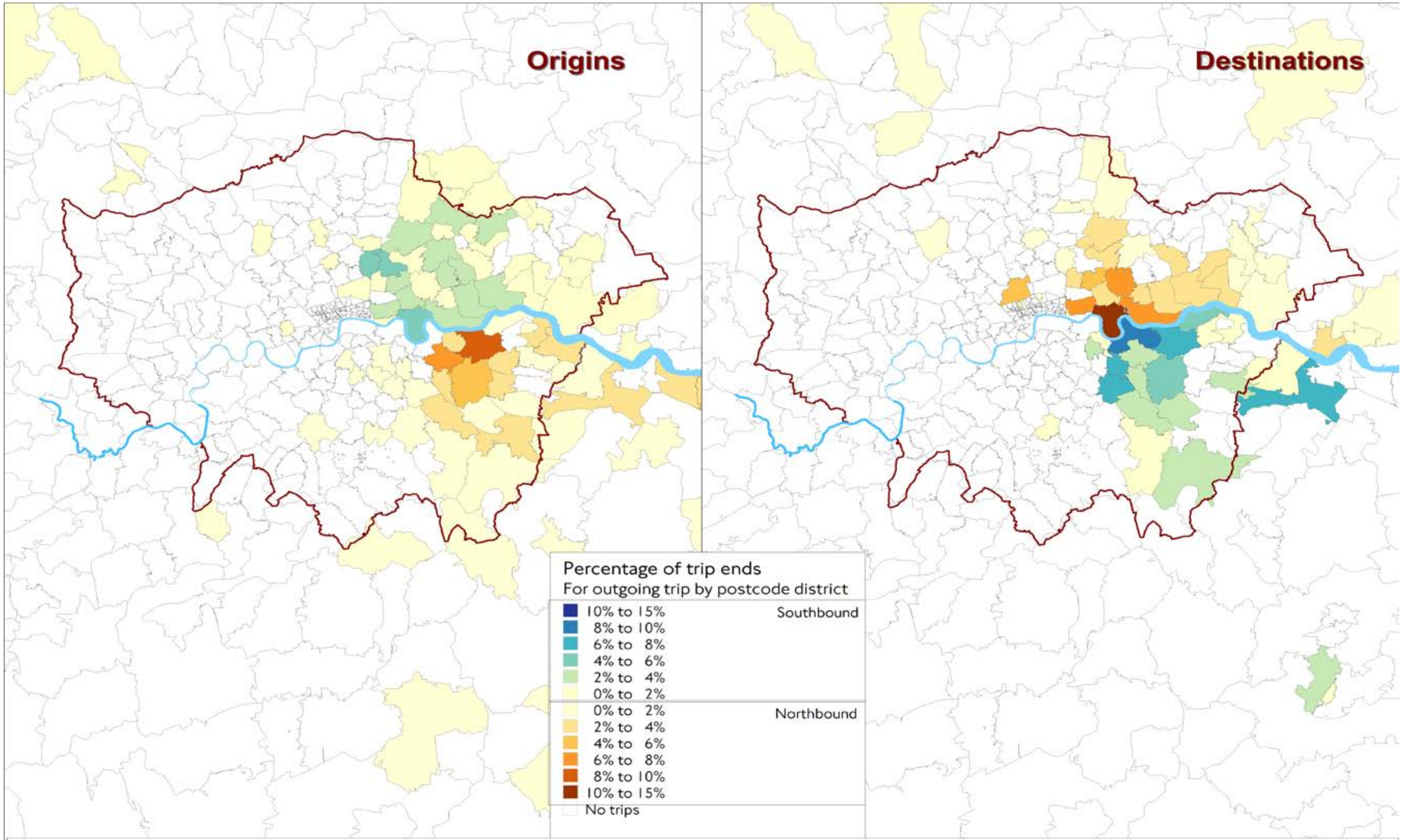
3.6.13 Figure 3-23: Origins and destinations for Blackwall Tunnel users in the AM peak period shows the origins and destinations of trips across the Blackwall Tunnel during the AM peak period, while origins and destinations are shown for the PM peak period in Figure 3-24: Origins and destinations for Blackwall Tunnel users in the PM peak.

3.6.14 Of the trips that had both origin and destination assigned, some three quarters had an origin or a destination in the local area[20] with around a quarter having both a local origin and destination.

3.6.15 Other work trips had the highest proportion of trips that neither start nor end in the local area at 40% while around a fifth of commuting trips and a quarter of personal travel trips started and ended outside the local area.

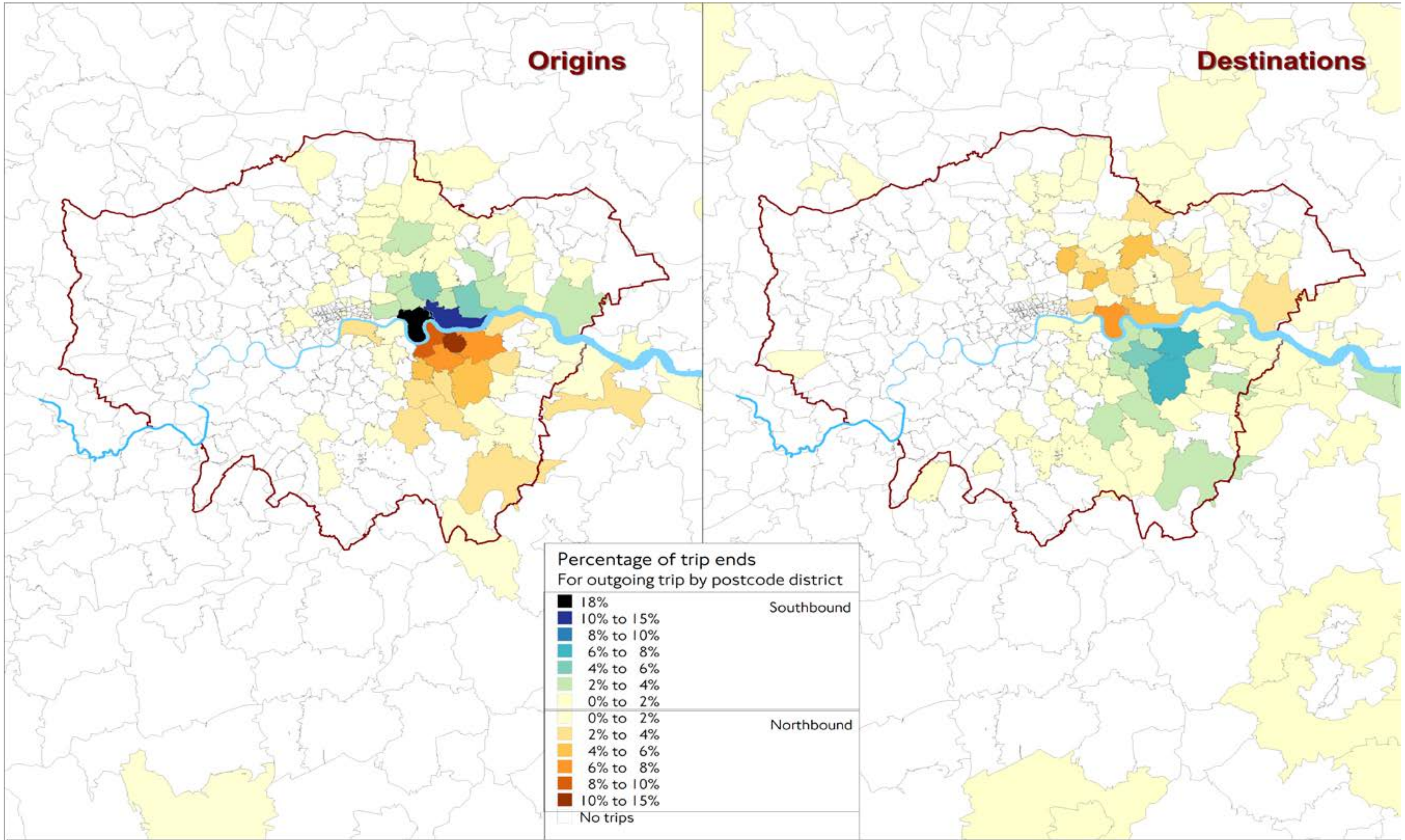
[20] A local origin or destination is one in the London Boroughs of Barking & Dagenham, Bexley, Greenwich, Havering, Lewisham, Newham & Tower Hamlets

Figure 3-23: Origins and destinations for Blackwall Tunnel users in the AM peak period



Percentage of trip ends by postcode district for outgoing trips in the AM peak using Blackwall

Figure 3-24: Origins and destinations for Blackwall Tunnel users in the PM peak



Percentage of trip ends by postcode district for outgoing trips in the PM peak using Blackwall

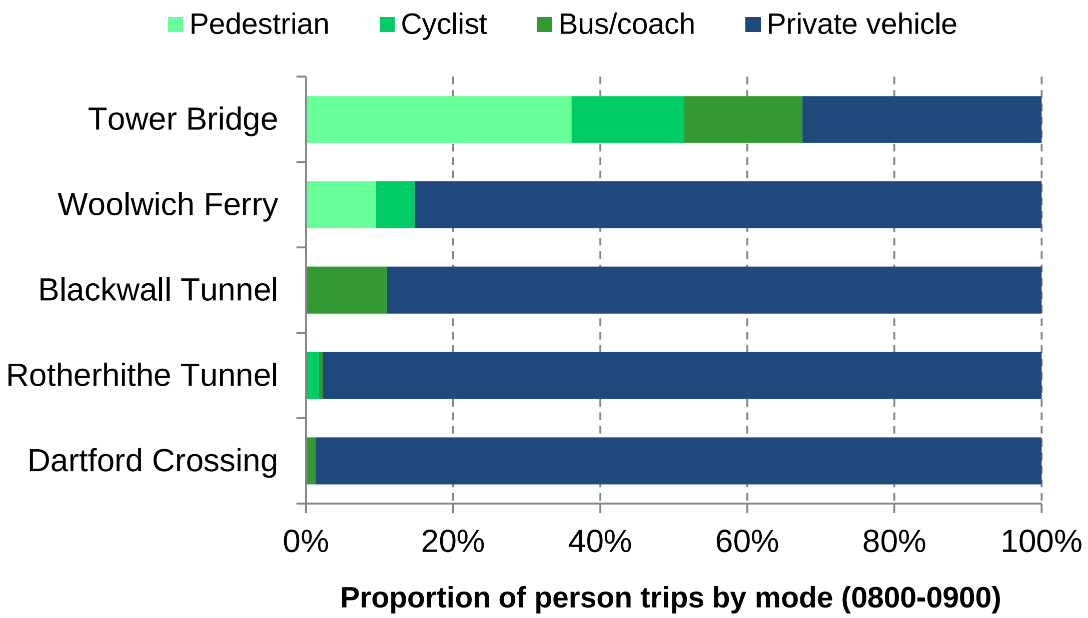
3.7 Use of highway crossings for public transport

3.7.1 It is important to emphasise that highway river crossings, as with any road, can play an important role in supporting PT journeys.

3.7.2 Figure 3-25 summarises the mode of cross-river person trips carried on the road network in east London during the AM peak hour. The graph makes clear that as well as carrying large volumes of private traffic, the Blackwall Tunnel also carries a significant volume of bus and, in particular, commuter coach passengers.

3.7.3 In fact, some 11% of total person trips using the tunnel in the AM peak hour are travelling by bus and coach, the vast majority in the northbound peak direction, and the Blackwall Tunnel carries almost as many bus and coach trips as Tower Bridge.

Figure 3-25: Proportion of person trips by mode on road crossings east of London Bridge (AM peak hour, both directions, 2012)[21]



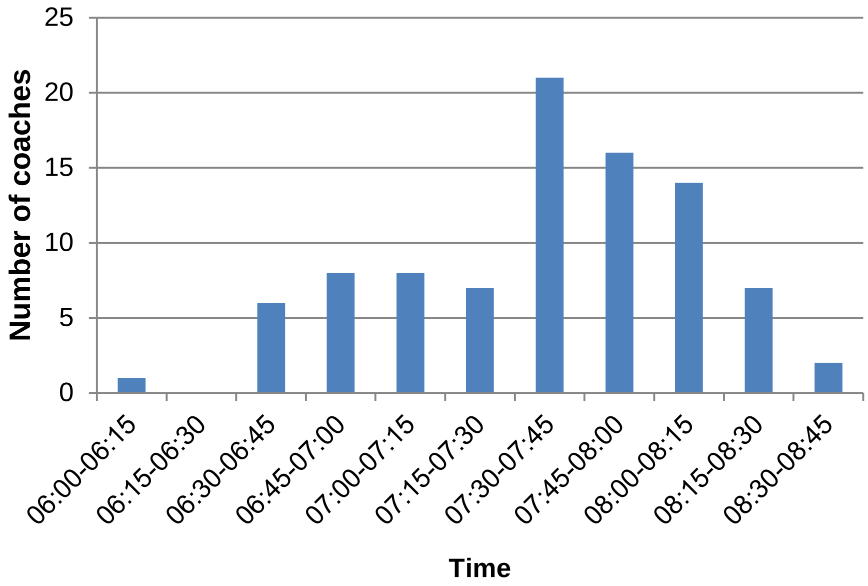
Coaches

3.7.4 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 90 coaches scheduled to pass through the

[21] 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 33; Other passenger occupancy assumptions from TAG data book

Blackwall Tunnel in the morning peak, and 58 of these in the high peak between 07:30 and 08:30, as shown in Figure 3-26.

Figure 3-26: Scheduled commuter coaches (northbound, AM peak, 15-minute periods)[22]



3.7.5 These commuter services carry approximately 2800 passengers in each peak direction based on an average of two-thirds occupancy.

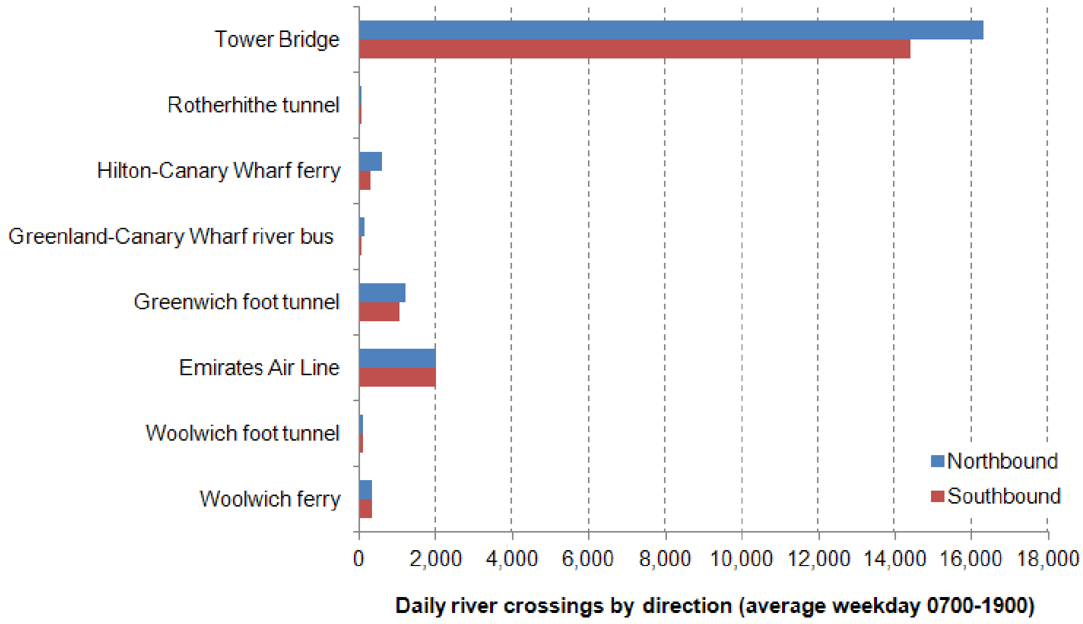
3.8 Pedestrians and cyclists

3.8.1 Tower Bridge carries around 30,000 pedestrians a day in total, with marginally more travelling northbound. The pedestrian crossings to the east are used less, with the EAL and the Greenwich foot tunnel each carrying over 1,000 pedestrians per day in both directions (Figure 3-27). Smaller numbers of people use passenger ferries as river crossings for part of their journey, including the Hilton Ferry[23] and the Woolwich Ferry.

3.8.2 The lower pedestrian flows on crossings to the east of Tower Bridge are primarily a reflection of the relative lack of pedestrian trip attractors in these areas when compared with areas in the vicinity of Tower Bridge. The spikes in activity evident at the Greenwich foot tunnel and the EAL are related to the proximity of attractions such as the Cutty Sark and The O2, and anecdotal evidence suggests that the EAL is also something of a tourist attraction in its own right.

[22] Chalkwell Coaches, www.chalkwell.co.uk; Centaur Coaches, www.centaurtravel.co.uk; Clarkes, www.clarkescommute.co.uk; Kings Ferry, www.thekingsferry.co.uk; Redwing Coaches, www.redwingcoaches-northkent.co.uk; Barcroft Coaches, www.barcrofttours.co.uk; Buzzlines Travel, www.buzzlinestravel.co.uk, Brookline Coaches, www.brooklinecoaches.co.uk. (2015)
[23] Shuttle service connecting the Hilton Hotel in Rotherhithe with Canary Wharf, operating seven days a week and open to the public (at a charge)

Figure 3-27: Daily pedestrian cross-river trips to the east of London Bridge (2012-13)[24]

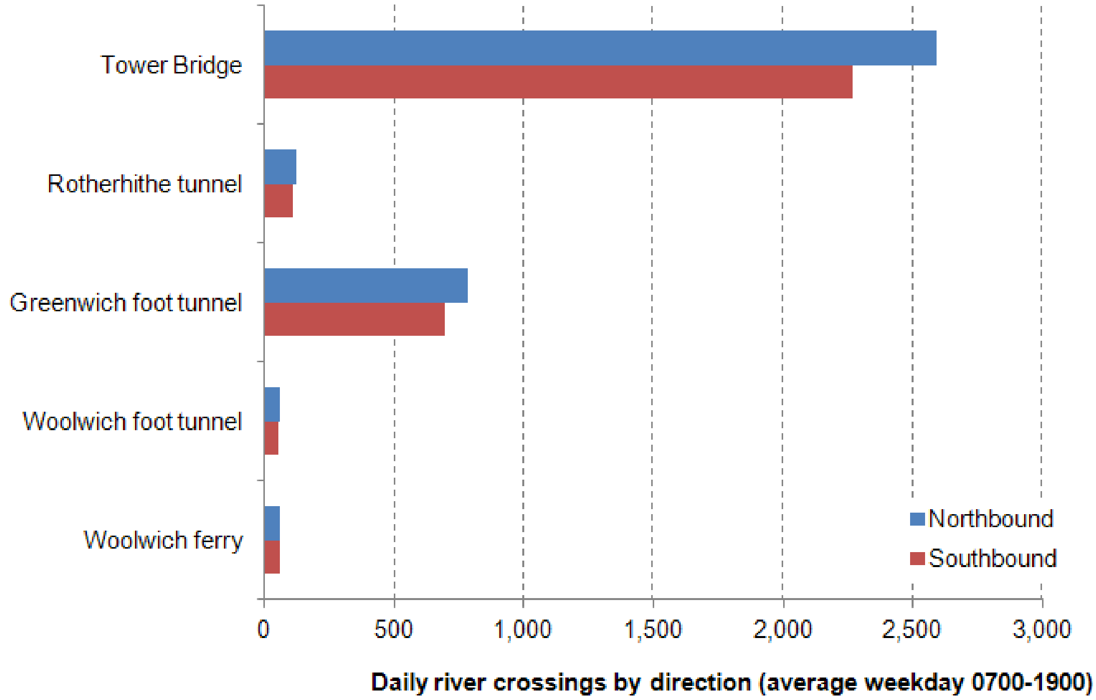


3.8.3 shows daily cross-river cycle flows in east London. Tower Bridge carries around 5,000 cyclists on an average weekday, and the peak cycling commuter movement is northbound in the morning peak hour (700 cyclists). Cyclists are permitted to push their bicycles through the Greenwich and Woolwich foot 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.

3.8.4 Cyclists were not counted separately on the EAL and passenger ferries and these trips were recorded as pedestrian cross-river trips. 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.

[24] Data sources: TfL: Pedestrian and cyclist Thames screenline crossings count (2013); TfL: River Bus Origin Destination Survey (2012); Emirates Air Line passenger data (2012)

Figure 3-28: Daily cycling cross-river trips to the east of London Bridge (2012-13)[25]



3.8.5 Pedestrian and cycle counts were also undertaken at two key locations affected by the proposed Silvertown Tunnel works sites (discussed in more detail in Chapter 6), as follows:

- the pedestrian and cycle bridge over the A102 Blackwall Tunnel Approach adjacent to Boord Street, on the Greenwich Peninsula south of the River Thames;
- Dock Road near the entrance to the Hanson Concrete site, in Silvertown north of the River Thames.

3.8.6 Counts were recorded by direction in 15-minute periods between 07:00 and 19:00 on Thursday 27 August 2015. The Boord Street bridge was predominantly used by pedestrians, with 264 counted in total across the 12-hour survey period (119 westbound and 145 eastbound). In comparison only 18 cyclists (nine in each direction) were counted. Activity peaked between 17:00 and 18:00, when 51 trips (47 pedestrians and four cyclists) were recorded.

3.8.7 On Dock Road more activity was recorded across the 12-hour survey period as a result of more cyclists using the link – in total, 125 cyclists were counted, compared with 245 pedestrians. When compared with the Boord

[25] Data sources: TfL: Pedestrian and cyclist Thames screenline crossings count (2013); Cyclists on the Emirates Air Line and Thames Clippers services are not counted separately and appear in the pedestrian figures above

Street bridge, most of the additional activity occurred in the AM peak and IP periods. In the peak hour (17:00-18:00) the overall flow was similar, with 53 trips counted in total (30 pedestrians and 23 cyclists).

3.9 Key points

3.9.1 There are a number of strategically important radial roads in east and south-east London, several of which converge at the Blackwall Tunnel. This makes the Tunnel one of the busiest links on London's road network, and in 2012 it carried an average of around 45,000 daily northbound trips.

3.9.2 The Blackwall Tunnel is however only one of three highway crossings in east London within the GLA area, and is the most strategically important with a capacity around three times that of the Rotherhithe Tunnel and twenty times that of the Woolwich Ferry. The Blackwall Tunnel essentially functions as the lynchpin of the strategic road network in east London, and is heavily used at most times of the day and week.

3.9.3 There are many more highway crossings in west and central London, and demand is spread more amongst crossings to the west of Tower Bridge.

3.9.4 There has been a period of sustained investment in PT capacity across east and southeast London over the past 20 years, with new cross-river links added through the Jubilee Line, DLR, High Speed 1 and the London Overground. However, because of the scarcity of highway crossings there is only a single cross-river bus route operating east of Tower Bridge (via the Blackwall Tunnel), compared to 47 bus routes that cross the river west of Vauxhall Bridge.

3.9.5 East of Tower Bridge, the overwhelming majority of cross-river trips are made by rail, with the majority of those carried on the Jubilee Line. In the AM and PM peak hours the proportion of cross-river trips made by PT is around 80% and 76% respectively. The Blackwall Tunnel carries around 3,000 bus and coach trips in the morning peak period.

3.9.6 The EAL provides a high quality cross-river link along the alignment of the proposed Silvertown Tunnel, catering for pedestrians and cyclists.

3.9.7 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 the EAL.

4 CURRENT NETWORK PERFORMANCE AND QUALITY ISSUES

4.1 Overview

4.1.1 The previous chapter outlined the current transport network in east London, with an emphasis on usage of the existing river crossings. This chapter summarises the known network performance issues.

4.2 Road network performance

Congestion and delay

4.2.1 Figure 4-1 and Figure 4-2 show the average delay across the entire network for the period of September 2013 to August 2014 and the AADT flows for 2012, during the AM and PM peak hours, respectively. As shown, the road network across London has a number of areas which are subject to significant delays during the peak periods. In the AM peak, the approach to the Blackwall Tunnel (northbound) is the most heavily congested major traffic route in the whole London network. It also experiences some of the highest delays across London in the PM peak, and certainly the most in the East and South-East Sub Region (ESR).

Figure 4-1: AM peak average delay (September 2013 to August 2014) and AADT traffic flows (2012)

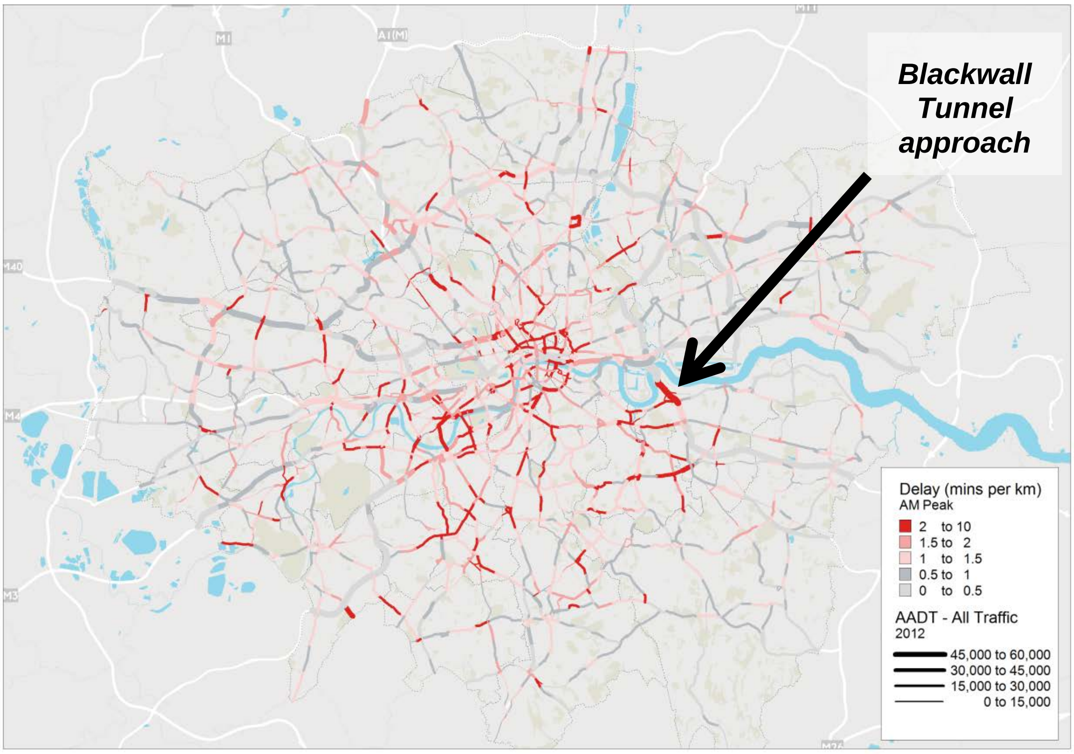
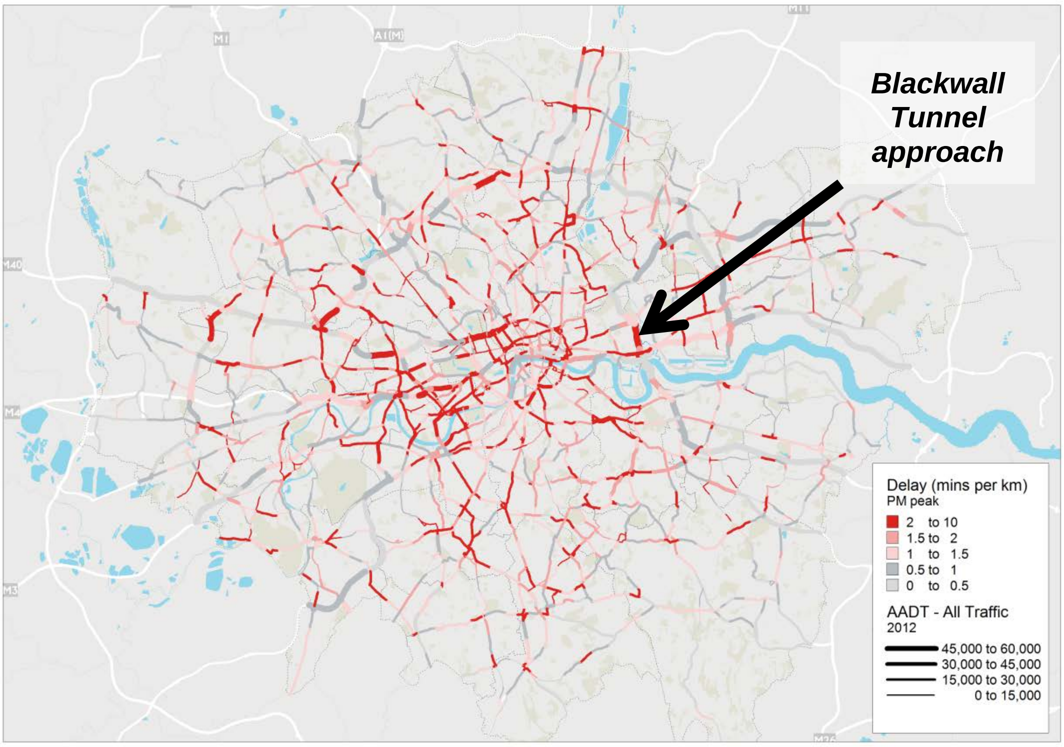


Figure 4-2: PM peak average delay (September 2013 to August 2014) and AADT traffic flows (2012)



4.2.2 Congestion can be seen on the links to a number of road crossings, and all three of the road crossings in east London operate at, or close to, their practical reserve capacity at peak times. Table 4-1 indicates the approximate capacity at which the Blackwall Tunnel and its adjacent crossings are operating in the peak hours, based on the approximate maximum capacity of each crossing (as set out in Table 3-1). A value of over 80% indicates that traffic flow on a link is approaching the design capacity of that link.

Table 4-1: 2012 estimated crossing capacity utilisation in peak periods[26]

Crossing	% capacity used (AM peak hour)	% capacity used (PM peak hour)
Rotherhithe Tunnel NB	73%	81%
Rotherhithe Tunnel SB	74%	84%
Blackwall Tunnel NB	100%	94%
Blackwall Tunnel SB	78%	99%
Woolwich Ferry NB	100%	98%
Woolwich Ferry SB	99%	100%

4.2.3 Table 4-1 indicates the approximate capacity at which the Blackwall Tunnel and its adjacent crossings are operating in the peak hours, based on the approximate maximum capacity of each crossing (as set out in Table 3-1). A

[26] As indicated in Chapter 3, the effective capacity of specific river crossings varies by time period for a number of reasons so the data in the table above should be treated as a guideline only.

value of over 80% indicates that traffic flow on a link is approaching the design capacity of that link.

4.2.4 Table 4-1 indicates that the Blackwall Tunnel's maximum capacity has been reached in the northbound direction of the AM peak and the southbound direction of the PM peak. As set out above, congestion is particularly an issue in the vicinity of the Blackwall Tunnel, with extensive queuing and delay to traffic occurring on the main approaches to the Tunnel portals.

4.2.5 For example, Figure 4-3 and Figure 4-4 show vehicles queuing on the A102 Blackwall Tunnel Approach to the northbound tunnel portal at Boord Street during the AM peak on a weekday in June 2015, while traffic flows freely in the adjacent southbound lanes. This is typical of the weekday morning peak period.

Figure 4-3: Traffic on the northbound approach to the Tunnel (view north from Boord Street footbridge, AM peak, 4th June 2015)

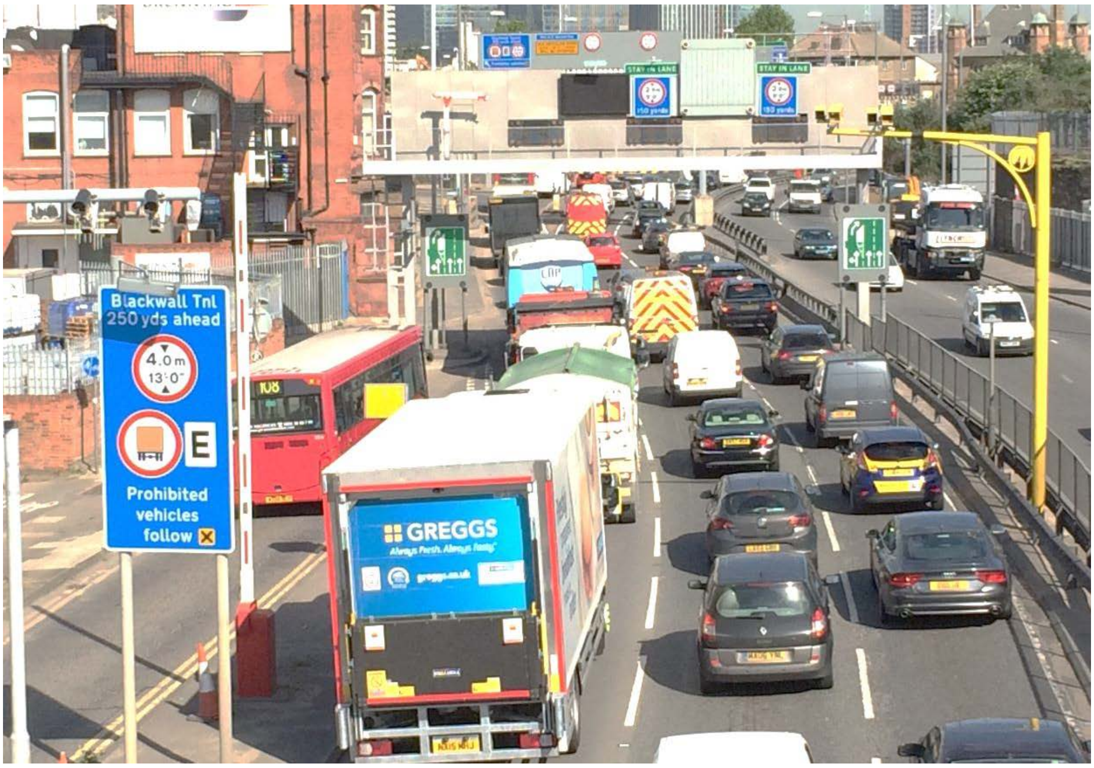
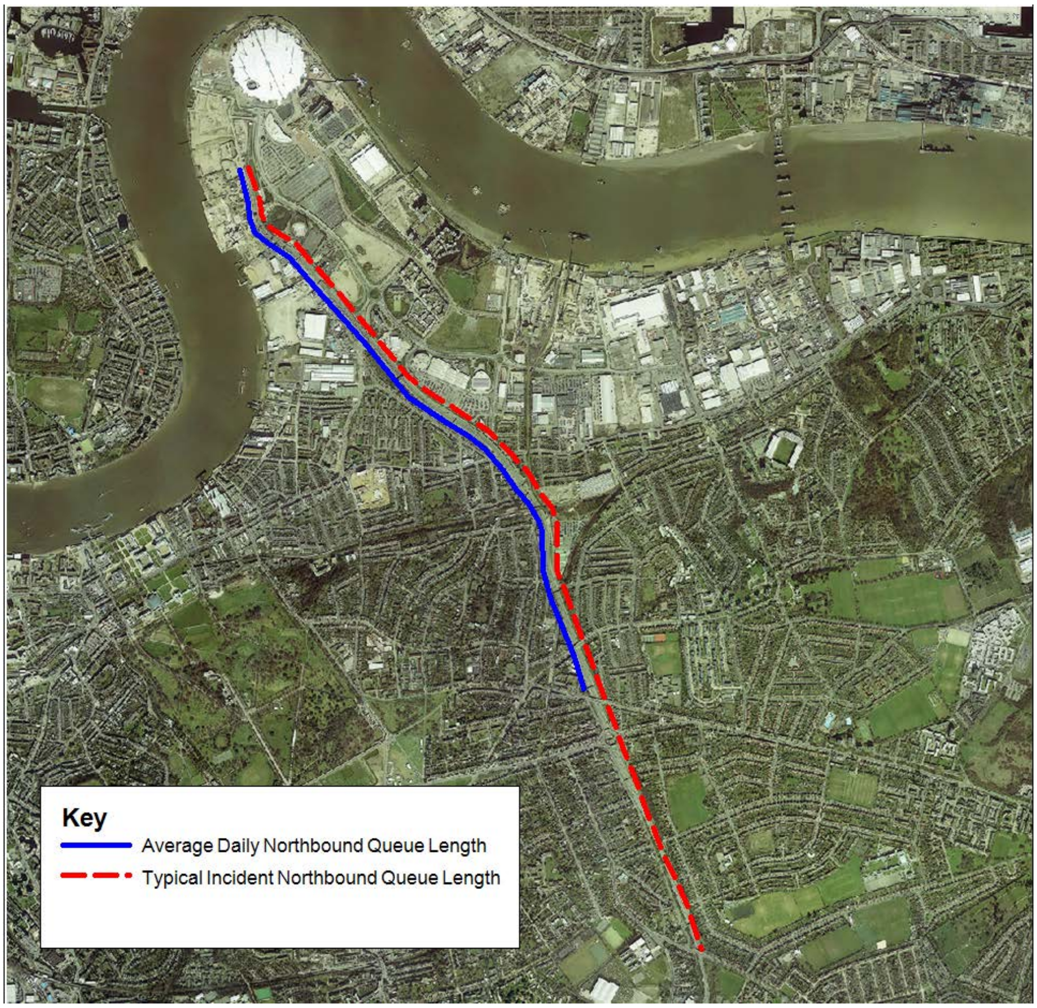


Figure 4-4: Traffic on the northbound approach to the Tunnel (view south from Boord Street footbridge, AM peak, 4th June 2015)

4.2.6 Long queues of traffic wishing to use the Blackwall Traffic routinely form on the approach roads in peak periods. Figure 4-5 and Figure 4-6 show the indicative extent of queuing traffic on an average weekday when there are no incidents at the Blackwall Tunnel, and on a day when a ‘typical’ incident takes place in the peak period and which affects traffic in the peak direction. Further information on incidents at the Blackwall Tunnel is set out later in this chapter.

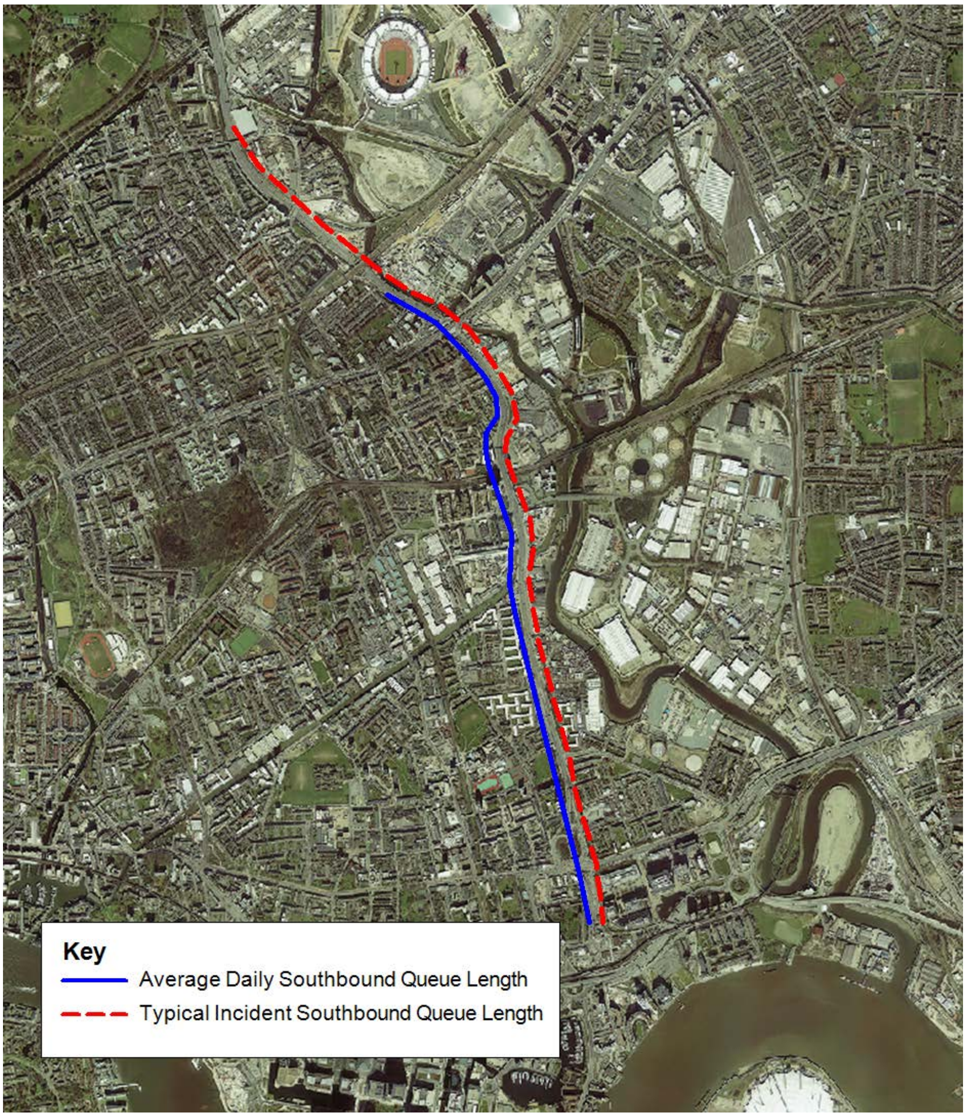
4.2.7 In the northbound direction in the AM peak, queues routinely start forming around 3.2 km from the Tunnel portal, at a point just north of the Sun-in-the-Sands Roundabout. On the regular occasions when incidents occur, queues can quickly build up further to around 4.6km in length leading to additional delay and journey times. The example in Figure 4-5 shows the resulting queue when a broken down vehicle caused a tunnel closure of six minutes in the AM peak on a typical weekday.

Figure 4-5: Indicative extent of queuing traffic on the northbound approach to the Tunnel, with and without an incident (AM peak)



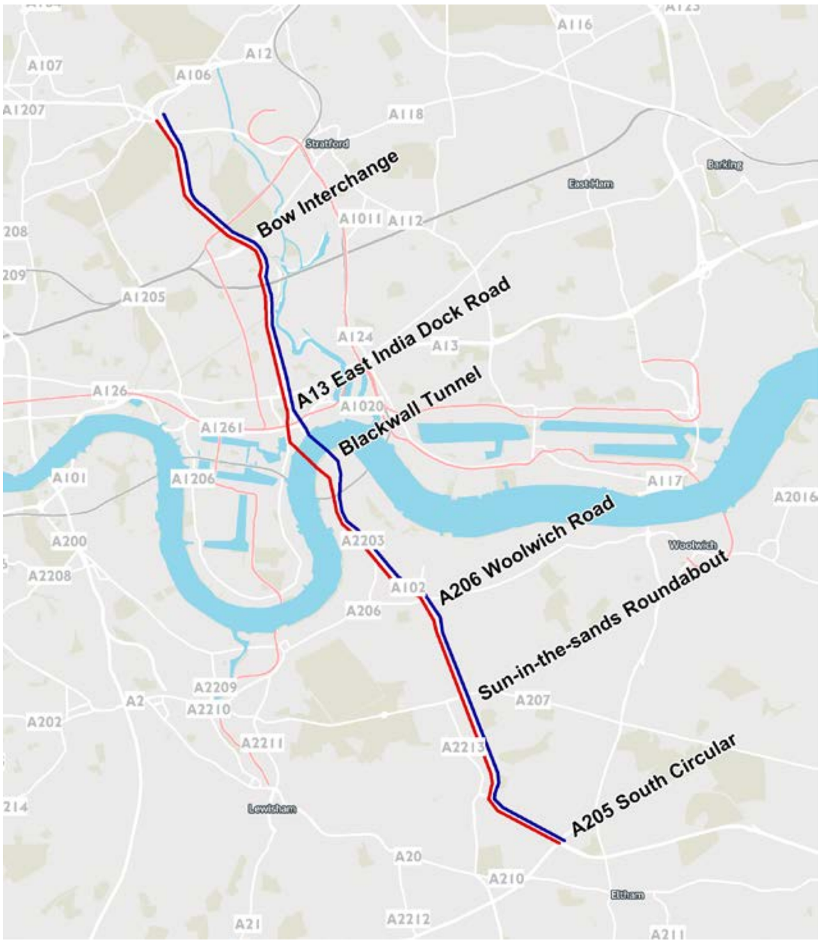
4.2.8 In the southbound direction in the PM peak, queues can regularly begin to form around 2.7km from the Tunnel portal, at a point north of the A11 Bow Interchange. In the event of an incident, the length of the queue can often quickly build up to around 3.2km from the Tunnel portal. The example in Figure 4-6 shows the resulting queue when a pedestrian attempting to access the tunnel caused a tunnel closure of three minutes in the PM peak on a typical weekday.

Figure 4-6: Indicative extent of queuing traffic on the southbound approach to the Tunnel, with and without an incident (PM peak)



4.2.9 As a result of this congestion, it follows that journey times to the Blackwall Tunnel are very slow during peak periods. Data for a number of strategic cross-river routes in November 2012 was collated to calibrate the strategic highway model (RXHAM) used in the assessment of the Silvertown Tunnel. One of these routes passed through the Blackwall Tunnel between the A205 South Circular and the A12 in Hackney Wick, as shown in Figure 4-7. The northbound route is 11.9km long, while the southbound route is 11.6km.

Figure 4-7: RXHAM Blackwall Tunnel journey time assessment route



4.2.10 Averaged across all weekdays in November 2012, the northbound speed recorded along the whole route in the AM peak period was 26.1kph. However, the breakdown of speed per link, illustrated in Figure 4-8, shows that average speed falls considerably beyond the Sun-in-the-Sands Roundabout, some 3.5km from southern Tunnel portal. The significant dip in speed at the point just over 1km from the start of the route occurs at the Kidbrooke Interchange, where traffic on the A2 Rochester Way meets traffic on the A2213 Kidbrooke Park Road.

Figure 4-8: Observed average weekday AM peak speed northbound (Nov 2012)

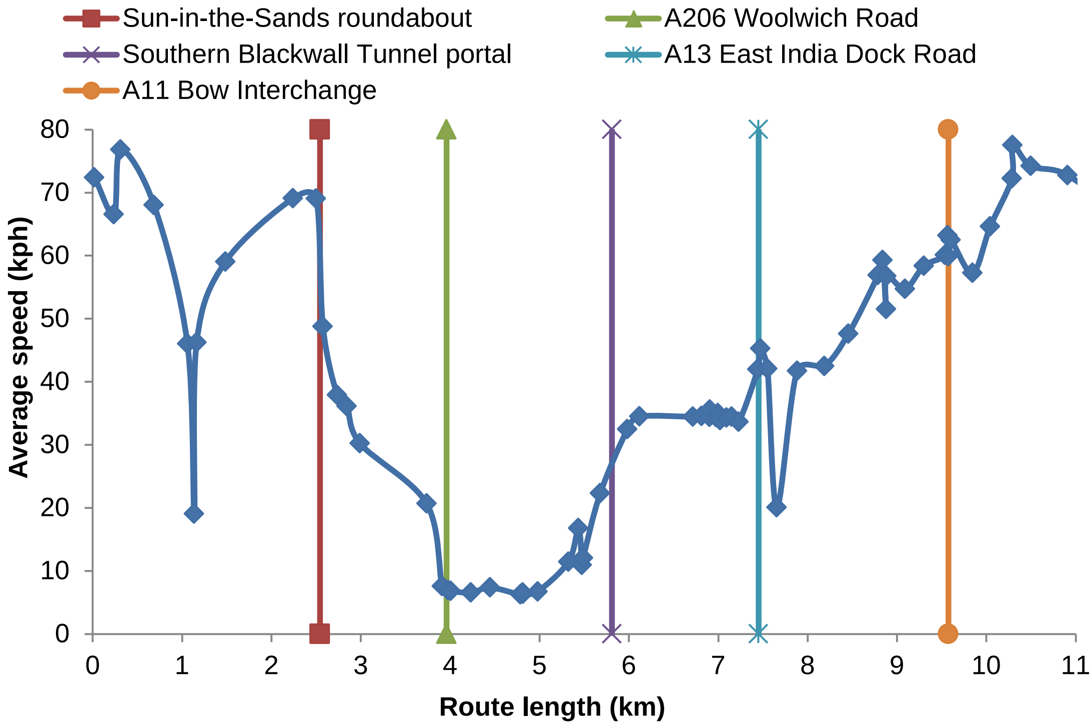
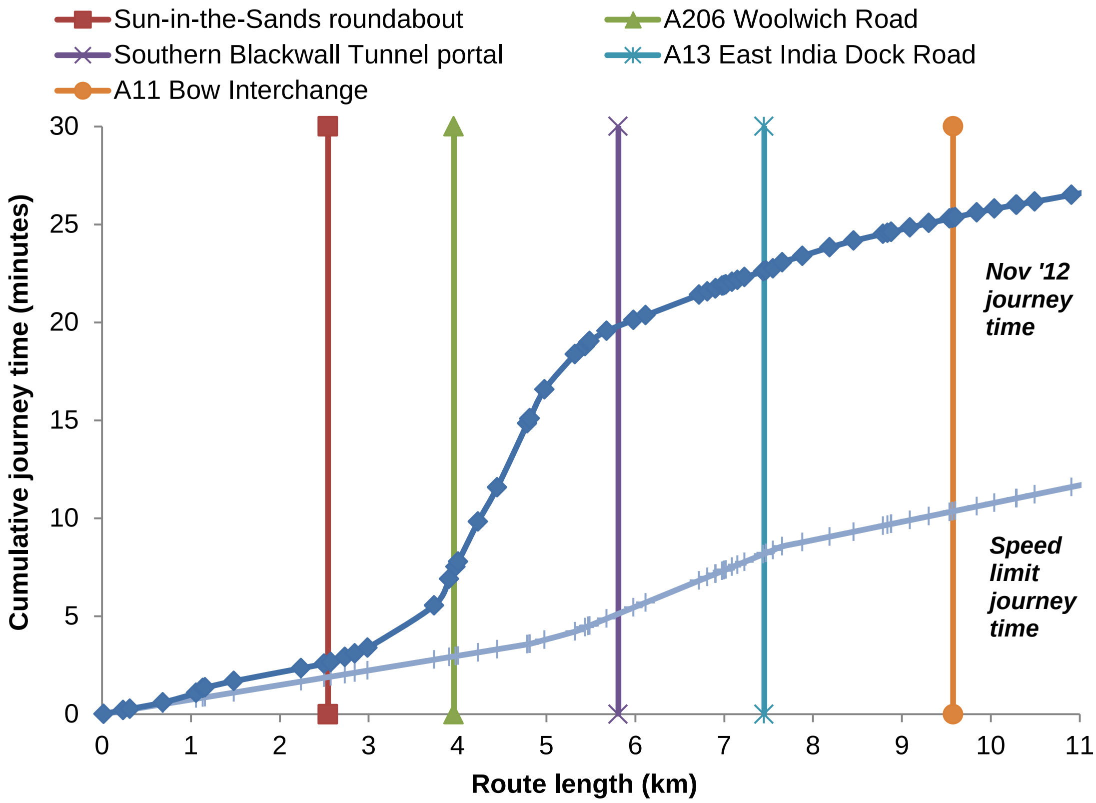


Figure 4-9: Observed average weekday AM peak cumulative journey time northbound (Nov 2012) v unconstrained (speed limit) journey time



4.2.11 On the section between the A206 junction and the Tunnel portal, average AM peak speed across the month was less than 8kph. This congestion results in a delay of approximately 15 minutes along the route compared with the unconstrained journey time at current designated speed limits (assuming no additional delays due to red lights at the signal junctions on the route: the A2/A2213 Kidbrooke Park Road junction, the A102/A13 East India Dock Road junction, the A12/Lochnagar Street junction, and the part-time signals on the approach to the tunnel), as shown in Figure 4-9. Delays during periods when incidents and closures occur at the Blackwall Tunnel can be considerably longer. The time profile shown in Figure 4-9 clearly indicates delay building on the approach to the tunnel as a result of congestion, with the aforementioned signal junctions having comparatively little impact on journey time.

4.2.12 Along the full length of the route in the southbound direction in the weekday PM peak, average speed was only 16.4kph in the same month, and the data suggests that average speed falls considerably from a point around 1km to the north of the A11 Bow Interchange. Figure 4-10, which shows the average speed profile along the route, indicates that average speed reduced to 6.4kph along this section. Average speed increases to around 20 kph between the A13 East India Dock Road and the tunnel portal as traffic merges and speeds increase, and then increases again to over 40 kph through the tunnel portal as traffic becomes more free-flowing.

Figure 4-10: Observed average weekday PM peak speed southbound (Nov 2012)

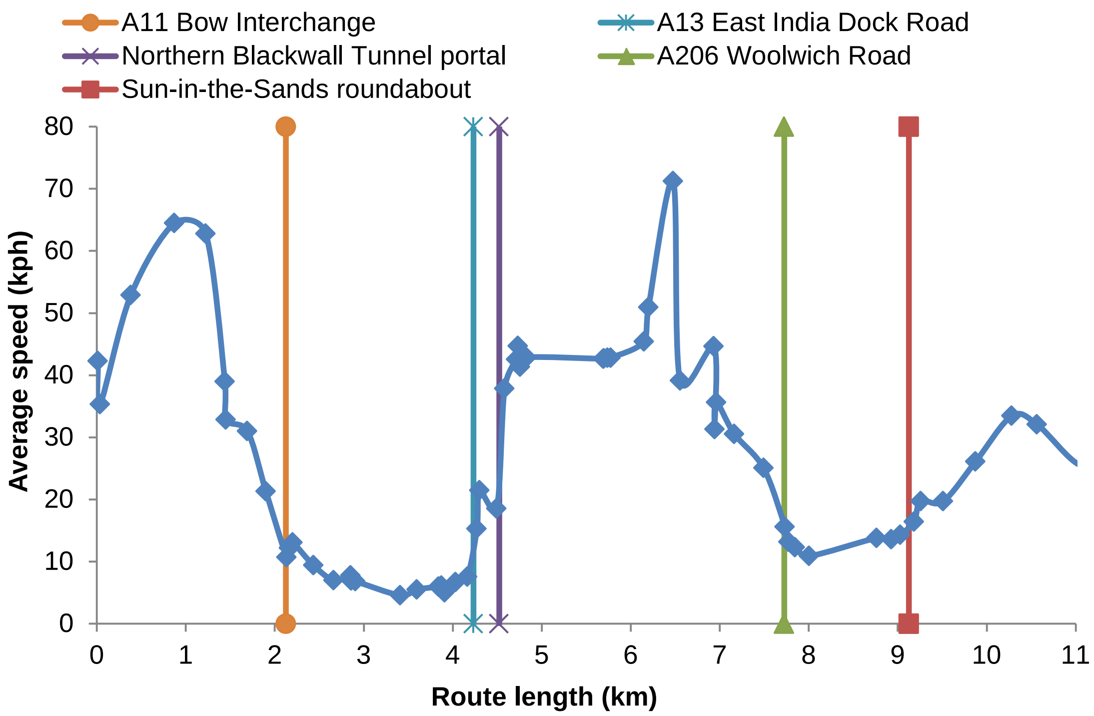
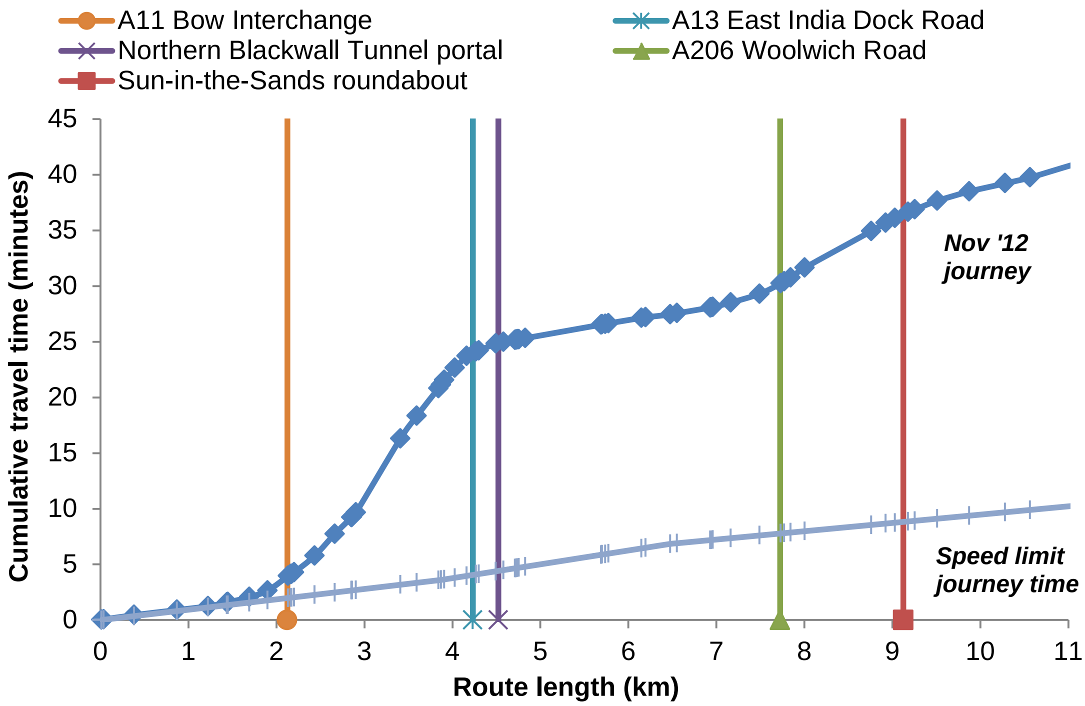


Figure 4-11: Observed average weekday PM peak cumulative journey time southbound (Nov 2012) v unconstrained (speed limit) journey time



4.2.13 Average delay along the route compared with unconstrained (speed limit) journey time is approximately 20 minutes on the section before traffic enters the southbound tunnel bore, and increases further to the south due to congestion between the A206 Woolwich Road junction and the Sun-in-the-Sands Roundabout. Again, delays during periods when incidents and closures occur at the Blackwall Tunnel can be considerably longer.

4.2.14 The 2012 survey of Blackwall Tunnel users discussed in Chapter 3 indicates that average total journey time for car and LGV users was 76 minutes outbound, 79 minutes return with very little difference between north and southbound journeys.

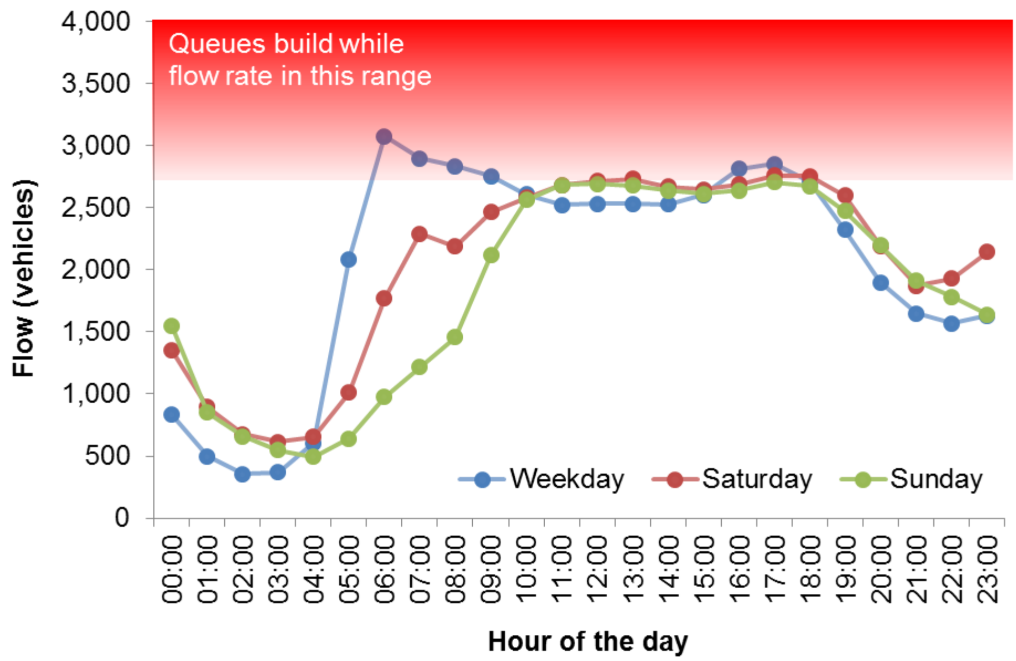
4.2.15 Overall, 18% of the time for journeys using the Blackwall Tunnel is spent in stationary traffic, with a third (33%) in congested traffic, and under half (49%) in free flowing traffic. Journeys that have a departure time of between 19:00 and 20:00 spend the highest proportion of time in free flowing traffic, but even here the proportion is only some 64%.

4.2.16 In the AM peak period, journeys which depart at between 06:00 and 07:00 spend the least time in free time flowing traffic at 40% of the total journey duration. There is a noticeable drop in the free flow traffic percentage in the late afternoon and although this effect exists for trips made in both directions it is particularly pronounced for trips made southbound.

Profile of use of the Blackwall Tunnel

4.2.17 The constraints encountered in the northbound tunnel bore result in a situation where peak vehicle flow actually occurs between 06:00-07:00 and then decreases gradually through the morning as increasing congestion causes delay on the approaches to the Tunnel, which in turn results in a reduced throughput through the Tunnel. The profile of use of the northbound tunnel is shown again in Figure 4-12, with an indication given of the point at which congestion builds due to vehicle flow approaching the northbound tunnel capacity.

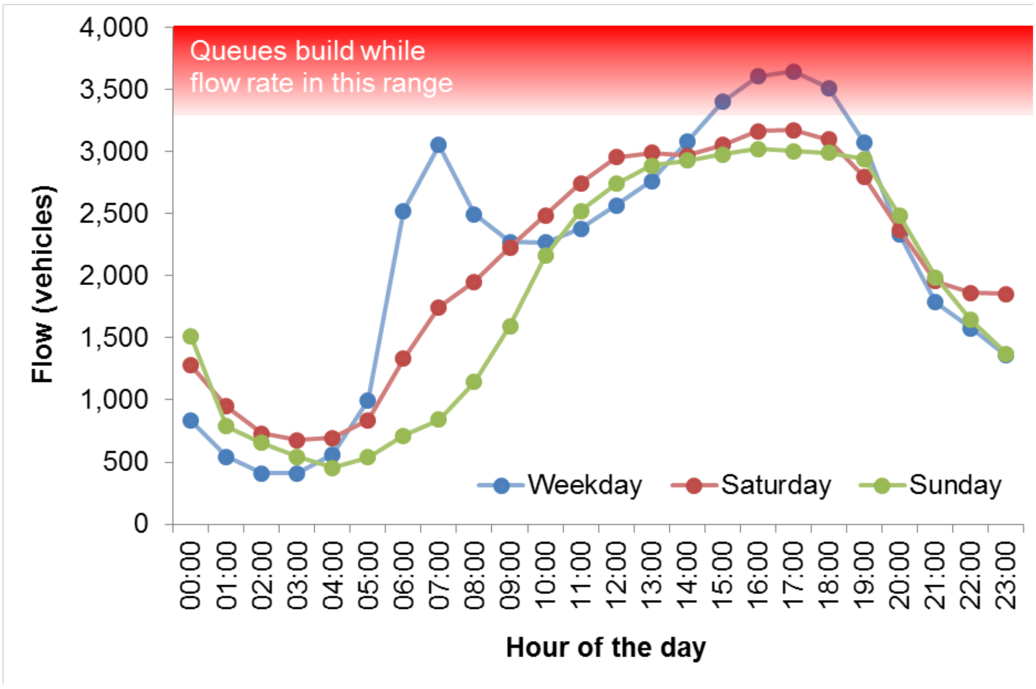
Figure 4-12: Blackwall Tunnel northbound - average hourly flows by day type[27]



4.2.18 The southbound tunnel bore can operate at a slightly higher capacity with the PM peak throughput reaching around 3,600 vehicles. The profile of use of the southbound tunnel is shown again in Figure 4-13, with an indication given of the point at which congestion builds due to vehicle flow approaching the southbound tunnel capacity.

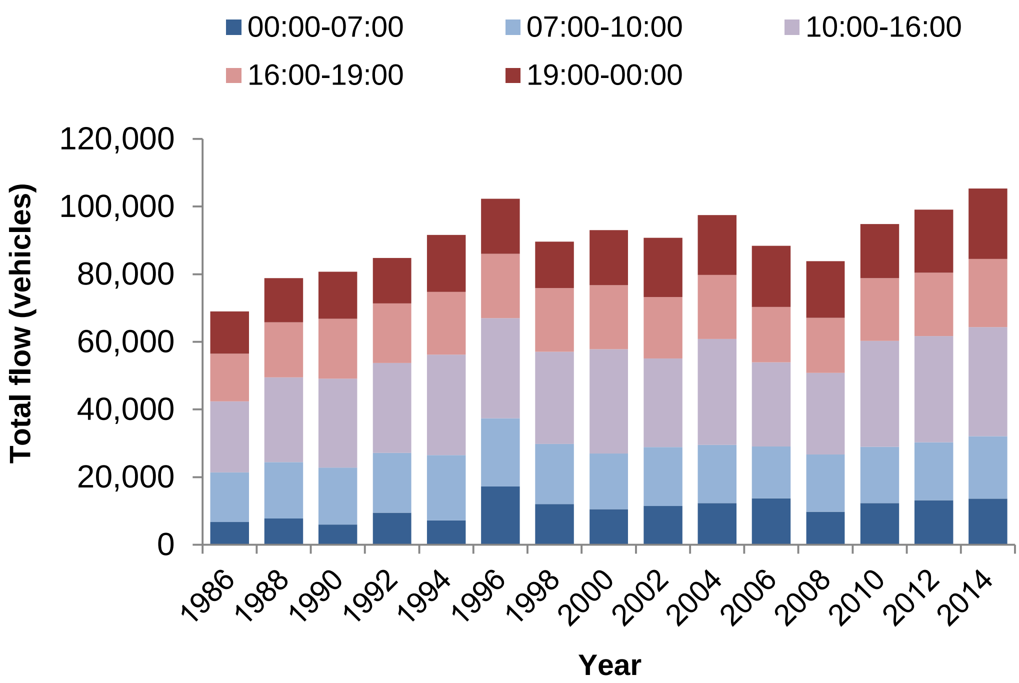
[27] Blackwall Tunnel Flows, 01/12/2011 to 28/11/2013

Figure 4-13: Blackwall Tunnel southbound - average hourly flows by day type



4.2.19 Traffic flows through the Blackwall Tunnel are at an all time high, having risen steadily for the past thirty years. Figure 4-14 shows average daily traffic flows through the Blackwall Tunnel from 1986 to 2014.

Figure 4-14: Two-way weekday daily vehicle flows at the Blackwall Tunnel, 1986-2014



4.2.20 In addition to the total daily vehicle flows increasing (reaching over 100,000 vehicles in 2014), it can be seen from Figure 4-14 that the proportion of trips made outside of the peak periods (07:00-10:00 and 16:00-19:00) has increased. For instance, since 1986 the proportion of trips made between midnight and 07:00 has grown from around 10% to around 13% currently. The proportion of trips made in the AM peak has reduced from around 21% to around 17% currently, whilst for the PM peak the proportion has reduced from around 21% to around 19%. This indicates that the majority of growth in traffic flow is being accommodated at off-peak times, as the Tunnel is operating at or close to capacity at peak times and further trips in these periods cannot be accommodated.

4.2.21 One other point that can also be inferred from Figure 4-14 is that there does not appear to be a strong correlation between vehicle flows through the Blackwall Tunnel and the significant investment in cross-river PT links in east London as described in Chapter 3. For example, the opening of the Jubilee Line extension in 1999 does not seem to have resulted in a reduction in trips through the Blackwall Tunnel.

Base year model analysis

4.2.22 As described in Chapter 1, RXHAM is a strategic model that has been used to assess the impact of Silvertown Tunnel on the road network in east and south-east London[28]. Outputs from the 2012 base year RXHAM, which has been calibrated to observed data, provide further evidence about the performance of the road network in the vicinity of the Blackwall Tunnel.

4.2.23 Figure 4-15, Figure 4-16and Figure 4-17below show the modelled actual traffic flows on the strategic road network in the vicinity of Blackwall Tunnel in three different time periods as follows:

- 2012 weekday AM peak hour (08:00-09:00);
- 2012 weekday average inter peak (IP) hour (10:00-16:00); and
- 2012 weekday PM peak hour (17:00-18:00).

4.2.24 Figure 4-15 indicates heavy flows on the strategic road network during the AM peak hour. To the south of the River Thames, flows exceed 3,000 passenger car units per hour (PCUs/hr) on much of the A2 inbound to London from its junction with the M25, and in places exceed 3,500 PCUs/hr. Flows in excess of 3,200 PCUs/hr are modelled on the A102 northbound from the Sun-in-the-Sands Roundabout to the Blackwall Tunnel itself. Also in evidence is a significant counter-peak flow, reaching in excess of 2,900

[28] Further details of the base year calibration are detailed in the ‘Local Model Validation Report’ (LMVR), while Silvertown Tunnel impacts in future years are detailed in the ‘Forecasting Report’

PCUs/hr through the Tunnel and reaching approximately 70-90% of the peak flow along the A2.

4.2.25 To the north of the River Thames, heavy flows are also in evidence on the A12 in both directions, reaching in excess of 3,000 PCUs/hr south of the Bow Interchange. Flows are higher still on the A13 inbound to London, reaching in excess of 5,500 PCUs/hr through Canning Town, although the counter-peak flow is significantly lower at approximately 50% of the peak. High flows are also in evidence to the west of the Tunnel portal on Aspen Way inbound to Canary Wharf and the City.

4.2.26 In the Inter-Peak (IP) average hour (Figure 4-16), flows are generally lower than in the AM peak hour across the network but are still high on the strategic routes approaching the Tunnel, including the A2, A102, A12 and A13. The flow northbound through the Tunnel is close to 2,900 PCUs/hr with over 3,000 PCUs/hr southbound.

4.2.27 In the PM peak hour (Figure 4-17) the same roads carry the highest volumes of traffic in the area but a tidal flow outbound from London is in evidence. Southbound flow through the Tunnel reaches over 3,700 PCUs/hr with just under 3,000 northbound. On the A102 approaching Sun-in-the-Sands Roundabout southbound, flows exceed 3,900 with over 2,900 in the opposite direction, and on the A2 southbound flows exceed 5,100 with over 3,600 in the opposite direction. North of the River Thames, flows on the A13 reach over 4,600 PCUs/hr eastbound east of its junction with the A406 North Circular, with close to 3,800 westbound.

4.2.28 Larger versions of these plots are available in Appendix I.

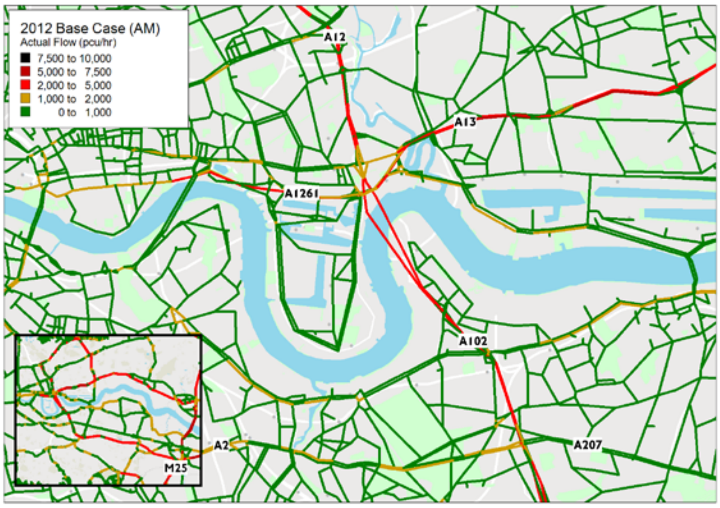


Figure 4-15: 2012 AM peak hour actual flow

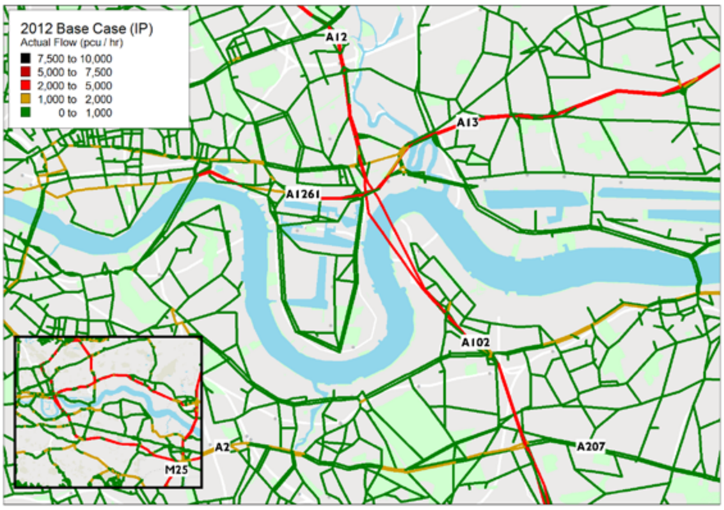


Figure 4-16: 2012 IP average hour actual flow

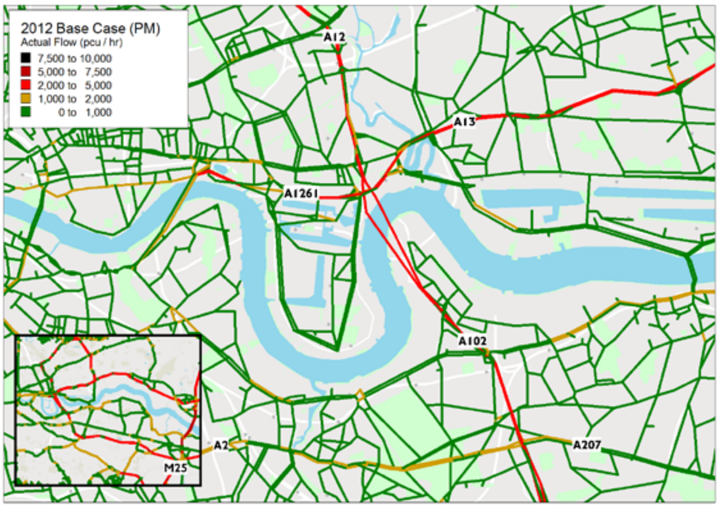


Figure 4-17: 2012 PM peak hour actual flow

4.2.29 Figure 4-18, Figure 4-19 and Figure 4-20 illustrate the Volume/Capacity Ratios (VCRs) calculated for each link in the 2012 base year model in each of three time periods assessed. VCR is a means of measuring traffic flows relative to the theoretical maximum traffic flow that can use a highway link or junction in reasonable traffic conditions. Essentially each highway link or junction is assumed to have a maximum theoretical carrying capacity, and as traffic volumes on a particular link approach its capacity the performance of that link or junction worsens.

4.2.30 A VCR of below 80% generally indicates no or low congestion, between 80-90% indicates moderate congestion, and between 90-100% indicates heavy congestion. A VCR of over 100% means that the flow arriving at a link or junction exceeds theoretical capacity, restricting the volume that can pass through the link or junction in the modelled time period, resulting in severe congestion. Effectively the link or junction is not operating efficiently thereby resulting in substantial queuing and delay occurring on the network.

4.2.31 The AM peak hour plan indicates that demand through the Blackwall Tunnel northbound bore exceeds theoretical capacity in the 2012 base year, with the capacity constraint identified as the section between the A102/Blackwall Lane junction on the approach to the south and the A102/A13 East India Dock Road junction to the north. In particular the left-turn slip northbound from the A102 to the A13 is highlighted as a particular capacity issue at this junction.

4.2.32 On the wider network south of the River Thames there are also capacity issues evident on the A206 Woolwich Road, the A207 Shooters Hill Road, the A2 Rochester Way and the A20 Sidcup Road. To the north, sections of the A13, the A118 Romford Road and the A1205 Burdett Road are also operating above theoretical capacity and there are also issues in evidence on many other more minor roads in the vicinity of the tunnel portals and beyond. In most cases these capacity issues are not linked to capacity constraints at the Blackwall Tunnel; rather they represent other constraints across the wider network.

4.2.33 In the IP average hour, the capacity issues are less evident than in the AM peak hour. It is however worth noting that flow through the Blackwall Tunnel northbound bore during this period is still forecast at between 80 and 90% of capacity.

4.2.34 In the PM peak hour, both tunnel bores operate at between 90% and 100% of theoretical capacity, and a number of key approach links on the north side are reported as in excess of 100% of capacity, including the A12 southbound and the slip roads to the A102 northern Blackwall Tunnel portal at the junction with the A13 East India Dock Road. Capacity issues are also in evidence on sections of the strategic road network to the south of the River Thames, including the A2 and A20.

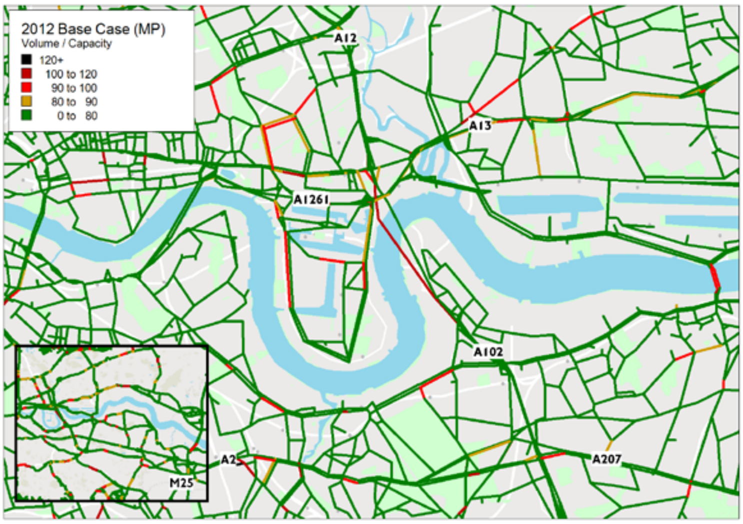


Figure 4-18: 2012 AM peak hour VCR

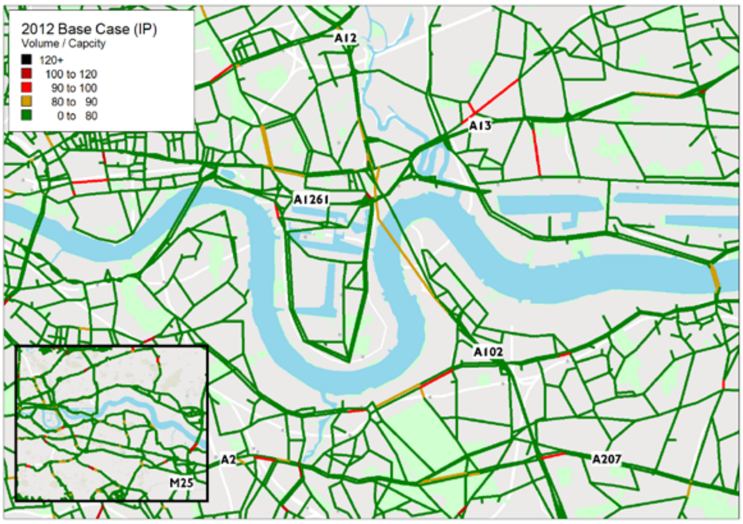


Figure 4-19: 2012 IP average hour VCR

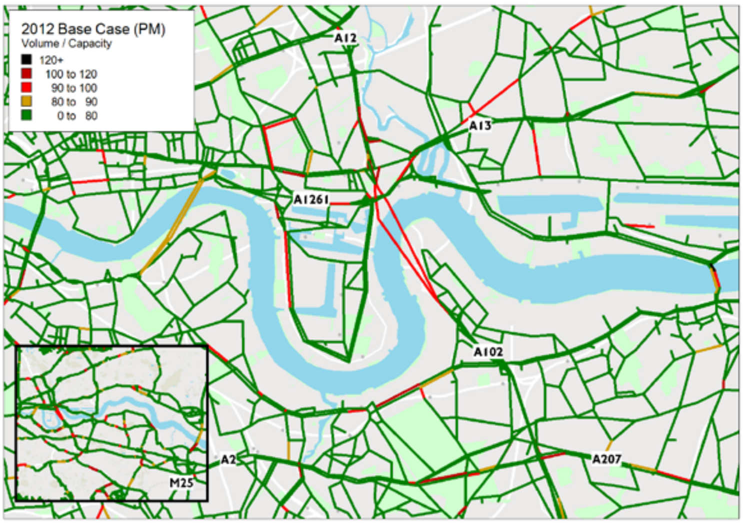


Figure 4-20: 2012 PM peak base VCR

4.2.35 Figure 4-21to Figure 4-23show the 2012 model outputs for the base year in terms of vehicle delay for the three time periods assessed, measured in passenger car unit hours (PCU hrs), for junctions in the model network. This metric identifies the time spent in queued traffic in congested conditions, taking in to account the arrival flow and delay at the junction.

4.2.36 The model (calibrated to observed conditions) indicates high levels of delay on the network in 2012 in all three time periods. In the AM peak hour, delay reaches in excess of 200 PCU hrs, which is considered severe, on key junctions approaching the southern tunnel portal. This delay is greater than at any other junction in the central London during the morning peak. To the north of the River Thames, high levels of delay also occur at the A102/A13 East India Dock Road junction and further afield delay is evident across the network, notably on the A20, the A2, sections of the A13, and on junctions to the north of Canary Wharf including on the A1205 Burdett Road.

4.2.37 In the IP average hour, delay is less prevalent than in the AM peak but still excessive delays at junctions before river crossings like Tower Bridge and Blackfriars Bridge. Delays of over 150 PCU hrs are also in evidence on the A12 southbound in the PM peak (the VCR plot indicates that the southbound tunnel bore is above 80% of capacity during this time period).

4.2.38 During peak times, high levels of delay are also evident on the approaches to other east London river crossings, including the Rotherhithe Tunnel, the Woolwich Ferry and the Dartford Crossing, although only the latter experiences similar levels of delay to the Blackwall Tunnel.

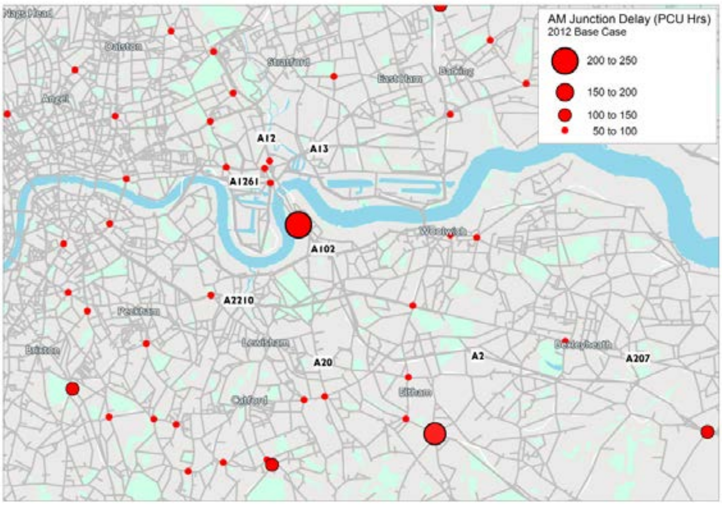


Figure 4-21: 2012 AM peak hour junction delay

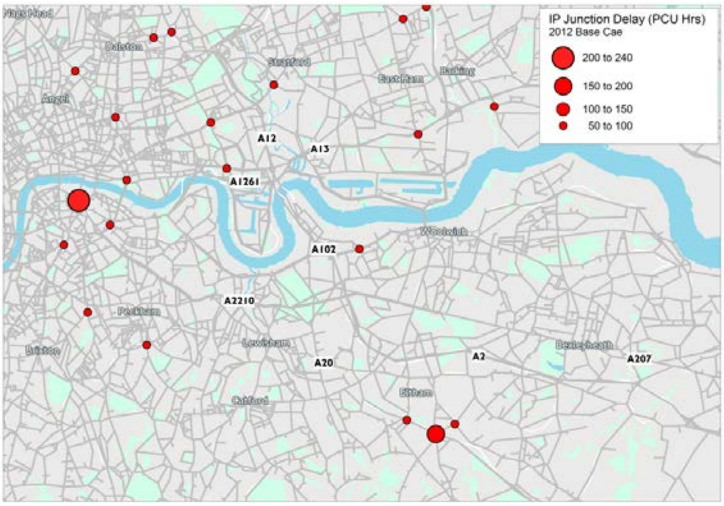


Figure 4-22:2012 IP peak hour junction delay

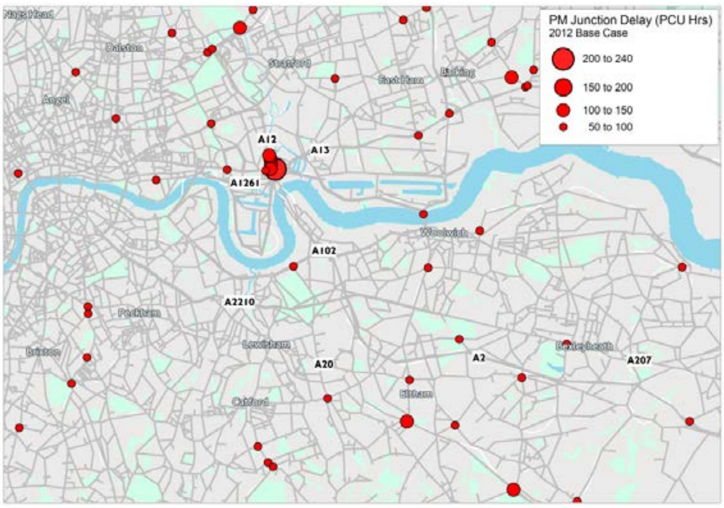


Figure 4-23: 2012 PM peak hour junction delay

Crossing performance

4.2.39 Figure 4-24 and Figure 4-25 summarise the difference between demand (the traffic that would be allocated to the link irrespective of capacity) and actual flow (the traffic that is assigned accounting for capacity constraints) at river crossings in the 2012 base year model. Where demand significantly exceeds actual flow, this suggests that the crossing link itself (as opposed to or as well as the approach roads) is acting as a constraint which leads to queuing to use the crossings. Queuing and congestion also occurs to a lesser extent at crossings where VCR is less than 100%, although the difference between demand and actual flow may not be significant in these instances.

Figure 4-24: 2012 AM Demand vs Actual flow for East London River Crossings (PCUs)

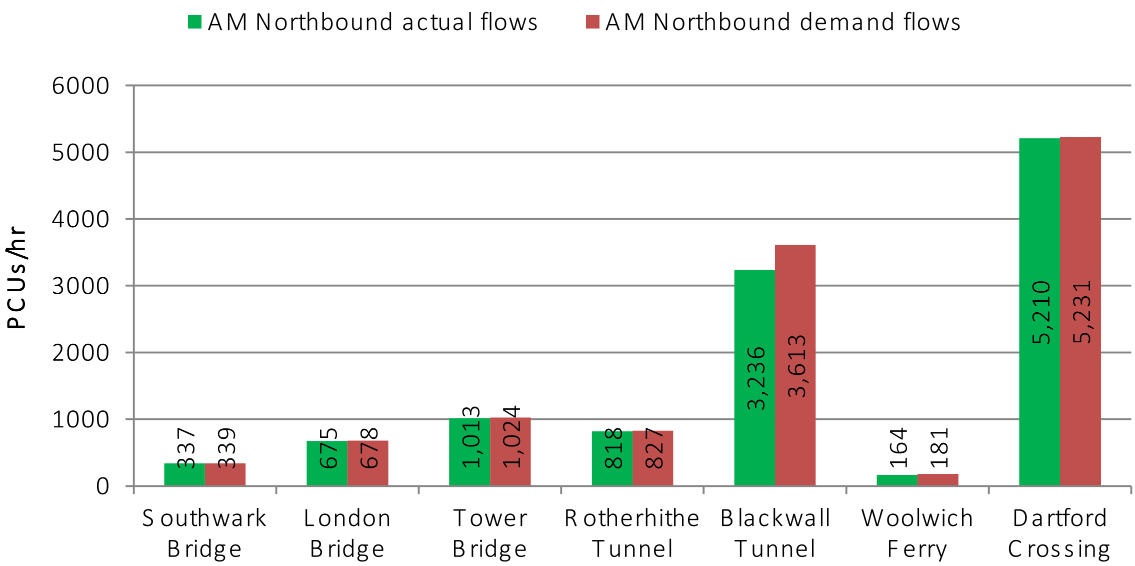
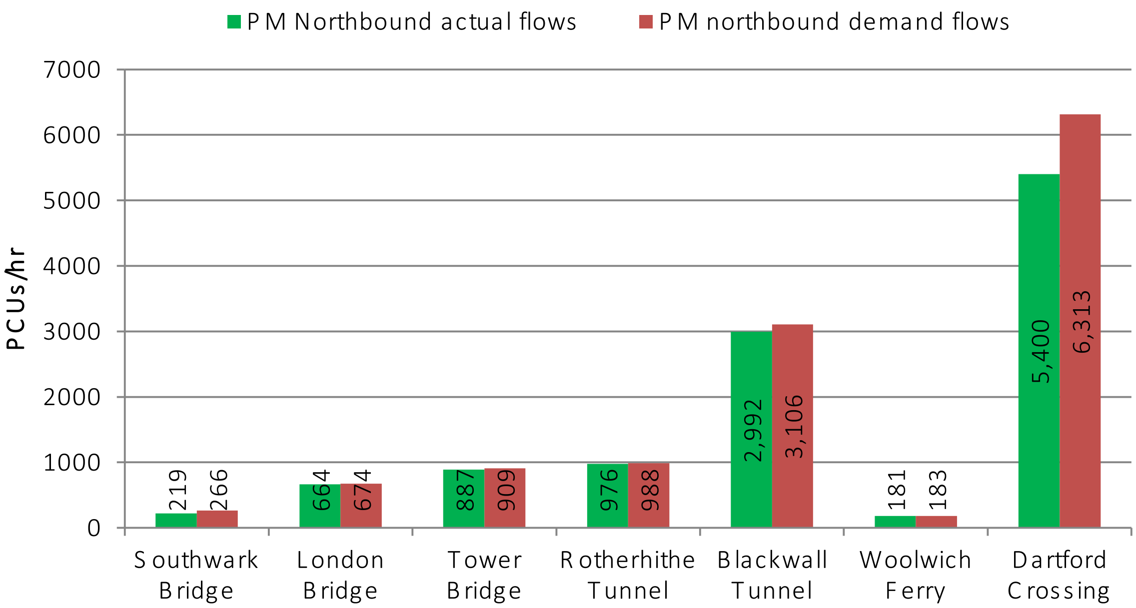


Figure 4-25: 2012 PM Demand vs Actual flow for East London River Crossings (PCUs)



4.2.40 As can be seen from the figures above, in the northbound direction in the AM peak the Blackwall Tunnel has the highest level of demand relative to actual flow (112%). In the PM peak the Dartford Crossing has the highest level of demand relative to actual flow (117%). This suggests that these crossing links are unable to accommodate forecast demand, and further illustrates the capacity constraints of these crossings in the base year modelling.

4.2.41 Demand slightly exceeds actual flows in both peak periods at all of the other crossings, although the difference in most cases is negligible.

Network reliability and resilience

4.2.42 The cross-river highway network in the east of London is notoriously unreliable. The congestion issues summarised above are a key factor underlying this sub-optimal performance, and affect the performance of much of the strategic road network in east London.

4.2.43 It can be seen to be attributable largely to the relative scarcity of highway crossings (illustrated in Chapter 3), which results in cross-river traffic from across the entire ESR converges at only three crossings all of which have capacity constraints. Of the three, the Blackwall Tunnel has the highest capacity and has the greatest importance for the accommodation of strategic traffic.

4.2.44 As well as giving rise to congestion, this lack of crossings reduces the reliability of the network, limits its resilience to disruption and compounds traffic congestion and safety concerns when incidents and crossing closures occur. The factors that negatively impact on the reliability and resilience of the existing cross-river highway network in east London can be summarised as follows:

- The small number of crossings and the distance between them;
- The lack of capacity of existing crossings to meet demand;
- The susceptibility of existing crossings to incidents and closures.

4.2.45 These factors are addressed in the remainder of this section. A detailed discussion of the reliability and resilience issues affecting the east London road network can be found in Appendix D.

4.2.46 Incidents that cause obstruction and delay are a common occurrence at the Blackwall Tunnel, including those that necessitate the activation of an unplanned closure of the tunnel so that the incident can be dealt with safely and effectively. Table 4-2 shows the number of incidents recorded within on the approaches to the Blackwall Tunnel in 2013, by category of incident and direction.

Table 4-2: Incidents at the Blackwall Tunnel in 2013

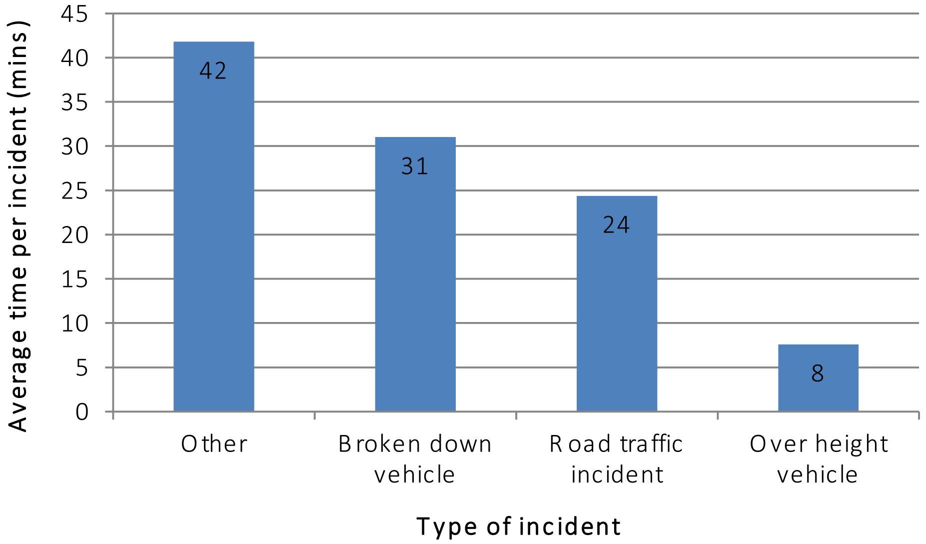
Type of incident	**Number**			**% of total**
	N/b	**S/b**	**Total**	
Congestion	396	274	670	31%
Over height vehicle	652	4	656	30%
Broken down vehicle	237	189	426	20%
Road traffic incident	67	46	113	5%
Other (pedestrians, debris, etc.)	140	166	306	14%
Total	**1492**	**679**	**2171**	**100%**

4.2.47 In total almost 2,200 incidents were recorded at or in the vicinity of the Blackwall Tunnel in 2013, equating to almost six incidents recorded per day. Congestion incidents and incidents involving over-height vehicles each accounted for around a third of all incidents, with broken down vehicles, road traffic incidents and other incidents accounting for the other third. ‘Other’ incidents include pedestrians attempting to access the tunnel portals, debris being dropped by vehicles onto the carriageway, emergency roadworks and fuel/oil spills.

4.2.48 The northbound tunnel bore had the highest number of incidents in 2013, amounting to a total of almost 1,500 incidents. The most common incident recorded was related to over-height vehicles, of which some 650 such incidents were recorded (compared to just four for the southbound tunnel bore). Other frequent occurrences related to vehicle breakdowns and road-traffic incidents (RTIs). Nearly 400 general congestion incidents were also recorded when traffic flow was observed to be particularly heavy, in some instances as a result of the knock-on impact of an incident occurring elsewhere on the road network.

4.2.49 Incidents affecting the southbound tunnel bore tend to occur less frequently as the southbound bore does not have the same constraints (most notably the 4.0m height restriction). However, nearly 700 incidents in total were still recorded at the southbound bore in 2013. As well as the number of incidents, the duration of an incident can also have a significant bearing on reliability. Figure 4-26 summarises the average duration of each type of incident recorded in 2013, excluding congestion incidents.

Figure 4-26: Average duration of incidents in 2013



4.2.50 The graph indicates that 'other' incidents and incidents relating to broken down vehicles are recorded as occurring for an average of just over 30 minutes. Incidents involving road traffic incidents were recorded as occurring for an average of 24 minutes, whilst the average duration of over-height vehicle incidents was considerably less at eight minutes.

4.2.51 Congestion incidents have been excluded from the graph as these do not represent an 'incident' in the conventional sense; rather, congestion incidents are recorded when levels of congestion on the approach to the tunnel are particularly high. They do not include congestion which is caused as a result of other incidents on the Blackwall Tunnel corridor, but may be related to other incidents elsewhere on the network. The average duration of a congestion incident in 2013 was 215 minutes (just over 3.5 hours).

4.2.52 Where it is necessary to do so, temporary closures are implemented at the Blackwall Tunnel to enable the incident to be dealt with promptly and safely. Not all incidents require a closure of the Tunnel – congestion incidents do not necessitate closures and over-height vehicle incidents, for example, may be dealt with without the need for a closure if the vehicle in question is diverted on to Tunnel Avenue at the last exit before the actual portal.

4.2.53 The number of incidents which resulted in a closure at Blackwall Tunnel in 2013 are shown in Table :

Table 4-3: Blackwall Tunnel closures in 2013

Type of incident resulting in closure	Number		% of total	
	N/b	S/b	N/b	S/b
Over height vehicle	618	0	50%	0%
Broken down vehicle	225	143	18%	12%
Road traffic incident	30	21	2%	2%
Other (pedestrians, debris, etc.)	85	112	7%	9%
Total	**958**	**276**	**100%**	

4.2.54 Of the 2,171 incidents recorded at the Blackwall Tunnel in 2013, around 1,234 resulted in a closure. This equates to 57% of all recorded incidents. Almost 80% of the closures in 2013 were implemented at the northbound tunnel bore, and a comparison with other strategic highway tunnels shows that the Blackwall Tunnel is subject to a disproportionate number of closures each year.

4.2.55 As can be seen from Table , over-height vehicle incidents account for about half of all unplanned closures, which are implemented where it is necessary to extract an over-height vehicle from the A102 Blackwall Tunnel Approach, which may require the vehicle to reverse, or in the worst case to deal with a vehicle striking an overhead structure. Over-height vehicles are not a significant issue for other strategic highway tunnels which do not have a 4.0m height restriction.

4.2.56 Broken down vehicles either within either of the tunnel bores or their approaches accounted for just over a quarter of closures, with the closures often implemented to facilitate timely recovery of the broken down vehicle by the on-call recovery service. Road traffic collisions and other incidents accounted for the remaining closures.

4.2.57 The average northbound tunnel closure lasted just over four minutes, resulting in the loss of the tunnel for a total of 68 hours across the year. For the southbound tunnel the average closure last over seven minutes, resulting in the closure of the tunnel for a total of 30 hours across the year.

4.2.58 When the Tunnel is closed (or indeed heavily congested), drivers will frequently seek alternative routes. The four principal diversion routes from the Blackwall Tunnel to alternative river crossings are shown in Figure 4-27.

Figure 4-27: Blackwall Tunnel diversion routes

4.2.59 The closest routes are via Tower Bridge, Rotherhithe Tunnel or the Woolwich Ferry, all of which have little spare capacity to accommodate diverted traffic. The other diversion route via the Dartford Crossing is a substantial distance and again has limited spare capacity during peak hours. Any diversion from the Blackwall Tunnel therefore has a direct impact on already very congested sections of the strategic highway network.

4.2.60 As well as Tunnel incidents and associated closures, which make a significant contribution to unreliable journey times, congestion itself can lead to a high degree of journey time variability on the approaches to the Tunnel during certain time periods. This reflects the fact that, in general, as congestion increases, the road network has less spare capacity to accommodate minor fluctuations in traffic flow[29].

[29] The link between congestion and variability is well established from previous research listed in WebTAG (UNIT A1.3: User and Provider Impacts (November 2014)

Evidence of unreliable journey times

4.2.61 The issues above manifest in significant variability in journey times for journeys using the Blackwall Tunnel.

4.2.62 The AM peak graph indicates significant variability in journey time through the northbound bore during this time period, with journey times widely dispersed between eight and 68 minutes. The average time across the period was 28 minutes but approximately one in four trips on this route is not within ten minutes of this journey time during this hour, and while journey times of between around 20 and 40 minutes account for a significant proportion of trips, no single journey time accounts for more than about 6% of all observations.

4.2.63 The PM peak graph indicates significantly less variability in journey time, with the majority of trips being completed in between eight and 14 minutes, primarily because traffic congestion in this time period is significantly lower than in the AM peak.

4.2.64 Figure 4-28 and Figure 4-29 illustrate the spread of northbound journey times recorded on 2013 weekdays during three-hour AM and PM peak periods from the Sun-in-the-Sands Roundabout (A2/A102 junction) and the Bow Interchange (A11/A12 junction).

4.2.65 The AM peak graph indicates significant variability in journey time through the northbound bore during this time period, with journey times widely dispersed between eight and 68 minutes. The average time across the period was 28 minutes but approximately one in four trips on this route is not within ten minutes of this journey time during this hour, and while journey times of between around 20 and 40 minutes account for a significant proportion of trips, no single journey time accounts for more than about 6% of all observations.

4.2.66 The PM peak graph indicates significantly less variability in journey time, with the majority of trips being completed in between eight and 14 minutes, primarily because traffic congestion in this time period is significantly lower than in the AM peak.

Figure 4-28: 2013 weekday AM peak (07:00-10:00) northbound journey times (Sun-in-the-Sands to Bow Interchange), school term time only

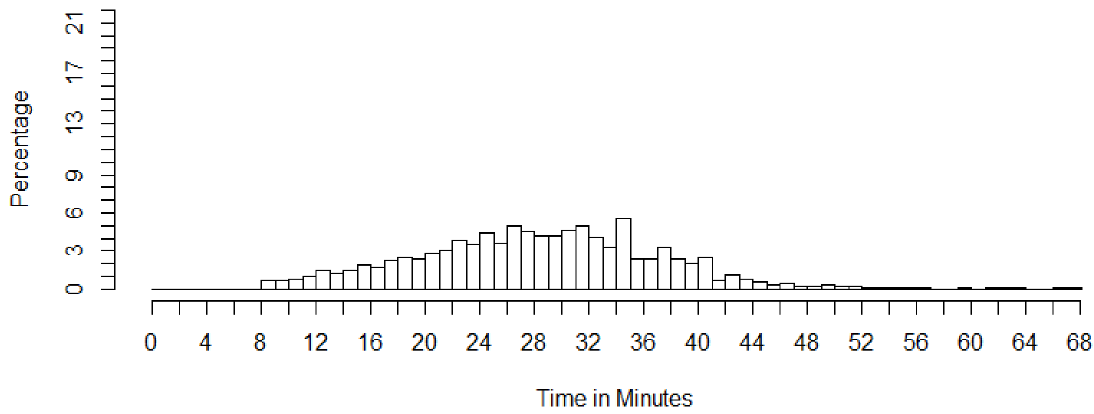
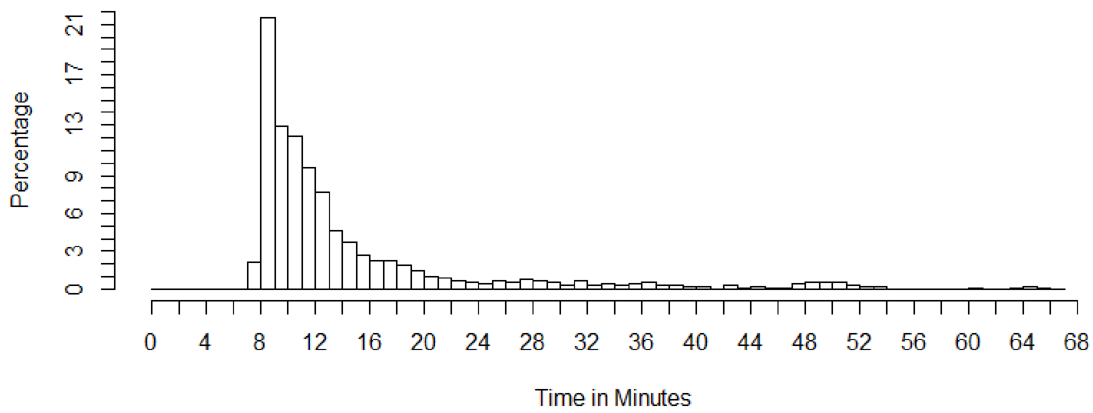


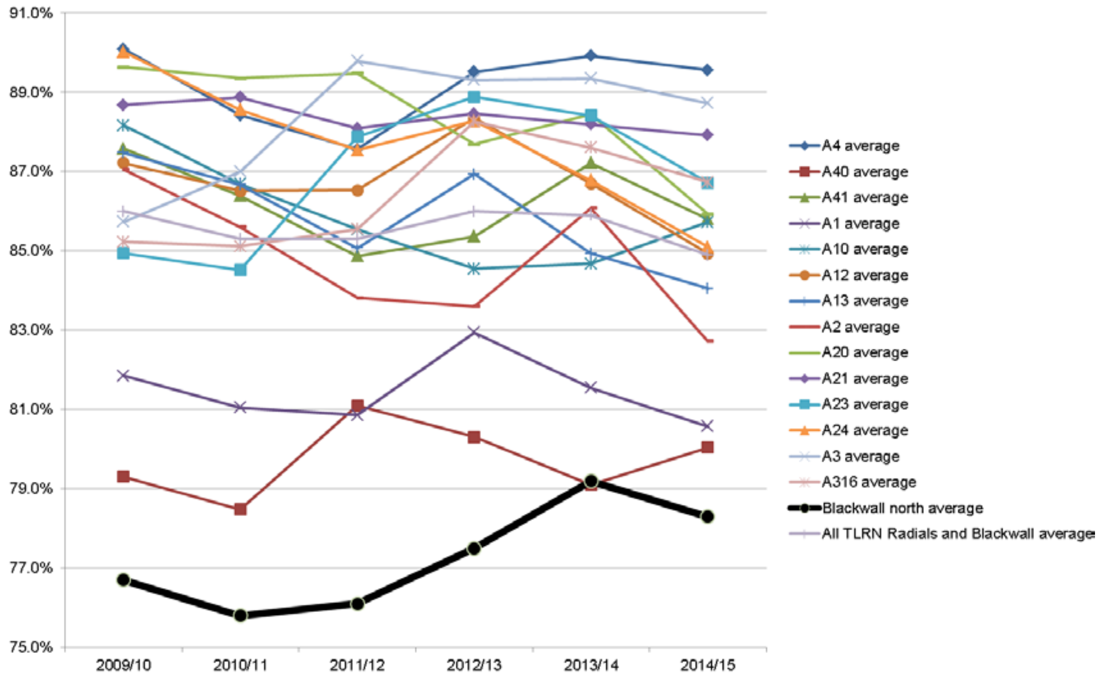
Figure 4-29: 2013 weekday PM peak (16:00-19:00) northbound journey times (Sun-in-the-Sands to Bow Interchange), school term time only



4.2.67 While journey time reliability is a challenge on many of London's roads, and in particular on the heavily used radial roads on the Transport for London Road Network (TLRN), poor journey time reliability is a particular problem at the Blackwall Tunnel.

4.2.68 Figure 4-30 below shows that journey time reliability (measured as a percentage of nominal 30 minute journeys completed within five minutes of that time in the AM peak period) is lower at the Blackwall Tunnel than any other radial corridor on the TLRN, in most cases significantly so. This same is true in the PM peak, as evidenced by the graph included in Appendix D.

Figure 4-30: AM peak direction journey time reliability (TLRN radial corridors)



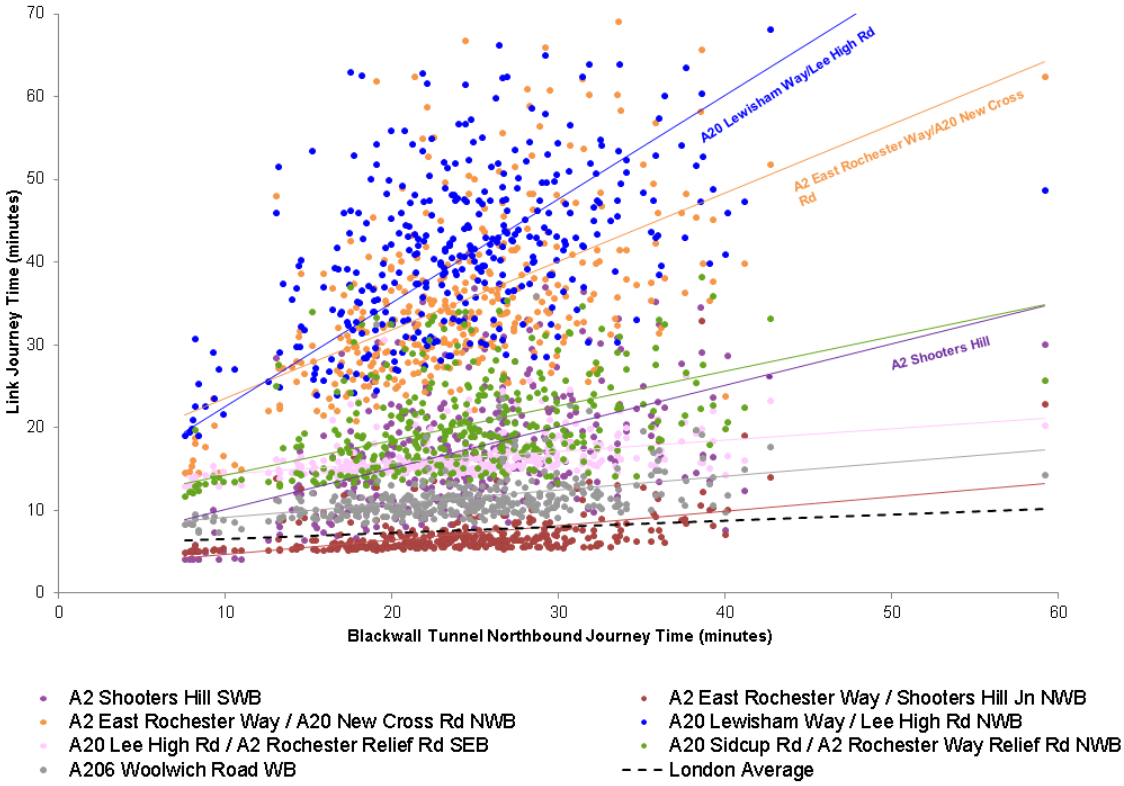
4.2.69 As well as impacting on journey time variability on the approaches to the Blackwall Tunnel, incidents that result in tunnel closures also have wider network impacts as traffic diverts to other adjacent crossings. These impacts are as follows:

- journey time disbenefits suffered by diverting traffic, which has to take lengthy and circuitous routes to use alternative river crossings;
- knock-on disbenefits for other traffic already using the routes that Blackwall Tunnel traffic diverts to, in the form of additional congestion and delays.

4.2.70 Analysis undertaken using daily average peak journey time data from December 2013 to June 2015 sourced from the London Congestion Analysis Project (LCAP) suggests that re-assignment of traffic from the Blackwall Tunnel begins to occur as a result of relatively minor incidents and closures during peak times.

4.2.71 This is demonstrated in Figure 4-31 which shows the correlation between northbound AM peak journey times through the Blackwall Tunnel over this period (plotted on the horizontal access) and journey times on other links in south London. Each point on the graph represents the daily average AM peak journey time recorded for dates between December 2013 and June 2015.

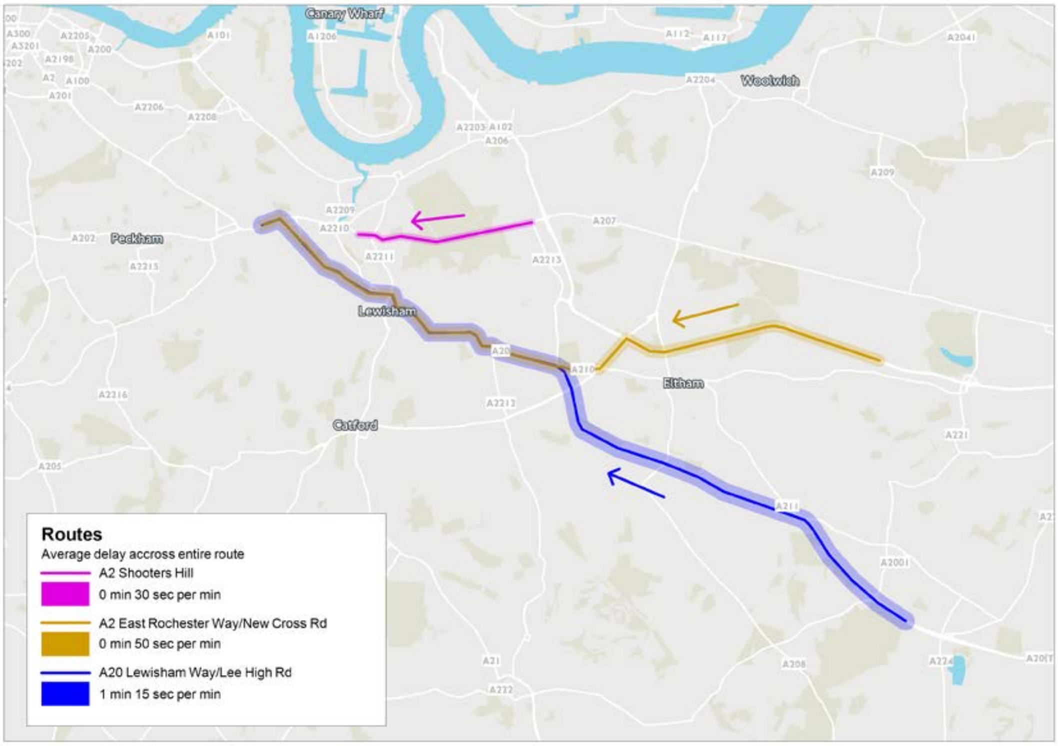
Figure 4-31: Impact of Blackwall Tunnel northbound AM journey times on other links in south London



4.2.72 Although there is a lot of 'noise' in the data, Figure 4-31 indicates that as a result of incidents and journey time variation occurring elsewhere on the network, there does appear to be a link between delay at the Blackwall Tunnel and delay in some locations elsewhere on the network.

4.2.73 A comparison of journey times indicates that most of the extra delay occurring on these links when delay occurs at the Blackwall Tunnel is experienced to the west of the A102 Blackwall Tunnel Approach, suggesting that delays at the Blackwall Tunnel result in diversion to alternative routes. Links which are strongly affected are the A20 Lewisham Way/Lee High Road (north-west bound), the A2 East Rochester Way to New Cross Road (north-west bound) and the A2 Shooters Hill (westbound). These links are highlighted in Figure 4-32.

Figure 4-32: Additional delays experienced on links when there is delay at the Blackwall Tunnel northbound



4.2.74 The analysis suggests that for every additional minute of delay for journeys northbound through the Blackwall Tunnel, vehicles travelling on the A20 Lewisham Way/Lee High Road corridor experience an increased journey time of one minute 15 seconds. Vehicles on A2 East Rochester Way corridor experience an increased journey time of 50 seconds, whilst vehicles on the A2 Shooters Hill corridor experience an increased journey time of 30 seconds. As can be seen in Figure 4-31, other links are less affected and the slope for the London average trend line suggests an increase of four seconds per minute of northbound Blackwall Tunnel delay, which is considered negligible.

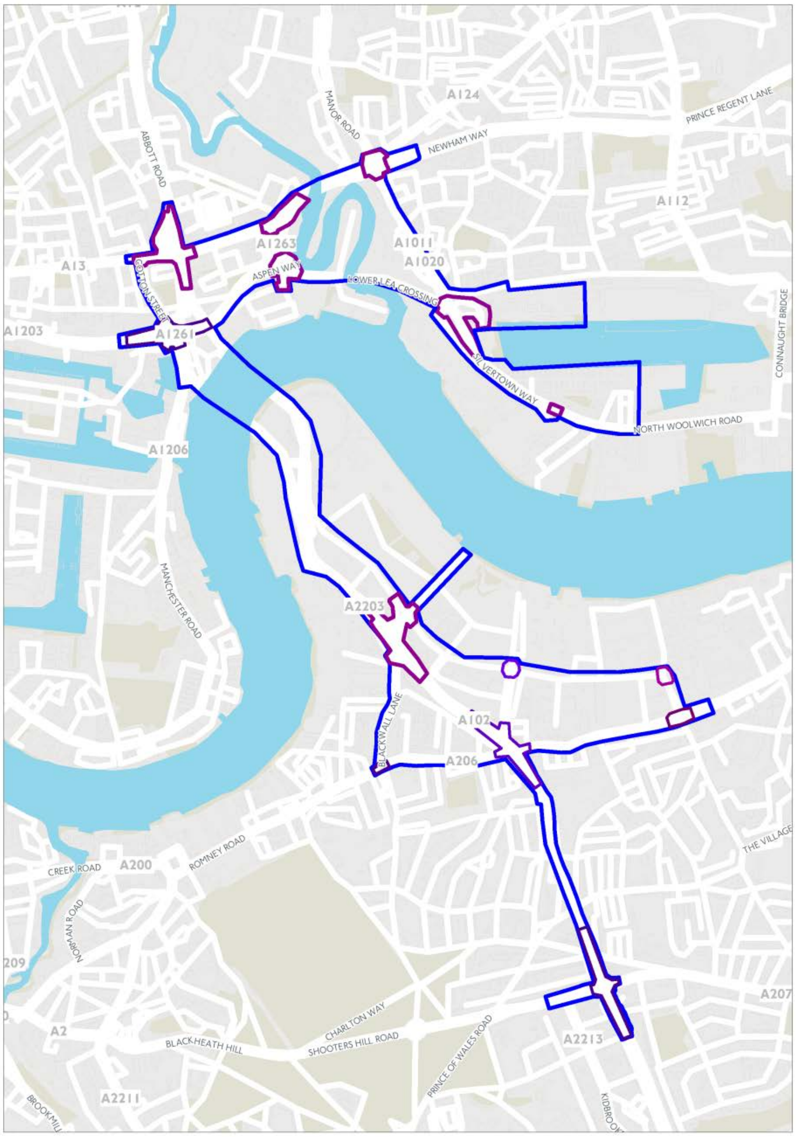
4.2.75 Overall, the data provides a strong indication that higher delays on the northbound approach to the Blackwall Tunnel cause more traffic to reassign to the A20 and the A2 in the AM peak. As these routes are sensitive to diversion, they can be adversely affected when there is higher than usual delay to use the Blackwall Tunnel (for instance due to heavy congestion or incidents). There is less evidence of diversion in the PM peak, which is likely to be largely due to delays being lower across the network.

4.2.76 The impact of tunnel closures with and without the Silvertown Tunnel in place has been modelled for a Test Case using the 2021 RXHAM. The results of these model tests are summarised in Appendix D.

Road safety

4.2.77 A final important aspect of the performance of the road network is around Road Safety. Road traffic collision data for a three-year period between 1 January 2012 and 31 December 2014 was obtained for an area covering the main road network along both approaches to the proposed Silvertown Tunnel, as well as the existing Blackwall Tunnel and approaches. This area is shown in Figure 4-33.

Figure 4-33: Collision review area



4.2.78 As indicated in Table 4-4 there were 477 recorded injury collisions in the three year period reviewed, of which six resulted in fatalities and 35 resulted in serious injuries. The remaining 436 collisions resulted in slight injuries. There were no clear trends over the three year period, with both the overall number of collisions and the percentage of those resulting in the most serious injuries fluctuating around an average of 159 collisions per year, with 9% resulting in the most serious of injuries.

Table 4-4: Collisions by severity and year in defined study area[30]

Year	Fatal	Serious	Slight	Total	% KSI
Year 1: 01/01/2012 – 31/12/2012	3	12	147	162	9%
Year 2: 01/01/2013 – 31/12/2013	1	10	133	144	8%
Year 3: 01/01/2014 – 31/12/2014	2	13	156	171	9%
TOTAL	**6**	**35**	**436**	**477**	**9%**
Annual Average	2	12	145	159	

4.2.79 The 477 collisions together resulted in 607 casualties. Of this total, six were fatalities, 35 were serious injuries and 566 were slight injuries. Vehicle drivers accounted for the highest percentage of casualties at 47% of the total. Across the whole of Greater London in 2014 the equivalent proportion was 31%. In the Silvertown area, 7% of all casualties were pedestrians and 6% were cyclists. Both these proportions were lower than the comparable 2014 Greater London figures of 18% and 17% respectively.

4.2.80 In the defined Silvertown area, 21% of all collisions involved a goods vehicle (significantly higher than the 2014 Greater London average of 12%). Collisions involving right-turn manoeuvres were of a lower proportion than in Greater London. This reflects the strategic function of many of the routes in the area.

4.2.81 Some 46% of the collisions recorded in the Silvertown area occurred at 14 interchanges, and collisions at these interchanges were marginally more likely to result in the most serious of injuries (9%) when compared with the remainder of the area (8%).

4.2.82 The analysis identified 17 separate cluster sites where six or more collisions occurred within the three year period within a 25m radius. These clusters are summarised as follows:

- seven were located on the A13 East India Dock Road and Barking Road;
- five were located on the A102 Blackwall Tunnel Approach, to the south of the river;
- four were located on the A206 Woolwich Road;
- one was located on Shooters Hill Road, close to its junction with Kidbrooke Park Road.

[30] Note that where a collision results in more than one casualty, the collision is graded according to the most severe level of injury sustained by any party involved. Hence the number of collisions does not correspond with the number of casualties.

4.2.83 Five of these sites recorded an average of three or more collisions per year, and these are listed in Table 4-5. Further details of the analysis undertaken are provided in Appendix A.

Table 4-5: Cluster analysis summary

Cluster	Collisions	Involving pedestrians	Involving cyclists	% involving pedestrians or cyclists
A206 Woolwich Road in the vicinity of Charlton Church Lane	14	6	2	57%
A13 East India Dock Road in the vicinity of Leamouth Road	12	1	1	17%
A13 East India Dock Road in the vicinity of its junction with Cotton Street	11	2	0	18%
A13 East India Dock Road in the vicinity of Abbott Road	10	0	0	0%
A2 Shooters Hill Road in the vicinity of Kidbrooke Park Road	9	1	0	11%

4.3 Current public transport performance

4.3.1 The level of crowding on the London Underground and DLR networks in 2011 is shown in Figure 4-34[31]. Figure 4-35 shows levels of crowding on the National Rail and London Overground networks.

[31] 2011 is the calibration year for TfL's Railplan model, which forecasts crowding on PT services in the Greater London and south-east England regions, hence more recent base data is not available. Further details on this model are provided in section 1.5.8.

Figure 4-34: AM peak period (07:00-10:00) London Underground and DLR crowding (2011)[32]

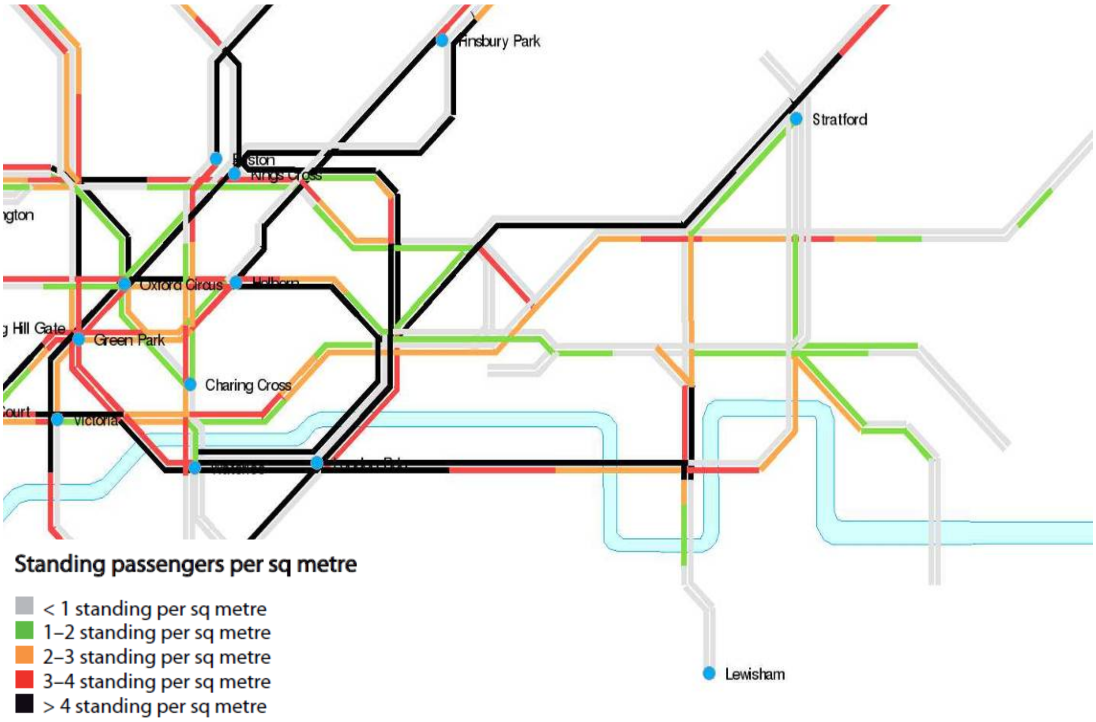
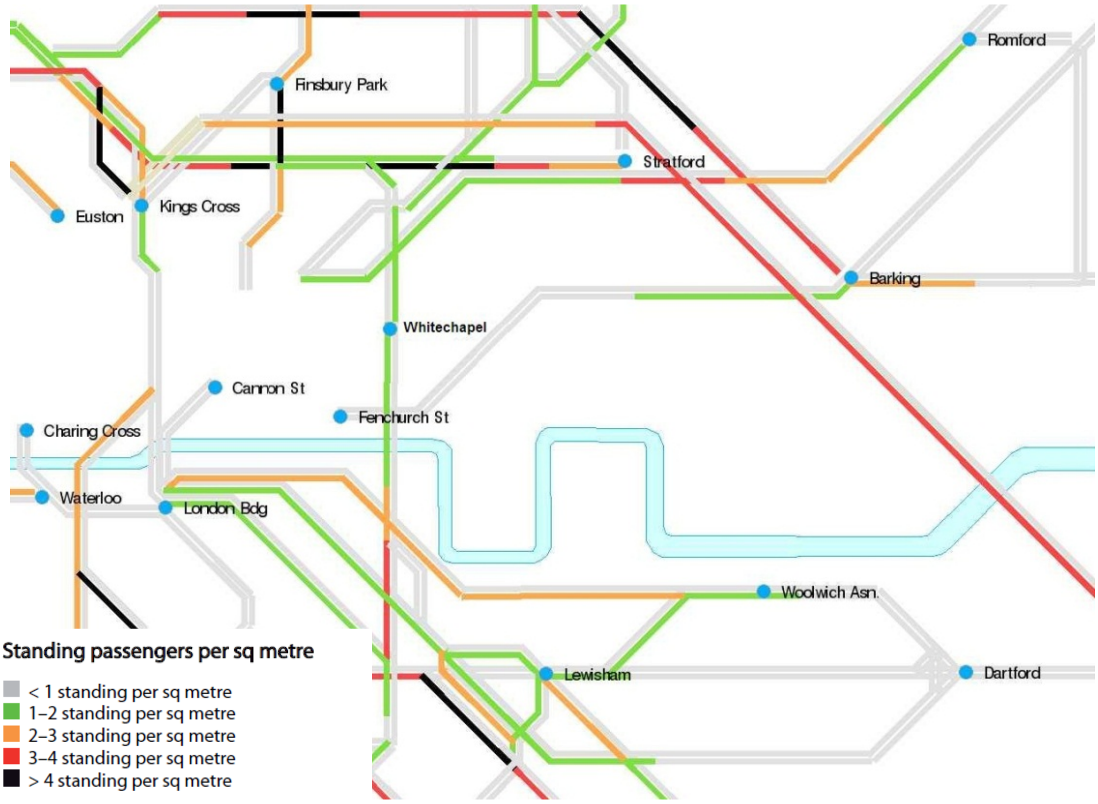


Figure 4-35: PM peak period (07:00-10:00) National Rail and London Overground crowding (2011)

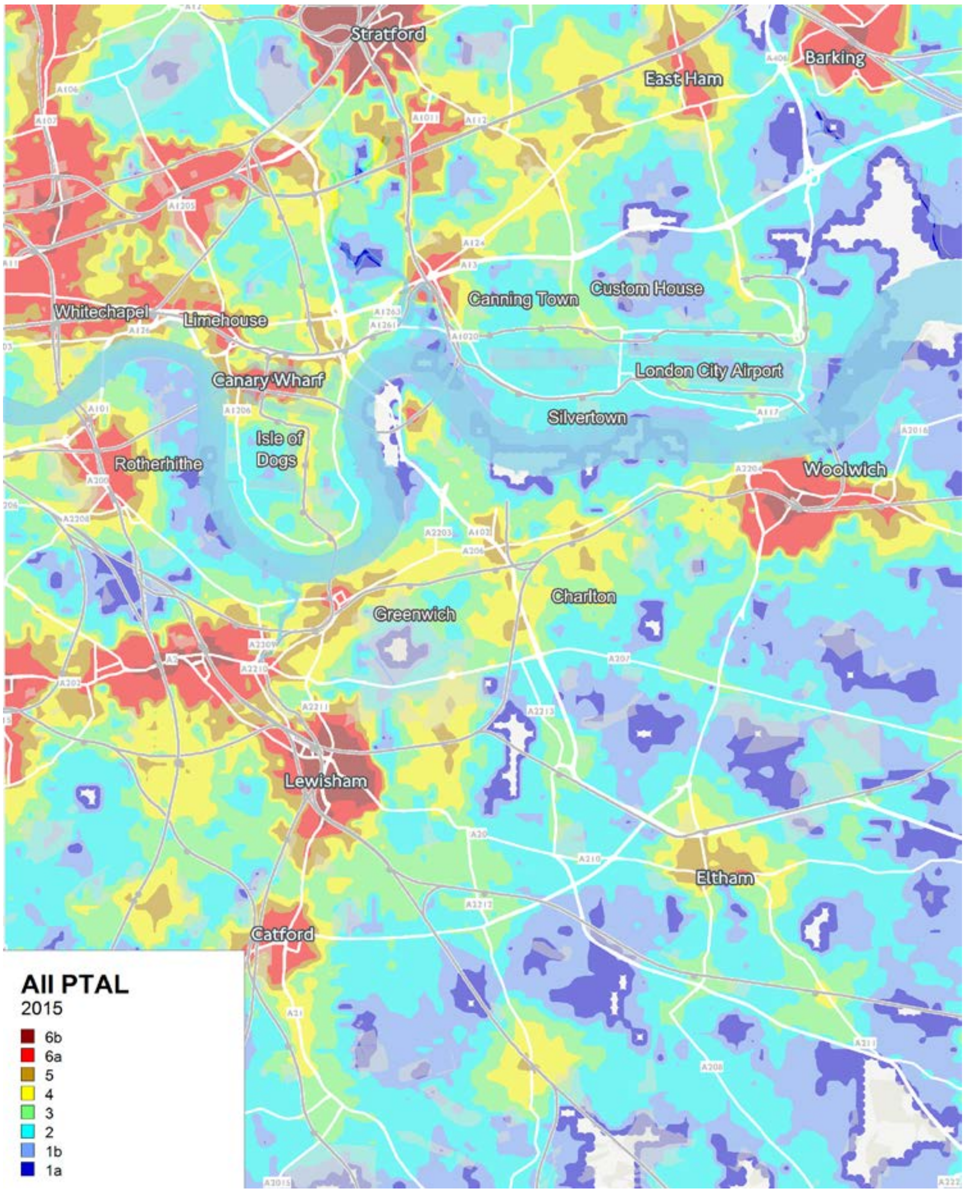


[32] Mayors Transport Strategy (2010)

4.3.2 Figure 4-34 and Figure 4-35 show that there is capacity on the cross-river Underground and DLR links east of Canary Wharf, but higher levels of crowding to the west. While the investment in cross-river rail links has vastly improved PT connectivity between east and south-east London, previous responses to the river crossings consultation highlighted some disparity with communities in south-east London in terms of access to employment growth in the Docklands area by PT.

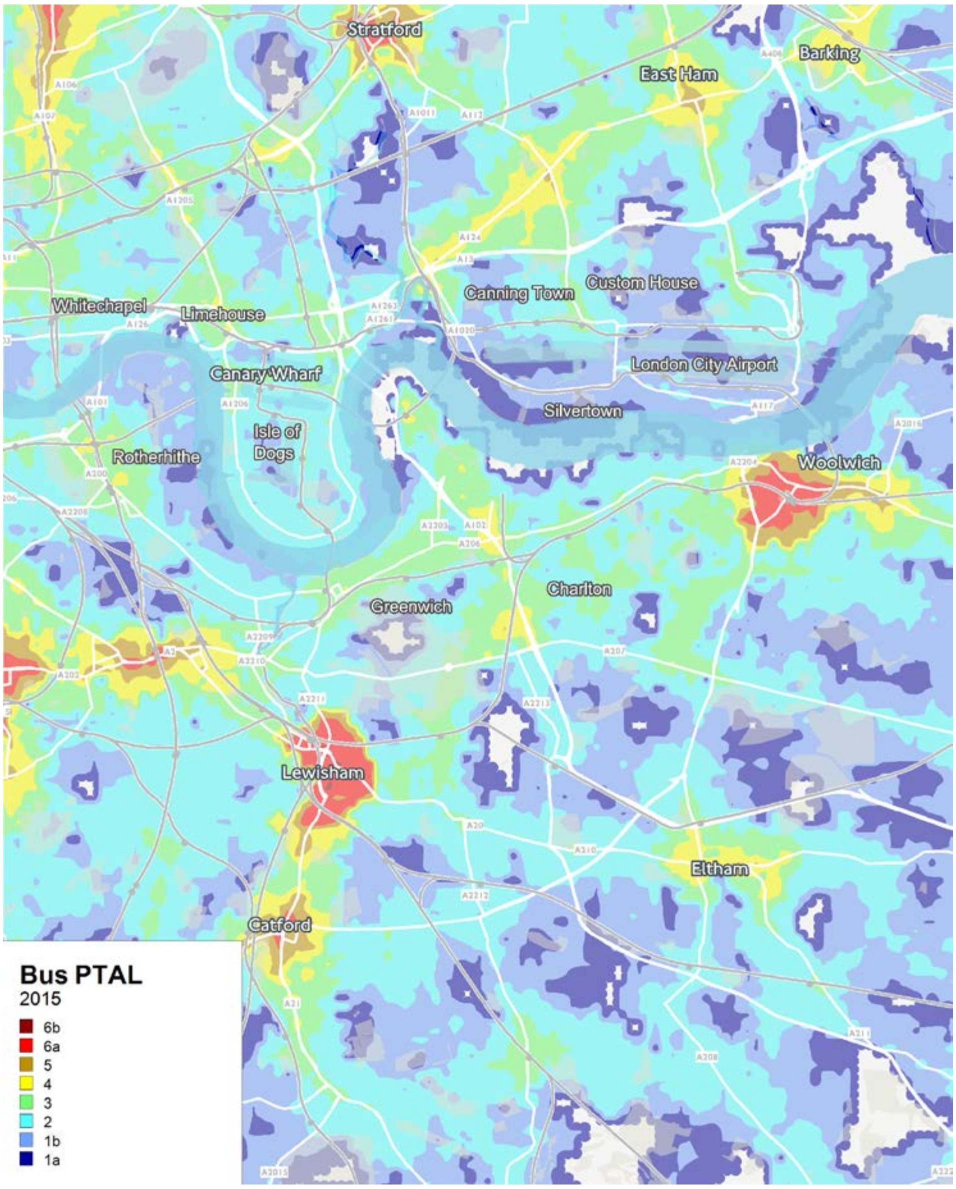
4.3.3 Figure 4-36 sets out the 2015 Public Transport Accessibility Levels (PTALs) in the area around the Blackwall Tunnel – further details on PTALs are provided in paragraph 1.5.10. The Figure indicates that while there are some areas in south-east London with good access to the PT network (notably around Woolwich, Lewisham and New Cross), many other areas have poor levels of accessibility. Access to the PT network is also poor north of the River Thames in the Silvertown area south of the Royal Docks.

Figure 4-36: 2015 PTALs (all modes)



4.3.4 Figure 4-37 shows 2015 PTALs for bus services only, indicating that while some areas have good accessibility to the bus network (notably Woolwich and Lewisham) many areas have poor levels of accessibility.

Figure 4-37: 2015 PTALs (bus only)



4.3.5 The very limited existing cross-river bus network in east London reflects the relative lack of highway crossing provision to the east of Tower Bridge. The bus networks on either side of the River Thames in east and south-east London operate largely independently of one another due to the physical severance of the river.

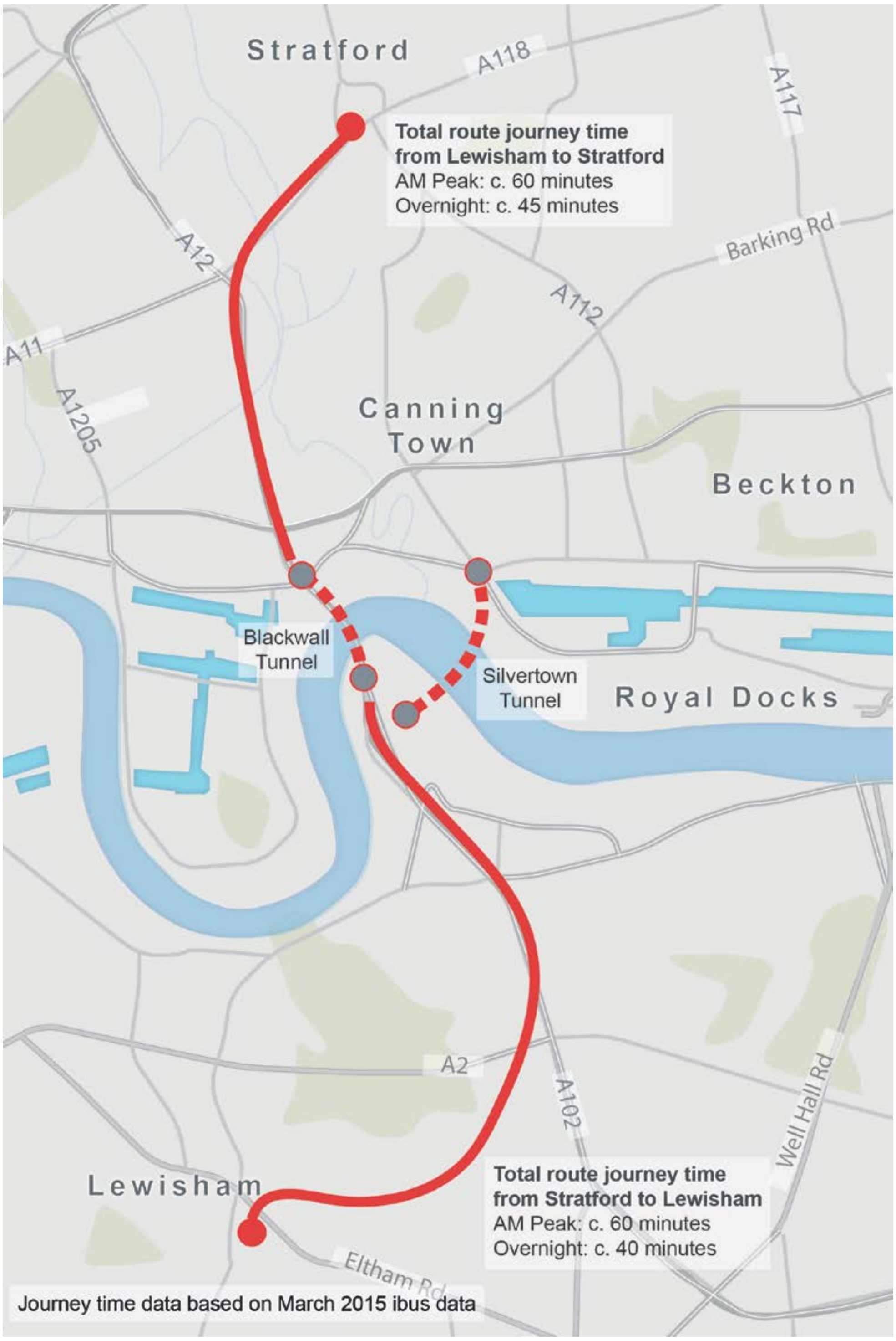
4.3.6 Bus route 108, which uses the Blackwall Tunnel, can be subject to major disruption when the Tunnel is closed, whether planned or unplanned, causing inconvenience to passengers. The queues experienced by bus route 108 cause delays to passenger journeys and increase the cost of operating the service. In addition, the route can only be operated with single-deck vehicles due to the height restrictions on the northbound tunnel bore.

4.3.7 TfL measures reliability for high-frequency bus routes (five buses per hour or higher) based on the time waited by passengers at stops in excess of the average scheduled wait time. This is known as the excess wait time (EWT) and is measured in minutes. EWT on the route 108 for the period from 3 July 2013 to 2 July 2014 was 1.21 minutes, which was 25% longer than the average EWT for all high frequency bus routes in RB Greenwich and LB Newham[33] for the same period. This figure is an annual average and EWT during the peak periods would be higher. Overall journey times in the peaks are affected by day to day congestion as well as incident related congestion.

4.3.8 Figure 4-38 shows the journey time difference of Route 108 in the AM peak compared to more free-flowing conditions between 22:00 and 23:00. The northbound end-to-end journey takes an additional 20 minutes in the AM peak compared to the late evening and the southbound journey an additional 15 minutes.

[33] LB Newham was selected over LB Tower Hamlets as being more representative because Tower Hamlets includes parts of the Central Activities Zone.

Figure 4-38: Route 108 journey time



4.3.9 The experience of the constraints affecting this service, together with the Tunnel's low headroom which prevents the operation of double-deck vehicles, inhibit the potential for TfL to provide further services across the river in this location.

4.3.10 The congestion effects are also experienced by some other bus services – which do not cross the river. Some services terminating at North Greenwich bus station experience a drop in average speeds, delay and excess journey time as a consequence of congestion on the Blackwall Tunnel approach roads caused by unplanned closures at the Tunnel.

4.3.11 Consideration has been given to the performance of one such route - the Route 132[34] - on occasions where congestion has built up due to closures of the Blackwall Tunnel. On 16 January 2014, for example, a 34 minute closure in the AM peak led to average bus speeds on this route reducing to almost half their normal running over the course of the day, with a much more significant dip (to around 8kph) in the immediate period following the closure.

4.4 Walking and cycling network

4.4.1 The EAL provides a crossing at this location that is accessible to both pedestrians and cyclists. The high quality service carries passengers close to their most likely onward destinations (on the north side of the River Thames between the Crystal building and the ExCeL centre near the Royal Victoria DLR station, rather than the industrial river frontage) and there is adequate capacity most of the time, especially on weekdays. Queues do occur at the busiest times (for example during major events at The O2 or ExCeL, and during school holidays). There is a charge to use the crossing.

4.4.2 The Greenwich and Woolwich foot tunnels are accessible 24 hours per day to both pedestrians and cyclists, although cyclists are required to dismount and push their bicycles. The tunnels were refurbished in 2011 and 2012.

4.4.3 Pedestrians and cyclists are able to use the Woolwich Ferry, with ample space provided for pedestrians, and the Hilton Ferry provides a direct cross-river shuttle service between Rotherhithe and Canary Wharf seven days per week (there is a charge to use this service).

4.4.4 A Pedestrian Environment Review System (PERS) audit was undertaken in a study area around the proposed sites of the two Silvertown Tunnel portals, to assess the current quality of the pedestrian network. Further details of the PERS audit can be found in Appendix G. The PERS system scores the quality of the environment based on a red, amber, green (RAG) rating.

4.4.5 The audit indicated the following key findings with regard to current pedestrian quality on the North Greenwich side:

- links to the east of the Peninsula are generally of a reasonable to good quality;
- sections of Tunnel Avenue constitute a threatening environment for

[34] The full route is Market Place / Bexleyheath Clock Tower – North Greenwich station

pedestrians with high levels of fumes, dust, pollution, and a general lack of permeability as a result of vehicle domination – no tactile paving is provided and there are maintenance, litter, debris, surface quality issues in evidence; and

- sections of Blackwall Lane were also identified as 'Amber' for similar issues described above, plus inadequate footway width in part.

4.4.6 On the Silvertown side, the following conclusions were drawn about the quality of the pedestrian network:

- the areas around the docks and Western Gateway were generally identified as high quality pedestrian environments;
- sections of the A1020 Lower Lea Crossing were scored as 'Red' with generally unacceptable widths provided for pedestrians and poor permeability, exacerbated by a poor general environment with overgrown vegetation, safety and security issues and evidence of rough sleeping; and
- Dock Road and North Woolwich Road were also flagged as 'Amber' issues due to inconsistent provision of paving materials, inconsistent provision and design of dropped kerbs, high HGV traffic levels, dust, fumes, debris, litter and obstructions on footways (including parked cars) – this area is currently dominated by light industry.

4.4.7 Similarly, an assessment of current cycling facilities in the same areas was undertaken based on the principles of Cycling Level of Service (CLoS). Full details of this assessment are provided in Appendix H. The key findings on the North Greenwich side were as follows:

- Tunnel Avenue – the current cycling facilities are of a particularly poor standard (cluttered, frequently interrupted, incorrectly signed);
- Blackwall Lane south of Millennium Way/John Harrison Way Roundabout – the junction with the A102 is intimidating for cyclists due to heavy traffic and sub-standard existing cycling facilities (with a cluttered shared-use footway on one side) – there is also no provision for cyclists on the western side (a group of cyclists observed using the footway indicates that it is a desire line);
- Millennium Way/John Harrison Way Roundabout – several movements at this roundabout received a 'Red' RAG rating in the junction assessment, and a number of recent cycling collisions have been recorded (one in the last three years, several in the last five) – many of the existing cycling facilities are indirect and sub-standard; and
- direct access to North Greenwich Bus and Underground station – cyclists are currently forced to make relatively circuitous journeys into North Greenwich with roads restricted to busy traffic and authorised vehicles only.

4.4.8 On the Silvertown side the key findings were as follows:

- Lower Lea Crossing/Leamouth Road Roundabout – cycling facilities are provided on part of the roundabout but they are incomplete, and this junction has had several recorded cyclist collisions in the most recent three years of casualty data;
- Leamouth Road – cycling provision is only in place on the western side that carries CS3 for a short section – cycling is not currently permitted on the eastern footway despite a relatively generous width, and the likelihood of low pedestrian flows;
- Silvertown Way – advisory cycle lanes are in place with coloured surfacing but appear to be of sub-standard width; and
- Tidal Basin Roundabout – there is currently a two-way cycle track around most of the perimeter of the roundabout with uncontrolled crossings of each arm.

4.5 Access to labour market and jobs

4.5.1 While rail connections are crucial in supporting the density of jobs in London's major employment zones, across London, the road network plays an important role in providing connectivity between the labour market and places of employment. The capacity and performance of the road network therefore has a direct impact on the number of jobs that are considered to be accessible by the labour market, and vice versa.

4.5.2 Employment and labour market accessibility across London has been modelled using RXHAM to indicate the level of connectivity at an individual borough level, represented both as origins (place of residence) and as destinations (places of employment).

4.5.3 TfL uses a 45-minute standard threshold to assess employment connectivity in London, as per the 'Travel in London' annual reports[35]. If the modelled travel time between an origin zone (i) and a destination zone (j) was less than the 45-minute threshold, then the number of jobs in zone j was added to the jobs connectivity figure for the origin zone i. Similarly the size of the labour force in zone i was added to the labour force connectivity figure for the destination zone j.

4.5.4 On this basis, Figure 4-39 and Figure 4-40 show job connectivity levels (by car) across London during the 2012 weekday AM peak hour and the PM peak hour.

[35] https://tfl.gov.uk/corporate/publications-and-reports/travel-in-london-reports

Figure 4-39: Base year job accessibility by car – AM Peak

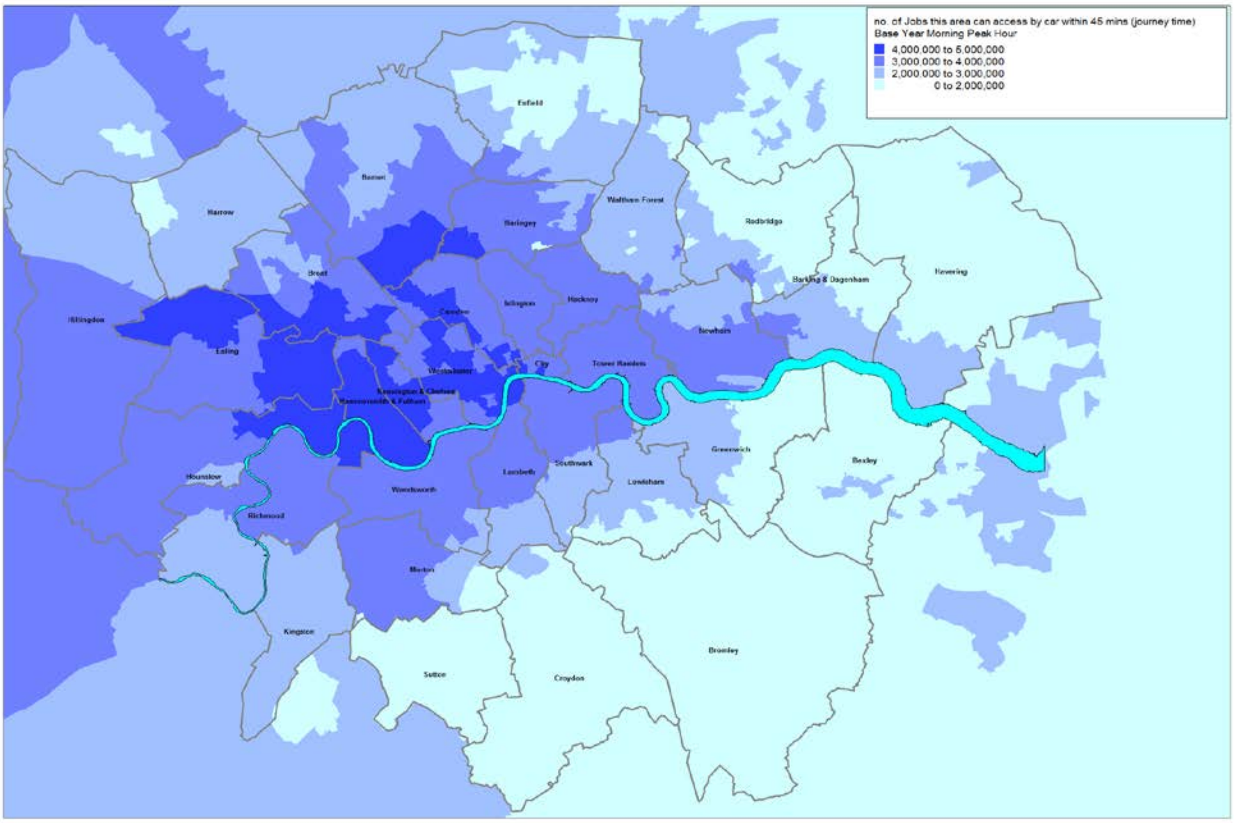
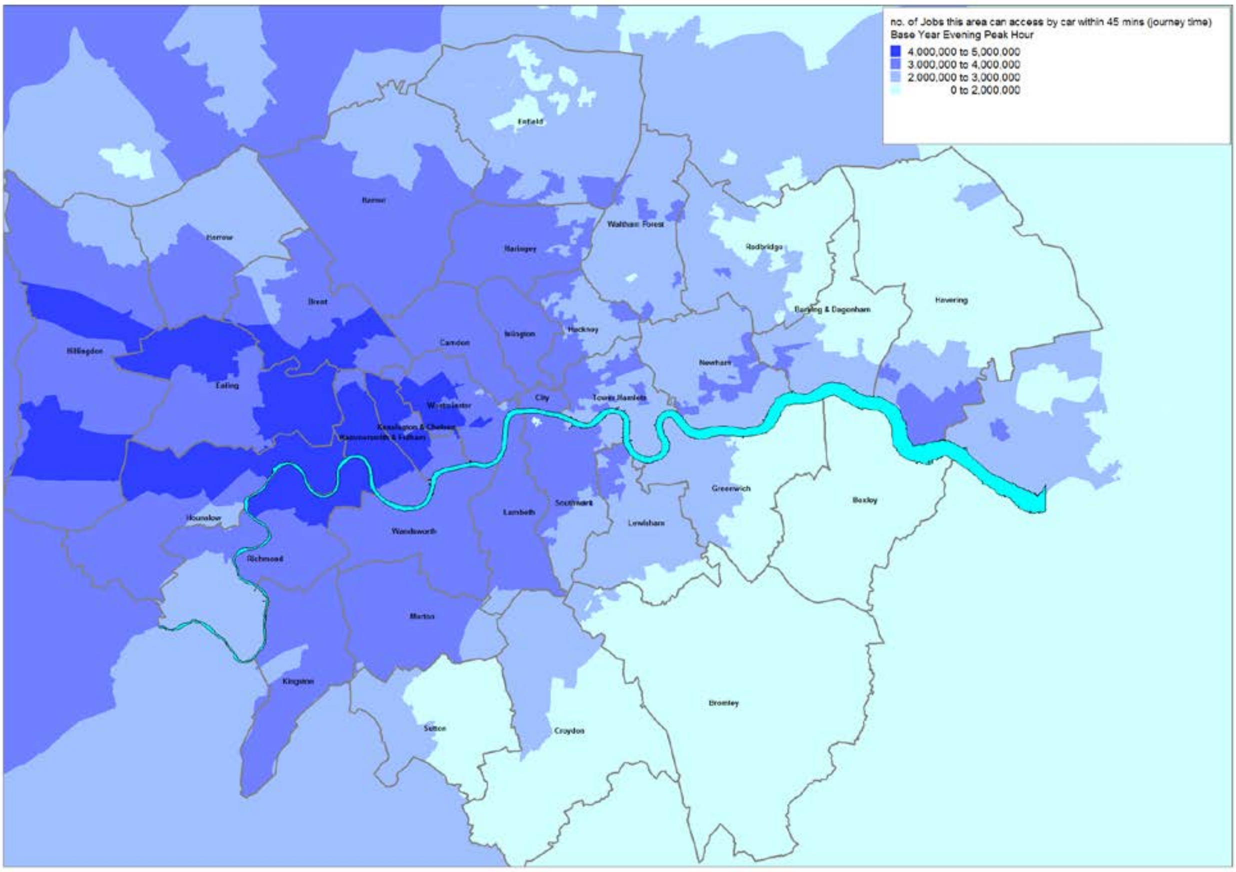


Figure 4-40: Base year job accessibility by car – PM peak



4.5.5 The figures show that higher levels of connectivity between jobs and labour markets occur in west and north-west London, while connectivity in the east and particularly the south-east of London is much lower, especially during peak periods. Table 4-6 summarises the number of jobs considered to be accessible via car (within a 45-minute journey time) for a number of key boroughs in the vicinity of the Silvertown Tunnel scheme, including the three host boroughs, for all three modelled time periods.

Table 4-6: Number of accessible jobs by car within 45 minutes (millions, base year)[36]

Borough	AM	Inter-peak	PM
Barking and Dagenham	2.25	3.08	2.32
Greenwich	1.65	2.57	2.21
Hackney	3.49	3.60	2.87
Lewisham	2.06	2.77	2.54
Newham	2.98	3.40	2.74
Tower Hamlets	3.50	3.57	2.98
Waltham Forest	2.50	3.37	2.65

4.5.6 The relatively poor level of highway access for boroughs south of the River Thames directly reflects the limited availability and performance of highway crossings. This has the effect of curtailing access to the large numbers of jobs, businesses and other opportunities that are concentrated in parts of inner and central London north of the River Thames. The implication is that residents and businesses based south of the river in the ESR are at a disadvantage in competing for employment and labour market opportunities in London when compared with residents and businesses located north of the river.

4.6 Key points

4.6.1 The Blackwall Tunnel is clearly visible as one of the most heavily congested major traffic routes in the whole of London. Whilst all three crossings are operating close to or at maximum capacity at peak times, high levels of demand at the Blackwall Tunnel in particular mean that peak vehicle flow in the northbound direction is reached early in the AM peak and flow in the southbound direction the flow of vehicles is close to the Tunnel’s maximum capacity for a significant duration of the PM period.

[36] Figures are rounded to the nearest 100,000

4.6.2 As a result, there are long queues on the approach roads to the Tunnel particularly in peak periods and average speeds are low. In the northbound direction in the AM peak, queues routinely stretch back 3.2km whilst in the southbound direction in the PM peak queues can often stretch back 2.7km. This congestion can add, on average, around 20 minutes to users' journey times and often more when incidents occur.

4.6.3 Coupled with the day-to-day congestion issues, the cross-river highway network is notoriously unreliable. Whilst congestion and the scarcity of existing crossings are key factors which underlie the sub-optimal performance of the network, another factor is the susceptibility of the Blackwall Tunnel to incidents and closures which often cause additional delay and congestion. In 2013 there were almost 2,200 incidents recorded at the Tunnel, of which over 1,200 resulted in an unplanned closure. A significant proportion of these incidents were associated with over-height vehicles attempting to use the northbound tunnel bore, which has a height restriction.

4.6.4 When incidents and closures do occur, the adjacent crossings are some distance away (particularly the Dartford Crossing which has the highest capacity). Moreover they have little spare capacity to accommodate diverted traffic, hence the impact of incidents at the Blackwall Tunnel on the wider network can be significant.

4.6.5 The consequence of these issues is that there is significant variability in journey times for journeys made via the Blackwall Tunnel, in particular in the northbound direction in the AM peak. In fact, journey time reliability on the Blackwall Tunnel corridor is notably lower than for any other radial corridor on the TLRN both in the AM and PM peak periods. This often has knock on impacts on other strategic road corridors, as users re-route away from the Blackwall Tunnel when congestion is particularly heavy and when there are closures.

4.6.6 The PT network is better able to accommodate demand; however access to PT (and particularly bus services) is relatively poor in some parts of east and south-east London as a result of the very limited cross-river bus network. Bus route 108, the one bus service which uses the Blackwall Tunnel, can suffer from slow peak journey speed, poor reliability and major disruption during times the Tunnel is closed. It also has to operate with single deck vehicles due to the height restrictions on the northbound tunnel bore.

5 FUTURE 'BASELINE' GROWTH AND IMPACTS

5.1 Overview

5.1.1 This chapter outlines forecast growth in population and jobs in London, and particularly in east London, together with an overview of committed investments in transport infrastructure. It then sets out how transport network performance is expected to change in future (without the Silvertown Tunnel scheme in place).

5.1.2 Within this chapter forecast growth is considered over the period to 2021 and 2031. As a general rule, where data is derived from the London Plan, MTS or London-wide forecasts the period to 2031 has been used to match the periods considered by these sources. Where data is derived from RXHAM, the period to 2021 has been used to reflect the focus of the analysis on this year[37].

5.2 Changes in population and employment

5.2.1 The London Plan anticipates that population growth between 2011 and 2031 in the ESR will be considerably greater than in the other sub-regions.

5.2.2 Table 5-1 shows that the forecast population growth in all but two of the nine boroughs in the ESR is expected to exceed the London average of 14%. Across the three Silvertown Tunnel host boroughs (Greenwich, Newham, and Tower Hamlets) the average growth rate is around double the London average.

Table 5-1: Forecast growth in resident population in ESR boroughs[38]

Borough	2011 population	2031 population	% 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%
ESR	*2,197,770*	*2,629,139*	*20%*
Greater London	*7,991,889*	*9,144,126*	*14%*

[37] See section 1.5.3
[38] GLA Population Projections 2011 Round, SHLAA, High Fertility, Borough SYA (Jan 2012, GLA)

5.2.3 Together, the boroughs in the ESR are expected to account for 37% of London's total population growth over this period, while the four boroughs with the highest rates of growth (the three Silvertown Tunnel host boroughs of Tower Hamlets, Newham, and Greenwich as well as Barking and Dagenham) are expected to account for 23% of London's population growth.

5.2.4 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 some 180,000 higher than had been forecast by the GLA, and the ESR alone accounted for 75,000, or 42%, of that additional population. This suggests that future projections of growth across Greater London could be even higher than the significant increases shown in Table 5-.

Table 5-2: Comparing GLA 2011 population forecasts with 2011 Census data[39]

Borough	2011 population (GLA)	2011 population (Census)	Difference (absolute)	Difference (%)
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%
ESR	*2,197,800*	*2,273,000*	*75,200*	*3%*
Greater London	*7,991,900*	*8,173,900*	*182,000*	*2%*

5.2.5 The ESR's share of expected total employment growth in London is around 22% as shown in Table 5-3.

Table 5-3: Current and forecast employment in the ESR[40]

Borough	2011 jobs	2031 jobs	% 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	56000	10%
Redbridge	74,000	81,000	9%

[39] GLA Population Projections 2011 Round, SHLAA, High Fertility, Borough SYA (Jan 2012, GLA) and the Census (2011)
[40] Borough Employment Projections, 2009, GLA (presented in the London Plan, 2011)

Lewisham	77,000	83,000	8%
ESR	*849,000*	*994,000*	*17%*
Greater London	*4,797,000*	*5,452,000*	*14%*

5.2.6 Forecast employment growth is highly concentrated, with three of the nine boroughs in the ESR expected to experience growth rates above the London average. Growth of 33% and 22% 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% (all these boroughs lie north of the River Thames).

5.2.7 Together, the three Silvertown Tunnel host boroughs account for over two-thirds of the employment growth forecast in the ESR (100,000 of the 145,000 new jobs forecast).

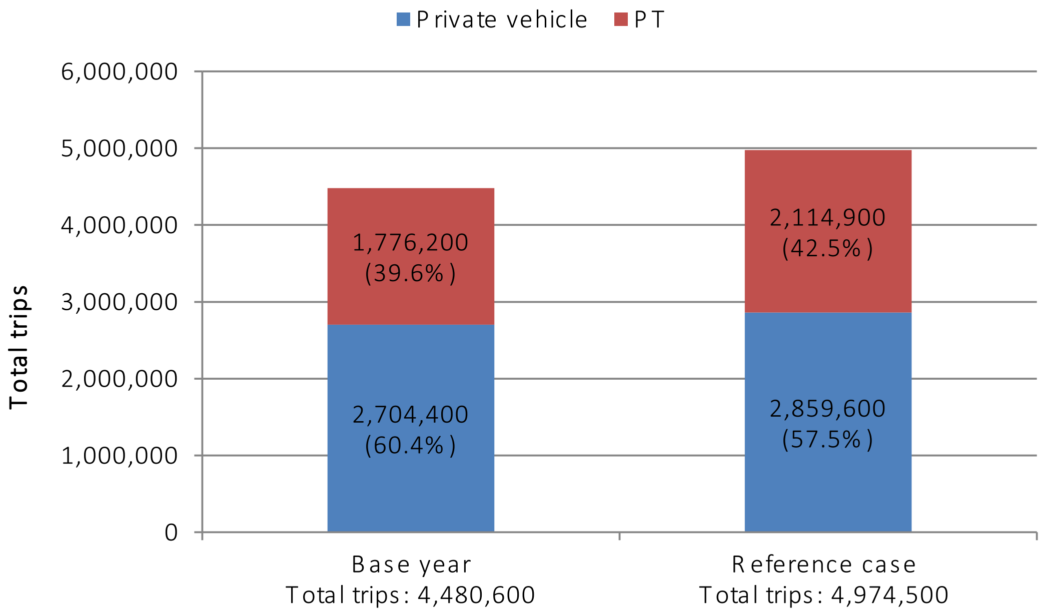
5.2.8 A significant proportion of the growth within the host boroughs is expected to be accommodated within the Greenwich Peninsula and Royal Docks area. The plans for the Peninsula are set out in the Greenwich Peninsula and Greenwich Peninsula West masterplans, whilst the masterplanning of the Royal Docks area is underway. Plans have been published for Silvertown Quays and the ABP ‘Business Port’ proposals, and a ‘parameters for development’ document has also been prepared by the GLA and LB Newham. An OAPF for the Royal Docks area is expected to be adopted during 2016.

5.2.9 As the resident and working populations grow, additional cross-river trips can be expected to impact on the operation of the cross river transport networks, as employment growth is expected to be concentrated on the north side of the River Thames, while much of the population growth will be on the south side.

5.3 Total trips made and mode share

5.3.1 Taking into account the forecast growth in population and jobs described above, the total volume of trips will continue to rise across east and south-east London. The total number of trips originating in the ESR between 2012 and 2021 is expected to rise by almost 500,000 trips per day, which represents a very significant increase of over 10%. Most of the new trips will be made on the PT network, and the increase in PT trips is expected to be over twice that of the increase in trips made by car. This is illustrated in Figure 5-1 below.

Figure 5-1: Total trips by mode in ESR, 2012 base year and 2021 Reference Case (0700-1900)



5.3.2 The rise in PT trips is forecast to be greater than the rise in car trips largely due to the significant planned investment in the PT network which will deliver improvements in PT capacity and connectivity. As a result, the PT mode share in the ESR is expected to rise from around 40% in the base year to 43% in 2021. For the three boroughs of Greenwich, Newham and Tower Hamlets, the PT mode share will rise from 48% to 52%.

5.3.3 The same broad pattern of an overall increase in trips and a greater increase in PT trips can be seen in all three modelled time periods, both within the three boroughs of Greenwich, Newham and Tower Hamlets and for the ESR as a whole. This is evident in the tables below.

5.3.4 Table 5-4 shows the number of AM peak hour trips originating in Greenwich, Newham and Tower Hamlets by mode, with and without the Scheme. It can be seen from this table that across the three boroughs, the total number of trips is forecast to increase by almost 30,000 trips and the PT mode share in is expected to rise from 54% to 58%.

Table 5-4: AM peak hour person trips with an origin in Greenwich, Newham and Tower Hamlets

	2012 base trips (mode share %)		2021 Reference Case trips (mode share %)	
Borough	**Private vehicle**	**PT**	**Private vehicle**	**PT**
Greenwich	24,200	18,800	27,700	25,400
	(56%)	(44%)	(52%)	(48%)
Newham	19,500	27,000	21,900	34,100

	(42%)	(58%)	(39%)	(61%)
Tower Hamlets	15,300	24,500	17,600	32,200
	(38%)	(62%)	(35%)	(65%)
Sub-total	59,100	70,400	**67,200**	**91,700**
	(46%)	(54%)	**(42%)**	**(58%)**
ESR	211,700	192,000	**226,300**	**230,000**
	(52%)	(48%)	**(50%)**	**(50%)**

Table 5-5 provides the same information for the average IP hour. As for the AM peak, it can be seen that the number of PT trips increases to a greater degree than the increase in the number of car trips. PT mode share in the three boroughs is expected to rise from 41% to 44%.

Table 5-5: IP person trips with an origin in Greenwich, Newham and Tower Hamlets

	2012 base trips (mode share %)		**2021 Reference Case trips (mode share %)**	
Borough	**Private vehicle**	**PT**	**Private vehicle**	**PT**
Greenwich	28,200	11,800	31,900	15,200
	(71%)	(30%)	(68%)	(32%)
Newham	25,900	19,200	28,300	23,600
	(58%)	(43%)	(55%)	(46%)
Tower Hamlets	19,600	20,600	22,100	25,900
	(49%)	(51%)	(46%)	(54%)
Sub-total	73,700	51,500	**82,300**	**64,700**
	(59%)	(41%)	**(56%)**	**(44%)**
ESR	248,100	120,400	**262,100**	**142,900**
	(67%)	(33%)	**(65%)**	**(35%)**

5.3.5 Table 5-6 provides the same information for the average PM peak hour. Again, the number of trips made by private vehicles increases to a lesser degree than the increase in the number of PT trips. The total increase in trips across the three boroughs is just over 26,000 trips and PT mode share is expected to rise from 59% to 62%.

Table 5-6: PM peak person trips with an origin in Greenwich, Newham and Tower Hamlets

	2012 base trips (mode share %)		**2021 Reference Case trips (mode share %)**	
Borough	**Private vehicle**	**PT**	**Private vehicle**	**PT**
Greenwich	23,300	12,700	25,800	16,400
	(65%)	(35%)	(61%)	(39%)
Newham	18,200	25,400	19,900	30,200
	(42%)	(58%)	(40%)	(60%)
Tower Hamlets	17,000	45,500	18,700	57,400
	(27%)	(73%)	(25%)	(75%)

Sub-total	58,400	83,600	**64,400**	**103,900**
	(41%)	(59%)	**(38%)**	**(62%)**
ESR	193,500	159,300	**202,700**	**189,100**
	(55%)	(45%)	**(52%)**	**(48%)**

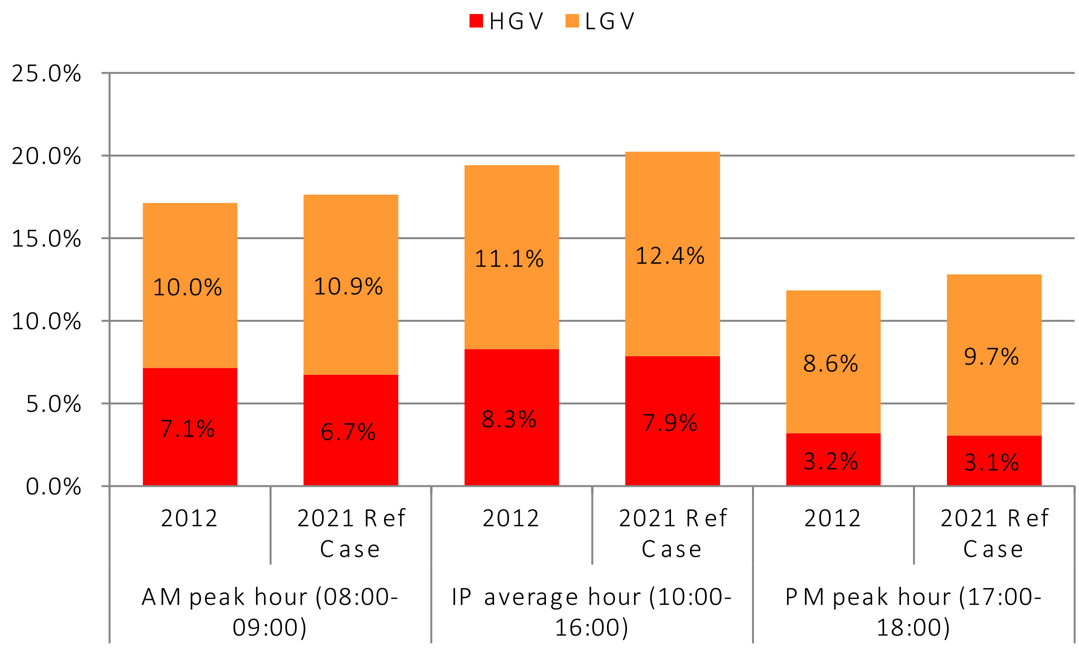
5.3.6 The following sections set out the anticipated changes and performance on the sub-region's transport networks.

5.4 Road network

5.4.1 As set out above, despite significant increases in PT mode share (accompanied by an uplift in walking and cycling mode share), growth in population and employment is such that some absolute growth in vehicle trips is inevitable. The tables above indicate that private vehicle trips with an origin in the ESR are forecast to increase by 7% in the AM peak hour from 2012 to the 2021 Reference Case (211,700 trips increasing to 226,300), 6% in the IP average hour, and 5% in the PM peak hour.

5.4.2 Within this overall uplift, the composition of private vehicle trips is also forecast to change, with goods vehicles accounting for an increasing proportion as shown in Figure 5-2.

Figure 5-2: Goods vehicle trips originating in ESR, as a proportion of all private vehicle trips (2012 v 2021 Reference Case)

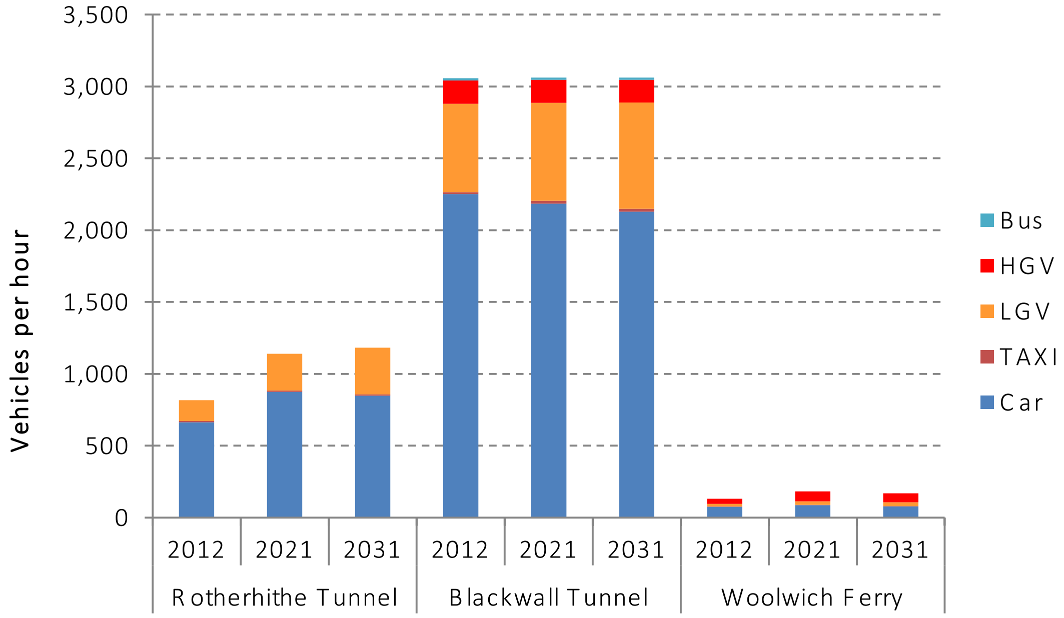


5.4.3 The graph indicates that the proportion of all private vehicle trips originating in the ESR that are made by goods vehicles (LGVs and HGVs) is forecast to rise from 17.1% to 17.6% in the AM peak hour between 2012 and the 2021 Reference Case. In the IP average hour, the corresponding increase is from 19.4% to 20.3%, with the proportion in the PM peak hour increasing from

11.8% to 12.8%. In each time period, the increase in the proportion of trips made by LGVs exceeds a forecast decrease in the proportion of trips made by HGVs.

5.4.4 This overall forecast increase in goods vehicle ‘mode share’ is more noticeable at the Blackwall Tunnel, which is an important route for delivery and servicing traffic. As a result, goods vehicles make up a larger proportion of all trips through the tunnel than on the overall road network in the ESR. Figure 5-3 for example indicates that goods vehicles account for 25.4% of all road vehicle trips northbound through the Blackwall Tunnel in the AM peak hour in 2012. This proportion is forecast to increase to 27.5% in the 2021 Reference Case and 29.3% in the 2031 Reference Case.

Figure 5-3: AM peak hour (08:00-09:00) northbound cross-river road vehicle trips (base 2012 and Reference Case 2021 and 2031)



5.4.5 The forecast increase in goods vehicle mode share is significant, since servicing and delivery trips are generally more difficult to transfer to other modes than other trips (for example, many delivery and servicing trips involve the transit of heavy loads). In addition, as indicated in Chapter 3, the origins and destinations of Blackwall Tunnel users are currently widely dispersed and this is not expected to change in future, meaning that no viable PT alternative will exist for many other trips.

5.4.6 Figure 5-4 to Figure 5-6 illustrate the change in actual flow forecast by the RXHAM in the 2021 Reference Case (i.e. the model run without the Silvertown Tunnel in place but with forecast growth and committed investments) when compared to the 2012 base year in each of the three time periods assessed. The plots indicate that traffic is forecast to increase on all strategic links in the vicinity of the Blackwall Tunnel (including the A102, the

A2, the A12, the A13, the A206 Woolwich Road and the A1261 Aspen Way) in all three time periods.

5.4.7 Larger versions of these plots are available in Appendix I.

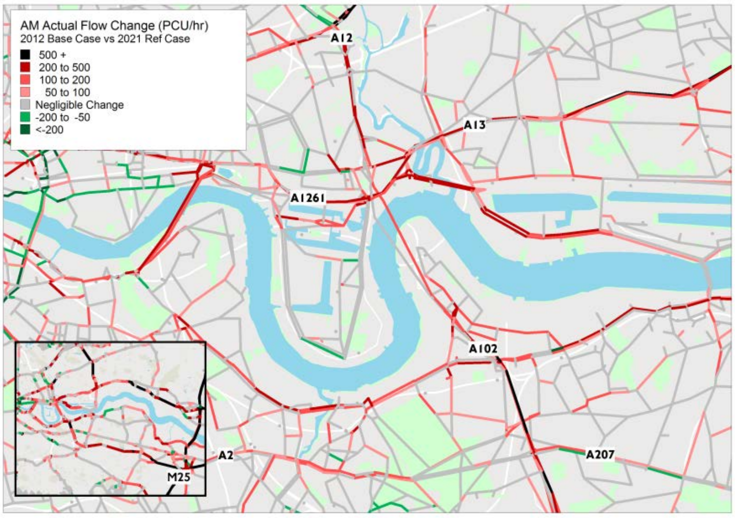


Figure 5-4: AM peak forecast change in actual flow (2021 Reference Case – 2012 base)

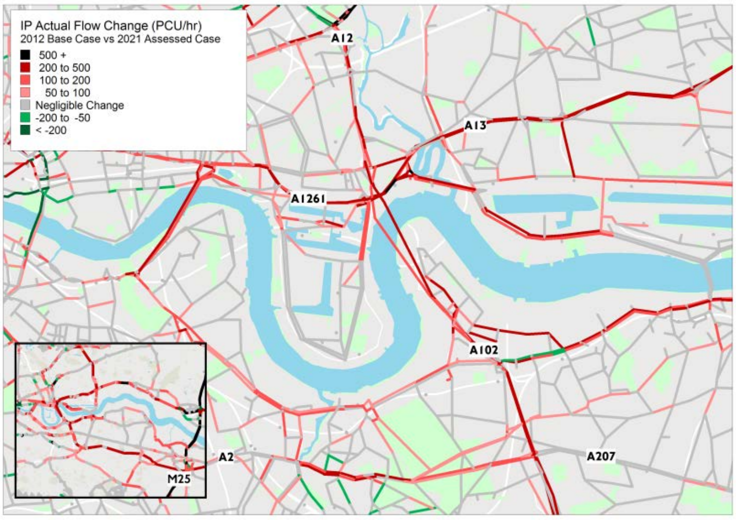


Figure 5-5: IP forecast change in actual flow (2021 Reference Case – 2012 base)

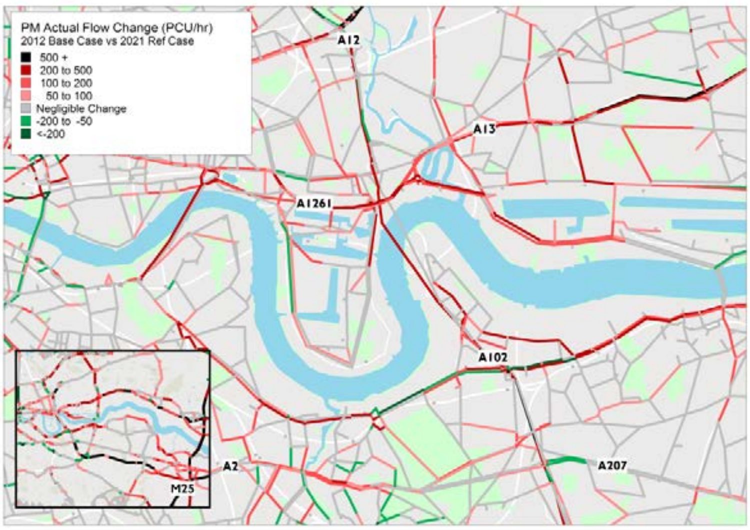


Figure 5-6: PM peak forecast change in actual flow (2021 Reference Case – 2012 base)

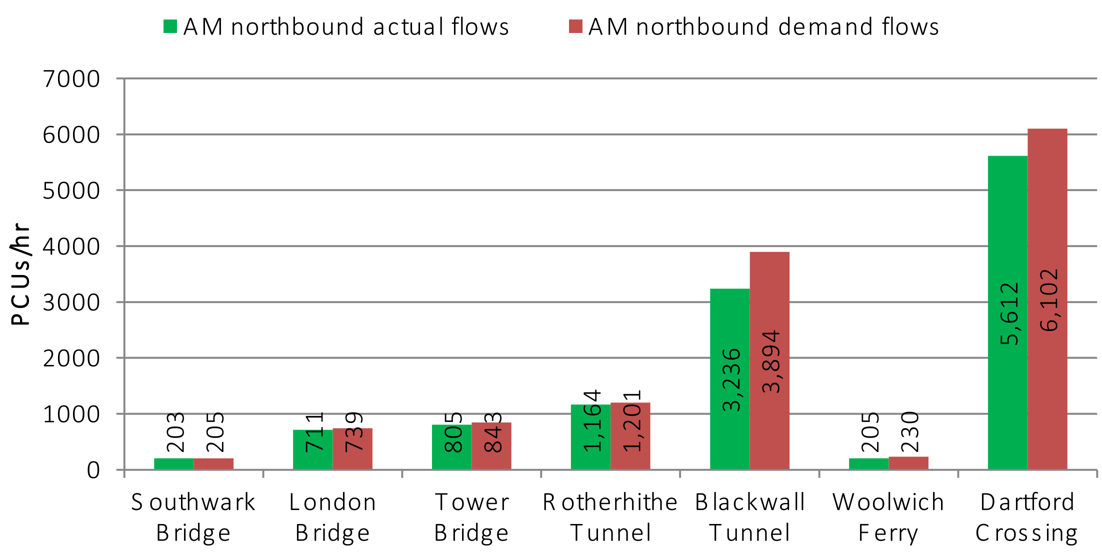
5.4.8 These Figures also demonstrate the base year capacity constraints affecting the Blackwall Tunnel. Despite increases in actual flow on the approach roads in 2021 when compared with the base year, there is no significant forecast increase in actual flow through the northbound bore in the AM peak hour or through the southbound bore in the PM peak hour as these links are currently already at capacity during these time periods. Increases in traffic through the tunnel itself are evident in the IP period and the counter-peak flow direction during the peak hours.

Crossing performance

5.4.9 The extent of the river crossings capacity constraints in east London can be seen by comparing the demand flow forecasts with the actual flow forecasts from the 2021 RXHAM Reference Case. The difference between the two is effectively the traffic that could not be assigned to the network in the modelled hour as a result of the capacity constraint, resulting in queued traffic remaining on the network at the end of the hour.

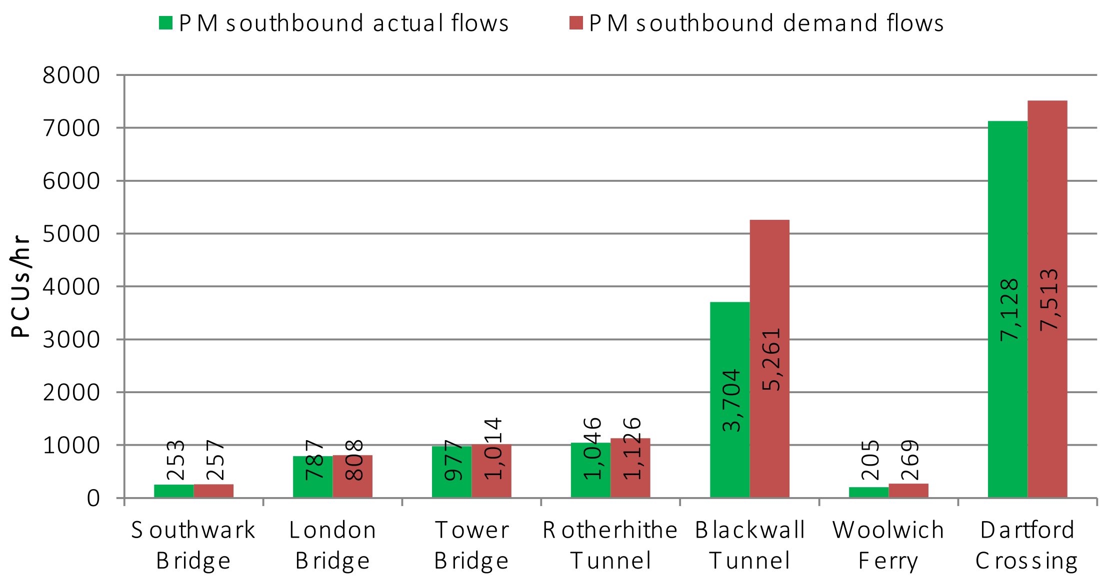
5.4.10 Figure 5-7 illustrates the difference between demand and actual flow for northbound river crossings in the AM peak hour in the 2021 Reference Case, clearly highlighting the capacity constraints at all crossings in east London, but notably at the Blackwall Tunnel and the Dartford Crossing. Demand flow relative to actual flow at the Blackwall Tunnel rises from 112% in the base year to 120% in the Reference Case, which as the northbound tunnel is already operating at capacity in the AM peak represents a notable increase in demand which would manifest in further delay.

Figure 5-7: 2021 Reference Case AM peak hour northbound actual v demand flow (PCUs)



5.4.11 Figure 5-8 summarises the same data for southbound flows in the PM peak hour, showing that by far the greatest differential between cross-river demand and capacity in east London during this time period is found at the Blackwall Tunnel. Demand flow relative to actual flow at the Blackwall Tunnel rises from 104% in the base year to 142% in the Reference Case, a significant increase. Demand flow would significantly exceed available capacity and resultant levels of delay would hence be significantly higher than current levels.

Figure 5-8: 2021 Reference Case PM peak hour southbound actual v demand flow (PCUs)



5.4.12 The graph in Figure 5-3 illustrating the composition of traffic using the Blackwall Tunnel and adjacent crossings further demonstrates the capacity constraint at the Blackwall Tunnel, indicating no forecast increase through the tunnel northbound in the AM peak hour from 2012 through to 2031. The graph also shows that both the Rotherhithe Tunnel and the Woolwich Ferry will be at capacity by 2021, with no significant growth in flow evident by 2031.

5.4.13 Due to the introduction of free-flow charging, there is anticipated to be some additional peak capacity growth on the Dartford Crossing prior to the opening of the Silvertown Tunnel, although strategic modelling suggests that this will not have a material impact on demand for the river crossings in east London.

Congestion and delay in 2021

5.4.14 The forecast increase in highway trips between 2012 and 2021 coupled with the river crossing capacity constraints in the Reference Case are expected to result in increasing levels of congestion on the road network, and in particular in the vicinity of the Blackwall Tunnel.

5.4.15 illustrate the AM peak and PM peak change in Volume/Capacity Ratios (VCRs) evident in the 2021 Reference Case RXHAM outputs when compared to the 2012 base year outputs described in the previous chapter. The colour denotes whether the change results in a link crossing an identified threshold, in this case either 80% or 100% saturation.

Figure 5-9: 2012 base vs 2021 Reference Case AM peak VCR change

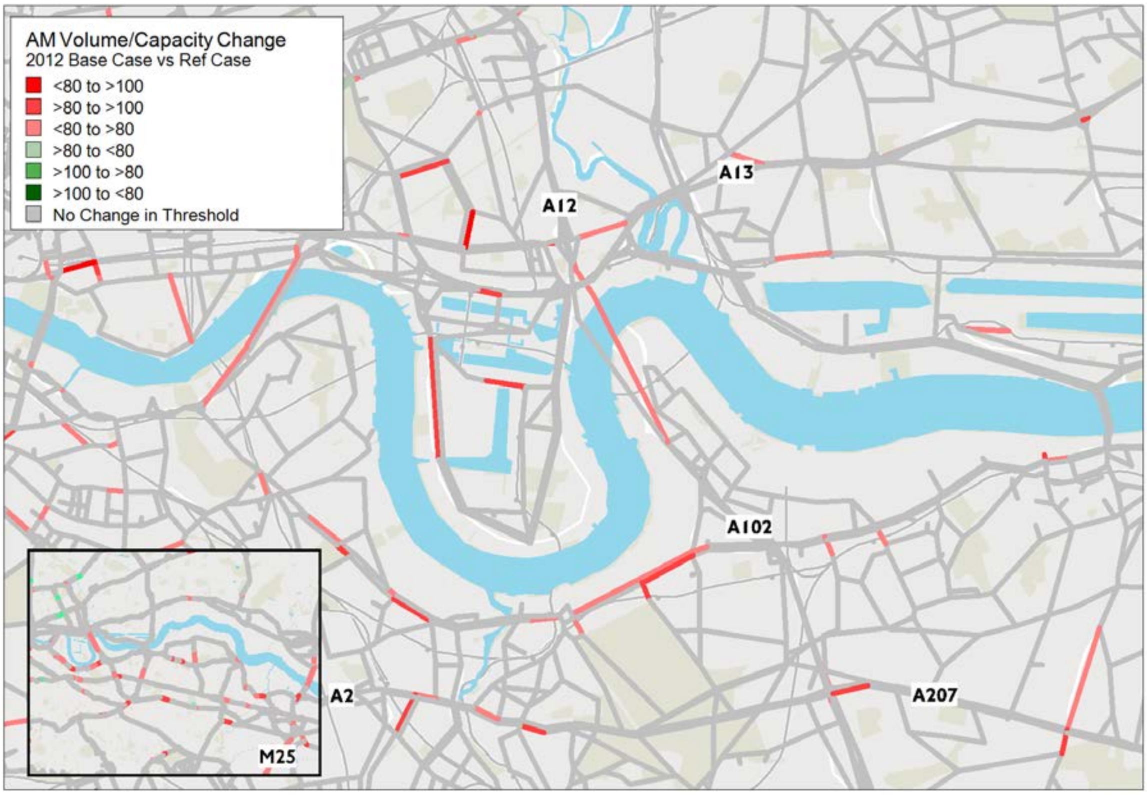
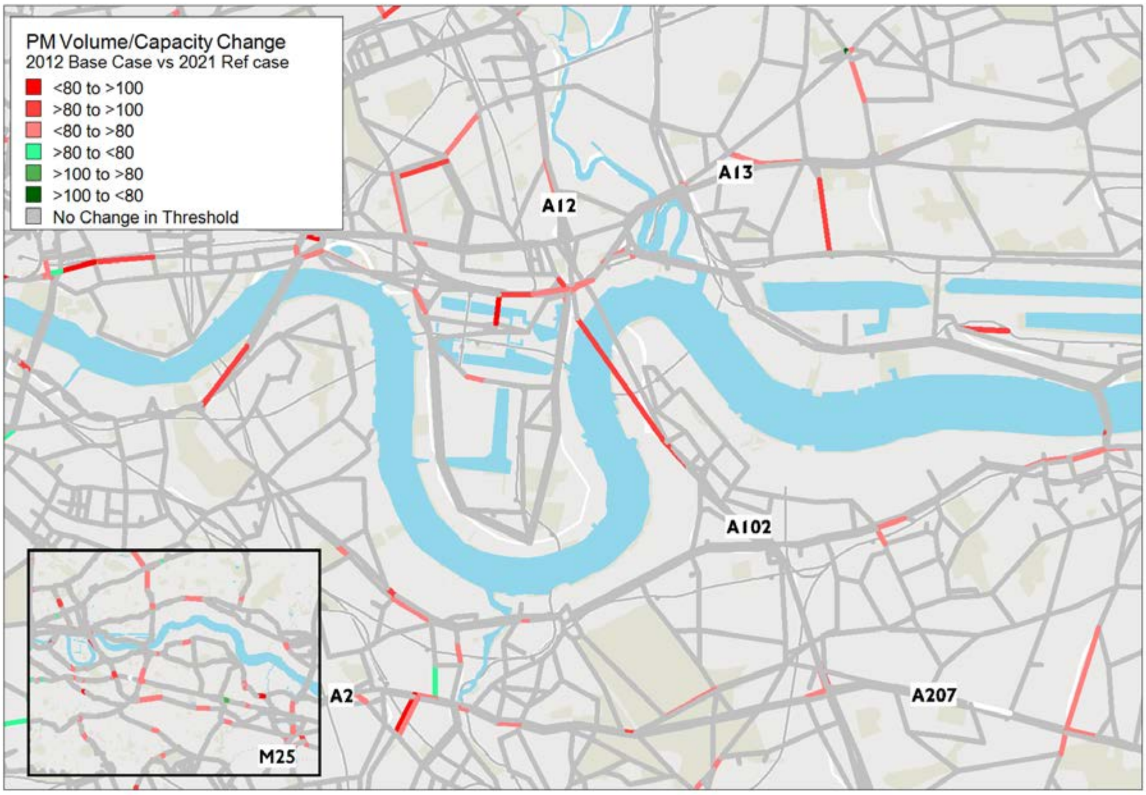


Figure 5-10: 2012 base vs 2021 Reference Case PM peak VCR change



5.4.16 Figure 5-9 and Figure 5-10 indicate that traffic demand for the Blackwall Tunnel northbound is forecast to exceed capacity in both the AM and PM peak hours due to the forecast increase in throughput in the PM peak hour (the northbound bore is already in excess of capacity in the AM peak hour at 100%). Southbound, VCR reaches in excess of 80% in the AM peak hour and in excess of 90% in the PM peak hour.

5.4.17 Further afield from the Blackwall Tunnel, the plans indicate numerous links where VCR increases above 90% and 100% capacity on both sides of the River Thames in the AM and PM peak hours.

5.4.18 These changes are anticipated to lead to increases in congestion around the network. Figure 5-11 to Figure 5-13 illustrate the level of delay, measured in passenger car unit hours, forecast at junctions in the three assessed time periods in the 2021 Reference Case.

5.4.19 The figures show that significant delay in excess of 1.5 minutes per km is likely to affect many sections of the strategic network. During both peak periods, high levels of delay are expected to affect the approaches to Tower Bridge, London Bridge and the Rotherhithe Tunnel.

5.4.20 In the AM peak hour, extensive delays of over 240 PCU Hrs occur on the approach to the Blackwall Tunnel southern portal (on the A102 Blackwall Tunnel Approach and Blackwall Lane). This delay is higher than anywhere else in the wider network. The wider area insets also indicate delays in the A20 Sidcup Road and on the A206, the main access to the Woolwich Ferry from the east. North of the River Thames, delays are evident on sections of the A13 and the A118 through Ilford.

5.4.21 In the IP average hour, delays are less prevalent across the network but are still significant on the approach to river crossings such as Tower Bridge and London Bridge.

5.4.22 In the PM peak hour, significant delays are evident on the A12 and A13 approaches to the A102/A13 East India Dock Road junction, and also on the approach to the southern portal from south of the River Thames. The plot shows a number of key junctions with significant delays across much of the network.

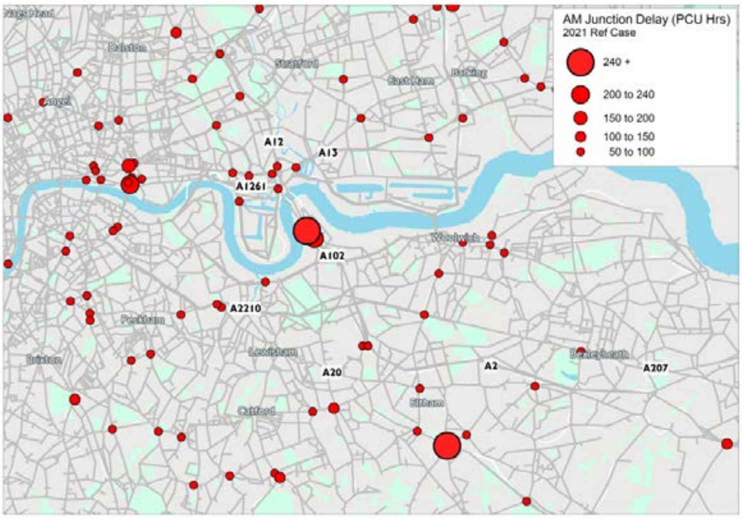


Figure 5-11: 2021 AM peak hour Reference Case junction delay

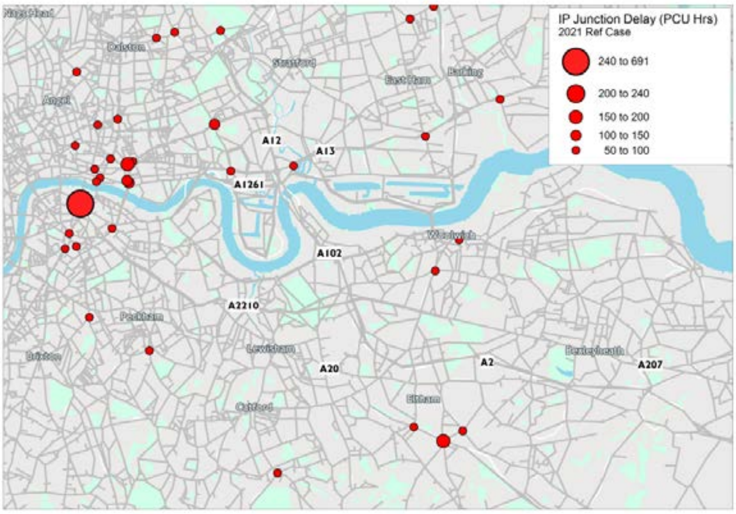


Figure 5-12: 2021 IP peak hour Reference Case junction delay

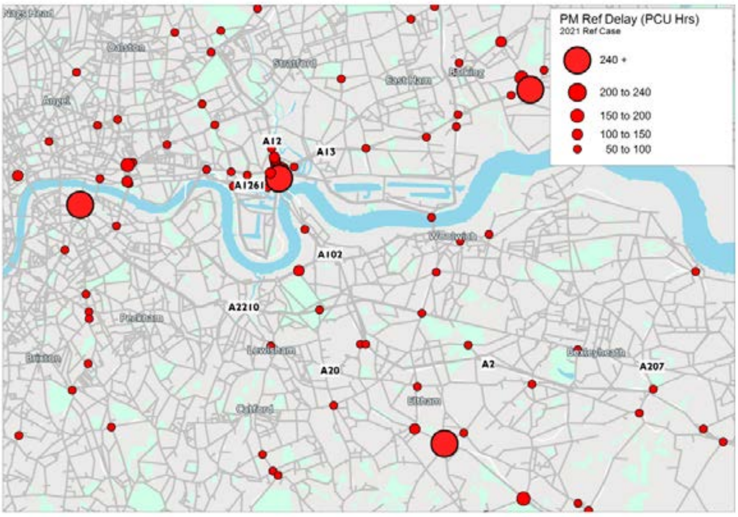


Figure 5-13: 2021 PM peak hour Reference Case junction delay

Network reliability and resilience

5.4.23 As described in Chapter 4, the Blackwall Tunnel is currently particularly susceptible to high levels of congestion and the frequent occurrence of disruptive incidents and tunnel closures. These factors contribute to poor journey time reliability for traffic using the tunnel, and the frequent unplanned closures are symptomatic of the lack of resilience of the cross-river strategic road network in the ESR generally, and the resulting wider network dis-benefits caused as traffic diverts.

5.4.24 The assessment in Chapter 4 demonstrates the established link between congestion (expressed as a function of average speed) and reliability. It is evident that the forecast increased congestion on the road network in the ESR in the 2021 Reference Case (and the increasing pressure on available river crossings) will lead to increasing unreliability on the road network, and particularly at the Blackwall Tunnel.

5.4.25 This added congestion will also result in more severe wider network impacts in terms of journey time delay when an unplanned closure of the Blackwall Tunnel occurs, as there will be less available spare capacity to accommodate diverting traffic. During both peak periods in 2021, high levels of delay are evident on the approaches to all crossings in the ESR and at Dartford in the Reference Case, and consequential diversions will add to congestion on the approaches to these crossings.

Road safety

5.4.26 Due to the overall increase in traffic volumes forecast, and that these will follow the existing distribution of traffic on different road types, it is expected that there would be an increase in accidents in the Reference Case when compared to the base year[41]. However, it is likely that the patterns and rate of traffic collisions would not change significantly when compared with the base year, as planned changes to the Reference Case highway network in the vicinity of the tunnel are limited when compared with the base year.

5.4.27 It should be noted that TfL has on-going programmes in place that seek to address road safety issues, and that the collision clusters identified in Chapter 4 will be considered as part of those programmes independently of the Silvertown Tunnel scheme.

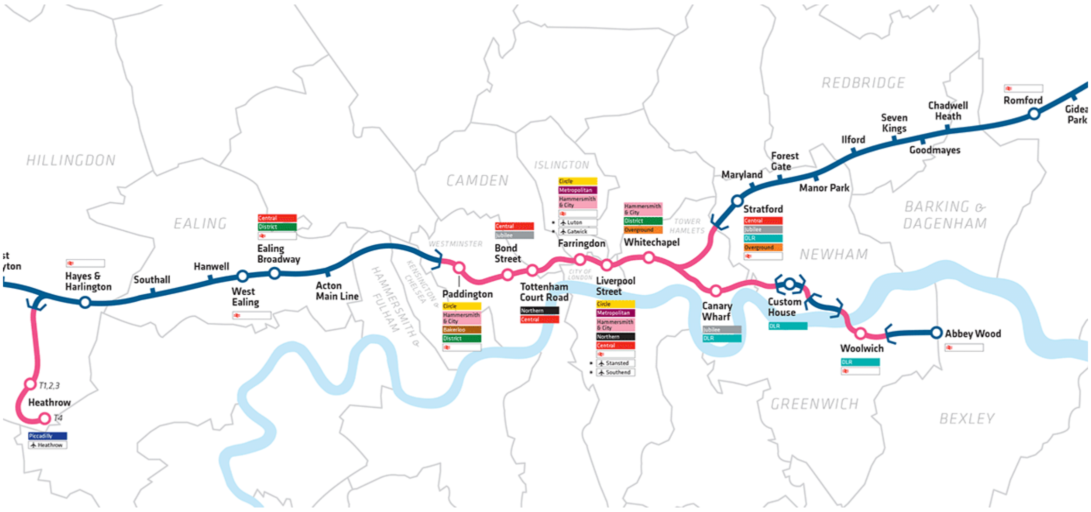
[41] TAG Unit A4.1, DfT, Nov 2014

5.5 Public transport network

5.5.1 The forecast increase in population and employment in the ESR will result in an increase in trips on the available PT networks.

5.5.2 In addition, the rail PT network in east London will be enhanced by Crossrail coming into service in 2018 (Figure 5-14), which will provide a new crossing of the Thames at Woolwich. This will increase capacity for trips by rail, and significantly reduce journey times to Canary Wharf and central London from its stations in south-east London at Woolwich and Abbey Wood and associated areas with walking, bus or rail connections to those stations.

Figure 5-14: Crossrail route map



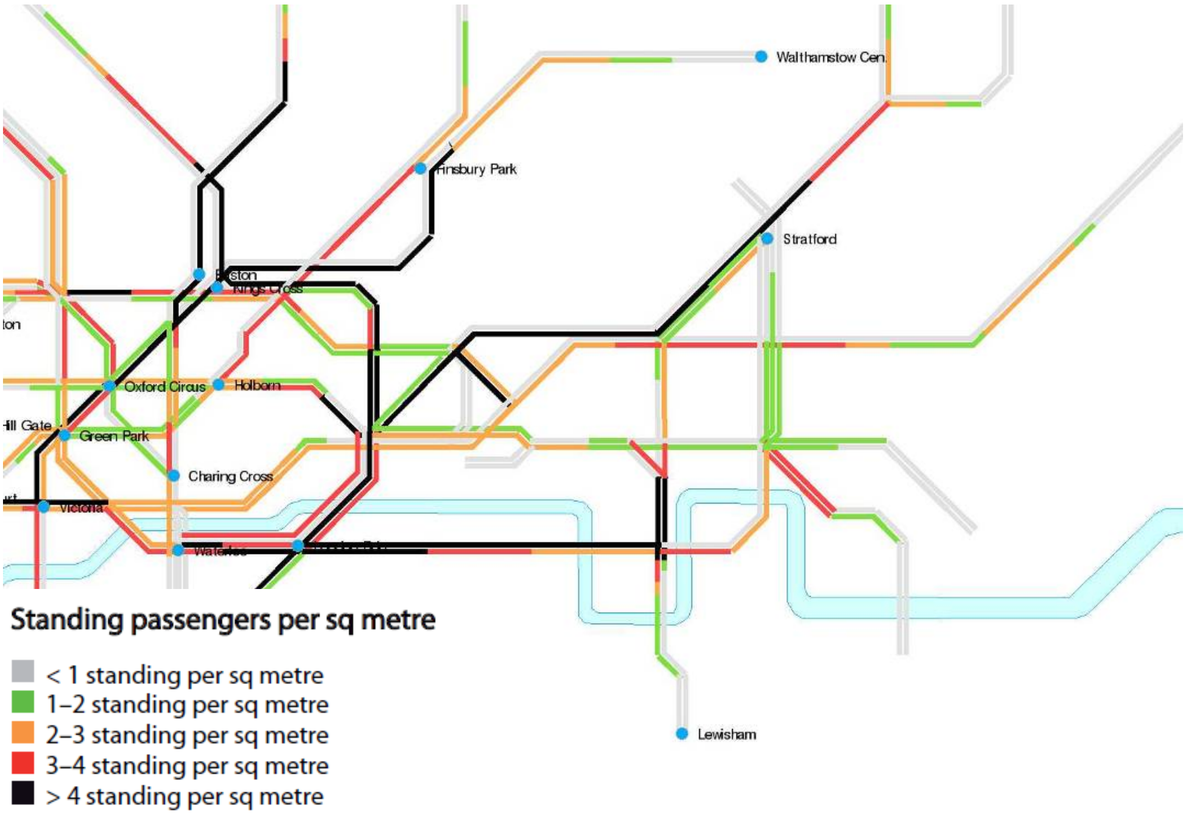
5.5.3 Other planned rail PT enhancements include increasing capacity and service levels on the London Underground Jubilee line, and on the DLR.

5.5.4 This additional rail capacity will see total cross-river PT trips rise to almost 80,000 northbound passengers in the AM peak hour (as shown in Figure 3-4). Further capacity enhancements may be achievable through the provision of additional and/or longer trains.

5.5.5 As a result of this investment, forecast peak PT demand can generally be accommodated on cross-river PT links in future despite the forecast growth in population and employment, albeit with some degree of standing and crowding.

5.5.6 Figure 5-15 shows the expected crowding levels on the London Underground and DLR networks in 2031 following the implementation of measures in the Mayor's Transport Strategy (MTS)[42]. The Jubilee line between Canary Wharf and Canada Water, in particular, is expected to remain among the busiest sections of the London Underground network.

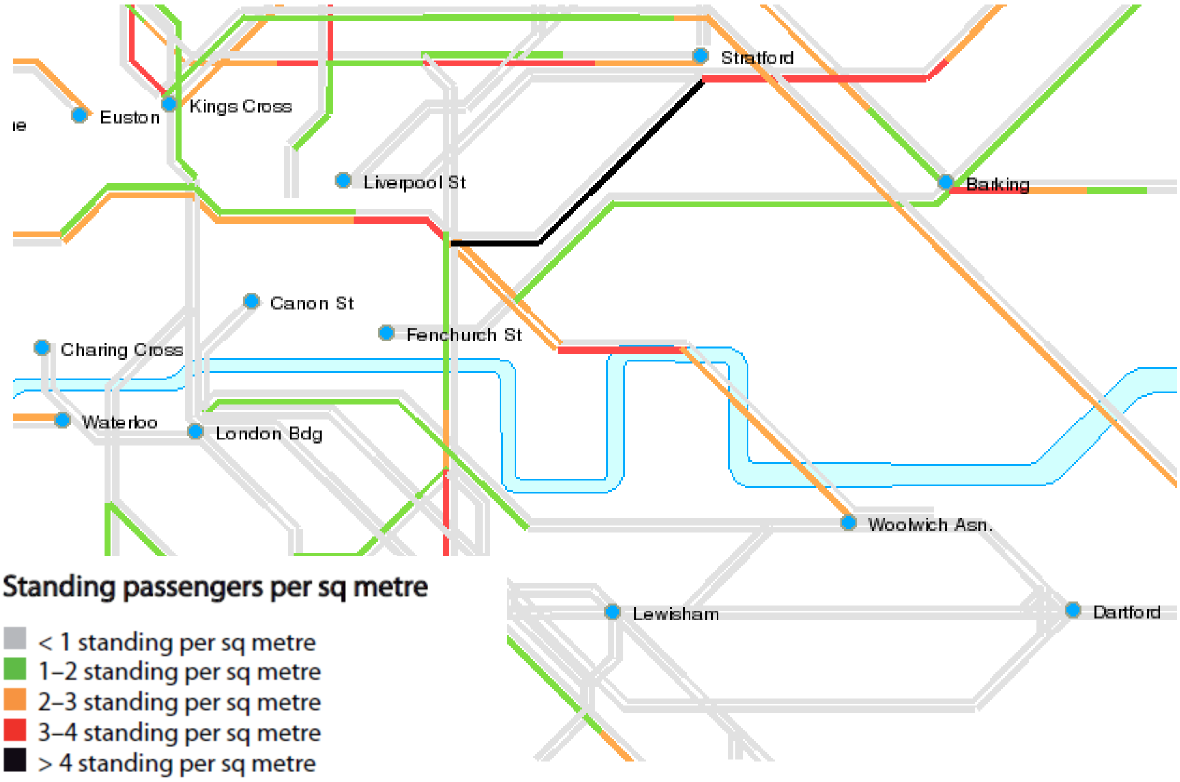
Figure 5-15: Forecast morning peak (0700-1000) crowding levels on the London Underground and DLR networks (2031)



5.5.7 Figure 5-16 shows levels of crowding on the National Rail, London Overground and Crossrail networks.

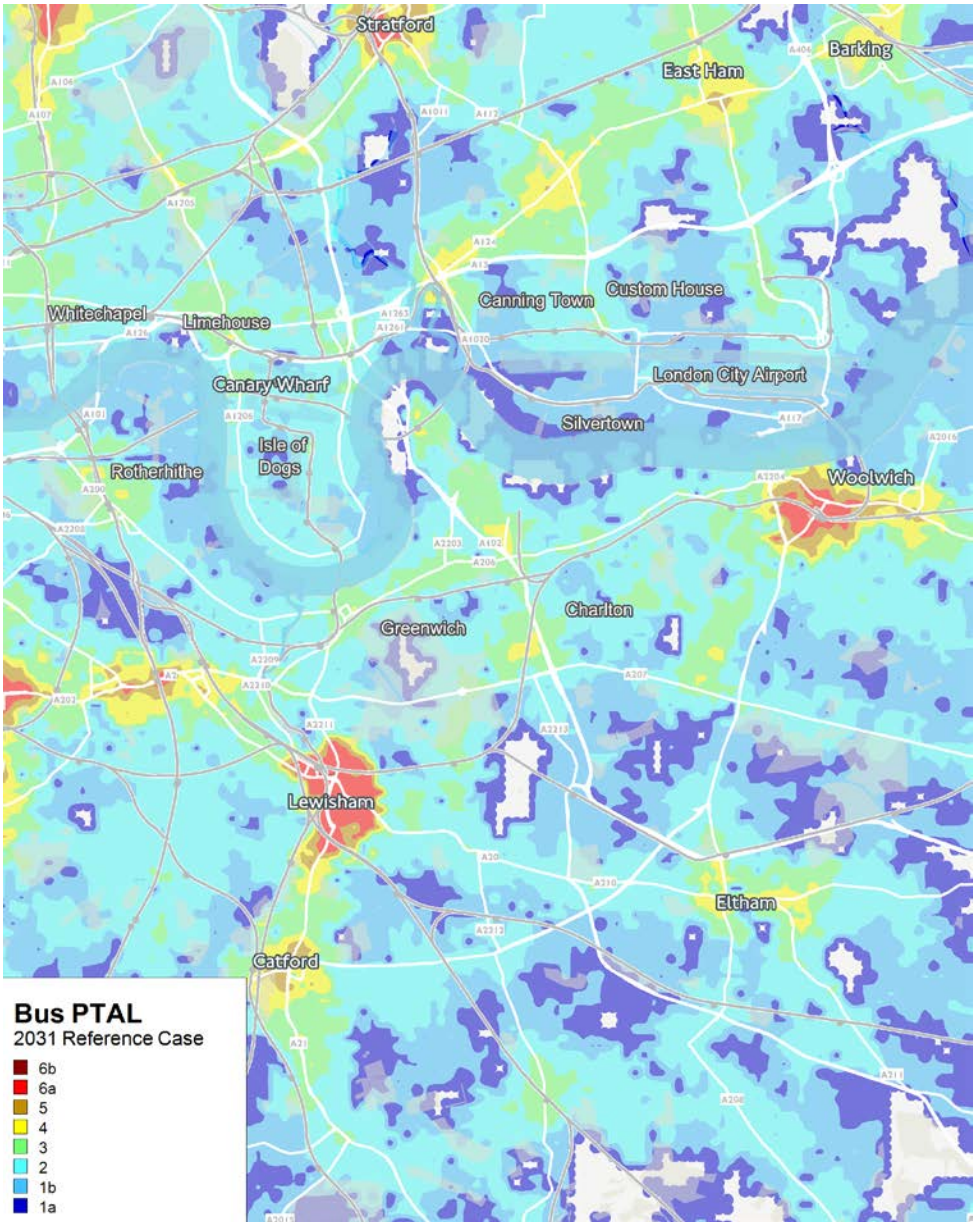
[42] Details on the London Underground upgrade programme are available on the TfL website at https://tfl.gov.uk/campaign/tube-improvements

Figure 5-16: Forecast morning peak (0700-1000) crowding levels on the National Rail, London Overground and Crossrail networks (2031)



5.5.8 In terms of access to the bus network, the low PTALs evident in some areas on either side of the River Thames in east London at present are likely to remain low in future years in the Reference Case scenario – 2031 bus PTALs are shown in Figure 5-17. In particular the areas around Eltham and north of Mottingham have poor levels of accessibility to the bus network.

Figure 5-17: 2031 Reference Case bus PTALs



5.5.9 Current constraints on the optimal use of buses in the area around the Blackwall Tunnel (i.e. the physical limitations of the tunnel itself, associated road network congestion and unreliability, and the general lack of road-based river crossings serving east and south-east London) mean that it will be very difficult to plug identified gaps in rail network provision in future years by improving bus services without the provision of new river crossings.

5.5.10 At present there is one bus route that uses the Blackwall Tunnel (route 108 Lewisham Centre to Stratford bus station, a 24-hour service) and due to the height restrictions at the Blackwall Tunnel it is only possible to operate single-deck buses, which limits capacity. As indicated in Chapter 4, the route also performs poorly based on TfL's measure of reliability, Excess Wait Time.

5.5.11 The forecast increase in traffic volumes in future years and the associated added congestion and lack of resilience on the highway network in the Reference Case described earlier will likely have a significant negative impact on the performance of the route 108 bus service, as well as coach services that use the tunnel, particularly in terms of increasing journey time variability.

5.5.12 Variable journey time reduces the ability of bus services to keep to timetable, leading to an unsatisfactory passenger experience and also making it necessary to incorporate longer 'recovery times' in schedules to mitigate the impact. This in turn results in higher operating costs as more buses and drivers are needed to operate the service.

5.5.13 Opportunities for further increasing the number of coach services that use the Blackwall Tunnel in future are also limited by the congestion and resilience issues outlined above.

5.6 Walking and cycling network

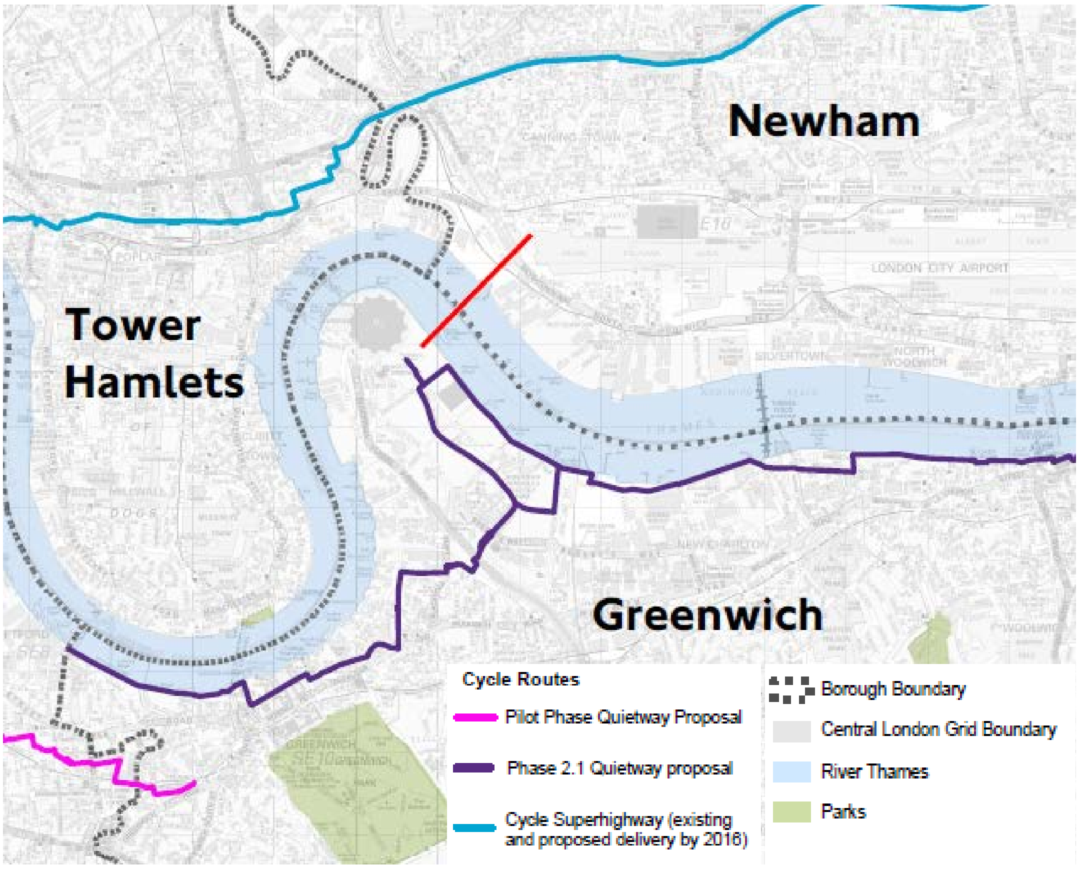
5.6.1 Due to the forecast increases in population and employment referred to above, a large increase in overall trips undertaken in the study area is expected to occur over the coming years. As with PT and road-based trips, this will result in an increase in local pedestrian and cycling trips above current numbers. An increase in cross-river cycling trips is also expected to be driven by significant background growth in cycling in London.

5.6.2 The walking and cycling networks in the study area are also expected to have changed significantly by 2021 and beyond as a result of several major developments. The Greenwich Peninsula Masterplan and the Greenwich Peninsula West Masterplan will result in a transformation of the area around the southern portals the Tunnel including improvements to the public realm. On the north side, the emerging Royal Docks OAPF is expected to result in a similar transformation which could create a much improved environment for pedestrians and cyclists.

5.6.3 In the medium term, outline planning consent has been granted for the Blackwall Reach development which would reconfigure local movements around the northern Blackwall Tunnel portal. The area around the northern portal of the Silvertown Tunnel is likely to be brought forward for redevelopment and could include a new DLR station in the Silvertown area, which would create new pedestrian routes and desire lines. Cycle Superhighway 4 is also planned to broadly follow the A206 between Woolwich and Greenwich to the south of the Greenwich Peninsula.

5.6.4 A cross-London network of high-quality ‘Quietways’ is also being constructed, which will provide more direct and better serviced cycle routes than the London Cycle Network. The planned network in the area is shown in purple in the figure below, and runs right up to the EAL terminals on both sides of the River Thames. The existing Cycle Super Highways are shown in blue and the EAL is highlighted in red:

Figure 5-18: Proposed cycle Quietways and existing Cycle Superhighways



5.6.5 Improvements delivered through the planned development and schemes outlined above are likely to address some of the issues highlighted by the PERS and CLoS assessments undertaken for this TA and summarised in Chapter 4.

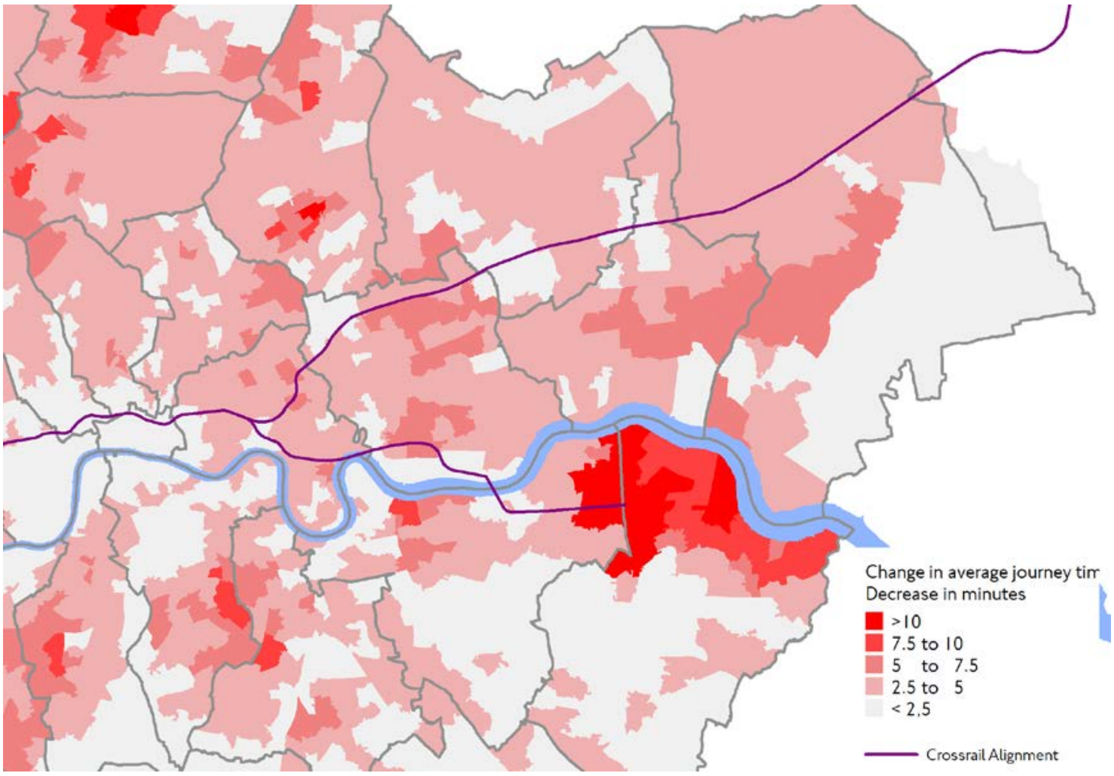
5.6.6 Other issues may need to be addressed through on-going TfL programmes to improve pedestrian and cycling facilities across London. Without improvement to facilities, the issues identified by the PERS and CLoS assessments will either be exacerbated by an increase in pedestrian and cycling activity, or will inhibit growth in the numbers of pedestrians and cyclists.

5.7 Access to jobs and labour market

Public Transport

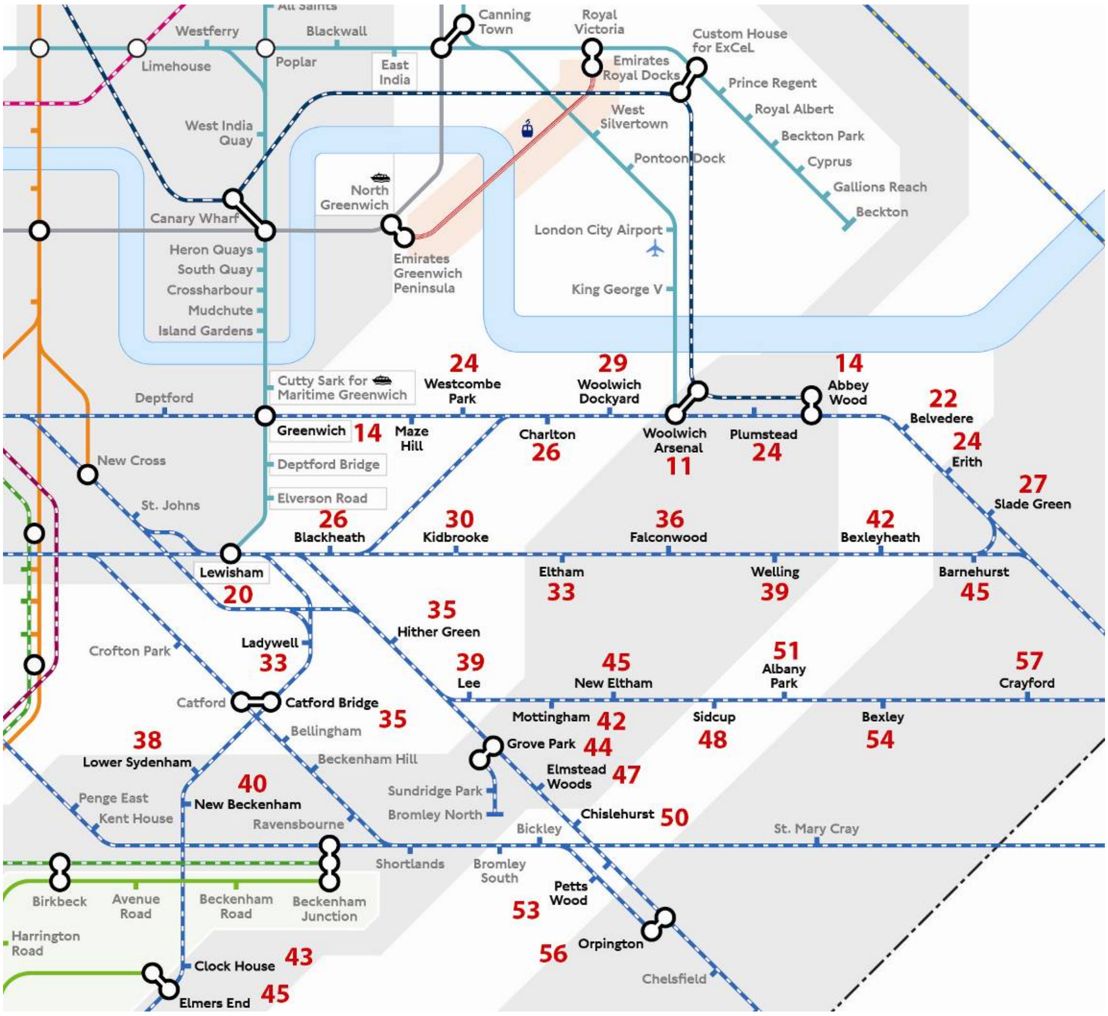
5.7.1 Figure 5-19 shows the change in PT connectivity expected by 2021. The largest improvements in journey time are seen along the Crossrail alignment, particularly in south-east London.

Figure 5-19: Change in PT journey times (AM peak hour, 2011 to 2021)



5.7.2 However, despite the capacity and connectivity increases in rail PT in the ESR, there are some locations where access to employment is still likely to be lower in future. For example, Figure 5-20 shows expected AM peak hour journey time to Canary Wharf from different stations in south-east London in 2021.

Figure 5-20: Approx. rail journey times to Canary Wharf from SE London (peak hour, 2021)[43]



5.7.3 Figure 5-20 shows areas with good connections to Abbey Wood, Greenwich or Lewisham will in future benefit from relatively rapid journey times to Canary Wharf. Areas with poorer connections to those interchange stations (such as those on train lines bypassing Lewisham) will continue to have higher average journey times into Canary Wharf.

[43] 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.

Private vehicles

5.7.4 The future year congestion described earlier in this chapter will contribute to an overall reduction in cross-river connectivity for private vehicles when compared to today's levels, which will be more critical in future than at present in the context of the growth potential of key regeneration areas in east London.

5.7.5 To illustrate this, Figure 5-21 and Figure 5-22 show the change in highway access to jobs within 45 minutes journey time expected in the period from 2012 to 2021 during the AM and PM peak hours respectively in the Reference Case, without the Silvertown Tunnel.

5.7.6 Average journey times to each zone generally lengthen in east London due to increased congestion, resulting in a decrease in the number of jobs located within the 45 minute 'standard threshold' and thus poorer connectivity to jobs via car. The figures indicate that these impacts are particularly acute in boroughs located in the ESR.

Figure 5-21: Change in job accessibility by car from 2012 to 2021 Reference Case – AM peak

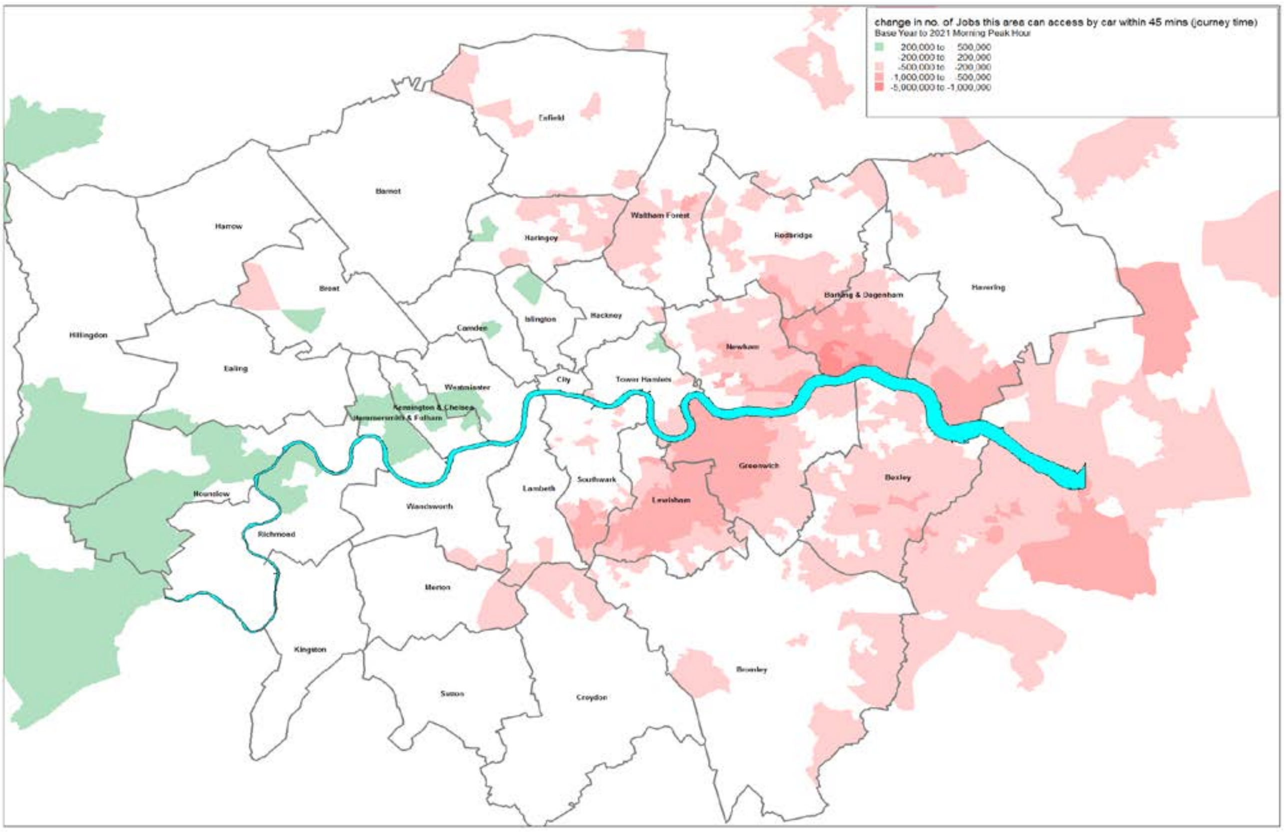
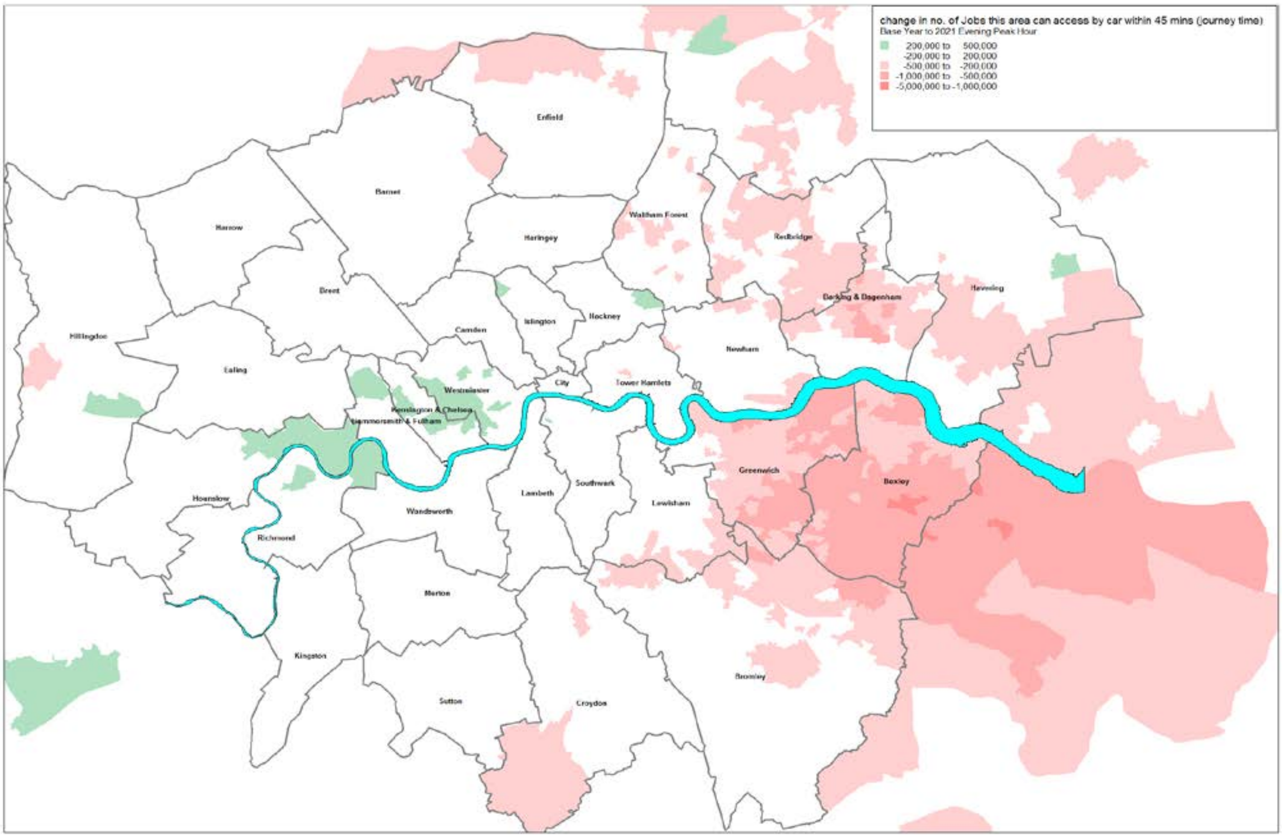


Figure 5-22: Change in job accessibility by car from 2012 to 2021 Reference Case – PM peak



5.7.7 Table 5-7 and Table 5-8 show the number of jobs within a 45-minute journey time by car by borough comparing the Base Year with the 2021 Reference Case without the Silvertown Tunnel scheme during the AM and PM peak hours respectively.

Table 5-7: Number of accessible jobs by borough (millions, by car) – AM peak hour

Borough	**No. of accessible jobs**		**% Change**
	Base year	**2021 Reference Case**	
Barking and Dagenham	2.25	1.85	-18%
Greenwich	1.65	1.29	-22%
Hackney	3.49	3.53	+1%
Lewisham	2.06	1.63	-21%
Newham	2.98	2.70	-9%
Tower Hamlets	3.50	3.48	-1%
Waltham Forest	2.50	2.38	-5%

Table 5-8: Number of accessible jobs by borough (millions, by car) – PM peak hour

Borough	**No. of accessible jobs**		**% Change**
	Base year	**2021 Reference Case**	
Barking and Dagenham	2.32	2.08	-10%
Greenwich	2.21	1.84	-17%
Hackney	2.87	2.94	+3%
Lewisham	2.54	2.43	-4%
Newham	2.74	2.70	-2%
Tower Hamlets	2.98	2.96	-1%
Waltham Forest	2.65	2.54	-4%

5.7.8 The data indicates that without further intervention, significant absolute reductions in connectivity can be expected in east and south-east London, as increased congestion on the road network results in large parts of London becoming increasingly unreachable by car within the 45 minute car journey time threshold.

5.8 Key points

5.8.1 Population and employment is forecast to rise rapidly across London between 2011 and 2031, but particularly in the ESR. Population in ESR boroughs is forecast to grow by 20% over this period (compared to 14% across London) while employment is forecast to grow by 17% (compared to 14% across London). Forecast growth is higher still in the three Silvertown Tunnel host boroughs of Greenwich, Newham and Tower Hamlets, with population rising by 27% and employment rising by 25%.

5.8.2 As a result of this growth, it is forecast that between 2012 and 2021 the total volume of trips will continue to rise across the ESR by over 10%. Most of these new trips will be made on the PT network, and the planned investment in PT capacity and connectivity means these trips can be accommodated on the network albeit with some degree of standing and crowding. PT mode share in the host boroughs is forecast to increase from 48% to 52%.

5.8.3 Nonetheless, there will be some growth in trips made by private vehicles and demand for the existing river crossings will increase further. At the Blackwall Tunnel, demand relative to capacity will increase significantly at peak times, and in particular in the southbound direction of the PM where demand relative to actual flow is forecast to increase from 104% in 2012 to 142% in the Reference Case. The resultant levels of delay and congestion on the approaches to the Blackwall Tunnel would be significantly higher than current levels.

5.8.4 In a future year scenario without the Silvertown Tunnel scheme therefore, the absence of new road crossings means there will be limited capacity for growth in road vehicle trips between east and south-east London, which will lead to increased levels of queuing and congestion on the approaches to existing crossings. As a result, average journey times and delays are expected to increase significantly across the area, with knock-on negative impacts for network resilience and connectivity to labour market (for businesses) and jobs (for residents).

5.8.5 Walking and cycling demand will increase and put pressure on existing networks which currently have some deficiencies and are in need of improvement.

6 IMPACTS OF CONSTRUCTION OF THE PROPOSED SCHEME

6.1 Scheme delivery overview

6.1.1 TfL proposes to deliver the Silvertown Tunnel scheme though a private financed initiative and has established that a Design Build Finance and Maintain (DBFM) structure would best meet the project objectives and constraints, and achieve an appropriate risk balance. A DBFM contract would be competitively tendered in accordance with EU procurement procedures and requirements.

6.1.2 Bidders for the DBFM contract would submit proposals to meet TfL's specification and requirements, which would reflect the requirements of the DCO. Bidders' proposals would be subject to a robust technical and environmental evaluation in addition to financial evaluation to ensure a sympathetic enhancement of highway infrastructure is delivered to meet the Scheme objectives while also offering value for money.

6.1.3 The appointed DBFM contractor would then complete the detailed design, construct the tunnel and supporting infrastructure, and be responsible for maintenance during a 30-year concession period. DCO requirements would be encased in the contract documents, and the contractor's detailed proposals would be subject to further detailed review prior to construction to ensure that the final design and construction methodology have no greater adverse effects than those assessed for the DCO.

6.1.4 The engineering design and the construction methodology and programme for the Scheme summarised in this chapter are illustrative examples of what a suitable solution may look like and how it could be built. They have been developed in sufficient detail to enable a DCO application to be submitted, and the following has been established:

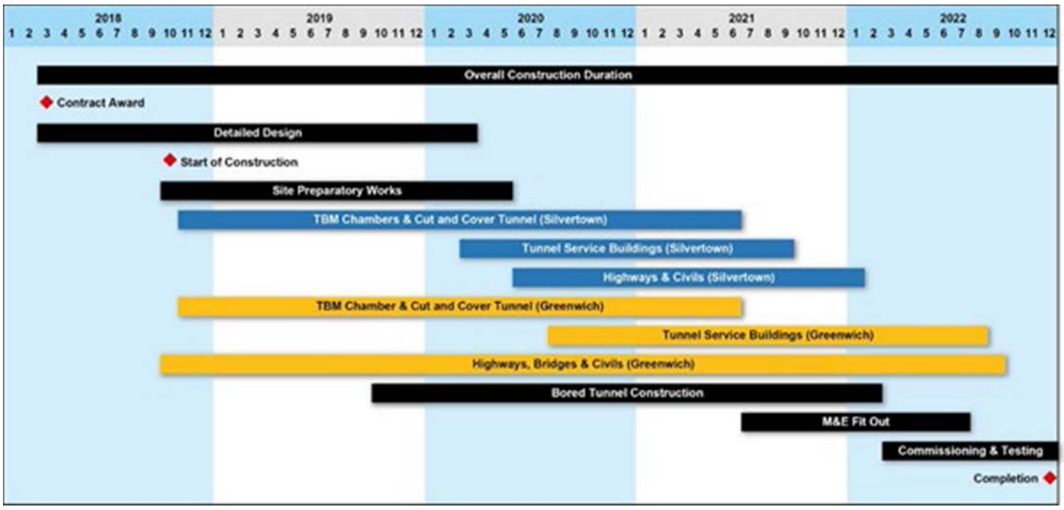
- that construction of the scheme is feasible in the timescale indicated;
- a possible construction sequence allowing traffic movements and services (utilities) supplies to be maintained during construction;
- the land required for the permanent works;
- the land required temporarily for the safe construction of the works;
- a level of detail to allow assessment of the likely costs, impacts, effects and benefits of the scheme.

6.1.5 As a result, some of the details described in this chapter, notably the programme dates, should be regarded as indicative and are subject to change in the final detailed design for the Scheme and the accompanying construction methodology and programme. The final design and construction programme would be developed by the DBFM contractor after the Secretary of State for Transport granted a DCO for the Scheme.

6.2 Indicative construction programme

6.2.1 The indicative construction programme is around four years, as indicated in summary in Figure 6-1 – more detail on the programme can be found in the Preliminary Engineering Report.

Figure 6-1: Outlined Construction Programme



6.2.2 A tunnel boring machine (TBM) would be installed at Silvertown and work towards Greenwich, where it will turn and work back to Silvertown. A TBM is a machine used to excavate tunnels with a circular cross section. All excavated material will be extracted through the Silvertown works site.

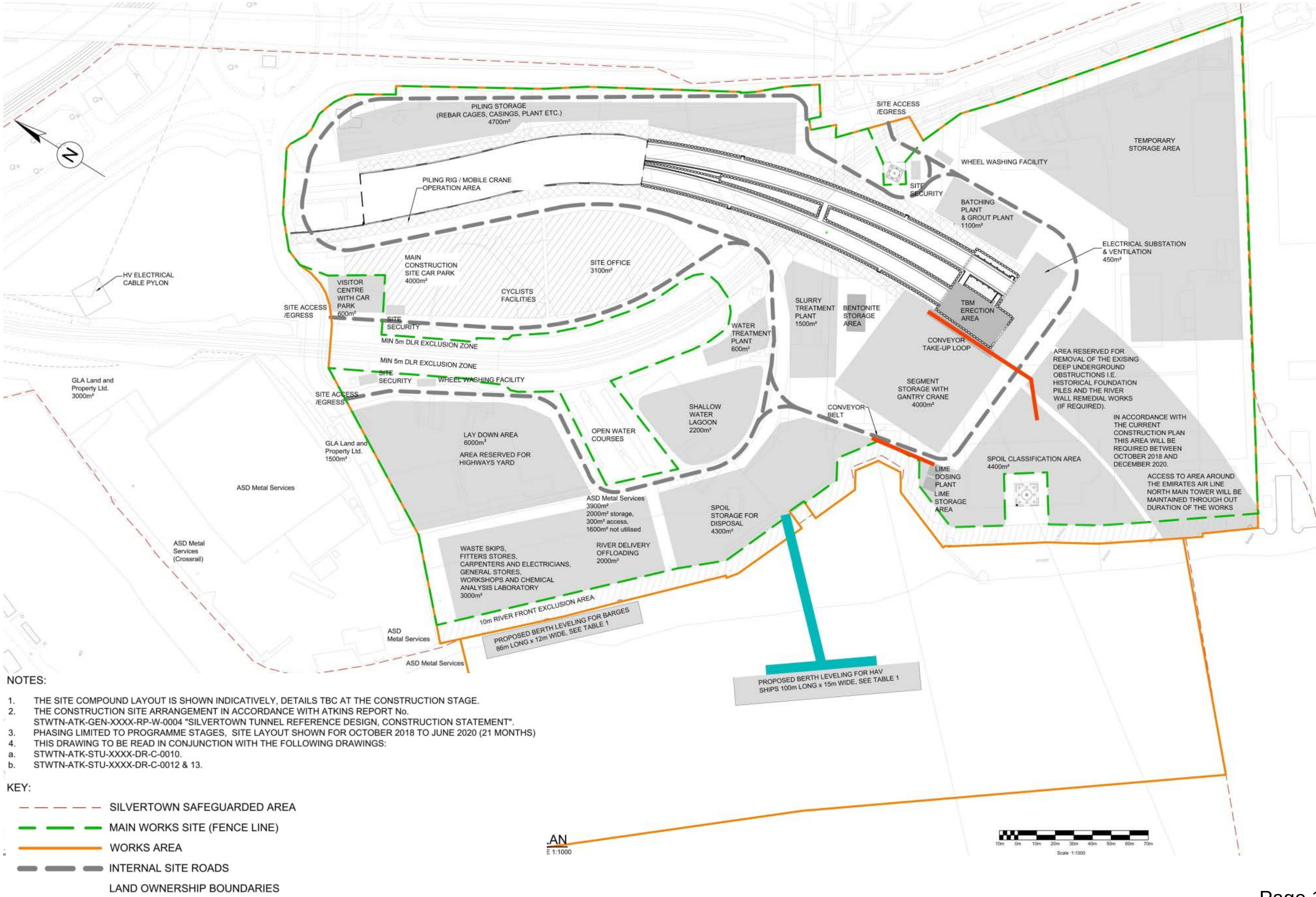
6.2.3 Much of the first year of the construction programme is taken up with preparatory works. The main tunnel bore would last for approximately 27 months, from delivery of the TBM to its removal. The highways elements of the tunnel construction programme can be divided into a series of three phases at the Silvertown portal site and four phases at the Greenwich portal site, which are described later in this chapter. The Silvertown works site has been chosen as the main construction site for the following reasons:

- it has a safeguarded wharf for river transport; and
- it is currently occupied by industrial and brownfield sites, and construction will therefore have less impact on existing and committed land-uses when compared with the Greenwich Peninsula.

Silvertown highways work phases

6.2.4 The proposed Silvertown works site area is shown in Figure 6-2 along with key site access points and alternative access routes to Dock Road.

Figure 6-2: Proposed Silvertown works site



6.2.5 Based upon initial construction planning, the Silvertown highway works can be divided into three distinct phases as described in Table 6-1 below.

Table 6-1: Silvertown work site phases

Phase 1 (estimated duration: June 2020 to May 2021)	• Access to Dock Road will be 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 (estimated duration: May to Aug 2021)	• 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 • Dock Road to remain closed
Phase 3 (estimated duration: Sept 2021 to Jan 2022)	• The tunnel portal access roads will be completed • The new alignment for Dock Road will be instated

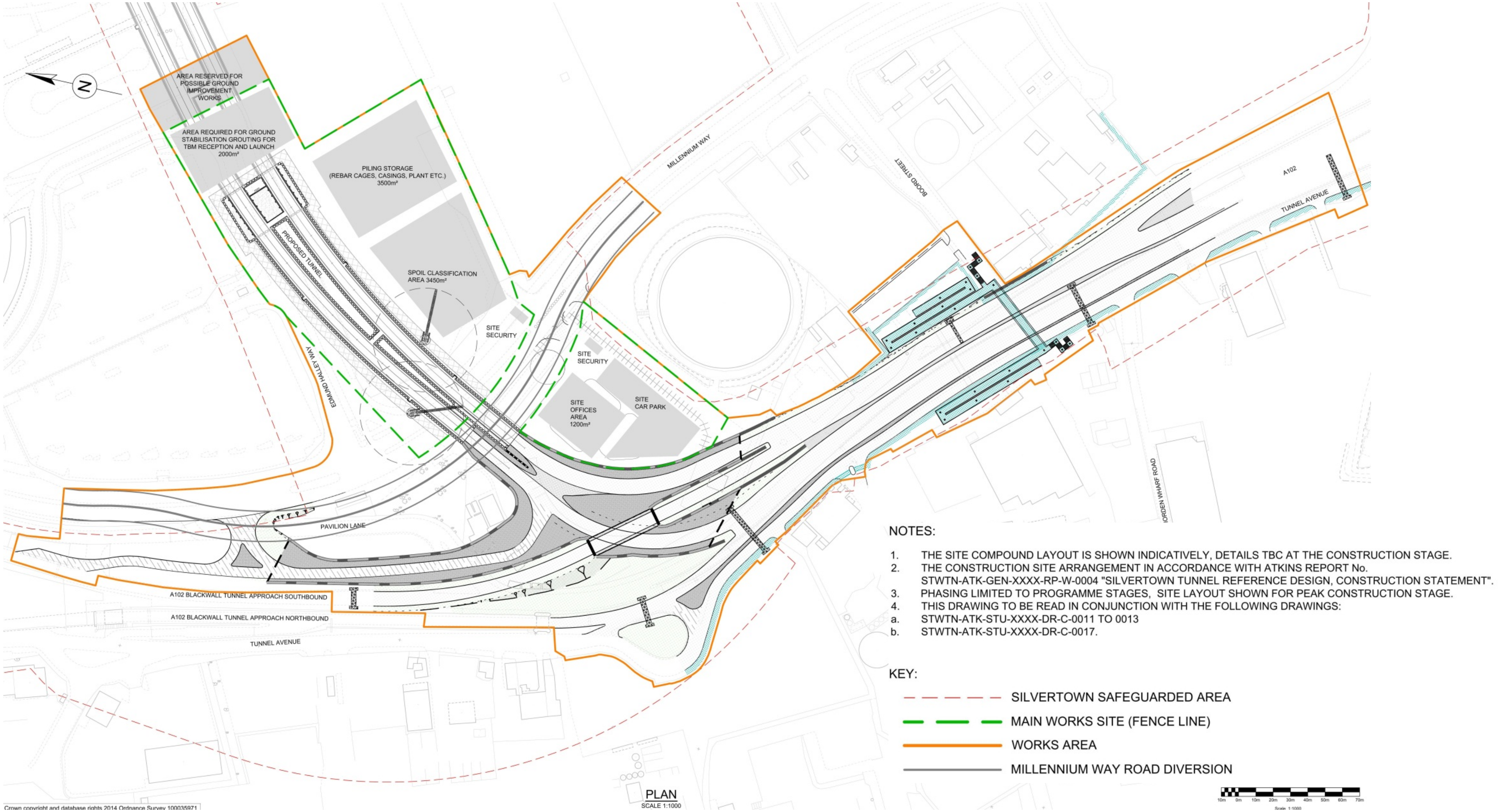
6.2.6 There will be no access to properties via Dock Road from the Tidal Basin Roundabout for the majority of the construction works since the main tunnel portal works site will be located here. The eastern access to Dock Road from North Woolwich Road will be maintained at all times. Access to Scarab Close/Thames Wharf from the Tidal Basin Roundabout will also be maintained for properties adjacent to the works site to the west.

6.2.7 There will be no impact on the Jubilee Line, the EAL, the DLR or Crossrail infrastructure as part of the works.

Greenwich highways work phases

6.2.8 The proposed Greenwich works site area is shown in Figure 6-3 along with the main site access point and the temporary road required for the duration of the works.

Figure 6-3: Proposed Greenwich works site



6.2.9 Based upon initial construction planning the works can be divided into four distinct phases as described in Table 6-2 below.

Table 6-2: Greenwich work site phases

Phase 1 (estimated duration: Oct 2018 – Mar 2021)	• Access along Millennium Way to be maintained along a new temporary alignment over a completed section of the cut-and-cover structure; • The existing Boord Street footbridge would be demolished once a new adjacent footbridge is constructed and complete – ramps would then be added later to the structure; • Silvertown Tunnel portal access roads would be constructed, including a new southbound alignment for the A102 Blackwall Tunnel Approach on a bridge over the northbound Silvertown Tunnel approach; • Boord Street would be subject to a temporary closure except for access – bus-only exit slip road to Boord Street and bus stop MA would be closed; • The new bus link between the southbound A102 Blackwall Tunnel Approach and Millennium Way would be partially constructed.
Phase 2 (estimated duration: Mar 2021 – May 2021)	• Traffic on the southbound A102 Blackwall Tunnel Approach would move to the newly-constructed bridge; • Bus-only exit slip road to Boord Street and bus stop MA would re-open.
Phase 3 (estimated duration: May 2021 – Oct 2021)	• Traffic on the northbound A102 Blackwall Tunnel Approach would move to the original southbound alignment to allow construction of the upgraded northbound tunnel approach; • Construction works on some sections of Tunnel Avenue (although access will be maintained) and bus stop MV would be closed; • Entry slip roads from Tunnel Avenue to the A102 Blackwall Tunnel Approach northbound would also be closed.
Phase 4 (estimated duration: Oct 2021 – Sept 2022)	• Traffic on the northbound A102 Blackwall Tunnel Approach would move to the new alignment; • New bus link between the southbound A102 Blackwall Tunnel Approach and Millennium Way would be completed; • New bus-only entry slip road from Tunnel Avenue to the northbound A102 Blackwall Tunnel Approach would be opened.

6.2.10 For the duration of the works, the A102 Blackwall Tunnel Approach would be operational at all times with the exception of some night closures at key stages in the construction process, such as for the demolition of the existing footbridge and the erection of the proposed replacement pedestrian and cycle bridge and gantry structures.

6.2.11 Edmund Halley Way will be closed for a period during the construction works to enable the cut and cover section of the tunnel to be constructed. Millennium Way would remain open throughout by using localised diversion and phasing the cut-and-cover tunnel construction. The cut and cover tunnelling works would initially stop short of the road, and then a temporary road diversion would be constructed to ensure access is maintained along the road for all modes. Traffic would then move back to the original alignment once the cut-and-cover section has been completed and the road reinstated. This would remove the need for a longer diversion and avoid encroaching on the site currently occupied by the North Greenwich station car park, where a multi-story car park has been proposed to consolidate The O2 parking arrangements as part of wider development plans for the area.

6.2.12 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. The work phasing will ensure that a new permanent pedestrian and cycle bridge will be installed and operational before the old bridge is removed to allow for continuous access. Ramps will be added on to this structure later. The new permanent footbridge including the ramps will take approximately 18 weeks to construct, once the new footbridge is completed the demolition of the existing footbridge will take approximately 4 weeks.

6.3 Construction traffic

6.3.1 The total volume of spoil produced by the TBM for disposal is estimated at 275,000m^3 or 550,000 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 six-and-a-half days per week with half a day allowed for maintenance. During this period tunnelling is estimated to produce 1,630 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 1,500 tonnes.

6.3.2 The Silvertown works site has a safeguarded wharf facility known as Thames Wharf, from which the majority of excavated material from both tunnel bores and some from the highways works could be transported. For a number of similar construction projects, Wallasea Island on the Essex coastline 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. The volume of spoil that could be transported to Wallasea Island depends on the suitability and condition of the excavated material for transport by river and for the intended end use.

6.3.3 River transport may also be used to transport large bulky construction materials and goods (for example aggregates and tunnel segments) and may therefore be used to minimise the number of HGV movements on the road network.

6.3.4 The approximate number of two-way lorry movements (inbound and outbound) by works element and site are presented in Table 6-3, indicating a scenario allowing for river transport of excavated spoil alongside a worst case scenario where all construction traffic would be undertaken by road. The table indicates that spoil removal by river barge could reduce road-based construction traffic by over 89,300 two-way lorry movements over the duration of the works (the difference between the worst case of 155,200 trips and the forecast of 65,900 including use of the River Thames).

6.3.5 Further details on river transport are provided later in this chapter. However, for the purposes of this assessment, the worst case has been assumed, where all construction traffic including spoil removal would be undertaken by road.

Table 6-3: Estimated two-way lorry movements over four year construction period (with river transport and worst case – inbound and outbound trips)

Works element	Silvertown site (with river transport)	Silvertown site (worst case)	Greenwich site[44]
Site buildings	2,600	2,600	2,000
Cut and cover tunnel	18,100	41,100	38,600
Bored tunnel	29,000	86,500	-
Highways	4,400	13,200	24,100
Mechanical and electrical	2,500	2,500	2,500
Landscaping	1,000	1,000	1,000
Site establishment	7,300	7,300	3,400
TBM delivery/removal	1,000	1,000	-
Total	**65,900**	**155,200**	**71,600**

6.3.6 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. The CMPs will also specify the routes to be used by construction vehicles, which will be agreed

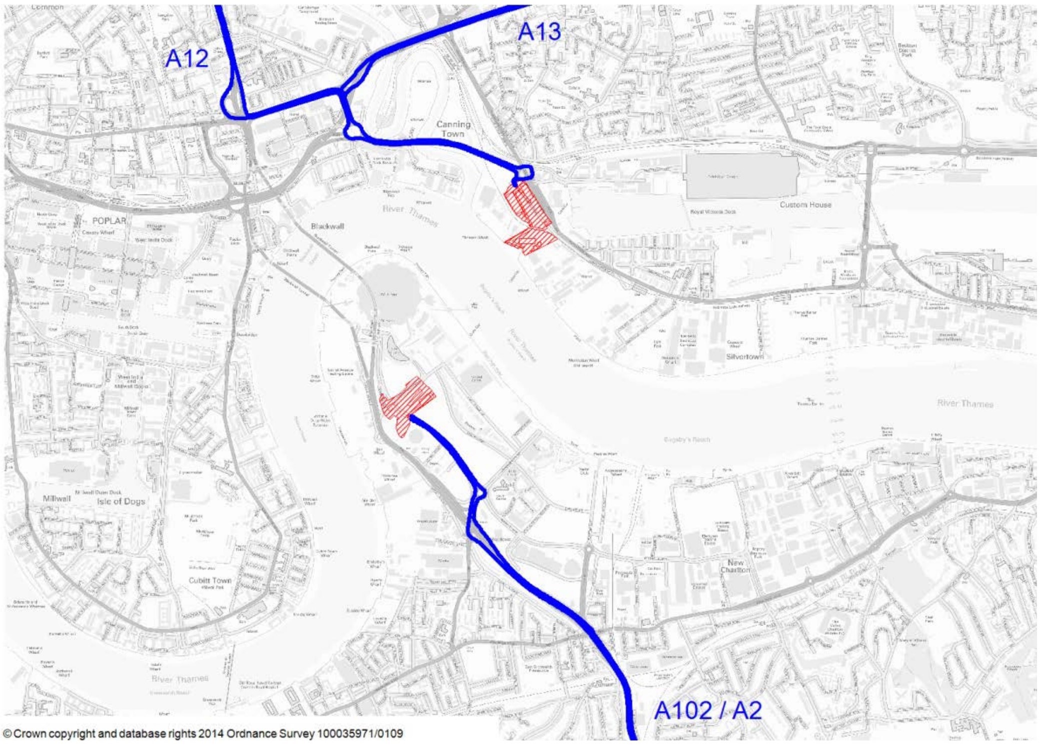
[44] There is no proposal to transport spoil by river from the Greenwich site, and as a result there is only one scenario that involves all transport to and from the site by road

in consultation with the host boroughs. As a general rule, routes to the working sites will be on the major road network as these roads are best suited to accommodating high volumes of traffic, with vehicles only using local roads to directly access the worksites.

6.3.7 The Silvertown works site would require a larger number of lorry movements due to the larger working areas. The vehicular access point to this site would be via the Tidal Basin Roundabout. The principal HGV route from the A13 and A12 to the site should be via Leamouth Road and the Lower Lea Crossing (Figure 6-4). 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.

6.3.8 The CMP would also confirm arrangements for a lorry holding facility near to the site entrance, which could be located on part of the current Crossrail site accessed from the Lower Lea Crossing.

Figure 6-4: Proposed HGV works site access routes

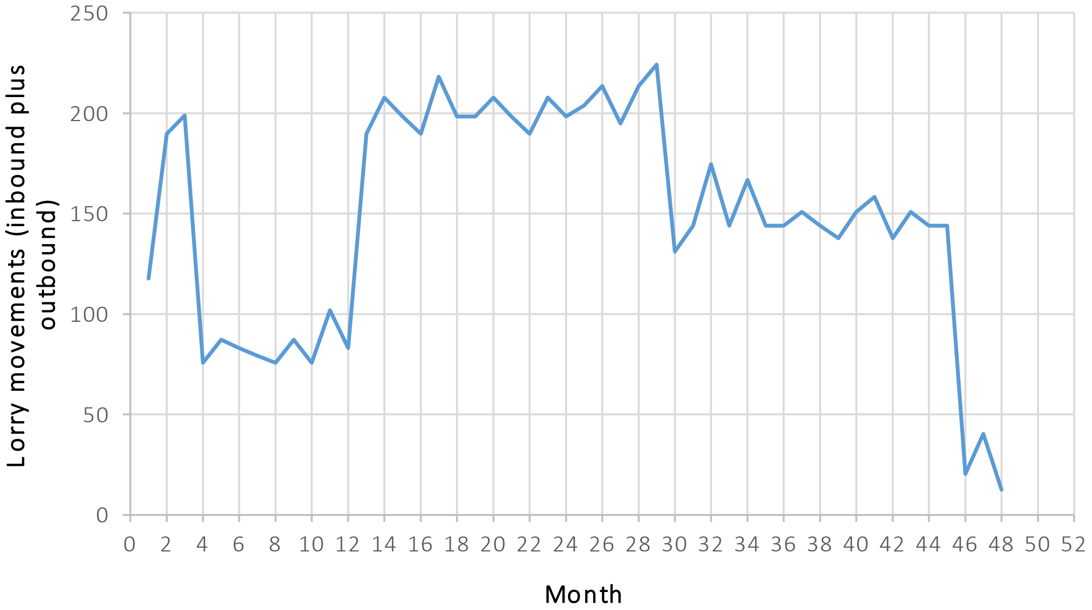


6.3.9 The Greenwich site would require a smaller number of lorry movements, and the vehicular access point to the site would be from Millennium Way. HGVs could access the site from the A102 Blackwall Tunnel Approach via Blackwall Lane and there is space for a small lorry holding facility near to the site entrance if required. This facility could be provided in liaison with the Greenwich Peninsula developers to accommodate their construction programme.

6.3.10 Figure 6-5 indicates that peak lorry activity is anticipated to occur during month 29 in the worst case scenario, with approximately 224 movements (inbound plus outbound) per day. The following assumptions were made to assess daily traffic generation:

- six working days per week, ten hours per working day, with lorry traffic spread evenly across the hours;
- for the Silvertown site, the following trip distribution assumptions were made:
    - 50% to/from east via A13 and 50% to/from north via A12 throughout construction period for all lorries apart from those removing spoil;
    - for spoil removal, 80% to/from east via A13 and 20% to/from north via A12, accounting for likely destination for spoil at Wallasea Island.

Figure 6-5: Daily lorry movement during construction – Silvertown site (worst case scenario)



6.3.11 Table 6-4 and Table 6-5 summarise the impact of construction traffic during the spoil removal stage and other construction periods on the highway network during the AM and PM peak hours. The RXHAM 2021 Reference Case scenario was used to provide background traffic estimates on each link.

Table 6-4: AM peak hour traffic increase due to construction traffic – Silvertown site (worst case)

Link	Reference Case traffic 2021 (two-way)		Predicted construction traffic (two-way)		% increase in traffic (two-way)			
					Total vehicles		HGV	
	Total vehicles	HGV	Spoil removal stage	Other construction period	Spoil removal stage	Other construction period	Spoil removal stage	Other construction period
A12	4,808	457	5	8	0.1%	0.2%	1.0%	1.6%
A13 East	6,610	701	18	8	0.3%	0.1%	2.6%	1.1%
A13 West	3,327	260	5	8	0.1%	0.2%	1.7%	2.9%
Leamouth Road	1,462	195	23	15	1.5%	1.0%	11.5%	7.7%
Lower Lea Crossing	2,069	79	23	15	1.1%	0.7%	28.5%	19.0%

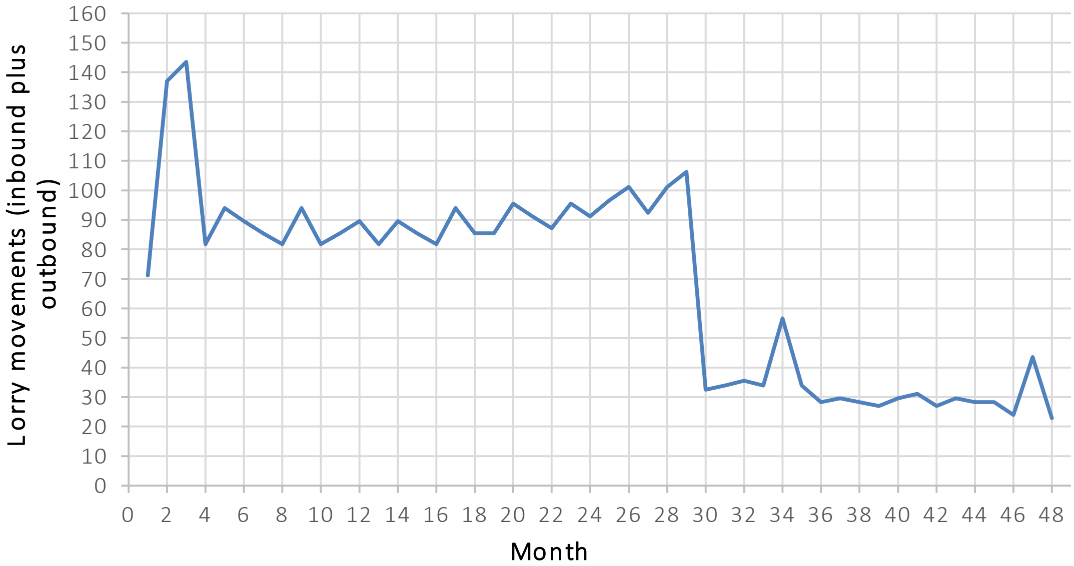
Table 6-5: PM peak hour traffic increase due to construction traffic – Silvertown site (worst case)

Link	Reference Case traffic 2021 (two-way)		Predicted construction traffic (two-way)		% increase in traffic (two-way)			
					Total vehicles		HGV	
	Total vehicles	HGV	Spoil removal stage	Other construction period	Spoil removal stage	Other construction period	Spoil removal stage	Other construction period
A12	4,567	153	5	8	0.1%	0.2%	2.9%	4.9%
A13 East	6,498	223	18	8	0.3%	0.1%	8.1%	3.4%
A13 West	2,147	79	5	8	0.2%	0.3%	5.7%	9.5%
Leamouth Road	1,530	85	23	15	1.5%	1.0%	26.5%	17.6%
Lower Lea Crossing	1,992	45	23	15	1.1%	0.8%	50.0%	33.3%

6.3.12 The tables above indicate that the impact of Silvertown site construction traffic on total traffic on the A12 and A13 would be negligible throughout the construction period (less than 0.5% during the AM and PM peak hours. The scale of the impact on Leamouth Road and Lower Lea Crossing during the spoil removal stage is estimated as less than 2% of the Reference Case 2021 traffic during both the AM and PM peak hours. The majority of lorry movements would be expected to take place during off-peak periods where vehicle flows are generally over 10% lower than during peak times.

6.3.13 Figure 6-6 indicates that peak movements are anticipated to occur at the Greenwich site during month 3, where approximately 144 movements per day (inbound plus outbound) would be expected.

Figure 6-6: Daily lorry movement during construction – Greenwich site



6.3.14 Table 6-6 and Table 6-7 summarise the impact of peak construction traffic on the highway network during the AM and PM peak hours. As with the Silvertown site, background traffic was sourced from the RXHAM 2021 Reference Case scenario.

Table 6-6: AM peak hour traffic increase due to construction traffic – Greenwich site

Link	Reference Case traffic 2021 (two-way)		Predicted construction traffic (two way)	% increase in traffic (two way)	
	Total vehicles	HGV		Total vehicles	HGV
A102	5,274	381	15	0.3%	3.8%

Table 6-7: PM peak hour traffic increase due to construction traffic – Greenwich site

Link	Reference Case traffic 2021 (two-way)		Predicted construction traffic (two way)	% increase in traffic (two way)	
	Total vehicles	HGV		Total vehicles	HGV

A102	6,367	179	15	0.2%	8.1%

6.3.15 The tables above indicate that the impact of peak construction traffic on the A102 would be negligible during the AM and PM peak hours. The majority of lorry movements would take place during off-peak periods where vehicle flows are generally over 10% lower than during peak periods.

6.3.16 To further improve the safety of vulnerable road users on London's roads, TfL has mandated in all new and existing contracts that the suppliers and their sub-contractors who deliver to, collect from or service a TfL project, premise or site must comply with certain safety requirements known as 'Work Related Road Risk' (WRRR). These requirements include:

- accreditation to the Fleet Operator Recognition Scheme (FORS);
- enhanced vehicle safety equipment;
- Safe Urban Driving training and regular DVLA licence checking; and
- collision and incident reporting.

6.3.17 The estimates of lorry movements described above do not include workforce access to each site. The construction workforce would be discouraged from travelling by car through the implementation of Site Travel Plans. There would be limited car parking available at both sites. The Silvertown site would have 200 car parking spaces with the Greenwich site providing 80 car parking spaces.

6.3.18 Construction would take place over a four year period at the Silvertown site, starting in late 2018 and finishing in Autumn 2022. Working hours for surface construction activity would be restricted to 08:00 to 18:00 Monday to Friday and 09:00 to 14:00 on Saturday, with no work taking place on Sundays or bank/public holidays.

6.3.19 It is estimated that 682 staff would be expected on the Silvertown site every day during the busiest period in mid 2021. Census 2011 travel-to-work data for mid-layer super output areas 034 and 037 in Newham (the areas covering the works site), summarised in Table 6-8, were used to provide a first indication of how this workforce may be expected to travel to the site during peak times, excluding those listed as 'not in employment' or 'working mainly at home'. Since the proposed Silvertown site would have limited access to car parking, the modal splits were adjusted and reassigned proportionally to PT modes as shown in the table.

Table 6-8: Silvertown works site mode of travel to work, based on 2011 Census (mid-layer super output areas 034 and 037 – LB Newham)

Travel mode	Mode share	Amended mode share	Total one-way daily trips

		(limited parking)	(amended mode share)
Underground, metro, light rail or tram	21.0%	27.5%	188
Train	9.4%	15.9%	109
Bus, minibus or coach	9.4%	15.9%	109
Taxi	0.2%	0.2%	1
Motorcycle, scooter or moped	1.6%	1.6%	11
Driving a car or van	48.9%	29.3%	200
Passenger in a car or van	2.2%	2.2%	15
Bicycle	2.1%	2.1%	14
On foot	4.7%	4.7%	32
Other method of travel to work	0.5%	0.5%	4
TOTAL	**100.0%**	**100.0%**	**682**

6.3.20 Construction would take place over a four year period at the Greenwich site, starting in late 2018 and finishing in late 2022. Working hours for surface construction activity would be restricted to 08:00 to 18:00 Monday to Friday and 09:00 to 14:00 on Saturday, with no work taking place on Sundays or bank/public holidays.

6.3.21 It is estimated that 303 staff would be expected on the Greenwich site every day during the busiest period in the construction programme, in mid 2021. Census 2011 travel-to-work data for mid-layer super output area 036 in Greenwich (the area covering the works site), summarised in Table 6-9, was used to provide a first indication of how this workforce may be expected to travel to the site during peak times, excluding those listed as ‘not in employment’ or ‘working mainly at home’. Since the proposed Greenwich site would have limited access to car parking, the modal splits were adjusted and reassigned proportionally to PT modes as shown in the table.

Table 6-9: Greenwich works site mode of travel to work, based on 2011 Census (mid-layer super output area 036 – RB Greenwich)

Travel mode	Census mode share	Amended mode share (limited parking)	Total one-way daily trips (amended mode share)
Underground, metro, light rail or tram	21.8%	24.6%	74
Train	14.2%	16.9%	51
Bus, minibus or coach	17.5%	20.3%	61
Taxi	0.1%	0.1%	0
Motorcycle, scooter or moped	1.1%	1.1%	3
Driving a car or van	34.6%	26.4%	80
Passenger in a car or van	2.2%	2.2%	7
Bicycle	2.7%	2.7%	8
On foot	5.3%	5.3%	16
Other method of travel to work	0.5%	0.5%	1
TOTAL	**100.0%**	**100.0%**	**303**

6.3.22 The preliminary forecasts summarised above would be revised during the development of Site Travel Plans, which would be a requirement of the DCO as indicated in the mitigations section at the end of this chapter.

6.4 Cumulative construction traffic impacts

6.4.1 In addition to background traffic forecasts derived from the RXHAM and construction/site workforce traffic generated by the Silvertown Tunnel, there is also the potential that development sites in the vicinity of the tunnel portals will generate construction traffic flows that will cumulatively impact on the road network.

6.4.2 The list of relevant development sites considered correlates with those considered in the Preliminary Environmental Information Report, as set out in Chapter 17 of that document. The period considered was from 2018 to 2022, corresponding to the planned construction programme for the tunnel. The following data was collated for each site:

- Average daily forecast of construction vehicle trips;
- Average AM peak forecast of construction vehicle trips; and
- Average PM peak forecast of construction vehicle trips.

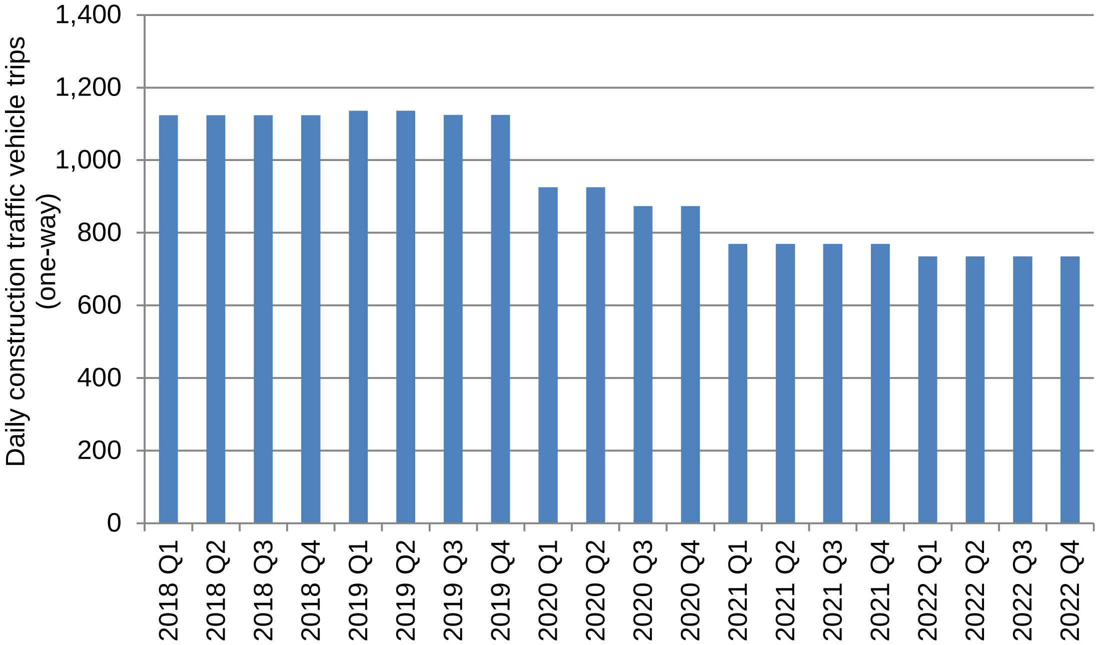
6.4.3 Where possible, information on expected construction traffic was sourced directly from the respective TAs for each development. Sites were excluded in cases where construction is expected to be completed before 2018, as construction traffic associated with such sites would not conflict with the current assumed works programme for the Silvertown Tunnel.

6.4.4 In cases where construction traffic details were not included in a TA or the information provided was not clear, the following assumptions were used to provide an estimate based on the quantum of development proposed and the length of the anticipated construction period:

- 0.58 one-way trips per sqm of development, regardless of type of development – this includes demolition, excavation and construction;
- each residential unit assumed to be 65 sqm – an additional 40% of floorspace was added to each unit to take into account communal areas, car parking and other ancillary uses;
- five working days in a week (Monday to Friday) and 65 working days in a quarter;
- no allowance made for peaks in construction activity, hence construction traffic spread evenly over construction phases; and
- ten hours per working day between 08:00 to 18:00 for lorries.

6.4.5 Figure 6-7 shows the cumulative daily one-way construction trips generated by the schemes described above.

Figure 6-7: Daily one-way cumulative construction traffic movement



Cumulative construction traffic trip assignment

6.4.6 Where routes to be used by construction traffic were specified in TAs, the traffic generated by these specific schemes was assigned accordingly. Where routes were not specified, traffic was assigned on routes around the northern and southern tunnel portals as shown in Figure 6-4 depending on the location of the development scheme being considered.

6.4.7 Table 6-10 and Table 6-11 summarise the hourly level of construction traffic on the local highway network within the vicinity of the Silvertown and Greenwich sites in 2021.

Table 6-10: Hourly cumulative two-way construction traffic – Silvertown site

Link	Total vehicles	HGV
A12	3	3
A13 East	34	34
A13 West	37	37
Leamouth Road	0	0
Lower Lea Crossing	0	0

Table 6-11: Hourly cumulative two-way construction traffic – Greenwich site

Link	Total vehicles	HGV
A102	21	21

6.4.8 The cumulative traffic summarised above was combined with the Silvertown site traffic (Table 6-4 and Table 6-5) and Greenwich site traffic (Table 6-6 and Table 6-7) to estimate 'cumulative development + Silvertown Tunnel construction traffic'. This is summarised in Table 6-12 to Table 6-15.

Table 6-12: AM peak hour increase in traffic due to cumulative development + Silvertown Tunnel construction traffic – Silvertown site

Link	Reference Case traffic 2021 (two-way)		Predicted cumulative + Silvertown Tunnel construction traffic (two-way)		% increase in traffic (two-way)			
					Total vehicles		HGV	
	Total vehicles	HGV	Spoil removal stage	Other construction period	Spoil removal stage	Other construction period	Spoil removal stage	Other construction period
A12	4,808	457	8	11	0.2%	0.2%	1.6%	2.3%
A13 East	6,610	701	52	42	0.8%	0.6%	7.4%	5.9%
A13 West	3,327	260	42	45	1.2%	1.3%	16.0%	17.1%
Leamouth Road	1,462	195	23	15	1.5%	1.0%	11.5%	7.7%
Lower Lea Crossing	2,069	79	23	15	1.1%	0.7%	28.5%	19.0%

Table 6-13: PM peak hour increase in traffic due to cumulative development + Silvertown Tunnel construction traffic – Silvertown site

Link	Reference Case traffic 2021 (two-way)		Predicted cumulative + Silvertown Tunnel construction traffic (two-way)		% increase in traffic (two-way)			
					Total vehicles		HGV	
	Total vehicles	HGV	Spoil removal stage	Other construction period	Spoil removal stage	Other construction period	Spoil removal stage	Other construction period
A12	4,567	153	8	11	0.2%	0.2%	4.9%	6.9%
A13 East	6,498	223	55	45	0.8%	0.7%	24.7%	20.0%
A13 West	2,147	79	39	42	1.8%	1.9%	48.7%	52.5%
Leamouth Road	1,530	85	23	15	1.5%	1.0%	26.5%	17.6%
Lower Lea Crossing	1,992	45	23	15	1.1%	0.8%	50.0%	33.3%

Table 6-14: AM peak hour increase in traffic due to cumulative development + Silvertown Tunnel construction traffic – Greenwich site

Link	Reference Case traffic 2021 (two-way)		Predicted cumulative + Silvertown Tunnel construction traffic (two-way)	% increase in traffic (two-way)	
	Total vehicles	HGV		Total vehicles	HGV
A102	5,274	381	36	0.7%	9.3%

Table 6-15: PM peak increase in traffic on roads due to cumulative development + Silvertown Tunnel construction traffic – Greenwich site

Link	Reference Case traffic 2021 (two-way)		Predicted cumulative + Silvertown Tunnel construction traffic (two-way)	% increase in traffic (two-way)	
	Total vehicles	HGVs		Total vehicles	HGVs
A102	6,367	179	36	0.6%	19.8%

6.4.9 As indicated above, the impact of the total two-way cumulative development and Silvertown Tunnel construction traffic is less than 2% of 2021 Reference Case traffic flows on all links assessed. It is therefore considered that the impact is negligible.

6.4.10 Table 6-14 and Table 6-15 indicate that the impact of the total two-way cumulative development and Silvertown construction traffic during the AM and PM peak hour on the A102 is negligible (less than 1% increase in vehicles).

6.5 Construction impact summary

6.5.1 Table 6-16 and Table 6-17 summarise the impacts of construction on different modes of transport during each identified phase of works at each site. Each mode is considered in more detail later in this chapter.

Table 6-16: Silvertown works site impact matrix

Modes	**Phase 1**		**Phase 2**		**Phase 3**	
	Impact	**Proposed mitigation**	**Impact**	**Proposed mitigation**	**Impact**	**Proposed mitigation**
Pedestrians	No access through work-sites	Diversion routes identified and kept to minimum feasible length	No access through work-sites	Diversion routes identified and kept to minimum feasible length	No access through work-sites	Diversion routes identified and kept to minimum feasible length
Cyclists	No access through work-sites	Diversion routes identified and kept to minimum feasible length	No access through work-sites	Diversion routes identified and kept to minimum feasible length	No access through work-sites	Diversion routes identified and kept to minimum feasible length
Rail users	Onward routes from DLR stations impacted (see pedestrians)	Diversion routes identified and kept to minimum feasible length	Onward routes from DLR stations impacted (see pedestrians)	Diversion routes identified and kept to minimum feasible length	Onward routes from DLR stations impacted (see pedestrians)	Diversion routes identified and kept to minimum feasible length
Bus users	No existing bus routes affected	None required	No existing bus routes affected	None required	No existing bus routes affected	None required
Car users	No through traffic on North Woolwich Road; no access to Dock Road via Tidal Basin Roundabout	Lower Lea Crossing maintained during works with minimal restrictions	Tidal Basin Roundabout extension completed	None required	New alignment for Dock Road completed; tunnel portal access roads completed	None required
HGVs	No through traffic on North Woolwich Road; no access to Dock Road via Tidal Basin Roundabout	Lower Lea Crossing maintained during works with minimal restrictions	Tidal Basin Roundabout extension completed	None required	New alignment for Dock Road completed; tunnel portal access roads completed	None required
River network	No impact expected on capacity of river or river traffic; jetty for removal of excavated material may be provided	Steps taken to ensure jetty does not impinge on navigable channel	See Phase 1	See Phase 1	See Phase 1	See Phase 1

Table 6-17: Greenwich works site impact matrix

Mode	Phase 1		Phase 2		Phase 3		Phase 4	
	Impact	**Proposed mitigation**	**Impact**	**Proposed mitigation**	**Impact**	**Proposed mitigation**	**Impact**	**Proposed mitigation**
Pedestrians	No access through work-sites; no route along Edmund Halley Way as temporarily stopped up; Boord Street closed except for access; demolition of bridge near Boord Street	Construction of new bridge at Boord Street for pedestrians and cyclists with stairs and deck before demolition of old footbridge; ramps to be added after demolition	No access through work-sites	Diversion routes identified and kept to minimum feasible length	No access through work-sites	Diversion routes identified and kept to minimum feasible length	No access through work-sites	Diversion routes identified and kept to minimum feasible length
Cyclists	No access through work-sites; no route along Edmund Halley Way as temporarily stopped up; Boord Street closed except for access; demolition of bridge near Boord Street	Construction of new bridge at Boord Street for pedestrians and cyclists with stairs and deck before demolition of old footbridge; ramps to be added after demolition	No access through work-sites	Diversion routes identified and kept to minimum feasible length	Cycle access to properties on Tunnel Avenue restricted at times due to works	Access to businesses on Tunnel Avenue guaranteed through management of access points	Tunnel Avenue to be reopened, along with Boord street and Edmund Halley Way	None required
Rail users	Onward routes from North Greenwich station impacted (see pedestrians)	See mitigation for pedestrians	See pedestrians	Diversion routes identified and kept to minimum feasible length	See pedestrians	Diversion routes identified and kept to minimum feasible length	See pedestrians	Diversion routes identified and kept to minimum feasible length
Bus users	Two bus stops closed near Boord Street bridge (Tunnel Avenue and Dreadnought Street)	Temporary bus stops provided at suitable locations following review by TfL Bus Operations	Bus Stop MA at end of Boord Street on Millennium Way to be re-opened	None required	Construction works on Tunnel Avenue (access maintained), bus stop MV closed	Temporary bus stop provided at suitable location following review by TfL Bus Operations	Bus-only link (Blackwall Tunnel to North Greenwich bus station) opened; re-opening of Boord Street; re-opening of Edmund Halley Way	None required

Mode	Phase 1		Phase 2		Phase 3		Phase 4	
	Impact	**Proposed mitigation**	**Impact**	**Proposed mitigation**	**Impact**	**Proposed mitigation**	**Impact**	**Proposed mitigation**
Car users	Edmund Halley Way temporarily stopped up	Traffic re-routed via Millennium Way and West Parkside; new parking facilities/ alternative access arrangements provided for The O2/North Greenwich Station car park users	Southbound section of A102 to be closed and re-aligned	Traffic diverted along newly-constructed bridge to facilitate removal of existing central reserve	Northbound section of A102 closed; Tunnel Avenue closed at jct with Salutation Road - no local access	Traffic diverted to original southbound carriageway; Salutation Road access via Blackwall Lane; access further north direct from A102 and actively managed	Re-opening of Boord Street; re-opening of Edmund Halley Way	None required
HGVs	Boord Street closed except for access; Edmund Halley way temporarily stopped up	Traffic re-routed via Millennium Way	Southbound section of A102 to be closed	Traffic diverted along newly-constructed bridge to facilitate removal of existing central reserve	Northbound section of A102 closed; Tunnel Avenue closed at jct with Salutation Road - no local access	Traffic diverted to original southbound carriageway; Salutation Road access via Blackwall Lane; access further north direct from A102 and actively managed	Re-opening of Boord Street; re-opening of Edmund Halley Way	None required

6.6 Road network

Silvertown

6.6.1 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.

6.6.2 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/North Woolwich Road and appropriate kerbside restrictions to ensure that it remains clear of parked vehicles.

Greenwich

6.6.3 It is important for access to be retained along Millennium Way, as any closure would have a significant impact on the local network around the Greenwich works site.

6.6.4 The works site itself will require changes to parking arrangements at The O2. TfL are working with the Peninsula Masterplan developers to devise a joint O2 car parking replacement plan to enable their respective construction programmes. TfL are committed to providing, and maintaining access to, the full compliment of parking for The O2. 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.

6.6.5 There would be no impact on local access to Tunnel Avenue during the first two phases of construction aside from in the immediate vicinity of the Boord Street footbridge, and this would be managed in liaison with the affected businesses. During phase 3, access along Tunnel Avenue would be closed from the junction with Salutation Road to the entrance to the wharf adjacent to the northbound Blackwall Tunnel gatehouse. During this phase of construction works, access to sites along Tunnel Avenue would be from the A102 Blackwall Tunnel Approach itself and would need to be actively managed.

6.6.6 As indicated in the table above, at the start of phase 4 access through Tunnel Avenue in both directions would be established. There would no longer be direct access from Tunnel Avenue to the northbound A102 Blackwall Tunnel Approach with the exception of buses, which would have a bus-only link.

6.7 Public transport network

Silvertown

6.7.1 The Silvertown works site will not impact on the operation of DLR services or the EAL, and there are currently no scheduled bus services on the Tidal Basin Roundabout.

6.7.2 For the duration of the works, key PT access routes would 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 the West Silvertown DLR station and the employment sites around Dock Road would also remain open. The diversion route for Dock Road (which would be closed for the duration of the works) is described later in this chapter.

Greenwich

6.7.3 The Greenwich works will not impact on the operation of North Greenwich bus station, the Jubilee Line station, or the EAL. However, there will be some diversions to existing bus routes during the works as set out in Table 6-18.

6.7.4 In addition to the impact on buses, the closure of bus stop MV on Tunnel Avenue in phase 3 would also impact on some northbound commuter coaches from Kent that currently use the stop. To mitigate such impacts, TfL would seek alternative arrangements in partnership with coach operators wishing to continue stopping in the vicinity during the Silvertown Tunnel construction phases.

Table 6-18: Bus route impacts during Greenwich construction phases

Route 108 towards Stratford	• The closure of Edmund Halley Way means that the northbound 108 will need to be re-routed after it departs North Greenwich station – an obvious proposal would be to divert it along West Parkside and then John Harrison Way before re-joining its original alignment at Blackwall Lane – this would involve the northbound service operating along the same alignment as the southbound service on West Parkside, which may require additional destination signage/information at stops and on vehicles; • The access route to the northbound A102 Blackwall Tunnel Approach via Tunnel Avenue would 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 would be constructed – it is likely that northbound buses would be able to divert to this route at the beginning of phase 3, and this would be confirmed in the detailed programme of construction works; • Bus stop MV on Tunnel Avenue would be closed during phase 3 of the works, and an alternative facility would be provided if required following a review by TfL Bus Operations.
Route 108 towards Molesworth Street	• During phase 1, buses would not be able to exit the southbound A102 Blackwall Tunnel Approach at Boord Street, and would be diverted via the main slip road to reach Blackwall Lane; • From phase 2, buses would be able to exit the southbound A102 Blackwall Tunnel Approach at Boord Street, serving bus stops MA, MT and MN.
Route 188 towards Russell Square	• Similar diversion required to Stratford-bound 108 service highlighted above to accommodate closure of Edmund Halley Way – similar mitigation proposed.

6.8 River network

6.8.1 TfL is exploring the use of river vessels to transport construction materials and waste. While the exact configuration of the mooring has not been determined, a jetty has been proposed to enable the operation of HAV ships at Thames Wharf (provided and named after HAV shipping, a Norwegian limited holding company focused on short sea shipping).

6.8.2 Current indications are that spoil and materials could be carried by large barge or HAV ships. Large barges typically have a maximum capacity of approximately 1,000t but in this assessment were assumed to operate at

50% of capacity for safety reasons. HAV ships have a capacity of 2,000t and are not subject to the same safety considerations as barges and so, for the purpose of this assessment, they were assumed to operate on average at 75% of capacity.

6.8.3 There are a number of other planned or current construction-related river freight operations on the Thames. In determining the cumulative impact of river movements, the assessment methodology referred to the Thames Tideway Tunnel (TTT) TA, as 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.

6.8.4 Table 6-19 shows the estimated number of river transit movements passing the Thames Wharf site. The site furthest to the east in the TTT assessment is King Edward Memorial Park on the busy stretch of the River 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 the Limmo Peninsula, will have terminated prior to the start of the Silvertown Tunnel bore.

Table 6-19: Estimated daily and peak hourly river transit movements at Thames Wharf

	Daily
King Edward Memorial Park	185
(adjustment for services terminating at Greenwich)	-44
Estimated river transit movements at Thames Wharf	141

6.8.5 Assuming that 1000t barges are used at the Silvertown site and are on average loaded to 50% of their total capacity, the likely number of weekly river movements to and from Thames Wharf is expected to peak at approximately 24 during the period when both the cut-and-cover and bored tunnel sections are under construction and the highway works phase has commenced.

6.8.6 Using the same six day working week assumption applied to the lorry traffic forecasts, this would mean four barge movements to and from Thames Wharf per day. The table above indicates this would increase the number of river movements expected to pass Thames Wharf by around 3%.

6.8.7 The adoption of 2000t HAV ships loaded on average to 75% of their capacity would reduce weekly two-way movements to approximately eight, meaning a maximum of two on a peak day.

6.8.8 A Navigational Issues and Preliminary Risk Assessment (NIPRA) is currently being prepared in liaison with the PLA to assess the impacts of Silvertown Tunnel river usage on existing and future river traffic. This assessment is expected to be completed before the DCO application next year, and it is not anticipated that any significant issues will be identified with using the river to transport spoil and other materials from the Silvertown site.

6.9 Walking network and route diversion options

Silvertown

6.9.1 Pedestrian routes around the Tidal Basin Roundabout would 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 would 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

6.9.2 Pedestrians would still be able to use Millennium Way via its temporary diversion throughout the entire works.

6.9.3 Although the existing Boord Street bridge would be demolished as part of the works, a bridge would be maintained at or adjacent to this location for the duration of the construction works in the form of the permanent replacement. This construction would take place from month 24 with the works for the ramps due to be finished by month 29. This means that while a bridge would be provided continuously throughout the construction programme, there would be a relatively short period of approximately four weeks when no ramp access to the bridge would be available.

6.9.4 The pedestrian route along the Thames Path would be unaffected by the works. During phase 3, pedestrian access to properties on the closed section of Tunnel Avenue may be restricted at times, and engagement with the affected businesses would be required to ensure business continuity.

6.10 Cycling network and route diversion options

Silvertown

6.10.1 The off-street cycle route linking the Lower Lea Crossing and Tidal Basin Road around the south of roundabout would 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 would be closed. The alternative cycle access routes are via the Silvertown Way and North Woolwich Road, or alternatively via Tidal Basin Road, Royal Victoria Dock and through a shared-path passage under Silvertown Way.

Greenwich

6.10.2 Although the existing Boord Street bridge, which is used by cyclists, would be demolished as part of the works, a bridge would be maintained at or adjacent to this location for the duration of the construction works in the form of the permanent replacement. There would be a relatively short period of approximately four weeks when no ramp access to the bridge would be available.

6.10.3 The cycle route along the Thames Path would be unaffected by the works. During phase 3, cycle access to properties on the closed section of Tunnel Avenue would be restricted at times although access to businesses should be guaranteed through the management of access points.

6.11 Construction mitigation

6.11.1 The assessment of construction impacts has highlighted a number of potentially adverse impacts, as follows:

- environmental impacts of the construction activities;
- construction traffic-related impacts;
- business and surface access at Dock Road;
- business and surface access on the Greenwich Peninsula; and
- travel to work for construction staff and contractors to work sites.

6.11.2 This section addresses the measures that will be appropriate to mitigate the impacts identified.

6.11.3 The DCO would include a requirement for Construction Environmental Management Plans (CEMPs) to be submitted to and approved by the local planning authority before works commence at the northern and southern portals. The CEMPs will address mitigation of a variety of environmental impacts of the construction activities, including construction traffic-related impacts.

6.11.4 It is TfL’s intention that excavated spoil and materials should be transported by river wherever possible, and the use of a safeguarded wharf is available for this purpose. However, the use of river barges cannot be guaranteed until a full exploration of the use of river vessels has been undertaken. The worst case scenario therefore requires lorry route mapping to facilitate the arrival of a total of around 226,800 one-way lorry movements over the four year construction period (see Table 6-3). This would necessitate suitable mitigation measures to minimise adverse impacts on the surrounding residential and business communities.

6.11.5 The CEMPs will 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.

6.11.6 Measures to ensure continuation of access for premises along Dock Road in Silvertown would include:

- Requirements for complementary measures 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 Royal Victoria Dock).

6.11.7 Measures to ensure continuation of access on the Greenwich Peninsula would include:

- Preparation of a strategy to manage the impact of the works site on events parking and access at The O2, North Greenwich Station and other local businesses and organisations;
- Signage of alternative pedestrian and cycle access routes around the works sites (Millennium Way and Boord Street bridge); and
- Active management of access arrangements to Tunnel Avenue during the construction phase where access will be restricted.

6.11.8 The DCO would also include a requirement for Travel Plans for each works site to be submitted to and approved by the local planning authority before works commence. While materials and equipment would be delivered to site using goods vehicles and river vessels, both sites are easily accessible by PT and TfL would seek suitable mode share targets for workforce travel by sustainable modes. The success of the London 2012 Olympic Park Construction Travel Plan highlights what can be achieved through early planning and setting rigorous targets.

6.12 Key points

S.8.2 The indicative construction programme for the Scheme is around four years, and the programme would require the establishment of a works site around each proposed tunnel portal location.

6.12.1 The Silvertown works site is likely to be the main works site as it would minimise the impact on current land uses and maximise the potential use of river transport, as the construction of the Silvertown Tunnel would require the transport of a large volume of excavated material. River transport of spoil and other materials and goods could therefore be used to minimise the number of HGV movements on the road network, and it is estimated that spoil removal by barge could remove over 178,000 two-way lorry movements from the road network over the four year construction period.

6.12.2 The tunnel works sites at Greenwich and Silvertown would lead to some localised impacts i.e. access to residences and businesses in the immediate area. A range of mitigation measures have been identified as a result, including temporary diversions for vehicular traffic, pedestrians and cyclists.

6.12.3 In general, the impacts on the surrounding networks for all transport modes would be relatively small for a scheme of this size as the construction sites would be conveniently located in relation to river and main road access.

7 TRANSPORT IMPACTS OF THE PROPOSED SCHEME

7.1 Overview

7.1.1 This chapter describes the transport-related impacts of the Scheme on all modes of transport, with specific reference to the Assessed Case scenario presented in Chapter 1. Where appropriate, consideration is also given to the Reference Case (without Scheme scenario) for the purpose of providing a comparison.

7.1.2 As with the base year and the future year Reference Cases, the assessment of road network impacts covers three key weekday time periods, as follows:

- AM peak hour (08:00-09:00);
- Inter-peak (IP) average hour (between 10:00 and 16:00);
- PM peak hour (17:00-18:00).

7.1.3 The focus of the analysis is on the modelled opening year of 2021, and a summary of forecast changes in 2031 and 2041 is also included.

7.2 Road network

7.2.1 This section describes the road network impacts associated with the Assessed Case scheme proposal, and is broken down into the following key sub-sections:

- Trip distribution and vehicle routeing;
- Crossing performance;
- Impact on the timing of journeys;
- Resilience and incident management;
- Journey times:
- Total trips and mode shift;
- Overall road network performance;
- Road safety; and
- Wider area highway mitigation.

7.2.2 The most pronounced impacts of the Scheme generally occur at the site of the Scheme itself (i.e. the Blackwall and Silvertown Tunnels and their approach roads). It follows that where there are impacts at the site of the Scheme, that these are set out first followed by a discussion of the impacts on the wider road network. For some aspects the Scheme impacts are reported on a network wide basis.

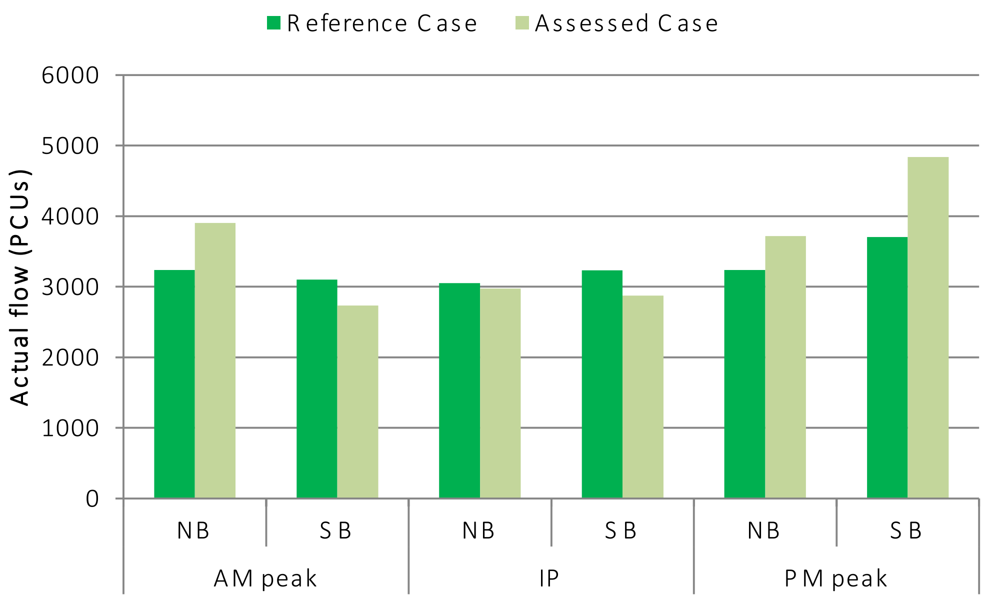
7.2.3 Consideration has also been given to the road network impacts of the Scheme in the 2031 and 2041 future years, and in a scenario with no traffic growth (the Assessed Case road network with 2012 demand). A brief overview of these assessments is included at the end of this section.

Trip distribution and vehicle routeing

7.2.4 The Scheme is expected to lead to some changes in the distribution of trips across the road network. This reflects the impact of people changing their behaviour in response to changes in connectivity, journey times, and financial costs.

7.2.5 The most significant change in trips is expected at the Blackwall and Silvertown Tunnels. Figure shows the expected change between the actual traffic volumes through the Blackwall Tunnel in the 2021 Reference Case and the combined traffic volumes through the Blackwall and Silvertown Tunnels in the Assessed Case, for the three modelled time periods.

Figure 7-1: Blackwall Tunnel only Reference Case actual flows vs combined Blackwall and Silvertown Tunnels Assessed Case (PCUs)



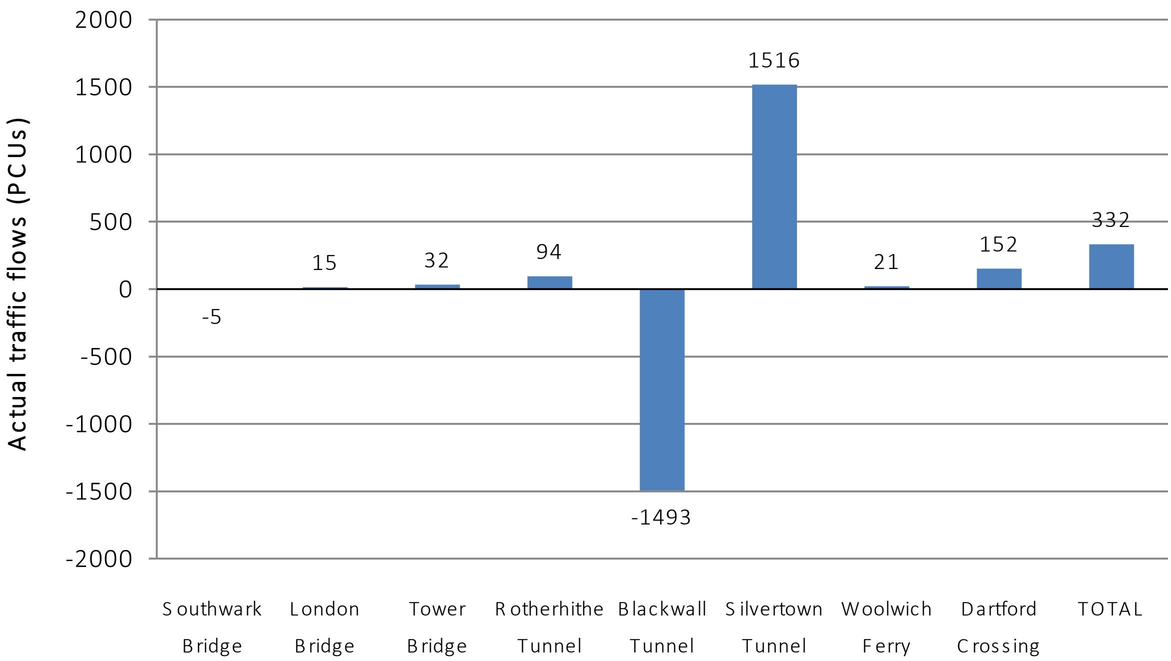
7.2.6 Figure 7-1 shows that actual combined flows at the Blackwall and Silvertown Tunnels are expected to increase relative to flows at the Blackwall Tunnel in the Reference Case in some directions/periods, and reduce in others.

7.2.7 The biggest increase in actual flows is forecast in the southbound direction in the PM peak, with increases also forecast in the northbound direction of the AM peak and PM peak. Smaller reductions in actual flow are forecast in the southbound direction of the AM peak and in both directions in the IP, which covers a much longer period of the day.

7.2.8 While the increase in actual flows at the busiest times (northbound direction in the AM peak and southbound direction in the PM peak) is made possible by the additional crossing capacity provided by the Silvertown Tunnel, it is important these changes in traffic volumes are considered in the context of no overall increase in future demand to use the Blackwall and Silvertown Tunnels (set out in the following section) and trips using other crossings. The following figures present these changes in the context of all east London river crossings for all three modelled time periods.

7.2.9 Figure 7-2 shows the change in actual cross-river traffic flows at all east London crossings with the Scheme in the AM peak hour in 2021, for both directions combined. While there are significant changes at the Blackwall and Silvertown Tunnels, the forecast increase in flow at Silvertown of around 1,520 PCUs is almost matched by the reduction in flow at Blackwall of around 1,490 PCUs, with the net increase of 30 PCUs considered negligible. At other crossings changes are small, with the increases in flow of around 90 PCUs at Rotherhithe and 150 PCUs at Dartford occurring in the southbound direction where there is spare capacity. The overall change in total flow across all crossings of around 330 PCUs represents an increase of around 1%.

Figure 7-2: Cross-river actual traffic flows (PCUs) in the AM peak hour, 2021 (Assessed Case and Reference Case)

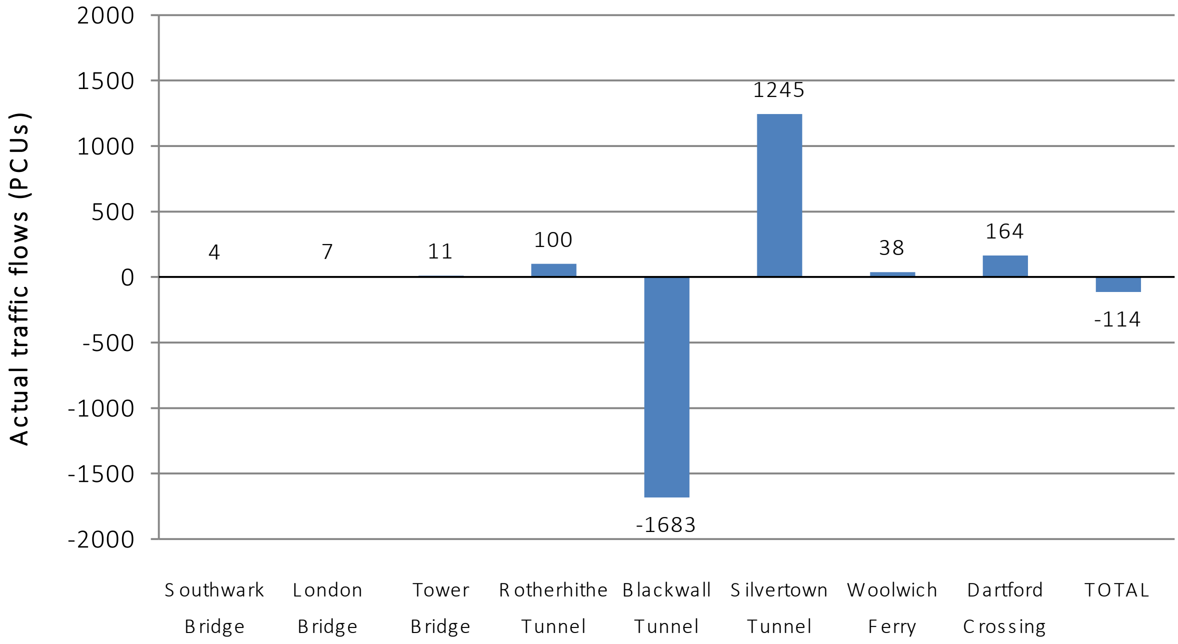


7.2.10 Figure 7-4 shows the change in actual cross-river traffic flows at all east London crossings in 2021 with the Scheme in the PM peak hour, for both directions combined. In this period, the forecast reduction in flow at Blackwall is still significant (at around 830 PCUs) but the increase in flow at Silvertown is around three times more at 2,500 PCUs. The net increase in flow at these crossings combined is therefore around 1,600 PCUs in this period, of which the majority is due to the release of traffic that would formerly have been queueing to use the Blackwall Tunnel in this period (as explained more fully below).

7.2.11 Small, and in most cases negligible, reductions can be seen at all other crossings, with Dartford seeing the most significant reduction of almost 300 PCUs (around 2% of total flow in this period), which is likely to be a result of re-routeing to the Blackwall and Silvertown Tunnels due to the reduction in delay at these crossings. The overall change in total flow across all crossings of around 1,200 PCUs represents an increase of around 5% in this period.

7.2.12 Figure 7-3 shows the change in actual cross-river traffic flows at all east London crossings in 2021 with the Scheme in an average IP hour, for both directions combined. It can be seen that for this period the forecast reduction in flow at Blackwall of around 1,680 PCUs is greater than the increased flow at Silvertown of around 1,250 PCUs, resulting in a net reduction of around 440 PCUs at these crossings overall. Changes at other crossings are minimal, with the small increase in flows at Rotherhithe, Woolwich and Dartford occurring at a time when these crossings are operating with spare capacity. The overall reduction in total flow across all crossings is around 110 PCUs, and as this is for the average IP hour it can be assumed that this represents the situation for much of the day.

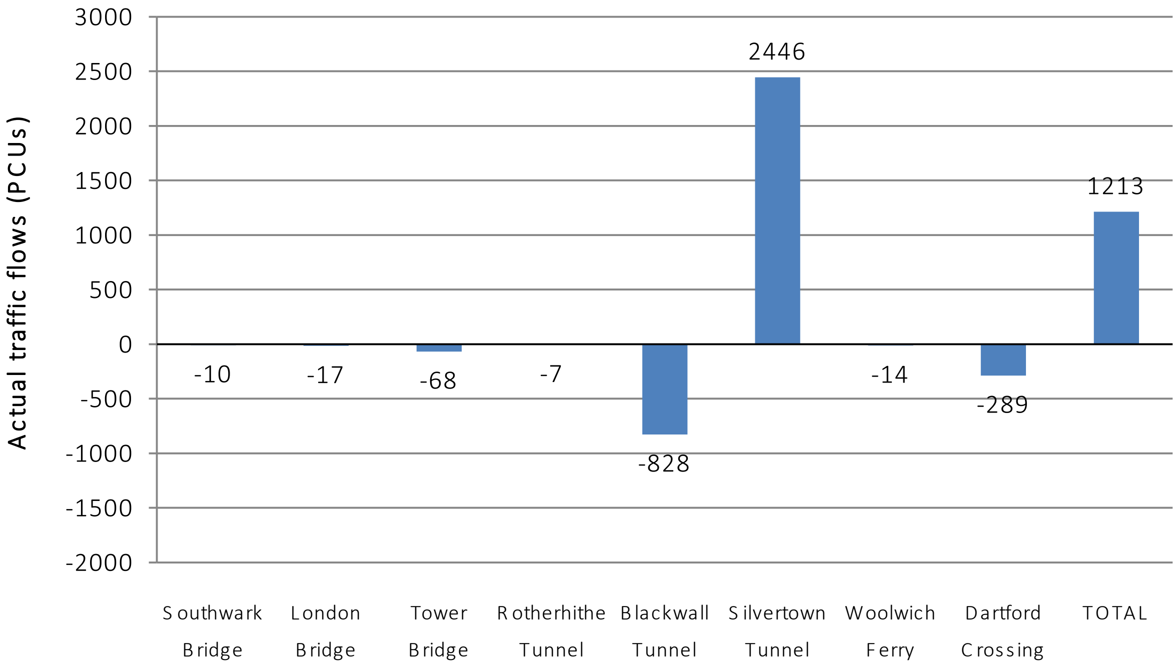
Figure 7-3: Cross-river actual traffic flows (PCUs) in the IP average hour, 2021 (Assessed Case and Reference Case)



7.2.13 Figure 7-4 shows the change in actual cross-river traffic flows at all east London crossings in 2021 with the Scheme in the PM peak hour, for both directions combined. In this period, the forecast reduction in flow at Blackwall is still significant (at around 830 PCUs) but the increase in flow at Silvertown is around three times more at 2,500 PCUs. The net increase in flow at these crossings combined is therefore around 1,600 PCUs in this period, of which the majority is due to the release of traffic that would formerly have been queueing to use the Blackwall Tunnel in this period (as explained more fully below).

7.2.14 Small, and in most cases negligible, reductions can be seen at all other crossings, with Dartford seeing the most significant reduction of almost 300 PCUs (around 2% of total flow in this period), which is likely to be a result of re-routeing to the Blackwall and Silvertown Tunnels due to the reduction in delay at these crossings. The overall change in total flow across all crossings of around 1,200 PCUs represents an increase of around 5% in this period.

Figure 7-4: Cross-river actual traffic flows (PCUs) in the PM peak hour, 2021 (Assessed Case and Reference Case)



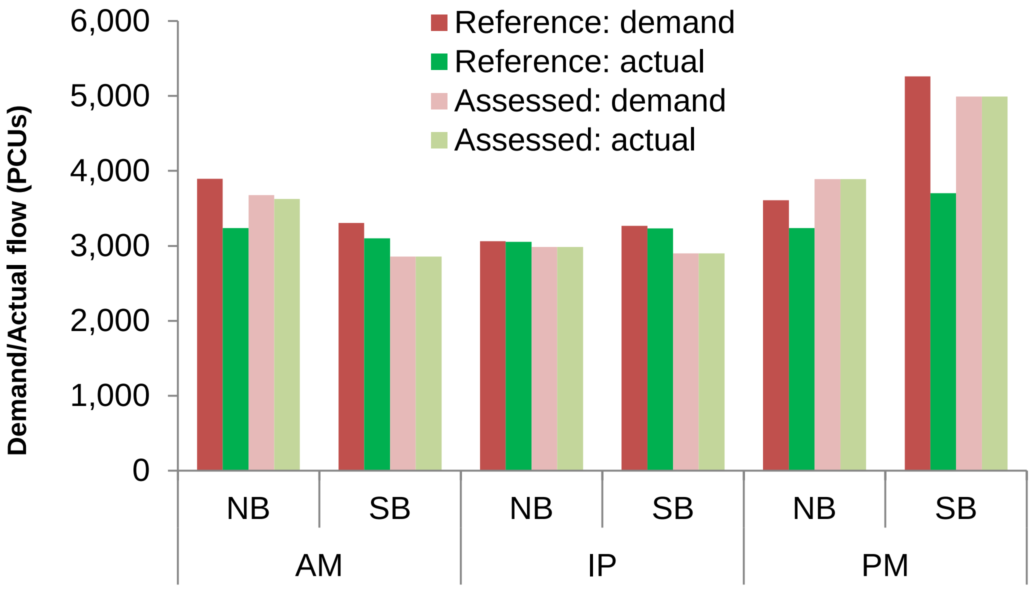
7.2.15 For all three time periods, the figures above show that by far the most significant changes in actual flows are forecast at the Blackwall and Silvertown Tunnels in the Assessed Case. Relative to the total number of cross-river highway trips in east London, which reaches a maximum of over 27,000 PCU trips (both directions) in the southbound Assessed Case, the changes in actual flows at other crossings are minimal as a result of the Scheme.

Crossing performance

7.2.16 As well as traffic flows at other crossings, a further important consideration when looking at the changes in actual traffic volume at the Blackwall and Silvertown Tunnels is future demand to use these crossings. The difference between demand and actual flow represents the traffic that could not be assigned to the network in the modelled hour as a result of a capacity constraint; the higher the difference, the higher the delay.

7.2.17 A clear indication of the fundamental effects of the Scheme can be seen when comparing the level of demand traffic flow across the Blackwall Tunnel (in the 2021 Reference Case) with the combined demand Blackwall and Silvertown tunnels (in the 2021 Assessed Case). This adds useful further insight to the comparison of actual flows presented in Figure 7-1, and is summarised below in Figure .

Figure 7-5: Blackwall Tunnel only Reference Case actual and demand flows vs Combined Blackwall and Silvertown Tunnels Assessed Case flows (PCUs)



7.2.18 The data shows that the combined actual traffic flow through the Blackwall and Silvertown Tunnels in the Assessed Case exceeds the flow that can be accommodated through the Blackwall Tunnel in the Reference Case for the busiest movements (northbound in the AM peak and particularly southbound in the PM peak).

7.2.19 However, it is also notable that the total demand for these movements is actually lower in both cases with the Scheme than it was in the Reference Case. This demonstrates the potential for the Scheme to increase the throughput of traffic in this area without causing overall increases in traffic, through a combination of new capacity and demand management.

7.2.20 At most other times of day, including the IP which covers the longest period of the day, there are modest reductions in demand and actual flow compared to the Reference Case. This reflects the influence of the user charge in conditions which are (relatively) free-flowing in the Reference Case.

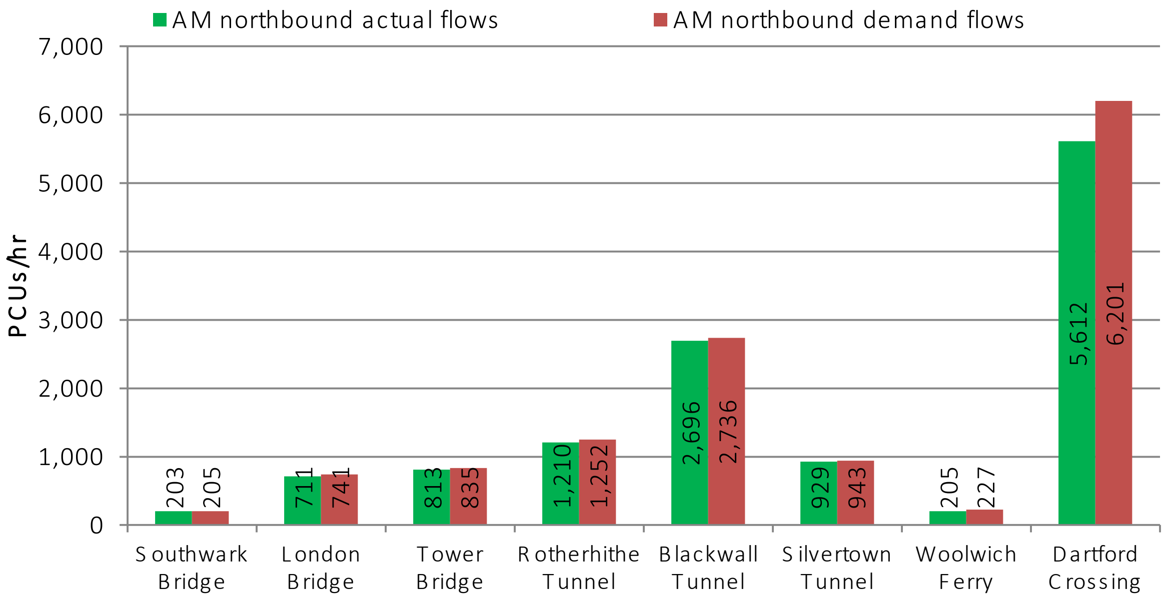
7.2.21 There is an increase in demand over the Reference Case in one situation – in the northbound direction during the PM peak. This reflects the fact that while this movement is charged at an ‘off-peak’ rate, in the Reference Case it experiences a degree of congestion which approaches that seen in the busiest movements.

7.2.22 Again, the level of actual flow is equal to the level of demand for all movements (except for the northbound AM peak movement, where demand is very marginally higher than actual flow). This indicates that the Scheme would effectively eliminate delay on the approach to the tunnels.

7.2.23 While the Scheme is expected to have a significant impact on demand flow relative to actual flow at the Blackwall Tunnel, the impact on other crossings is expected to be minimal. The following figures present the changes in demand flow relative to actual flow for all east London river crossings in the peak periods.

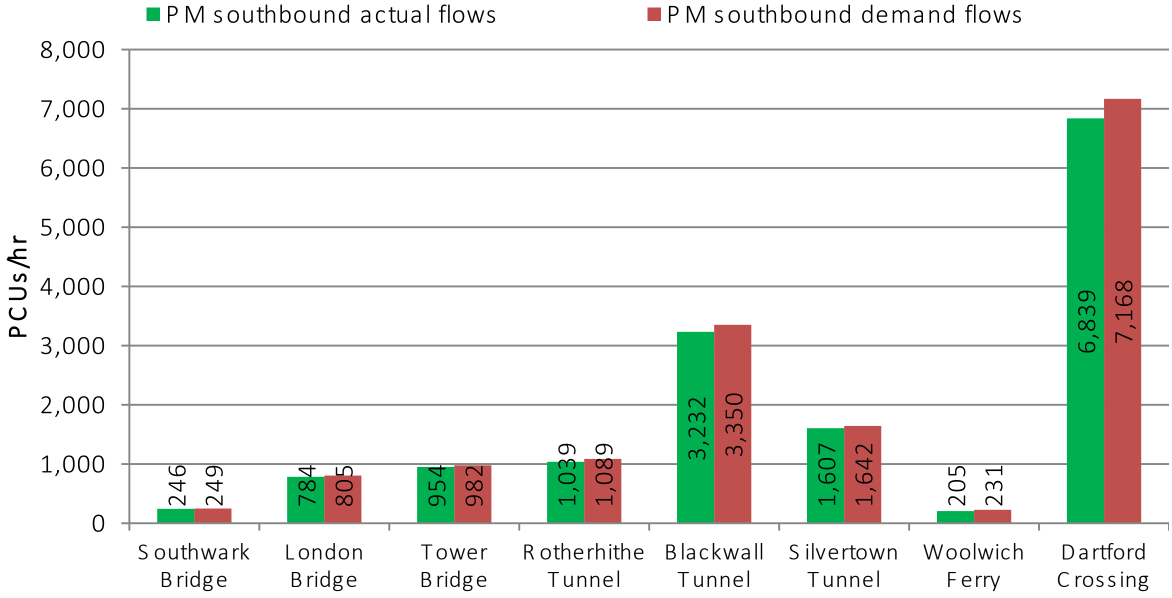
7.2.24 Figure 7-6 illustrates the difference between demand and actual flow for northbound river crossings in the AM peak hour in the 2021 Assessed Case. The difference in demand flow relative to actual flow at all other crossings is negligible, with the exception of the Dartford Crossing. At Dartford, demand flow is already around 9% higher than actual flow in the Reference Case and this is forecast to rise very marginally to around 10% in the Assessed Case.

Figure 7-6: 2021 AM Assessed Case Actual vs Demand Flow for East London River Crossings (PCUs)



7.2.25 **Error! Reference source not found.** shows the same data for southbound flows in the PM peak hour in the 2021 Assessed Case. The difference in demand flow relative to actual flow at all other crossings is again negligible, with the exception of the Dartford Crossing. At Dartford, demand flow is around 5% higher than actual flow and this is not expected to change in the Assessed Case.

Figure 7-7: 2021 PM Assessed Case Actual vs Demand Flow for East London River Crossings (PCUs)



7.2.26 Further details on the impact of the Scheme on the two adjacent river crossings are provided in Appendix E.

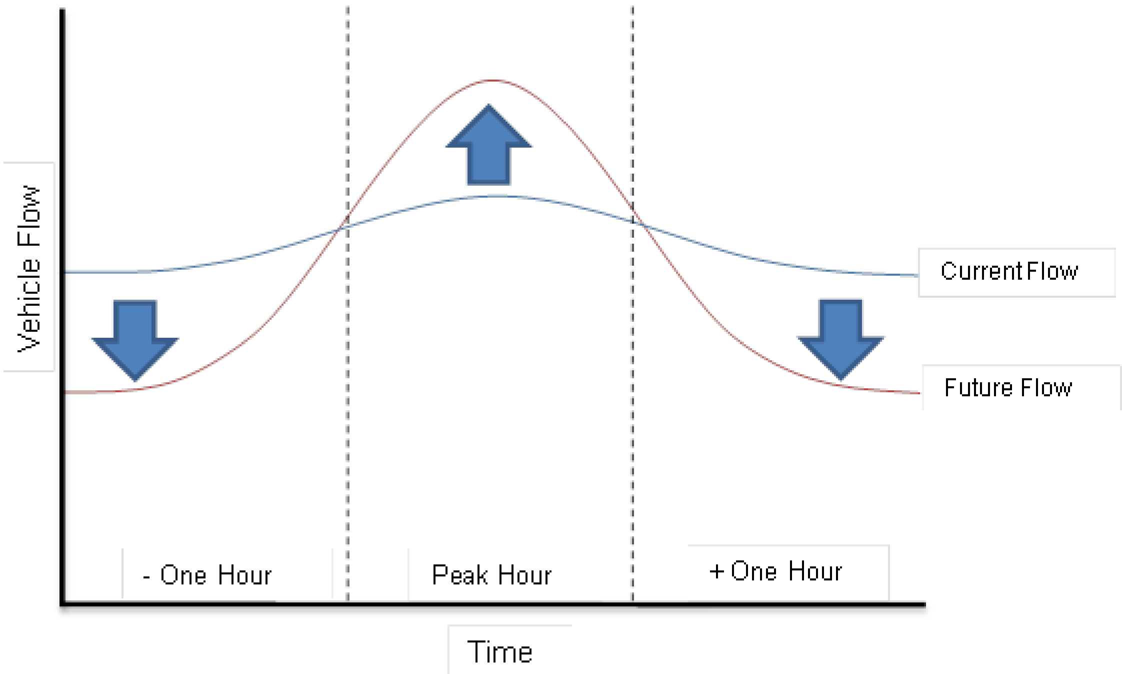
Impact on the timing of journeys (peak contraction)

7.2.27 The analysis described above focusses on modelled peak hours, which is the standard assessment time period for a SATURN model run and represents the so called ‘peak of the peak’.

7.2.28 Across London as a whole there are pronounced peaks in highway trips in the morning (between 07:00 and 10:00) and afternoon (between 16:00 and 19:00). However, at present, and as indicated in Chapter 3, the weekday peaks at the Blackwall Tunnel are spread over a much longer period, with traffic starting to build noticeably earlier as motorists seek to avoid the extremes in congestion that affect the northbound bore from around 06:00, with conditions that remain close to peak levels for much of the day. Also, in the afternoon traffic flows recede later than the London average, and in the southbound direction are still at over 80% of the peak level at 19:00.

7.2.29 Figure 7-8 illustrates how the character of the peaks could change at the Blackwall Tunnel as a result of the Silvertown Tunnel scheme. While traffic flows could be expected to increase in the peak hour, flows in the hours either side of the peak hour could be expected to fall.

Figure 7-8: Illustration showing how traffic flows could change at the Blackwall Tunnel in peak periods



7.2.30 It is important to understand that the changes in actual traffic flow forecast by the model in the vicinity of the Blackwall Tunnel itself therefore reflect a reduction in the duration of the peaks, as a result of the additional throughput capacity and reduced congestion that the scheme would deliver. The forecast changes in traffic flows in the peak periods are inclusive of changes that motorists may make to the timing of their journeys.

7.2.31 With the Silvertown Tunnel scheme therefore, the distribution of trips across peak periods through the Blackwall/Silvertown Tunnel corridor overall would come more into line with other major routes in London, and in future motorists would no longer have to allow the same amount of extra time to use the corridor in busy times. Effectively the Scheme would enable more motorists to travel at the times they wish, rather than earlier or later to avoid the worst of the traffic (provided they are prepared to pay the relevant user charge).

Resilience and incident management

7.2.32 As outlined in Chapter 4 and more fully in Appendix D, the cross-river highway network in east London suffers from poor reliability and resilience.

This is in a large part due to the relative scarcity of existing river crossings, their high level of demand and their susceptibility to incidents and closures.

7.2.33 Through reducing delay and congestion, the Silvertown Tunnel scheme would significantly improve the day-to-day reliability of the network particularly for users of the Blackwall and Silvertown Tunnels. The resilience of the network will be considerably improved in two main ways.

7.2.34 Firstly, the Scheme would reduce the number of over-height vehicle incidents at the Blackwall Tunnel, which currently account for a significant proportion of all incidents and closures. By providing an adjacent alternative route with full dimensional clearance, supported by a signage strategy to direct over-height vehicles to use the Silvertown Tunnel, it is anticipated that over-height vehicle incidents at the Blackwall Tunnel could be reduced by around 80%. While the operational strategy for both Tunnels would be confirmed closer to the time of opening, the Scheme presents the opportunity for all HGVs to be routed via the Silvertown Tunnel as a means of preventing any future over-height vehicles at the Blackwall Tunnel should this be deemed necessary. Further work is underway to examine potential routeing strategies for HGVs and the impacts these strategies could have on the highway network. It is planned that more information on this will be included within the next iteration of this TA.

7.2.35 Secondly, the Silvertown Tunnel would provide the ability to quickly divert vehicles to an adjacent, high capacity crossing in the event of incidents and closures at the Blackwall Tunnel. The diversion via the Silvertown Tunnel compares favourably with the current alternative of much lengthier diversions to other crossings that are already operating at or close to capacity, causing considerably additional delay to users of the road network.

7.2.36 In addition to these day-to-day benefits, the scheme will enable improved asset management when compared to current arrangements thereby potentially reducing the resultant effects on traffic. The Scheme would also significantly enhance the resilience of the network in the event of a long-term closure of the Blackwall Tunnel that could, for instance, be caused by a major incident.

7.2.37 Further detail on the benefits that the Scheme could have on reliability and resilience can be found in Appendix D.

Journey times

7.2.38 By reducing congestion and delay in the vicinity of the Blackwall and Silvertown Tunnels, the Scheme would result in reduced journey times for users. Average speeds would significantly increase on the route between the

A205 South Circular and the A12 at Hackney Wick as shown in Figure 4-7, as delay on this corridor would be virtually eliminated. It is important to note that these changes to average speeds would largely reflect the reduction in queuing with the Scheme, rather than increases in top speeds or the average speeds of uncongested traffic.

7.2.39 All users of the Blackwall and Silvertown Tunnels would experience shorter journey times to cross the River Thames as a result of the Scheme, with journey time savings on the immediate approaches to the tunnel of up to 20 minutes in peak periods. This excludes any journey time benefits the Scheme would provide through improved reliability, and essentially reflects the savings during ‘incident free’ periods.

7.2.40 Figure 7-9 and Figure 7-10 show the forecast cumulative time profile of traffic on the route between the A205 South Circular and the A12, in both directions for the peak periods, in the Assessed Case. From these, it can be seen that the Scheme results in a significant reduction in average journey times along this route. In both directions the average journey time reduces significantly from the observed average journey time used for the base case (November 2012), and journey time with the Scheme is much closer to the speed limit journey time (i.e. free-flowing conditions). This is particularly the case in the northbound direction in the AM peak.

Figure 7-9: Assessed Case average weekday AM peak cumulative journey time northbound v observed (Nov 2012) and unconstrained (speed limit) JT

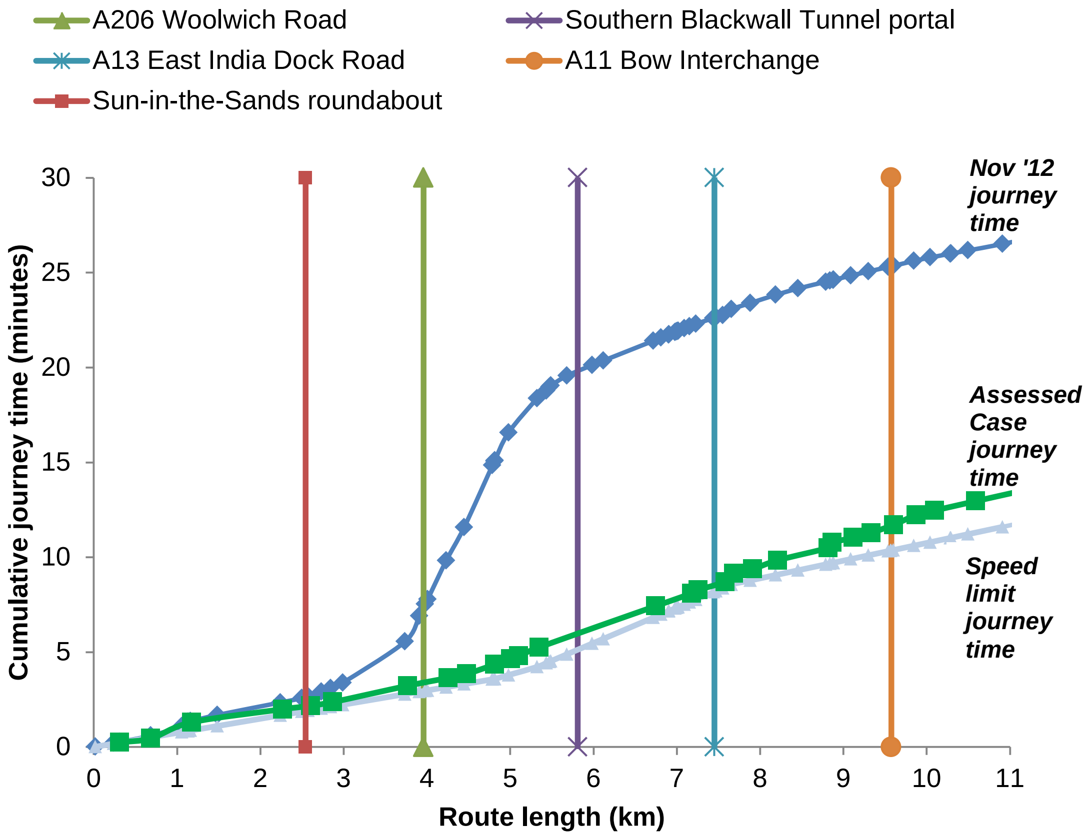
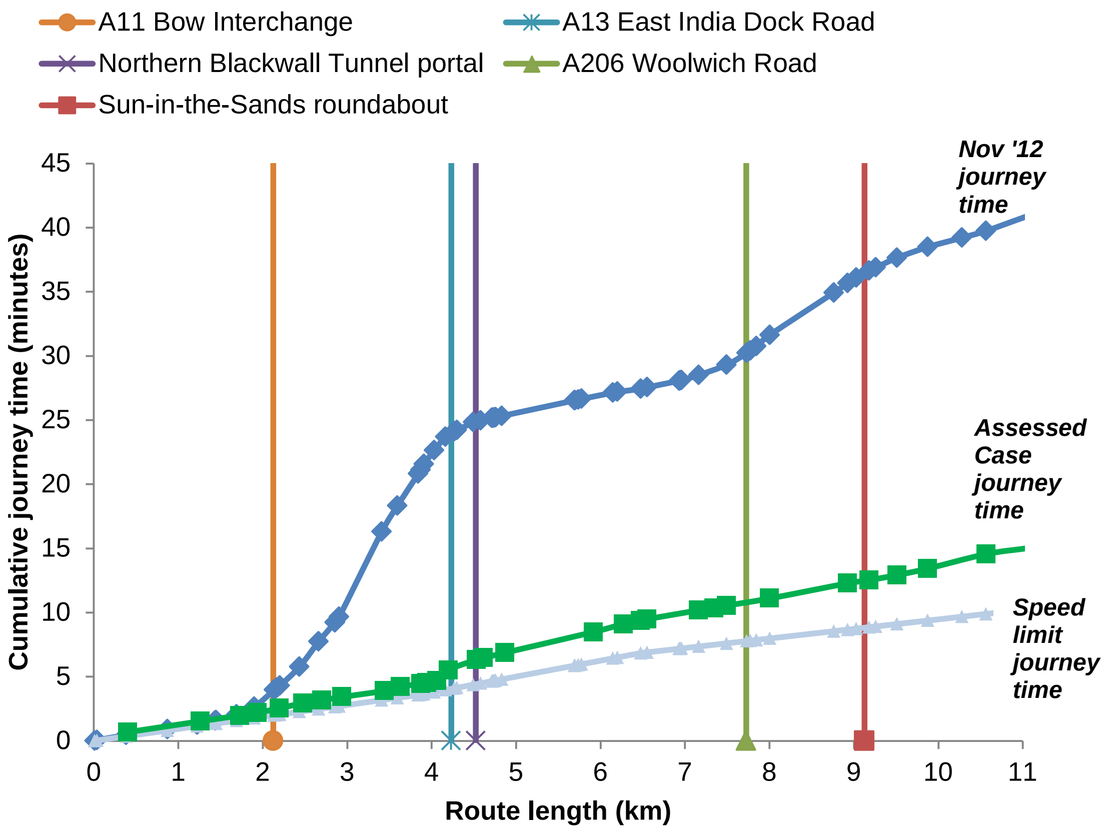


Figure 7-10: Assessed Case average weekday PM peak cumulative journey time southbound v observed (Nov 2012) and unconstrained (speed limit) JT



7.2.41

7.2.42 Table 7-1 shows the modelled change in journey times for a selection of cross-river routes in 2021 with the Silvertown Tunnel scheme in place. The biggest impact in the AM peak is in the northbound direction where the Scheme results in the elimination of most of the queues on the A102 Blackwall Tunnel Approach. While trips to all destinations would benefit from this, trips to the Royal Docks area would additionally benefit from the availability of a more direct route.

Table 7-1: Journey time savings (mins) with Silvertown Tunnel (AM peak hour, 2021)

Northbound	**To Stratford**	**To Royal Docks**	**To Canary Wharf**
Lewisham	-12	-16	-9
Charlton	-12	-17	-15
Eltham	-12	-17	-15
Southbound	**To Lewisham**	**To Eltham**	**To Charlton**
Stratford	-1	-1	-1
Royal Docks	-6	-5	-5

Canary Wharf	2	-2	-2

7.2.43 Journey time savings for the southbound direction in the AM peak are less pronounced, as delay to use the Blackwall Tunnel are lower during this time, but the reduced journey times from the Royal Docks area in particular are still significant.

7.2.44 These improvements have wider impacts on road connectivity in east and south-east London as a whole, as discussed later in this chapter.

Total trips made and mode share

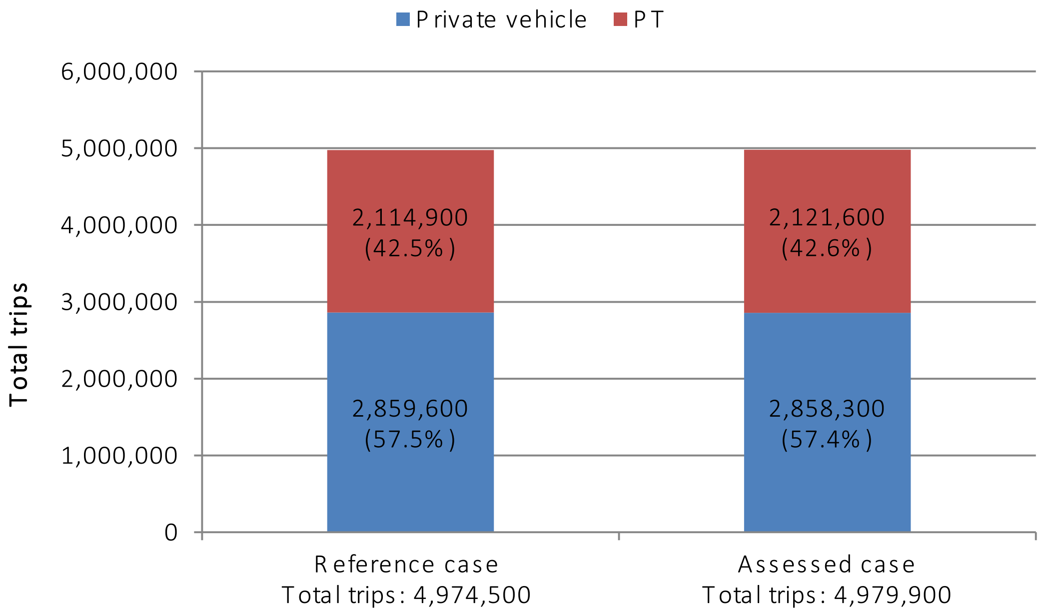
7.2.45 The impacts of the Assessed Case with regard to total trips made and mode shift should be considered within the context of an overall forecast growth in travel expected between now and 2021 (as described in Chapter 0), and a shift in travel behaviour from private car to PT.

7.2.46 At the overall level, the Scheme is not expected to generate any significant additional demand for cross-river highway trips. Responses to previous public consultations on the Scheme have revealed a concern over ‘induced traffic’ as a result of the Scheme’s implementation. Induced traffic relates to the effect where increasing supply in itself causes increased demand. In a transport context this includes the generation of additional traffic as a result of the provision of new road capacity, often to the point that congestion builds up to previous levels. In the Silvertown Tunnel scheme, the user charging element is designed to offset the ‘induced traffic’ effect.

7.2.47 The forecasts set out in this chapter are derived from the LoRDM model, which accounts for both the improved journey times resulting from increased capacity (and therefore the increased attractiveness of the tunnel) and the cost of the user charge (which reduces the attractiveness of the tunnel). This means that the potential for and scale of any induced traffic is taken account of in the forecasts presented here, and overall induced traffic is not an issue for this Scheme as a result of the user charge which locks in the benefit of the additional highway capacity for the long-term. The topic of induced traffic is covered in more detail in Appendix B.

7.2.48 As described more fully in Chapter 5, there is forecast to be a very significant increase in PT trips between 2012 and 2021, and a smaller but still significant increase in total private vehicle trips. By contrast, the impact of the Scheme on overall trip volumes (both for PT and for private vehicle trips) is extremely small, and its impact on mode shares across the ESR should be considered negligible. This is illustrated in Figure 7-11 below.

Figure 7-11: Total trips by mode in ESR, 2021 Reference Case and Assessed Case (0700-1900)



7.2.49 The figure shows that across the ESR, the total number of trips made with the Scheme in place would change very marginally. Private vehicle trips would reduce by around 1,300, while trips made by PT would increase by 6,700 trips (as a result of the improvements to the bus network that would be made possible by the Scheme, set out later in this chapter). Overall therefore, around 5,400 additional trips would be made in the Assessed Case over the course of a 12-hour day, and all growth can be attributed to new PT trips.

7.2.50 The same broad pattern of a marginal decrease in the number of private vehicle trips and marginal increase in PT trips can be seen in all three modelled time periods, both within the three boroughs of Greenwich, Newham and Tower Hamlets and for the ESR as a whole. This is evident in the tables below.

7.2.51 Table 7-2 shows the number of AM peak hour trips originating in Greenwich, Newham and Tower Hamlets by mode, with and without the Scheme. It shows that across the three boroughs, and the wider ESR, the total number of trips by private transport is forecast to reduce in the Assessed Case while the total number of PT trips is forecast to increase.

Table 7-2: AM peak hour person trips with an origin in Greenwich, Newham and Tower Hamlets

	2021 Reference Case trips (mode share %)		2021 Assessed Case trips (mode share %)	
Borough	**Private vehicle**	**PT**	**Private vehicle**	**PT**
Greenwich	27,700	25,400	27,669	25,522
	(52%)	(48%)	(52%)	(48%)
Newham	21,900	34,100	21,822	34,290
	(39%)	(61%)	(39%)	(61%)
Tower Hamlets	17,600	32,200	17,608	32,203
	(35%)	(65%)	(35%)	(65%)
Sub-total	67,200	91,700	**67,099**	**92,015**
	(42%)	(58%)	**(42%)**	**(58%)**
ESR	226,300	230,000	**226,169**	**230,482**
	(50%)	(50%)	**(50%)**	**(51%)**

7.2.52 Table 7-3 provides the same information for the average IP hour. As for the AM peak, the number of trips by private vehicles reduces very marginally while the number of PT trips increases within all three boroughs and the wider ESR.

Table 7-3: IP person trips with an origin in Greenwich, Newham and Tower Hamlets

	2021 Reference Case trips (mode share %)		2021 Assessed Case trips (mode share %)	
Borough	**Private vehicle**	**PT**	**Private vehicle**	**PT**
Greenwich	31,900	15,200	31,800	15,300
	(68%)	(32%)	(68%)	(33%)
Newham	28,300	23,600	28,300	23,900
	(55%)	(46%)	(54%)	(46%)
Tower Hamlets	22,100	25,900	22,100	26,600
	(46%)	(54%)	(46%)	(44%)
Sub-total	82,300	64,700	**82,200**	**65,200**
	(56%)	(44%)	**(56%)**	**(44%)**
ESR	262,100	142,900	**262,000**	**144,000**
	(65%)	(35%)	**(65%)**	**(35%)**

7.2.53

7.2.54 Table 7-4 provides the same information for the average PM peak hour. Again, the number of trips made by PT increases slightly while the number of trips by private vehicles is largely unchanged.

Table 7-4: PM peak person trips with an origin in Greenwich, Newham and Tower Hamlets

	2021 Reference Case trips (mode share %)		2021 Assessed Case trips (mode share %)	
Borough	**Private vehicle**	**PT**	**Private vehicle**	**PT**
Greenwich	25,800	16,400	25,700	16,600
	(61%)	(39%)	(61%)	(39%)
Newham	19,900	30,200	19,900	30,500
	(40%)	(60%)	(40%)	(61%)
Tower Hamlets	18,700	57,400	18,800	57,400
	(25%)	(75%)	(25%)	(75%)
Sub-total	64,400	103,900	**64,400**	**104,500**
	(38%)	(62%)	**(38%)**	**(62%)**
ESR	202,700	189,100	**202,600**	**189,700**
	(52%)	(48%)	**(52%)**	**(48%)**

7.2.55 With the Scheme in place therefore, the total number of trips made by private vehicles would decrease while the total number of trips made by PT would increase, albeit the changes at the overall ESR level would be minimal. This applies both across the day and for all three modelled time periods. The marginally higher PT mode share in the Assessed Case is a result of the improvements to the bus network that would be made possible by the Scheme (discussed later in this chapter).

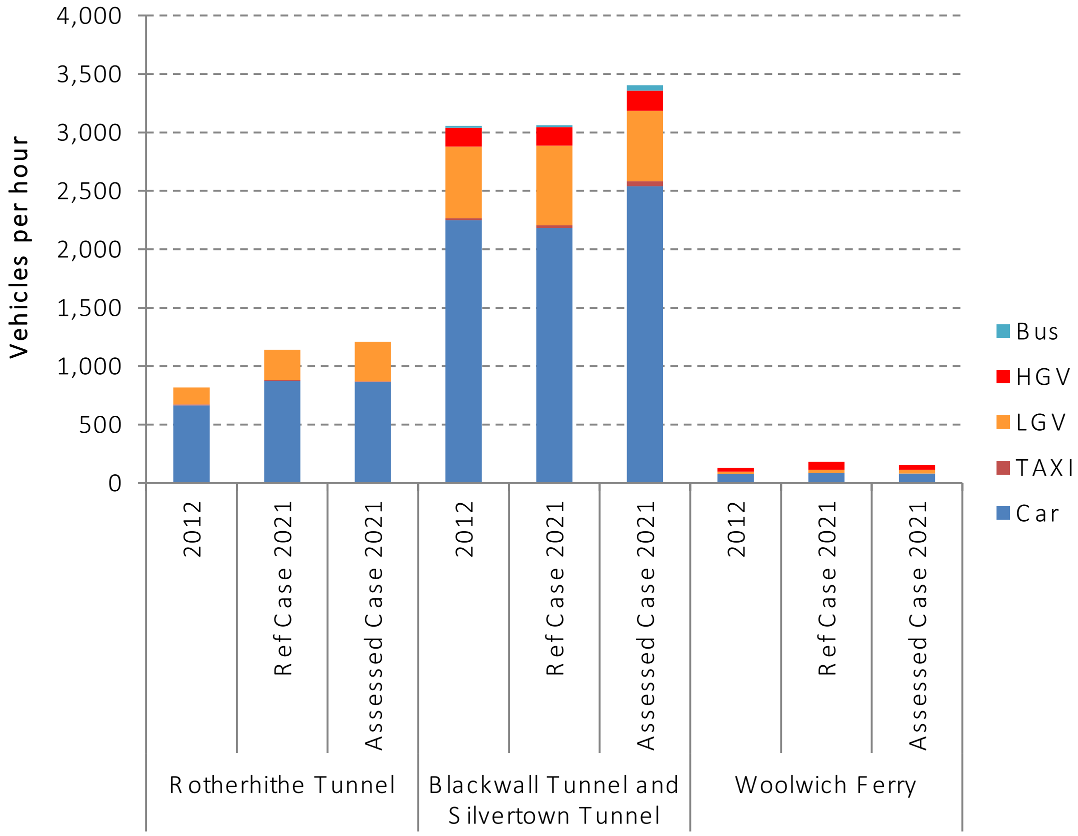
7.2.56 The Scheme would also have negligible impact on the composition of traffic on the wider road network when compared with the Reference Case. Model outputs indicate that the proportion of all private vehicle trips originating in the ESR that are made by LGVs and HGVs are similar in the Assessed Case to the Reference Case figures shown in Figure 5-2 in Chapter 0 in each of the three modelled time periods.

7.2.57 At the tunnels themselves and at adjacent crossings, the impact of the Scheme on traffic composition would be more noticeable, as shown in However, in absolute terms this only amounts to an increase of around 80 LGVs using the Rotherhithe Tunnel in the Assessed Case, with a reduction of around 80 LGVs using Blackwall and Silvertown Tunnels. The number of HGVs using the Blackwall and Silvertown Tunnels increases marginally (by around a dozen trips) in the Assessed Case as HGVs cannot divert to the Rotherhithe Tunnel due to height and width restrictions, and there is evidence that a very small number of HGV trips divert from the Woolwich Ferry to the Blackwall and Silvertown Tunnels due to the benefits of congestion relief.

7.2.58 Figure 7-12. The graph shows that in the AM peak hour northbound in the 2021 Reference Case, 27.5% of vehicle trips through the Blackwall Tunnel are made by HGVs and LGVs. In the Assessed Case the proportion through both the Blackwall and Silvertown Tunnels reduces to 22.7%, with a corresponding similar scale of uplift evident at the Rotherhithe Tunnel (from 22.5% in the Reference Case to 28.1% in the Assessed Case) as some goods vehicles divert as a result of the user charge.

7.2.59 However, in absolute terms this only amounts to an increase of around 80 LGVs using the Rotherhithe Tunnel in the Assessed Case, with a reduction of around 80 LGVs using Blackwall and Silvertown Tunnels. The number of HGVs using the Blackwall and Silvertown Tunnels increases marginally (by around a dozen trips) in the Assessed Case as HGVs cannot divert to the Rotherhithe Tunnel due to height and width restrictions, and there is evidence that a very small number of HGV trips divert from the Woolwich Ferry to the Blackwall and Silvertown Tunnels due to the benefits of congestion relief.

Figure 7-12: Impact of the Scheme on traffic composition in the AM peak hour northbound



7.2.60 Outside the peak periods, and in the counter-peak direction during peak times, the impact of the Scheme on vehicle composition is less noticeable as the proposed user charges for LGVs and HGVs in the Assessed Case are lower than during peak times in the peak direction.

Overall road network performance

7.2.61 When compared with the 2021 Reference Case, overall statistics for the RXHAM simulation area (the extent of which was shown in Chapter 1) indicate an improved network performance in 2021 with the Silvertown Tunnel in place in the peak periods (notably the PM peak) and a broadly negligible impact in the IP.

7.2.62 It is important to note that these statistics relate to the entire modelled area. As the Blackwall and Silvertown Tunnels represent only fraction of the total highway network of east and south-east London, a relatively modest change at this overall level could in fact be reflective of a very significant change.

7.2.63 Table 7-5: 2021 Reference Case and Assessed Case RXHAM sim area outputs Table 7-5 shows the difference between the Reference Case and the Assessed Case across the modelled simulation area, across all time periods, for three metrics; total travel time (measured in PCU hours), average speed (measured in kph) and the queue at the end of the modelled period (measured in PCUs).

Table 7-5: 2021 Reference Case and Assessed Case RXHAM sim area outputs

Metric	2021 Reference Case	2021 Assessed Case	Difference
AM peak			
Travel time (PCU hrs)	120,320	119,879	-441
Average speed (kph)	32.3	32.4	+0.1
Queue at the end of the hour (PCUs)	13,087	12,843	-244
IP			
Travel time (PCU hrs)	92,275	91,825	-450
Average speed (kph)	35.9	35.9	0
Queue at the end of the hour (PCUs)	3,229	3,255	+26
PM peak			
Travel time (PCU hrs)	125,969	124,417	-1,552
Average speed (kph)	31.6	32.0	+0.4
Queue at the end of the hour (PCUs)	15,294	13,850	-1,444

7.2.64 The Scheme results a reduction in overall travel time across all time periods. The reduction is most pronounced in the PM peak, for which there is a reduction of almost 1,600 PCU hours across the modelled area. Smaller reductions of around 440 and 450 PCUs are seen in the AM peak and IP periods respectively.

7.2.65 The impact of the Scheme on average speeds across the modelled area is less pronounced, with the biggest change being a marginal improvement of around 1.5% (0.4kph) in the PM peak. Changes in average speed in the AM peak and IP are negligible. It is important to note that these changes to average speeds will largely reflect the reduction in queuing with the Scheme, rather than increases in top speeds or the average speeds of uncongested traffic.

7.2.66 The PM peak also sees the biggest change when considering total queued demand at the end of the modelled hour. Indicates a indicates a 9% reduction (around 1,400 PCUs) in queued demand across the modelled area in the PM peak with the Silvertown Tunnel in place, and a 2% reduction (around 240 PCUs) in the AM peak. Queued demand increases very marginally in the IP, by around 1% (or around 30 PCUs), albeit this is from a much lower base level.

7.2.67 Overall the changes to travel time and queued demand, particularly those in the peaks, can be considered to represent significant benefits attributable to the Scheme given that they are presented relative to the total travel time and queued traffic modelled across the entire model simulation area.

7.2.68 In terms of impacts on specific parts of the network, the change between the 2021 Reference Case and the Assessed Case in terms of actual traffic flows, Volume to Capacity Ratio (VCR) and junction delay are shown in Figure 7-13 to Figure 7-20.

7.2.69 Figure 7-16 shows the change in actual flows in the AM peak hour. It can be seen that compared to the Reference Case, there is an increase in traffic flow in the Silvertown area as a result of the new Tunnel and some small increases south of the River Thames on the approach to the Tunnels (as a result of the reduction in congestion) and on the approaches to Tower Bridge[45]. There is a reduction in flow through the Blackwall Tunnel as some traffic switches to the Silvertown Tunnel.

7.2.70 Figure 7-17 shows a similar pattern in the average IP hour, however there are more significant reductions in flow on the main routes including the A2, A102, A12 and A13 as a result of the deterrence effect of the charge. There is a small increase in flow through the Rotherhithe Tunnel as a result of traffic re-routeing however the Tunnel is operating within capacity during this period.

7.2.71 In the PM peak hour, Figure 7-15 shows a forecast increase in actual flow on the main routes to and from the Blackwall and Silvertown Tunnels which is

[45] Note that the increase in flows on the approaches to Tower Bridge are currently being examined, and early indications are that this will not have a significant impact on trip times or delays on this part of the network.

as a result of the reduction in congestion and the release of formerly queuing traffic. There is little change shown elsewhere on the network in this period.

7.2.72 Larger versions of these plots are available in Appendix I.

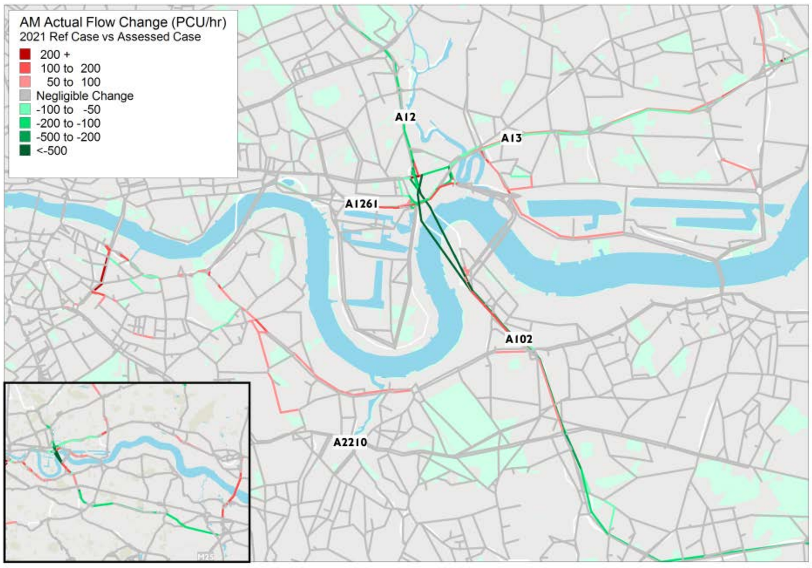


Figure 7-13: Change in actual flow (PCU/hr) with Silvertown Tunnel (Assessed Case, AM peak hour, 2021)

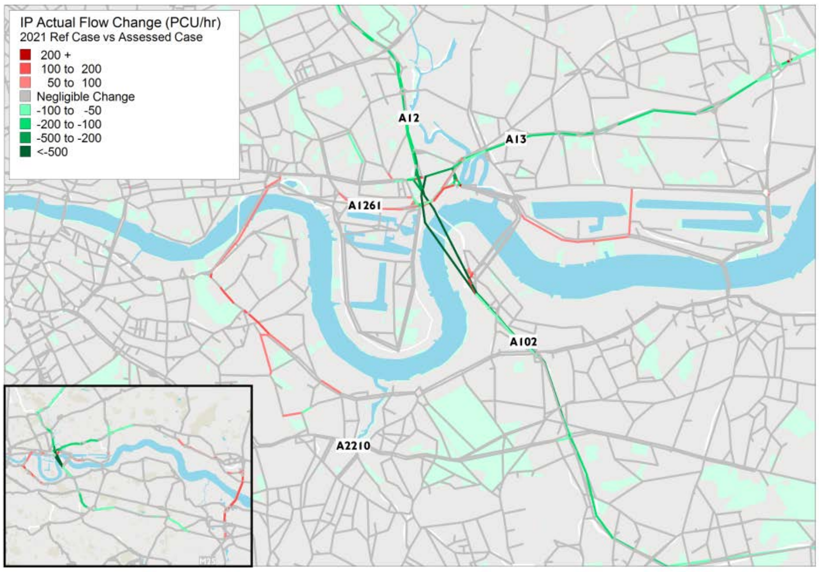


Figure 7-14: Change in actual flow (PCU/hr) with Silvertown Tunnel (Assessed Case, IP average hour, 2021)

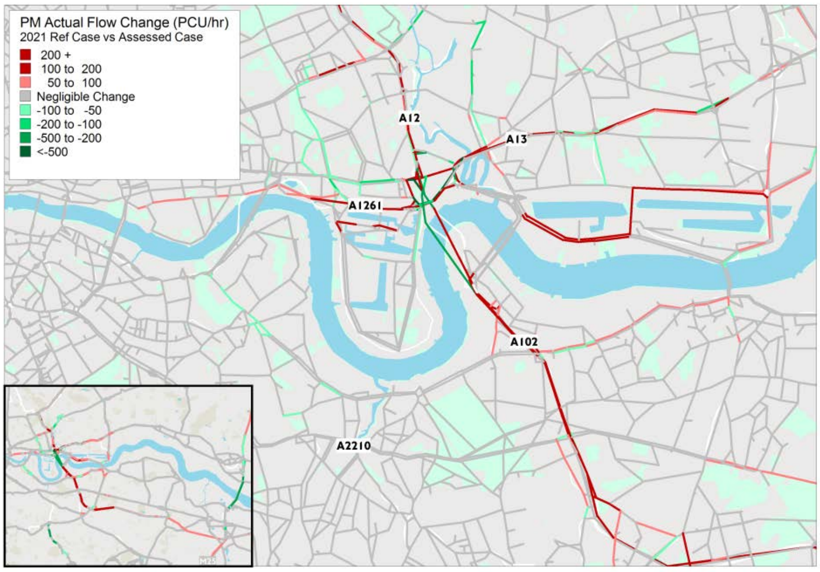


Figure 7-15: Change in actual flow (PCU/hr) with Silvertown Tunnel (Assessed Case, PM peak hour, 2021)

7.2.74 Figure 7-16 and Figure 7-17 show the change in Volume to Capacity Ratio (VCR) between the 2021 Reference Case and the Assessed Case in the AM and PM peak hours.

7.2.75 The change plots clearly indicate the benefit of Silvertown Tunnel in capacity terms on the approaches to the tunnels. In the AM peak hour, VCR reductions are evident on the A102 approaching the southern portal, and at the A102/A13 East India Dock Road junction – the left-turn slip onto the A13 westbound is a key link that is identified as reducing from over 80% in the Reference Case to under 80% in the Assessed Case.

7.2.76 These plots also clearly indicate that, in general, there is very little impact on wider network which results in a change in VCR threshold. The exception to this can be seen at Rotherhithe Tunnel in the AM peak where VCR increases from under 80% to over 80%.

7.2.77 In the PM peak hour, VCR reduces on links approaching the northern portal, notably the A12 and at the A102/A13 junction. The PM peak hour results also suggest some that the release of formerly queued southbound would lead to an increase in VCR on the A102 and the A2.

Figure 7-16: VCR change with Silvertown Tunnel (Assessed Case v Reference Case, AM peak hour, 2021)

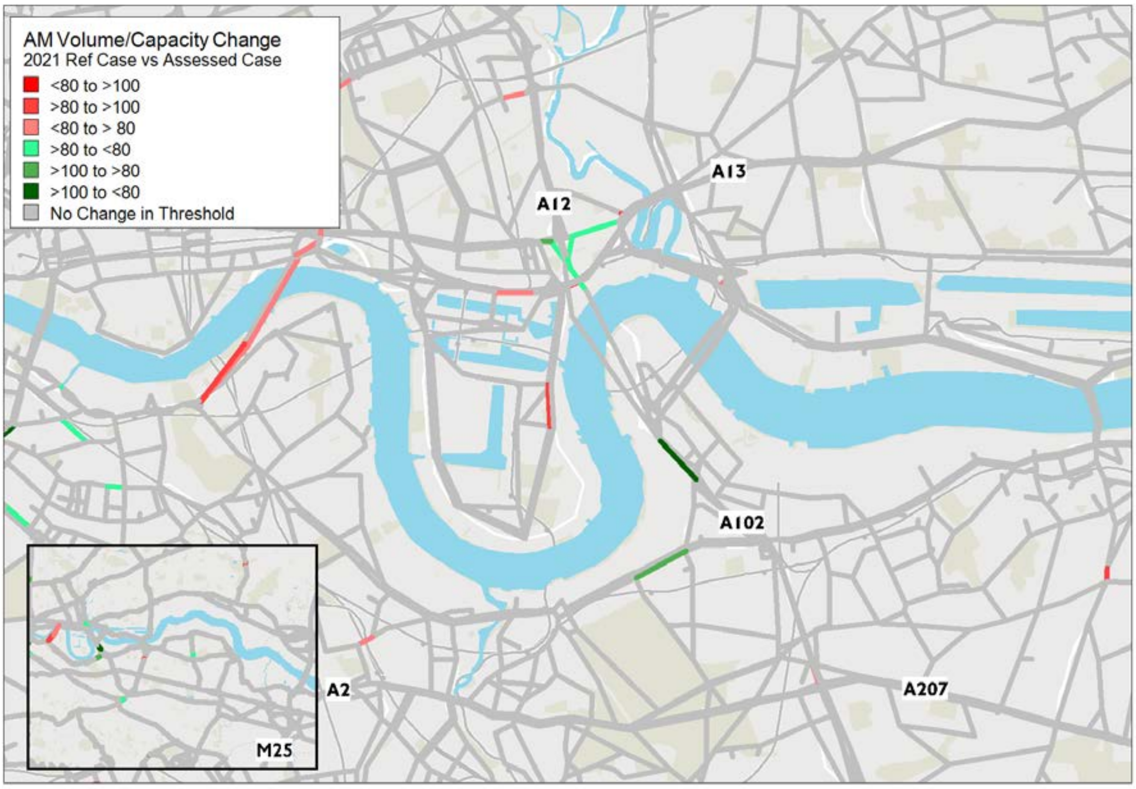
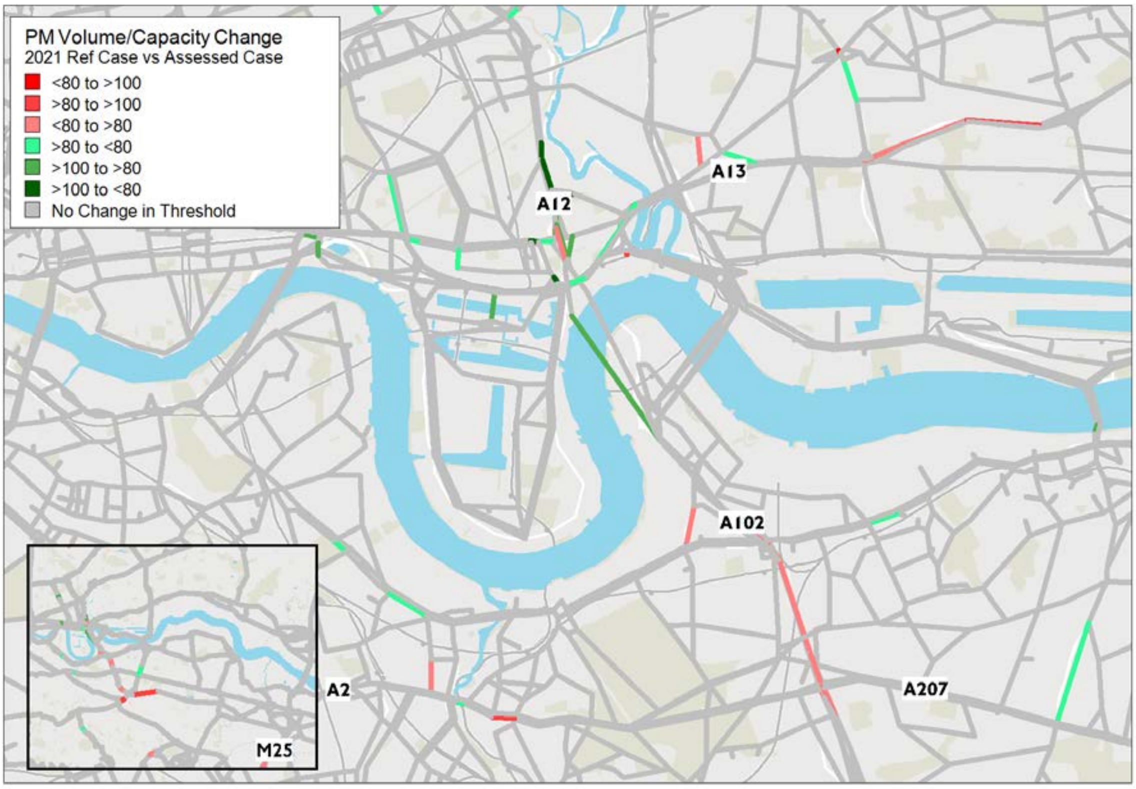


Figure 7-17: VCR change with Silvertown Tunnel (Assessed Case v Reference Case, PM peak hour, 2021)



7.2.78 Figure 7-18 to Figure 7-20 show the change in junction delay between the 2012 Reference Case and the Assessed Case in all three modelled time periods. These are measured in passenger car unit hours (PCU Hrs) which take in to account both delay at the junction and the flow of traffic arriving at each junction.

7.2.79 The junction delay plots for all three time periods indicate a reduction in delay on the approaches to the Blackwall and Silvertown tunnels. With the Silvertown Tunnel in place, delays on the Blackwall Tunnel approach reduce. The AM peak has the northbound approach on the A102 has the most stark change in delay with a reduction of over 200 PCU Hrs. This release of traffic therefore allows traffic to move more freely and therefore creates increases in delay on other parts of the network. However these increases in delay are minor when compared to the reduction at Blackwall tunnel, and only exceed 10 PCU Hrs at 8 junctions across the entire network in the AM peak.

7.2.80 The Inter Peak plot shows very little change in junction delay across the network when Silvertown Tunnel is introduced. However the most significant changes at the Blackwall Tunnel southbound approach where there are multiple reductions of over 10 PCU Hrs at the A13/A12 Junction.

7.2.81 The PM peak further accentuates the reduction in junction delay at the A13/A12 junction and the southbound approach to Blackwall Tunnel with multiple junctions showing a reduction of over 200 PCU Hrs. Again such a release to the network allows a build up of delay in other areas, such as along the A102 and A11, but again such increases in delay are minor when compared to the decreases shown at Blackwall Tunnel.

7.2.82 The reduction in junction delay is most significant on the immediate approaches to the Blackwall Tunnel in the northbound direction in the AM peak and the southbound direction in the PM peak, which correlates with when delay is highest at junctions in the Reference Case.

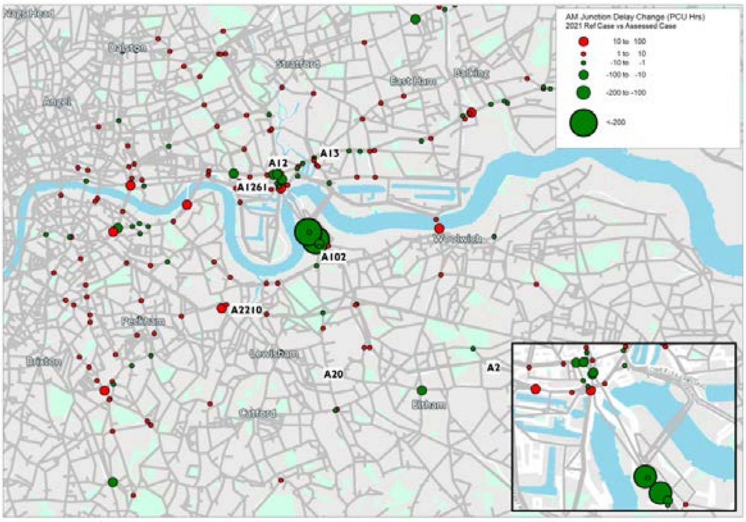


Figure 7-18: Change in junction delay with Silvertown Tunnel (Reference Case Vs Assessed Case, AM peak hour, 2021)

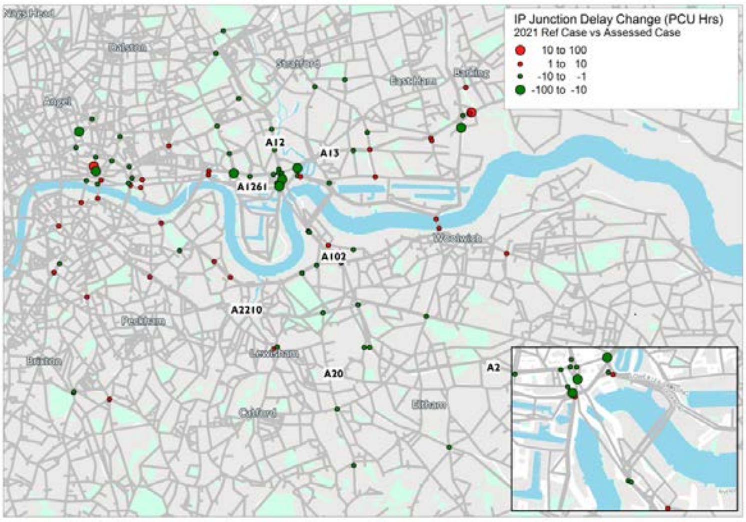


Figure 7-19: Change in junction delay with Silvertown Tunnel (Reference Case vs Assessed Case, IP average hour, 2021)

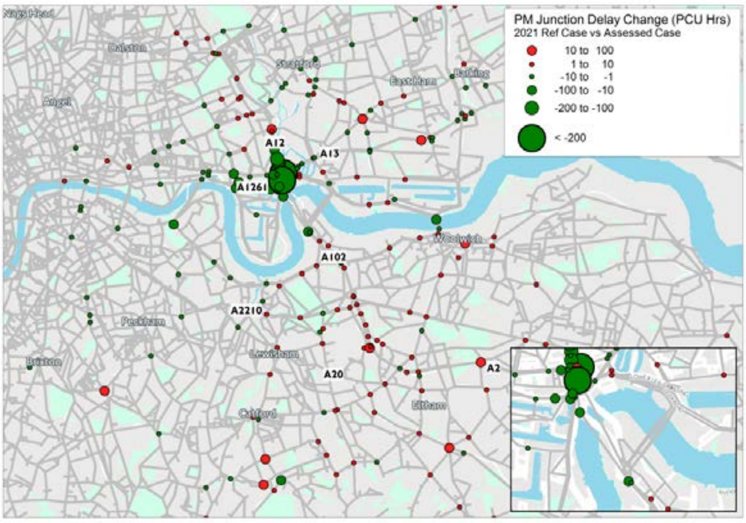


Figure 7-20: Change in junction delay with Silvertown Tunnel (Reference Case vs Assessed Case, PM peak hour, 2021)

7.2.83 At a local level, at the points that the new approach roads for the Silvertown Tunnel tie-in with the existing road network, the Scheme is not expected to have a significant adverse impact on local junctions and highway links. The tie-ins have been designed to current design standards taking into account the expected level of demand; on the north side, the Tidal Basin Roundabout would be altered to create a new signal-controlled roundabout which is able to accommodate flows from all connecting links whilst on the south side, the A102 would be widened to create new slip-road links to the Silvertown Tunnel and a flyover would be built to take southbound traffic exiting the Blackwall Tunnel. The tie-in arrangements also take into account the development plans for the surrounding areas. Further information on the tie-in arrangements can be found in the Preliminary Engineering Report.

Road safety

7.2.84 An analysis of potential future accident levels has been undertaken using the COBA-LT methodology, which uses accident records, forecast traffic flows (derived from RXHAM) and road types to calculate accident rates with the Scheme in place. As traffic volumes in the Assessed Case are forecast to reduce overall, the analysis has found that the Scheme would be expected to have a marginal positive impact on accidents (equating to a reduction of 683 accidents over a 60 year period, or a reduction of 0.3% compared to the Reference Case).

7.2.85 The current design for the Silvertown Tunnel and the proposed tie-in arrangements linking it to the road network on either side of the River Thames have been subject to a full Stage 1 Road Safety Audit. As part of this process a number of safety issues were identified and recommendations made for the purpose of maximising the road safety of the proposals. A further Road Safety Audit will be completed as the design of the Scheme is further developed.

Wider area highway mitigation

7.2.86 One of the principal effects of the Scheme is expected to be a significant improvement in the efficiency of traffic movement on the A102 Blackwall Tunnel Approach corridor, with a small decrease in levels of demand on this corridor. This largely reflects the fact that the scheme involves embedded mitigation for potential traffic impacts in the form of the user charge that acts to directly control any induced traffic.

7.2.87 Aside from the benefits to the A102, therefore, the implementation of the Scheme is expected to have only modest impacts on junction delays in the 2021 modelled year, and none of the increases in 2021 require the implementation of specific mitigation measures prior to scheme opening, particularly as none of the changes are currently anticipated to have a material impact on journey times.

7.2.88 As the road network is going to change and evolve between now and the Scheme opening year, TfL acknowledges that a need for junction mitigations could emerge closer to (or after) the time of Scheme opening.

7.2.89 Accordingly, TfL is not proposing specific junction mitigation works in the DCO application. Instead, TfL proposes to assess the traffic impacts on the wider network closer to the opening date of the Scheme in order to determine whether any mitigation measures are required at that stage. Following the opening of the Tunnel, TfL will then monitor the wider network to accurately identify the scale and location of any adverse impacts attributable to the Tunnel and will implement any mitigation which is necessary in connection with those impacts. This approach is explained in more detail below and reference in the Preliminary Monitoring and Mitigation Strategy[46].

7.2.90 TfL has a duty under the Traffic Management Act 2004 to ensure the effective management of the road network (‘Network Management Duty’), and in accordance with this duty, will provide the above commitments to monitor and mitigate any potential unforeseen Silvertown Scheme impacts in the DCO application itself. Details of these are set out in the Preliminary Monitoring and Mitigation Strategy, and summarised in Appendix C.

7.2.91 TfL would start the pre-Scheme monitoring process and carry out local junction modelling approximately two to three years in advance of Scheme opening. TfL would identify the locations for monitoring in liaison with the relevant boroughs in advance of the commencement of the monitoring programme, prior to Scheme opening. This ensures that pre-Scheme data would be collected for comparison purposes and that the boroughs are able to provide their input on the locations they are concerned about and would like to see included in the monitoring programme.

7.2.92 Following the opening of the Silvertown Tunnel, detailed traffic data would be collected on an annual basis for a period of five years. At the end of the five year period, the monitoring programme would be subsumed by TfL’s general network performance monitoring programme and form part of TfL’s overall Network Management Duty under the Traffic Management Act 2004.

[46] Transport for London, October 2015, Silvertown Tunnel Preliminary Monitoring and Mitigation Strategy

7.2.93 This process would be set out in the DCO as a requirement in order to provide assurance to the boroughs and other stakeholders of TfL's commitment to deliver necessary and appropriate mitigation. More definition on the proposed approach to monitoring and mitigation is available in the Preliminary Monitoring and Mitigation Strategy.

7.2.94 TfL has carried out an 'example' assessment based on the Assessed Case defined for the consultation and DCO application. This provides evidence none of the increases in 2021 appear to justify the implementation of specific mitigation measures prior to Scheme opening to be designed at this stage in the process and provides readers with an understanding of the assessment process methodology and illustrates the potential type and scale of mitigations that may be required. Detail on this is provided in Appendix C.

A review of 2031 and 2041 RXHAM results

7.2.95 The majority of the material in this chapter deals with the forecasts from the 2021 RXHAM model. The following section provides RXHAM simulation area statistics for the 2031 and 2041 model runs with and without the Scheme in place.

7.2.96 Table 7-6 shows the difference between the 2031 Reference Case and Assessed Case across the modelled simulation area, across all time periods, for three metrics; total travel time (measured in PCU hours), average speed (measured in kph) and the queue at the end of the modelled period (measured in PCUs).

Table 7-6: 2031 Reference Case and Assessed Case RXHAM sim area outputs

Metric	2031 Reference Case	2031 Assessed Case	Difference
AM peak			
Travel time (PCU hrs)	130,758	130,384	-374
Average speed (kph)	31.0	31.2	+0.2
Queue at the end of the hour (PCUs)	19,806	19,432	-374
IP			
Travel time (PCU hrs)	100,326	100,072	-254
Average speed (kph)	35.0	35.1	+0.1
Queue at the end of the hour (PCUs)	5,103	5,163	+60
PM peak			
Travel time (PCU hrs)	139,909	138,858	-1,051
Average speed (kph)	29.8	30.2	+0.4
Queue at the end of the hour (PCUs)	23,978	22,276	-1,702

7.2.97 The table illustrates the benefits of the Scheme in 2031, particularly in the PM peak when there is a reduction in overall travel time of almost 1,100 PCU hours (compared with 1,600 PCU hours in 2021) and a reduction in queued demand of 1,700 PCUs (compared with around 1,400 PCUs in 2021). The impact on average speed remains minimal, with the biggest change being an increase of speed by around 1.5% (0.4kph) in the PM peak.

7.2.98 The AM peak also sees notable reductions in overall travel time and queued demand, although to a lesser extent than the PM peak. As with the 2021 outputs, there is a very marginal increase in queued traffic in the model at the end of the average IP hour (of around 1%, or 60 PCUs) although again this is from a much lower base level.

7.2.99 Table 7-7 shows the difference between the 2041 Reference Case and Assessed Case across the modelled simulation area, across all time periods, for the same three metrics.

Table 7-7: 2041 Reference Case and Assessed Case RXHAM sim area outputs

Metric	2041 Reference Case	2041 Assessed Case	Difference
AM peak			
Travel time (PCU hrs)	140,597	140,469	-128
Average speed (kph)	29.7	29.8	+0.1
Queue at the end of the hour (PCUs)	25,968	25,612	-356
IP			
Travel time (PCU hrs)	108,400	108,295	-105
Average speed (kph)	33.9	33.9	0
Queue at the end of the hour (PCUs)	7,622	7,602	-20
PM peak			
Travel time (PCU hrs)	151,001	150,249	-752
Average speed (kph)	28.4	28.7	+0.3
Queue at the end of the hour (PCUs)	31,246	29,876	-1,370

7.2.100 The benefits of the Scheme are also apparent for 2041, again particularly in the PM peak in terms of overall travel time and queued demand across the modelled area. Positive changes for all three metrics are also seen in the AM peak, and to a lesser extent than the PM peak, whilst change in the average IP hour is minimal.

7.2.101 Overall, the benefits of the Scheme are less pronounced in the longer-term than they are in the earlier years after opening. This is largely a consequence of forecast future growth in highway demand (as set out in Chapter 5) and the network operating closer to capacity, which will serve to increase travel time and queued demand, and reduce average speeds, across the ESR.

Sensitivity of the Scheme to traffic growth

7.2.102 As well as summarising the longer term benefits of the Scheme, the above 2031 and 2041 results also provide an indication of the benefits of the scheme in the opening year if overall traffic volumes on the road network are higher than forecast in the Assessed Case.

7.2.103 Higher than expected traffic volumes in the opening year could occur as a result of a number of key factors, including a higher than expected rate of population and employment growth in London as a whole, and in the ESR particularly, and changes in the expected level of car ownership and use in future years.

7.2.104 In fact, the Scheme would also provide significant benefits in a ‘no growth’ scenario. In summary, the RXHAM simulation area results for the 2012 base year model with and without the Scheme in place (to simulate the latter, the 2021 Assessed Case was run with 2012 demand) indicate that:

- total travel time across the modelled area is forecast to reduce slightly in the peak periods;
- average speed would increase in all three time periods; and
- queued demand would reduce in all three time periods.

7.2.105 The outputs demonstrate that the Scheme would have a significant impact in terms of reducing queuing and increasing traffic speeds across the road network in the ESR today. The benefits of the Scheme are therefore not dependent on any assumed growth in traffic volumes in future years.

7.2.106 Within the next iteration of the TA it is planned that additional alternative scenarios will be considered to provide further understanding of the impacts of the Scheme if different assumptions about the future baseline are used. These scenarios could include higher and lower levels of economic growth, different user Values of Time (VoT) and the impact of other potential but currently uncommitted transport schemes.

7.3 Public transport network

7.3.1 The Silvertown Tunnel scheme would not have any material impact on the operation of the Jubilee Line, DLR or Emirates Air Line services. After completion of construction works, the tunnel portals would 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.

7.3.2 Two key objectives of the Silvertown Tunnel project are to improve resilience and road network performance in and around the Blackwall Tunnel, which would benefit local bus services. The existing route 108, which is the only cross-river London bus service east of Tower Bridge, would benefit from improved performance in terms of reliability and journey times arising from reduced congestion at the Blackwall Tunnel.

7.3.3 As highlighted in Chapter 4, congestion significantly disrupts the 108 at present. Closures of the Blackwall Tunnel can also result in the route being operated in two sections either side of the River 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 could be diverted via the Silvertown Tunnel in the event of closures of the Blackwall Tunnel. Many other local bus routes which currently suffer delays on the surrounding road network when the Blackwall Tunnel is closed or congested would benefit from the more reliable network

7.3.4 The most important impact on PT would be the opportunities the Silvertown Tunnel would create for new cross-river bus services to improve PT links between south-east and east London, notably the growing employment areas in the Royal Docks and Canary Wharf. The Silvertown Tunnel is designed to accommodate double-deck buses, thus providing operational flexibility enabling bus routes to be extended across the River Thames, as well as greater bus capacity.

7.3.5 It is currently proposed that one lane in each direction in each bore of the Silvertown Tunnel would be reserved for buses and HGVs which would further enhance reliability and reduce bus journey times. This configuration has the potential, over time, to enable in excess of 60 buses per hour in each direction.

7.3.6 In addition, the proposed amendments to the road network serving the southern tunnel portal would facilitate bus movements between both tunnels and North Greenwich bus station:

- Blackwall Tunnel southbound – There would be a bus-only slip road after the tunnel portal enabling buses to exit to Millennium Way.
- Blackwall Tunnel northbound – There would 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 northbound – There would be a bus-only slip road from

Millennium Way directly onto the tunnel approach.

7.3.7 The bus-only access roads could also be used by commuter coaches if operators wished to serve the Greenwich Peninsula.

7.3.8 While the Silvertown Tunnel scheme would provide 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 2022/3, any plans for the bus network at this time can only be indicative and for the purpose of assessing operational feasibility.

7.3.9 In considering bus route options, TfL needs to be mindful of emerging new developments to be served. Development of the bus network could also assist in relieving peak crowding on the Jubilee Line and provide affordable journey options for people on lower incomes, thereby mitigating some adverse impacts of the proposed user charge as bus passengers would not pay.

7.3.10 An example indicative cross-river bus network utilising the Silvertown Tunnel was developed based on an analysis of existing service provision, expected land use and transport network changes, and feedback on the indicative network was received during the 2014 public consultation. The network consisted of two new services and enhancements to four existing services (predominantly through cross-river extensions). These services are shown on the plan in Figure 7-21.

Figure 7-21: Indicative Silvertown Tunnel cross-river bus network

7.3.11 The assumed changes associated with the services highlighted on the plan above are shown in Table 7-8.

Table 7-8: Indicative cross-river bus network service details

Route	Existing freq (buses per hour)	Future freq (buses per hour)	Summary of changes
108 (Lewisham Town Centre/Stratford Bus Station)	6	7.5	Minor change in southbound direction at North Greenwich due to new road layout
129 (Greenwich Town Centre/North Greenwich Station)	5	10	Extension from North Greenwich to Beckton – stopping pattern for other services on route assumed

309 (London Chest Hospital/Stephenson St)	5	5	Extension from Canning Town to North Greenwich – stopping pattern for other services on route assumed
104A (Manor Park/Stratford)	6	6	New route (covers part of existing 104) including extension to North Greenwich – stopping pattern for other services on route assumed
Grove Park – Canary Wharf	~	4	Stopping pattern for other services on route assumed
Eltham – Beckton	~	5	Stopping pattern for other services on route assumed

7.3.12 These enhancements may potentially be supported by a number of other schemes being developed independently of the Silvertown Tunnel scheme through TfL's Bus Priority Delivery Portfolio. These schemes are summarised below:

- Plumstead Road – extension of westbound bus lane from Plumstead station towards Woolwich (at concept design stage);
- North Greenwich – study on Pilot Busway undertaken to identify improvements to existing alignment/operation, which will feed into Masterplanning work being undertaken by developer – further bus lane schemes on Commercial Way/Bugsby's Way and Peartree Way at feasibility stage;
- Asian Business Port – potential bus-only ramp linking Strait Road and Royal Albert Way (at feasibility stage);
- Royal Albert Basin – potential bus-only road east of Gallions Reach (at feasibility stage).

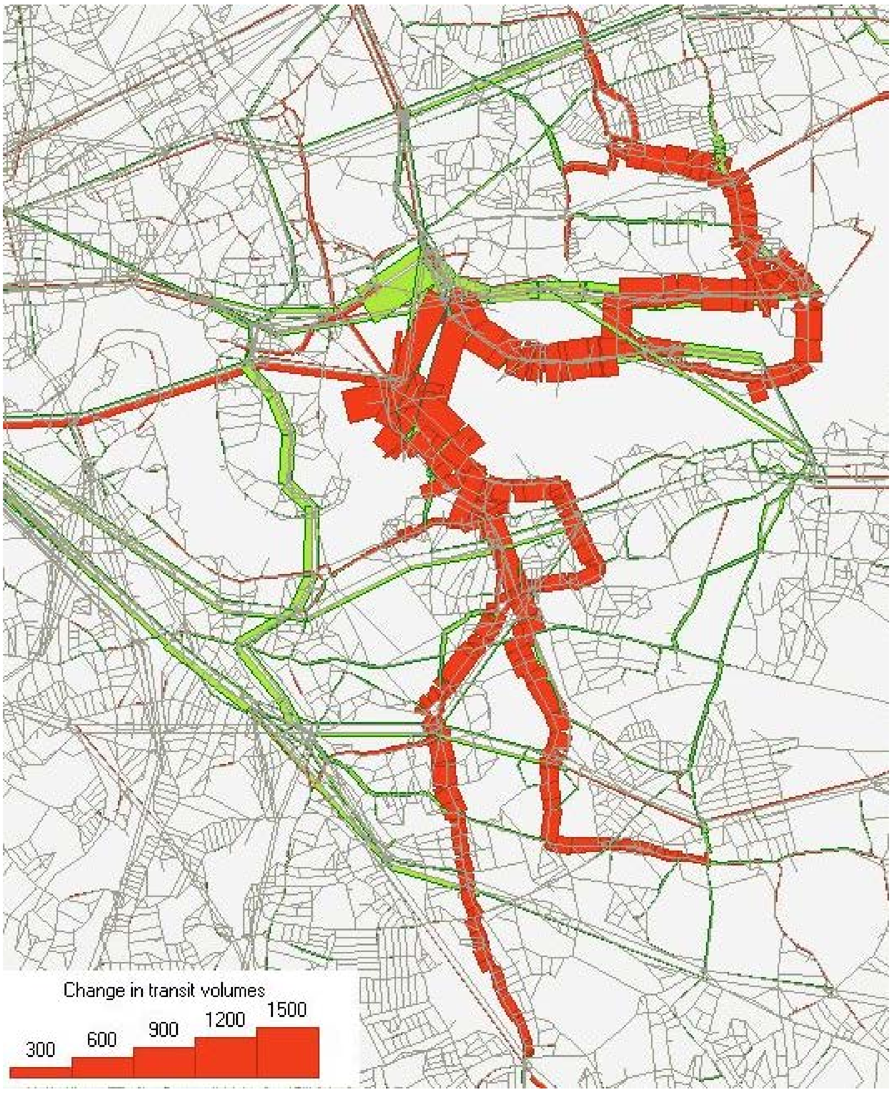
7.3.13 A westbound bus lane on Bugsby's Way was implemented in January 2015 by a local developer as part of a Section 106 agreement. Further details on the development of this network and the new bus opportunities created by the Silvertown Tunnel are provided in Appendix F.

Public transport patronage

7.3.14 The indicative network described above was coded in TfL's Railplan with the costs fed into LoRDM to assess the impact of new services on patronage and crowding on the PT network. When compared with the Reference Case in 2021, LoRDM indicated that the provision of the Silvertown Tunnel and associated bus network enhancements resulted in an overall uplift of 6,500 daily public transport trips (2,500 transferring from car and 4,000 from active modes).

7.3.15 As well as resulting in a significant number of new PT trips overall, the bus network enhancements would be expected to result in a noticeable change in the distribution of PT trips across this part of the network. Figure 7-22 illustrates the forecast change in AM peak volumes on individual PT lines in 2021 when compared with the Reference Case – red indicates an increase in patronage while green indicates a reduction.

Figure 7-22: Change in AM transit volume – 2021 Assessed Case v Reference Case



7.3.16 The plan indicates that proposed new bus services would reduce demand on National Rail and DLR services in the vicinity of the Tunnels, which suggests a switch for some shorter distance PT trips from rail to bus or part of a PT journey now being made by bus. A substantial number of new bus trips are likely to be trips to and from North Greenwich station to interchange with other bus services and the Jubilee line. A similar pattern was evident in the IP and PM peak.

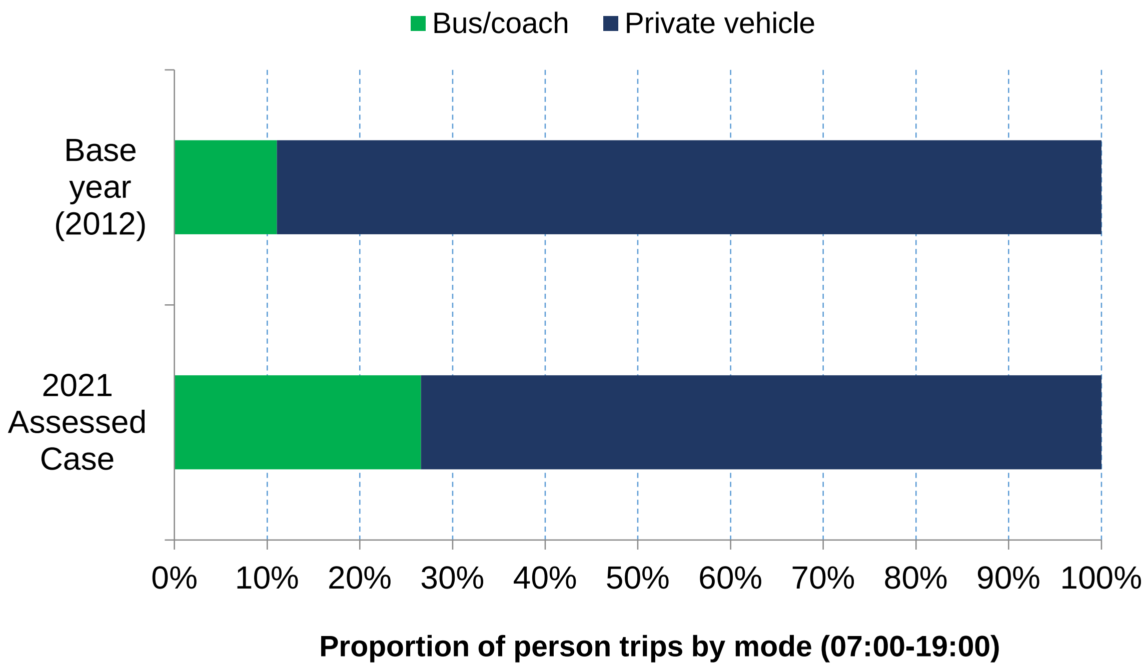
7.3.17 Over the course of a 12-hour period (07:00-19:00), a total of almost 19,000 cross-river bus passenger trips are forecast to be made via the Silvertown and Blackwall Tunnels in 2021, with a large proportion of this total coming from people switching from rail to bus. This compares with a total of around 3,000 cross-river bus trips made via the Blackwall Tunnel in the Reference Case, and represents a significant increase of over 500%.

7.3.18 The forecast impacts on bus patronage by individual service were as follows:

- Patronage on route 108 would increase by approximately 25% as a result of the frequency increase;
- Patronage on route 129 would increase approximately four-fold as a result of the extension across the River Thames and the frequency increase;
- Patronage on route 309 would increase approximately two-fold as a result of the extension across the River Thames, although patronage is relatively low compared to other routes;
- Patronage on route 104 would increase approximately two-fold as a result of the extension across the River Thames;
- Patronage on each of the other new routes (Eltham to Beckton and Grove Park to Canary Wharf) is around 70% - 95% that of existing levels of patronage on the 108.

7.3.19 When including scheduled coach services, the proportion of person trips made by made by bus or coach through the Blackwall and Silvertown Tunnels combined is expected to increase from just over 10% in the base year to approaching 30% in 2021, as shown in Figure 7-23. This illustrates the significant impact the Scheme could have in facilitating public transport trips.

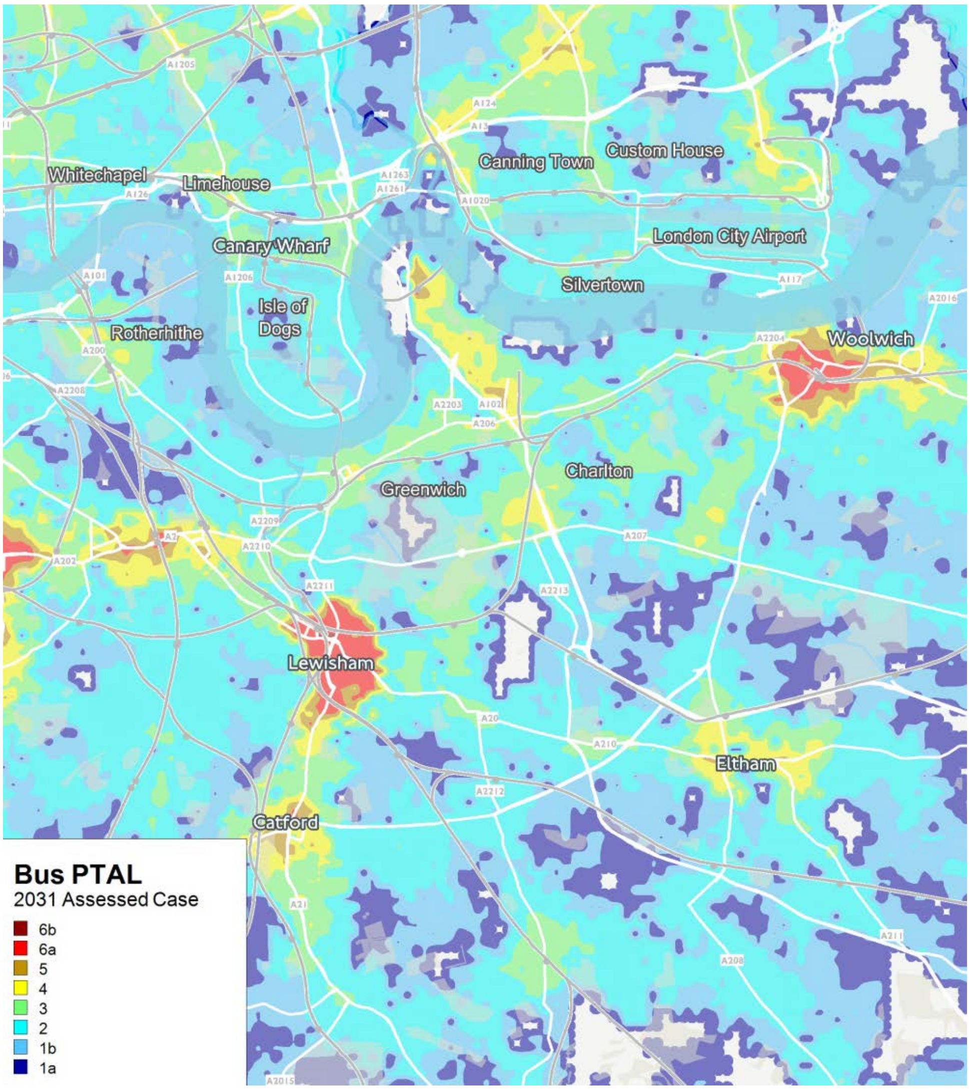
Figure 7-23: Indicative proportion of person trips by mode through the Blackwall Tunnel in 2012 compared to both Tunnels in the 2021 Assessed Case



Public transport accessibility

7.3.20 The proposed new bus networks would also result in an uplift in PTALs in the areas they serve. Figure 7-24 illustrates the 2031 bus PTAL levels with the new services in place (based on the assumed codings used to generate the Railplan run described above), while Figure 7-25 illustrates the change in PTAL scores as a result of the new services when compared with the 2031 Reference Case outputs described earlier in this report.

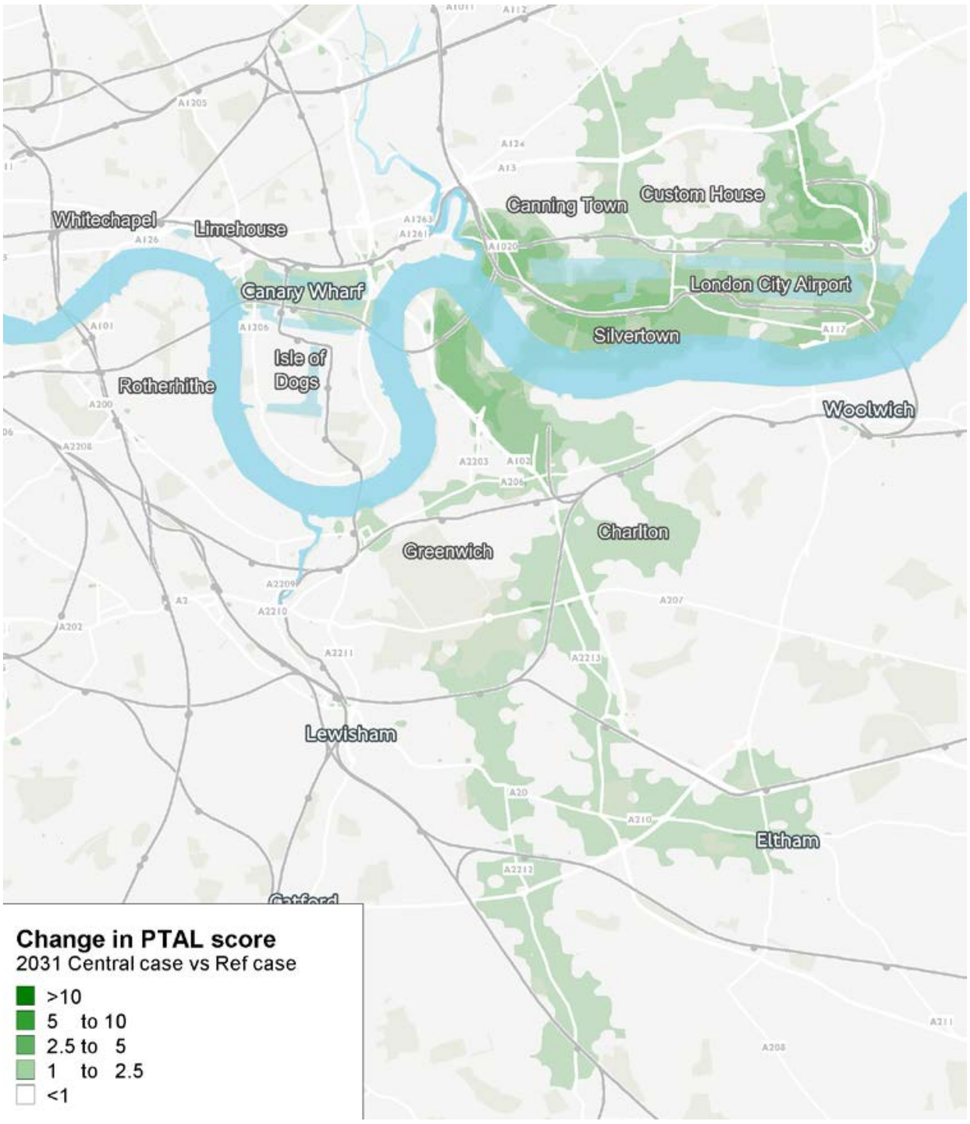
Figure 7-24: Bus PTAL, Assessed Case 2031



7.3.21 The change plot indicates the uplift in PTAL scores[47] as a result of new services. The main benefits are in the Silvertown and Beckton areas on the north side of the River Thames, and on the approaches to the North Greenwich bus station to the south. The benefit of individual routes extending to Eltham and Mottingham are also evident.

[47] The PTAL methodology is outlined in paragraph 1.5.10.

Figure 7-25: Change in PTAL score due to new Silvertown bus connections (2031 Reference Case v Assessed Case)

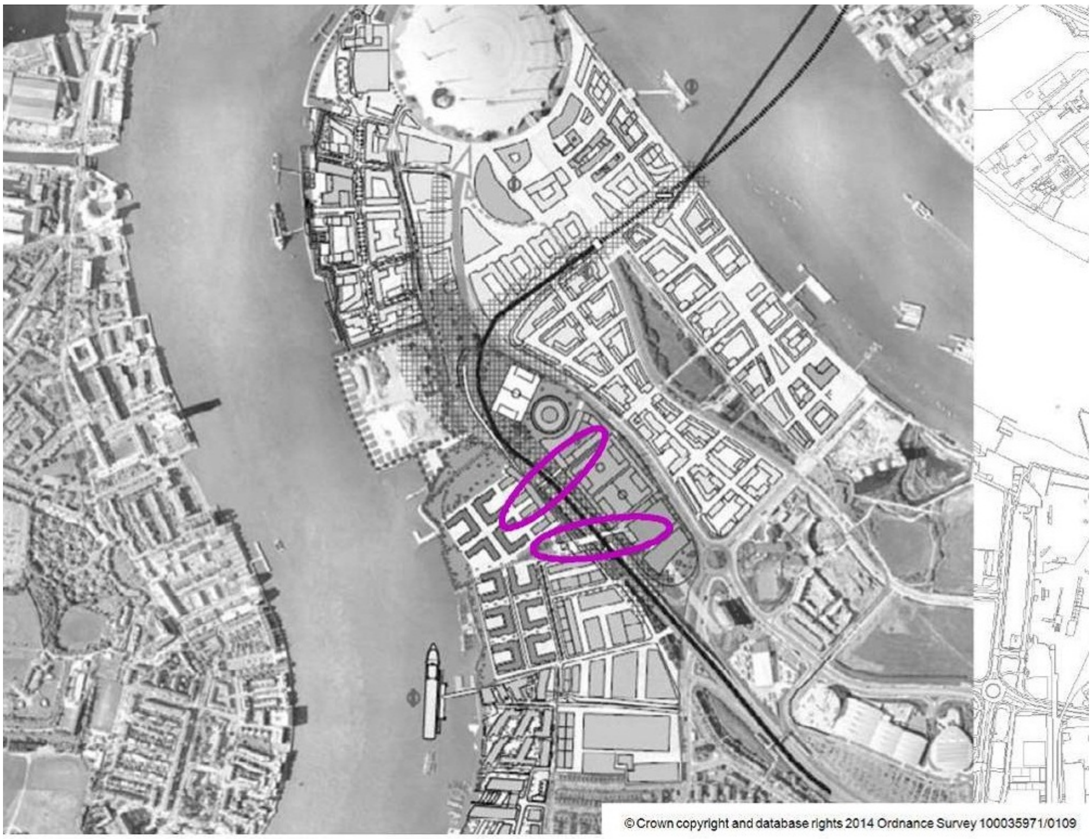


7.4 Walking and cycling network

7.4.1 In terms of pedestrian and cycling connectivity, as set out in Chapter 5 a number of improvements are expected as a result of the Greenwich Peninsula masterplans and the emerging masterplan for the Royal Docks area.

7.4.2 On the south side of the River Thames, the Greenwich Peninsula West Masterplan 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 7-26 shows an indicative plan of the future walking network taking into account these developments with potential crossing alignments, including the Boord Street pedestrian and cycle bridge, highlighted in purple.

Figure 7-26: Greenwich Peninsula and Peninsula West Masterplans



7.4.3 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. The reference design for the Silvertown Tunnel makes specific provision for existing, new, and improved pedestrian routes and connections, which will be the subject of ongoing engagement.

7.4.4 The proposed walking and cycling links in the vicinity of the southern portal of the Silvertown Tunnel are shown in Figure 7-27 and Figure 7-28.

7.4.5 The pedestrian routes which are affected during construction at the southern portal, namely Edmund Halley Way and Tunnel Avenue, will be re-instated. The Boord Street footbridge will be replaced in approximately the same location with a new enhanced bridge designed to the latest shared-use standards.

Figure 7-27: Proposed pedestrian links in vicinity of the southern tunnel portal

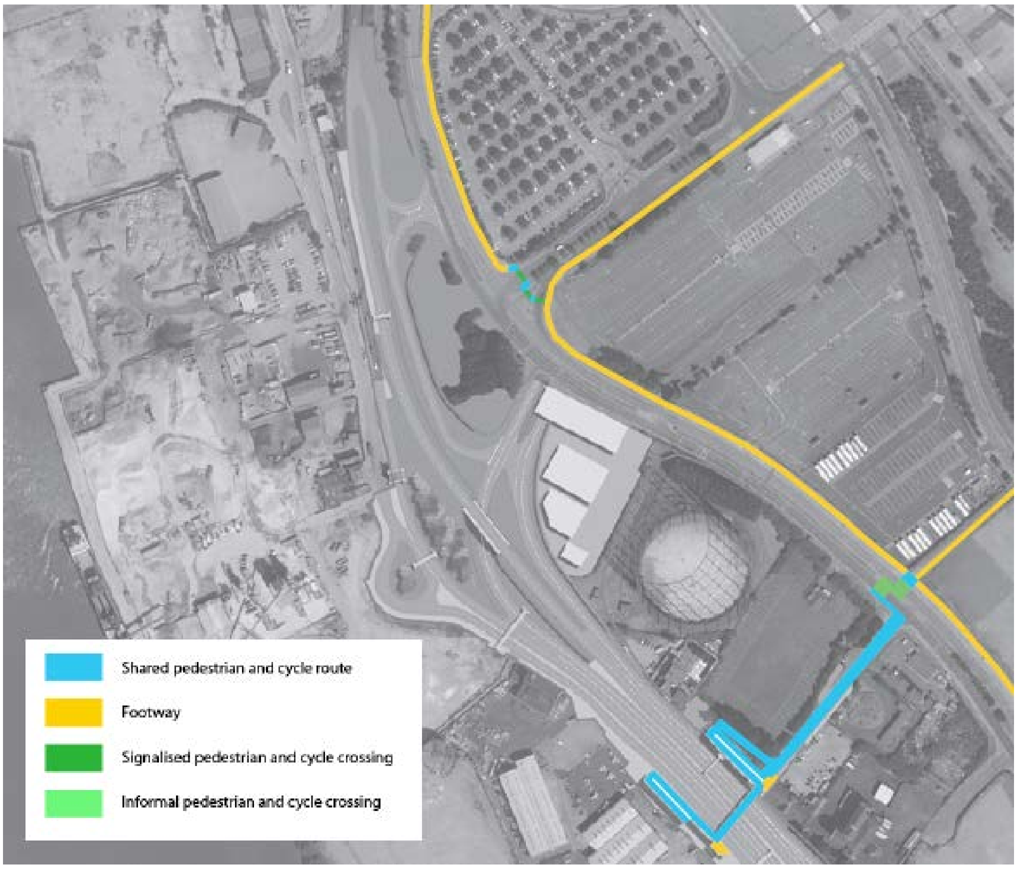
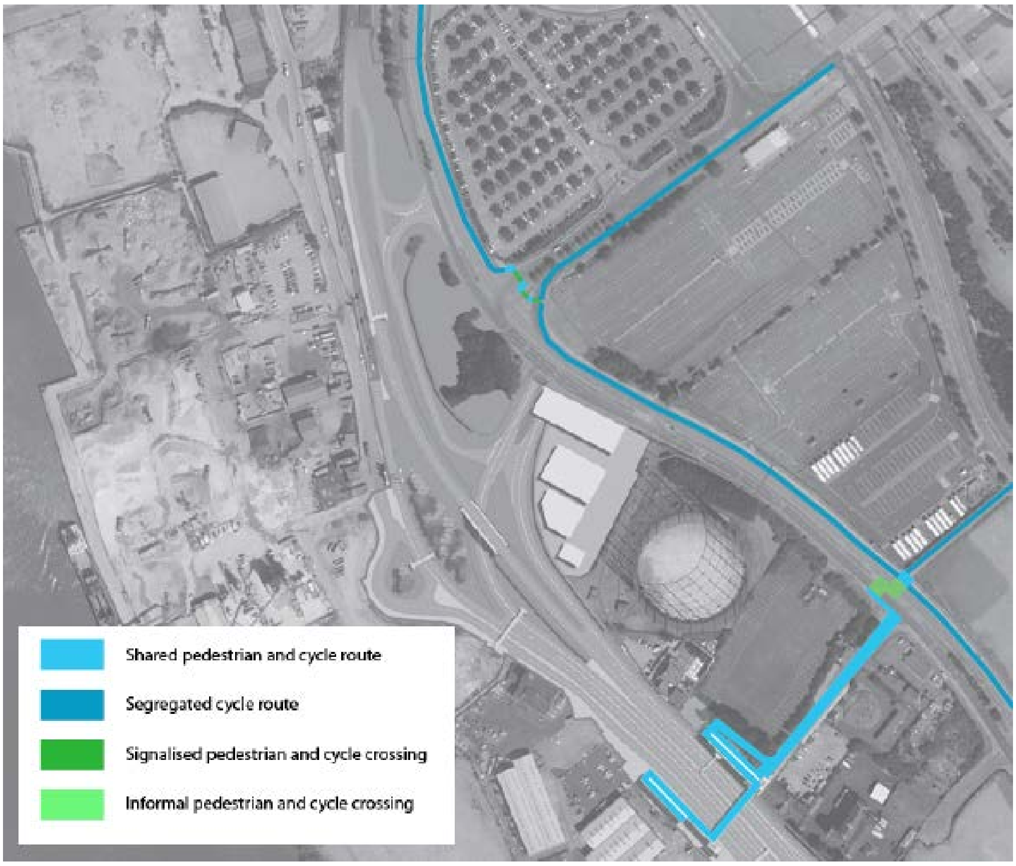


Figure 7-28: Proposed cycle links in vicinity of the southern tunnel portal



7.4.6 The proposed walking and cycling links in the vicinity of the northern portal of the Silvertown Tunnel are shown in Figure 7-29 and Figure 7-30.

7.4.7 Following consultation with LB Newham and the GLA, the reference design makes specific or passive provision for improved pedestrian and cycle connections at the northern portal. This includes a potential new pedestrian and cycle bridge across the tunnel approach roads, to the south of the Tidal Basin Roundabout, to better connected potential future development in this area.

7.4.8 The exact design of cycling facilities at the Tidal Basin Roundabout will be confirmed at a later date, when more information about the development of the surrounding area and associated cycling infrastructure is known. However, it is expected that the current off-street cycle paths will be maintained or enhanced, with appropriate crossing facilities provided in line with current good practice. Consideration will also be given to how cycling routes can be best tied in with the planned Quietways network shown in Figure 5-18.

Figure 7-29: Proposed pedestrian links in vicinity of the northern tunnel portal

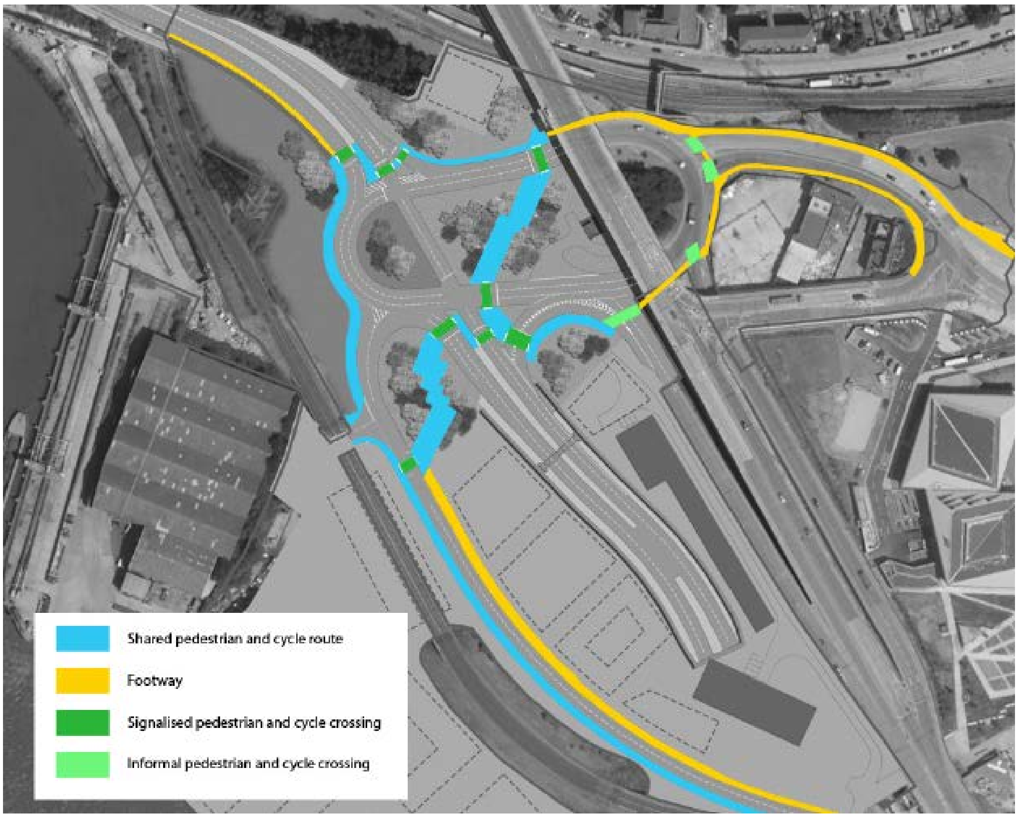
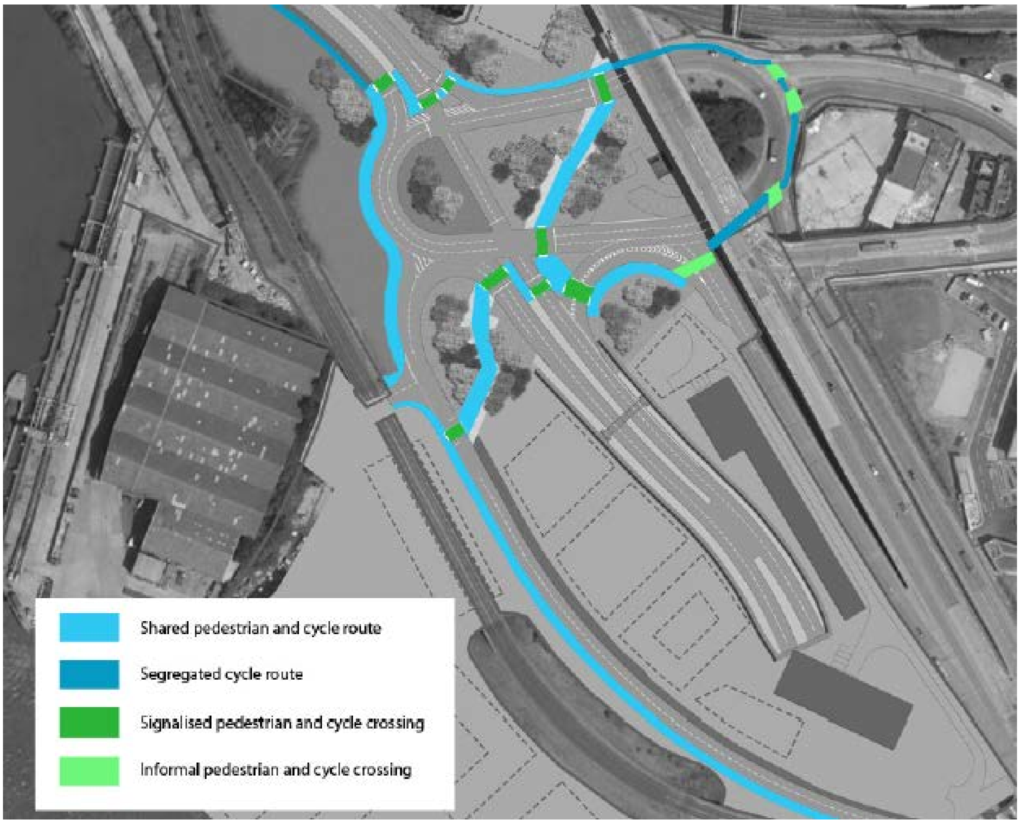


Figure 7-30: Proposed cycle links in vicinity of the northern tunnel portal



7.4.9 Further details of the proposed walking and cycling improvements proposed as part of the Silvertown Tunnel scheme can be found in the Preliminary Design and Access Statement.

7.5 Access to labour market and jobs

Public Transport

7.5.1 Figure 7-31 and Figure 7-32 show the difference in job accessibility by PT (jobs located within a 75 minute generalised cost) forecast between the 2021 Reference Case and Assessed Case scenarios during the AM and PM peak three-hour periods respectively. A 75 minute generalised cost threshold was used for PT instead of 45 minutes (used to assess car journey times) since it includes waiting and interchange time, which is weighted greater than actual time in accordance with WebTAG. Therefore, a 75 minute generalised cost is broadly equivalent to a 45 minute journey time by PT for many journeys.

7.5.2 As shown on the first plan, improvements north of the River Thames during the AM peak period are forecast due to the new bus routes reducing the generalised cost between zones within Newham. Similar improvements are forecast during the PM peak period.

Figure 7-31: Change in job accessibility by PT (2021 Reference Case v Assessed Case) based on generalised cost – AM peak period (07:00-10:00)

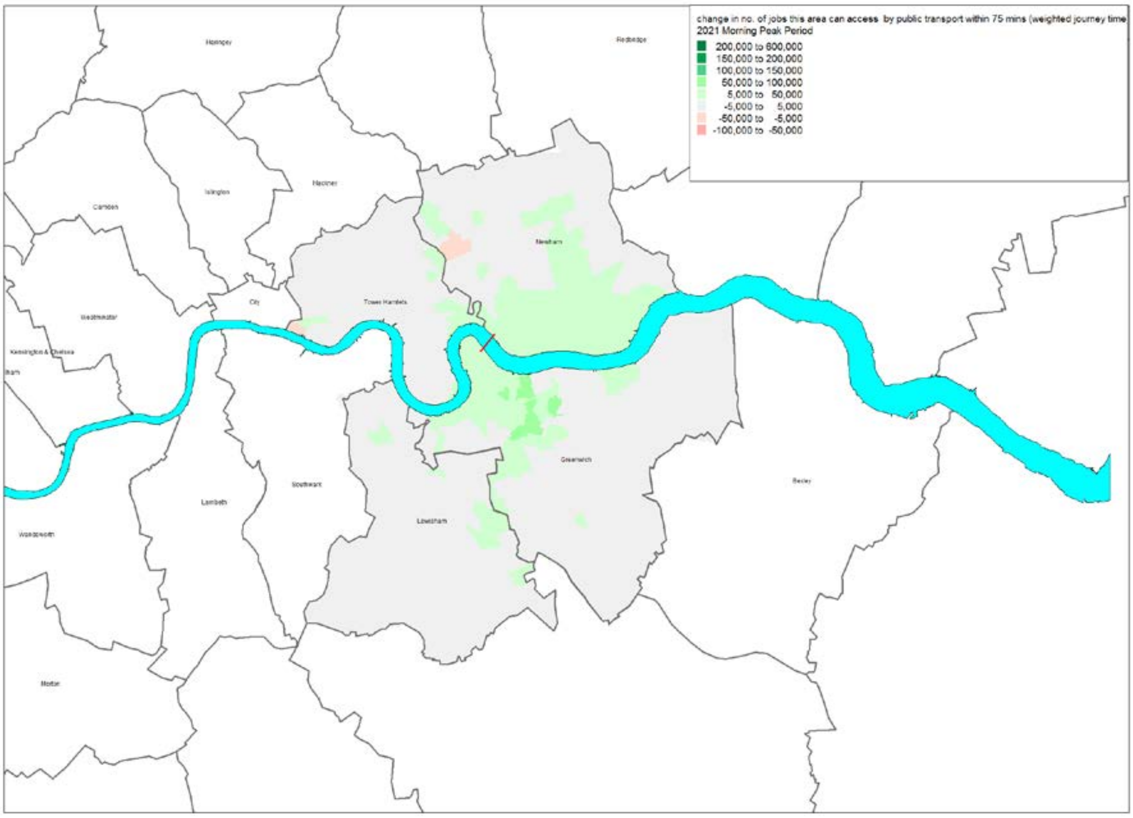
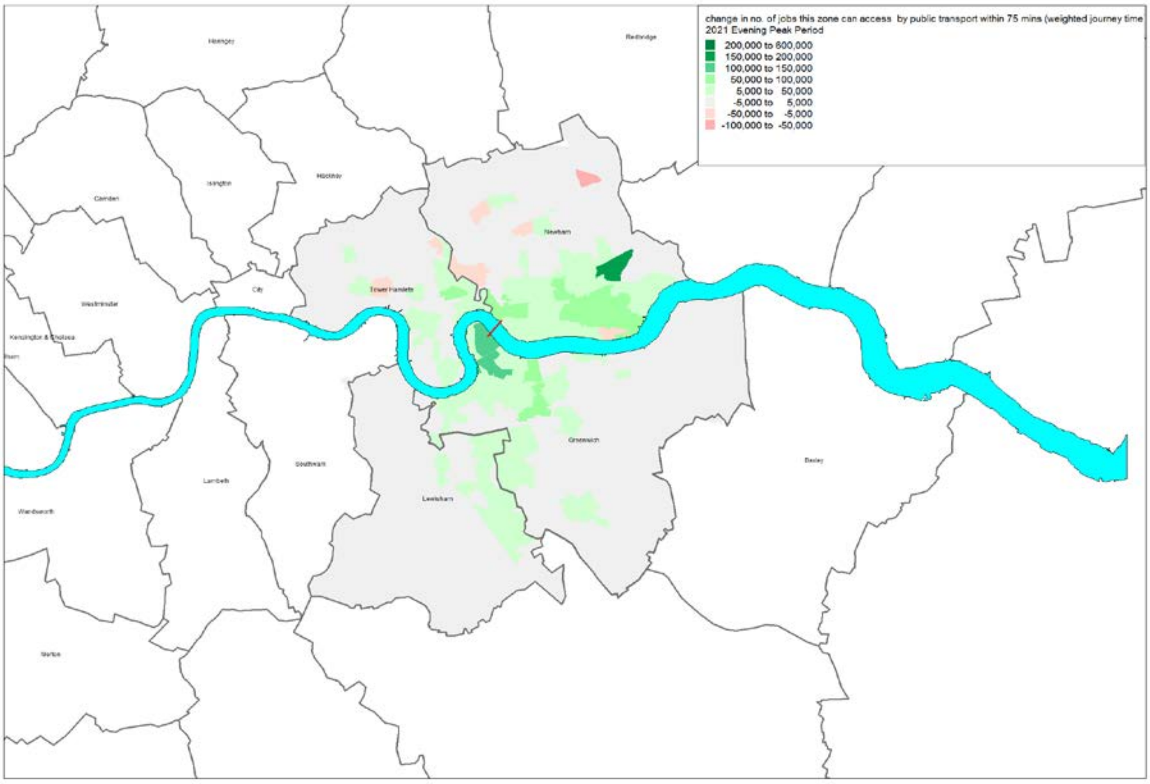


Figure 7-32: Change in job accessibility by PT (2021 Reference Case v Assessed Case) based on generalised cost – PM peak period (16:00-19:00)



Private vehicles

7.5.3 A key aim of the Silvertown Tunnel scheme is to provide improved cross-river road links to support business and services.

7.5.4 Figure 7-33 and Figure 7-34 show the difference in job connectivity by car (e.g. jobs located within a 45 minute journey time) expected between the 2021 Reference Case and Assessed Case scenarios during the AM and PM peak hours respectively.

7.5.5 Figure 7-33 shows the change in access to jobs in the AM 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 River Thames in Greenwich, Lewisham, Bexley and Bromley. Significant proportions of Greenwich, Lewisham and Bexley are estimated to see over 200,000 additional potential jobs accessible within a 45 minute journey time.

7.5.6 Journey times in the AM peak are expected to be impacted somewhat in the immediate vicinity of the northern portal of the Silvertown Tunnel due to the increased throughput of traffic in the Silvertown area; however the reduction in accessible jobs within the borough of Newham is expected to be some 2% from the Reference Case to the Assessed Case. Conversely, the number of accessible jobs during the AM peak period in Greenwich and Lewisham are expected to increase by 21% and 9% respectively.

7.5.7 Figure 7-34 shows the change in access to jobs in the PM peak hour. The greatest increases in connectivity to employment also occur south of the River Thames, in Greenwich, Lewisham, Bexley and Bromley. However, in this time period improvements in the number of jobs accessible from Tower Hamlets and Newham are also anticipated when compared to the Reference Case.

Figure 7-33: Change in job accessibility by Car (2021 Reference Case v Assessed Case) based on journey time – AM peak hour

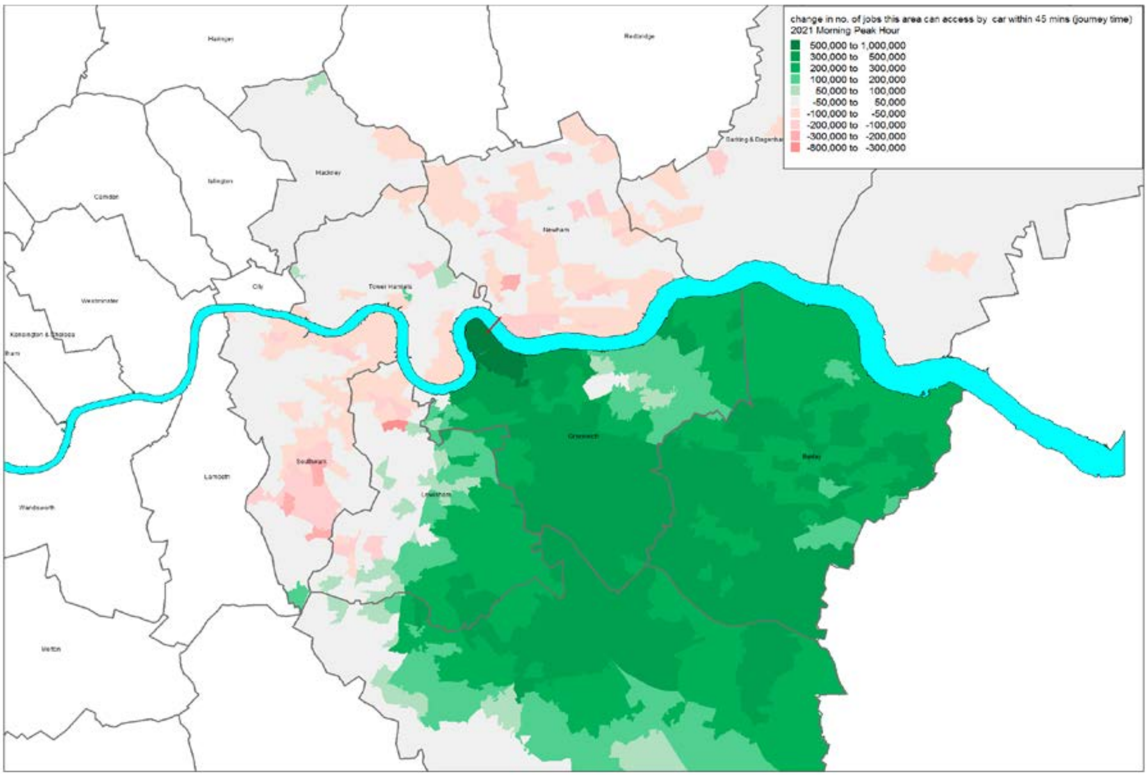
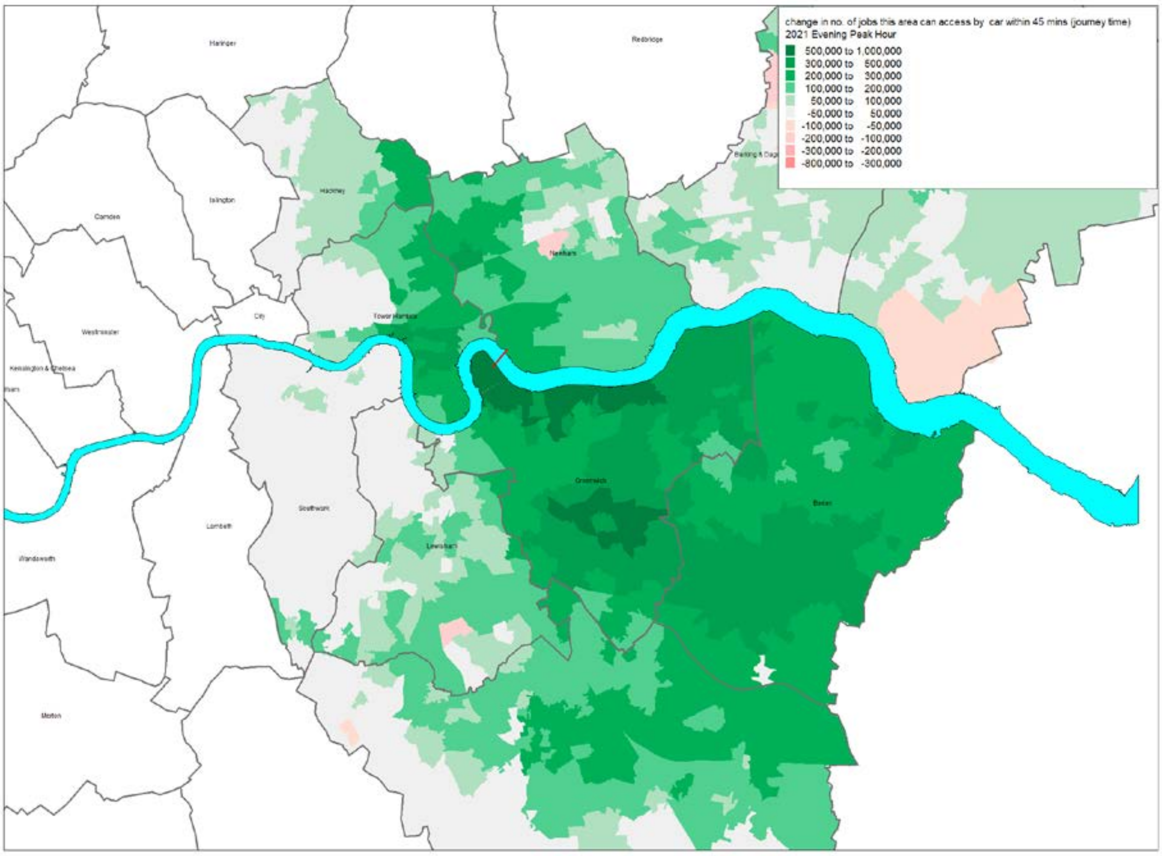


Figure 7-34: Change in job accessibility by Car (2021 Reference Case v Assessed Case) based on journey time – PM peak hour



7.5.8 Connectivity by car was also assessed based on changes in the generalised cost of a journey. Generalised cost for car trips in this instance takes into consideration the travel time plus vehicle operating costs, reliability benefits associated with the Scheme (as described earlier in this chapter), and the Assessed Case user charge. Parking costs were not included as these were assumed to be constant in both Reference Case and Assessed Case. Costs were converted to time in minutes using a Value of Time (VoT) factor, which is primarily related to journey purpose and mode.

7.5.9 A 70 minute generalised cost threshold was used to assess connectivity by car, which was broadly equivalent to a 45 minute journey time plus the average cost of the charge in generalised minutes (weighted by journey purpose) during peak times in the peak direction.

7.5.10 Since VoT is relatively low for car-based commuters, the user charge applied in the Assessed Case would increase journeys with a generalised cost of over 70 minutes, when compared to the Reference Case and subsequently result in lower levels of connectivity to jobs.

7.5.11 The generalised cost comparison between the Reference Case and Assessed Case for commuter car trips is shown in Figure 7-35 and Figure 7-36.

Figure 7-35: Change in job accessibility (2021 Reference Case v Assessed Case) based on generalised cost for Car Commuters – AM peak hour

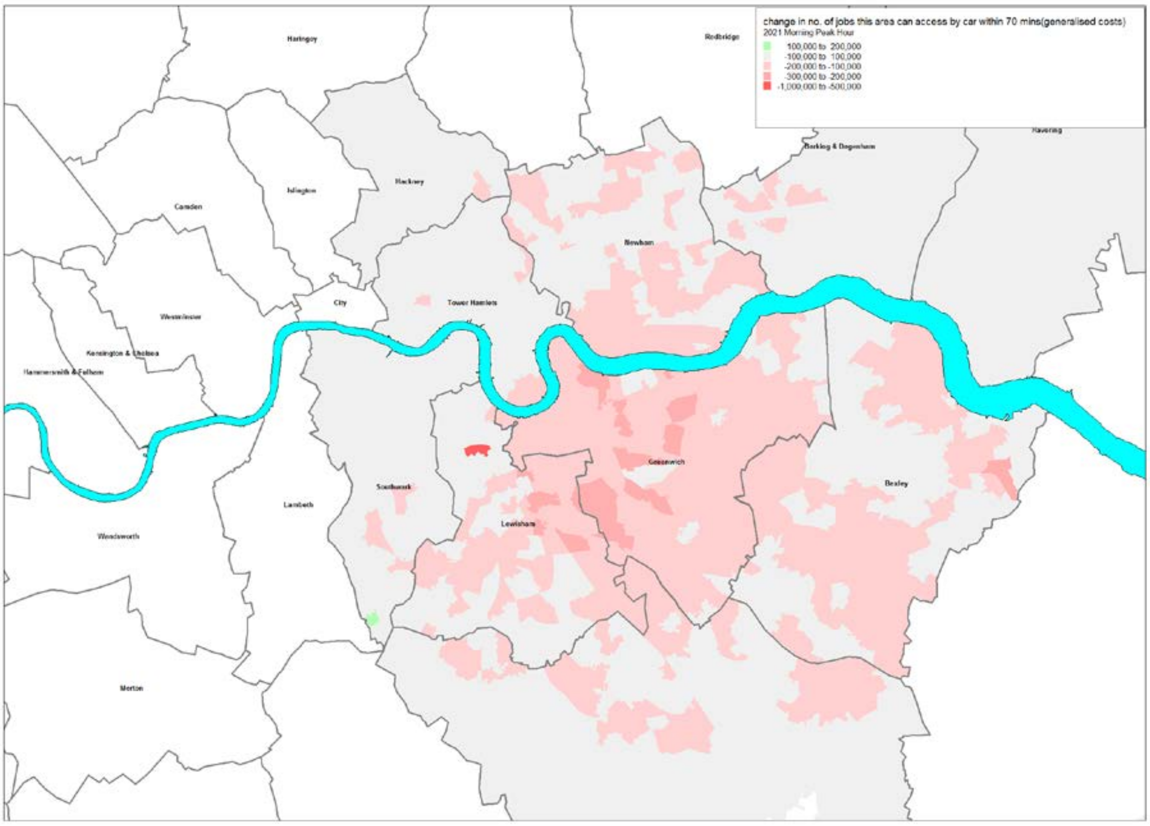
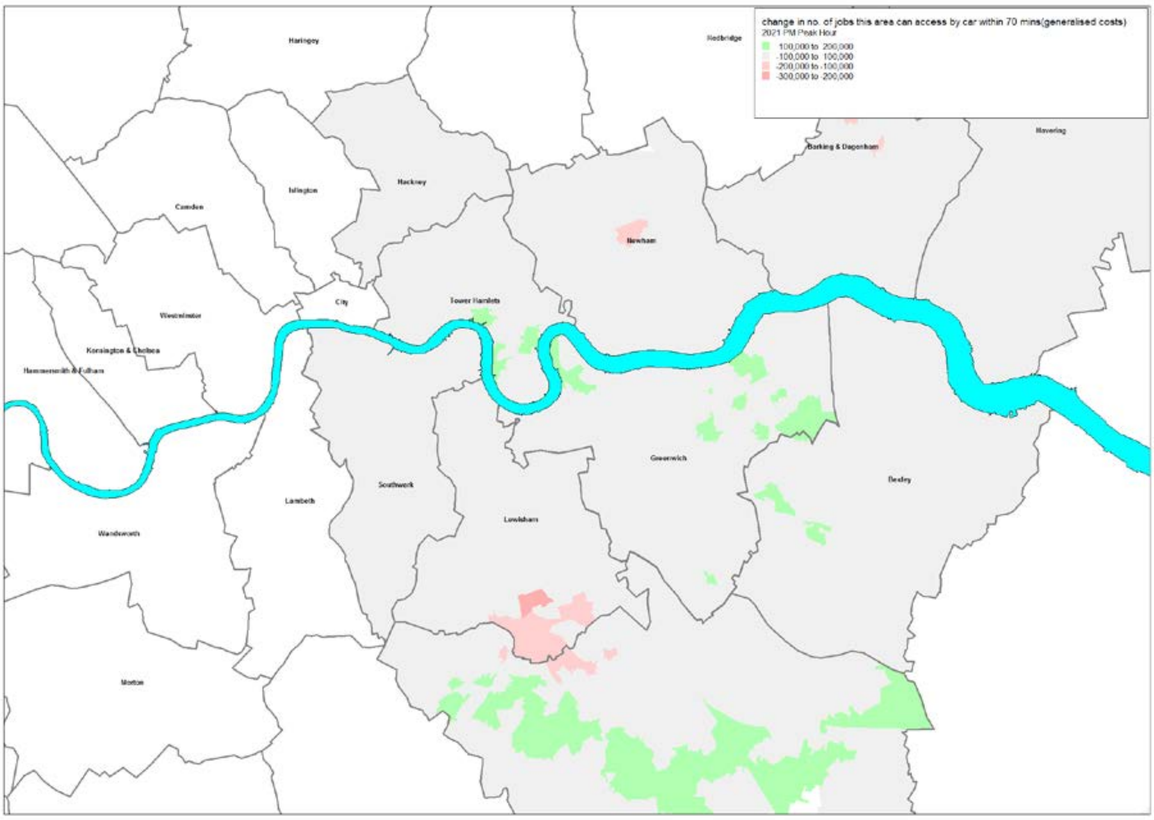


Figure 7-36: Change in job accessibility (2021 Reference Case v Assessed Case) based on generalised cost for Car Commuters – PM peak hour



7.5.12 However, since VoT is much higher for business trips, the Scheme results in connectivity improvements in terms of journeys with a generalised cost of fewer than 70 minutes when compared to the Reference Case. The comparison between the Reference Case and Assessed Case for business car trips for example is shown in Figure 7-37 and Figure 7-38 for the AM peak hour and PM peak hour respectively.

7.5.13 In summary, during the AM peak hour car business users living in south-east London have access to more jobs because of the generalised cost savings attributable to the Silvertown Tunnel scheme. During the PM peak, connectivity to jobs for business users from both north and south of the River Thames is improved because of improved generalised costs.

Figure 7-37: Change in job accessibility (2021 Reference Case v Assessed Case) based on generalised cost for Car Business – AM peak hour

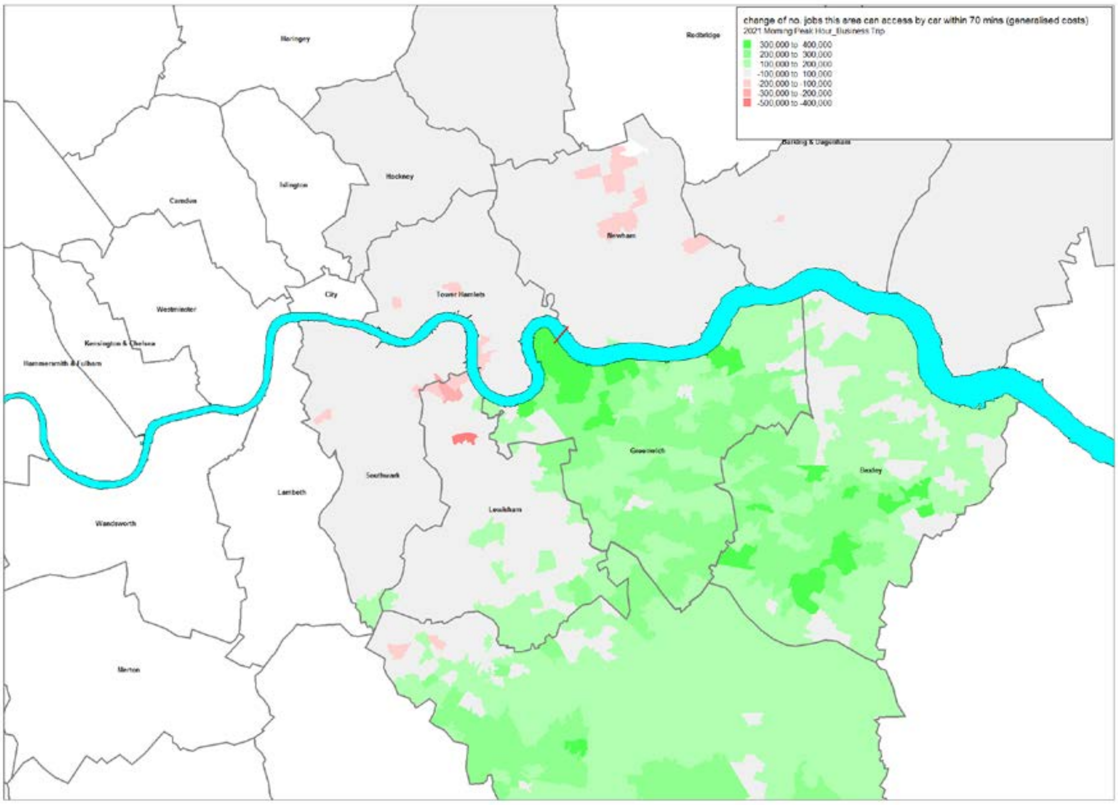
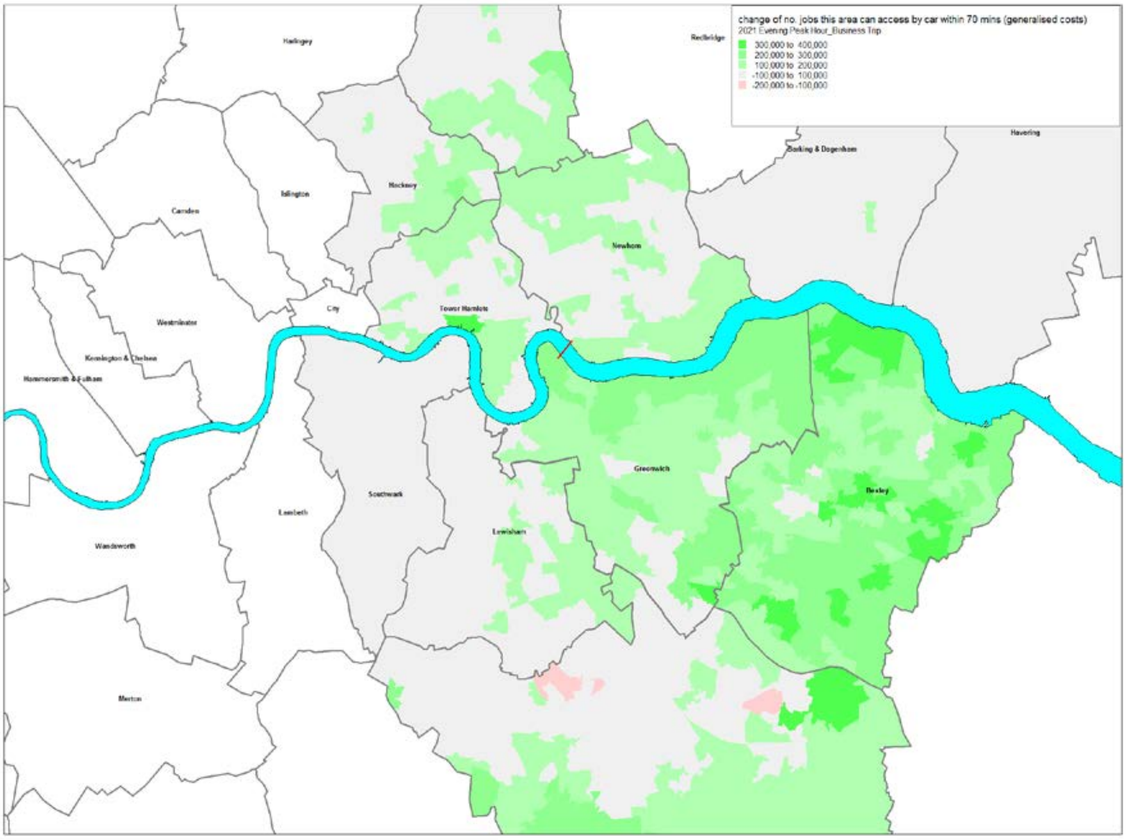


Figure 7-38: Change in job accessibility (2021 Reference Case v Assessed Case) based on generalised cost for Car Business – PM peak-hour



Freight

7.5.14 The analysis described above does not factor in the additional benefits to freight operations from the Silvertown Tunnel scheme. While the current river crossing restrictions set out earlier in this document place considerable constraints on vehicle types and their operations, the proposed Silvertown Tunnel would provide a river crossing that is available to most vehicle types, including HGVs over 4m in height and double-deck buses.

7.5.15 Information received from freight operators suggests that there are a range of responses by industry operators to the congestion issues at the Blackwall Tunnel. Industry representatives suggest that each minute of delay caused by congestion costs operators £1, so a 20 minute delay for example adds £20 of cost to freight operators for each vehicle.

7.5.16 Some operators currently appear to absorb the delays and costs, probably as a result of there being no viable alternative route. At least one major freight operator reported avoiding the Blackwall Tunnel entirely, and this would have knock-on implications for the wider highway network, suggesting a degree of diversion to other crossings.

7.5.17 The cost of diverted journeys is estimated by industry representatives as being approximately 33p per km[48]. Therefore, freight traffic diverted from the Blackwall Tunnel to the Dartford Crossing, as an example, could face additional fuel costs in the region of £12.50 (assuming traffic diverts via the A2 to the south of the River Thames). This leads to additional costs for businesses locally and nationally, and uncertainty in delivery times for both businesses and consumers.

7.6 Key points

7.6.1 The most pronounced transport impacts of the Silvertown Tunnel scheme would generally be seen in the local area surrounding the scheme (i.e. the Blackwall and Silvertown Tunnels and their approach roads).

7.6.2 At the busiest times of the day, when levels of demand to use the Blackwall Tunnel are at their highest, traffic flows in 2021 through the Blackwall and Silvertown Tunnels combined (the Assessed Case) are forecast to be higher than would be the case through the Blackwall Tunnel alone without the Scheme (the Reference Case). Small reductions in traffic flow are forecast

[48] Source: Freight Transport Authority estimate, based pm average operating costs for a 44 tonne articulated lorry

for the majority of the day outside of these times, and the net result is no significant change in daily cross-river traffic flows.

7.6.3 The increase in traffic flow through the tunnels at the busiest times – namely the northbound directions in both AM peak hour and the southbound direction in the PM peak hour – is made possible through the additional cross-river capacity that would be provided by the Silvertown Tunnel. In the Assessed Case the actual demand to use the tunnels reduces in these periods and, unlike the Reference Case, traffic flows match demand in all periods, which illustrates that congestion and delay on the approaches to the tunnels are virtually eliminated. This demonstrates the potential of the Scheme to increase the throughput of vehicles through the tunnels at the busiest times without causing overall increases in traffic, through a combination of new capacity and demand management. Overall the user charge is assessed as providing an effective mechanism for preventing induced traffic.

7.6.4 The ability to use the Blackwall and Silvertown Tunnels without encountering significant delay and congestion means that drivers are more likely to travel at the time of their choosing, rather than earlier or later in order to avoid the worst of the traffic (provided they are prepared to pay the relevant user charge). The peak periods could therefore contract at the Blackwall and Silvertown Tunnels, so that the distribution of trips across peak periods would come more into line with other major routes in London.

7.6.5 Journey times through the Blackwall Tunnel in peak periods and peak directions would be reduced by around 20 minutes or more, leading to improved connectivity for residents and businesses in east and southeast London. As well as significantly improving journey times and the day-to-day reliability of the road network, the Scheme would considerably enhance network resilience through reducing the number of over-height vehicle incidents and the impact of incidents at the Blackwall Tunnel when they do occur. The scheme would also significantly enhance the resilience of the network in the event of a long-term closure of the Blackwall Tunnel.

7.6.6 Changes at all other crossings in east London are minimal across all three modelled time periods, suggesting that other crossings are not significantly impacted by the Scheme. Where increases in traffic flows at other crossings are forecast, these increases are small relative to total flows and occur at times when the crossings are operating with spare capacity.

7.6.7 At the overall level, across the ESR as a whole and the three host boroughs, the total number of trips made by private vehicles is not forecast to change as a result of the Scheme; in fact, a marginal decrease in private trips is forecast as cross-river trips switch to PT modes (most notably the enhanced cross-river bus services that would be made possible by the Scheme). Noticeable reductions in VCR and junction delay are forecast on the approaches to the Tunnel; where negative changes are identified at junctions across the wider network the impacts are generally minimal and not of a scale that warrants proposals for mitigation. It is proposed that these junctions would be monitored and appropriate mitigation implemented as necessary. Further information on this is available in the Preliminary Monitoring and Mitigation Strategy.

7.6.8 A major benefit of the Scheme is the opportunity it provides to significantly enhance the bus network. Through reducing delay and providing a full-height Tunnel with designated lanes for buses and HGVs, new and extended cross-river bus routes (amounting to around forty buses per hour per direction) could be provided that would considerably improve public transport accessibility in the areas served. In 2021 it is forecast that almost 30% of trips made through the Blackwall and Silvertown Tunnels could be made via bus or coach.

7.6.9 The Scheme provides the opportunity for improving conditions for pedestrians and cyclists in the vicinity of the Silvertown Tunnel, for instance through enhancing access to the EAL. One of the requirements for the 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.

7.6.10 Access to the labour market and jobs would, on the whole, be significantly improved with the Scheme. Accessibility to jobs by public transport would improve in all time periods as a result of the enhanced bus network made possible by the Scheme and the journey time and reliability benefits it would bring for bus users. Accessibility by private vehicle would also improve significantly in journey time terms, with residents south of the River Thames estimated to see over 200,000 additional potential jobs accessible within a 45 minute journey time in the AM peak. Whilst the introduction of the user charge would mean accessibility for car commuters would be negatively impacted in terms of generalised cost, car-based business trips would generally see a significant improvement due to the higher values of time for these trips. Businesses and freight users would particularly benefit from the accessibility improvements provided by the Scheme.

8 SUMMARY OF SCHEME IMPACTS

8.1 Overview

8.1.1 It is recognised that there will be different levels of impacts on the various users of the transport system during both the construction phase and the operational phase of the Scheme. These impacts are expected to be either positive, neutral or negative, and regardless of their classification have each been considered.

8.1.2 This section summarises the likely impacts on the transport network and transport users during both the construction and operational phases of the Scheme and, where a negative impact is expected, describes the potential mitigation measures for ensuring such impacts are negated or minimised.

8.2 Construction impacts

8.2.1 Table sets out a summary of the anticipated impacts on the transport system during the construction phase of the Scheme. The detailed aspects of this phase are discussed in Chapter 6.

Table 8-1: Summary of construction impacts

Impact	Positive/ negative	Comment
Freight, servicing and business travel	Neutral	Negligible impact expected with construction traffic expected to be less than 2% of Reference Case flows
Car users (non-business)	Neutral	Negligible impact expected with construction traffic expected to be less than 2% of Reference Case flows
Bus passengers	Slight negative	During the Greenwich construction phases, minor route diversions would be necessary and temporary bus stops provided at suitable locations
Underground and DLR passengers	Slight negative	Onward routes from DLR stations impacted, however key PT access routes would remain open for the duration of the works
Pedestrians	Slight negative	Diversion routes identified and kept to minimum feasible length. A new permanent pedestrian and cycle bridge will be installed and operational before the existing Boord Street crossing is decommissioned
Cyclists	Slight negative	Diversion routes identified and kept to minimum feasible length

Coach passengers	Neutral	A stop used by a northbound commuter coach is likely to be temporarily closed during a phase of the Greenwich works, however a suitable alterative arrangement is expected to be identified
River users	Neutral	No impact
EAL passengers	Neutral	No impact.

8.2.2 As summarised above, the negative impacts during the construction phase are predominantly associated with local pedestrian access routes (including those to DLR and bus services) as well as a diversion to the existing bus service. In this regard, the following mitigation measures are proposed:

- construction work sites will have several temporary impacts on local pedestrian and cycling access and will necessitate the identification of diversion routes, ensuring they are kept to minimum feasible length.
- prior to the existing Boord Street crossing being removed, a new permanent pedestrian and cycle bridge will be installed and made operational to ensure a connection remains throughout the construction phase.
- there will be some impacts on PT 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 co-ordinated information campaign targeting the affected routes, stations and stops. TfL would employ its Travel Information communications channels to deliver this campaign.

8.2.3 It is noted that these impacts are temporary only and are expected to last for the duration of the construction phase or part of it. Following the construction phase, the anticipated impacts on the transport system with the Scheme in operation are summarised below.

8.3 Operational impacts

8.3.1 Table summarises the Scheme's ultimate impacts on the transport system as described in previous chapters.

Table 8-2: Summary of operational 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	Strong	Improved reliability, journey times and

passengers	positive	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	Slight positive	Improved Boord Street pedestrian and cycle bridge and controlled crossings at Tidal Basin Roundabout
Cyclists	Slight positive	Improved Boord Street pedestrian and cycle bridge and controlled crossings at Tidal Basin Roundabout, together with targeted improvements to improve access to the EAL
Coach passengers	Strong 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
EAL passengers	Neutral	Provides a crossing of the river for pedestrians and cyclists, complementing the road tunnel. No impact.

8.3.2 Based on the above summary, there is not considered to be a significant negative impact on users of the transport network in the vicinity of the Scheme. However, it is recognised that there may potentially be other flow-on effects that may necessitate further mitigation. These are discussed below.

Highway network

8.3.3 The provision of reliable journey times for freight on the strategic road network is one of the objectives of the Silvertown Tunnel scheme. However, appropriate mitigation is required to ensure that any increase in vehicle traffic does not adversely impact upon local residential streets. This could include measures targeted at restricting access by large vehicles on certain streets.

8.3.4 An assessment of local junctions has shown that the implementation of the Scheme is expected to have only modest impacts on junction delays in the 2021 modelled year, and none of the increases in 2021 appear to warrant the implementation of specific mitigation measures prior to Scheme opening, particularly as none of the changes are currently anticipated to have a material impact on journey times.

8.3.5 Notwithstanding this, following the opening of the Scheme, detailed traffic data would be collected on an annual basis for a period of five years to identify actual Scheme impacts on the local road network and then develop appropriate mitigation measures in consultation with the relevant borough(s)

Further information on this can be found in the Preliminary Monitoring and Mitigation Strategy.

8.3.6 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 regimes (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.

Public transport - coaches

8.3.7 While some of the commuter coach routes currently stop on the Blackwall Tunnel Approach, this option would not be available under the proposed design for the Silvertown Tunnel approaches. If coach operators wished to continue serving North Greenwich, alternative coach stops may be required near to the Silvertown Tunnel slip roads. Further discussions would be undertaken with representatives from the coach industry as the Scheme is developed on potential stopping arrangements and coach routeing via the Silvertown Tunnel.

Walking and cycling

8.3.8 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. With the future development of the Royal Docks it will become even more important for the walking and cycling routes in the area to be well linked, reinforcing the importance of the Tidal Basin roundabout works.