




SILVERTOWN TUNNEL

SUPPORTING TECHNICAL DOCUMENTATION

PRELIMINARY CASE FOR THE SCHEME

October 2015

This report sets out the need for the Silvertown Tunnel scheme and how it was developed. It explains the main alternatives that were considered, and outlines the benefits of the Scheme and how it meets its objectives. It also assesses the Scheme against relevant national, regional and local policy. A draft Monitoring and Mitigation Strategy is included in this report.



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 Case for the Scheme

October 2015

MAYOR OF LONDON



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Silvertown Tunnel

Preliminary Case for the Scheme


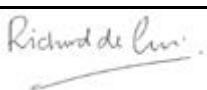
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List of Abbreviations

AADT	Annual Average Daily Traffic
AQMA	Air Quality Management Area
BPH	Buses per Hour
CCTV	Closed Circuit Television
CEMP	Construction Environmental Management Plan
CIL	Community Infrastructure Levy
CoCP	Code of Construction Practice
dB	Decibel
DCO	Development Consent Order
DLR	Docklands Light Railway
EAL	Emirates Air Line (cable car)
EDS	Economic Development Strategy
EIA	Environmental Impact Assessment
EiP	Examination in Public

ELL	East London Line
EqIA	Equality Impact Assessment
EWT	Excess Wait Time
FALP	Further Alternations to the London Plan
FSC	Further Suggested Changes
FTA	Freight Transport Association
GLA	Greater London Authority
GLAA	Greater London Authority Act
HGV	Heavy Goods Vehicle
HIA	Health Impact Assessment
LB	London Borough
LGV	Light Goods Vehicle
LoHAC	London Highways Alliance Contract
LTraCS	London Traffic Control System
MPH	Miles per Hour

MTS	Mayor's Transport Strategy
NB	Northbound
NNNPS	National Networks National Policy Statement
NPPF	National Planning Policy Framework
NPS	National Policy Statement
NSIP	Nationally Significant Infrastructure Project
OBC	Outline Business Case
OGV	Other Goods Vehicle
PCU	Passenger Car Unit
PEIR	Preliminary Environmental Impact Report
PLA	Port of London Authority
PO	Project Objective
PT	Public Transport
PTAL	Public Transport Accessibility Level
RB	Royal Borough

RSI	Road Side Interview
SAF	Strategic Assessment Framework
SB	Southbound
SoS	Secretary of State
SPD	Supplementary Planning Document
TfL	Transport for London
TGB	Thames Gateway Bridge
TLRN	Transport for London Road Network
ULEZ	Ultra Low Emission Zone
WebTAG	DfT Web-based Transport Analysis Guidance

Glossary of Terms

Air Quality Management Area	Monitored results of any of the pollutants must be evaluated against national air quality objectives, which are defined by statutory legislation. An Air Quality Management Area (AQMA) is an area that local authorities are obliged to designate, if monitored air pollution exceeds the objectives.
AM peak	The morning peak hours when traffic is busiest. In the context of the Silvertown Tunnel scheme this applies to the hours between 6:00 and 10:00 in the northbound direction.
Assessed Case	Scenario adopted for assessment of likely effects of the proposed scheme, with user charges set so as to balance the Scheme's traffic, environmental, socio-economic and financial objectives.
CEEQUAL	The evidence-based sustainability assessment, rating and awards scheme for civil engineering, infrastructure, landscaping and the public realm, and celebrates the achievement of high environmental and social performance.
COBA-LT	A computer program developed by the Department for Transport to undertake the analysis of the impact on accidents as part of economic appraisal for a road scheme.

Counter-peak	In the context of the Silvertown Tunnel, where traffic flow is tidal in nature, the counter peak refers to the hours of 6:00-10:00 southbound and 16:00-19:00 northbound i.e. the opposite directions of the AM peak and PM peak.
Demand flow	A traffic modelling term which refers to the traffic that would be allocated to the link irrespective of capacity.
Development Consent Order	This is a statutory order which provides consent for the project and means that a range of other consents, such as planning permission and listed building consent, will not be required. A DCO can also include provisions authorising the compulsory acquisition of land or of interests in or rights over land which is the subject of an application.
Emirates Air Line	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.
Enterprise Zone	An area in which state incentives such as tax concessions are offered to encourage business investment.
Excess Wait Time	The time waited in excess of the average scheduled wait time e.g. when waiting for a bus service.

<p>Induced traffic</p>	<p>The implementation of an improvement to the road network has the potential to generate additional traffic on the improved section if new users respond by, for example, diverting from other routes, changing their origin or destination (trip locations), or switching from other transport modes. This additional traffic is often referred to as induced traffic.</p>
<p>Inter peak</p>	<p>The time period between the AM peak and the PM peak when traffic levels are lower. In the context of the Silvertown Tunnel scheme this refers to the hours between 10:00 and 16:00.</p>
<p>LoHAC</p>	<p>The London Highways Alliance Contract is a framework of collaborative highways services contracts. Authorities can form individual call-offs with no loss of sovereignty. The contract was developed jointly by London boroughs and TfL, it enables them to carry out a wide variety of tasks using four area-based contractors.</p>
<p>Mode share</p>	<p>The percentage of trips or people using a particular mode of transport. Also referred to as mode split.</p>
<p>Mode shift</p>	<p>A change in the percentage mode share composition e.g. increase in the percentage of trips made by public transport and decreasing the percentage of trips made by car.</p>

<p>Opportunity Areas</p>	<p>London's major source of brownfield land with significant capacity for new housing, commercial and other development linked to existing or potential improvements to public transport accessibility.</p>
<p>Passenger car unit</p>	<p>A method used in Transport Modelling to allow for the different vehicle types within a traffic flow group to be assessed in a consistent manner. Typical factors are 1 for a car or light goods vehicle, 2 for a bus or heavy goods vehicle, 0.4 for a motorcycle and 0.2 for a pedal cycle.</p>
<p>PM peak</p>	<p>The evening peak hours when traffic is busiest. In the context of the Silvertown Tunnel scheme this applies to the hours between 16:00 and 19:00 in the southbound direction.</p>
<p>Public Transport Accessibility Levels</p>	<p>A detailed and accurate measure of the accessibility of a point to the public transport network, taking into account walk access time and service availability. The method is a way of measuring the density of the public transport network at any location within Greater London.</p>
<p>Quietways</p>	<p>Quietways will be a network of radial and orbital cycle routes throughout London. Linking key destinations, they will follow backstreet routes, through parks, along waterways or tree-lined streets.</p>

<p>Ramp metering</p>	<p>A ramp meter, ramp signal or metering light is a device, usually a basic traffic light or a two-section signal (red and green only, no yellow) light together with a signal controller that regulates the flow of traffic entering freeways according to current traffic conditions.</p>
<p>Reference Case</p>	<p>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.</p>
<p>Reference Design</p>	<p>Design proposals that the consultation and DCO application will refer to.</p>
<p>Safeguarding</p>	<p>Safeguarding is a formal process, undertaken by the Department for Transport (DfT), to protect land required for major new infrastructure projects from future development. The Safeguarding Directions, made by the Secretary of State for Transport, instruct local planning authorities to consult TfL on planning applications for land within the safeguarded area.</p>
<p>Thames Gateway</p>	<p>An area of land stretching 70 kilometres east from inner east London on both sides of the River Thames and the Thames Estuary.</p>

Tidal flow	Tidal flow refers to a road where a lane or lanes can sometimes carry traffic in one direction and at other times in the opposite direction, to help with traffic flow. This was in operation at the Blackwall Tunnel between 1978 and 2007.
WebTAG	The Department for Transport's web-based transport analysis guidance

SUMMARY

Purpose of this Preliminary Case for the Scheme

1. This document sets out the need for the Scheme, explains how strategic options were assessed, and describes how the details of the Scheme, including the user charging proposal, were developed. It then describes the benefits for private and public transport users, and outlines how impacts would be managed. It concludes by showing how policy underpins the Scheme.

A growing London needs a range of river crossings

2. There is set to be substantial growth in London over the next 15 years - with an estimated ten million people expected to reside in the Capital by 2030. With this growth comes increased pressure on existing infrastructure, services and connections to move our people and goods. Within London, it is the east sub-region which will see the biggest increase in population, housing and employment.
3. Transport for London (TfL) is planning for the impacts of this growth. Fundamental to accommodating this growth in a sustainable manner will be measures to overcome poor connectivity in east London. In particular it is necessary to address the severance caused by the River Thames.
4. This will require investment across the board in river crossings which improve connections for pedestrians, cyclists, public transport and road users. TfL has developed plans for a series of new crossings, many of which are now being progressed through the River Crossings programme. The Silvertown Tunnel is one of the first in the programme and could be operational in 2022/23.
5. There has been a period of sustained investment in public transport capacity across the whole of east London over the past 20 years, which by the opening of Crossrail in 2018, will have led to almost a tenfold increase in the capacity of the cross river rail network east of Tower Bridge. This has contributed to London's excellent track record in achieving substantial mode shift from private to public transport. Since 2000 the public transport mode share for London has increased by more than ten percentage points and in 2013 public transport mode share overtook private mode share for the first time.

The need for a new road crossing close to the Blackwall Tunnel

6. There are few road-based crossings in the east: the Rotherhithe Tunnel, the Blackwall Tunnel and the Woolwich Ferry (the Dartford Crossing, 25km to the east, is outside London). All of the vehicle river crossings in east London are capacity-constrained, outdated in design and ageing.
7. Because of its position, and the lack of alternatives, the Blackwall Tunnel has become the strategic crossing in east London. Not only does it carry the most traffic of all the road crossings in east London, it carries the most traffic of any road crossing in all of London. But the Blackwall Tunnel has three significant problems: congestion, closures and incidents, and a lack of resilience. These problems are long-standing and have significant adverse effects on the environment and the economy. They also act as a constraint on the provision of public transport services across the river by bus and coach. Given the importance of the Blackwall Tunnel as a road crossing in east London, the effects of these problems are highly significant.
8. Despite huge increases in the availability and use of public transport, traffic at the Blackwall Tunnel has grown steadily over the last twenty years, and despite further investment in public transport, the scale of growth forecast means this trend will inevitably continue. Although only one in five cross river trips is made by private transport, some trips can only be made in a vehicle (for example, 85 per cent of all freight in London is carried by road).
9. Since the election of a new Mayor in 2008, TfL has thoroughly assessed a range of options for river crossings in east London. This work has led to the development of policy in the London Plan and local development plans, as well as the Mayor's Transport Strategy (MTS) which support a road tunnel at Silvertown as part of the River Crossings Programme. A user charge as a means of managing demand and paying for new river crossings is also supported in the MTS.
10. TfL has developed the Scheme as the best option to address the three problems of the Blackwall Tunnel. Once the Silvertown Tunnel becomes operational, a user charge would be applied at both Blackwall and Silvertown tunnels. The user charge would help to manage demand for both crossings and keep traffic levels within appropriate limits, and help to pay for the new Tunnel.

Benefits of the Scheme

11. The Scheme would directly address the severe and ongoing lack of resilience in the cross-river network in east London by adding an additional

tunnel adjacent to the Blackwall Tunnel. Being built to modern standards, the Tunnel would be able to accommodate the tall vehicles which are currently the cause of so many closures of the Blackwall Tunnel. The existence of a diversion route so close to the Blackwall Tunnel would also mean that congestion and delay on the surrounding road network would be reduced in the event of any remaining closures.

12. The Scheme would enable a network of new cross-river bus services (including double-deck buses). TfL has identified several route extensions and two potential new routes, and in future there is the potential for more than 60 buses per hour in this location. Similarly it would provide further opportunities for enhanced cross-river commuter coach services through extra capacity and more reliable journey times.
13. All users of the Blackwall and Silvertown tunnels - including bus and coach passengers - 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 tunnels of up to 20 minutes in peak periods. Journey time reliability would also be greatly improved and drivers are more likely to travel at the time of their choosing, rather than adapt their journey time to avoid the worst of the congestion. Overall levels of traffic would not increase, because of the demand management effect of the charge and the existence of new public transport alternatives. The user charge would maximise time-savings and lock them in for the future.
14. With a similar amount of traffic moving more efficiently, the Scheme is expected to result in an overall net reduction in air quality emissions from road transport.
15. The development of the Scheme has been informed throughout by the desire to support future development and optimise the use of sustainable transport. TfL would use the opportunity provided by the Scheme to improve the road layout in the area to help cyclists and pedestrians and make a more attractive environment around the north and south portals.
16. The public transport mode share in the east and south-east sub-region is expected to increase from around 39 per cent to around 42 per cent in 2021, regardless of whether the Scheme is in place. The share of daily Blackwall Tunnel / Silvertown Tunnel trips made by public transport would increase from just over 10% currently to nearly 30% with the Scheme in 2021.
17. The scheme has an Initial Net Present Value (NPV) of £979m, rising to £1,273 once reliability benefits are included.

18. TfL would use the powers granted by the DCO to vary the charge in response to changing conditions and to maintain an appropriate balance between the effects of the Scheme and to ensure that it continues to meet its objectives. Limited discounts and exemptions would be available to help mitigate any adverse impacts.
19. As well as the main benefits summarised above, the Scheme has been designed to optimise the additional (or legacy) impacts, both in construction and operation. These include for example a commitment to local employment and training, changes to road layout on the approach roads and the use of low-emission buses. TfL would set up a Community Fund to deliver transport, environmental and social enhancements to local communities, and could be used to mitigate any adverse impacts arising from the charge on low-income groups.

Next steps

20. TfL has already undertaken several non-statutory consultations which indicate support for new river crossings in east London, and, when asked about a crossing at Silvertown, more than three-quarters of respondents have been supportive each time. In preparation for this consultation TfL has revisited all the options for potential new river crossings - including those put forward by stakeholders and other consultation respondents - to check that this is still the right option. This assessment is included in the Case.
21. The Scheme was designated as a Nationally Significant Infrastructure Project (NSIP) by the Secretary of State in 2012. As such, TfL is applying for a Development Consent Order (DCO) in order to construct the Tunnel.
22. A statutory consultation on the Silvertown Tunnel Scheme runs from 5 October to 29 November 2015. Following this consultation, TfL will carefully consider comments made by the public and stakeholders as part of its continuing appraisal of the justification for the Scheme and in order, where appropriate, to improve and refine the Scheme proposals. Subject to its consideration of consultation responses, TfL aims to submit a DCO application to the Planning Inspectorate in spring 2016.
23. Over the next 20 years TfL envisages that multiple new crossings of the river will be needed across London with a clear focus on east London. Later this year TfL will consult on potential crossings at Gallions Reach and Belvedere. Together, these crossings will improve the reliability and resilience of the road network - which is vital to businesses in London. They will transform connectivity, bringing in investment and open up London's opportunities.

They will also provide for the expansion of public transport connections and encourage more active travel. In this way the shift towards public transport can be maintained in the context of significant growth.

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1. INTRODUCTION

1.1 Overview of the Silvertown Tunnel scheme

- 1.1.1 Transport for London (TfL) is a statutory body created by the Greater London Authority Act 1999 (GLAA). The GLAA imposes on the Mayor of London a general duty to develop and apply policies to promote and encourage safe, integrated, efficient and economic transport facilities and services to, from and within London. TfL is responsible for delivering these services on the Mayor's behalf.
- 1.1.2 TfL is also the statutory highway and traffic authority for the TfL Road Network (TLRN), and is responsible for the maintenance, management and operation of traffic signals throughout London. TfL has a network management duty under the Traffic Management Act 2004 which requires it to make sure road networks are managed effectively to minimise congestion and disruption to vehicles and pedestrians.
- 1.1.3 The Silvertown Tunnel Scheme (the Scheme) involves the construction of a twin bore road tunnel providing a new connection between the A102 Blackwall Tunnel Approach on the Greenwich Peninsula (Royal Borough of Greenwich) and the Tidal Basin roundabout junction on the A1020 Lower Lea Crossing/Silvertown Way (London Borough of Newham).
- 1.1.4 The Scheme also includes the introduction of free-flow user charging on both the Blackwall Tunnel (northern portal located in London Borough of Tower Hamlets) and at the new Silvertown Tunnel. This measure is intended to play a fundamental role in managing traffic demand and supporting the financing of the construction and operation of the Silvertown Tunnel.
- 1.1.5 The Silvertown Tunnel would be approximately 1.4km long and would be designed to accommodate large vehicles including double-deck buses. It would include a dedicated bus, coach and goods vehicle lane, which would enable TfL to provide additional cross-river bus routes.
- 1.1.6 The Scheme is proposed in response to the need to address three significant transport problems which exist at the Blackwall Tunnel crossing: continuing congestion, frequent closures and incidents, and a lack of resilience to traffic disruption and delay caused by incidents at the tunnel (owing to the lack of proximate alternative road crossings). As well as being costly in themselves in terms of time lost and unpredictability,

these transport problems have significant adverse social, economic and environmental effects both locally and regionally. In the context of continued significant growth, the transport problems of the Blackwall Tunnel are forecast to become more serious, and in turn their secondary impacts (on the economy, environment and public transport) will increase. Failing to address these problems could hamper the sustainable and optimal growth of London and the UK.

1.1.7 The Scheme would significantly reduce congestion, day-to-day journey time variability and deliver congestion-relief benefits during peak times on the main approach roads to the tunnels, including the A102, the A12 and the A13. The user charge is critical in ensuring that the benefits of the Scheme are locked-in for the longer-term, and would also help to pay for the Scheme.

1.1.8 The most important impact on public transport would be the opportunity the Scheme would create for new cross-river bus services to improve public transport 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 in the bus routes that could be extended across the Thames, as well as greater capacity for buses and commuter coaches alike.

1.2 The application for a Development Consent Order (DCO)

1.2.1 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 Scheme should 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.

1.2.2 The reasons given for the direction were:

- i. London's importance as an engine for economic growth nationally
- ii. The projected growth of London
- iii. The impact of congestion at the Blackwall tunnel on the strategic road network
- iv. The size and nature of the Silvertown Tunnel and comparison to other NSIPs

1.2.3 DCO applications must be determined in accordance with the relevant National Policy Statement (NPS). For highway schemes, the relevant NPS is the NPS on National Networks (December 2014). The Secretary of State will use this NPS as the primary basis for the decision on the DCO application made by TfL. This Preliminary Case shows how the Scheme complies with the policies and requirements set out in the National Networks NPS (NNNPS).

1.2.4 For schemes which have been designated as nationally significant under section 35, the NNNPS states that

“the relevant development plan is also likely to be an important and relevant matter especially in respect of establishing the need for the development”.

1.2.5 In this case the relevant development plan is the London Plan together with the local development plans of the three host boroughs for the Scheme: Royal Borough of Greenwich and London Boroughs of Newham and Tower Hamlets. The Mayor’s Transport Strategy (MTS)¹ is also a document constituting a significant material consideration in this context. This Preliminary Case therefore also seeks to demonstrate how the Scheme complies with the development plan and the MTS.

1.3 Structure of this document

1.3.1 This document sets out the need for the Scheme, explains how strategic options were assessed, and describes how the details of the Scheme, including the user charging proposal, were developed. It then describes the benefits for private and public transport users, and outlines how impacts would be managed. It concludes by showing how policy underpins the Scheme.

1.3.2 Chapter 2 describes how the Blackwall Tunnel came to be the only strategic highway crossing in east London, and explores the three transport problems directly arising from this. It explains the secondary effects of these and how in the context of growth, the need to resolve these problems becomes more pressing.

¹ GLA, 2010, Mayor’s Transport Strategy

- 1.3.3 Chapter 3 sets out the strategic assessment of options undertaken by TfL in identifying the road tunnel option at this location, and provides context in relation to TfL's wider River Crossings programme of which the Silvertown Tunnel scheme is part. It also describes how this assessment led to the development of policies for both new river crossings and for the use of road user charging in the London Plan and Mayor's Transport Strategy. In preparing the proposed application for statutory consultation TfL has reviewed the options again to ensure that the selection process remains valid and robust. The review is reported at Appendix A.
- 1.3.4 Chapter 4 outlines why and how user charging forms an integral part of the Scheme. It describes why a user charge is important and how TfL proposes to set this charge in future. Appendix C is a draft of the monitoring and mitigation strategy that TfL would use once the Scheme is implemented.
- 1.3.5 Chapter 5 focuses on the detailed development of the Scheme which is now proposed, summarising the options considered for the road tunnel. Both this chapter and Chapter 3 make reference to how consultation has informed the development of the Scheme.
- 1.3.6 Chapter 6 sets out how the Scheme has been optimised in terms of its direct and additional benefits, which together encompass transport, environmental and other benefits. It also illustrates how the Project Objectives would be fulfilled and how these link to development plan policies and the MTS.
- 1.3.7 Chapter 7 shows how the Scheme complies with relevant policy: it also sets out how the benefits would be optimised and how any adverse impacts would be managed and mitigated. (Appendix B shows how specific policy tests have been met.)

1.4 Next steps

- 1.4.1 There is set to be substantial growth in London over the next 15 years – with an estimated ten million people expected to reside in the Capital by 2030. With this growth comes increased pressure on existing infrastructure, services and connections to move our people and goods. Within London, it is the east sub-region which will see the biggest increase in population, housing and employment in the coming years.
- 1.4.2 Transport for London is planning for the impacts of this growth. Fundamental to accommodating this growth in a sustainable manner will

be measures to overcome poor connectivity in east London. In particular it is necessary to address the severance caused by the River Thames.

- 1.4.3 This will require investment across the board in river crossings which improves connections for pedestrians, cyclists, public transport and road users. TfL has developed plans for a series of new crossings, many of which are now being progressed through the River Crossings programme. The Silvertown Tunnel is one of the first in the programme.
- 1.4.4 These crossings will improve the reliability and resilience of the road network – which is vital to businesses in London. They will transform connectivity, bringing in investment and opening up London’s opportunities. They will also provide for the expansion of public transport connections and encourage more active travel.
- 1.4.5 This Case for the Scheme is part of a suite of preliminary documents which have been made available for the statutory consultation on the Silvertown Tunnel Scheme which runs from 5 October to 29 November 2015. Following this consultation, TfL will carefully consider comments made by the public and stakeholders as part of its continuing appraisal of the justification for the Scheme and in order, where appropriate, to improve and refine the Scheme proposals. Subject to its consideration of consultation responses, TfL aims to submit a DCO application to the Planning Inspectorate in spring 2016. This application will seek development consent to build and operate the Scheme and all associated measures.
- 1.4.6 Under this timetable, the new Silvertown Tunnel could be open in 2022/23. Upon implementation, a user charging regime would be put in place at both the Blackwall and Silvertown tunnels.

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2. THE NEED FOR THE SCHEME

2.1 Overview

2.1.1 This chapter considers how the development of London has led to a situation where the Blackwall Tunnel stands as the single strategic river crossing in London for vehicular traffic east of Tower Bridge, and how (together with problems inherent in its design) this situation leads to significant transport problems. It will also identify important secondary effects of these transport problems, showing that these problems have existed for some time and that they are already having a negative effect on London. In the context of significant growth, the effects are forecast to deteriorate with an increasing impact on the London and UK economy. This means that there is a pressing need to take action now.

2.2 River crossings reflect the development of London

2.2.1 The limited number of east Thames river crossings for highway traffic is in part a legacy of the Capital's development². This saw residential and commercial growth take place in the central and western parts of the city, while the east became the home for industrial and shipping activities which had less need for extensive cross-river infrastructure.

2.2.2 However, the last five decades have seen those industries decline, and the inner eastern sector of London has become a hub of the knowledge economy, a leisure destination, and home to a rapidly growing population. Together with growth in central London, this change has led to increasing demand for travel to and through the former docklands from London and the wider South East.

2.2.3 Central to this story is the River Thames. East of the Tower of London, the river is broad and deep – ideal for docks and shipping. As a consequence, wharves and industry began to line the banks. The presence of large, sea-going ships prevented the construction of low-level bridges, and the concentration of industry along the river banks led to limited demand for cross-river movements. These characteristics, and the physical and

² See for example: Centre for London, 2014, Linking London East Thames Crossing Report

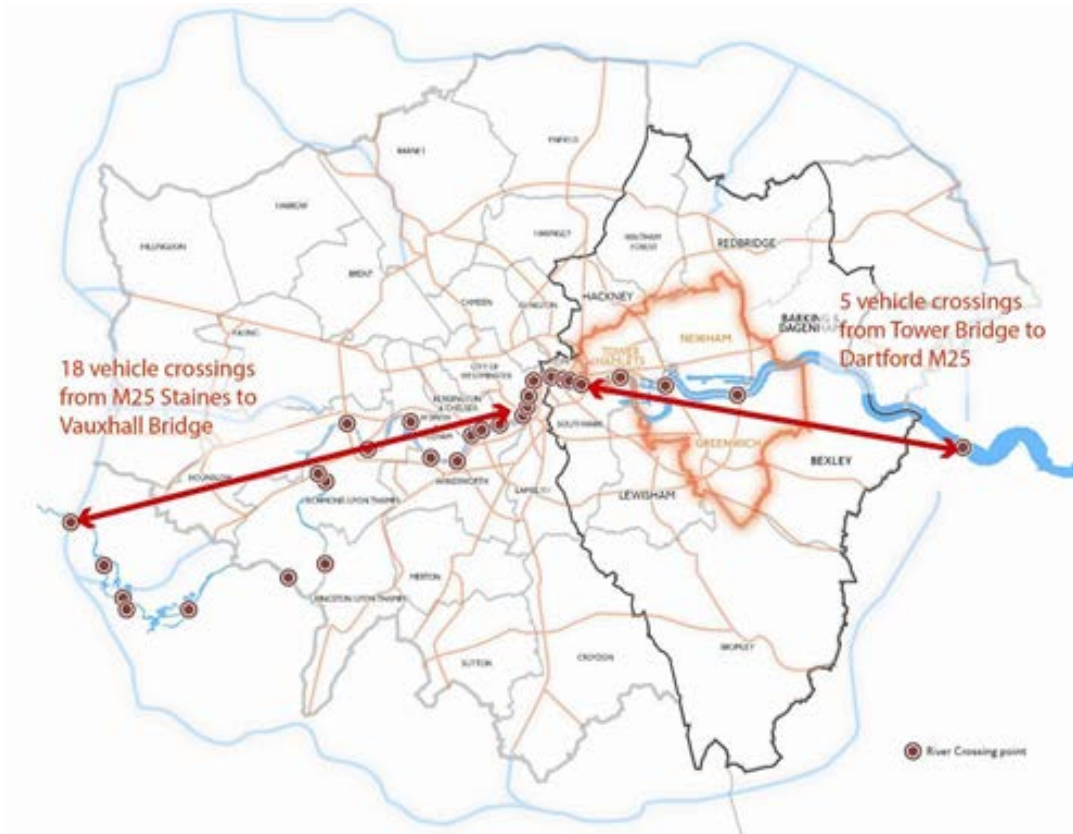
engineering constraints imposed by the River Thames, are reflected in the river crossings constructed to date.

- 2.2.4 In the east, the river crossings are few in number and limited in capacity. Crossings that have been constructed here (the Rotherhithe and Blackwall tunnels and the Woolwich Ferry) were all designed to avoid interference with shipping. What is now the northbound bore of the Blackwall Tunnel was opened in 1897, and like the Rotherhithe Tunnel, was originally for horse-drawn traffic³. A second bore was opened in 1967, in recognition of the inadequacy of the single tunnel, which had until that point served traffic in both directions. Although shipping is no longer so economically important, vessels retain the right of navigation downstream and plans for crossings in east London must still consider the need to avoid impeding their movement.
- 2.2.5 Meanwhile west London attracted predominantly residential and commercial uses and the Thames posed fewer constraints to engineers. Tall ships cannot travel west of London Bridge, and the distance from bank to bank at Putney is one fifth as wide as at Woolwich. For these reasons, it is relatively easy to construct low-level bridges in west London which can be used by vehicles, pedestrians and cyclists alike. These are generally cheaper than tunnels to construct, and as a consequence of demand married with feasibility, low-level bridges have proliferated.
- 2.2.6 The result is that in west London, highway crossings of the Thames are spaced on average 2km apart, and in central London the average distance is around 1km. In the east, the average is 8km. Yet population numbers and population density between west and east are now not dissimilar and with much of London's population growth happening in east London, the demand for crossings will increase.

³ The tunnel could also be used by pedestrians, but this was not its primary purpose.

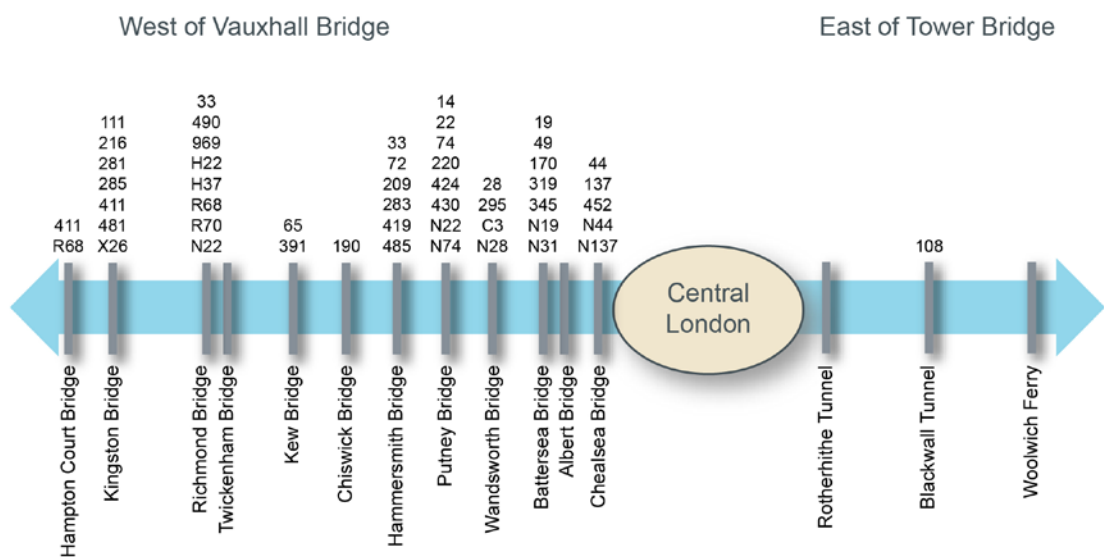
2.2.7 The disparity between the availability of crossings in the east and west of the Capital is illustrated clearly in Figure 2-1 where it can be seen that there are 18 crossings in the 29km from Vauxhall Bridge to the M25 (Staines) in west London, but only five crossings in the 23km from Tower Bridge to the M25 (Dartford) in east London.

Figure 2-1: Vehicle crossings in east and west London



2.2.8 It is not only users of private vehicles who are disadvantaged by this paucity of road crossings in east London: the provision of bus and coach services is also hindered. In west London there is at least one bus route over all but two of its bridges (the exceptions being Albert and Twickenham bridges).

Figure 2-2: Cross-river bus services in east and west London



2.2.9 In east London, the limited number of road crossings acts as a major constraint on the number of cross-river bus services that can be operated. Only the Blackwall Tunnel provides a suitable opportunity for a bus route (the 108) and it can only accommodate single-deck buses owing to its size.

2.2.10 As will be described in section 2.9.10 below, the 108 service is badly affected by the congestion, closures and lack of resilience of the Blackwall Tunnel. These problems undermine the feasibility of running further services through the Tunnel. Of the three remaining crossings to the east of Tower Bridge, the Dartford Crossing⁴ is outside the Greater London Authority (GLA) area, and neither the Rotherhithe Tunnel nor the Woolwich Ferry can accommodate buses.

⁴ The Dartford crossing comprises a tunnel and a bridge.

2.2.11 Highway travel is an important component of transport provision in London for both private road users and for public transport in the form of buses and coaches. However, it is only part of the transport story: dedicated public transport links are also important. In contrast to the road network, there has been a period of sustained investment in public transport capacity across the whole of east London over the past 20 years.

2.2.12 Led by the regeneration of Docklands, six new rail crossings of the Thames in east London have been implemented, with a further crossing to come in the form of Crossrail. This means that by 2020, there will be almost as many rail crossings to the east of Tower Bridge as to the west of Vauxhall Bridge (Figure 2-3). This investment will have led to almost a tenfold increase in the capacity of the cross river rail network east of Tower Bridge, as shown in Figure 2-4.

Figure 2-3: Cross-river rail services in east and west London

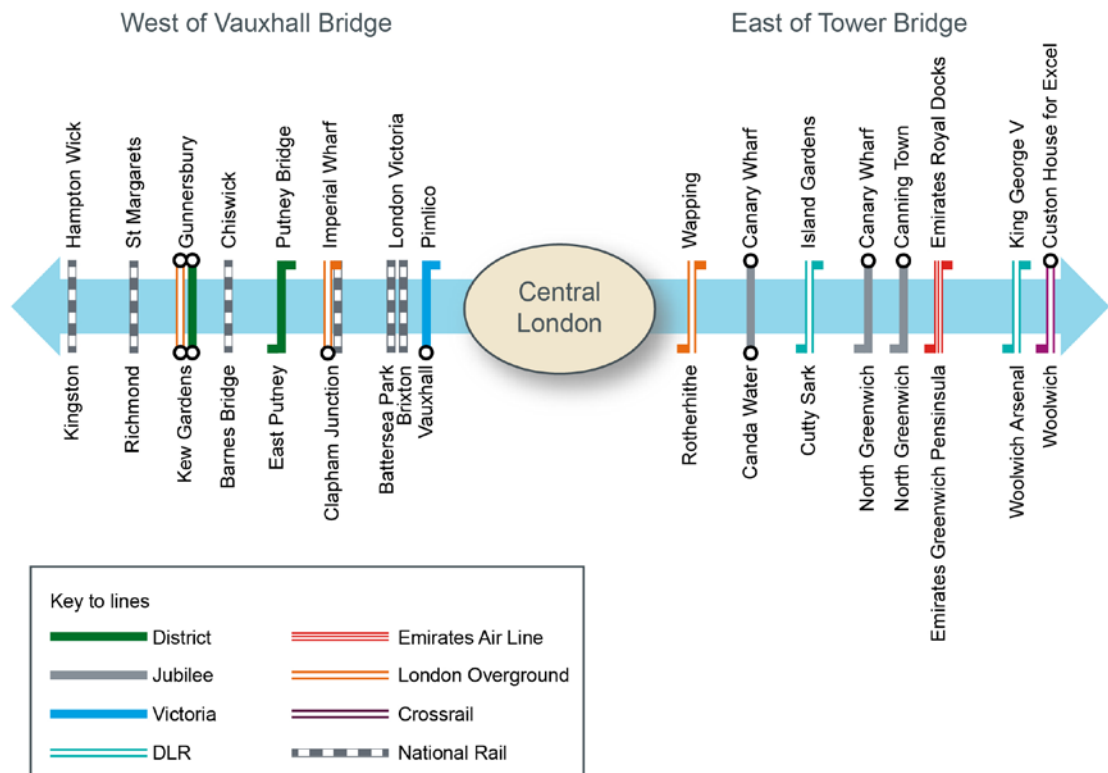
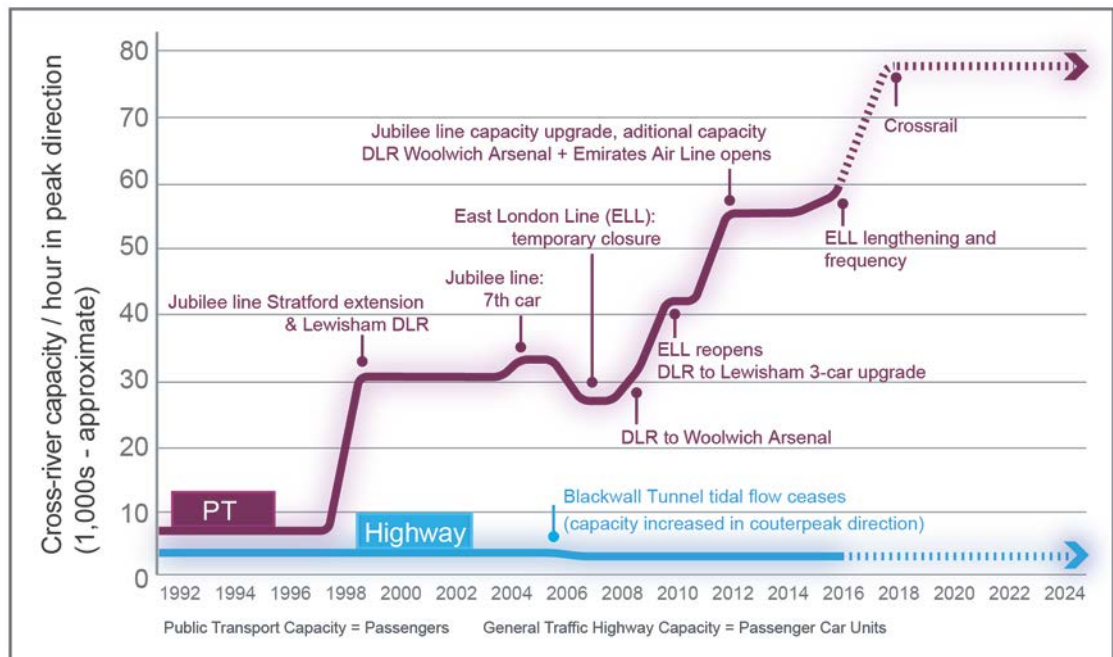
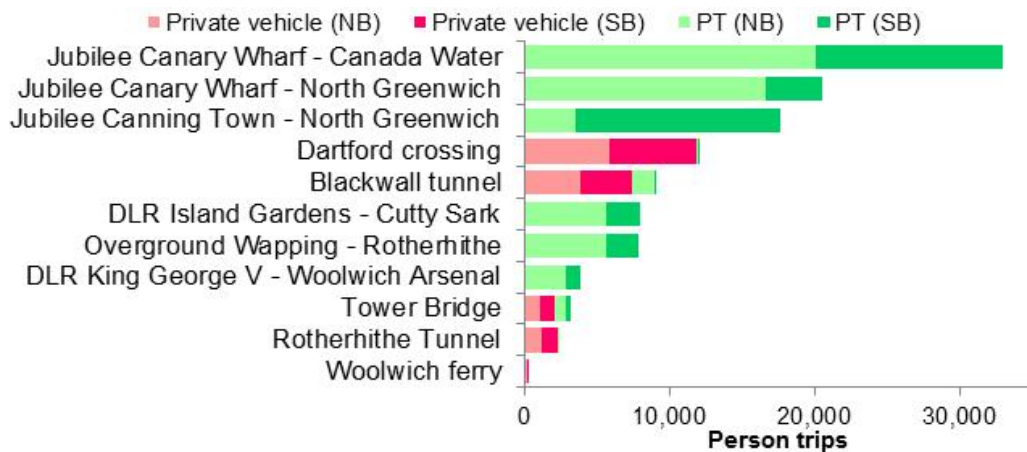


Figure 2-4: Increase in rail capacity east of Tower Bridge



2.2.13 This investment and prioritisation of rail investment has had a direct influence on the patterns of travel that have developed in east London in recent years. As shown in Figure 2-5 public transport trips overwhelmingly dominate cross-river travel for both northbound and southbound journeys.

Figure 2-5 AM peak hour (08:00-09:00) cross-river road and public transport person trips in east London (2012-13)⁵



2.2.14 The effect of this investment is also discernible in reported attitudes towards cross-river travel. In a recent survey for TfL, residents of the four London boroughs⁶ in this region which are closest to central London identified the ability to travel by public transport as the second-most important factor in the work commute, and Underground/Rail modes were perceived as affordable by most respondents⁷.

2.2.15 However, while only around 20 per cent of cross-river trips are now made by private highway transport, the absolute level of demand for road crossings has not fallen as a result of the increased public transport provision in the area. There remains a continued need for trips by road, particularly for commercial traffic such as vans and lorries – 85 per cent of all freight in London is carried by road. Not all trips can be shifted to public transport, walking and cycling, and increases to public transport capacity do not automatically lead to reduced vehicle traffic.

2.2.16 Figure 2-6 summarises average daily traffic flows through the Blackwall Tunnel from 1986 to 2014⁸. It shows that demand for the Blackwall Tunnel

⁵ 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

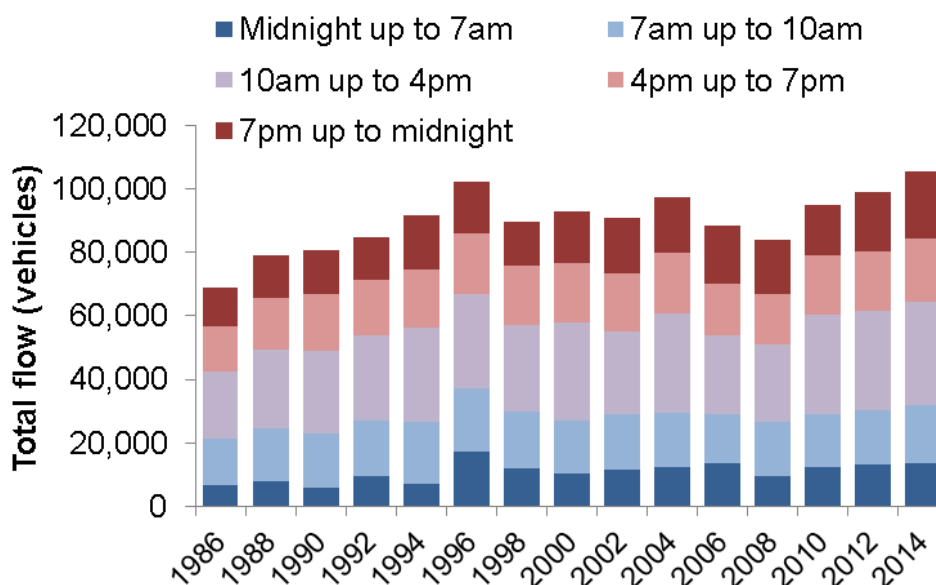
⁶ Lewisham, Southwark, Greenwich and Tower Hamlets. The most important factor was travel time to place of work.

⁷ Accent for TfL, 2015, River Crossings Residents Survey. Q21. The statement “I can’t afford to travel to work by Underground/Rail” was agreed with by 16 per cent of respondents, 58 per cent disagreed.

⁸ Source: TfL screenline counts

was not affected by the vast increases to rail provision in east London described above, and indeed has been growing steadily since 2008.

Figure 2-6: Vehicle flows at the Blackwall Tunnel, 1986-2014



2.3 The Blackwall Tunnel is east London’s strategic highway crossing

2.3.1 In central and west London, there is a closely-spaced series of crossings which are well-connected to the road network. This means that there are genuine alternatives available for many journeys, and provides a good degree of resilience when any one of the crossings is congested, or closed (as Putney Bridge was for three months in late summer 2014).

2.3.2 In east London however, the economic, historical, and topographical factors outlined above have led to a very different situation, in which the Blackwall Tunnel has become a single link of pivotal strategic importance in the highway network. The importance of the crossing amplifies the effects of its problems.

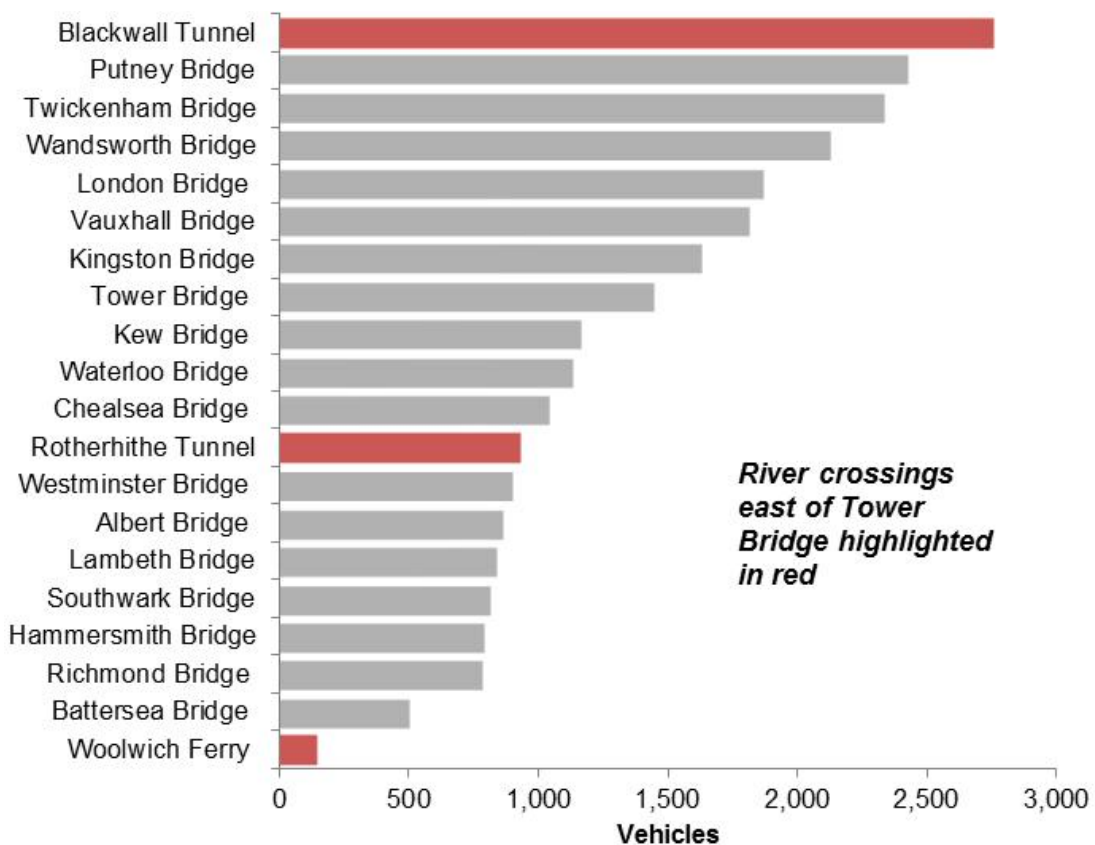
2.3.3 The importance of the Blackwall Tunnel as a link in the east London road network can be demonstrated by considering its contribution as one of five crossings in the eastern part of the Thames⁹. It can be seen that the

⁹ The others are Tower Bridge, Rotherhithe Tunnel, Woolwich Ferry and the Dartford Crossing

Blackwall Tunnel is carrying a disproportionate share of traffic: over 30 per cent of all private highway trips across the eastern Thames in the AM peak hour, the inter peak average hour, and the PM peak hour (if the Dartford Crossing is included in the calculation). If Dartford is excluded, the proportion increases to 60 per cent or more in each period; and this high figure persists despite significant congestion and closures at the Blackwall Tunnel.

2.3.4 In fact, as Figure 2-7 shows, the Blackwall Tunnel not only carries by far the most traffic of the three road crossings in east London (shown in the darker bars), but also carries the most traffic of *any* of the road crossings in the Capital.

Figure 2-7: Weekday AM peak hour northbound traffic on GLA river crossings (2012)

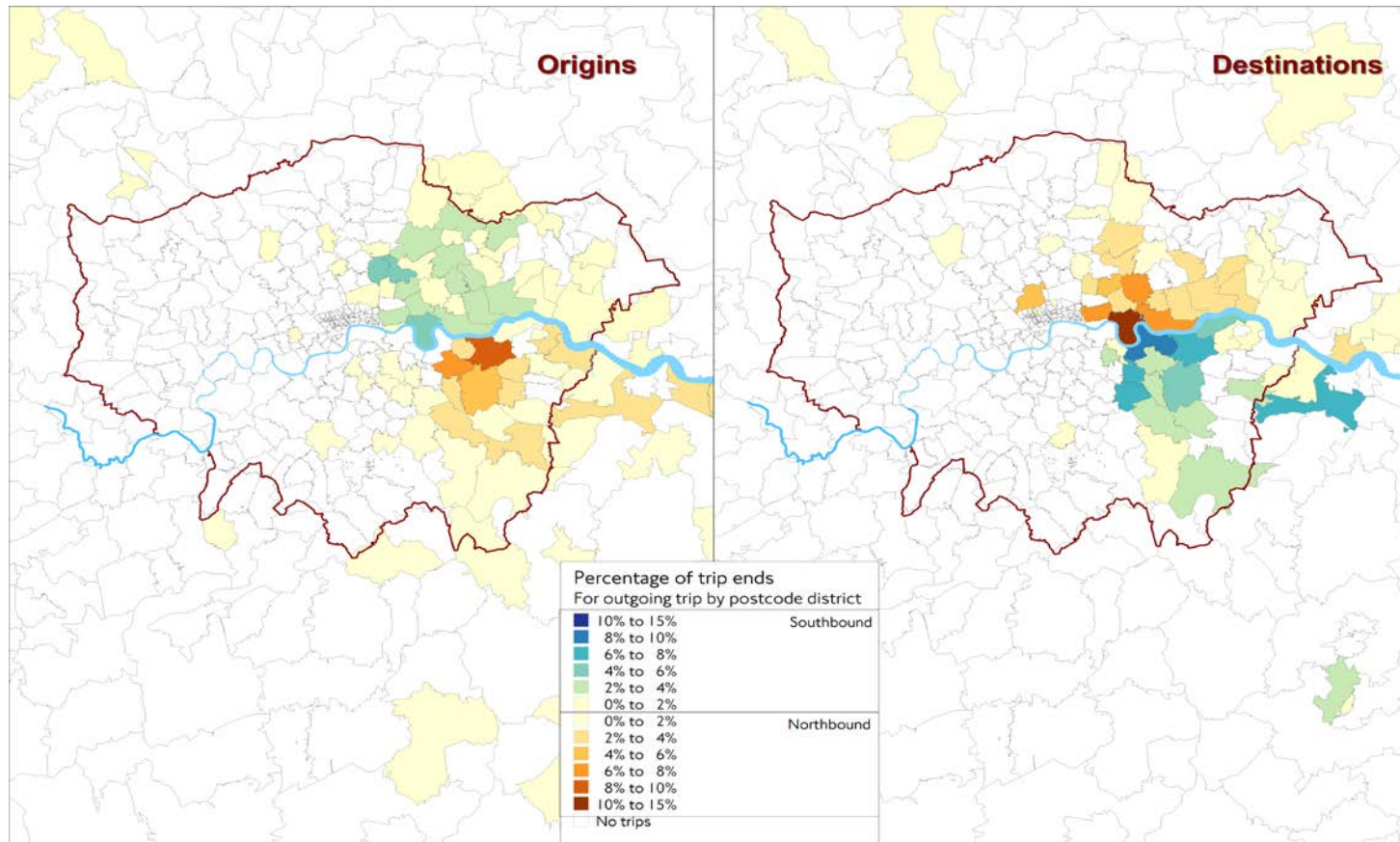


2.3.5 The Blackwall Tunnel is clearly working hard in carrying significant volumes of traffic. In part this reflects its position in the road network, carrying traffic through the heart of the intersection between the A2, A12 and A13 – inner east London’s principal roads.

- 2.3.6 It also reflects the distance from other crossings in the east. The nearest alternative road crossings are the Rotherhithe Tunnel and the Woolwich Ferry, lying 7.5km to the west and 5km to the east respectively. These crossings do not provide meaningful alternatives to the Blackwall Tunnel because they are principally local links, capacity-constrained, and are not positioned to connect major arterial routes.
- 2.3.7 These capacity constraints are a consequence of the design of the other east London links. Owing to its relatively narrow and bending shape, heavy goods vehicles are not permitted to use the Rotherhithe Tunnel, and it is unsuitable for buses (certain taller vehicles are not permitted to use the northbound bore of the Blackwall Tunnel either.) The Woolwich Ferry has extremely low capacity (around 200 PCUs per hour in each direction) and is already at capacity in the AM peak.
- 2.3.8 Still further to the west and east of the Blackwall Tunnel respectively are Tower Bridge (some 9km distance) and the Dartford Crossing (some 25km distance, with a user charge).
- 2.3.9 Using these crossings would mean traffic making longer trips, partly on local roads, adding to journey time. Despite the significant diversion involved in using the Dartford Crossing, (which is a strategic, orbital route outside London), it is sometimes used as an alternative to the Blackwall Tunnel, which highlights the lack of appropriate alternatives within London.
- 2.3.10 For traffic which has an origin or destination within the east sub-region of London, a crossing in the vicinity of the Blackwall Tunnel is the preferable route for most drivers. But within that broad area, trip ends are for the most part widely dispersed – notwithstanding a cluster centred on the Isle of Dogs.
- 2.3.11 As shown in Figure 2-8, around three of every four trips through the Blackwall Tunnel¹⁰ had an origin and or destination in the local area (defined as the boroughs of Barking & Dagenham, Bexley, Greenwich, Havering, Lewisham, Newham & Tower Hamlets).

¹⁰ Behavioural surveys undertaken from roadside sampling, TfL, 2012

Figure 2-8: Origins and destinations of AM Peak period Blackwall Tunnel trips (Behavioural Survey 2013)



2.3.12 This evidence demonstrates that the Blackwall Tunnel is east London's primary strategic river crossing for vehicular traffic. It also acts as a major connection for traffic between east London and areas beyond London on the other side of the river, and so by extension operates as part of the strategic road network. Its ability to act as a strategic connection for bus and coach users, who also wish to cross the river at this location, is severely constrained by its design and capacity.

2.4 Transport problems at the Blackwall Tunnel

2.4.1 As we have seen, the Blackwall Tunnel has a singular strategic function in the east London highway network, but is constrained by being at capacity, its outdated design and the lack of proximate alternative crossings. However, its position means that it is well-connected to the strategic road network, suggesting that any additional link must also provide these connections.

2.4.2 The next section will examine the specific transport problems of the Blackwall Tunnel – congestion, closures and incidents and lack of resilience – in more detail. These problems are numbered for ease of reference but no hierarchy is intended.

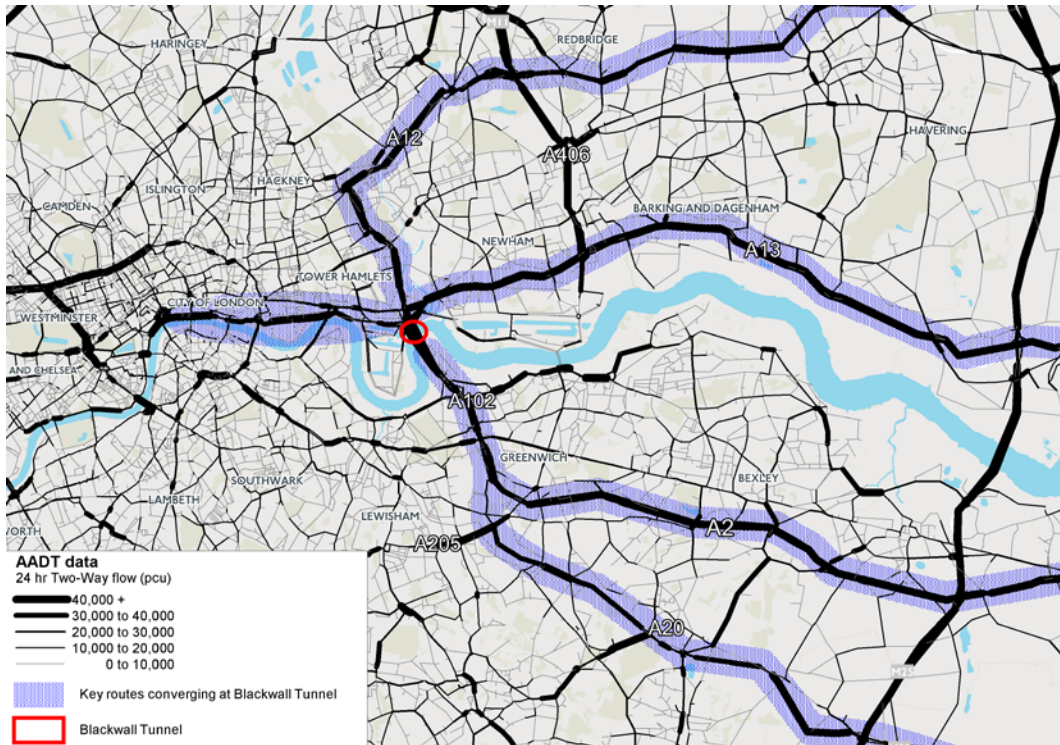
2.5 Transport problem 1 – congestion

Traffic volume

2.5.1 The strategic importance of the Blackwall Tunnel on the road network means it attracts far more traffic than it can accommodate. This is particularly the case for northbound travel in the AM peak and southbound travel in the PM peak, reflecting the fact that it connects predominantly residential areas to the south and south-east of the river with employment and commercial centres to the north, which gives rise to commuting, servicing and deliveries and other business trips.

2.5.2 This is illustrated in Figure 2-9 which uses black lines of differing width to show levels of traffic flow: the broad line at the Blackwall Tunnel indicates that it carries among the most traffic of all the roads in east London, and connects to other highly significant routes. It also illustrates that several strategic routes converge at the Blackwall Tunnel (shown circled in red).

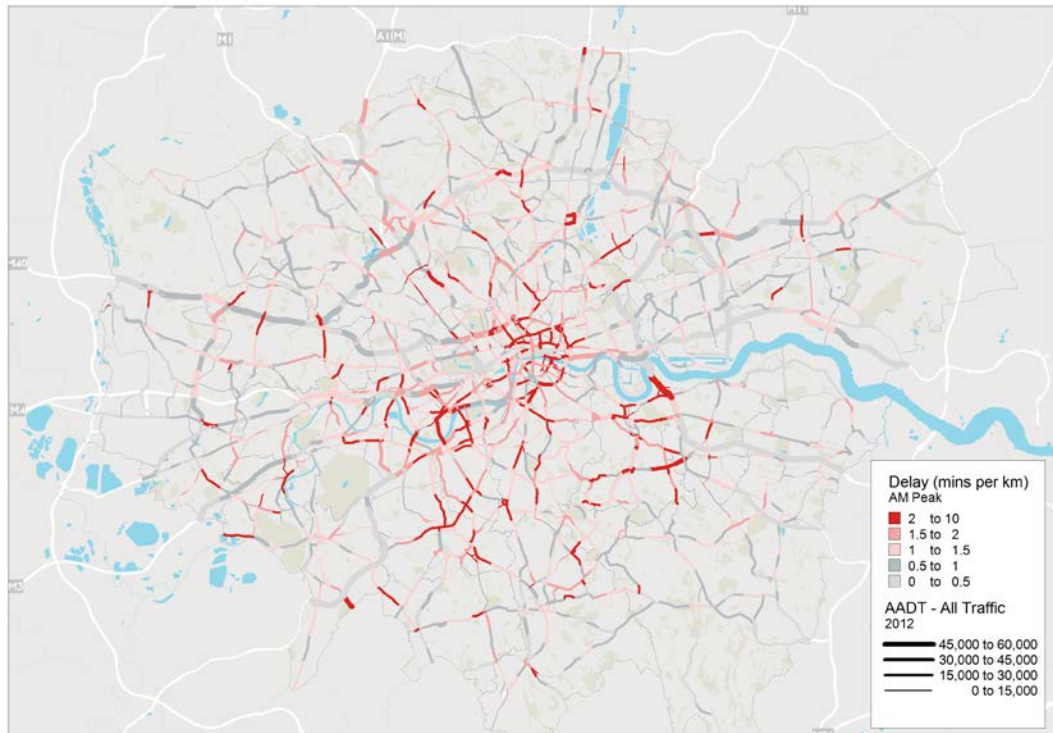
Figure 2-9: Two-way Annual Average Daily Traffic (AADT) on the strategic road network in east London¹¹



2.5.3 The delay which results from this level of congestion in both the AM and PM peak periods is shown in Figure 2-10 and Figure 2-11 below. In the morning peak, the Blackwall Tunnel and its southbound approach is one of the most congested roads in London, with delays on average between two and ten minutes. Although less marked, this pattern is also characteristic of the PM peak.

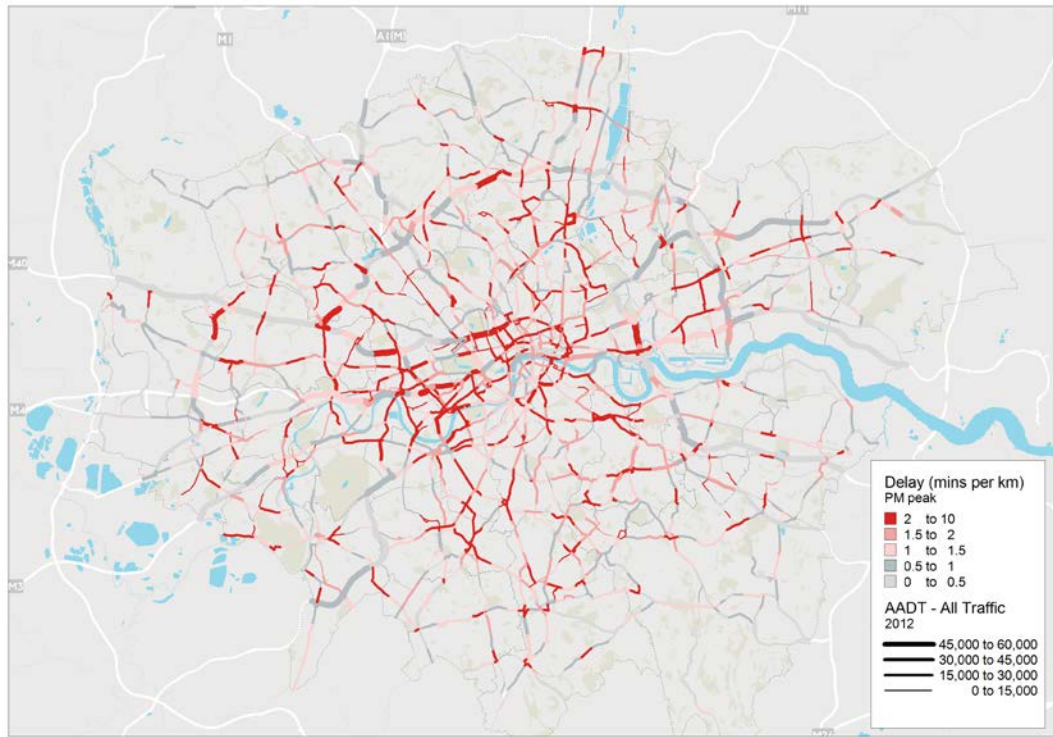
¹¹ Source: annualised RXHAM base year traffic model data

Figure 2-10: Delay in the AM peak on the strategic road network in east London¹²



¹² Source: TrafficMaster (using GPS data). The period covered is September 2013 to August 2014 for the delay data, and the flow data is from 2012.

Figure 2-11: Delay in the PM peak on the strategic road network in east London



2.5.4 Unlike the A2/A12 corridor, much of which has three inbound lanes, the Blackwall Tunnel has only two lanes each way, effectively making it a traffic bottleneck: this mismatch of capacities is another factor leading to congestion.

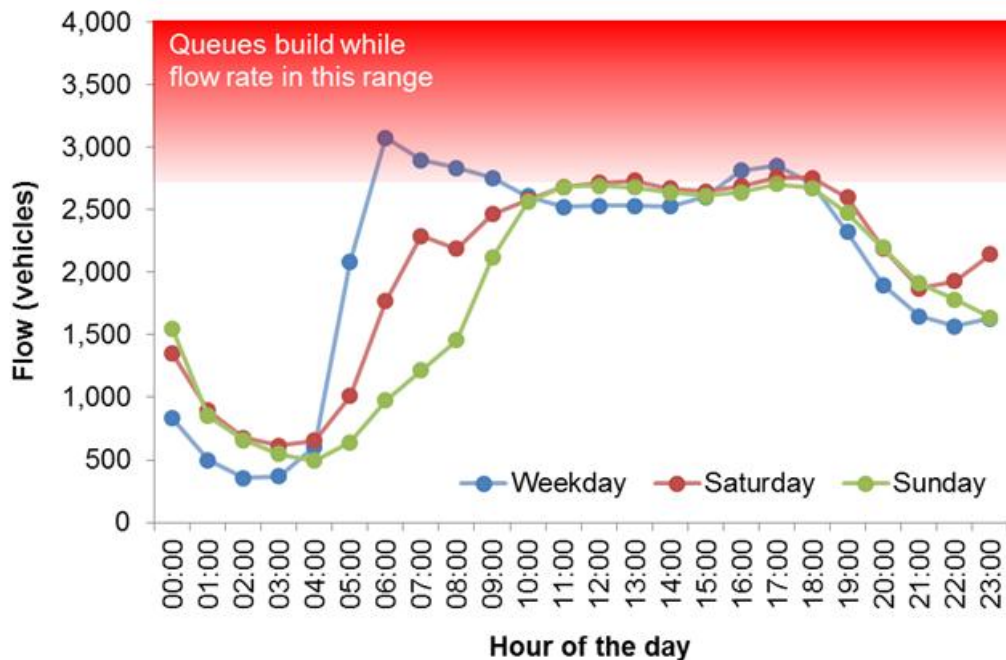
Figure 2-12: Traffic on the northbound approach to the Tunnel (view north from Boord Street footbridge, AM peak, 4 June 2015)



Peak duration

2.5.5 This is also visible in the extended duration of the peak period at the Blackwall Tunnel compared to most other links on the highway network. While most roads become busy from around 6:00 or 7:00, here, traffic builds up from 5:00 in the morning as motorists seek to avoid the extremes in congestion which affect the northbound bore from around 6:00 to around 10:00. Flow remains close to peak levels for much of the day, as can be seen in Figure 2-13 that even outside the busiest times, demand is close to or exceeds capacity through much of the rest of the day.

Figure 2-13: Blackwall Tunnel northbound - average hourly flows by day type¹³



Delay and journey times

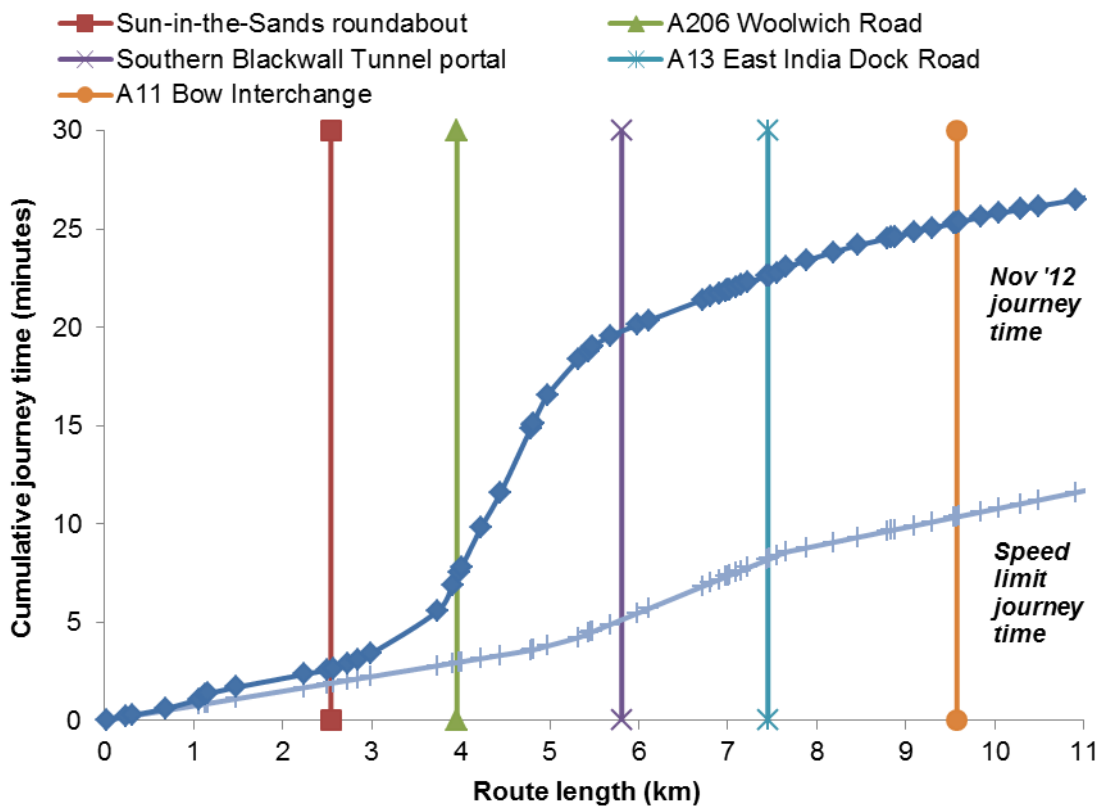
- 2.5.6 The result is that traffic on one of London’s key strategic road links is routinely subject to significant delay. Journey times for trips along the A102 are very slow during peak periods. In the northbound direction in the AM peak, queues routinely stretch back from the tunnel around 3.2km to a point just north of the Sun-in-the-Sands roundabout, with speeds on this section averaging 8kph (5mph). In the PM peak southbound, queues regularly extend almost 2.7km to a point north of the Bow Interchange, with speeds on this section averaging 6.4kph (4mph)¹⁴.
- 2.5.7 It will be useful to identify where the congestion occurs on this route (which is typical of a northbound journey through the Blackwall Tunnel). This can be done by comparing the actual journey time with what the journey time would be if the journey was made at the applicable speed limit (i.e. was not subject to congestion and delay), and noting where the

¹³ Blackwall Tunnel Flows, 01/12/2011 to 28/11/2013

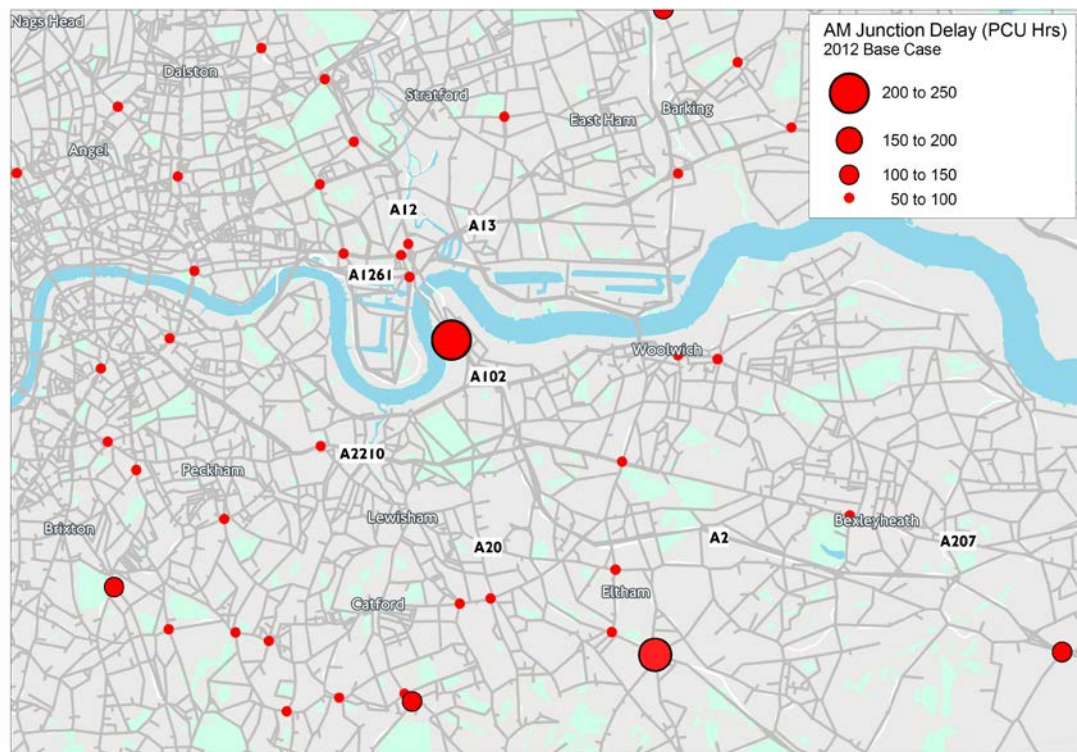
¹⁴ Data for a number of strategic cross-river routes in November 2012 was collated to calibrate the strategic highway model (RXHAM) used in the assessment of the Silvertown Tunnel. See Preliminary Transport Assessment.

two sets of data diverge. This is shown in Figure 2-14 below. As can be seen the delay starts to appear at the A206 Woolwich Road and then continues as far as the end of the journey at Bow Interchange. A disparity around 15 minutes journey time is observed throughout the final 4km section of the route. (It is important to note that this is an average of a month's data, the level of delay regularly significantly exceeds what is shown below.)

Figure 2-14: Observed average weekday AM peak cumulative journey time northbound (Nov 2012) v unconstrained (speed limit) journey time



2.5.8 The location and magnitude of the delay which regularly occurs at the approaches to the Blackwall Tunnel, especially the northbound approach, can also be seen in **Figure 2-15** below. The dots on the Figure show the magnitude of delay experienced on the road network for the AM peak hour, calculated using the number of affected vehicles and the duration of the delay experienced.

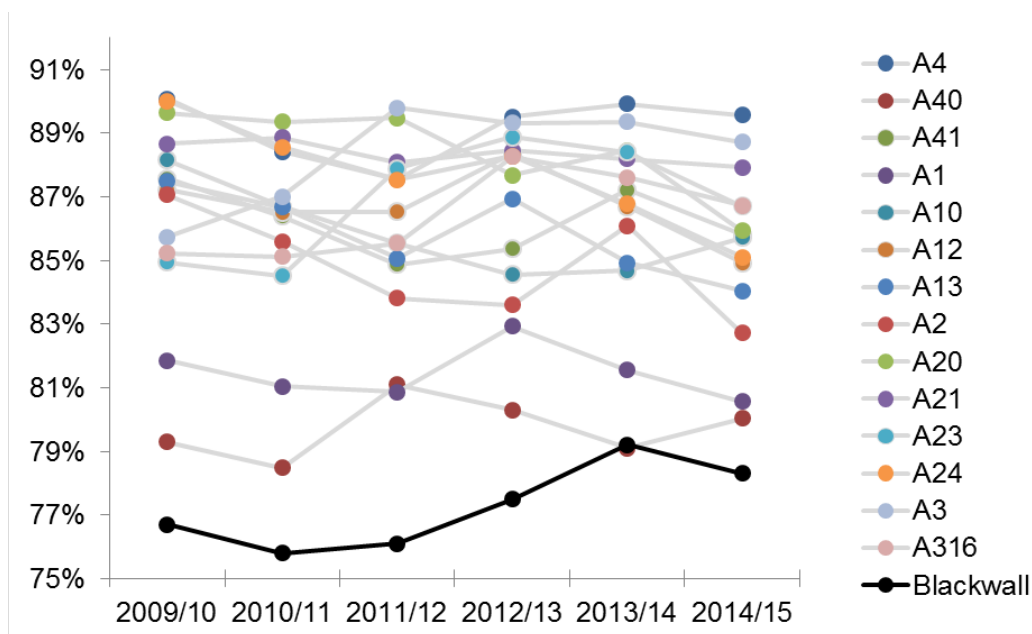
Figure 2-15: AM peak hour junction delay (2012)

- 2.5.9 Data from recent surveys of travel behaviour suggests that 63 per cent of local residents who cross the river said that they changed the time of their journey to avoid congestion, and over half (52 per cent) said they sometimes used public transport to avoid driving across the river. Just under half (49 per cent) said they sometimes travelled by a longer route to avoid using the Blackwall Tunnel¹⁵. This congestion clearly has a highly detrimental effect on users.
- 2.5.10 Another problem arising from this routine (but nonetheless unpredictable) delay is journey time unreliability. This makes it difficult for users to know what time to set off in order to arrive on time and is likely to be a particular problem for businesses concerned with deliveries and servicing and need to schedule a series of trips throughout the day.

¹⁵ River Crossings Residents Survey, Accent Market Research for TfL, 2015

2.5.11 TfL collects data on journey time reliability¹⁶ for the entire Transport for London Road Network (TLRN) and has compared data from the radial corridors on the network with data collected at the Blackwall Tunnel. As shown in Figure 2-16 below, while it has improved over recent years, the performance of the Blackwall Tunnel has been worse than that of any other route in all but one year, and is significantly poorer than most.

Figure 2-16: AM peak direction journey time reliability (TLRN radial corridors)



2.5.12 Congestion at the Blackwall Tunnel has a far-reaching effect on the wider road network. With around a quarter of all journeys originating outside Greater London, many of the vehicles using the crossing on their way to destinations within London also use the M11 or the A2. Owing to congestion, traffic will sometimes divert to other crossings which has a detrimental effect at the Dartford Crossing and the M25, both part of the strategic road network.

2.5.13 This effect is recognised in the third of the four reasons for the NSIP designation:

¹⁶ measured as a percentage of nominal 30 minute journeys completed within five minutes of that time in the AM peak period

Current congestion at the Blackwall Tunnel is having a direct impact on the strategic road network.

2.6 Transport problem 2 – closures and incidents

- 2.6.1 The design of the northbound bore of the Blackwall Tunnel, while suitable for the Victorian age in which it was built, acts as a serious constraint today. It does not meet modern tunnel design standards for size, safety or curvature.
- 2.6.2 Its narrowness means that vehicles over 4m (in the right-hand lane) and 2.8m (in the left) cannot be accommodated, which rules out larger lorries and double-deck buses. A 2m width restriction also applies. Both the north- and southbound bores are subject to Category E load restrictions, which is the most restrictive category. The Rotherhithe Tunnel (built a decade later in 1908) also has restrictions.
- 2.6.3 However, unsuitable vehicles nevertheless continue to attempt to use the Blackwall Tunnel, and even those vehicles which are suitable for the tunnel still experience an outdated and far from optimal link. As a consequence, the northbound bore of the crossing suffers an abnormally high rate of incidents, including collisions, shedding of debris, and, most frequently, the attempted use of the tunnel by vehicles which are too tall to use it. In 2013 there was an average of six incidents per day. For around 60 per cent of incidents, the nature of the problem means that TfL has to close the tunnel in order to fully resolve it, which given the very high number of incidents, means frequent closures as shown in Table 2-1. There were 1,234 incidents (figure includes northbound and southbound tunnels) causing tunnel closures in 2013, around half of which were due to over height vehicles. TfL has taken steps to reduce these incidents, but the fundamental design issues cannot readily be addressed.
- 2.6.4 Most closures are very brief (the average time for the northbound tunnel is just over four minutes), but because the volume of traffic is so high and exceeds the capacity of the tunnel for long periods of the day, even short closures can have significant and extended impacts, adding thousands of vehicle-hours of delays over the course of a year. They also add to the difficulty of accurately predicting the length of time a journey will take for both bus passengers and private vehicle users alike.

Table 2-1: Closures of the Blackwall Tunnel in 2013

Type of incident resulting in closure	Number		% of total	
	North bound	South bound	North bound	South bound
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%	

2.6.5 Occasional serious incidents such as accidents can lead to lengthier closures, in which case these impacts are greatly amplified. The effects of this are considered further in the next section.

2.6.6 TfL has also compared the closure rate of the Blackwall Tunnel with similar tunnels in the UK, both in terms of absolute number of closures and using a calculation which produces the number of vehicle km travelled per year in each tunnel¹⁷. On both measures, the Blackwall Tunnel is clearly prone to a much higher number of closures, almost four times that of the other tunnels with some 25.3 unplanned closures occurring for every million kilometres travelled.

2.6.7 So far, the Blackwall Tunnel has not been subject to an extended closure – weeks or months rather than the few minutes per closure described here. It is likely that at some point in the future a longer closure would be

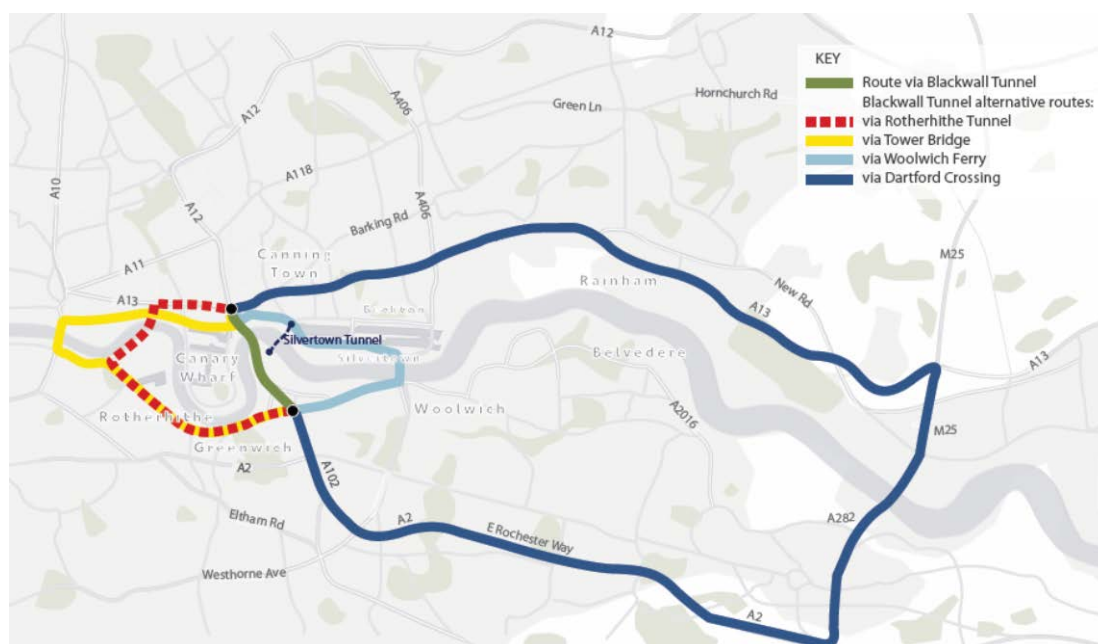
¹⁷ Tunnels compared: Limehouse Link, Rotherhithe Tunnel, Tyne Tunnels, Mersey Tunnels (2014/15). See Appendix D of the Preliminary Transport Assessment

required, if not for maintenance then as a result of an incident, since despite best efforts, this remains a possibility in an ageing tunnel.

2.7 Transport problem 3 – lack of network resilience

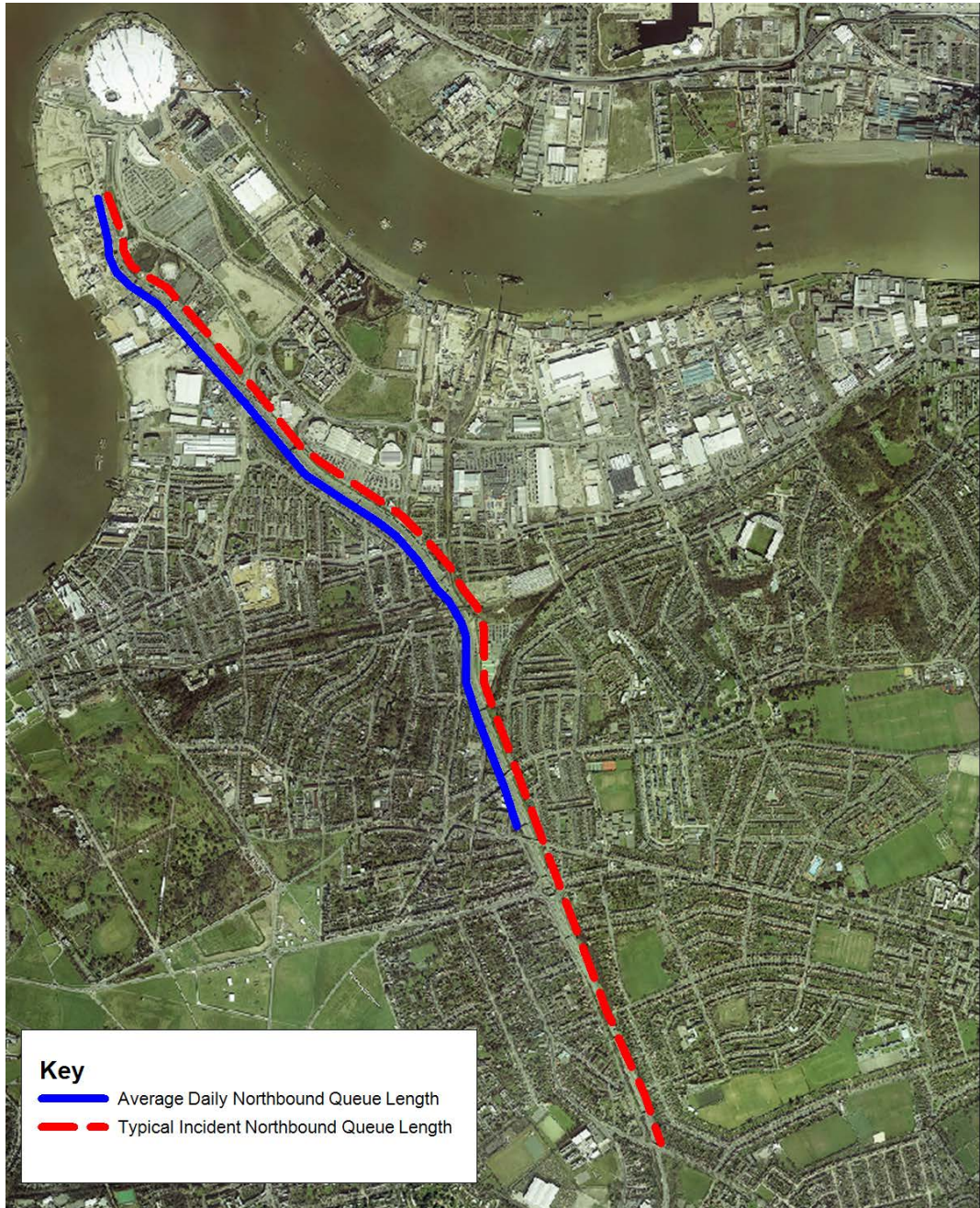
- 2.7.1 The preceding sections have described the significant levels of delay experienced at the Blackwall Tunnel and the frequency of closures and incidents at the tunnel. Together with continuing high levels of demand, the susceptibility of the Blackwall Tunnel to closures exposes a third distinct problem – a lack of resilience in the road network in the area of the Tunnel. In a transport context the term ‘resilience’ describes the ability of transport networks to provide and maintain an acceptable level of service in the face of both planned and unplanned incidents.
- 2.7.2 This lack of resilience becomes most apparent in the event of closures of the Tunnel which encourage significant numbers of vehicles to seek alternative routes. As we have seen, suitable alternative routes close to the Blackwall Tunnel in east London do not exist, because of the capacity constraints at the nearest crossings of Rotherhithe and the Woolwich Ferry.
- 2.7.3 With a short closure, a queue forms at the approach to the tunnel, but does not immediately cause widespread disruption on the road network. As the length of the closure increases, the queue increases and leads to widespread disruption over a bigger area.
- 2.7.4 As a result of these longer closures, many users of the Blackwall Tunnel have no viable options but to travel to the Dartford Crossing, which forms part of the M25 London Orbital Motorway. Since the Dartford Crossing does not have the capacity to accommodate these additional volumes of traffic, this can result in serious congestion on the M25, one of the UK’s key strategic roads, and on roads crossing the M25 in north Kent and south Essex (including the principal freight corridor between the Channel ports and the North of England). In these circumstances the strategic significance of the Blackwall Tunnel becomes plain.

Figure 2-17 Blackwall Tunnel diversion routes



2.7.5 Currently, most of the closures last for less than 15 minutes and queues build up as drivers wait for the reopening (see Figure 2-18). While some drivers will divert to other crossings if they have sufficient warning, many spend time in queues, and bus services also are impacted (see section 2.9.10). Drivers continue to use the Blackwall Tunnel owing to the lack of alternative crossings, and continue to endure delays and congestion. The example in Figure 2-18 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 2-18: Typical weekday morning peak queues northbound on a normal day and when there is an incident



2.7.6 Were a long-term closure of the Blackwall Tunnel to be required in future, which is always a possibility, drivers would have to plan their journeys to use other crossings or not make the journey at all. In this scenario, the impact on the wider road network and by extension the economy and environmental impacts would be significant. The impacts from the short closures of the tunnel and the likely reactions to any longer closures

demonstrate that the Blackwall Tunnel lacks both short- and long-term resilience to traffic disruption and delay.

2.8 Transport problems at the Blackwall Tunnel have significant impacts

2.8.1 The three transport problems of the Blackwall Tunnel are a problem now and will, in the context of growth, become an even more pressing issue in future. It is also important to understand why these problems matter in the wider sense and why it is therefore necessary to take action to resolve them. To do this, some of the 'second-order' effects of the transport problems need to be considered: the economic, environmental and public transport impacts. To a greater degree than the transport problems, these effects are also detrimental to non-users of the Blackwall Tunnel.

2.8.2 The section 35 direction which designates the Silvertown Tunnel Scheme as an NSIP¹⁸ recognises the interaction of transport and economic growth. It gives four reasons for the designation, the first three of which are:

1. *London as an engine of economic growth nationally; and*
2. *The projected growth of London*
3. *Current congestion at the Blackwall tunnel is having a direct impact on the strategic road network.*¹⁹

2.8.3 In expansion of the second point the text reads:

“Current infrastructure is likely to be unable to absorb this additional capacity, leading to even greater congestion. 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. The proposed development [the Silvertown tunnel scheme] is in part intended to address that congestion.”

2.9 Economic effects

2.9.1 The three transport problems of congestion, closures and a lack of resilience described above translate into secondary effects on the

¹⁸ Letter from Justine Greening MP to Boris Johnson, June 2012

¹⁹ The fourth point concerns the fact that although the Scheme is not automatically an NSIP owing to the administrative responsibilities, its size and nature makes it comparable to other NSIPs.

economy. To understand the range and significance of these economic effects we need to describe how businesses rely on the Blackwall Tunnel to operate effectively. We then need to describe the significance of the transport problems and how these translate into impacts on business operations, as well as investigate whether these problems are acting as a disincentive to further investment in east London.

- 2.9.2 First, it is known that much of the current use in business hours is for work or commuting purposes. Nearly 45 per cent of all trips through the Blackwall Tunnel in 2013 were commuters, with a further 25 per cent travelling for other work purposes²⁰. The Blackwall Tunnel therefore provides an important means for businesses to access their labour market, and for individuals to access jobs.
- 2.9.3 The Blackwall Tunnel is also a key route for goods vehicles, with businesses using it to deliver goods and services to customers and clients, as well as receiving deliveries to support business operations. It carries the most LGVs of all the eastern crossings, at over 500/hour in the AM peak, northbound. These trips are fundamental to the efficient functioning of the London economy – 85 per cent of all freight traffic is carried by road, with LGV movements expected to grow by 30 per cent between 2008 and 2031²¹. Goods vehicle trips are also very difficult to switch to other modes, so demand at major strategic links like the Blackwall Tunnel is very likely to remain high in future.
- 2.9.4 The importance of the Blackwall Tunnel as a strategic link for businesses is attested to by businesses themselves. A survey of 500 businesses was undertaken during summer 2015²² to identify the extent of their markets, their suppliers, their growth expectations and specific constraints to their operations. Interviews were undertaken with businesses based in the London Boroughs of Barking & Dagenham Bexley, Lewisham, Newham, Southwark and Tower Hamlets as well as the Royal Borough of Greenwich. The survey results show that the Blackwall Tunnel is viewed as the most important cross river link in East London, by half (52 per cent) of businesses, followed by the Dartford Crossing (24 per cent) and Tower Bridge (14 per cent).

²⁰ TfL, 2012, RSI surveys

²¹ GLA, 2010, Mayor's Transport Strategy (section 4.2)

²² WSP, 2015, Silvertown Tunnel business survey

- 2.9.5 Given the high level of agreement that the Blackwall Tunnel is the most important cross river link for businesses in East London, high levels of congestion can be assumed to have an impact on a wide range of businesses. Three quarters (74 per cent) of all businesses surveyed said that daily congestion at the Blackwall Tunnel is a disruption or constraint to their business. This is time which could be better spent on productive activities, rather than sitting in traffic.
- 2.9.6 The Freight Transport Association (FTA) has calculated that each minute of delay caused by congestion costs the operator £1; on this basis a delay of 20 minutes at the Blackwall Tunnel could add £20 to the cost of each individual vehicle's trip.
- 2.9.7 Whilst everyday levels of congestion impose predictable costs on businesses, poor journey time reliability through closures and incidents also poses significant additional problems for businesses which result in further costs. Nearly two thirds (62 per cent) of businesses stated that journey time predictability at the Blackwall Tunnel is poor. This makes it difficult for businesses to plan their operations with certainty and results in a range of inefficiencies including:
- Businesses having to build in extra time to allow for uncertainty when crossing the River Thames (32 per cent of all businesses surveyed);
 - Businesses missing time critical deliveries which let down their customers and can affect future business opportunities (33 per cent);
 - Staff are often late for meetings with customers when crossing the River Thames, which again has an impact on future opportunities (40 per cent); and
 - Staff are often late for work (30 per cent say staff are late at least once a week, with the average cost of this estimated to be £26,000, enough to employ an additional member of staff)
- 2.9.8 With reduced congestion and improved journey time reliability, businesses would have more certainty over their route planning, have more control over their costs and be able to pursue potential opportunities more effectively. Just over half of all businesses in east London reported that their business would be more likely to operate cross-river if journey times were made more reliable.
- 2.9.9 Poor levels of resilience and the lack of alternative routes also result in additional costs. The FTA has also calculated that the additional costs of

fuel caused by having to take diversionary routes are some 50 pence per mile. On this basis a diversion from the Blackwall Tunnel to the Dartford Crossing could cost an extra £12 in fuel per vehicle. Additionally, when disruption at the Blackwall Tunnel leads to significant rerouting to the Dartford Crossing, congestion can affect commercial road users across the south-east of England, and impede regional, national and even international movements of goods.

- 2.9.10 Taken together, high levels of congestion, poor reliability and resilience at the Blackwall Tunnel therefore impose significant costs on the large number of businesses that rely on being able to cross the River Thames, with costs much higher than would be the case if the road network was functioning efficiently. These increased costs effectively result in a 'barrier effect' where the movement across the River Thames is seen as a constraint to the ability to access customers, suppliers, staff and jobs on the other side of the river.
- 2.9.11 This 'barrier effect' is clearly apparent in terms of the distribution of the labour market in East London. This can be seen by comparing the labour catchment areas for locations south and north of the River Thames. **Figure 2-19** shows the labour catchment area of part of the London Borough of Richmond upon Thames (outlined in green) located south of the river. It can be seen that the river is no real barrier and has minimal impact on travel to work patterns.

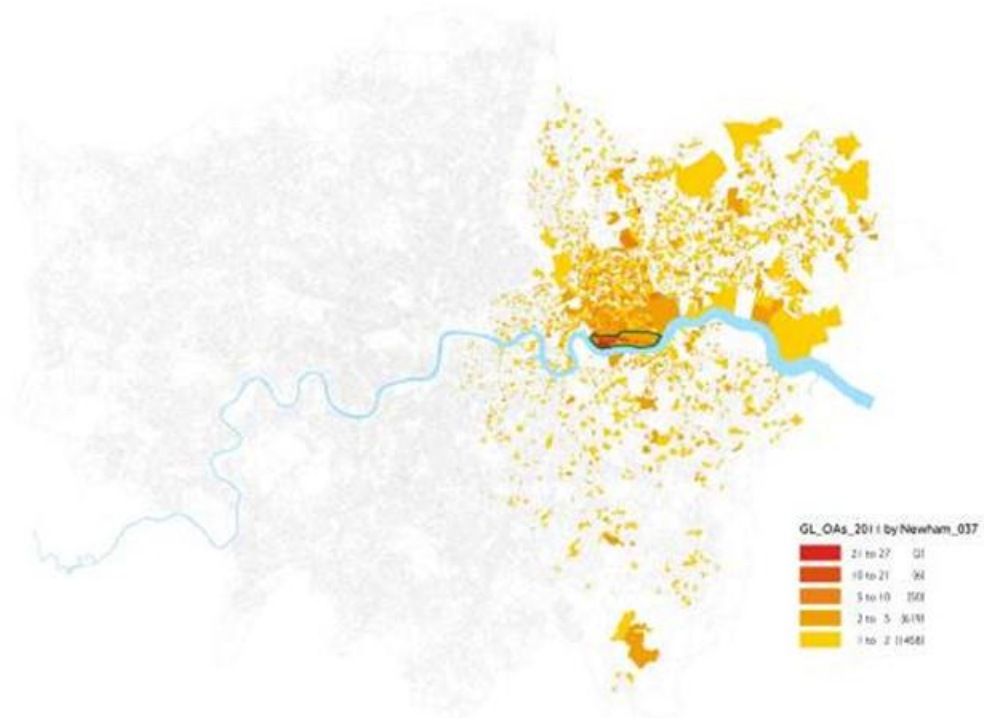
Figure 2-19: Place of residence²³ of those working in Richmond Town Centre 2011



2.9.12 A rather different picture emerges when looking at the labour market catchment of the Royal Docks in the London Borough of Newham as illustrated in Figure 2-20. This shows that there are very few people travelling from the south of the River. It is clear that in east London the river acts as a major barrier both to people seeking work and employers trying to recruit. The business survey identified that 60 per cent of those taking on staff had recruited more than 75 per cent of them from the same side of the river and over 40 per cent had recruited no-one from the other side of the river.

²³ Source: Nomis

Figure 2-20: Place of residence of those working²⁴ in Royal Docks 2011



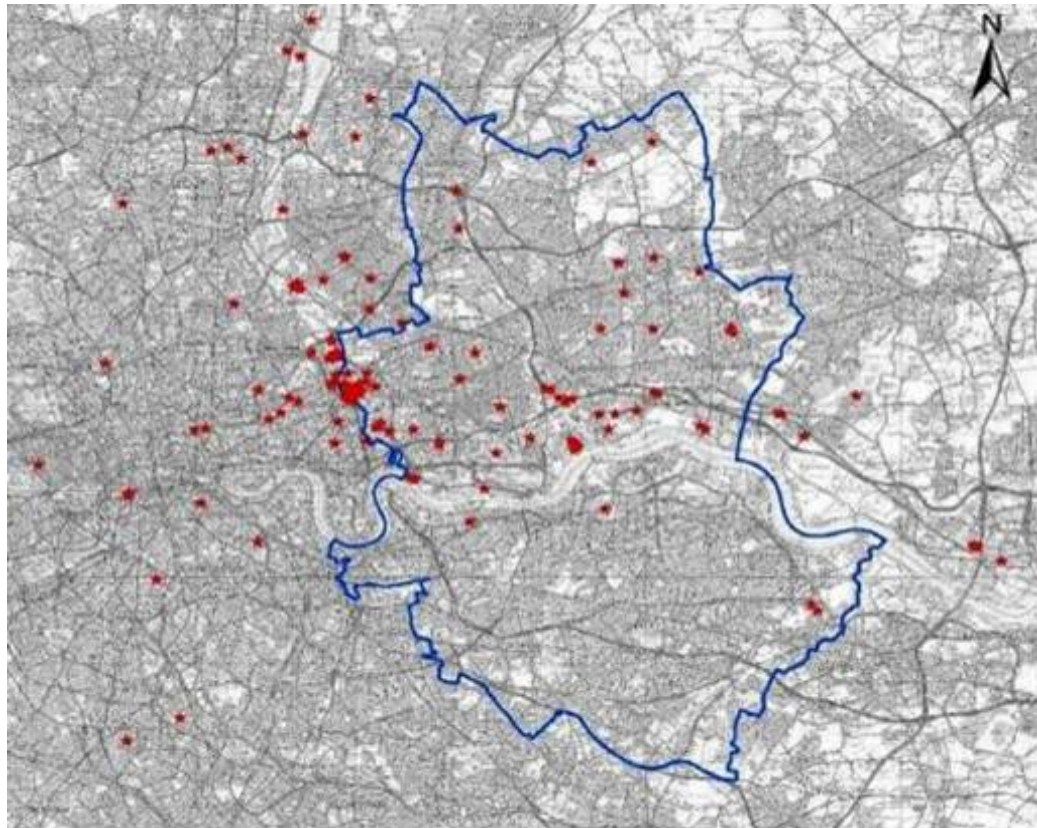
- 2.9.13 Given the amount of potential employment growth that can be accommodated in East London, this is a major barrier to facilitating access to job opportunities for residents south of the river.
- 2.9.14 This 'barrier effect' is also evident in terms of access to customers. 26 per cent of all businesses surveyed believe that the problems at the Blackwall Tunnel have reduced the size of their potential customer base.
- 2.9.15 The net result of high levels of congestion, poor journey time reliability, poor resilience and a 'barrier effect' of the River Thames is an economy in East London that is not operating optimally and is not fulfilling its true potential. It is perhaps not surprising then that there is a strong consensus that current crossing options are not adequate (68 per cent), and that four in ten businesses feel that the current number and capacity of river

²⁴ Source: Nomis

crossings in east London act as a barrier to the development of their operations across the other side of the River. This rises to 49 per cent in the London Borough of Tower Hamlets and Royal Borough of Greenwich and to 53 per cent amongst respondents with £1m turnover or more.

- 2.9.16 The additional costs described here result in an environment which is less attractive for businesses to operate within. This is highly likely to have resulted in lower levels of inward investment and job creation than would otherwise have been the case had these costs and inefficiencies not existed.
- 2.9.17 Evidence that businesses have chosen not to locate in a given area is almost by definition difficult to find. However there is an example of this in the case of the relocations of businesses from what is now the Queen Elizabeth Olympic Park ahead of the London 2012 Games. The majority of these businesses did not choose new premises south of the River Thames, with many preferring to locate much further from their original Stratford home in outer east London and even in Essex (see Figure 2-21) This suggests that businesses felt that the additional costs to access their customers, suppliers and labour market, which as we have seen are partly a result of the inadequacy of existing river crossings, would be too high if they went south of the River Thames.

Figure 2-21: Relocation of businesses formerly based at the Olympic site



2.9.18 The transport problems and their detrimental impact on the local economy described here are already being experienced by businesses across east London. In the context of continued population and employment growth, there is likely to be a compounding effect whereby escalating transport demand puts further strain on the Blackwall Tunnel (resulting in even more congestion and delay) and the economic effects of these problems are felt even more acutely, ultimately serving to impede rather than support forecast growth.

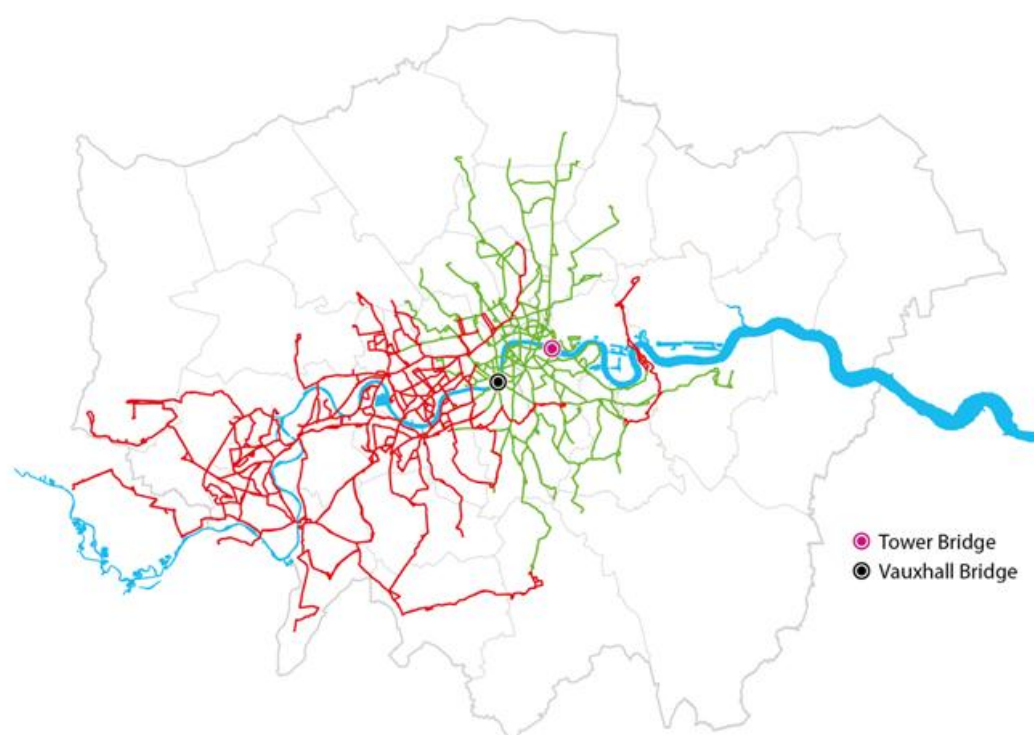
2.10 Public transport effects

2.10.1 The problems of the Blackwall Tunnel do not affect only private cars and commercial traffic: public transport users (and potential users) are also adversely affected by delays, congestion and journey time unreliability. There is one bus route through the tunnel, running 24-hours per day at a frequency of 7-10 minutes in the daytime. Additionally, some 90 commuter

coaches from Kent also use the northbound route in the morning peak. On this measure, approaching one in five of the current users of the Blackwall Tunnel in the AM peak are public transport users²⁵.

- 2.10.2 Figure 2-22 highlights the extreme disparity in cross-river bus services operating between east and west London. There are 47 bus routes which cross the river west of Vauxhall Bridge and only a single route crossing the river east of Tower Bridge – the 108 between Stratford and Lewisham via the Blackwall Tunnel.

Figure 2-22: Cross-river bus services in London



- 2.10.3 Users of the 108 bus route routinely experience delay caused by congestion, and disruption owing to tunnel closures which cause delays to

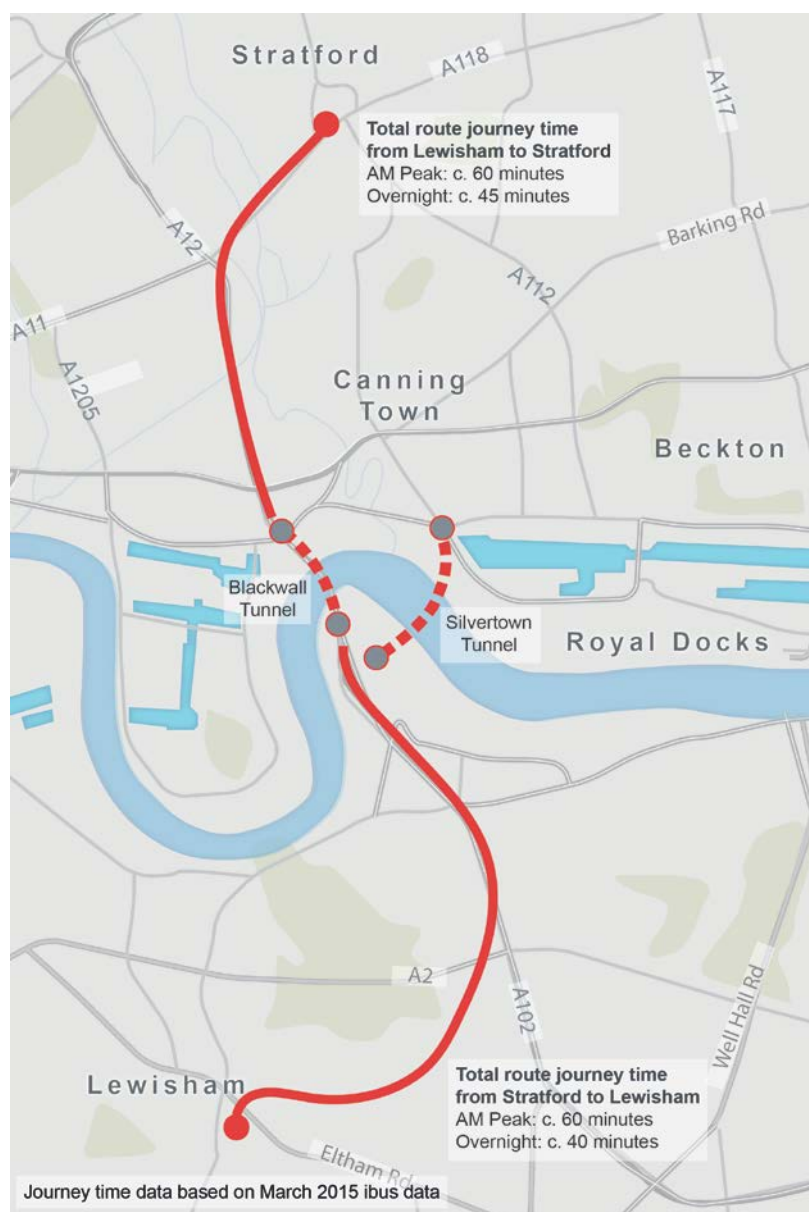
²⁵ As set out in Silvertown Tunnel Transport Assessment (Data sources: Highway Assignment Model baseline traffic counts (2012); Bus Origin Destination Surveys for routes 42, 78, RV1 and 108 (2013); TfL: Pedestrian and cyclist Thames screenline crossings count (2013); Scheduled coach services with an estimated average passenger occupancy of 48; Other passenger occupancy assumptions from TAG data book)

passenger journeys and increase the cost of operating the service 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 Newham²⁶ 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. **Figure 2-23** 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.

- 2.10.4 Under present conditions, a journey across the river by bus is not a realistic proposition for many prospective passengers. It may also act as a deterrent to bus usage even for routes which do not actually cross the river.

²⁶ LB Newham was selected over LB Tower Hamlets as being more representative because Tower Hamlets includes parts of the Central Activities Zone

Figure 2-23 Route 108 journey time



- 2.10.5 The experience of the traffic constraints affecting this bus service, together with the Tunnel's low headroom which prevents the operation of double-deck vehicles, undermine TfL's ability to provide further bus services across the river in this location. Consultation respondents have indicated that additional cross-river bus services would be an important element of any new river crossing and it is likely that there is significant unmet demand for these services.
- 2.10.6 The congestion effects of tunnel closures are also experienced by bus services which do not cross the river. Some bus services terminating at

North Greenwich bus station experience a consequential drop in average speeds, delay and excess journey time as a result of closures of the crossing leading to traffic congestion on the approach roads.

- 2.10.7 TfL has looked at the performance of one such route - the 132²⁷ - on occasions where congestion has built up owing to closures of the Blackwall Tunnel. On 16 January 2014, for example, a 34 minute closure in the AM peak led to bus speeds on this route reducing to almost half their usual average over the course of the day, with a much more significant decrease (to around 5mph) in the period immediately following the closure.
- 2.10.8 Commuter coach services to and from Kent have long been users of the Blackwall Tunnel, and those using them are subject to the same problems as bus users.
- 2.10.9 Operators report²⁸ that it is becoming more difficult to run reliable timetabled peak-hour services, since the variability of delay at the Blackwall Tunnel is high. Delays are also a concern – indeed one operator, Buzzlines, commented on its website:
- Although we will continue to operate Service 737A into Canary Wharf and onwards to the City of London and Westminster, our experience of negotiating the Blackwall Tunnel [...] at peak hour tells us that commuters will be able to keep their overall journey time to a minimum in both directions if we link them with the Jubilee Line, rather than attempting any of the Thames crossings.²⁹
- 2.10.10 Services are also made relatively less attractive by the significant delays, and by the difficulty of reliably estimating likely journey times. In addition to this, unpredictable journey times make it difficult for coach operators to meet their obligations to the Traffic Commissioner and to TfL (through the London Service Permit scheme³⁰).

²⁷ The full route is Market Place/Bexleyheath Clock Tower – North Greenwich station

²⁸ TfL research, 2015

²⁹ Buzzlines website (<http://www.buzzlinestravel.co.uk/commuter?wa=14>), accessed 24 June 2015

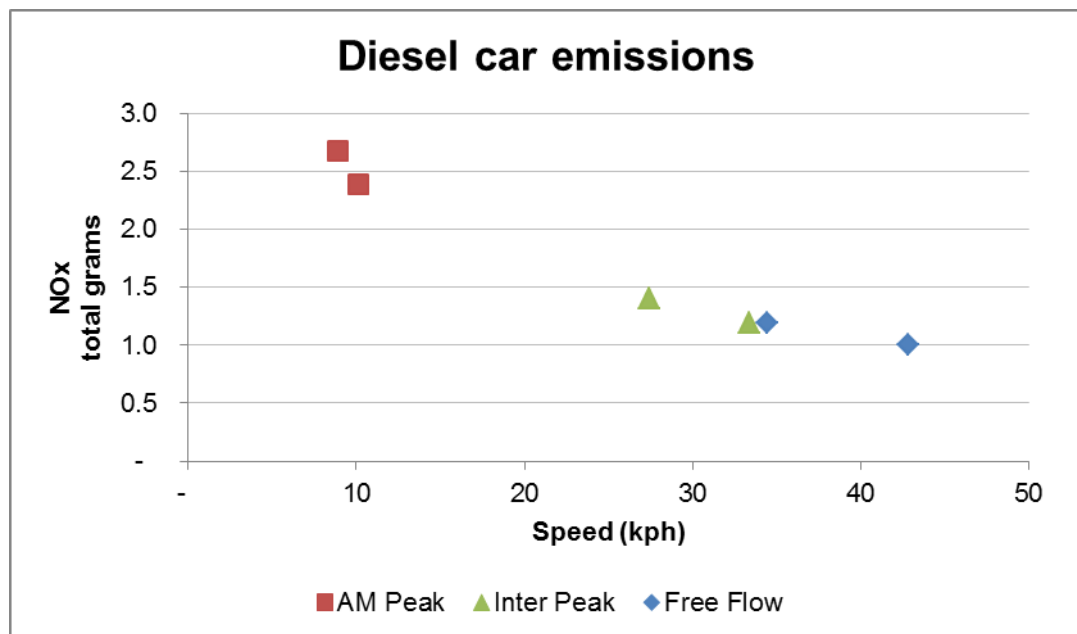
³⁰ A permit required to operate a bus or coach service in London

2.11 Environmental effects

2.11.1 All motorised traffic produces emissions: on a per-vehicle basis, slow-moving and congested stop-start conditions lead to more pollutant emissions than free-flowing conditions and uncongested speeds. Exhaust emissions contribute to poor air quality locally and higher CO₂ emissions from transport.

2.11.2 Figure 2-24 shows how total emissions from a modern car driven through the northbound bore of the Blackwall Tunnel³¹ vary depending on the time of the day, demonstrating the impact of congestion on engine efficiency. A diesel car has been analysed since these have become more prevalent in the fleet and typically have higher air quality pollutant emissions than petrol vehicles.

Figure 2-24 Blackwall Tunnel northbound diesel car emissions (2014)



2.11.3 Congested conditions therefore exacerbate the already significant environmental impacts of large flows of traffic travelling along the A2 and A102, which is one of London's most polluted road corridors.

³¹ TfL drive cycle test using average speeds on northbound approach to Blackwall Tunnel, 2014

2.12 The problems now and in the future

- 2.12.1 London has an excellent track record in achieving substantial mode shift from private to public transport; since 2000 the public transport mode share for London has increased by 10.6 percentage points³². At the same time, public transport modes have all seen increases in trip rates³³. In 2013, the most recently available year of data, public transport mode share overtook private transport mode share for the first time³⁴.
- 2.12.2 There are many reasons for this trend towards public transport. A fundamental reason is the sustained and substantial investment in public transport that has taken place over this period, as outlined above. Demographic factors have also been important. What is certain is that this trend has continued even with population growth. Although overall trips have increased as the population grows, public transport trips have increased much more than private transport trips. In this way, the mode share for public transport has increased.
- 2.12.3 The maintenance of this trend is important because, as shown in forecasts supporting the London Plan policies, London's population will continue to grow, and east London will accommodate much of this growth. GLA forecasts are that London will grow by around 1.2m people between 2011 and 2031 (see Figure 2-25: Population growth projection (2011-2031) and Figure 2-26 below). The boroughs in the east and south east sub-regions are expected to accommodate 37 per cent of this growth, and the three Silvertown tunnel host boroughs plus the London Borough of Barking and Dagenham, to accommodate 23 per cent of London's growth.

³² Travel in London 7, TfL, 2014 (journey stage based mode share)

³³ Drivers of Demand for Travel in London, TfL, 2014

³⁴ Travel in London 7, TfL, 2014. The trip-based mode share was 36.9 per cent for public transport, 36.8 per cent for private transport, 2 per cent cycling and 24 per cent walking

Figure 2-25: Population growth projection (2011-2031)

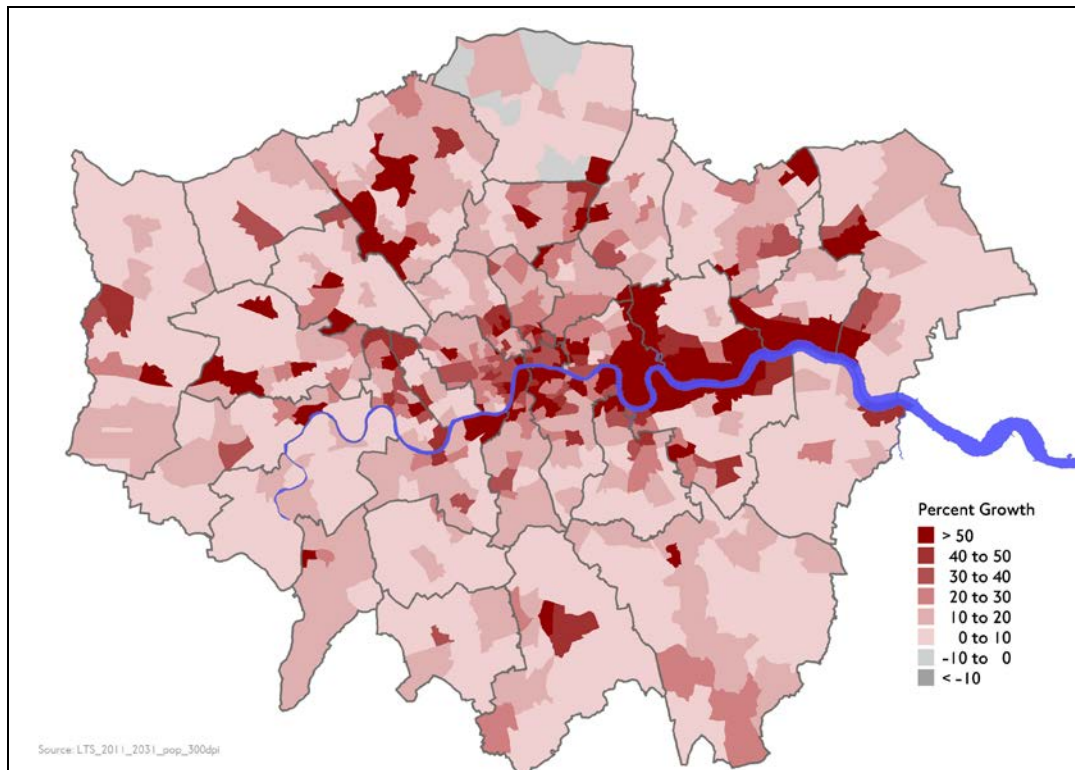
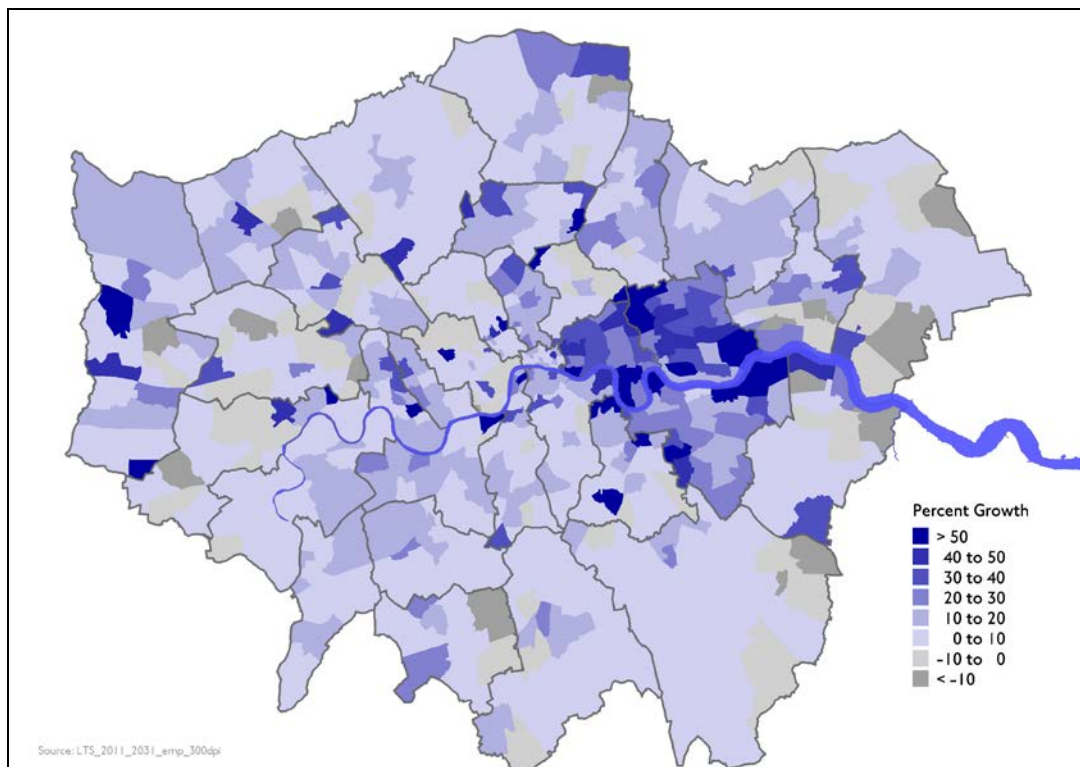


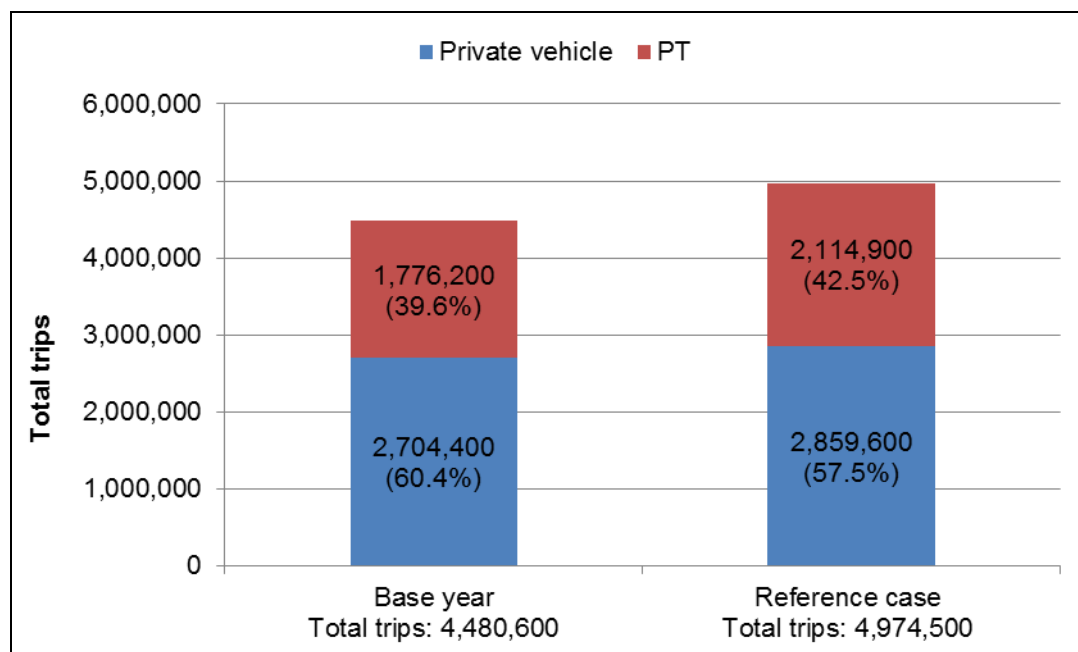
Figure 2-26: Employment growth in London (2011-2031)



- 2.12.4 As a consequence of this increased population and employment, the overall number of trips will increase. Around three million more trips are expected to take place each day by 2031, an increase of around 15 per cent on the baseline 2008 rate. Because growth is so concentrated in the east and south-east, the increase in trip-making there is likely to be even bigger – up to around 30 per cent on 2008 levels³⁵.
- 2.12.5 While many of these additional trips will be accommodated on public transport, a proportion of these additional trips will inevitably be made by private vehicle. The Mayor's Transport Strategy (MTS) sets out a clear commitment to sustainable transport and a continued increase in public transport, walking and cycling mode share (Policy 11). This has so far been achieved. Figure 2-27 below compares the mode shares for the base year of 2012 with the Reference Case (without the Scheme) in 2021. As can be seen, the majority of new trips in the east sub-region in 2021 are anticipated to be made by public transport. However, the growth in absolute numbers of trips is such that even with further growth in the public transport mode share, a relatively small increase in highway travel is inevitable. Nevertheless, the public transport mode share is expected to increase from its current level to around 42 per cent in 2021.

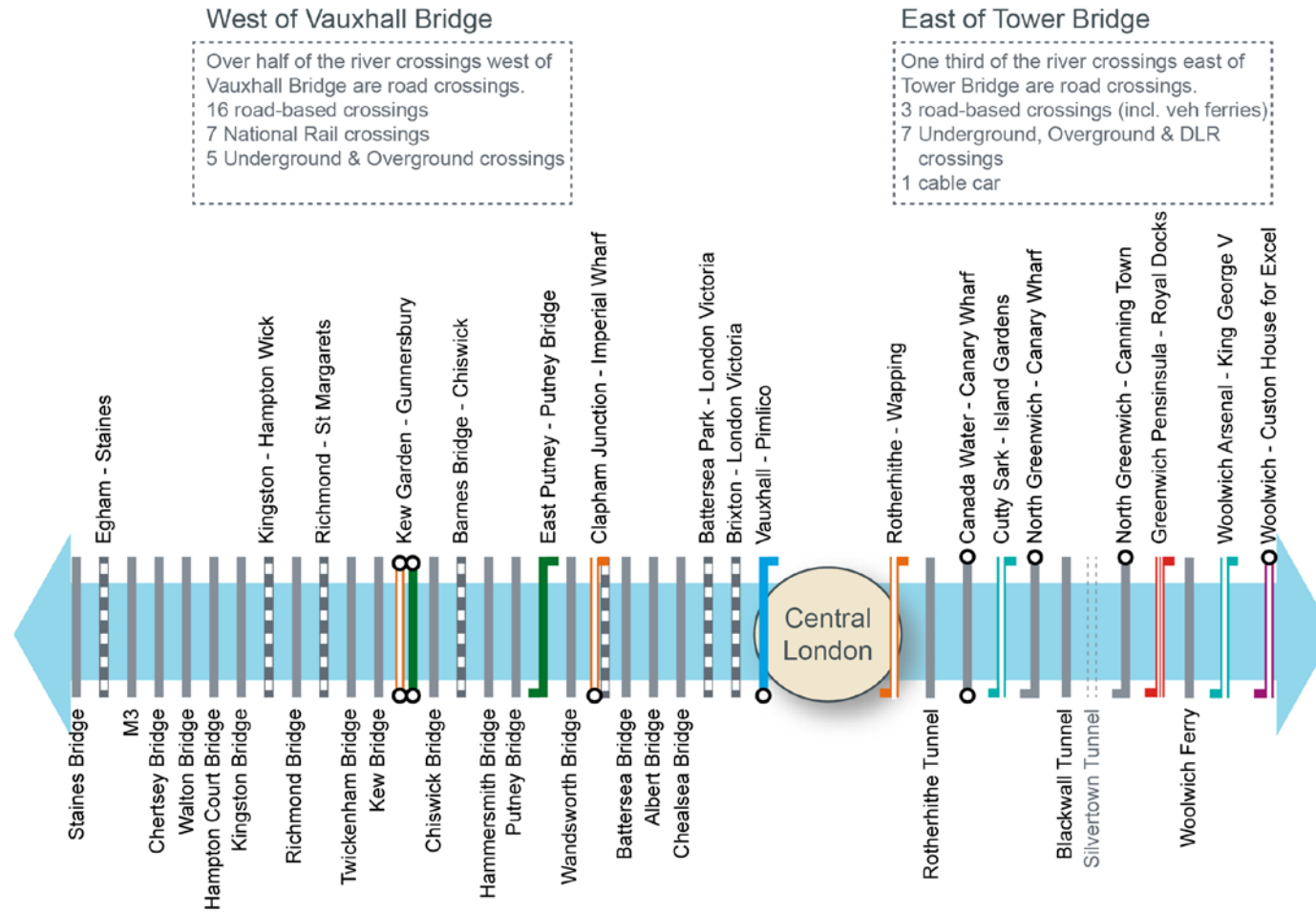
³⁵ TfL, East London Challenges and Opportunities (2010)

Figure 2-27: Total trips by mode in east sub-region, 2012 base year and 2021 Reference Case (0700-1900)



2.12.6 It is worth reiterating in this context the significant investment in rail-based cross-river transport which has characterised east London in the past twenty years. Public transport links constitute a much greater proportion (two-thirds) of all crossings in east London than is the case in west London (where they account for less than half of all cross-river links). This is shown in Figure 2-28.

Figure 2-28 River crossings mix and mode share



- 2.12.7 The forecast of significant employment and population growth in east London that has been described means that the need for this road crossing is even more pressing.
- 2.12.8 The Blackwall Tunnel passes under the River Thames in proximity to three of the most active Opportunity Areas in London: the Greenwich Peninsula and the Royal Docks (designated an Enterprise Zone in March 2011) between them have the potential to accommodate 13,000 new jobs and 24,500 new homes. The Isle of Dogs has the potential to accommodate 110,000 jobs and 10,000 new homes.
- 2.12.9 It is important, however, to recognise that the road traffic problems described here are causing economic and environmental problems today. The case for the Silvertown Tunnel scheme is not made exclusively in response to the need for accommodate forecast growth, though the adverse consequences of not acting on these problems will be much greater in the context of this growth. The problems of the Blackwall Tunnel could threaten the viability of the east and southeast sub-regions to develop as planned.
- 2.12.10 Plans for a new road crossing in the vicinity of the Blackwall Tunnel date back to at least the mid-1990s, and land was safeguarded for this purpose in 1997. Much of the land around the safeguarded area is now high-density residential, and more development is forthcoming both on the Peninsula and at Royal Docks. Although the safeguarding³⁶ means that it is feasible now to build a tunnel, competing demands for space will make this more difficult in the future. Without timely action, the land needed for the tunnel at the north and south sides of the River Thames will be used for new buildings and the opportunity to construct the Silvertown Tunnel could be permanently lost.

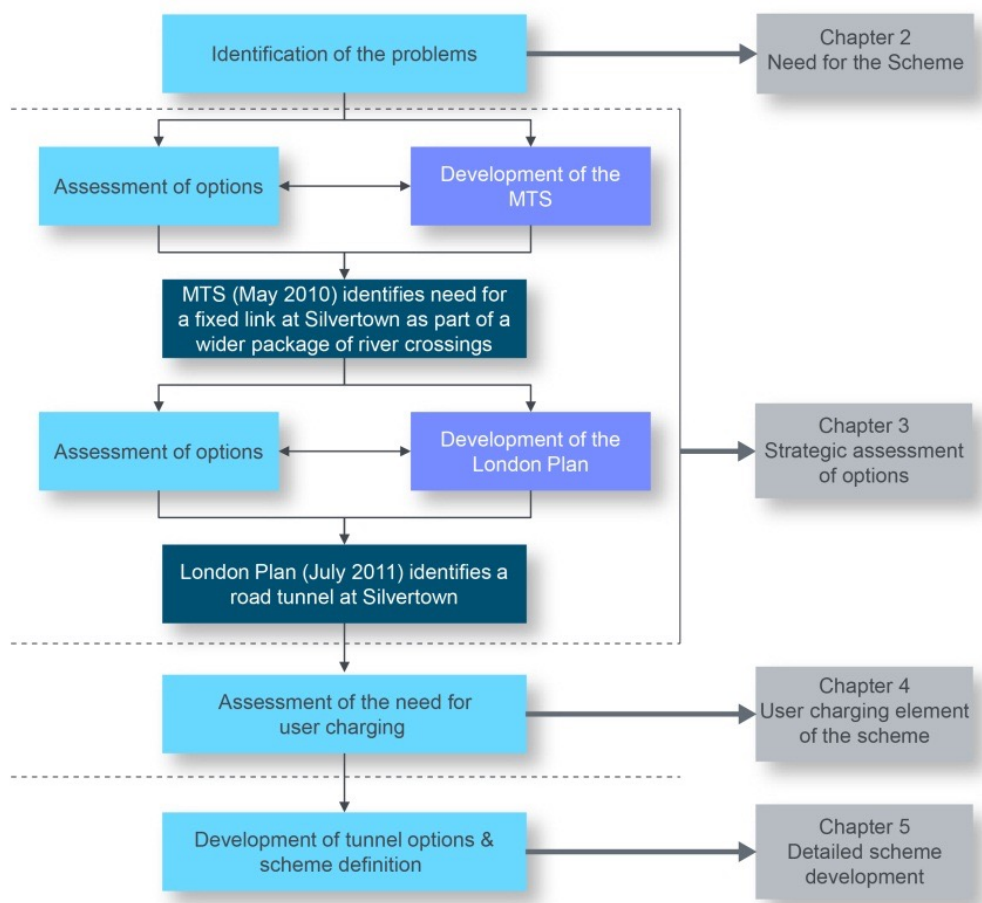
³⁶ See 5.2

3. STRATEGIC ASSESSMENT OF OPTIONS

3.1 Overview

- 3.1.1 This chapter describes how TfL assessed the diverse crossing needs in east London and developed proposals for the Silvertown Tunnel scheme within a broader River Crossings programme responding to these. It summarises the various options considered for road-based crossings, walking and cycling, and public transport.
- 3.1.2 This chapter also explains how this work informed the Mayor's Transport Strategy, and how the further development of options followed this policy.
- 3.1.3 As well as providing a chronological account of this development, it sets out the finding of a 'back-check' of options, undertaken in preparation for statutory consultation.
- 3.1.4 The evolution of objectives which shaped the direction of the River Crossings programme and Silvertown Tunnel scheme is also described.
- 3.1.5 Figure 3-1 gives an overview of the development of the Scheme together with the setting of relevant policy.

Figure 3-1: Optioneering process



3.2 Summary of option development process

Early work

- 3.2.1 In preparation for the production of his Transport Strategy and London Plan, the newly elected Mayor of London, Boris Johnson, directed TfL to undertake a review of the need for river crossings in east London.
- 3.2.2 This review first considered how far existing crossings were adequate and what future needs might arise given the context of growth in east London, and in light of the Mayor’s decision not to proceed with the previously promoted Thames Gateway Bridge scheme. The work undertaken was

summarised in an update to the TfL Planning and Corporate Panel in July 2009³⁷.

3.2.3 The Panel Update set out eight objectives:

- to improve the efficiency of the highway network in the London Thames Gateway, especially at river crossings, and provide greater resilience for all transport users;
- to provide improved connections for local traffic and to discourage potential use of new crossing(s) by longer distance traffic that should be using national routes such as the M25;
- to support the needs of existing businesses in the area and to encourage new business investment in London through reduced and more reliable journey times, and better access to markets and the labour market;
- to support the provision of and access to public transport services in the London Thames Gateway and, in particular, to improve access to new rail links being provided in the area and provide opportunities for more orbital public transport journeys;
- to promote walking and cycling by providing improved links across the Thames;
- to integrate with and support local and strategic land use policies including existing and future developments and to help improve the quality of the built environment in east London;
- to ensure that any proposals are acceptable in principle to key stakeholders, including affected Boroughs; and
- to identify options that are capable of being delivered, achieve value for money for TfL and the wider GLA (reinforcing existing and planned investment in the area e.g. Crossrail, DLR extensions and site remediation and environmental upgrades)

³⁷ TfL, 2009, Planning and Corporate Panel: Update on East London River Crossings review

- 3.2.4 The Panel Update grouped options for addressing the objectives into three categories:
- I. options for improving local access for pedestrians and cyclists at North Greenwich/Isle of Dogs;
 - II. options for providing congestion relief around the Blackwall Tunnel and road network resilience; and
 - III. options to improve accessibility and route choice where no fixed highway links exist
- 3.2.5 In relation to the second category, which relates most directly to the Scheme that TfL is now promoting, the Panel Update included options for a highway bridge or tunnel at Silvertown (which was recommended for further investigation), together with a third bore of the Blackwall Tunnel, and a possible highway tunnel under the Thames at Charlton, neither of which were recommended.
- 3.2.6 The Panel Update also highlighted the potential benefits of managing demand for the Blackwall Tunnel and a new crossing at Silvertown through user charges and maximisation of public transport use, and noted the potential role of user charges in helping fund the crossings.
- Mayor's Transport Strategy and London Plan**
- 3.2.7 This work informed the development of the MTS, which included a proposal for a fixed highway crossing at Silvertown as well as a proposal for road user charging to provide revenue and demand management to support new river crossings, alongside a broad range of other proposals to improve cross river transport. More information about the development of the text of the MTS is provided in section 3.4.
- 3.2.8 The MTS also confirmed that despite substantial investment in the many public transport, walking and cycling schemes it contained, and the resulting forecast for a significant reduction in private highway mode share (from 43 per cent to 37 per cent) by 2031, absolute levels of traffic and congestion in London were likely to grow as a result of very significant population and employment growth.
- 3.2.9 After the publication of the MTS in 2010, TfL continued to refine the options for a highway crossing at Silvertown, which had been only broadly defined in the MTS. Reflecting this further work, the London Plan (published in 2011 a year after the MTS), included a more specific

proposal for a tunnel at Silvertown, on the basis that any fixed high level bridge in this location would entail problematic environmental and land-use impacts, while a low-level lifting bridge would be a source of ongoing operational difficulty.

Further development of the River Crossings programme

- 3.2.10 Following the publication of the London Plan, TfL continued to enhance its understanding of the use and problems of east London's river crossings, and the possible ways of addressing these.
- 3.2.11 This included revisiting options which it had considered previously to give further confidence that the appropriate options had been identified, and addressing comments raised through consultation and discussion with stakeholders by setting out detailed consideration of a range of alternative options. A further consideration was the new Emirates Air Line cable car, which was implemented in June 2012, and rendered the construction of a high level fixed bridge using the safeguarded land at Silvertown unfeasible.
- 3.2.12 TfL summarised this work in two reports published to support a non-statutory consultation on east London river crossings which began in October 2012:
- East London River Crossings: Assessment of Options; and
 - East London River Crossings: Assessment of Need³⁸.
- 3.2.13 These reports set out TfL's process for determining its preferred solutions, including the objectives used and the options considered.
- 3.2.14 The 2012 Assessment of Need provided a refined interpretation of the transport problems at the Blackwall Tunnel, highlighting two specific issues:
- the imbalance between highway network capacity and demand around the Blackwall Tunnel, which results in significant congestion; and

³⁸ TfL, 2012, East London River Crossings Assessment of Needs
TfL, 2012, East London River Crossings Assessment of Options

- the unreliability of the Blackwall Tunnel, and the limited ability of the surrounding road network to cope with incidents when they occur

3.2.15 The 2012 Assessment of Options considered the following options:

- Do nothing
- Congestion charging at the Blackwall Tunnel
- Public transport
- Silvertown vehicle ferry
- Woolwich vehicle ferry
- Gallions Reach vehicle ferry
- Third bore at Blackwall Tunnel
- Silvertown lifting bridge
- Silvertown bored tunnel
- Silvertown immersed tube tunnel
- Woolwich bridge
- Woolwich tunnel
- Thames Gateway Bridge

3.2.16 The work considered options in two ways. The first approach was to assess the options against a set of specific programme objectives, which were an evolution of those which had been set in 2009:

- to improve the efficiency of the highway network in the London Thames Gateway, especially at river crossings, and provide greater resilience for all transport users;
- to support the needs of existing businesses in the area and to encourage new business investment;
- to support the provision of public transport services in the London Thames Gateway;
- to integrate with local and strategic land use policies;

- to minimise any adverse impacts of any proposals on health, safety and the environment;
- to ensure where possible that any proposals are acceptable in principle to key stakeholders, including affected boroughs; and
- to achieve value for money

3.2.17 The second approach used in the 2012 Assessment of Options was to apply TfL's Strategic Assessment Framework, a standard assessment, which produced a qualitative assessment of how the options performed against the challenges and outcomes set out in the MTS.

3.2.18 This Assessment of Options recommended that TfL should take forward a programme of options:

- bored tunnel at Silvertown;
- user charging at the Blackwall Tunnel;
- new vehicle ferry at Gallions Reach; and
- new local road bridge or tunnel at Gallions Reach

3.2.19 Accordingly, the October 2012 consultation put forward proposals for a new highway tunnel at Silvertown, together with user charges at both the Blackwall Tunnel and Silvertown Tunnel, alongside the options for Gallions Reach. Publishing the options assessment as part of the consultation materials gave stakeholders and the public an opportunity to comment on TfL's refreshed assessment of the needs and options for new river crossings, including the Silvertown Tunnel.

Development of the Silvertown Tunnel as a standalone scheme

3.2.20 The October 2012 consultation found strong support for the Silvertown Tunnel scheme, and TfL began to develop it as a standalone project, while continuing to develop other components of the programme separately.

3.2.21 Work has continued on these separate components, in parallel with the Silvertown Tunnel. Options which continue to be assessed under the River Crossings programme – but outside the scope of the Silvertown Tunnel scheme – include bridge, tunnel and ferry options at a number of locations along the Thames, such as at Gallions Reach and Belvedere. These crossings would be multi-modal and could potentially incorporate

fixed rail links; meanwhile others would be dedicated pedestrian and cycle crossings.

3.2.22 TfL set out the resulting work in a further – Silvertown-specific – Needs and Options report which it published for consideration during the most recent consultation on the scheme, in 2014³⁹.

3.2.23 This 2014 Silvertown Needs and Options report restated TfL's assessment of the need for intervention, and summarised TfL's assessment of the following specific options:

- Do nothing;
- Congestion charging at the Blackwall Tunnel;
- DLR extension to Falconwood;
- Silvertown vehicle ferry;
- Third bore at Blackwall Tunnel;
- Silvertown lifting bridge;
- Silvertown bored tunnel; and
- Silvertown immersed tube tunnel

3.2.24 The 2014 report assessed options against newly-defined objectives⁴⁰ for the project itself, and in particular against the first three which were used to assess the different strategic options (the remaining objectives mirror the earlier programme-level objectives):

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

³⁹ Jacobs, 2014, Silvertown Crossing Assessment of Needs and Options

⁴⁰ The final set of Project Objectives (which differs slightly) is given at the end of this chapter

PO3: to support growth in east and south-east London by providing improved cross-river transport links for business and services (including public transport)

PO4: to integrate with local and strategic land use policies

PO5: to minimise any adverse impacts of any proposals on health, safety and the environment

PO6: to ensure where possible that any proposals are acceptable in principle to key stakeholders, including affected boroughs

PO7: to achieve value for money

3.2.25 Publishing this report enabled TfL to summarise the work already undertaken and to invite further comment.

3.2.26 Again, the consultation found considerable support for the proposed Silvertown Tunnel scheme, as well as eliciting a variety of comments on specific impacts and the process by which TfL identified its preferred solution.

3.2.27 In preparing this Preliminary Case for the Scheme in 2015, TfL has undertaken a further back-check of options (including those that were previously assessed and additional options identified by respondents to various consultations). To complete this back-check, TfL has assessed the options against the project objectives as they now stand:

PO1: Improve resilience of river crossings in the highway network in east and south east London to cope with planned and unplanned events and incidents

PO2: Improve road network performance of Blackwall Tunnel and approach roads

PO3: Support economic and population growth by providing improved cross-river road 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

3.2.28 In completing this back-check, TfL has put particular emphasis on the three core transport problems of the Blackwall Tunnel which were described in Chapter 2: congestion, closures and incidents, and a lack of resilience. A narrative summary of the back-check is presented in a box at the end of each section below, and is presented in full as Appendix A.

3.2.29 The following section sets out in more detail TfL's assessment of the options considered over the course of the process described above, including the recent back-check. Where relevant, it also includes information from technical studies considering the feasibility and benefits of specific options in detail.

3.3 Summary of options considered and findings

Road-based crossing options

3.3.1 Over the course of the development of the Silvertown Tunnel scheme within the River Crossings programme, TfL assessed a variety of different highway crossing options as potential solutions to the problems of the Blackwall Tunnel.

3.3.2 Options highlighted in the update to the TfL Planning and Corporate Panel in July 2009 were a third bore of the Blackwall Tunnel, a road bridge or a road tunnel at Silvertown, and a road tunnel at Charlton.

3.3.3 The update recommended against the option of a third bore of the Blackwall Tunnel on the basis that it was unfeasible without major impacts on existing development and extensive civil engineering, while the road tunnel at Charlton was not recommended given likely significant property impacts and feasibility risks due to proximity to the Thames Barrier. The 2009 Update recommended the option of a bridge or tunnel at Silvertown for further work on the basis that it could directly address the Blackwall Tunnel's congestion and resilience issues and appeared technically feasible.

3.3.4 Following the publication of the MTS and London Plan, TfL investigated the option of a bridge or tunnel at Silvertown further, examining a variety of options for implementing it (bored tunnel, lifting bridge, and immersed tube tunnel). (The introduction in June 2012 of the Emirates Air Line cable car had rendered a high-level bridge in this location unfeasible.) Findings were summarised in the 2012 options assessment report. This concluded

that the bored tunnel should be developed further, while it did not recommend the immersed tube tunnel option due to environmental, land, and cost impacts, or a lifting bridge which would directly conflict with the local Masterplan and fail to provide the needed resilience.

- 3.3.5 As noted above, the 2012 options assessment also considered a variety of other schemes, including some which had been considered previously and discounted. It assessed the potential of ferries, bridges and tunnels at alternative locations, and the possibility of a third bore of the Blackwall Tunnel, as well as of bridges and tunnels at alternative locations.
- 3.3.6 The report found that ferries at Silvertown, Woolwich or Gallions Reach would do little to address the problems at the Blackwall Tunnel due to their low capacities.
- 3.3.7 The report found that bridges and tunnels at alternative locations (Woolwich, Gallions Reach) could offer only slight to moderate benefits for the problems at the Blackwall Tunnel. In light of this modest performance, the options of a bridge or tunnel at Woolwich were not recommended for further work on the basis of severe local impacts (for the bridge) and very significant costs (for the tunnel). The option of a bridge or tunnel at Gallions Reach was recommended for further work on the basis of its general connectivity benefits – though the report highlighted the greater potential of a crossing at Silvertown to address the acute issues at the Blackwall Tunnel.
- 3.3.8 The option of a third bore at the Blackwall Tunnel was not recommended on the basis that it would have offered little extra resilience owing to the constraint of being a single bore (so tidal or single-direction flow only) and could not substantially improve opportunities for public transport. The report also noted concerns over engineering feasibility which had been raised previously in relation to this option.
- 3.3.9 Subsequent to this, the 2014 Assessment of Options report produced for consultation on the Silvertown Tunnel scheme considered the following highway based options, once again including some which had previously been recommended for rejection but which had subsequently been raised through consultation and discussion with stakeholders:
- Vehicle ferry at Silvertown;
 - Third bore at the Blackwall Tunnel;
 - Lifting bridge at Silvertown;

- Immersed tube tunnel at Silvertown; and
 - Bored tunnel at Silvertown
- 3.3.10 The 2014 assessment set aside a number of options which had been considered in the 2012 assessment, those which were geographically remote from the Blackwall Tunnel, on the basis that these were not directly related to meeting the strategic highway objectives at the Blackwall Tunnel.
- 3.3.11 The 2014 report assessed the Silvertown vehicle ferry option as performing negatively with regard to resilience and growth, with a slight positive effect on road network performance, and it was not recommended.
- 3.3.12 Echoing previous reports, the 2014 report did not recommend the option of a third bore at the Blackwall Tunnel on the basis that it could only partially address congestion and resilience problems, would be very difficult to manage, and was of uncertain feasibility due to development of tall buildings on piled foundations in the vicinity.
- 3.3.13 The 2014 report did not recommend the option of a lifting bridge on the basis that while it could partially address congestion and resilience problems, it would introduce its own resilience issues with regular closures for passing shipping, thus undermining its effectiveness. The report also noted that any lifting bridge would have a considerable physical and visual impact on surrounding urban areas, would not be compatible with the London Plan's vision for the Peninsula, and would be contrary to local planning policy. With a high-level bridge already confirmed as being unsuitable in this location, this confirmed that no bridge option would offer an appropriate solution.
- 3.3.14 In relation to tunnel options, the 2014 report assessed both an immersed tube tunnel at Silvertown and the option of a bored tunnel. It found that both would be capable of effectively addressing the objectives of the project. It also noted that the extent of congestion relief would depend on the introduction of user charges as the approach roads could not cope with both tunnels operating at capacity. The assessment flagged that of the two, the immersed tube tunnel was likely to have more problematic impacts on the local urban area and river environment.
- 3.3.15 More detail on the selection of the preferred form of the Silvertown Tunnel is given in Chapter 5.

BACK-CHECK of highway options (see Appendix A)

This back-check review confirms that options located some distance to the east of the Blackwall Tunnel (namely at Charlton, Woolwich, Gallions Reach and Belvedere) would not – by virtue of their location – be able to fully satisfy the objectives of reducing congestion and closures at the Blackwall Tunnel and providing resilience to mitigate closures. As set out in Chapter 2, there is significant demand to cross the river in the vicinity of the existing Blackwall Tunnel owing to its connections to strategic roads – this is likely to remain the case.

The back-check also confirms that vehicle ferries cannot offer an effective solution to the problems at the Blackwall Tunnel. Their limited capacity and slow journey times mean they would not attract enough traffic to meaningfully address the congestion problems (even in conjunction with demand management measures), and the same characteristics render them incapable of providing effective resilience, because they could not accommodate the significant demand resulting from incidents or closures of the Blackwall Tunnel (and so would not address resilience). The Blackwall Tunnel has a capacity for around 3,000 vehicles per hour in the peak direction, with a ferry (in a two-ferry configuration) only being able to accommodate around 200 vehicles per hour in normal conditions.

A new fixed highway connection close to the Blackwall Tunnel would deliver significant resilience, allowing even traffic which is on the final approach to the tunnels to reroute with minimal diversion in the event of closures. It would also enable the existing bottleneck on the A102 to be removed, addressing the immediate cause of congestion on this route. Built to modern standards and capable of accommodating overheight vehicles, it would directly reduce the frequency of closures of the Blackwall Tunnel.

Of the main options considered for a fixed crossing in this location (third bore of the Blackwall Tunnel, or a high level bridge, lifting bridge, or tunnel at Silvertown), a third bore of the Blackwall Tunnel would entail ongoing operational difficulty as it would need to be operated tidally, while a lifting bridge would be problematic in a similar way as it would need to open for shipping.

Meanwhile, the option of a tunnel or high level bridge at Silvertown could both address the congestion and resilience problems of the Blackwall Tunnel by providing capacity and connectivity close by. However, a high level bridge at

Silvertown would be deeply incongruous with the development of the Greenwich Peninsula and Royal Docks and would conflict with relevant masterplan (it would also be unfeasible in the context of the Emirates Air Line in this location) – this means that a tunnel at Silvertown offers the best solution to address the issues of the Blackwall Tunnel in a way that complements and supports the vision for this rapidly growing site.

However, there is an important caveat for options which improve highway conditions. Implemented in isolation, there is a tendency for benefits to be eroded over time as drivers take advantage of reduced journey times and increased convenience. This means that the eventual solution should also entail a means of managing traffic demand e.g. user charging.

Walking and cycling options

- 3.3.16 TfL explored the potential for walking and cycling-based solutions to address the identified needs for river crossings in east London in its 2009 studies, which considered pedestrian and cycle crossings at a number of different locations (from North Greenwich to Canary Wharf, from Rotherhithe to Canary Wharf, from North Greenwich to Silvertown and at Gallions Reach).
- 3.3.17 Although this work did not identify any potential for pedestrian and / or cycle improvements in themselves to address the specific problems of the Blackwall Tunnel, TfL considered the possibility of incorporating provision for pedestrians and cyclists in its detailed consideration of highway options with greater potential to address the problems of the Blackwall Tunnel.
- 3.3.18 The option of including provision for pedestrians and cyclists in the context of a highway bridge crossing appeared to have potential merit, but the bridge option was subsequently rejected (as set out above).
- 3.3.19 Meanwhile TfL noted from an early stage that although it might be feasible to incorporate provision for pedestrians and cyclists within a tunnel crossing, it would be of questionable benefit because of the poor and potentially intimidating ambience of a 1.4km tunnel exposed to high levels

of road noise (the Panel Update of 2009 referred to the likelihood that a tunnel would be less attractive than a bridge to pedestrians and cyclists). This was strengthened in further examination of the option in 2010⁴¹, which pointed out in addition that lengthy pedestrian tunnels had the potential for significant safety risks, and that permanent staffing might be required.

- 3.3.20 The 2009 studies did highlight the potential to promote walking and cycling by providing improved links across the Thames, and accordingly, MTS Proposal 39 included reference to 'local links to improve connections for pedestrians and cyclists'. This provided the policy support for the for Emirates Air Line cable car which subsequently opened in summer 2012.
- 3.3.21 The options assessments undertaken following the publication of the MTS did not identify any potential for walking and cycling options in and of themselves to address the problems of the Blackwall Tunnel, though TfL has continued to consider the possibility of incorporating provision for pedestrians and cyclists within the fabric of highway crossing options. More recent consideration of the issue has confirmed that concerns over ambience, safety and security would be likely to greatly undermine the potential benefits of such a facility.
- 3.3.22 More broadly as part of the river crossings programme and following the support for this in the MTS, TfL has also continued to progress improvements for pedestrians and cyclists and is currently supporting Sustrans in developing a proposal for a Rotherhithe-Canary Wharf bridge for the use of pedestrians and cyclists.

BACK-CHECK of walking and cycling options (see Appendix A)

TfL's recent back-check against the project objectives confirms that walking and cycling measures in and of themselves would be highly unlikely to achieve the significant reduction in demand needed to address the congestion and closure problems of the Blackwall Tunnel. Furthermore a walk or cycle crossing could not offer a realistic alternative in case of incidents or closures and hence would not provide any additional resilience.

TfL has also considered again the potential to include provision for

⁴¹ Mott MacDonald, October 2010, Silvertown Tunnel Option – Addendum To Volume 1

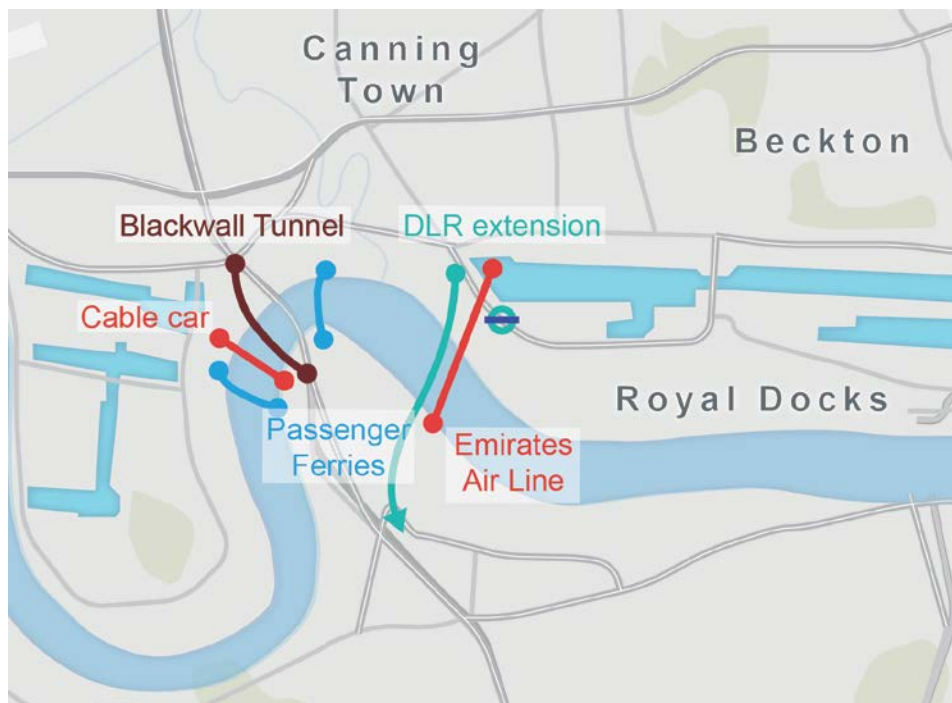
pedestrians and cyclists within the structure of the Silvertown Tunnel itself. The length of the tunnel means that a poor and potentially intimidating ambience is inevitable, and there is concern over safety and security implications. In the context of the existing Emirates Air Line which follows broadly the same alignment but ties more directly into the local centres of activity, it would likely prove unattractive to most potential users. Additionally, cost impacts would likely be very significant, in the region of some £70m additional cost.

TfL's proposed approach is to maximise the use of the Emirates Air Line by improving access to this dedicated pedestrian and cycle crossing through the delivery of the Silvertown Tunnel scheme.

Public transport options

- 3.3.23 In developing its work on River Crossings, TfL has assessed a variety of public transport options, in addition to the substantial package of public transport improvements put forward in the MTS.
- 3.3.24 Figure 3-2 shows the public transport river crossing options considered in the vicinity of the Blackwall Tunnel (TfL also considered the implementation of public transport crossings further east, at Gallions Reach and at Belvedere).

Figure 3-2: Public transport alternatives



- 3.3.25 The 2009 update to the Planning and Corporate Panel included considerations in relation to a cable car or a passenger ferry between North Greenwich and Canary Wharf, an upgrade of the ferry service between the O2 and East India DLR station, a light rapid transit crossing at Gallions Reach, and a cable car, a passenger ferry, or a bus/pedestrian/cyclist bridge at Gallions Reach.
- 3.3.26 While many of these options have merit, and indeed work on some is being progressed separately, the early work did not highlight potential for these options in and of themselves to meaningfully address the problems of the Blackwall Tunnel.

- 3.3.27 The 2012 Assessment of Options reported on TfL's further assessment of the potential to address the problems of the Blackwall Tunnel by implementing further new public transport infrastructure, targeting private car trips which have the greatest potential to switch to alternative modes of transport.
- 3.3.28 Before identifying specific options, the 2012 report noted that as a result of very substantial investment in recent years, a large proportion of the London-based car drivers currently using the Blackwall Tunnel already have good public transport access (the implication being that these users would be unlikely to be encouraged to use public transport by the provision of further infrastructure – for example because of the time or purpose of their travel).
- 3.3.29 It also discounted the option of providing additional capacity on existing fixed public transport lines on the basis that there was forecast to be available capacity on the relevant cross-river links in peak periods into the future. It also discounted options based on bus network development on the basis that these would not be able to generate a step change in driver behaviour of a scale necessary to address the problems at the Blackwall Tunnel.
- 3.3.30 The 2012 report identified an extension of the DLR to Eltham as the only public transport scheme which in principle had the potential to lead to a significant shift away from the car to public transport. The concept of a DLR extension had been put forward by stakeholders and other consultation respondents.
- 3.3.31 The report assessed its potential to address congestion and resilience issues at the Blackwall Tunnel as neutral, based on the very diffuse pattern of origins and destinations of Blackwall Tunnel users, and analysis that indicated only 4% of existing tunnel users would be within its catchment (and of these even fewer would be capable of taking advantage of the new connection it offered), and it would not have any effect on road network resilience. Additionally, the 2012 report noted the significant feasibility issues with the connection at Canning Town, estimated high costs (in the region of £1bn), as well as the negative impacts on the capacity to support development in the Royal Docks because some services would need to be diverted.
- 3.3.32 TfL revisited this option in the Assessment of Needs and Options for the 2014 Silvertown Tunnel consultation, which again came to the conclusion that a DLR extension would be unable to materially address the problems

of the Blackwall Tunnel. A further problem identified for a DLR option was that it would require land which has been identified for other uses, including housing.

- 3.3.33 The 2014 report also highlighted the potential for highway-based options to effectively support new bus connections, in addition to meeting the project objectives, noting that new bus connections utilising a new river crossing at Silvertown would represent a more cost-effective way of catering for demand along this particular route.

BACK-CHECK of public transport options (see Appendix A)

In developing this Preliminary Case for the Scheme, TfL has again considered the potential for public transport connections to address the problems of the Blackwall Tunnel.

A key issue for public transport-based options is that they would offer almost no benefit for highway network resilience. In the event of closures of the Blackwall Tunnel, large numbers of vehicles already part-way through their journeys would still need to find alternative road-based routes across the river as there would be no practical prospect of switching to alternative modes of transport instead. This would leave a critical objective of the Scheme and the river crossings programme unmet.

While there might appear to be potential to address the congestion at the Blackwall Tunnel through provision of alternative modes of transport, the recent history of substantial increases in public transport provision shows that in fact this has not succeeded in reducing highway trips through the Blackwall Tunnel (in fact, as set out in Chapter 2, despite large increases in the provision and use of public transport, the amount of traffic using the Blackwall Tunnel has generally increased steadily since 1986). It is also worth noting that without some additional form of user charging any reductions in traffic achieved might be rapidly offset as improved traffic conditions would tend to encourage car use.

TfL recently assessed a scenario entailing a user charge at the Blackwall Tunnel, together with measures to reduce inbound flows on the A2 and maximised capacities of existing cross-river rail links, as well as increased provision of cross-river bus services (though the latter has limited potential without improvements to the highway network). TfL's analysis indicated that traffic flow would reduce only in the off-peak period and substantial delay in the peak would remain, with delay also worsening on other parts of the network. Furthermore, this option would leave the resilience objective of the

Scheme unmet.

However, there is clearly merit in ensuring that there are good public transport options available for as many journeys as possible. Due to the comparative ease of implementation and route flexibility buses are the ideal public transport solution to meet rapidly emerging demand and to provide orbital connections between south east and east London. A successful cross-river bus network relies on an efficient and resilient cross-river road network in order to provide fast and reliable journey times and to be attractive to (potential) customers. The problems of congestion, closures and resilience at the Blackwall Tunnel therefore need to be addressed first, in order to be able to run an efficient bus network.

Locking in the benefits – user charging and other options

- 3.3.34 Consideration of the role of road user charges to manage demand and address the problems of the Blackwall Tunnel has been central to TfL's assessment of options from the earliest stages of TfL's work on river crossings.
- 3.3.35 The 2009 Planning and Corporate Panel update identified user charging as a potential complement to a highway-based solution, where it would bring an ability to manage traffic demand. The 2009 update also highlighted user charging as a potentially effective means of funding new infrastructure.
- 3.3.36 The MTS included specific reference to the role of user charging in managing demand and raising revenue to support the introduction of new highway river crossings.
- 3.3.37 In light of consultation feedback, options appraisals following the publication of the MTS also considered whether road user charging could in itself address the problems of the Blackwall Tunnel.
- 3.3.38 The 2012 Assessment of Options report noted that charging could potentially reduce congestion at the Blackwall Tunnel, but could not address the problem of resilience. The report recommended that user charging should not be taken forward as a measure in isolation, but that it should be considered alongside a new highway crossing option.
- 3.3.39 The 2014 Assessment of Needs and Options report also assessed the option of road user charging in isolation, again concluding that it could not

fully address the issues at the Blackwall Tunnel, but noted that it would make an effective complementary measure to a new tunnel at Silvertown.

BACK-CHECK of user charging and other options (see Appendix A)

TfL's recent back-check of options, drawing on the evidence generated in its development of the Silvertown Tunnel scheme, confirms that demand management in the form of road user charging has a key role to play in addressing the problems of the Blackwall Tunnel.

As noted above, even options which offer the prospect of meaningfully reducing congestion at the Blackwall Tunnel would only be likely to deliver temporary relief, as improved conditions would over time encourage more trips to be made.

Recent traffic modelling also confirms that while the Silvertown Tunnel implemented without a user charge would provide congestion relief, some queuing would still be likely to remain.

User charges also represent a highly effective means of both maximising and maintaining the congestion-reduction benefits of new highway infrastructure, and could be tailored to achieve a number of desirable outcomes. For example, a system of discounts could be used to encourage the use of cleaner vehicles, or discourage the use of more polluting vehicles.

Charging also represents a very promising means of raising revenue to help fund the costs of new highway infrastructure, and once this is recouped could help to deliver further transport improvements.

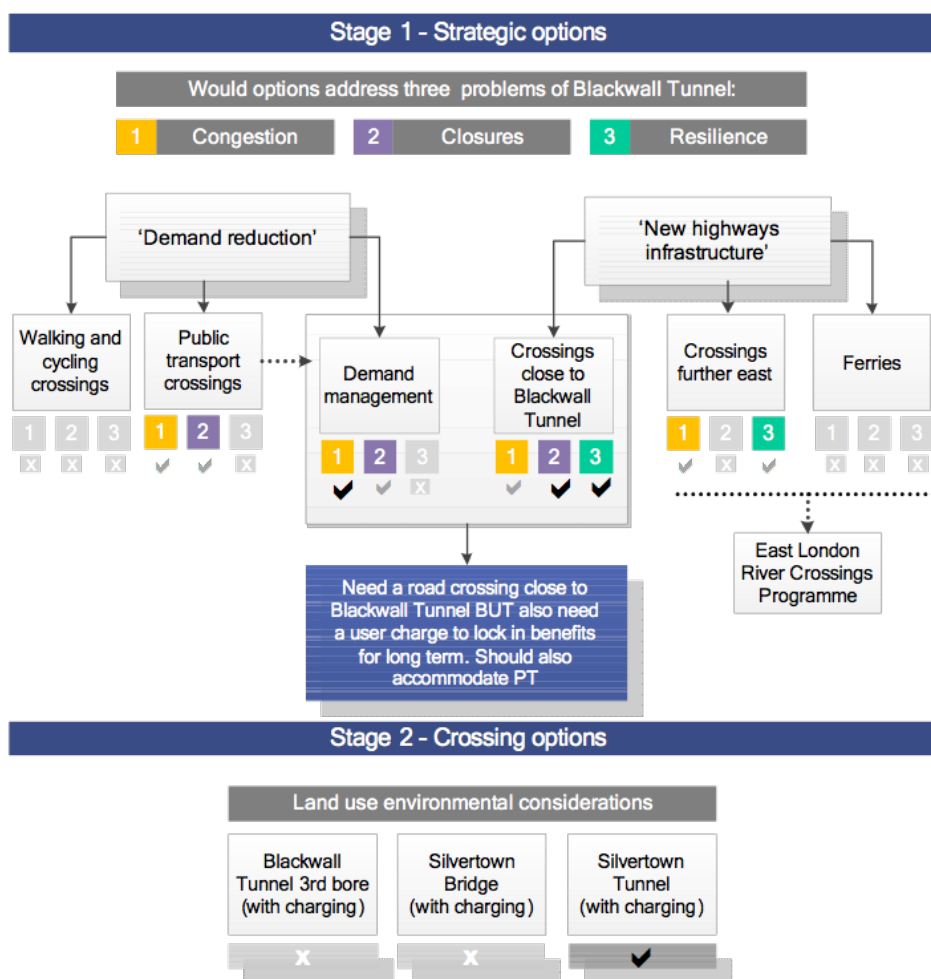
Back-check – overview

- 3.3.40 Given the conflict of bridge options at Silvertown with relevant local plans, and the inability of a third bore of the Blackwall Tunnel to effectively provide resilience (as well as its doubtful feasibility); a tunnel at Silvertown continues to represent the most appropriate means of providing new highway capacity.
- 3.3.41 However, TfL's back-check review, conducted in preparing this Preliminary Case for the Scheme, indicates that no single approach would fully address all of the three identified transport problems at the Blackwall Tunnel. Hence, a blended solution, combining the resilience benefits of

this additional highway link close to the existing crossing and the demand management benefits of user charging represent the most appropriate means of addressing the problems of the Blackwall Tunnel.

3.3.42 Figure 3-3 summarises the findings of TfL’s back-check review. The next section describes in detail how the options appraisal described here led to the development of policies in the MTS and London Plan.

Figure 3-3: Overview of back-check appraisal



3.4 Policy Development – the MTS and the London Plan

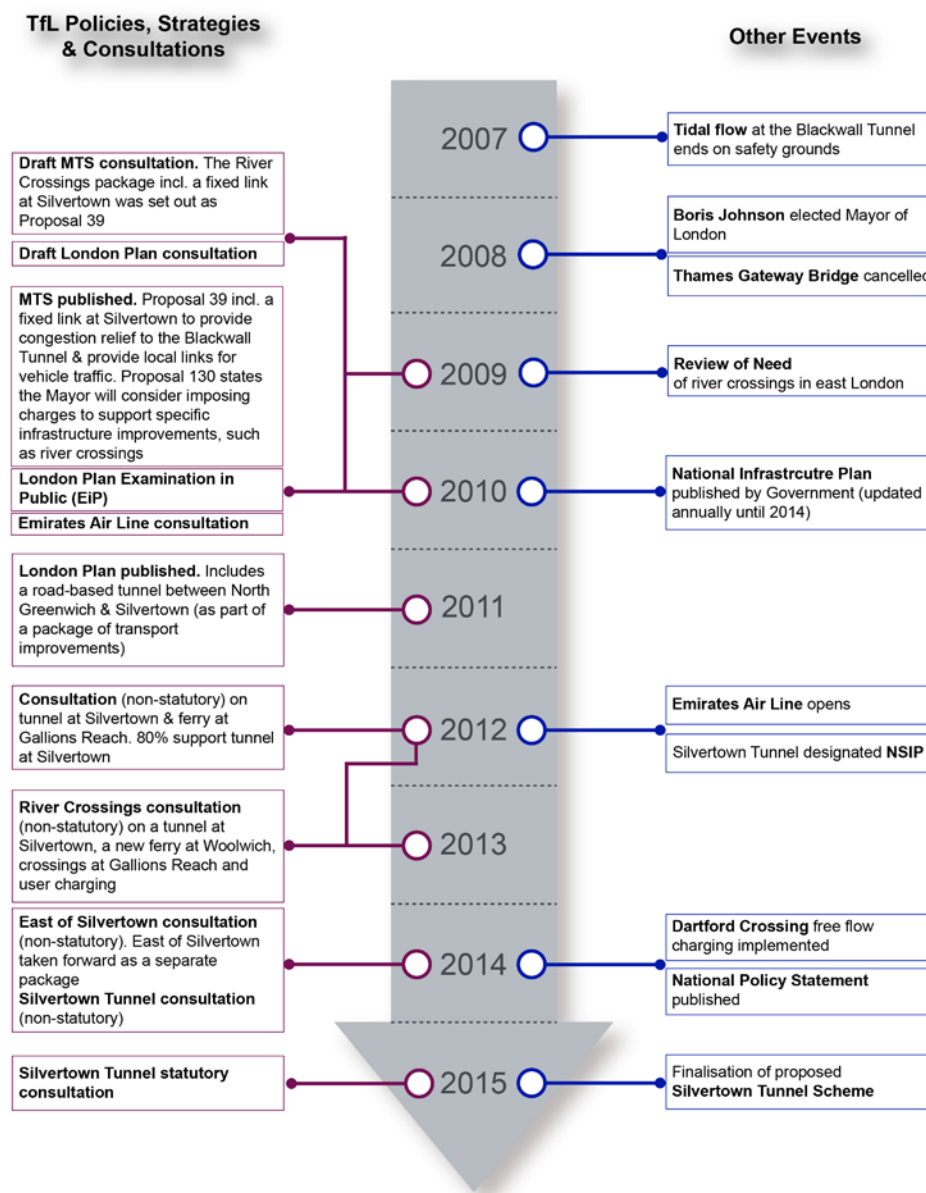
- 3.4.1 The May 2009 study described above informed the development of the MTS and the London Plan. These set policy foundation for the River Crossings Programme in London, which has subsequently (from 2014) been taken forward in two workstreams, the Silvertown Tunnel scheme and East of Silvertown. This section will describe how policies in support of a Silvertown crossing with a user charge became embedded in the MTS and London Plan following statutory consultation.
- 3.4.2 The MTS is the principal policy tool through which the Mayor through TfL exercises his responsibilities for the planning, management and development of transport in London. The London Plan is the development plan for London. It sets out an integrated economic, environmental, transport and social framework for the development of London, and the strategic and London-wide policy context within which boroughs should set out their detailed local planning policies.
- 3.4.3 The MTS was published in May 2010. The London Plan was adopted in 2011, and a version (consolidated with alterations) was published in March 2015. The current London Plan⁴², the Economic Development Strategy (EDS) and the MTS⁴³ were developed in tandem using the same evidence base over the broad period of 2009-2011, following the election of Boris Johnson in May 2008.
- 3.4.4 The MTS and London Plan, both of which were subject to statutory public and stakeholder consultation, contain policies that underpin the option of a Silvertown Tunnel with a user charge (as well as for the wider River Crossings programme).
- 3.4.5 However, there was more than a year between the publication of the MTS (2010) and the London Plan (2011) and this is reflected in their different references to what became the Silvertown Tunnel scheme, which was informed by the options appraisals in progress at the time. In short, the MTS provides policy support for a new fixed link at Silvertown and the use of user charging as a means of demand management and revenue raising. London Plan policy provides support for a road tunnel at

⁴² <http://www.london.gov.uk/priorities/planning/london-plan>

⁴³ <https://www.london.gov.uk/priorities/transport/publications/mayors-transport-strategy>

Silvertown. Changes to both strategies were made as a result of consultation and as a result of TfL's continued work. Figure 3-4 summarises the development of the Scheme, showing some of the key influences in terms of policy.

Figure 3-4: Timeline of development of the Silvertown Tunnel scheme



MTS development

3.4.6 The consultation draft MTS was published on 12 October 2009 and subject to public consultation until 12 January 2010, and prior to that underwent consultation with the London Assembly and Functional Bodies of the GLA.

3.4.7 Two proposals in the draft MTS reflect the outcomes of the options assessment phase leading to the identification of the Silvertown Tunnel scheme: Proposal 39 on river crossings and Proposal 130 on managing demand for travel. These were as follows in the draft version of the MTS

Proposal 39

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

- a) a new fixed link at Silvertown, to provide congestion relief to the Blackwall Tunnel and provide local links for vehicle traffic*
- b) an upgraded Woolwich ferry and consideration of a new vehicle ferry at Gallions Reach to improve connectivity*
- c) local links to improve connections for pedestrians and cyclists;*
- d) consideration of a longer term fixed link at Gallions Reach to improve connectivity for local traffic, buses, cyclists and to support economic development in this area*
- e) new rail links including High Speed One domestic services, Crossrail and the DLR extension to Woolwich, reducing road demand, and so road congestion at river crossings, where possible*
- f) support for Government proposals to reduce congestion at Dartford*

Proposal 130

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

groups. The Mayor will also consider imposing charges or tolls to support specific infrastructure improvements, such as river crossings.

3.4.8 TfL's analysis of consultation responses and its recommendations to the Mayor with regard to any changes to the Proposals, Policies or the surrounding text are set out in its Report to the Mayor⁴⁴. Proposal 39 was modified slightly (in part e) as a result of the consultation. The final version is shown below.

Proposal 39

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

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

3.4.9 Changes were also made to the surrounding text. The text at paragraph 392 was modified to include 'new and enhanced passenger/cycle ferries, new fixed links, or innovative solutions such as cable cars' and a new paragraph (393) was added which set out a commitment to encourage switch from cars to public transport, walking and cycling on cross-river links and to reduce freight traffic in peak hours. Paragraph 397 was added stating that there are a range of funding options for the Schemes including tolling, which could both pay for the Scheme and manage demand. As

⁴⁴ <https://www.london.gov.uk/priorities/transport/publications/mayors-transport-strategy>

can be seen, this text is reflected in the current proposal in which user charging is an intrinsic element.

- 3.4.10 Proposal 130 did not change as a result of consultation.
- 3.4.11 A fixed link at Silvertown (and the wider River Crossings Programme) are therefore enshrined in the MTS as approved by the Mayor in May 2010 and described in Proposal 39. The principle of a user charge was also approved in the final MTS as set out in Proposal 130. These two proposals form the transport policy basis for the further development of the Silvertown Tunnel with a user charge.

London Plan development

- 3.4.12 The draft London Plan was published alongside the MTS in October 2009 but because there were different legal procedures leading to adoption – including an independent examination – its development followed a longer timeframe and the Plan was adopted in July 2011. This meant that the adopted Plan reflected TfL’s further work with regard to the preferable form of Silvertown crossing which had been identified broadly as a ‘fixed link’ in the MTS.
- 3.4.13 The 2009 consultation draft London Plan contained the following:

Policy 6.4 | Enhancing London’s transport connectivity

B The Mayor will work with strategic partners to improve the public transport system in London, including cross-London and orbital rail links to support future development and regeneration priority areas, and increase public transport capacity by:

[...]

k) Providing new river crossings⁴⁵

- 3.4.14 Following the consultation, Early Draft Changes (EDC)⁴⁶ to the London Plan were published in May 2010. These included additional text at

⁴⁵ The preceding clauses are a list of public transport (particularly rail) improvements, including Crossrail, the Tube upgrades and DLR and Tramlink enhancements.

⁴⁶ www.london.gov.uk/sites/default/files/archives/mayor-planning-london-plan-review-docs-early-suggested-changes-schedule-may2010.pdf

Paragraph 6.37 concerning the Mayor's wish to investigate the provision of additional road-based river crossings in east London (Policy 6.4 remained unchanged). Later in 2010, an Examination in Public (EiP) was held.

- 3.4.15 Following the EiP, Further Suggested Changes (FSC) to the London Plan were published in October 2010. At this point the policy with regard to river crossings changed from being a link to a tunnel, as shown in the extract from Para 6.18B below (relevant line in bold).

Para 6.18B

The Mayor is developing proposals for further new and enhanced river crossings in east London to improve accessibility and the resilience of local transport networks, support economic growth in the area and link local communities (see also paragraph 6.37). These will complement the Jubilee Line crossings, DLR Lewisham and Woolwich extensions, the re-opened crossing of the extended East London Line and the further cross-river public transport capacity provided by Crossrail and will include:

- *a new cable car-based crossing linking Greenwich Peninsula with the Royal Docks;*
- *a new **road-based tunnel crossing** between the Greenwich Peninsula and Silvertown (see paragraph 6.37);*
- *consideration of ferry-based options east of a crossing at Silvertown; and*
- *consideration over the longer term of a fixed link at Gallions Reach*
- *These will help ensure a range of pedestrian, cycle and road-based Thames crossings*

- 3.4.16 In December 2010 a final version of the draft Replacement London Plan was published, incorporating all the changes put forward before and during the EiP (the Consolidated Draft Replacement Plan)⁴⁷. This included Policy 6.4 and the Para 6.18B, both of which make clear the commitment

⁴⁷ www.london.gov.uk/priorities/planning/london-plan/the-london-plan-july-2011-archive

to a road tunnel at Silvertown. The final stage in the approval of the Plan came in March 2011 with the publication of the Panel Report⁴⁸, which endorsed the policies for river crossings.

3.5 The East London River Crossings Programme

- 3.5.1 This chapter has described how TfL undertook extensive options appraisal for river crossings in east London in order to develop the policies in the MTS and London Plan. The options assessment was informed by statutory consultation and TfL's engagement with stakeholders, and the changing circumstances with regard to land-use in the area.
- 3.5.2 The work identified a range of needs for river crossings in east London. The options to address these needs were set out in Proposal 39 of the MTS and became the River Crossings programme, which was later split into the Silvertown Tunnel scheme and the East of Silvertown programme. In order to address the problems of the Blackwall Tunnel, a tunnel at Silvertown, with user charging to manage demand and provide funding, was identified as the right option.
- 3.5.3 Proposal 39 comprised six elements. Table 3-1 shows the progress against each.

⁴⁸ www.london.gov.uk/sites/default/files/Panel-report-Vol-1.pdf. See particularly paras 6.14-15 and 6.21

Table 3-1 Progress on the River Crossings Proposal

Proposal 39	Progress to date
a. A new fixed link at Silvertown, to provide congestion relief to the Blackwall Tunnel and provide local links for vehicle traffic	<ul style="list-style-type: none"> • Consulted on Oct-Dec 2014. A statutory consultation runs Oct-Nov 2015. • Consulted on in the two River Crossings consultations in 2012. • Could open in 2022/23
b. An upgraded Woolwich ferry and consideration of a new vehicle ferry at Gallions Reach to improve connectivity	<ul style="list-style-type: none"> • Part of East of Silvertown programme. • Consulted on in River Crossings consultations. • Life extension works underway
c. Local links to improve connections for pedestrians and cyclists	<ul style="list-style-type: none"> • Emirates Air Line cable car opened in summer 2012. • Supporting Sustrans developing Rotherhithe-Canary Wharf bridge proposal.
d. Consideration of a longer term fixed link at Gallions Reach to improve connectivity for local traffic, buses, cyclists and to support economic development in this area	<ul style="list-style-type: none"> • Part of East of Silvertown programme. • Has been consulted on. • Could be delivered by 2025
e. The encouragement of modal shift from private cars to public transport using new rail links including High Speed One domestic services, Crossrail and the DLR extension to Woolwich, reducing road demand, and so road congestion at river crossings, where possible	<ul style="list-style-type: none"> • DLR Woolwich Arsenal (2009), DLR capacity enhancements (2010) • London Overground (2010) • HS1 Ebbsfleet-Stratford (2009) • Crossrail (2018) • Public transport mode share has increased in London over past decade.

Proposal 39	Progress to date
f. Support for Government proposals to reduce congestion at Dartford	<ul style="list-style-type: none"> • Free-flow charging was implemented in spring 2015. • DfT developing plans for Lower Thames Crossing

- 3.5.4 As noted in Chapter 2, east London will see the largest share of the substantial increase in population, housing and employment anticipated in the Capital in the coming years. TfL is planning for the impacts of this growth and to overcome poor cross-river connectivity, with a clear focus on east London. For this reason there is a programme of river crossings, which would improve connections for pedestrians, cyclists, public transport and road users.
- 3.5.5 These crossings would improve the reliability and resilience of the road network – which is key to businesses in London. They would transform connectivity, bringing in investment and opening up London’s opportunities. They will also provide for the expansion of public transport connections and encourage more active travel. In terms of fixed links, the Silvertown Tunnel is assumed to open in 2022/3⁴⁹, closely followed by crossings at Gallions Reach and Belvedere by 2025. Separately, the Government is progressing plans for a new Lower Thames crossing and is now considering two options at Dartford and at Gravesend/Tilbury following a consultation in 2013⁵⁰.
- 3.5.6 Delivery of this programme would mean that by 2025, east of Tower Bridge to the London boundary there would be eight rail crossings, five road based river crossings with two further road crossings east of London and four dedicated pedestrian and cycle links including the existing foot tunnels at Greenwich and Woolwich, the cable car and the bridge at Rotherhithe. This would deliver a level of cross-river connectivity that is near comparable with west London and provide the level of capacity required to accommodate cross-river road traffic.

3.6 Project objectives for the Silvertown Tunnel scheme

- 3.6.1 As described in 3.1 above, options for the River Crossings programme were assessed against evolving objectives. Once the Silvertown Tunnel became a separate project within this programme, specific objectives were set for it. These were derived from policy in the London Plan and the

⁴⁹ 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.

⁵⁰ <https://www.gov.uk/government/publications/lower-thames-crossing-government-response-to-consultation-on-options>

MTS and are designed to ensure that the proposal meets the tests set out in the London Plan and the MTS.

3.6.2 The project objectives (PO) are:

PO1: Improve resilience of river crossings in the highway network in east and south east London to cope with planned and unplanned events and incidents

PO2: Improve road network performance of Blackwall Tunnel and approach roads

PO3: Support economic and population growth by providing improved cross-river road 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

3.6.3 TfL developed the Silvertown Tunnel scheme so as to best satisfy these criteria. This process, and a description of the proposal, is set out in the following two chapters.

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4. USER CHARGING ELEMENT OF THE SCHEME

4.1 Introduction

4.1.1 Chapter 3 outlined the Scheme optioneering process in the context of the development of the MTS and the London Plan. Proposal 130 of the MTS states that pricing incentives may be considered to manage demand provided they achieve a reasonable balance between objectives, costs and impacts. This is in alignment with the National Networks National Policy Statement (NNNPS) which supports user charging to fund new capacity and/or manage demand (3.26).

4.1.2 The assessment exercise outlined in Chapter 3 concluded that a road tunnel with user charges was the right option to address the transport problems at the Blackwall Tunnel and set out the Project objectives. As noted, Project Objective PO7 makes direct reference to user charging.

4.1.3 This chapter explains in more detail why and how, based on these policies, the user charge forms an integral part of the Silvertown Tunnel scheme and how future conditions that could impact on the charge parameters would be monitored.

4.2 The reasons for charging

4.2.1 TfL proposes to charge for the use of the Silvertown and Blackwall tunnels for two principal reasons:

- to help manage the demand for both crossings and keep traffic levels within appropriate limits; and
- to help pay for the new tunnel

4.2.2 These reasons reflect the need to deliver the project objectives (set out at the end of Chapter 3), in particular PO1, PO2, PO3 and PO7. With regard to managing demand, the Silvertown Tunnel on its own (without a user charge) would add highway capacity which would go only part of the way towards addressing the three transport problems of the Blackwall Tunnel. It has been well documented in recent years that the provision of additional highway capacity to address congestion in urban areas can prove to be of short-lived benefit. This reflects an effect known as 'induced traffic' in which the increased convenience of driving (owing to reduced

journey times, for example) attracts additional traffic to the point where queues initially relieved return to their former levels. At this point, congestion on the road network in the vicinity of the crossings would increase, offsetting the benefits (in terms of congestion relief and improved resilience) of the Scheme.

- 4.2.3 This potential adverse impact can be managed effectively through a user charge, which would act to suppress demand and could therefore be used as a powerful and flexible tool to ensure the benefits of the additional capacity are secured.
- 4.2.4 Setting a charge means that drivers (and potential drivers) must decide if they are willing to pay to make this journey and if not, respond by switching to another mode, changing the time or route of their journey or not making the journey at all. Although its objectives differ from the present Scheme, the central London Congestion Charging scheme is an example in London of how pricing can effectively incentivise behaviour change⁵¹.
- 4.2.5 Secondly, the user charge provides a means of helping to pay for the design and construction and operation of the Scheme, which costs are currently estimated at £920m and £3.5m/year respectively⁵². Charging users would also ensure that those who benefit most directly from the Scheme would help to fund it in return.
- 4.2.6 Charging would generate a relatively stable long-term source of revenue that can support both the servicing and repayment of construction finance (either publicly or privately raised) and ongoing operation and maintenance costs. It is an approach that has been adopted on 'crossing'

⁵¹ In the initial years post implementation, congestion reduced by 20-30% in the Congestion Charging Zone. While levels of congestion in London in central London are now close to pre-charging levels, traffic levels in central London continue to fall and the reason that congestion has not fallen at the same rate is attributable to a number of factors including reallocation of road space to prioritise public transport, increased pedestrianisation and increased dedicated road space for cycling, and extensive utilities and development works. Without the charge, traffic levels would rise and congestion would be worse, with resulting adverse economic impacts on London.

⁵² The design and construction works are expected to cost c. £920m, in outturn prices including an allowance for risk. This is based on a category E tunnel, the associated highway works and utilities diversions. Operational costs are forecasted to be in the region of £3.5m per annum in 2015 prices, made up of routine and reactive maintenance and utility costs. In addition, an average of £26m has been set aside every 10 years to cover capital replacement costs.

schemes around the world and there is an established market for financing on this basis (Mersey Gateway Bridge is a recent UK example).

4.2.7 TfL has considered the potential to use other sources of funding, including a Mayoral or Borough Community Infrastructure Levy (CIL) and public funding such as a Government grant. However none of these alternative funding options would manage demand and since this is the most important function of the charge, it would most still require a user charge to apply in addition to any other funding. Furthermore, the amounts likely to be raised from some of these sources like CIL are expected to be modest and not sufficient to meet the Scheme cost.

4.2.8 There are a number of other benefits that arise from managing traffic through user charging. Charging would help to encourage people to consider public transport as an alternative option, as well as making buses more attractive by enabling better journey time reliability due to the reduced congestion and creating opportunities for more cross-river bus services. It would also have a role in improving air quality through reduced congestion.

4.2.9 Charging would be applied in such a way as to align with other transport objectives. For example, in its response to the Roads Task Force⁵³ TfL committed to the further development of tools to increase the re-timing of freight journeys, following the success of the 'Get Ahead of the Games' campaign in summer 2012, which led to reduced traffic levels of up to 10 per cent in central London. As set out later in this chapter, the charge for HGVs would help to encourage operators to consider journey retiming by offering the opportunity to make cost savings. Similarly, low emission vehicles would be incentivised by the offer of a discount on the user charge.

4.3 Second non-statutory consultation on the River Crossings programme (Oct 2012-Feb 2013)

4.3.1 Based on the reasons set out in section 4.2, TfL presented the concept of user charging as part of the Scheme in the second non-statutory consultation on the river crossings programme. This consultation (as well

⁵³ Delivering the vision for London's streets and roads, TfL, July 2013. See also Delivering a Road Freight Strategy, TfL, September 2013.

as the full programme of consultations) is referred to in greater detail in section 5.4 but it is important to reference here because the consultation documentation indicated that the Blackwall and Silvertown tunnels would be subject to a user charge in order to manage traffic and pay for the Scheme.

4.3.2 While there was a high level of support for the option of a new road tunnel between Silvertown and the Greenwich Peninsula (76 per cent support), just over half of those responding using the questionnaire expressed opposition to a user charge for the new crossings and Blackwall Tunnel, with 55 per cent opposing it, while a third of respondents supported the charge.⁵⁴

4.3.3 Many of the free-text comments on this issue highlighted a particular concern over the possibility of charging for the use of the Blackwall Tunnel, which is at present free to use. An overview of the reasons as to why TfL considered a user charge to be appropriate and necessary, despite the strong opposition, was published in the *Responses to Issues Raised* report for this consultation⁵⁵. TfL has since carried out further work to examine the need for a charge, including understanding the implications of not having any charge.

4.4 Silvertown Tunnel without a user charge

4.4.1 Using its traffic models, TfL has assessed the effects of a new tunnel at Silvertown implemented without a user charge at both Blackwall and Silvertown tunnels (known as the 'no charge scenario').

4.4.2 The results confirm expectations in terms of inducing traffic demand, as described in section 4.2.2 above. In the absence of user charging, there would be a significant increase in demand at the Blackwall and Silvertown Tunnels and consequential negative impacts on the surrounding road network in terms of additional traffic generated and continued long queues in the peak periods. The following sections set out the effects in detail.

⁵⁴ 40 per cent strongly opposed and 15 per cent opposed; 19 per cent supported and 14 per cent strongly supported. The remainder did not know, did not answer or neither supported nor opposed.

⁵⁵ *TfL River Crossings Programme: Responses to Issues Raised*, Transport for London (2013) https://consultations.tfl.gov.uk/rivercrossings/consultation/user_uploads/responses-to-issues-raised.pdf

Traffic demand

- 4.4.3 Under the 'no charge' scenario, there would be a substantial increase in demand at the Blackwall and Silvertown tunnels in both the peak and off-peak periods. This suggests that without a user charge in place the additional capacity provided by the Silvertown Tunnel would attract additional traffic. In the context of the highly constrained road network in London, this would not represent a sustainable solution. With a user charge, as demonstrated by the Assessed Case, the Scheme has the potential to increase the throughput of traffic in this area without causing overall increases in demand, through a combination of new capacity and demand management.

Delay

- 4.4.4 Delay is another important metric to consider. Here data on delay refers to delay at the tunnel portal. While the implementation of a tunnel at Silvertown without a user charge would reduce delays against the Reference Case, a significant amount of delay in crossing the river here would remain (this largely reflects the increase in demand referred to above). In the Assessed Case delay would be effectively eliminated.

Wider network impacts

- 4.4.5 It is not only the traffic conditions experienced by those using the crossing that would be worse under a no charge scenario. The effects of conditions at the Blackwall Tunnel (and in future the Silvertown Tunnel as well) are felt across the wider network and affect even those who do not use the crossing as the increase in demand will have a knock-on impact on the wider road network.

The need to charge

- 4.4.6 The analysis outlined in this section shows that implementing the Silvertown Tunnel scheme without a user charge would attract substantial levels of additional traffic demand to the Blackwall and Silvertown tunnels. A user charge is therefore considered necessary to manage demand at the Blackwall and Silvertown tunnels.
- 4.4.7 There would also be negative secondary impacts in terms of the economy, environment and public transport if no charge is applied. Business would continue to experience journey time delay and unreliability. The opportunity to run more and better public transport would be lost if demand is not managed at the Silvertown and Blackwall tunnels,

as certainty about journey times is needed in order to run bus and coach services effectively and attract customers.

- 4.4.8 A charge is therefore essential in order to meet the Government policy test (NNNPS) for new roads by managing demand to an extent that overall traffic levels do not increase and air quality does not worsen.

4.5 Charging scope

- 4.5.1 Both the Blackwall Tunnel and the Silvertown Tunnel would be charged. It is important to apply a charge at both tunnels in order to prevent drivers continuing to favour the existing tunnel despite its constraints and not making optimum use of the new infrastructure.

- 4.5.2 This is especially important given the proximity and shared approach road of the two tunnels on the south side. If the Blackwall Tunnel was not subject to a charge then queues would build up broadly as they do now, inhibiting access to the Silvertown Tunnel. As well as diminishing the Scheme's benefits in terms of reducing congestion, other benefits (such as the opportunity for enhanced bus provision) would be eroded.

- 4.5.3 The charge would apply each time a motorist entered the Blackwall or Silvertown tunnels during charging hours. Outside these times, the tunnels would be free to use.

- 4.5.4 The charge would be collected automatically, using systems similar to those for the central London Congestion Charging scheme; there would be no toll booths at the Blackwall or Silvertown tunnels.

- 4.5.5 There are no proposals to impose user charges at the two adjacent crossings, the Rotherhithe Tunnel or the Woolwich Ferry, as part of this Scheme. It is not expected that a significant number of drivers would divert to either of these to avoid the charges at the Blackwall and Silvertown tunnels.

- 4.5.6 In common with many other charging schemes, larger vehicles would pay more to use the tunnels, reflecting the greater impact they have on maintenance costs, traffic and the environment.

- 4.5.7 There would be discounts and exemptions for certain groups such as exemptions for taxi and private hire vehicles, buses and disabled badge holders as well as discounts for low emission vehicles and discounts for account holders. Details of the likely charging regime are contained in the *Preliminary Charging Report*⁵⁶.
- 4.5.8 An account system would be offered to make it easier to pay the charge. Users who set up an account would register their details with TfL, and the charge would be collected automatically as applicable. Users who set up an account would pay a discounted amount that would vary by time of day and direction of travel. A higher 'peak' rate would apply for those times and direction of travel when demand is greatest.
- 4.6 Setting the user charge**
- 4.6.1 TfL anticipates that charging would be a long-term measure, continuing at least for as long as its traffic management effects were required. In this respect, user charges differ from tolls (which are set in order to pay for infrastructure and so have a fixed end date).
- 4.6.2 It is proposed not to fix the level of the charge in the Development Consent Order (DCO) application process, but to provide a mechanism for its setting. TfL would have the ability to set and vary the charge in the future in response to changing conditions. The effects of the Scheme presented throughout the technical documents of this consultation are based on a set of assumed indicative charging levels and assumptions around future travel conditions. Together these assumptions form a scenario known as the 'Assessed Case'.
- 4.6.3 With the power to vary the charge, TfL would have the ability to adjust the charge in the future in response to changing conditions (e.g. higher rate of growth, significant change in oil prices impacting on levels of car ownership or total rates of driving) to maintain an appropriate balance between the effects of the Scheme and to ensure that it continues to meet its objectives.
- 4.6.4 TfL would set the initial charge nearer the opening of the Scheme to ensure it reflects the conditions that exist at the time. This power to vary
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⁵⁶ *Silvertown Tunnel Preliminary Charging Report*, Transport for London (Oct 2015)

encompasses many aspects of the charge: specific charges for each type of vehicle, charging hours, vehicle type categories, peak and off-peak pricing, and 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.

- 4.6.5 In setting the charge, TfL would therefore take these effects into account as well as the two overarching principles of managing traffic and paying for the Scheme. The Project objectives (see section 3.6) provide the guiding context for this. It is also worth reiterating here that TfL has a network management duty under the Traffic Management Act 2004 which requires it to make sure road networks are managed effectively to minimise congestion and disruption to vehicles and pedestrians.

The approach to setting the charge would be informed by a combination of monitoring (primarily of traffic flows and associated factors), and modelling the impacts of a change in the charge. In setting and varying the charge TfL would have regard to:

- Traffic and transport: TfL will consider the likely effects of the proposed charge on demand for the Silvertown and Blackwall Tunnels as well as effects, such as changes in flow or delay, on traffic and transport across the wider network. In evaluating these factors and their implication for setting the charge, TfL would have regard to its network management duty under the Traffic Management Act 2004^[1] and the policies, proposals, and objectives of the Mayor's Transport Strategy.

In assessing the traffic and transport effects, TfL will, amongst other things, monitor the changes in flow, capacity and delay on the surrounding strategic and local road network in the vicinity of the Scheme as well as adjacent river crossings.

Overall, TfL will seek to manage traffic demand at the Blackwall and Silvertown Tunnels to a level that ensures network capacity is not exceeded, and that significant displacement to alternative crossing routes is minimised.

- Environment: TfL will consider the likely effects of the proposed charge on the environment. TfL will seek to ensure that the Scheme in operation does not give rise to unacceptable environmental impacts (e.g. noise levels or air pollutant emissions). TfL will have regard to relevant legislation and strategies, including the national and Mayor's air quality strategies.

Measurements that will be used to assess the environment effects of the Scheme will include air quality concentrations and noise levels on affected roads.

Overall TfL will seek to contribute towards environmental goals and provide net benefit to London's environment

- Population, economy and growth: TfL will consider the likely effects of the proposed charge in supporting the performance of the local economy, the ability of residents to access employment opportunities and the delivery of new housing. TfL will have regard to planning policy set out in the London Plan and the Boroughs' Local Plans.

Overall, TfL will seek to facilitate planned economic development in east and south-east London by enhancing cross-river connectivity to enable businesses and residents to undertake essential movements by road more efficiently.

- Paying for the Scheme: TfL will have regard to the level of revenue likely to be generated from user charging. The amount of revenue will be considered against the cost of financing, constructing, maintaining and operating the new tunnel. TfL will manage the impact of any resulting shortfall having regard to TfL's business plan and the associated prioritisation of financial commitments.

Overall, TfL will seek to contribute, through the charge to the costs of building and maintaining the new tunnel and to use any surplus revenue in future years towards other transport improvements, including possibly other river crossings.

4.6.6 Charging policy would, accordingly, have regard to enhancing the benefits of the Scheme and as one means of mitigating any adverse environmental and social impacts. Examples of how this could be achieved are the inclusion of an 'emissions-related' discount, exemptions for certain vehicle types and the opportunity to make savings by registering for an account. A further example is bus and coach users: these vehicles would not be charged, enhancing the potential to benefit from a dedicated lane. In this way the charging regime can be used to amplify the benefits of using a sustainable mode of transport where practicable to cross the river.

4.6.7 As well as enhancing the benefits, the charging regime is an opportunity to bolster the effects of other policies which help to optimise the use of the

road network and manage the environmental effects, such as encouraging the re-timing of freight movements. The differential peak and off-peak rates offer an opportunity to operators to make significant cost savings if they switch their trips to night-time (when there is no charge) or off-peak times.

4.6.8 In the previous non-statutory public consultation (October 2014), TfL made available its outline strategy for user charging. Details of the process for setting the charges and any future revisions are set out in the *Silvertown Tunnel Preliminary Charging Report* (October 2015). Views on this aspect of the Scheme are being sought in the consultation and TfL will take these into account.

4.7 The role of monitoring in setting the charge

4.7.1 TfL would monitor the impacts of the Silvertown Tunnel scheme once the new Tunnel is operational. This would enable TfL to identify and address any adverse or unexpected impacts as a result of the introduction of the Scheme and to adjust the charging scheme accordingly. Adjusting the level of the charge is an obvious and important measure, but not the only form of mitigation against adverse impacts e.g. other mitigations could include changes to signal timings or other traffic management measures. It is worth noting that independently of this Scheme, TfL has statutory duties under the Traffic Management Act 2004 with regard to road network management in London which it must fulfil.

4.7.2 A Preliminary Monitoring and Mitigation Strategy is included in Appendix C. This outlines the scope of the monitoring that TfL proposes to undertake in relation to each impact, the potential range of mitigation measures that could be implemented, where necessary, to address any adverse impacts, and the process by which the triggers for mitigation will be determined in consultation with the relevant authority.

4.7.3 The draft strategy is being presented by TfL during the statutory consultation on the proposed DCO application for the Scheme. The draft strategy will be further developed in response to feedback received during the consultation and will be informed by the results of the further environmental assessments and traffic modelling that TfL will be carrying out prior to submitting the DCO application.

4.7.4 The final strategy will be submitted with the DCO application.

5. DETAILED SCHEME DEVELOPMENT

5.1 Development of the Silvertown Tunnel scheme

- 5.1.1 This chapter describes the detailed development of the Silvertown Tunnel scheme, focusing on the physical design of the Scheme. The starting point is the policy position of the London Plan recommending a highway tunnel at Silvertown.
- 5.1.2 As with the strategic options appraisal set out in Chapter 3, this section contains both a summary of the appraisals undertaken in the past and a back-check of options which has been undertaken more recently.
- 5.1.3 Table 5-1 summarises the river crossings consultations held to date (a statutory consultation will also be held from October to November 2015).

Table 5-1 Overview of river crossings consultations undertaken

Consultations	Proposals
River Crossings (Feb 2012-Mar 2012)	<ul style="list-style-type: none"> • New highway tunnel at Silvertown • A new vehicle ferry at Gallions Reach to replace the Woolwich Ferry
River Crossings (Oct 2012-Mar 2013)	<ul style="list-style-type: none"> • New Silvertown Tunnel • New ferry at Woolwich • New ferry at Gallions Reach • New bridge or tunnel at Gallions Reach • User charges for new crossings and the Blackwall Tunnel
East of Silvertown (July-Sept 2014)	<ul style="list-style-type: none"> • New ferry at Woolwich • New ferry at Gallions Reach • Bridge at Gallions Reach • Bridge at Belvedere
Silvertown Tunnel (Oct-Dec 2014)	<ul style="list-style-type: none"> • Silvertown Tunnel with a user charge at Blackwall and Silvertown tunnels

- 5.1.4 Changes made to the Scheme as a result of consultation are summarised at the end of this chapter.

5.2 Starting point of the assessment

5.2.1 Following the inclusion of the Silvertown Tunnel scheme in the London Plan, the various options for implementing such a scheme were assessed against engineering, environmental, land-use and cost criteria.

5.2.2 The development and assessment of the tunnel options was based on the alignment of a route being safeguarded in 1997 under a direction from the Secretary of State/Government Office for London. The safeguarding direction was issued under the Town and Country Planning (General Development Procedure) Order 1995. In 2001 the safeguarding was transferred to the Mayor of London/TfL to bring it within the scope of the Town and Country Planning (Mayor of London) Order 2000. This safeguarding presented a set of parameters to work within in developing the broad options for the Silvertown Tunnel, which will be summarised here (for detailed design matters, please refer to the engineering report⁵⁷).

5.3 River Crossings programme – first non-statutory consultation

5.3.1 With the policy supporting the River Crossings programme established in the MTS and the London Plan, TfL began to develop materials for the first non-statutory consultation on elements of the programme. This ran for four weeks in February and March 2012⁵⁸. The consultation introduced the idea of a range of river crossings for east London and sought views on:

- The concept of a new highway tunnel at Silvertown to ease congestion and provide additional resilience at Blackwall; and
- A new vehicle ferry at Gallions Reach, to replace the Woolwich Ferry

5.3.2 This was an initial, high-level and non-statutory consultation. Therefore it did not present detailed information on potential scheme impacts, costs or timetable. However, it was founded upon the river crossings programme, policy support for which had been subject to a statutory consultation as part of the draft MTS and draft London Plan.

⁵⁷ *Silvertown Tunnel Preliminary Engineering Report*, Transport for London (Oct 2015)

⁵⁸ <https://consultations.tfl.gov.uk/river/crossings>

- 5.3.3 The consultation materials referred to the Emirates Air Line cable car, which was already under construction at this point, as the cycling and pedestrian element of the river crossings programme. The consultation leaflet stated that a range of options for paying for the Scheme was under consideration. This informal consultation also asked about respondents' general views on the ease of crossing the river.
- 5.3.4 The consultation ran for four weeks and attracted 3,900 responses. Support for the Silvertown Tunnel was strong, with over 80 per cent of respondents supporting or strongly supporting a new road crossing at this location. More detailed information on the responses can be found in the report to the Mayor on the consultation⁵⁹.
- 5.3.5 The consultation responses indicated a very strong level of agreement that it is important to improve highway river crossings in east and south-east London, with over 90 per cent of respondents agreeing or strongly agreeing that it is difficult to cross the river, and that there is a need for more crossings. Some stakeholders urged TfL to consider user charging as a means of managing demand and paying for the Scheme. Having considered the responses, TfL went to progress the River Crossings programme in further detail.

Early tunnel optioneering

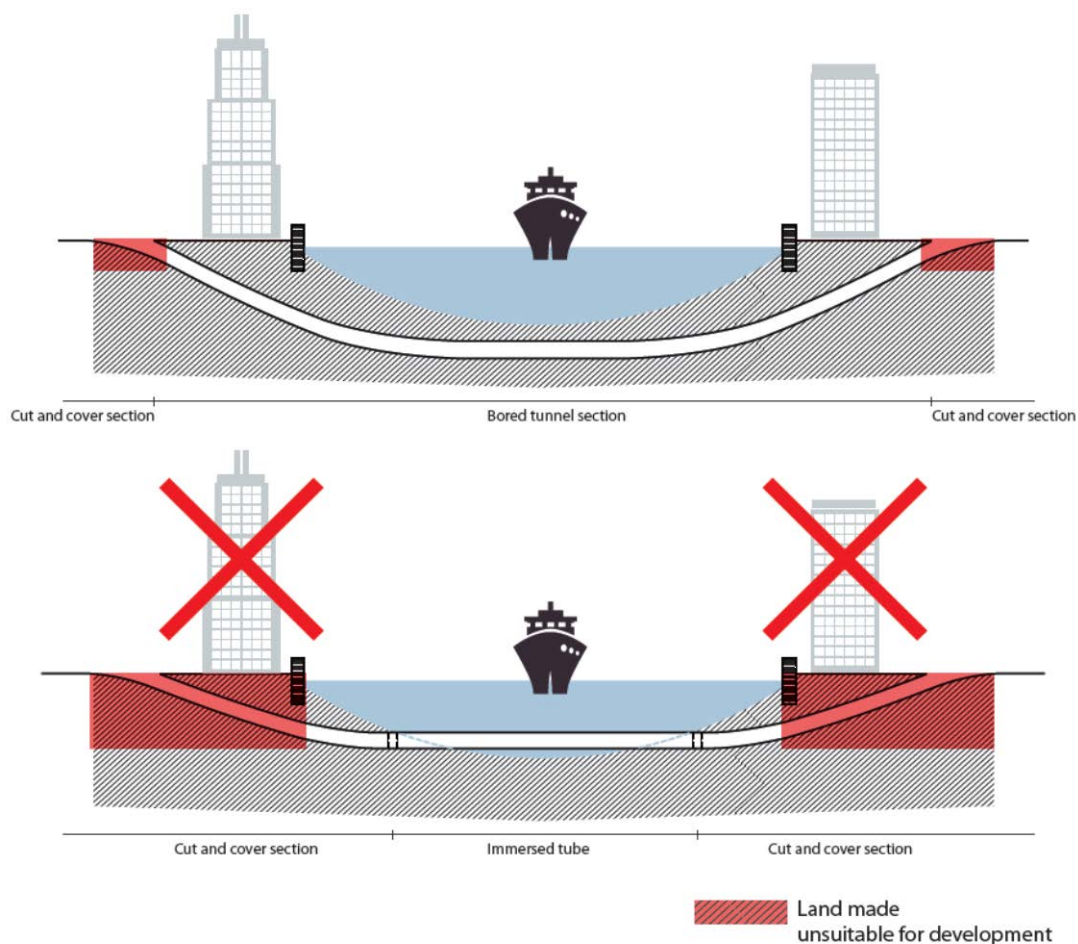
- 5.3.6 With the principle of a crossing at Silvertown in the form of a tunnel now well established, a 2012 study⁶⁰ considered two feasible tunnel types for the crossing – using bored or immersed tube construction. The study focused on technical feasibility and potential impacts on the environment and navigational requirements. It concluded that while both were technically feasible, and an immersed tube tunnel could be cheaper and shorter, a bored tunnel would minimise adverse impacts on the environment and local land uses.
- 5.3.7 The study noted that an immersed tube tunnel would have greater impacts on the river bed, on navigation, and on the land above, due to the larger cut and cover section (illustrated in Figure 5-1). This would create conflict with the Greenwich Peninsula masterplan. The masterplan was

⁵⁹ *TfL River Crossings Package: Report to the Mayor on 2012 informal consultation*, Transport for London (July 2012)

⁶⁰ *Silvertown Crossing Study Tunnel Engineering*, Mott MacDonald (Jun 2012)

approved in 2004 and the 2006 Unitary Development Plan (UDP) of the Royal Borough of Greenwich sets out its support for a crossing between North Greenwich and Silvertown (policy M15), with the caveat in the supporting paragraph 7.33 that the crossing must be in the form of a tunnel .

Figure 5-1 Schematic comparison of bored and immersed tube tunnel



5.3.8 In addition to this engineering assessment, the fixed road-based options (including a wide range of options for comparison purposes) were appraised using TfL's Strategic Assessment Framework (SAF) which assesses projects and programmes using a set of strategic planning criteria⁶¹. The use of the SAF enabled the options to be tested against all

⁶¹ *East London River Crossings Assessment of Options*, Transport for London (Dec 2012)

MTS outcomes and is consistent with the Department for Transport's WebTAG process.

5.3.9 This assessment recommended the following for further development:

- a bored tunnel at Silvertown; and
- user charging at the Blackwall Tunnel (in conjunction with the new infrastructure)

5.4 River Crossings programme – second non-statutory consultation (Oct 2012-Feb 2013)

5.4.1 A further consultation was held at the end of 2012. This focused on a programme of river crossings options for east London including a new road tunnel between North Greenwich and Silvertown, a new vehicle ferry at Woolwich and a vehicle ferry or bridge or tunnel at Gallions Reach. There was a high level of support for the option of a new road tunnel between Silvertown and the North Greenwich, with 76 per cent supporting it (57 per cent strongly supported and 19 per cent supported).

5.4.2 The findings of the December 2012 SAF appraisal (which proposed that a bored tunnel would be the preferable solution) were presented to the public as part of this consultation.

5.4.3 In its response to feedback received in the consultation⁶², TfL stated that from that point forward the Silvertown Tunnel would be progressed as a separate scheme, while work on the Woolwich Ferry replacement and other crossings would be continued as part of a separate programme of work. In summer 2014 (July-September), TfL held a non-statutory consultation on what had become the 'East of Silvertown' river crossings programme.

⁶²https://consultations.tfl.gov.uk/rivercrossings/consultation/user_uploads/responses-to-issues-raised.pdf

5.5 Detailed tunnel optioneering

- 5.5.1 In order to test the suitability of a bored tunnel, a comparison of eight tunnel options was undertaken in 2013 on the basis that these options were feasible in engineering terms but presented contrasting impacts when compared with one another⁶³. The eight options were broken down into two groups – bored and immersed tube (four each) and included ‘full length’ and ‘short’ length variants.
- 5.5.2 The ‘full length’ tunnel options conformed to the agreed Greenwich Peninsula Masterplan layout, with the southern tunnel portal to the west of Millennium Way so as to provide physical separation between tunnel traffic and the areas of the Masterplan identified for residential and commercial development.
- 5.5.3 The ‘short’ tunnel options located the tunnel portal in areas of the Masterplan identified for residential and commercial development, in a position dictated by maximum desirable tunnel gradient and the proposed road layout of the development. The report noted that there was no opportunity to shorten the tunnel on the Silvertown side as the tunnel gradient is already at the maximum desirable gradient from the mid-river position to the northern portal.
- 5.5.4 An assessment using cost, risk, land-use and environmental criteria was carried out. The quantified comparison showed that the ‘short’ tunnel options posed significant planning risks which were likely to result in a significant delay to the programme and therefore add to the outturn costs. On this basis the ‘short’ tunnel options were de-selected leaving the ‘full length’ tunnel options for further consideration.
- 5.5.5 Of the lowest cost ‘full length’ options, the bored tunnel was seen to be the best option on the basis that it would minimise planning risks and cost associated with construction on the River Thames. This option was favoured by the Port of London Authority (PLA). The immersed tube option was confirmed as entailing more substantial environmental risk,

⁶³ Hyder, Nov 2013, Silvertown Tunnel Options Study
Atkins, Nov 2013, Silvertown Tunnel Development Impacts Study
TfL, 2013, Summary and Comparison of Tunnel Options

additional land take, and potentially ongoing risk to shipping along this tidal section of river.

5.5.6 In light of these conclusions it was confirmed that the ‘full length’ bored tunnel option was most suitable to be taken forward. A high-level summary of the assessment is shown in **Table 5-2** and details were presented as part of the 2014 public consultation on the Silvertown Tunnel.

Table 5-2 Summary of tunnel options assessment

Option	Description	Environment risk	Land-use risk
Base	Full length immersed tube with on-site casting	High	Low
A	Full length immersed tube with off-site casting	High	Low
B	Shortened immersed tube with on-site casting	Highest	Medium - High
A+B	Shortened immersed tube with off-site casting	Highest	Medium - High
Base	Full length bored tunnel with cross-passages at up to 350m spacing	Lowest	Low
C	Shortened bored tunnel with cross-passages at up to 350m spacing	Medium	Medium - High
D	Shortened bored tunnel with cross-passages at 100m spacing	Medium	Medium - High
E	Full length bored tunnel with cross-passages at 100m spacing	Lowest	Low

5.6 First non-statutory consultation solely on the Silvertown Tunnel scheme (October to December 2014)

5.6.1 Details of the further refinement of the Silvertown Tunnel scheme were presented in the first non-statutory consultation solely on the Silvertown Tunnel in 2014.

5.6.2 This was the first consultation which focused solely on the Silvertown Tunnel scheme. TfL published suite of detailed technical reports, including:

- i. Assessment of needs and options
- ii. Outline Business case
- iii. Introductory transport assessment
- iv. Introductory environmental assessment (and environmental drawings related to air quality impacts, noise and assets)
- v. Introductory equalities impact assessment
- vi. Introductory health impact assessment
- vii. Traffic forecasting report
- viii. Outline user charging strategy

5.6.3 TfL also published extensive information on the background and development of the Scheme: a report on the recently completed River Crossings business survey; an Introductory Environmental Assessment Report which included a scope and outline methodology along with a high level assessment; studies on options assessment and tunnel development, and a report from an independent peer review group into the Scheme.

5.6.4 The questionnaire sought views on the principle of the Silvertown Tunnel as part of the river crossings programme, on a user charge and account system, and on the proposals for new cross-river bus provision. It also sought views on the proposed junction tie-ins at the north and south side and invited comments on the technical reports and any other issues of concern.

5.6.5 In response, 83 per cent of respondents agreed that a new river crossing was needed at this location. Just over half (55 per cent) opposed the user charge, with 37 per cent supporting it. In general there was support for the

junction changes (48 per cent at north side and 54 per cent at south side), with a substantial proportion in each case responding 'don't know'. There were many suggestions about new bus connections and services.

- 5.6.6 Aside from these, respondents raised a number of issues, including: concerns about how the traffic impacts of the Scheme might be managed; suggestions for discounts on the user charge; suggestions for new public transport links in addition to or instead of the new tunnel; and comments about the proposal not to incorporate provision for pedestrians and cyclists within the tunnel. There was also a range of comments about the materials published to support the proposals.
- 5.6.7 TfL published a report responding to the issues raised in the consultation⁶⁴ which committed to addressing these issues in the statutory consultation on the Scheme. The materials made available for the current consultation (autumn 2015) include a number of changes made as a result of a review of the layout and size of work sites and tunnel buildings. There is further information on potential new bus services and extensions⁶⁵ to existing services and intentions to strengthen the role of the EAL as the preferred crossing for pedestrians and cyclists in this location. The Charging Report⁶⁶ outlines the proposed discounts and exemptions as well as indicative charges.
- 5.6.8 Also as a result of its appraisal of consultation responses, TfL re-examined the potential to allow pedestrians and cyclists to use the tunnel (and so provide a further crossing at this location in addition to the EAL). Current design and safety standards indicate that only a segregated solution – either a separate tunnel bore or a deck underneath the road tunnel – would be permissible.
- 5.6.9 Given the length of the crossing and the need to provide lifts and ramps, either option would suffer from poor ambience, and be unsuitable in terms of safety and security. Either approach would be very expensive (an increase in Scheme cost of some £150 million. plus additional annual

⁶⁴ *TfL River Crossings programme – Silvertown Tunnel, Responses to issues raised report, Consultation Oct-Dec 2014*, Transport for London (Jun 2015)
https://consultations.tfl.gov.uk/roads/river-crossings/user_uploads/east-of-silvertown-responses-to-issues-raised.pdf

⁶⁵ *Silvertown Tunnel Preliminary Transport Assessment*, Transport for London (Oct 2015)

⁶⁶ *Silvertown Tunnel Preliminary Charging Report*, Transport for London (Oct 2015)

operating costs). A more appropriate way to deliver improvements for pedestrians and cyclists is to improve access to the Emirates Air Line, the existing dedicated crossing in this location.

- 5.6.10 Details on how the tunnel design evolved the expected construction methods and details on the development of the junction tie-ins are presented in the engineering report⁶⁷. The Design and Access Statement⁶⁸ describes how the Scheme would fit within the public realm at Greenwich and Silvertown.

5.7 The proposed Silvertown Tunnel Scheme

- 5.7.1 In line with the clear policy position in support of the Silvertown Tunnel in the MTS and the London Plan, which is reflected in the local development plans for Greenwich and Newham. The Scheme has been developed over a period of around five years, with extensive input from the local boroughs, stakeholders and the public.
- 5.7.2 It has been subject to continuous assessment against the transport requirements for east and south-east London, and has been back-checked against other strategic options to ensure and to demonstrate that the right scheme is being taken forward.
- 5.7.3 The land for the crossing was safeguarded by Government, and development plans for the Greenwich Peninsula and the Royal Docks are being progressed. The Silvertown Tunnel has been developed with these long-term plans in mind and integrates with existing and future development.
- 5.7.4 The proposed Scheme now put forward involves the construction of a twin bore road tunnel providing a new 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).
- 5.7.5 The Silvertown Tunnel would be approximately 1.4km long and would be able to accommodate large vehicles including double-deck buses. The Boord Street footbridge over the A102 would be replaced with a

⁶⁷ TfL, Oct 2015, Silvertown Tunnel Preliminary Engineering Report

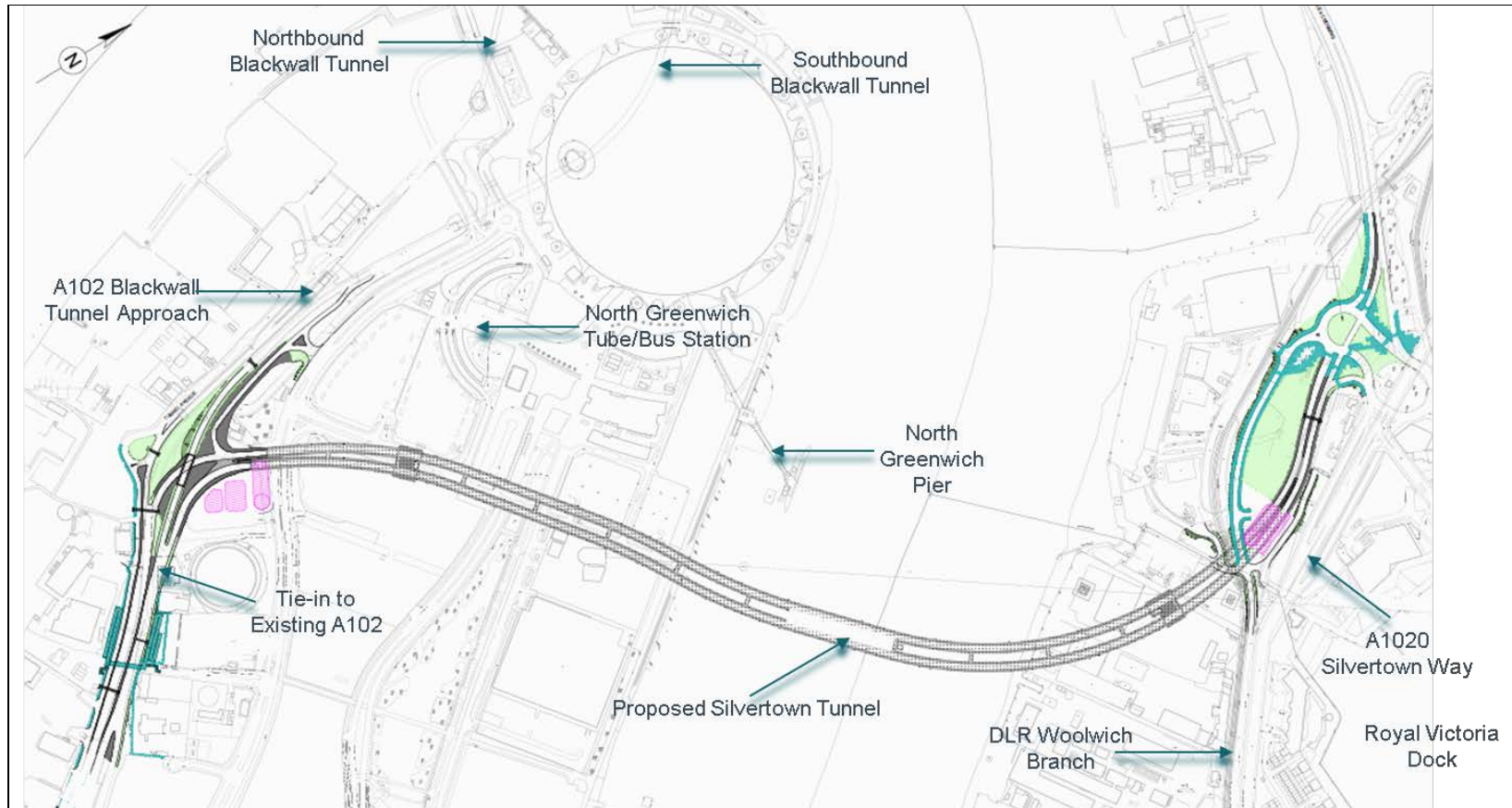
⁶⁸ TfL, Oct 2015, Silvertown Tunnel Preliminary Design and Access Statement

pedestrian and cycle bridge. See Figure 5-2 for an overview of the Scheme alignment.

Silvertown Tunnel

Preliminary Case for the Scheme

Figure 5-2 Scheme alignment



- 5.7.6 New portal buildings would be located close to each portal to house the plant and equipment necessary to operate the tunnel, including ventilation equipment.
- 5.7.7 Free-flow user charging would be introduced on both the Blackwall and Silvertown tunnels to manage traffic demand and raise revenue to support of the construction and operation of the Silvertown Tunnel.
- 5.7.8 One lane in each direction of the new tunnel would be a dedicated bus/coach and HGV lane, providing opportunities for TfL to deliver additional cross-river bus routes.
- 5.7.9 The Scheme would provide or enable improved pedestrian and cycle connections at the northern portal, including segregated cycleways. North-south connections currently provided by Dock Road would be improved across the site including under Silvertown Way, and to the DLR from the Docks towards the Thames. Access to the Emirates Air Line would be improved to facilitate cross-river access for pedestrians and cyclists.
- 5.7.10 Main construction works would likely commence in 2018 and would last approximately four years with the new tunnel opening in 2022/23⁶⁹. 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.

⁶⁹ 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.

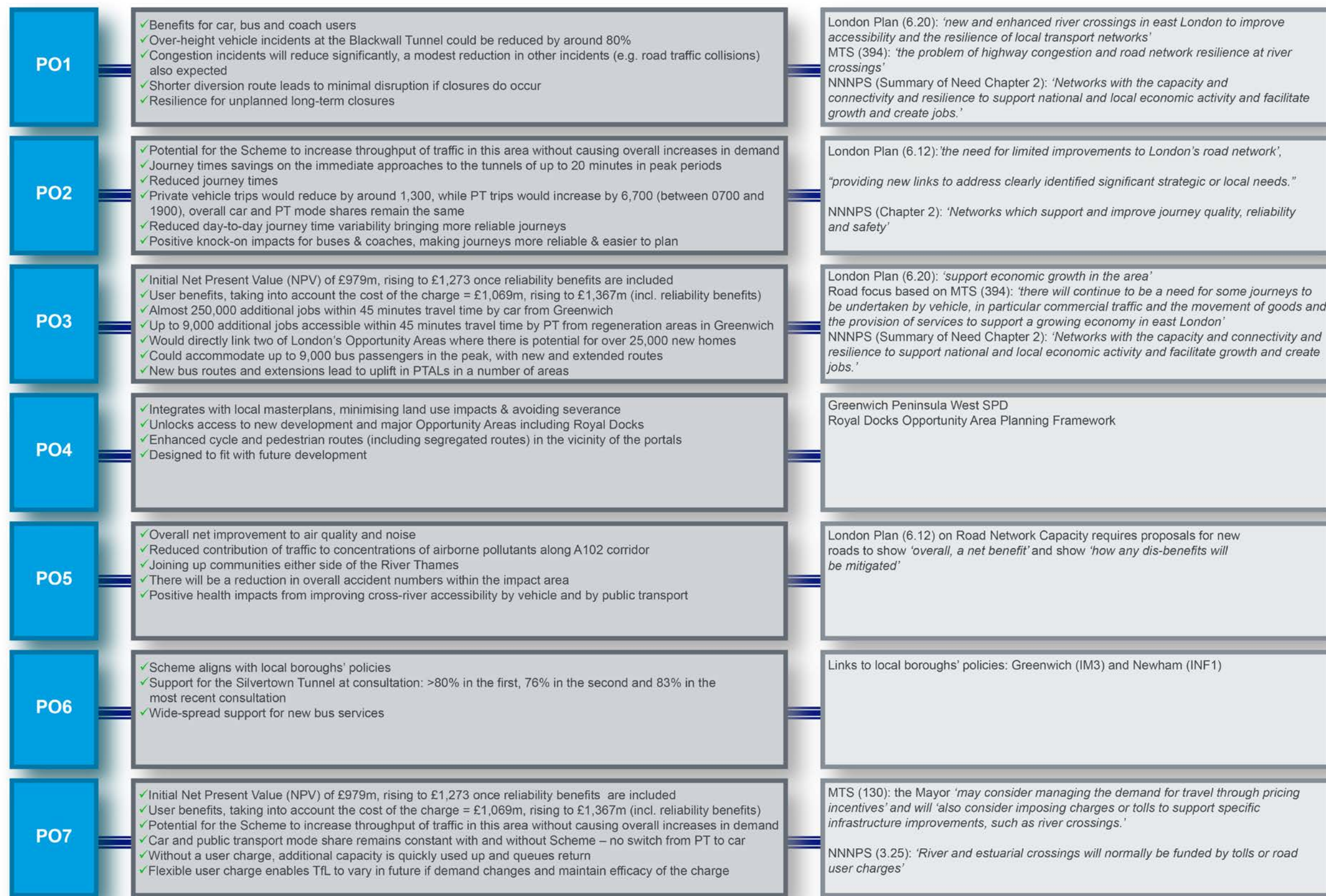
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6. SCHEME BENEFITS

6.1 Overview

- 6.1.1 The project objectives set for the Scheme are a way of optimising its benefits beyond solving the three problems - congestion, closures and incidents, and resilience - of the Blackwall Tunnel. These benefits may be as a direct result of the Scheme or as an 'additional benefit' achieved in connection with the Scheme (sometimes known as 'legacy benefits'). This chapter summarises both types of benefit, organised by project objective.
- 6.1.2 The project objectives link to the development plan (the London Plan together with the local development plans of the Royal Borough of Greenwich and London Boroughs of Newham and Tower Hamlets) and the MTS. Figure 6-1 summarises the benefits and links them to the project objectives and policies in the development plan and MTS.
- 6.1.3 The Silvertown Tunnel scheme should be understood not only as the construction and operation of a new tunnel, but as part of a broad scheme which delivers improved cross-river connectivity and road network performance in east and southeast London. The content of this Scheme has been developed in order to leave a positive and enduring infrastructural legacy for east and southeast London.
- 6.1.4 The Silvertown Tunnel scheme is part of an ongoing programme of improvements to river crossings in east London which has already delivered the Emirates Air Line (for pedestrians and cyclists) and will soon provide a Crossrail connection (Custom House to Woolwich), in addition to the almost tenfold increase in capacity added to the cross-river rail network in east London since 1999. Other improvements will be taken forward in the East of Silvertown programme. TfL plans to consult on two further river crossings, one at Gallions Reach (connecting Thamesmead and Beckton) and the other at Belvedere (connecting Rainham and Belvedere) later in 2015.

Figure 6-1 Scheme benefits and policy links



6.2 PO1: Improve resilience of river crossings in the highway network in east and south east London to cope with planned and unplanned events and incidents

6.2.1 The Scheme would directly address the severe and ongoing lack of resilience in the cross-river network in east London by adding an additional tunnel, which would both reduce the number of tunnel closures and greatly reduce the impact of closures.

6.2.2 Being built to modern standards, the Silvertown Tunnel would be able to accommodate the tall vehicles currently unable to use the Blackwall Tunnel, but which wish to travel on the A2/A102/A12 corridor. TfL's signing strategy would direct vehicles to the appropriate tunnel, greatly reducing overheight vehicle incidents which are responsible for around a third of current Blackwall Tunnel closures. Traffic accidents and other incidents which are exacerbated by the poor design of the Blackwall Tunnel would also be reduced through diverting a proportion of traffic to the better-designed Silvertown Tunnel. As a consequence, the number of incidents and the number of closures at the Blackwall Tunnel would decrease considerably.

6.2.3 The presence of the Silvertown Tunnel would also serve to greatly mitigate the impacts of any remaining closures of the Blackwall Tunnel, allowing traffic to reroute with minimal disruption to other roads. The impacts of any possible longer-term closure of the Blackwall Tunnel (for example, for refurbishment) would also be greatly mitigated by the existence of the alternative route.

Additional benefits – Woolwich Ferry life extension

6.2.4 TfL has identified options for enhancing the Woolwich Ferry, some of which are currently being implemented as part of the life extension project to replace old infrastructure at the crossing. Further improvements, for example changing the queueing arrangements to reduce delay and impact on the road network, have also been identified.

6.3 PO2: Improve road network performance of Blackwall Tunnel and approach roads

6.3.1 In addition to the benefits relating to managing incidents, described above, the general performance of the road network in the vicinity of Silvertown is forecast to improve with the Scheme in place as a result of two factors:

- A reduction in general congestion as a result of increased cross-river road network capacity delivered by the Scheme, which would be carefully managed by the user charge; and
- A significant reduction in the frequency of closures (as a result of the Silvertown Tunnel being able to accommodate tall vehicles). Currently these closures are a cause of delays and congestion on the wider network for road users, including bus and coach passengers.

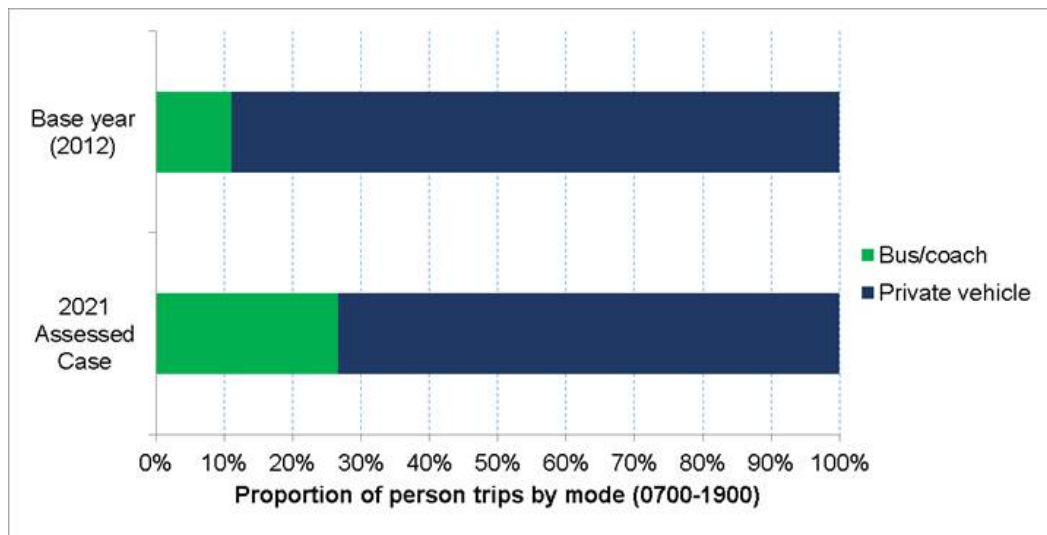
- 6.3.2 This improved road network performance would be seen in terms of reduced journey time, enhanced journey time reliability and reductions in delay and congestion.
- 6.3.3 All users of the Blackwall and Silvertown tunnels would experience shorter journey times to cross the River Thames as a result of the scheme, with journey time savings on the immediate approaches to the tunnels of up to 20 minutes in peak periods (excluding any additional reliability benefits).
- 6.3.4 Through reducing congestion, the Scheme would significantly reduce day-to-day journey time variability. People would have much more certainty about how long a journey is likely to take. The morning peak currently spread across a much longer time than is typical of London, would contract: the Scheme would enable people to travel at the time they prefer to travel rather than leaving early to avoid excessive queues.
- 6.3.5 The user charge would maximise time-savings and lock them in for the future. TfL would use the powers conferred on it to vary the charge in response to changing conditions and to maintain an appropriate balance between the effects of the Scheme and to ensure that it continues to meet its objectives.
- 6.3.6 The biggest impact in the morning peak would be in the northbound direction, where the Scheme would effectively eliminate queues on the A102 Blackwall Tunnel Approach. The Scheme would save drivers some 16 minutes on a morning peak journey from Lewisham to the Royal Docks. In the evening peak the savings for journeys heading in the southbound direction would be even more significant. The Scheme would deliver savings of around 20 minutes for journeys from Stratford to key destinations on the south side of the Scheme (e.g. Lewisham, Charlton, or Eltham).
- 6.3.7 The Scheme is not expected to lead to any significant increase in highway travel demand, but would greatly improve the efficiency of highway

journeys across the river in this location. As a result, congestion that is caused by both high levels of demand and incidents would be reduced, particularly at the busiest times.

6.3.8 The most important impact on public transport would be the new cross-river bus services which the Scheme enables. These would improve public transport links (including links between different sorts of public transport) between south-east and east London, notably the growing employment areas in the Royal Docks and Canary Wharf. Just over half (53 per cent) of local residents⁷⁰ said that they would benefit from new bus services as a result of the Scheme.

6.3.9 The Silvertown Tunnel is designed to accommodate double-deck buses, thus providing operational flexibility in the bus routes that could be extended across the Thames, as well as greater capacity. Similarly it would provide further opportunities for enhanced cross-river commuter coach services through extra capacity and more reliable journey times. The effect of this additional capacity is to significantly increase the share of trips made through the tunnels using buses or coaches, as shown in Figure 6-2 below.

Figure 6-2: Change in bus/coach mode share for trips through the Blackwall and Silvertown Tunnels



⁷⁰ Accent for TfL, 2015, River Crossings Residents Survey.

6.3.10 The existing cross-river bus route 108 would benefit from the improved performance of the crossing in terms of journey time reliability and reduced delay arising from reduced congestion at 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 also benefit from the more reliable network. The bus user benefits in travel time are estimated to be £591m⁷¹.

6.3.11 For coaches, these benefits are potentially worth £119.7m by enabling them to increase patronage, use coaches more effectively in the inter-peak and potentially run additional routes and services.

Additional benefits – changes to road layout

6.3.12 On the south side, TfL proposes to widen the A102 approach road, so that traffic approaching the tunnels can be managed appropriately. Signage would support this. A flyover would be built so that traffic heading southbound is separated from traffic approaching the tunnel.

6.3.13 On the north side, TfL proposes to modify the existing Tidal Basin Roundabout to connect the Silvertown Tunnel approach roads with Dock Road and the Lower Lea Crossing, and realign Dock Road so that it links with the modified roundabout. New pedestrian and cycle facilities would be provided at the modified roundabout.

6.4 PO3: Support economic and population growth by providing improved cross-river road transport links

6.4.1 There is set to be substantial growth in London over the next 15 years – with an estimated 10 million people expected to reside in the Capital by 2030, with much of the growth accommodated in east London. The Silvertown Tunnel scheme is part of the River Crossings programme which will support this growth by transforming connectivity and expanding opportunities for public transport and active modes. Access to jobs by public transport is particularly important for regeneration.

6.4.2 By virtue of the additional capacity and journey time reliability, TfL would be able to run 37.5 buses per hour across the river at Blackwall or

⁷¹ Both bus and coach figures are over a 60-year period, exclude reliability benefits and use 2010 prices.

Silvertown, a fivefold increase on current service levels. In the future, more than 60 buses per hour could be operated through the Silvertown Tunnel⁷². Coach operators would be expected to also run additional commuter services, as better journey time reliability provides the certainty required for their operations.

- 6.4.3 The charging policy at the tunnels would support public transport: buses and coaches would not be charged at any time and would also benefit from the dedicated lane for heavy vehicles.
- 6.4.4 As a consequence of the Scheme there would be an uplift in Public Transport Accessibility Levels (PTALs)⁷³, shown in Figure 6-3 below.

⁷² See Appendix F of the Preliminary Transport Assessment

⁷³ 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 a high score indicating high accessibility. Scores are normally banded: bands are not used here because they do not clearly show the change in PTAL score.

Figure 6-3: Change in PTAL score due to new Silvertown bus connections (2031 Ref Case v Assessed Case)



6.4.5 The connectivity benefits brought by the Silvertown Tunnel directly support access to jobs and labour markets, with improvements to access by car and public transport (shown in Figure 6-4). More information about changes in job accessibility by car and public transport by different times of day and including changes to generalised cost is given in the Preliminary Transport Assessment.

Figure 6-4: Change in job accessibility by PT (2021 Reference Case v Assessed Case) based on generalised time – AM peak period (07:00-10:00)

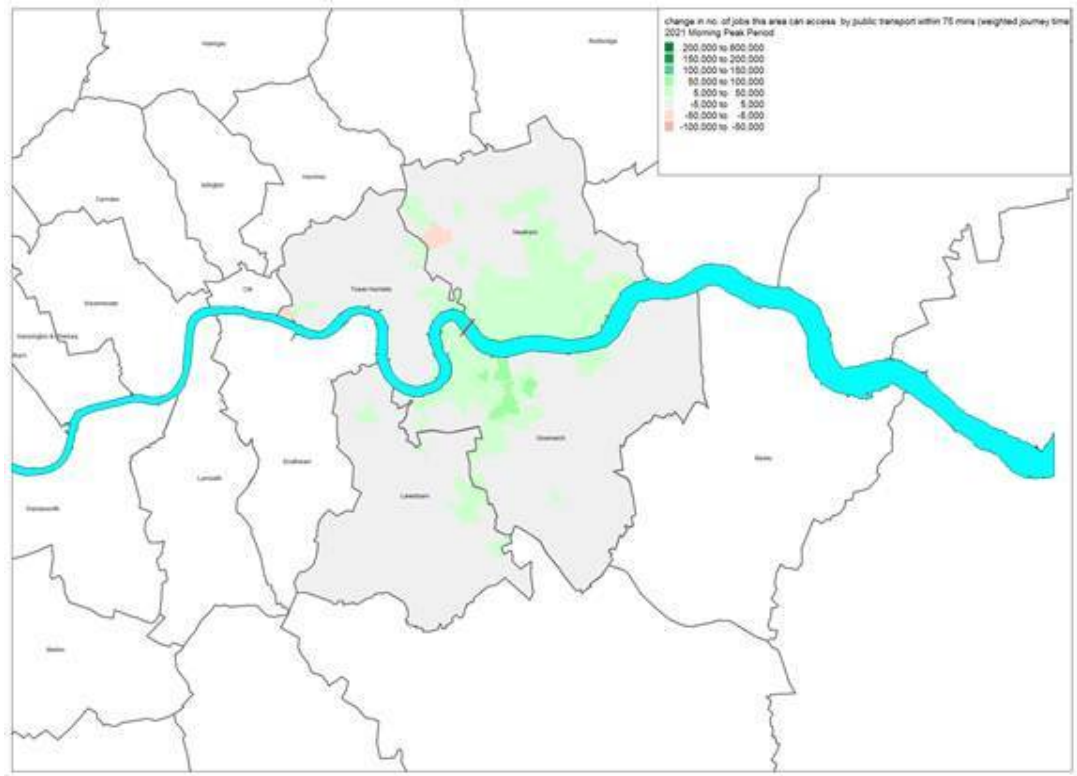
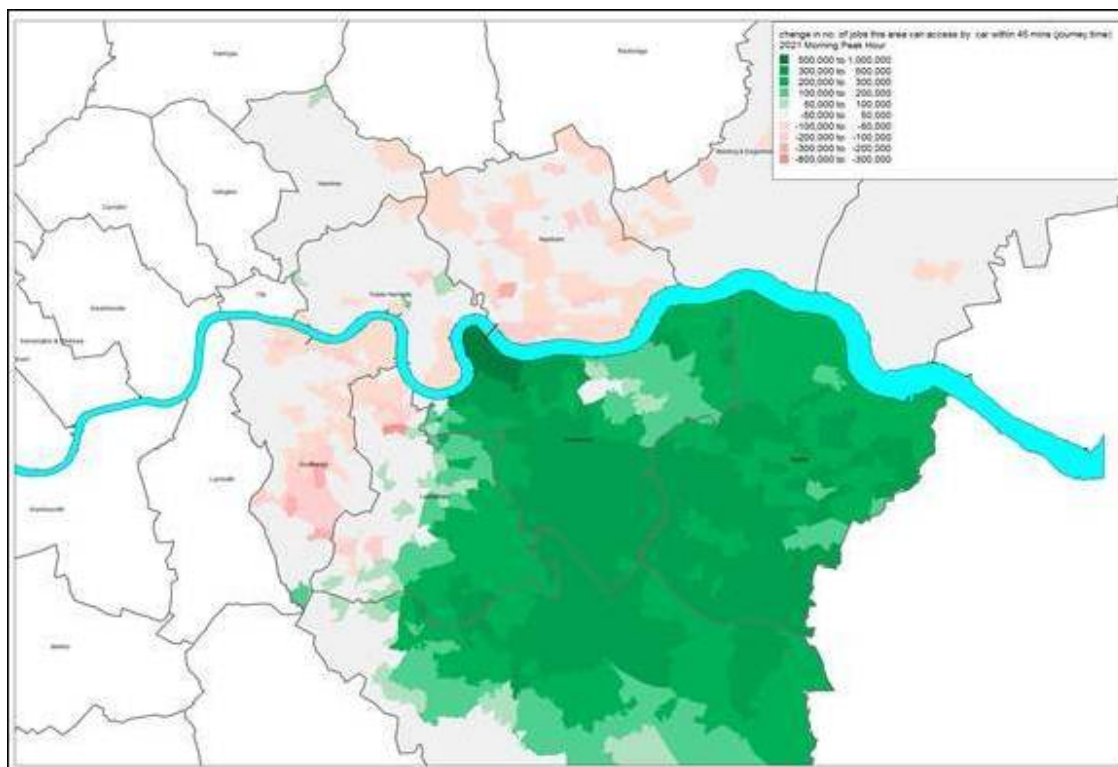


Figure 6-5: Change in job accessibility by Car (2021 Reference Case v Assessed Case) based on journey time – AM peak hour



Additional benefits – local employment

6.4.6 The Scheme would directly provide jobs both through construction and operation. TfL would require contractors to commit to offering employment and training opportunities, including apprenticeships to local people. This would be set out in the Strategic Needs and Training Commitments and secured through the DCO. The contractor would also be expected to encourage community involvement and provide opportunities for links to education through, for example, school visits.

6.5 PO4: To integrate with local and strategic land use policies

6.5.1 The new tunnel would be constructed on land which has been safeguarded since 1995; by using a bored tunnel (rather than a bridge or an immersed tunnel), the land available for development above the new structure is optimised. In anticipation of the future land-uses, and to improve current provision for pedestrians and cyclists, TfL has set out changes to road layout and new facilities as part of the Scheme and for potential future implementation.

6.5.2 The Design and Access Statement (DAS) sets out how the Scheme could be integrated with the existing roads and urban realm while recognising that the context is likely to change significantly in the future. In the illustrative design shown in the DAS, TfL has ensured that infrastructure provided as part of the core scheme significantly enhances pedestrian and cycle connectivity. Examples are the addition of off-carriageway cycle provision in the north and an improved pedestrian and cycle bridge in the south at Boord Street. TfL are also exploring a number of complementary projects outside of the core scheme which may improve pedestrian and cycle connectivity, these could be delivered jointly with other stakeholders.

6.5.3 Changes to the road network serving the southern tunnel portal would facilitate bus movements between both tunnels and North Greenwich bus station.

Additional benefits – enabling future links

6.5.4 Around the northern portal in particular, land-use is likely to change dramatically in future. The Scheme has been designed so that it would fit well with future development and optimise the use of sustainable transport. For example it would be possible to put in a bridge-type connection for pedestrians and cyclists over the tunnel approach to Tidal Basin roundabout/Silvertown Way, linking new developments with a potential new DLR station at Thames Wharf.

6.6 PO5: To minimise any adverse impacts of any proposals on communities, health, safety and the environment

6.6.1 The user charge would manage traffic and reduces volumes along the existing Blackwall Tunnel Approach Roads which are currently included within Borough Air Quality Management Areas⁷⁴. The Scheme will also facilitate more frequent cross-river bus services through the new tunnel, which are currently restricted by height and delays at the Blackwall Tunnel, thereby promoting a greater use of sustainable transport.

⁷⁴ An Air Quality Management Area is an area designated by the local authority, where UK air quality objectives are unlikely to be met.

6.6.2 Overall the scheme is expected to result in a net benefit to air quality as a result of the charge that has been assessed. The main impacts on air quality can be summarised as follows:

- In some areas the charge would bring about a reduction in both vehicle and HDV⁷⁵ movements and would therefore result in a negligible change or improvement to air quality along the Blackwall Approach roads such as the A102, A12 and most sections along the A13.
- Air quality would be slightly worsened in small areas along roads that are receiving large increases in traffic as a result of the new tunnel alignment such as Tidal Basin Road.
- There would also be a small worsening within a localised area on the Greenwich Peninsula.

6.6.3 The present environment in the vicinity of the Blackwall crossing would be significantly improved with the Scheme reducing the severance and pollution currently caused by the existing congested Blackwall Tunnel approach and producing a net benefit for noise and air quality.

6.6.4 For some, the user charge would have an adverse effect, although in the host boroughs for example, only around half of households have access to a car or van, which limits this effect. The increased provision of cross-river bus services both in terms of new routes and increased frequency and capacity would help to mitigate this impact by providing alternative public transport options.

6.6.5 Additionally, TfL will make available a community fund to the host boroughs. The current proposal is that an annual sum of money will be given to the boroughs for a period of five years and they will be able to decide on its exact function and distribution locally. The community fund is an opportunity to deliver transport, environmental and social enhancements to local communities, and could be used to mitigate any adverse impacts arising from the charge on low-income groups. The value of the fund will be discussed with the host boroughs and detailed proposals included in the DCO application. The community fund will be

⁷⁵ Heavy duty vehicles (i.e. HGVs, buses and coaches)

secured through a DCO requirement (similar to a planning condition) or a development consent obligation (similar to a planning obligation).

Additional benefits – sustainability

6.6.6 From September 2020, all buses in central London must meet new emissions standards (Euro VI) owing to the introduction of the Ultra Low Emission Zone (ULEZ). From 2016 TfL will start to change its fleet so that all double deck buses operating in central London are hybrid and all single deck buses are zero emission⁷⁶ (e.g. electric or hydrogen). TfL would use at least ULEZ-compliant buses on routes using the tunnels.

6.6.7 In developing the Scheme, TfL is seeking to be a leader in engineering sustainability and is working to achieve a CEEQUAL sustainability rating of Excellent.

6.7 PO6: To ensure where possible that any proposals are acceptable in principle to key stakeholders, including affected boroughs

6.7.1 TfL has engaged with the boroughs in developing the Scheme and has consulted extensively. All three host boroughs are supportive of the Silvertown Tunnel. TfL will continue to engage with the boroughs and other stakeholders during this statutory consultation and will carefully consider their responses and may make further changes to the Scheme as a result.

6.7.2 In consultations support for a new crossing at Silvertown has been consistently high: over 80 per cent in the first river crossings consultation; 76 per cent in the second; and 83 per cent in the most recent consultation⁷⁷.

Additional benefits – managing construction and operational impacts

6.7.3 TfL would seek to manage and mitigate the impacts of construction on the areas around the tunnel portals, and seek opportunities for long-term mitigations and enhancements.

⁷⁶ At tailpipe

⁷⁷ The following non-statutory consultations: River Crossings consultation Feb-Mar 2012; River Crossings consultation Oct 2012-Feb 2013; Silvertown tunnel Oct-Dec 2014

6.7.4 In the construction phase, there would be a commitment to maximising the use of the river for transportation of materials, which reduces the volume of construction traffic on the roads. Visual and acoustic screening would also be possible around the tunnel approaches.

6.7.5 Design principles for the tunnel buildings and landscaping would be to a high standard.

6.8 PO7: To achieve value for money and, through road user charging, to manage congestion

6.8.1 The Scheme has an Initial Net Present Value (NPV) of £979m, rising to £1,273 once reliability benefits are included - it therefore has a very positive economic outcome. Each user class (commuting, business and other trips) has positive net benefits (benefits less charges) over the 60 year appraisal. All vehicle user groups apart from goods vehicles would have benefits, goods vehicles have user time and vehicle operating benefits, but these are outweighed by the relevant user charges

6.8.2 The Silvertown Tunnel itself is not expected to generate significant additional demand for cross-river trips. Rather, demand for the additional capacity provided will be managed through user charging to reduce existing congestion and maintain optimal road network performance.

6.8.3 With the charges assumed in the Assessed Case⁷⁸ in place, the Scheme would result in a very limited overall change in traffic demand for the two tunnels compared with the reference case (i.e. a future without the Silvertown Tunnel). There is likely to be some change in the distribution of trips or changes to routes, but analysis of London travel data in the period 1993-2012 shows that trip rates generally remain relatively constant, despite changes to highway and public transport provision⁷⁹. By retaining the flexibility to adjust the charge in the future, TfL can be responsive to events or trends which influence traffic levels and thereby ensure that the Scheme continues to meet its objectives.

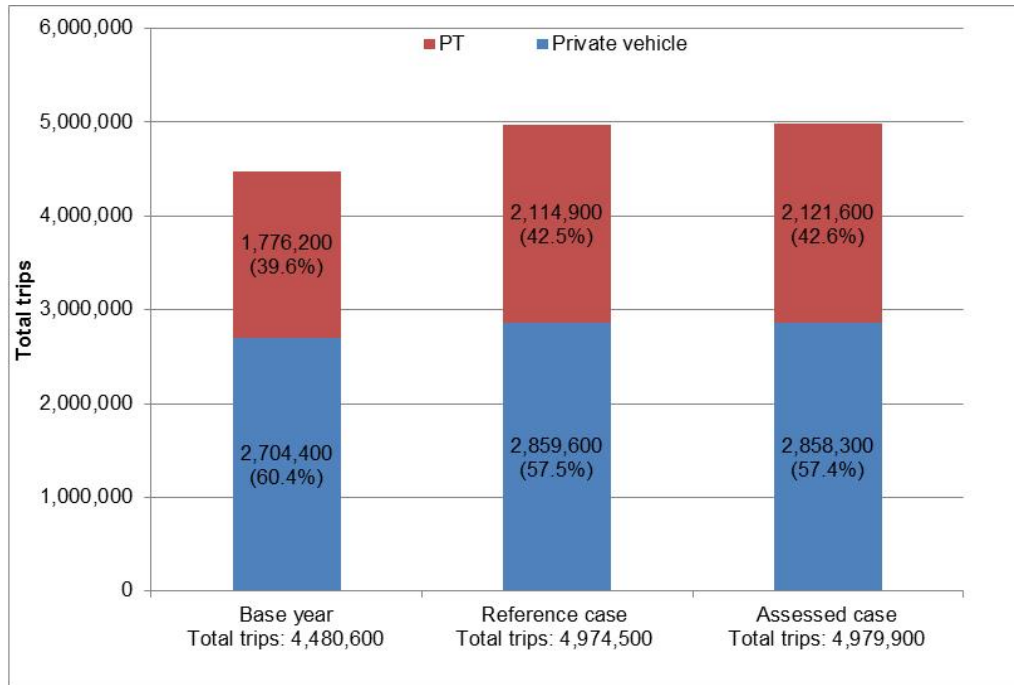
⁷⁸ Appendix B of the Transport Assessment provides more information on how TfL has considered the induced demand potential

⁷⁹ WebTAG also assumes constant trip rates within demographic sectors.

- 6.8.4 TfL has modelled trip rates and mode share in the east sub-region in 2021 with and without the Scheme, and compared this to a baseline of 2012⁸⁰, shown in Figure 6-3 below. As would be expected given population and employment growth, both public and private transport trips increase in both scenarios. The public transport mode share is expected to increase from its current level to around 42 per cent in 2021, regardless of whether the Scheme is in place. The Scheme would therefore not affect the continuing trend towards public transport. Indeed, there is even a very slight increase in public transport mode share with the Scheme in 2021.

⁸⁰ See Silvertown Tunnel Preliminary Transport Assessment for full details of modelling

Figure 6-6: Total trips by mode in east sub-region, 2012 base year and 2021 Reference Case and Assessed Case (0700-1900)



Additional benefits – charging policy

6.8.5 The user charge would incentivise use of low-emission vehicles by way of a discount. The central London Congestion Charge has since its inception in 2002 offered a discount to electric and other low emission vehicles which has proven effective in encouraging the development and uptake of eligible cars and vans in London.

7. PLANNING POLICY APPRAISAL

7.1 Overview

7.1.1 This chapter describes the main effects of the Scheme and assesses how it accords with planning policy; in particular how it meets the tests contained within the National Networks National Policy Statement (NNNPS) and the development plan.

7.1.2 The chapter starts by demonstrating how the need for the Scheme is embedded within development plan policy as well as how it meets the need tests within the NNNPS. It then assesses the key components the Scheme will deliver against planning policy requirements taking into account road user charging, public transport and walking and cycling enhancements, the role of design and how the Scheme meets safety requirements. It then considers the effects of the Scheme in a policy context examining economic and regeneration effects as well as environmental and social effects.

7.2 The need for the Silvertown Tunnel

Policy support in the development plan

7.2.1 The Silvertown Tunnel was designated a Nationally Significant Infrastructure Project (NSIP) by a Section 35 Direction made by the Secretary of State (SoS) for Transport in 2012. Therefore, in evaluating the merits of the Scheme the SoS must have regard to the NNNPS. In addition, section 1.3 of the NNNPS states that for schemes designated under Section 35:

“the relevant development plan is also likely to be an important and relevant matter especially in respect of establishing the need for the development”.

7.2.2 The development plan in this case consists of the London Plan and the local development plans of the Royal Borough of Greenwich and London Boroughs of Newham and Tower Hamlets. Both the Mayor’s Transport Strategy (MTS) and the National Planning Policy Framework (NPPF) are relevant material considerations.

7.2.3 As described in Chapter 3, the need for the Silvertown Tunnel is established in the policy of the MTS (2010) and the London Plan (2011). Support for the Scheme has remained throughout successive alterations

of the London Plan. In March 2015 the Mayor published (i.e. adopted) the Further Alterations to the London Plan (FALP). Paragraph 6.41 of the 2015 London Plan reiterates the need for the Scheme (previously paragraph 6.37). The relevant issues relating to road based river crossings described in paragraph 6.41 are becoming increasingly significant in the context of the economic and population growth experienced in London since the 2011 revision of the London Plan.

- 7.2.4 Local planning policy also supports the provision of additional river crossings and the need for the Silvertown Tunnel scheme. The Royal Borough of Greenwich's Core Strategy policy IM3 states that the Borough will work in partnership to:

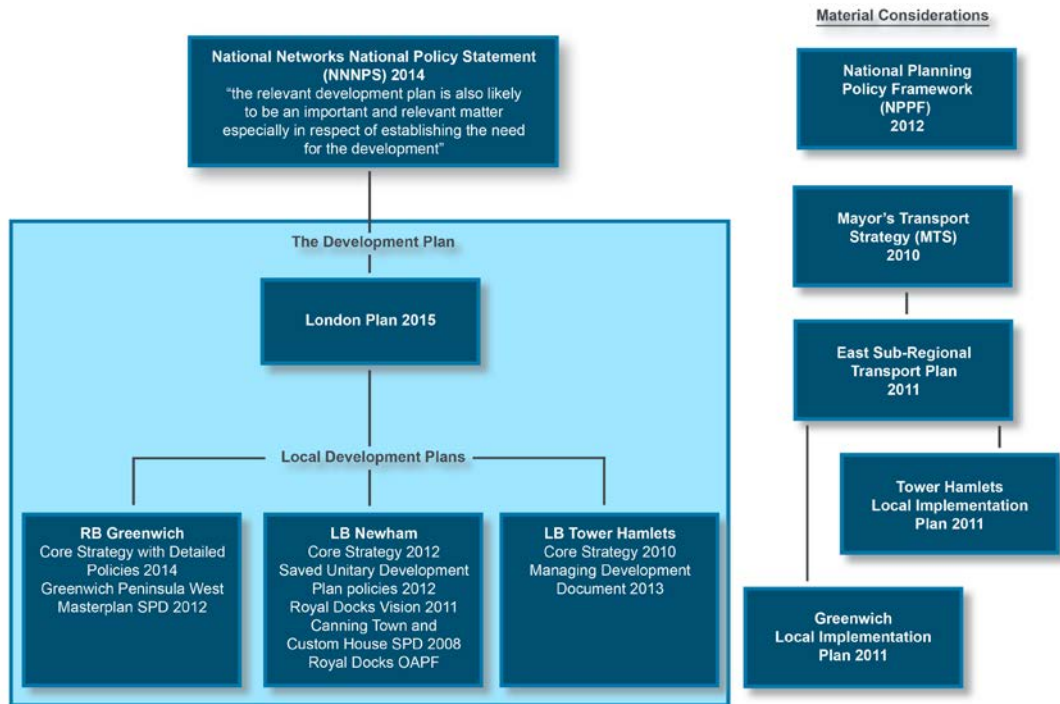
“deliver a new package of Thames river crossings in East London including the continued safeguarding of the Silvertown Link Tunnel”.

- 7.2.5 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.

- 7.2.6 Therefore a package of river crossings including a Silvertown Tunnel has support in the statutory development plan.

7.2.7 Figure 7-1 shows the relevant policy documents for the Scheme.

Figure 7-1 Policy documents relevant to the Scheme



Government’s vision and strategic objectives

7.2.8 The Scheme’s designation as an NSIP means that in determining the application for the Silvertown Tunnel the Secretary of State for Transport must have regard to the policy tests set out in the NNNPS. Therefore, in addition to demonstrating that the need for the Scheme is established in the development plan, the following section shows how the Silvertown Tunnel also accords with the need to develop national networks set out in the NNNPS.

7.2.9 Section 2 of the NNNPS explains this need. It states:

“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”*

7.2.10 As explained in previous chapters, the Silvertown Tunnel meets these needs by addressing the three problems at the Blackwall Tunnel – congestion, closures and incidents, and a lack of resilience. The following sections on capacity, connectivity, resilience, economic growth, reliability, safety, supporting environmental goals and joining up communities, demonstrate in more detail how the Scheme is meeting the need established in the NNNPS.

Capacity

7.2.11 The Silvertown Tunnel meets with the Government's policy criteria for the development of national networks with capacity (NNNPS chapter 2) to support economic activity, facilitate growth and create jobs. It would potentially double capacity for crossing the river at Blackwall/ Silvertown and provide full-height clearance enabling HGVs up to 5m in height (and double deck buses) to cross the Thames at this location. It would also provide connectivity benefits for taller HGVs and reduce reliance on existing crossings. This would significantly reduce the risk that drivers of overheight HGVs would attempt to use the Blackwall Tunnel – currently the cause of half of all closures of the tunnel (based on 2013 data).

7.2.12 The fundamental traffic management effect of the Silvertown Tunnel scheme would be to directly alleviate the very significant traffic bottleneck at the Blackwall Tunnel, effectively eliminating congestion at the crossing.

7.2.13 In the northbound direction, the A102 currently reduces from three lanes to two on the approach to the Blackwall Tunnel. This would no longer be necessary; the number of lanes would instead increase from three to four at this point with the Scheme. This would reduce delays caused by merging.

- 7.2.14 Southbound, the new tunnel would enable traffic from the A13, A12 and local roads serving the Royal Docks (all of which currently converge on the southbound bore of the capacity constrained Blackwall Tunnel) to be shared between the existing tunnel and the proposed new link.
- 7.2.15 Through these changes to cross-river network capacity, the implementation of the Silvertown Tunnel scheme would effectively eliminate the severe congestion which already routinely affects the approaches to the Blackwall Tunnel, and which is forecast to become even more significant in coming years as forecast population and employment growth leads to further increases in travel (including road based travel).
- 7.2.16 The effective elimination of congestion at the Blackwall Tunnel is also in accordance with London Plan policy 6.12 and MTS Proposal 35 which require that new roads in London contribute to the reduction of congestion and unreliable journey times.

Connectivity

- 7.2.17 Cross-river connectivity will be significantly improved by the doubling in potential tunnel capacity at Blackwall/Silvertown. This will provide businesses with access to a much wider labour market than at present, creating new employment opportunities locally. The Scheme will also create wider connectivity benefits for the national road network as current congestion and unplanned closures of Blackwall Tunnel have a knock-on adverse impact on the operation of the Dartford Crossing and contribute to congestion on the M25, as well as on local roads.
- 7.2.18 In addition to meeting the NNNPS requirement regarding connectivity the Scheme accords with MTS policy 22 which seeks to enhance connectivity and improve access to jobs and services and with LB Newham's Spatial Strategy policy S1 which seeks to improve connectivity, through strategic and local transport investment including new river crossings. It also accords with London Plan policy 6.12 which lists improved connectivity as criteria to be taken into account when assessing new road schemes.

Resilience

- 7.2.19 The term 'resilience' here describes the ability of transport networks to provide and maintain an acceptable level of service in the face of incidents and planned closures, and a lack of resilience can lead to and exacerbate a lack of reliability. As set out in Chapter 2 there is currently little resilience in the road network serving the Blackwall Tunnel with

drivers, in the event of a closure, having to make lengthy diversions often on relatively low capacity roads. Due to the high levels of demand for the crossing at Blackwall Tunnel even a short closure caused by a traffic incident can have widespread adverse network effects. The Silvertown Tunnel will ensure that in the event of Blackwall Tunnel closures there is an alternative route for traffic and one which can accommodate all types of vehicles.

- 7.2.20 By effecting these changes, the implementation of the Silvertown Tunnel scheme would effectively eliminate the severe congestion which currently routinely affects the approaches to the Blackwall Tunnel, and which is forecast to become even more intense in coming years as forecast population and employment growth lead to further increases in travel, including highway travel.

Economic growth

- 7.2.21 The Silvertown Tunnel scheme will significantly reduce the barrier effect of the River Thames in east London, and by facilitating greater economic activity within local regeneration and Opportunity Areas (such as Greenwich Peninsula and the Royal Docks) it will help support London's economy as a whole. These beneficial effects are addressed further in the section on economic effects starting at 7.4 below.

Reliability

- 7.2.22 Lack of journey time reliability is currently a major problem at Blackwall due to the frequency of incidents that cause closures and delays at the tunnel. These are particularly a problem in the northbound tunnel. In 2013 there were 958 closures of the northbound tunnel, each lasting an average of 4.1 minutes; in 2014 this reduced by around ten per cent, but this is still a considerable number. These closures can lead to serious congestion in the surrounding road network and cause major journey time problems for local businesses that rely on the road network and surrounding communities that suffer from poor air quality, noise and dis-amenity issues.
- 7.2.23 The positive effect of the Silvertown Tunnel on crossing closures will be two fold. Firstly, there would be fewer of them because the over height vehicles would be directed to the Silvertown Tunnel, which, by being in close proximity to the Blackwall Tunnel, would minimise the possibility of this traffic diverting via unsuitable routes to alternative crossings. Secondly, where closures do occur (for whatever reason), the Silvertown

Tunnel would provide an alternative route for all affected vehicles and so ameliorate the wider congestion effects of closures on the network. There would be an active, real-time signage strategy to manage traffic in these circumstances. Consequently the need to divert to alternative river crossings and the resulting negative impact on the wider road network is reduced. Consequently the Scheme will confer positive benefits on users of the wider road network, including public transport users, and on local communities.

- 7.2.24 These reliability improvements meet the requirements of objective (h) of London Plan Policy 6.11 (Smoothing Traffic Flow and Tackling Congestion) because it results in the smoothing of traffic flow and a consequential improvement in journey time reliability. Improvements to journey time reliability also accord with MTS Proposals 30 and 35 relating to the management of congestion and the introduction of new road schemes.

Safety

- 7.2.25 The Silvertown Tunnel would provide safer conditions than at Blackwall Tunnel due to the fact that it is a tunnel designed to modern standards. The Blackwall Tunnel, in particular the northbound bore which was opened in 1897, was designed for pedestrian and horse-drawn traffic. As a result the lanes are narrow with sharp bends and a height restriction of four metres. This leads to frequent closure of the tunnel due to accidents or over height vehicles attempting to use the northbound tunnel. In contrast Silvertown Tunnel would be designed for modern day traffic and vehicle heights and to up-to-date safety standards. The junction tie-ins would be designed to relevant highway standards, including measures to promote pedestrian and cyclist safety. These design specifications are dealt with below from paragraph 7.3.25 and in the Preliminary Engineering Report⁸¹.

Supporting environmental goals

- 7.2.26 The Silvertown Tunnel would support the delivery of relevant environmental goals through measures such as minimising CO₂ emissions, and facilitating the use of public transport. The Scheme would

⁸¹Transport for London, (October 2015), *Silvertown Tunnel Preliminary Engineering Report*

deliver a net benefit for noise and air quality emissions and is seeking to achieve an Excellent CEEQUAL rating for engineering sustainability. More on the Scheme's environmental effects is set out in section 7.4 below.

- 7.2.27 The NNNPS requires that applicants show that they have considered opportunities to deliver environmental and social benefits (NNNPS 3.3) and to improve quality of life (NNNPS 3.2). Similarly, London Plan policy 6.12 requires proposals that would increase road capacity to show how a net benefit to London's environment can be provided and how conditions for pedestrians, cyclists, public transport users, freight and local residents can be improved. A net benefit should be shown across these areas. In addition to improved journey time reliability, connectivity and resilience, the Scheme provides enhancements through improved public transport capacity, enhanced walking and cycling connections (particularly around the Tidal Basin Roundabout and to the Emirates Air Line) and the introduction of a community fund to support local transport, environmental or social projects. These are detailed further below.

Joining up communities

- 7.2.28 The Silvertown Tunnel would improve connectivity between communities across the river by reducing congestion and improving journey reliability. A user charge would be imposed on a crossing that currently is free to use (Blackwall Tunnel), which could have an adverse impact on groups unable or unwilling to pay. However, the significant improvements to cross-river bus capacity enabled by improved journey time reliability and increased capacity, as well as the provision of the bus/HGV lane and accommodation of double-deck buses would help to offset this. These public transport improvements would provide a relatively low-cost alternative to the private car and support links between communities. Discounts and exemptions – particularly to disabled and blue badge holders – also mitigate any impact. The effects on communities are assessed further in the Preliminary Outline Business Case (OBC)⁸² and Preliminary Social Impacts Appraisal.⁸³

Alternatives

⁸² *Transport for London, (October 2015), Silvertown Tunnel Preliminary Outline Business Case*

⁸³ *Transport for London, (October 2015), Silvertown Tunnel Preliminary Social Impacts Appraisal*

7.2.29 A comprehensive options assessment process was carried out, as described in Chapters 3 (strategic options development process) and 5 (tunnel options). Chapter 3 shows that demand reduction and modal alternative options, such as walking and cycling, and public transport, were considered. It sets out how this optioneering process supported the development of the MTS and London Plan policies on river crossings in east London. It demonstrates that whilst alternative modal crossings remain options for the wider river crossings programme, they are unable to address satisfactorily the three specific problems at Blackwall Tunnel (congestion, closures and a lack of network resilience). The options appraisal process – including the development and adoption of MTS and London Plan policies – meets the requirement in 4.27 of the NNNPS for all projects to be subject to options appraisal. Appendix A presents a back-check of the various river crossings options assessed by TfL since 2009.

7.2.30 The PEIR sets out an assessment of alternatives in Chapter 3 in accordance with Schedule 4, Part 1 (18) the Infrastructure Planning (Environmental Impact Assessment) Regulations 2009 (as amended).

7.3 Key components of the Scheme

7.3.1 This section considers key components delivered by the Silvertown Tunnel scheme and appraises them against planning policy.

Road user charging

7.3.2 Road user charging is a crucial element of the Scheme and is discussed in Chapter 4 of this document.

7.3.3 The user charge is an integral part of the Silvertown Tunnel scheme. Simply building a tunnel (with no user charge) would not address the three transport problems of the Blackwall Tunnel in the long-term. The user charge would help manage the demand for both crossings and keep traffic levels within appropriate limits so as to meet the objectives of the Scheme both over the short and long term, and is a way of paying for the scheme. The NNNPS supports user charging to fund new capacity and/or manage demand (3.26).

7.3.4 The Mayor's Transport Strategy at Proposal 130 states that pricing incentives may be considered to manage demand but only if it achieves a reasonable balance between objectives, costs and impacts. It states that any scheme should be fair and flexible, relating charges to the external

costs of travel with sensitivity to time of day, and with scope for discounts or exemptions for specific user groups.

- 7.3.5 TfL proposes to apply for powers to set and vary the charge in the future to ensure that in operation the Scheme continues to reflect the conditions that exist at the time and is set at a level which will manage demand for the Tunnels most effectively. In setting and varying the charge, TfL will have regard to the two overarching principles of managing traffic and paying for the scheme as well as the other consequential benefits (for example, on the environment) and Scheme objectives. Together these form the key considerations.
- 7.3.6 This would be informed by monitoring results. As a requirement of the DCO, TfL would monitor the effects of the charge after the opening the Silvertown Tunnel and the implementation of the user charge on both Blackwall and Silvertown tunnels. More detail on charging and monitoring is set out in Chapter 4 and Appendix C.
- 7.3.7 The level of the proposed charge at the Blackwall and Silvertown Tunnel would vary by different vehicle types and by the time of the day. It is currently proposed that there would be exemptions and discounts for a limited number of vehicles. More details are contained in the Preliminary Charging Report⁸⁴.
- 7.3.8 TfL has undertaken preliminary modelling to assess the impacts of the charge levels in the Assessed Case. TfL's understanding from this analysis is that the charge levels shown in the Preliminary Charging Report would help to meet the key considerations and achieve a balance between limiting displacement to alternative routes and river crossings, and avoiding an increase in overall demand on the Blackwall Tunnel approach routes.
- 7.3.9 Appendix B of the Preliminary Transport Assessment⁸⁵ provides more information on how TfL would use the charge to manage the induced traffic demand potential of the new crossing.

⁸⁴ TfL, 2015, Silvertown Tunnel Preliminary Charging Report

⁸⁵ TfL, 2015, Silvertown Tunnel Preliminary Transport Assessment

- 7.3.10 As is set out in Chapter 4, TfL proposes to apply for powers to vary the charge in the future to ensure that it continues to enable the Scheme to meet its objectives. 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.
- 7.3.11 The Economic Assessment Report⁸⁶ identifies that users will have significant time saving benefits, the monetary value of which are greater than the cost of user charges. However it is acknowledged that the introduction of a charge at the currently uncharged Blackwall Tunnel could have a negative impact for some groups, for example those on low incomes or small businesses who regularly use the Blackwall Tunnel. The Preliminary Distributional Impacts Appraisal⁸⁷ (in Table 9.1) shows that more than half of households within the impact area do not have access to a car. This limits the number of those affected by the road user charge and highlights the potential for benefit from providing increased bus services for those dependent on public transport. For personal affordability it assesses the impact of user charging as neutral overall (taking public transport benefits into account, with a slight adverse impact from user charges for low incomes users (due to their greater public transport use) and a large adverse for higher income users.
- 7.3.12 The increased opportunity to provide cross-river bus services both in terms of new routes and increased frequency and capacity will help to mitigate the effect of the user charge on low income groups by enabling the provision of alternative public transport options.
- 7.3.13 In addition to this TfL will make available a community fund to the host boroughs. The current proposal is that an annual sum of money will be given to the boroughs for a period of five years and they will be able to decide on its exact function and distribution locally. The community fund is an opportunity to deliver transport, environmental and social enhancements to local communities, and could be used to mitigate any adverse impacts arising from the charge on low-income groups. The value of the fund will be discussed with the host boroughs and detailed proposals included in the DCO application. The community fund will be
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⁸⁶ *Transport for London (Oct 2015), Preliminary Transport Assessment*

⁸⁷ *Transport for London (Oct 2015), Preliminary Distributional Impacts Appraisal*

secured through a DCO requirement (similar to a planning condition) or a development consent obligation (similar to a planning obligation).

- 7.3.14 Through the above measures the charge would meet the requirements of the MTS to be fair and flexible, relating charges to the external costs of travel with sensitivity to time of day, and with scope for discounts or exemptions for specific user groups and to achieve a reasonable balance between objectives, costs and impacts.

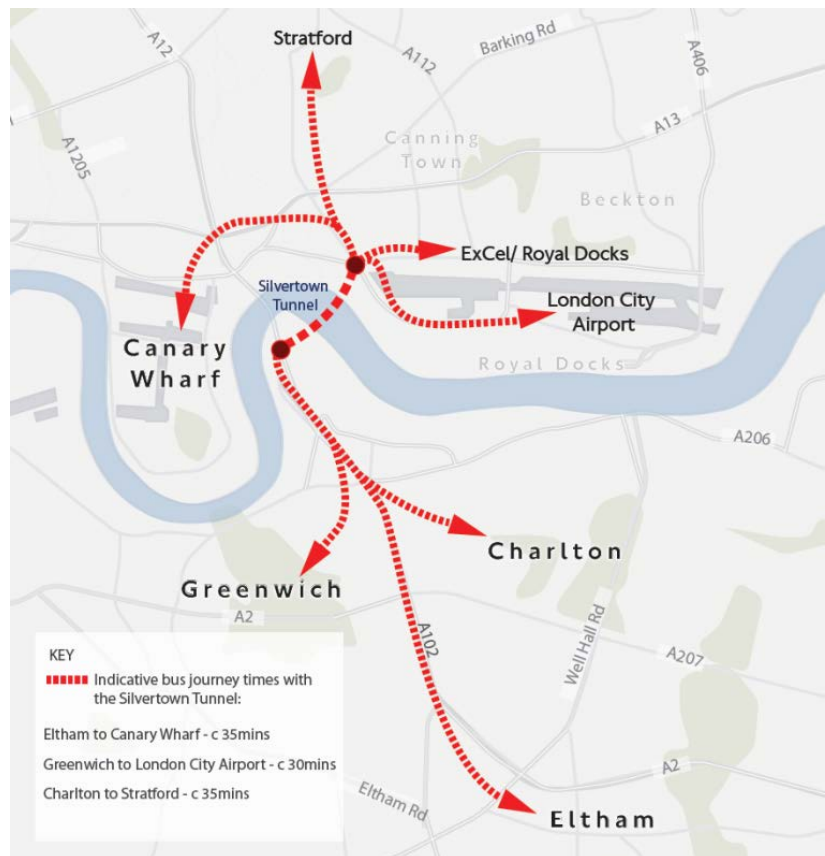
New public transport connections

- 7.3.15 The Blackwall Tunnel presents significant constraints on the provision of bus services across the river, in the form of severe congestion, unreliability, and low headroom which prevents the use of double-deck vehicles. The result is that only one service is operated through the Blackwall Tunnel, and opportunities to connect people to jobs and amenities cannot be maximised.
- 7.3.16 East London is growing rapidly and this adds to the need to connect centres within the sub-region such as the Royal Docks, Stratford and the Greenwich Peninsula and to cater for growing travel demand. Rail connections have improved with the Jubilee line, DLR extensions to Woolwich Arsenal and the development of Crossrail but there remains a need to provide for movement by road and in particular provide cross-river road connectivity for areas south of the river which do not currently benefit from good rail access.
- 7.3.17 Buses are a key element of the public transport network as they have the flexibility to fill gaps in rail public transport provision and to connect local communities. Where there is demand services can run 24 hours a day and buses provide a low cost transport option which promotes active travel as buses and walking are compatible modes of transport.
- 7.3.18 The implementation of the Silvertown Tunnel scheme would represent a significant network opportunity for enhancing the current cross-river bus services and enabling the provision of new bus services. This opportunity can deliver an environmental and social benefit (NNNPS 3.3) as well as enhance accessibility for non-motorised users (NNNPS 2.9). It also accords with the NPPF at paragraph 32 which seeks for opportunities for sustainable transport modes to be taken up and with the London Plan at policy 6.4 and MTS proposal 13 which looks to increase public transport capacity. London Plan policy 6.12 on Road Network Capacity requires new road schemes to demonstrate how conditions for public transport

users can be improved. At local plan level LB Tower Hamlets' policy SP08 supports public transport and improved bus connections as does LB Newham's policy INF2 on Sustainable Transport.

- 7.3.19 Increasing the number and frequency of bus services would help promote opportunities for modal shift especially as buses would be exempt from paying the tunnel charge and would therefore help to further reduce congestion.
- 7.3.20 TfL has identified a series of corridors where new and improved bus services would be likely to bring particular benefits, and these are summarised in Figure 7-2 below.

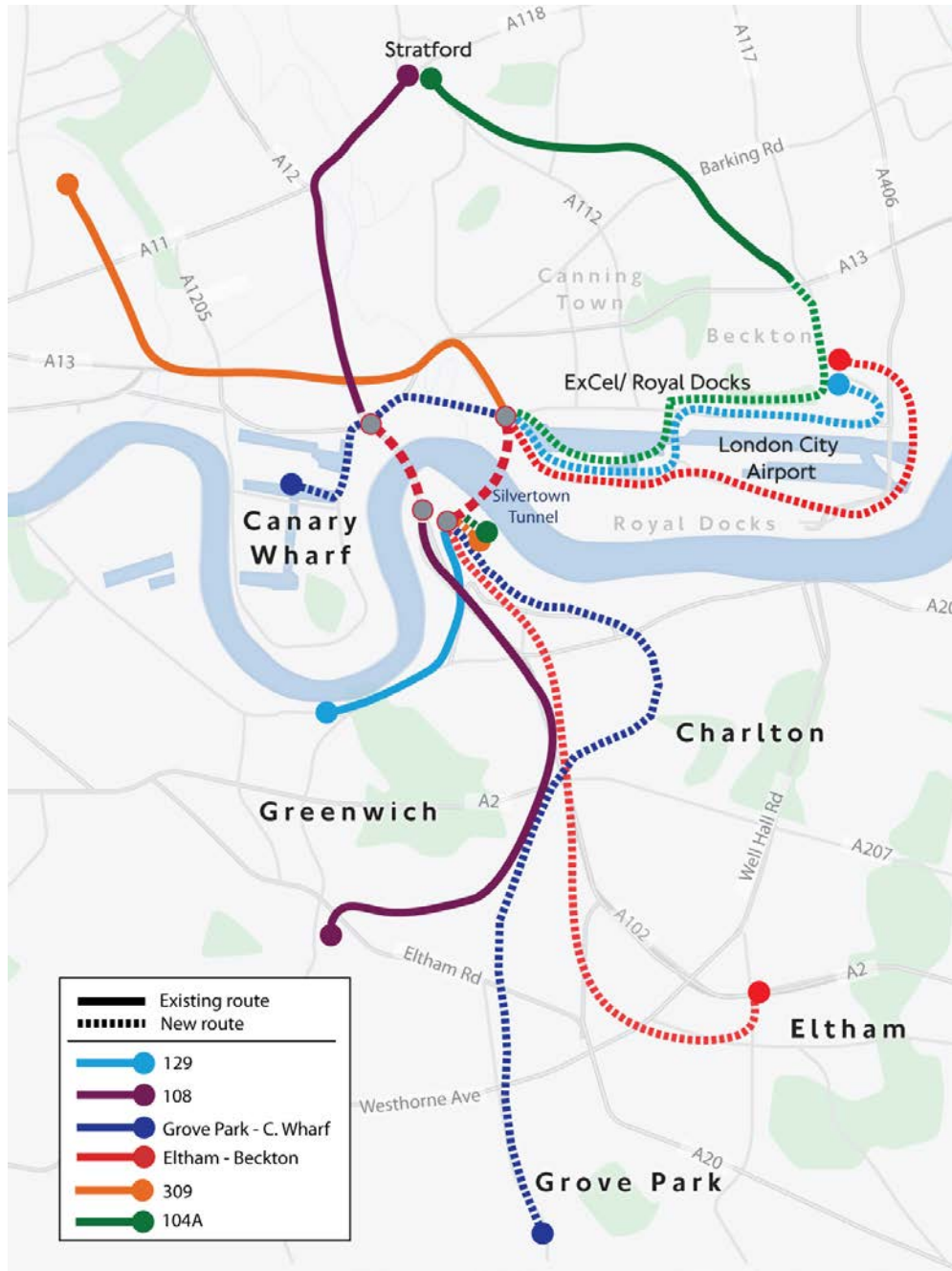
Figure 7-1: Bus corridors facilitated by the Scheme



- 7.3.21 Based on the corridors identified and comments received through the 2014 Silvertown Public Consultation, an example route network has been developed. This shows what a network using the Silvertown and Blackwall tunnels could look like – in terms of number, location, length and frequency of routes. An illustration of this network is shown in Figure 7-3. This would provide 37.5 buses per hour (bph) across the two crossings (7.5bph through Blackwall and 30bph through Silvertown), which would

constitute a fivefold increase over the current cross-river service level at Blackwall.

Figure 7-2: Example route network



- 7.3.22 Detailed work on bus route planning including consultation would commence around two years ahead of the proposed routes being implemented, in line with well-established TfL bus network development practice and in line with Proposal 23 of the MTS. TfL will commission buses with low emissions utilising the best available technology and therefore further maximise the environmental benefits of the Scheme.
- 7.3.23 Coaches are an important commuter service from Kent into Canary Wharf and operators would be able to run more efficient and attractive services as a result of improved reliability and reduced congestion on the Tunnel approaches brought about by the Scheme. There would also be the opportunity to run additional services through the Silvertown Tunnel which could enable coaches to capitalise on improved interchange facilities as a result of North Greenwich bus station improvements (which are already in progress).
- 7.3.24 Bus and coach users - both current and potential future passengers - would benefit from the provision of more services, as well as shorter and more reliable journey times on existing routes as a result of the Scheme. They would be likely to play an important role in demand management by attracting modal shift from private vehicles and would reduce the impact of the road user charge on users of the tunnel by providing a low-cost means of crossing the river.

Improvements for cyclists

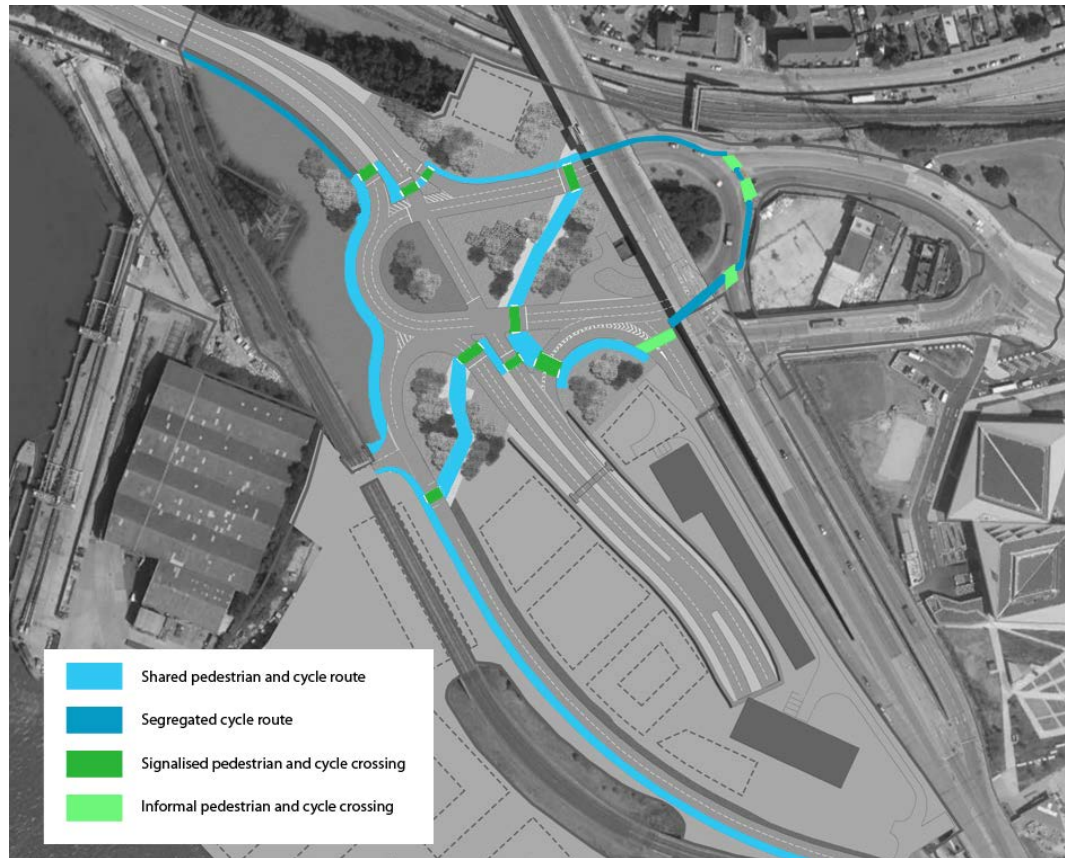
- 7.3.25 The NNNPS requires applicants to use reasonable endeavours to address the needs of cyclists and pedestrians in the design of new schemes (3.17). Similarly the London Plan policy 6.12 and MTS Proposal 35 on new road capacity require new road schemes to be assessed by reference to, among other matters, how they would improve conditions for pedestrians and cyclists. At local plan level promoting walking and cycling is supported in the policy of all three host boroughs (RB Greenwich IM4, LB Newham INF2, T23, LB Tower Hamlets SO20, SP09). This section considers improvements for cyclists and the following section addresses improvements for pedestrians.
- 7.3.26 TfL has a vision for cycling in east London and the provision made for cyclists through the Scheme would integrate with and support this. Walking and cycling will not be permitted through the Silvertown Tunnel for reasons of security, safety and amenity. The Silvertown Tunnel (as stated in London Plan policy and the MTS) is, however, one part of a package of river crossings to be delivered in East London. The first part of

this package, the Emirates Air Line (EAL) opened in 2012 and the purpose of this was to provide a cross-river link for pedestrians and cyclists. The Silvertown Tunnel scheme facilitates and enhances the use of the EAL by improving the cycle routes that provide access to its northern and southern terminals on either side of the river.

- 7.3.27 Additional river crossings are planned to be brought forward with bridge options that are being consulted on at Gallions Reach and Belvedere. Therefore cross-river infrastructure has been provided for pedestrians and cyclists, in close proximity to Blackwall/ Silvertown, and additional facilities are planned to be provided in the future.
- 7.3.28 The Silvertown Tunnel Scheme would include connections for cyclists on both sides of the river to link with existing cycle routes, further details are below. Passive provision would also be made to link with future residential development on both sides of the river.
- 7.3.29 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.

Pedestrian and cycle links - northern portal

- 7.3.30 Following consultation with the London Borough of Newham and the GLA (and subject to ongoing engagement), proposed improvements include connections between Thames Wharf and the Docklands, from the Tidal Basin roundabout to the Lower Lea Crossing towards Canary Wharf, and from the Tidal Basin roundabout under the DLR line and towards the Thames. The Reference Design makes specific or passive provision for improved pedestrian and cycle connections at the northern portal, including segregated cycleways as shown below:

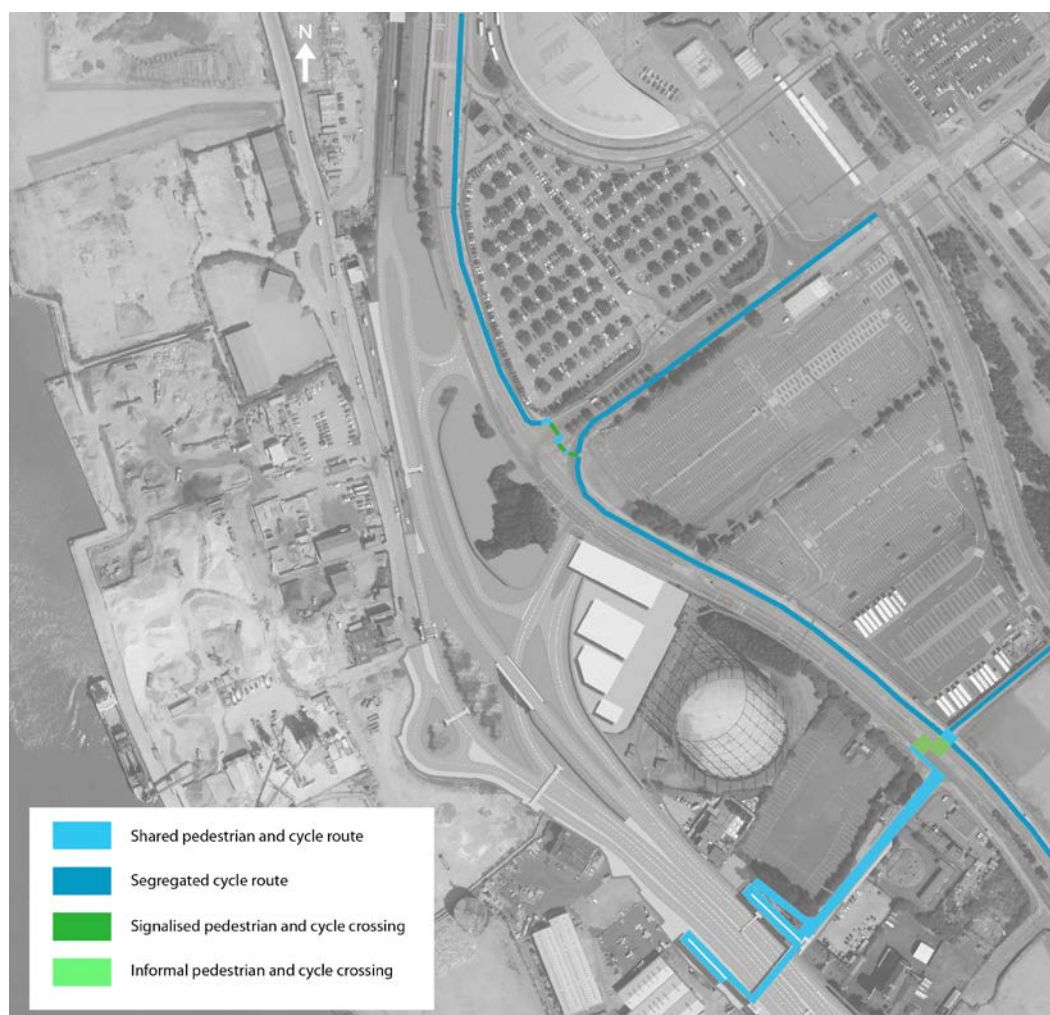
Figure 7-3: Pedestrian and cycle links around Tidal Basin roundabout

- 7.3.31 North-south connections currently provided by Dock Road would be improved across the site including under Silvertown Way, and to the DLR from the Docks towards the Thames. See Figure 7-5 above.

Pedestrian and cycle links - southern portal

- 7.3.32 On the south side of the river, the Scheme makes specific provision for existing, new, and improved pedestrian routes and connections, which will be the subject of ongoing engagement.
- 7.3.33 The pedestrian routes affected during construction at the southern portal, namely Edmund Halley Way and Tunnel Avenue will be re-instated.
- 7.3.34 At the southern portal, the re-provision of the Boord Street footbridge and alignment with Boord Street would improve network legibility. Ramped access to the bridge and a 3m width will allow for shared pedestrian and cycle use. The footbridge connects to the existing pedestrian routes on either side. Figure 7-5 below shows the new links on Greenwich Peninsula.

Figure 7-4: Pedestrian and cycle links around Greenwich Peninsula



The role of design

- 7.3.35 The existing area surrounding the Blackwall Tunnel suffers from an extremely poor pedestrian environment with major severance caused by the Blackwall Tunnel approach road. The frequently queuing traffic further adds to the severance and poor pedestrian environment through the noise and air quality impacts it creates. The NNNPS expects applicants to use reasonable endeavours to address any existing severance issues that act as a barrier to non-motorised users (5.205). Similarly the MTS at Policy 22 seeks to enhance connectivity and reduce community severance.
- 7.3.36 Currently the surrounding land uses on either side of the river are largely industrial but this is changing with major residential developments planned on both the north and south banks. The Silvertown Tunnel Scheme has

been designed to have a positive impact on the surrounding environment and with the integration of future development in mind (see Preliminary Design and Access Statement⁸⁸).

High quality design

7.3.37 It is an established planning principle that good design is a key aspect of sustainable development (NPPF 56). The NNNPS states that design must be an integral consideration from the outset of a proposal (4.28). The NNNPS also states at 4.29 that

“Visual appearance should be a key factor in considering the design of new infrastructure, as well as functionality, fitness for purpose, sustainability and cost. Applying “good design” to national network projects should therefore produce sustainable infrastructure sensitive to place, efficient in the use of natural resources and energy used in their construction, matched by an appearance that demonstrates good aesthetics as far as possible.”

7.3.38 Scheme design will be a material consideration in decision making and schemes should be durable, adaptable and resilient (NNNPS 4.32). At a local level RB Greenwich policy DH1 and LB Newham policy SP3 require high quality design.

7.3.39 The design vision is for a new piece of highway infrastructure that will meet the future expectations of all road users whilst addressing the current problems. To achieve this TfL have identified four core principles:

- Reliable infrastructure - a robust new tunnel, integrated with existing infrastructure, which addresses current problems while accommodating future changes, and which optimises the operational capacity;
 - Green (environmentally-friendly) infrastructure - reducing the environmental impact of traffic and highway infrastructure on people, being resilient to climate change, and providing high quality facilities for pedestrians and cyclists as well as motor vehicle users;
 - Safe and Smart Infrastructure - meeting the needs of all categories of road users, optimising traffic flows and creating a safe environment for
-

⁸⁸ Transport for London, (Oct 2015), Preliminary Design and Access Statement

road construction, working and maintenance, including use of appropriate crossings;

- People focused infrastructure - designing infrastructure for people not just vehicles; designing for how pedestrians and cyclists will experience the space as they move through and around it.

7.3.40 The tunnel design would have a positive impact on its local environment by design and operation. It would support the regeneration of the area around it, helping to stimulate new jobs and support the delivery of new homes.

7.3.41 The design takes account of all users, and where provision cannot be made in the tunnel itself, as is the case for cyclists and pedestrians, then appropriate complementary measures are being explored to support those users, principally by enhancing access to the Emirates Air Line.

7.3.42 The junction layouts, while driven by highway needs, have been designed to be more human in scale, and urban in design; with crossings on desire lines and multi-modal streets that have cycle and pedestrian as well as vehicle provision compatible with future development in the area.

7.3.43 The Scheme is also designed to be green. Road user charging would manage demand, but design can also help make the scheme green by combining new technologies to reduce the potential impacts of traffic such as noise, air and water pollution and with the introduction of landscape features such as green walls.

7.3.44 The design of the Scheme roads will include the use of materials such as low noise surfacing while the design of the landscape could deliver environmental enhancements and improved conditions for pedestrians and cyclists. Where barriers are required for noise or visual mitigation, they could be used as a canvas for public art or for signage and safety measures.

Future proofing the design

7.3.45 The NNNPS sets out the need for national networks infrastructure to be (amongst other things) 'durable' and 'adaptable' (4.32). The Preliminary

Design and Access Statement⁸⁹ sets out the planned future development at either end of the tunnel and how provision is to be made for this. On the Southern side the Greenwich Peninsula is undergoing major redevelopment through the implementation of property developer Knight Dragon's masterplan and in alignment with RB Greenwich's Peninsula West SPD. There is an opportunity for the Silvertown Tunnel scheme to help to overcome some of the severance caused by the tunnel approach roads, and to prepare the Peninsula West SPD area for future regeneration opportunities, by enhancing connectivity and wider linkages between the riverfront and the rest of the Peninsula.

- 7.3.46 The Scheme has been designed to integrate with and help facilitate future developments in the surrounding area - this reflects the objectives established in the Greenwich Peninsula West SPD produced by Royal Borough of Greenwich.
- 7.3.47 The Scheme for the northern portal is focussed around enhancements to the Tidal Basin roundabout, which will be significantly reconfigured by the scheme, with new arms to provide access to and from the tunnel, and a realigned Dock Road. This will create four linear pockets of land which have the future potential to become development sites.
- 7.3.48 The areas at either end of the tunnel are undergoing substantial regeneration and the Scheme can contribute to this. The Scheme for the northern side is more about open spaces and provision of routes for movement as a grid or network, to reflect the multiple destinations and desire lines that transect the study area. The site already contains a number of development sites, and there is the opportunity to package together other parcels of land into viable development.

Safety

- 7.3.49 Safety is obviously an essential element of any new road scheme and is a key policy requirement. The NNNPS states that promoters should introduce

“the most modern and effective safety measures where proportionate”. (NNNPS 3.10)

⁸⁹ Transport for London, (Oct 2015), Preliminary Design and Access Statement

7.3.50 All reasonable steps should be taken to minimise the risk of road casualties arising from the Scheme, and contribute to an overall improvement in the safety of the Strategic Road Network' (NNNPS 4.66). Improving safety for all is also an important London Plan and MTS requirement for new road schemes (London Plan policy 6.12, MTS Proposal 35), including ensuring a safe and secure environment in London with resilience against emergencies including fire, flood, weather and terrorism (policy 7.13). Safety is considered here both in the context of road and tunnel safety for motorists and in the context of pedestrian and cyclist safety.

Road and tunnel safety

7.3.51 The tunnel design conforms to safety principles established in the Highways England's Safety Framework and with the national Strategic Framework for Road Safety as well as with the Design Manual for Roads and Bridges and Manual for Streets. The design is also compliant with relevant legislation and standards (e.g. Road Tunnel Safety Regulations SI 2007 No. 1520 and Road Tunnel Safety (Amendment) Regulations 2009 SI 2009 No. 64).

7.3.52 The Scheme would implement safety measures to seek to reduce road casualties. A Road Safety Audit was undertaken in November 2014 and this recommended a number of design changes to optimise the safety of the design; these have all been included in the current design. The Preliminary Engineering Report ⁹⁰ has more details.

7.3.53 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 per cent compared to the Reference Case. The full analysis is reported in the Preliminary Transport Assessment.⁹¹

⁹⁰ *Transport for London, (Oct 2015), Preliminary Engineering Report*

⁹¹ *Transport for London, (Oct 2015), Preliminary Transport Assessment*

- 7.3.54 It should be noted that the current design for the Silvertown Tunnel and the proposed junctions 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 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 developed.
- 7.3.55 The tunnel would have a lighting system that is compliant with Highways England and British Standards, providing transition lighting levels to allow drivers eyes to adapt as they enter and leave the tunnel.
- 7.3.56 The tunnel would be resilient against emergencies. There will be CCTV within the tunnel and automated systems to identify potential incidents (e.g. animals/pedestrians in the tunnel). Fire and spillage detection systems would also be automated. Variable Message Signs on the tunnel approaches will facilitate active traffic management. Primary and secondary evacuation routes will be signed with provision made for those with reduced mobility. Tunnel cross passageway spacing has been agreed with London Fire Brigade.

Safety for walkers and cyclists

- 7.3.57 Following the Road Safety Audit in November 2014 design changes were made to improve safety for pedestrians and cyclists. These included amendments to pedestrian crossings on new Dock Road at Tidal Basin roundabout to allow more space to accommodate pedestrians on the splitter island at the crossing. Also a pedestrian route was added to the north side of Tidal Basin roundabout. A summary of improvements to pedestrian and cycling routes can be found earlier in this section and in Chapter 6.

7.4 Impacts of the Scheme

Economic and regeneration effects

- 7.4.1 London is a significant driver of the UK economy and creates the wealth and taxes that pay for a significant proportion of the country's public infrastructure and services. For London to continue to be a significant contributor to the UK's economy it needs to be able to compete with other major international centres and grow. Indeed London's population is forecast to grow by two million people over the next two decades, becoming a city of over ten million people by 2031. Development in east London is central to facilitating that growth, as it has the largest physical

capacity for development in the South East, and is one of the largest regeneration areas in the UK.

- 7.4.2 The NNNPS Summary of Need in Chapter 2 refers to the need for networks which join up communities, facilitate growth and create jobs. The NNNPS seeks national network schemes which support national and local economic growth and regeneration, particularly in the most disadvantaged areas (NNNPS 2.6).
- 7.4.3 The NPPF at paragraph 19 sets out how the planning system should support sustainable economic growth. Similarly London Plan policy 6.12 looks for road schemes which contribute to regeneration through improved connectivity and improved conditions for local residents.
- 7.4.4 The River Thames is a major barrier to cross river road traffic for both commuters and businesses. The existing Blackwall Tunnel is severely congested at peak and other times leading businesses to incur additional costs thereby imposing inefficiencies on the sub-regional economy. In addition the safeguarded land for Silvertown Tunnel in effect sterilises the land in that area as all developments must avoid that land if it required by TfL to construct or operate the crossing. Building the Tunnel would remove this restriction on development. The London Plan 2015 identifies the Greenwich Peninsula (the site of the tunnel on the south side of the river) as both an Opportunity Area (2.13) and a Regeneration Area (2.14). The Royal Docks on the north side is also an Opportunity Area and area of regeneration.
- 7.4.5 The opportunity the Scheme would provide in terms of additional capacity for the accommodation of vehicle movements will lead to significant improvements in connectivity. The provision of increased cross-river bus services and new bus routes would also help connect other parts of Greenwich and Newham to opportunity areas on either side of the river. In effect the Scheme and its potential new bus connections would 'stitch together' the regeneration areas on either side of the river. The Scheme is therefore expected to deliver a step change in cross-river connectivity and enhance the ability of local residents to access jobs in the wider area.

7.4.6 The Preliminary Economic Assessment Report⁹² shows significant time user benefits for all modes as shown in Table 7-1 which shows the user benefits and charges by transport system user group. Table 7-2 shows the same but takes into account reliability benefits. All modes except HGVs experience significant time user benefits when reliability benefits are included. HGVs show a negative user benefit because of the higher charge they would pay but there are indications that the value placed in the current appraisal on reliability of goods vehicles is an underestimate. The Freight Transport Association estimates that congestion costs freight operators £1 per minute.

Table 7-1: Benefits and charges by user type (£m, 2010 prices)

	Other users			Business users				Total
	Car commuting	Car other	Bus & coach	Cars	LGV	HGV	bus & coach	
Total user benefits	£161	£349	£650	£578	£291	£99	£60	£2,188
% benefits	7%	16%	30%	26%	13%	5%	3%	100%
User charges	-£150	-£278	£0	-£131	-£331	-£229	£0	-£1,119
% user charges	13%	25%	0%	12%	30%	20%	0%	100%
Total Net user benefit	£11	£71	£650	£447	-£40	-£130	£60	£1,069
% Total Net user benefits	1%	7%	61%	42%	-4%	-12%	6%	100%

Table 7-2: Benefits and charges by user type– reliability benefits included (£m, 2010 prices)

	Others users			Business users				Total
	Car commuting	Car other	Bus & coach	Cars	LGV	HGV	bus & coach	
Total user benefits	£194	£432	£650	£670	£357	£122	£60	£2,485
% benefits	8%	17%	26%	27%	14%	5%	2%	100%
User charges	-£150	-£278	£0	-£131	-£331	-£229	£0	-£1,119

⁹² Transport for London, (Oct 2015), Preliminary Economic Assessment Report

Silvertown Tunnel

Preliminary Case for the Scheme

% user charges	13.4%	24.9%	0.0%	11.7%	29.6%	20.5%	0.0%	100.0%
Total Net user benefit	£44	£153	£650	£539	£26	-£107	£60	£1,367
% Total Net user benefits	3%	11%	48%	39%	2%	-8%	4%	100%

7.4.7 The Preliminary Regeneration and Development Impact Assessment⁹³ report assesses the Scheme's impacts on accessibility. It found that the labour market in east London is not operating optimally, with the vast majority of people that work in areas east of the Blackwall Tunnel highly likely to also live on the same side of the River Thames. For example, 71 per cent of those who work in the Royal Docks reside north of the River Thames while in Woolwich 80% of workers come from south of the river. This restricts firms' access to skills, with lower levels of competition for jobs. With the Silvertown Tunnel, employers north of the River Thames would see more than a 10 per cent increase in the size of their labour market catchments living within a 45 minute drive time due to the faster journey times for those living south of the river wishing to access job opportunities to the north. These access improvements would be particularly important to the Royal Docks, where tens of thousands of new jobs are planned.

7.4.8 The results of the assessment found a net positive impact across the Area, with the average number of additional jobs accessible within 45 minutes travel time by car increasing by 21% in RB Greenwich and 9% in LB Lewisham as a result of the new crossing.

7.4.9 The step change in the frequency and connectivity of bus routes serving east London that the Scheme could deliver is likely to have a highly beneficial effect in improving the number of jobs accessible for local residents. It is estimated to facilitate an increase in access to 9,000 additional jobs for residents of regeneration areas in RB Greenwich and 6,000 jobs for residents of regeneration areas in LB Newham potentially contributing to reducing unemployment and deprivation.

7.4.10 Furthermore, businesses will have access to a greater potential labour market, making the area more attractive for inward investment and the

⁹³ *Transport for London, (Oct 2015), Preliminary Regeneration and Development Impact Assessment*

creation of new employment opportunities locally. This is particularly important given the distribution of new employment floor space – the northern side of the river has over twice as much floor space as the south. This is likely to lead to a much greater level of demand for travel across the river. If the ability to make these journeys is constrained by limited capacity and poor reliability (as is the case currently at the Blackwall Tunnel), there is a risk that businesses and developers will choose to go elsewhere.

Environmental effects

Air quality

- 7.4.11 All motorised traffic produces emissions: on a per-vehicle basis, slow-moving and congested stop-start traffic emits more pollutants than free-flowing traffic moving at a reasonable speed. This matters because exhaust emissions lead to poor air quality locally and higher CO² emissions from transport. In this respect, a sustainable policy would be to enable road traffic to move freely. However this benefit could be counter balanced by the potential for the Scheme to encourage an increased volume of cross river vehicle movements. A flexible user charge would assist TfL in managing this demand.
- 7.4.12 MTS Policy 15 states that the Mayor will seek to reduce emissions of air pollutants from transport. The Mayor's Transport Strategy includes proposals (93) to reduce private vehicle emissions by incentivising low emission vehicles. The proposed Silvertown Tunnel charging regime offers a 100% discount to low emission vehicles in order to encourage their use. This approach has been used successfully in the Congestion Charge zone, which has taken a progressive approach to defining emissions standards over time and would serve as a model.
- 7.4.13 An initial air quality assessment has been carried out for the Scheme. This is reported within the Air Quality chapter within the PEIR⁹⁴. A definitive judgement on significance has not been made as this requires the assessment of all receptors which are likely to exceed the air quality strategy objectives, rather than just worst case receptors. A receptor is

⁹⁴ *Transport for London, (October 2015), Preliminary Environmental Information Report*

defined as a physical resource or user group which would experience an effect (for example a housing development).

- 7.4.14 The PEIR chapter on air quality therefore provides the initial air quality modelling results.
- 7.4.15 The operational impact of the proposed Scheme on local air quality was assessed by undertaking air quality modelling of the reference case and assessed case. The study area incorporated approximately 50km of the road network in east London, covering sections of the A13, A12, A2, A1, A102, A1203, A1020, and A282. Base year monitored and modelled concentrations indicated that the study area was subject to existing poor air quality particularly for NO₂. Worst case receptors were modelled at locations where air pollutant concentrations were expected to be highest. It was found that exceedances of the annual mean AQS objective for NO₂ were widespread in the reference case (future baseline), which was expected given the locality of the Scheme.
- 7.4.16 The implementation of the Scheme is predicted to result in both improvements and deterioration in air quality at worst case receptors. In general there is a net benefit as there are more receptors where concentrations of NO₂, PM₁₀ and PM_{2.5} are predicted to decrease than receptors where concentrations are predicted to increase.
- 7.4.17 These initial results accord with London Plan policy 7.14 that states that development should minimise increased exposure to existing poor air quality. Policy 6.12 directly addresses proposals for increasing road capacity outlining that a balance of factors should be taken into account. The criteria includes the need for the development to provide a net benefit to London's environment along with providing regeneration, connectivity, congestion relief and safety improvements.
- 7.4.18 At a local level, RB Greenwich policy E (c) on air pollution states that development proposals with potential for a significant impact on air quality will be resisted unless measures to minimise the impact of air pollutants are included. Newham's policy SP7 on Quality Movement Corridors states that there is a need to reduce the noise and air pollution impacts of passing traffic in the Key Movement Corridors, which include Silvertown Way; a road close to the Scheme in Newham. Tower Hamlets' policy DM9 requires major developments to submit an Air Quality Assessment showing how it will prevent or reduce associated air pollution.

7.4.19 The NNNPS at 5.12 requires the Secretary of State to give air quality considerations substantial weight where, after taking into account mitigation, a project would lead to a significant air quality impact in relation to EIA and/ or where they lead to a deterioration in air quality in a zone/agglomeration. The NNNPS at 5.13 requires the Secretary of State to refuse consent for schemes which after taking into account mitigation will:

- *“result in a zone/agglomeration which is currently reported as being compliant with the Air Quality Directive becoming non-compliant; or*
- *affect the ability of a non-compliant area to achieve compliance within the most recent timescales reported to the European Commission at the time of the decision”.*

7.4.20 The NNNPS requires mitigation measures to ensure that the net impact of a project does not delay the point at which a zone will meet compliance timescales (NNNPS 5.14). A definitive judgement will be made in the ES when the air quality modelling has been updated with all receptors modelled. The current results indicate that the risk the Scheme would delay compliance with the EU Directive is low, although this will be fully assessed in the ES.

7.4.21 Based on the current modelling results compliance with air quality policies would be achieved as an overall net benefit would be produced and no significant deteriorations are expected that would compromise EU compliance timescales.

CO2 emissions

7.4.22 Carbon emissions are considered as part of the CEEQUAL assessment and through TfL's Sustainability Assessment Toolkit, see the Sustainability Statement⁹⁵. The NNNPS provides that carbon emissions are to be evaluated in the context of the national carbon reduction strategy (5.18). The London Plan 2015 seeks an overall reduction in London's carbon dioxide emissions of 60 per cent by 2025 (Policy 5.1)

⁹⁵ Transport for London, (Oct 2015), Preliminary Sustainability Statement

and for development proposals to make the fullest contribution to minimising emissions (5.2).

7.4.23 The Scheme would generate greenhouse gas emissions from the construction phase activities, and also indirectly from the production of construction materials, particularly from concrete and steel. The Preliminary Sustainability Statement draws from the Scheme's Preliminary Energy Statement⁹⁶ to explain how emissions have been assessed and energy efficiency has been maximised to contribute to the Scheme's sustainability.

7.4.24 A number of measures have been considered to reduce energy consumption during the Scheme's construction phase. The complete list of the potential energy saving measures is included in the Preliminary Energy Statement. These include:

- Minimising the use of diesel or petrol powered generators and instead using mains electricity or battery powered equipment.
- Power down of equipment/plant during periods of non-utilisation
- Ensure all vehicles and machinery is serviced at recommended intervals to guarantee optimum engine efficiencies and reduce waste energy.
- Fuel-efficient plant, machinery and vehicles used wherever possible.
- SMART targets for consumption during construction. Workforce should be educated regarding the information displayed. Targets to be made visible to workforce at all times.
- Deploy correctly sized generators for electrical provision onsite, where applicable. An accurate approach is to identify the processes and associated electrical equipment in use at each stage of the project, and then apply a 'diversity' factor to each item to allow for its intermittent and partial power usage. This will give a profile of the power requirement which will have a reduced peak.

⁹⁶ *Transport for London, (Oct 2015), Preliminary Energy Statement*

- Provide appropriate levels of thermal insulation to the relevant areas of site accommodation to reduce energy demand for heating. The utilisation of efficient heating mechanism will further reduce energy consumption.

7.4.25 The Preliminary CoCP ⁹⁷ has been produced for the Scheme outlining the principles of environmental management and mitigation strategies to be followed to minimise the adverse impact of the Scheme during the demolition and construction phases. The Preliminary CoCP, which sets out the framework for a Construction Environmental Management Plan (CEMP) to be prepared by the contractor of the Scheme prior to the start of construction in Autumn 2018, confirms that TfL will implement working methods that reduce energy consumption and continually improve energy efficiency on site during the construction phase.

7.4.26 In addition, the Preliminary Energy Statement ⁹⁸ will be revised through each design stage and will fulfil the role of the Carbon and Energy Efficiency Plan required by TfL's Pathway process to guide energy consumption and reduction during construction.

7.4.27 The Scheme design aims to optimise energy performance and CO₂ emissions during the operational phase. The relevant measures are contained in the Preliminary Energy Statement, prepared in accordance with the Mayor's Energy Hierarchy (i.e. Be Lean, Be Green, Be Clean) and The London Plan.

Noise

7.4.28 The Scheme would include measures to reduce and manage noise. The London Plan (policy 7.15) seeks to reduce and manage noise to improve health and quality of life. Proposals should avoid significant, adverse noise impacts and seek to mitigate and minimise existing and potential adverse impacts of noise. The MTS (Proposal 86 and Policy 16) seeks to ensure that all new transport projects consider noise mitigation and seek to reduce noise impacts.

⁹⁷ Transport for London, (October 2015), *Preliminary Code of Construction Practice appended to Preliminary Environmental Information Report*

⁹⁸ Transport for London, (October 2015), *Preliminary Energy Statement*

- 7.4.29 The NNNPS requires proposals to optimise scheme layout to minimise noise emissions and the use of landscaping, bunds or noise barriers to reduce noise transmission (5.194 NNNPS). The scheme should avoid significant adverse impacts on health and quality of life from noise and to where possible contribute to improvements (5.195 NNNPS).
- 7.4.30 The noise and vibration assessment (contained within the PEIR⁹⁹) is broken down into the construction phase and operational phase. The construction phase includes the assessment of noise and vibration from construction activity and tunnel boring. The operational phase assesses noise impacts from changes in road traffic and ventilation buildings as well as airborne vibration impacts as a result of changes in road traffic. The assessment considers noise levels at various receptors.
- 7.4.31 Daytime construction noise levels are not expected to be significant, they would be within the noisy character of the local area and are assessed to be slight adverse in effect. The number of receptors in the area is currently quite limited with the north side in particular still being quite industrial in nature. Vibration effects are considered to be neutral and slight adverse attributable to percussive piling operations but this is a worst case scenario. From the tunnel boring machine vibration levels would be below the threshold of human perception at the nearest identified sensitive receptors. As such they would be considered negligible.
- 7.4.32 Short term traffic noise impacts were assessed with a comparison made between the Do Minimum and Do Something scenarios in the opening year (2021) in order to consider what the change would be upon the Scheme opening.

⁹⁹ *Transport for London, (Oct 2015), Preliminary Environmental Information Report*

Table 7-3 Short Term Traffic Noise Impacts inside Detailed Study Area

		Daytime	
Change in Noise Level		Number of Dwellings	Number of Other Sensitive Receptors
Increase in noise level, L _{A10,18-hour}	0.1 - 0.9	3,822	6
	1.0 - 2.9	1,023	1
	2.9 - 4.9	180	0
	>5	0	0
No Change	0	6,596	3
Decrease in noise level, L _{A10,18-hour}	0.1 - 0.9	14,974	16
	1.0 - 2.9	2,505	9
	2.9 - 4.9	0	0
	>5	0	0

7.4.33 In the daytime there are 5,025 dwellings predicted to experience a noise increase. The majority of these (3,822) fall within the negligible noise change band of +0.1 to +0.9dB, where the change would not be perceptible. In contrast, there are 17,479 dwellings predicted to experience a noise decrease, the majority of which (14,974) fall within the negligible noise change band. There are also 6,596 dwellings predicted to experience no change in road traffic noise.

The comparison of the opening year situation with and without the Scheme indicates that 12,454 more dwellings are predicted to experience decreases in road traffic noise levels than increases.

7.4.34 Predicted noise level increases are due to a combination of predicted changes in road traffic flows with the scheme, and in some locations due to the new exit/entry roads for the tunnel. Noise increases tend to be localised around the areas of the tunnel portals.

7.4.35 One hundred and eighty dwellings are predicted to experience a moderate increase of greater than 2.9dB in the short term. These dwellings are located within the east tower of the Hoola development. These dwellings experience an increase due to a higher HGV percentage along Tidal Basin Road as a result of the Scheme. These impacts have been mitigated to a minimum through the use of low noise surfacing around Tidal Basin Road.

- 7.4.36 The 1,023 dwellings predicted to experience minor decreases in noise level occur at the northern exit of the Blackwall Tunnel due to reductions in traffic flow as a result of the Scheme.
- 7.4.37 The assessment of Other Sensitive Receptors predicts negligible changes in road traffic noise at 25 locations with one increase (Ravensborne College) and nine decreases. There are three Other Sensitive Receptors where there would be no change in road traffic noise.
- 7.4.38 Overall, the assessment of the Scheme in the short term indicates that there would be negligible or minor changes in road traffic noise at the majority of receptors with a net gain of 1,302 residential dwellings which would experience a perceptible decrease in noise level.
- 7.4.39 This complies with NNNPS policy 5.195 which requires proposals to “avoid significant adverse impacts on health and quality of life from noise as a result of the new development”.

Social effects

Health

- 7.4.40 A Preliminary Health Impact Assessment ¹⁰⁰of the Scheme has been carried out. This complies with policy in the NNNPS which requires an assessment of any likely significant adverse health impacts (4.81). Measures should be identified to avoid, reduce or compensate for adverse health impacts and the cumulative impact on health of different impacts should be considered (NNNPS 4.82). London Plan policy 3.2 looks to reduce health inequalities and improve the health of all Londoners. It requires the impacts of major development proposals on the health and wellbeing of communities to be considered, for example through a Health Impact Assessment (HIA).
- 7.4.41 Health is also emphasized in local planning policy, RB Greenwich require a Health Impact Assessment for major developments (Policy CH2) and LB Newham’s policy SP2 Healthy Neighbourhoods requires development proposals to respond to contributors to health and well-being such as air quality. Similarly LB Tower Hamlets’ policy SO10 and SP03 look to enhance health and well-being and reduce noise and air pollution impacts.

¹⁰⁰ *Transport for London, (Oct 2015), Preliminary Health Impact Assessment*

- 7.4.42 The Preliminary HIA assesses the impact of the Scheme on road safety, accessibility and active travel. It finds positive outcomes for public transport usage as the improved future bus services would provide greater accessibility for those on low incomes as well as supporting active travel. For pedestrians and cyclists there would be some enhancement of routes around the portals with the potential to link to future residential developments. It finds there to be a negligible impact on road safety.
- 7.4.43 The report considers also access to work and training as employment has direct and indirect benefits for health, particularly mental health and socio-economic status. It finds positive effects, both during construction due to the employment opportunities and apprenticeships which would be provided by the construction of the Scheme. In operation it finds a moderate positive effect due to the reduction in journey times to access employment that the Scheme would provide.
- 7.4.44 For noise and air quality from the initial assessments it finds an overall positive impact with improvements in several areas but minor deteriorations in others.
- 7.4.45 The report also considers social cohesion and lifetime neighbourhoods, looking at impacts on residential and commercial markets and access to cross river amenities due to improved accessibility and the introduction of a charging scheme. It finds there to be beneficial effects from improving access across the river but with the user charge having a potential impact on those on low incomes who wish to drive across the river. Improved bus services and the provision of a community fund could reduce any potential impacts.

Equalities

- 7.4.46 The Equality Act 2010 requires public organisations and those delivering public functions to show due regard to the need to eliminate unlawful discrimination, harassment, victimisation; to advance equality of opportunity; and to foster good relations between communities. The Preliminary Equality Impact Assessment ¹⁰¹(EqIA) considers the impact of a proposal on relevant groups who share characteristics which are protected under the Equality Act (age, disability, gender, transgender,

¹⁰¹ *Transport for London, (Oct 2015), Preliminary Equality Impact Assessment*

sexual orientation and faith) as well as others considered to be vulnerable within society such as low income groups.

7.4.47 A Preliminary EqlA was carried out on the Scheme to identify the main impacts on equality target groups, identify possible mitigation measures where necessary, outline further modelling and assessment work that may need to be undertaken and thereby aid the further development of the Scheme.

7.4.48 London Plan policy 3.1 – Ensuring Equal Life Chances for All commits the Mayor to ensuring equal life chances for all Londoners and states that development proposals should:

“protect and enhance facilities and services that meet the needs of particular groups and communities”.

7.4.49 Policy 4.12 seeks to improve employment opportunities for Londoners, to remove barriers to employment and progression.

7.4.50 Key findings from this preliminary EqlA include that:

- There would be negligible or minor changes in road traffic noise at the majority of receptors with a net gain of 1,302 residential dwellings which would experience a perceptible decrease in noise level;
- Impacts on severance as a result of the Scheme are considered to be slightly beneficial but in line with the overall population;
- There are considered to be reductions in overall accident risk on the local network as a result of the scheme with a slightly beneficial impact;
- There would be connectivity improvements across a wider area as a result of the Scheme, benefiting groups both within and outside of the immediate study area;
- Proposed improvements in public transport accessibility as part of the Scheme will provide a considerable benefit for equalities groups that typically use public transport more frequently, with improvements not only to journey routes but also to journey times and reliability as a result of bus-only lanes through the tunnel;
- Potential differential impacts arising from user charging (for example impacts on personal affordability) will be considerably offset by the provision of improved public transport links (specifically new and

extended journey routes together with improvements to journey times and reliability) and through the provision of the community fund currently being developed between TfL and the host boroughs, which could be used to fund transport, social and environmental enhancements within deprived communities; and

- Potential differential impacts experienced by businesses with a high utilisation of LGVs, for which Asian businesses may be more highly represented within the local area, should be considerably offset by wider benefits to business brought about by the Scheme such as improved access to cross-river markets and improvements in business journey times and reliability.

7.5 Conclusion

- 7.5.1 The Scheme meets the objectives in the NNNPS Summary of Need as set out in Chapter 2 of the NNNPS. However as set out in NNNPS 1.3 the relevant development plan is also an important and relevant matter. Whilst the London Plan is supportive of a new road-based tunnel at Silvertown as part of a package of river crossings in east London (6.20 and 6.41) it is clear through policy 6.12 of the London Plan that any new road scheme should show a net benefit across a range of criteria (including sustainable development and regeneration, congestion reduction, environmental and safety benefits and how conditions for pedestrians, cyclists, public transport users, freight and local residents are improved), and it must show how any dis-benefits will be mitigated.
- 7.5.2 Silvertown Tunnel would significantly improve cross-river road connectivity as it would potentially double the available road capacity for crossing the river in that area, eliminating congestion at the Blackwall Tunnel and providing resilience in the event of closures and incidents.
- 7.5.3 The road user charge is a fundamental element of the Scheme as it will ensure that traffic demand is managed and the congestion reduction benefits are maintained into the future. However the charge could have the potential to impact adversely in terms of personal affordability for those who need to drive across the river. This dis-benefit would be likely to be offset to an extent by public transport improvements and also through the provision of a community fund currently being developed between TfL and the host boroughs. This could be used to fund transport, social and environmental enhancements. A programme of ongoing monitoring of traffic, air quality and noise would ensure that the correct

balance was maintained between meeting the Scheme objectives whilst minimising any adverse effects of its operation.

- 7.5.4 The development of east London is central to accommodating the growth of London. The Silvertown Tunnel scheme would help to support the development of the surrounding regeneration and opportunity areas in the Royal Docks and Greenwich Peninsula by facilitating the traffic movements required for the servicing and construction of new developments. It would also support local businesses by widening their market catchments and providing reliable journey times across the river.
- 7.5.5 The Scheme would offer the opportunity to significantly improve cross-river bus services. The tunnel would contain a dedicated bus and HGV lane to enable bus priority and the increased capacity and reduced congestion would enable a huge increase in cross-river bus connections filling the gaps in the existing public transport network.
- 7.5.6 Local residents would enjoy improvements in the local environment through improved walking and cycling connections. These would improve further still as the area becomes more residential in nature and the passive provision in the Scheme enables routes to be linked up to new development. There would also be improvements through a reduction in queuing traffic, this would have a wide ranging effect as the traffic queue frequently extends back as far south as Sun-in-the-Sands roundabout in Blackheath.
- 7.5.7 Safety is a key consideration and the tunnel would reduce the number of incidents caused by over height vehicles in Blackwall Tunnel. The Silvertown Tunnel's design complies with safety principles established by Highways England and the national Strategic Framework for Road Safety.
- 7.5.8 Based on the initial assessment the Scheme would produce a net air quality improvement overall. Whilst there would be areas where air quality may deteriorate (e.g. Tidal Basin roundabout), there would be many more with improvements in air quality (e.g. the Blackwall Tunnel approach). Mitigation measures would include the use of the road user charge to manage traffic flows and therefore emissions. Similarly whilst there would be an overall net reduction in noise, in some areas, such as Tidal Basin there would be noise increases. Mitigation in the form of low-noise road surfacing and noise barriers would be provided.
- 7.5.9 In conclusion, as set out above, and in accordance with London Plan policy 6.12 the proposed scheme shows overall a net benefit across the

criteria for new road schemes (policy 6.12) when taken as a whole. Dis-benefits in relation to air quality, noise, and user charging would be largely mitigated. This also accords with the NNNPS at 3.4 which states that *“whilst applicants should deliver developments in accordance with Government policy and in an environmentally sensitive way, including considering opportunities to deliver environmental benefits, some adverse local effects of development may remain”*.

7.5.10 Overall the Scheme would complement and contribute to the transformation of the Greenwich Peninsula and Silvertown areas. It would alleviate the daily congestion and traffic delay at Blackwall Tunnel which blights the surrounding area (causing severance and pollution) and reinforces the river’s barrier effect.

7.6 Scheme forms part of a programme

7.6.1 This Preliminary Case is concerned only with the Silvertown Tunnel scheme, as this is the DCO application proposed. However, the Scheme is part of a programme of proposed river crossings designed to improve cross-river highway connectivity in east London, which includes possible enhancements to the Woolwich Ferry (in addition to current life extension works) as well as potential new crossings at Gallions Reach and Belvedere (the ‘East of Silvertown’ programme).

7.6.2 As regards the Woolwich Ferry, TfL intends to implement measures in the short-term aimed at improving the future operation of the ferry service with particular regard to the waiting areas and impacts on the local highway network. In the longer-term, as part of the overall river crossings programme, the ferry could be replaced with larger vessels, and possibly with a user charge.

7.6.3 TfL has also consulted on potential new links at Gallions Reach (connecting Thamesmead with Beckton) and at Belvedere (connecting Belvedere with Rainham). At both locations the assumption has been for a bridge but further work is being undertaken on tunnel options. Further work is also required on the traffic and environmental impacts and the potential for incorporating public transport.

7.6.4 Additionally, TfL is considering crossings in this area for pedestrians and cyclists, such as the Canary Wharf - Rotherhithe bridge put forward by Sustrans.

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Appendix A STRATEGIC OPTIONS BACK CHECK

A.1 Introduction

- A.1.1 This matrix presents a back-check of the various river crossings options assessed by TfL since 2009. The purpose of this back-check is to present the options in a single overview showing the potential of each option to meet the project objectives. Furthermore, it is of course the case that external circumstances change over time and for this reason it was important to revisit options again in summer 2015 to check that the proposed scheme remained the best approach to the problems identified.
- A.1.2 To address the problems of congestion, closures and incidents, and resilience at Blackwall, an option needs to score positively against PO1 and PO2. Options that do not meet these objectives have hence not always been developed to a level of detail which allows for scoring against the remaining objectives. Where options have been developed outside the context of this project, e.g. EAL, the assessment is included in this back-check.

	Project objectives	PO1	PO2	PO3	PO4	PO5	PO6	PO7	Additional back-check comments
		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.	To improve the road network performance of the Blackwall Tunnel and its approach roads.	To support economic and population growth, in particular east and southeast London by providing improved cross-river road transport links.	To integrate with local and strategic land use policies.	To minimise any adverse impacts of any proposals on communities, health, safety and the environment.	To ensure where possible that any proposals are acceptable in principle to key stakeholders, including affected boroughs.	To achieve value for money and, through road user charging, to manage congestion.	
1	Walking and cycling only options								
1A	Pedestrian & cycle bridge between Rotherhithe and Canary Wharf (proposed by Sustrans)	No. Would not impact demand or incidents at the Blackwall Tunnel. It does not provide a realistic alternative in case of incidents or closures and does hence not offer short- or long term resilience. x	No. Some mode shift from private transport to walking & cycling possible, however the number of trips that could switch modes is limited given journey type, purpose and origins and destinations. x	Partly. Improved connectivity will support growth, though limited to locations immediately adjacent to the river and the crossings rather than wider sub regions. --	The scheme is being progressed by Sustrans. It is assumed that the scheme would be designed to integrate with local land use policies.	The scheme is being progressed by Sustrans. It is assumed that the scheme would be designed to minimise adverse impacts.	The scheme is being progressed by Sustrans. It is assumed that the scheme would be designed and implemented to achieve stakeholder support.	Road user charging not applicable	TfL is now supporting Sustrans in the further development of this option as part of the wider river crossings programme for east London.
1B	Pedestrian & cycle bridge between North Greenwich &	No. Would not materially impact demand or incidents at the	No. Some mode shift from private transport to walking &	Partly. Improved connectivity will support growth, though	Partly. A range of options have been considered, one of which	Detailed assessments have not been carried out as this option	Such a scheme has been strongly supported by RB Greenwich and LB Tower Hamlets in	Road user charging not applicable	

	Project objectives	PO1	PO2	PO3	PO4	PO5	PO6	PO7	Additional back-check comments
	Canary Wharf	Blackwall Tunnel. It does not provide a realistic alternative in case of incidents or closures and does hence not offer short- or long term resilience. x	cycling possible, however the number of trips that could switch modes is limited given journey type, purpose and origins and destinations. x	limited to locations immediately adjacent to the river and the crossings rather than wider sub regions. --	would require demolition of residential buildings. --	does not meet some of the key objectives and similar alternatives in form of the EAL and the pedestrian & cycle bridge between Rotherhithe & Canary Wharf have been/are being progressed.	the past.		
1C	Pedestrian & cycle bridge between North Greenwich & Silvertown	No. Would not materially impact demand or incidents at the Blackwall Tunnel. It does not provide a realistic alternative in case of incidents or closures and does hence not offer short- or long term resilience. x	No. Some mode shift from private transport to walking & cycling possible, however the number of trips that could switch modes is limited given journey type, purpose and origins and destinations. x	Partly. Improved connectivity will support growth, though limited to locations immediately adjacent to the river and the crossings rather than wider sub regions. --	Yes. Land has been safeguarded for a river crossing at Silvertown but may conflict with additional road crossings at this location. ✓	Detailed assessments have not been carried out as this option does not meet some of the key objectives and a similar alternative in form of the Emirates Air Line has been progressed.	No report on stakeholder engagement included in this assessment.	Road user charging not applicable	
	Summary (walking and cycling only options)	<p>Walking and cycling measures are unlikely to be able to achieve any significant reduction in demand which would be needed to address the problems at the Blackwall Tunnel. This is because, owing to the characteristics of the trips made through the Blackwall Tunnel, there is little potential for mode shift to active modes. So demand for vehicle crossings would not be reduced enough to make any difference in terms of congestion reduction (even when combined with demand management initiatives such as road user charging). Furthermore they do not offer a realistic alternative in case of incidents or closures and hence do not provide short- or long-term resilience.</p> <p>While not being taken forward to find a solution to the problems at the Blackwall Tunnel, some of the options listed above have merits in their own rights. As a result a number of options and have been progressed as part of a wider east London River Crossings Programme. Finally, the Emirates Air Line opened in 2012 which provides a connection for pedestrians and cyclists between the Greenwich Peninsula and Silvertown.</p>							

	Project objectives	PO1	PO2	PO3	PO4	PO5	PO6	PO7	Additional back-check comments
2	Public transport options								
	Rail options (including light rapid transit & heavy rail)								
2A	Multimodal road / DLR crossing at Silvertown	Yes. The road element (provided there is sufficient capacity) would provide increased resilience of the highway network in the sub regions. ✓	Yes. A road & DLR crossing would improve road network performance on the Blackwall corridor and ease congestion by providing additional capacity and generating mode shift, even if the latter is small. ✓	Yes. Improved connectivity in form of a road and DLR crossing would support local and sub regional growth. ✓	No. The scheme would limit full utilisation of all the existing capacity on the current lines serving the Royal Docks, the land-use plans for which assume full capacity use of the DLR. ✗	Detailed assessments have not been carried out at this stage as the scheme is limited in other aspects including engineering feasibility & transport operations (see below).	A DLR extension to Kidbrooke/Falcon wood/Eltham is strongly supported by RB Greenwich.	No. Very high scheme cost due to engineering constraints. Very high user charges would be necessary to make the scheme more affordable. ✗	The option was ruled out on engineering feasibility & transport operation grounds (see comments following 2B). The same conclusion was reached in the back-check.

	Project objectives	PO1	PO2	PO3	PO4	PO5	PO6	PO7	Additional back-check comments
2B	DLR from Canning Town to Falconwood	No. Potential for small reduction in demand at the Blackwall Tunnel, but minimal reduction in the number of unplanned incidents. No realistic alternative in case of incidents. x	No. Some mode shift from private transport to public transport possible, but the number of trips that could switch modes is limited. Not all trips can shift to public transport given journey purpose, vehicle type and origins and destinations. Location further east limits congestion relief at the Blackwall corridor. This is supported by experience from the Jubilee Line Extension at this location. x	Partly. Improved connectivity will support growth, although highway access to growth areas would remain constrained. --	No. The scheme would limit full utilisation of all the existing capacity on the current lines serving the Royal Docks, the land-use plans for which assume full capacity use of the DLR. x	Detailed assessments have not been carried out at this stage as the scheme is limited in other aspects including engineering feasibility & transport operations (see comments).	A DLR extension to Kidbrooke/Falconwood/Eltham is strongly supported by RB Greenwich.	High scheme cost due to engineering constraints. Road user charging not applicable though fare revenue would be collected.	The option was ruled out on engineering feasibility & transport operation grounds (see comments below). The same conclusion was reached in the back-check.
	Comments on Options 2A and 2B	<p>Initial consideration has been given to the feasibility of extending the DLR network via the Silvertown Tunnel to serve the Kidbrooke, Eltham and Falconwood areas of south Greenwich. This would involve running new services to and from Stratford International, on the basis that spare capacity is available on this branch but not for additional services to Bank/Tower Gateway.</p> <p>Whilst such an extension could go some way towards improving public transport connectivity in the area around the Silvertown Tunnel, several major challenges exist which mean it is not deemed to be a viable option. No feasible options have been identified for connecting the extension to the existing network at Canning Town without eliminating land on Silvertown Way currently being progressed by the GLA for substantial amounts of housing, and enlarging the diameter of the Silvertown Tunnel to include sufficient space for DLR infrastructure</p>							

	Project objectives	PO1	PO2	PO3	PO4	PO5	PO6	PO7	Additional back-check comments
		<p>would significantly increase costs. Furthermore, the alignment of the extension would be such that most passengers from the south Greenwich area would be likely to alight at North Greenwich to connect with Jubilee line services towards central London, thereby making the cross-river element of the extension poor value for money.</p> <p>The envelope of the road tunnel would be at least 9 m by 4.7 m for a two lane road, and the minimum envelope for a single track DLR in tunnel would be 3.4 m by 4 m (not including emergency access, walkways, fans or other services). Consequently if a bored tunnel under the river was the preferred option for the Silvertown Link, a separate tunnel would be needed for the DLR Extension.</p> <p>Although a DLR extension through the Silvertown Tunnel is not being progressed, as set out above the possibility of extending the network from the Gallions Reach area to Thamesmead is being explored as part of the proposed Gallions crossing which forms part of the wider river crossings programme to the east of Silvertown. An opportunity also exists for constructing a new DLR station at Thames Wharf on the existing network between Canning Town and West Silvertown stations, close to the north portal of the Silvertown Tunnel, should this be justified by demand from new development in the area.</p>							
2C	Light rapid transit bridge in the Gallions Reach area (e.g. DLR)	No. Potential for small reduction in demand at the Blackwall Tunnel, but minimal reduction in the number of unplanned incidents. No realistic alternative in case of incidents. x	No. Some mode shift from private transport to public transport possible, however the number of trips that could switch modes is limited. Not all trips can shift to public transport given journey purpose, vehicle type and origins and destinations. Location further east limits congestion relief at the Blackwall corridor. x	Partly. Improved connectivity will support growth, although highway access to growth areas would remain constrained. --	Detailed assessments have not been carried out as this option does not meet some of the key objectives.	Detailed assessments have not been carried out as this option does not meet some of the key objectives.	No report on stakeholder engagement included in this assessment.	Road user charging not applicable though fare revenue would be collected.	

	Project objectives	PO1	PO2	PO3	PO4	PO5	PO6	PO7	Additional back-check comments
Passenger ferry options									
2D	Passenger ferry between North Greenwich & Canary Wharf	No. Would not materially impact demand or incidents at the Blackwall Tunnel. It does not provide a realistic alternative in case of incidents or closures and does hence not offer short- or long term resilience. x	No. Would not materially impact traffic flow in the Blackwall corridor. x	Partly. The impact on the connectivity of east London will be minor through this incentive. Improvements to ferry services are important and required, however should not be considered as part of the larger solution to the problem of connectivity of east London. --	Detailed assessments have not been carried out as this option does not meet some of the key objectives.	Detailed assessments have not been carried out as this option does not meet some of the key objectives.	No report on stakeholder engagement included in this assessment.	Road user charging not applicable though fare revenue may be collected.	
2E	Passenger ferry from North Greenwich (O2) to East India (DLR)	No. Would not materially impact demand or incidents at the Blackwall Tunnel. It does not provide a realistic alternative in case of incidents or closures and does hence not offer short- or long term resilience. x	No. Would not materially impact traffic flow in the Blackwall corridor. x	Partly. The impact on the connectivity of east London will be minor through this incentive. Improvements to ferry services are important and required, however should not be considered as part of the larger solution	Detailed assessments have not been carried out as this option does not meet some of the key objectives.	Detailed assessments have not been carried out as this option does not meet some of the key objectives.	No report on stakeholder engagement included in this assessment.	Road user charging not applicable though fare revenue would be collected.	

	Project objectives	PO1	PO2	PO3	PO4	PO5	PO6	PO7	Additional back-check comments
				to the problem of connectivity of east London. --					
2F	Additional river boat services around Blackwall	No. Would not materially impact demand or incidents at the Blackwall Tunnel. It does not provide a realistic alternative in case of incidents or closures and does hence not offer short- or long term resilience. x	No. Would not materially impact traffic flow in the Blackwall corridor. x	Partly. The impact on the connectivity of east London will be minor through this incentive. Improvements to ferry services are important and required, however should not be considered as part of the larger solution to the problem of connectivity of east London. --	Detailed assessments have not been carried out as this option does not meet some of the key objectives.	Detailed assessments have not been carried out as this option does not meet some of the key objectives.	No report on stakeholder engagement included in this assessment.	Road user charging not applicable though fare revenue would be collected.	
2G	Passenger ferry at Gallions Reach	No. Would not materially impact demand or incidents at the Blackwall Tunnel. It does not provide a realistic alternative in case of incidents or closures and	No. Would not materially impact traffic flow in the Blackwall corridor. x	Partly. Improved connectivity will support growth, though limited to locations immediately adjacent to the river and the crossings rather than wider sub	No. It is unlikely that significant demand for passenger ferry services would be achieved in lower density parts of the London Thames Gateway,	Detailed assessments have not been carried out as this option does not meet some of the key objectives.	No report on stakeholder engagement included in this assessment.	Road user charging not applicable though fare revenue may be collected.	

	Project objectives	PO1	PO2	PO3	PO4	PO5	PO6	PO7	Additional back-check comments
		does hence not offer short- or long term resilience. ✘		regions. It would further be limited by operating hours and conditions. --	where developments are not centred on the riverfront, and buses offer a high frequency connection to rail services. ✘				
Cable car option									
2H	Cable car between North Greenwich & Canary Wharf	No. Would not materially impact demand or incidents at the Blackwall Tunnel. It does not provide a realistic alternative in case of incidents or closures and does hence not offer short-long term resilience. ✘	No. Would not materially impact traffic flow in the Blackwall corridor. ✘	Partly. Improved connectivity will support growth, though limited to locations immediately adjacent to the river and the crossings rather than wider sub regions. It would further be limited by operating hours and conditions. --	Detailed assessments have not been carried out as this option does not meet some of the key objectives.	Detailed assessments have not been carried out as this option does not meet some of the key objectives.	No report on stakeholder engagement included in this assessment.	Road user charging not applicable though fare revenue would be collected.	When assessed in 2009 there was difficulty in determining a suitable landing site at Canary Wharf as the area was significantly built up already. This option is now not taken forward as another location was progressed for the cable car in form of the Emirates Air Line, and a ferry could provide a similar function between North Greenwich and Canary Wharf.

	Project objectives	PO1	PO2	PO3	PO4	PO5	PO6	PO7	Additional back-check comments
2I	Cable car between North Greenwich & Royal Docks (Emirates Air Line)	No. Would not materially impact demand or incidents at the Blackwall Tunnel. It does not provide a realistic alternative in case of incidents or closures and does hence not offer short- or long term resilience. x	No. Would not materially impact traffic flow in the Blackwall corridor. x	Partly. Improved connectivity will support growth, though limited to locations immediately adjacent to the river and the crossings rather than wider sub regions. It would further be limited by operating hours and conditions. --	Yes. Has been achieved with the implementation of the Emirates Air Line. ✓	Yes. Has been achieved with the implementation of the Emirates Air Line. ✓	Yes. Has been achieved with the implementation of the Emirates Air Line. ✓	Road user charging not applicable though fare revenue is collected and private sponsorship was sought.	This scheme was implemented in 2012 to kick-start improved connectivity in this location by providing a crossing for pedestrians and cyclists.
2J	Cable car at Gallions Reach	No. Would not materially impact demand or incidents at the Blackwall Tunnel. It does not provide a realistic alternative in case of incidents or closures and does hence not offer short- or long term resilience. x	No. Would not materially impact traffic flow in the Blackwall corridor. x	Partly. Improved connectivity will support growth, though limited to locations immediately adjacent to the river and the crossings rather than wider sub regions. It would further be limited by operating hours and conditions. --	No. It is unlikely that significant demand for a cable car would be achieved in lower density parts of the London Thames Gateway. x	Detailed assessments have not been carried out as this option does not meet some of the key objectives.	No report on stakeholder engagement included in this assessment.	Road user charging not applicable though fare revenue would be collected.	Work on cable car options showed that cable car tower height requirements were not feasible at Gallions Reach due to its proximity to London City Airport. The option is now not taken forward as another location was progressed for the cable car in form of the Emirates Air Line.

	Project objectives	PO1	PO2	PO3	PO4	PO5	PO6	PO7	Additional back-check comments
Other options									
2K	<p>Blackwall charge and maximum PT usage</p> <p><i>Note: this includes no Silvertown Tunnel, user charge at the Blackwall Tunnel, ramp metering on the A2, max achievable capacities of cross-river rail links, full implementation of bus package proposed for Silvertown</i></p>	<p>No. Would not materially impact demand or incidents at the Blackwall Tunnel. It does not provide a realistic alternative in case of incidents or closures and does hence not offer short- or long term resilience.</p> <p>✘</p>	<p>Partly. Traffic flow reduced in the off peak only. Substantial delay in the peak remains and delay worsens on other parts of the network.</p> <p>--</p>	<p>Partly. Improved connectivity will support growth, although highway access to growth areas would remain constrained.</p> <p>--</p>	<p>Detailed assessments have not been carried out as this option does not meet the key objectives.</p>	<p>Detailed assessments have not been carried out as this option does not meet the key objectives.</p>	<p>This scheme option has been developed and tested upon request of Friends of the Earth.</p>	<p>Yes. The primary objective of the charge would be traffic management.</p> <p>✓</p>	
2L	<p>Pedestrian, cycle & bus bridge at Gallions Reach</p>	<p>No. Would not materially impact demand or incidents at the Blackwall Tunnel. It does not provide a realistic alternative due to location, low capacity and non-fixed nature of the link.</p> <p>✘</p>	<p>No. Some mode shift from private to public transport possible, however the number of trips that could switch modes is limited given journey type, purpose and origins and destinations.</p> <p>✘</p>	<p>Partly. Improved connectivity will support growth, although highway access to growth areas would remain constrained.</p> <p>--</p>	<p>Detailed assessments have not been carried out in the context of solving the problems in the Blackwall corridor as this options fails to meet a number of the key objectives. Public transport and</p>	<p>Detailed assessments have not been carried out in the context of solving the problems in the Blackwall corridor as this options fails to meet a number of the key objectives. Public transport and</p>	<p>No report on stakeholder engagement included in this assessment.</p>	<p>No. While a road-based bridge (which also allows for pedestrians, cyclists and buses) would be (part) funded through user charging, this revenue stream would be foregone if private traffic were to be</p>	

	Project objectives	PO1	PO2	PO3	PO4	PO5	PO6	PO7	Additional back-check comments
					walking and cycling options are being considered under the wider river crossings programme for east London.	walking and cycling options are being considered under the wider river crossings programme for east London.		excluded from a new crossing. x	
2M	Amfibus (location flexible) <i>Note: an amfibus is an amphibious bus which is capable of both driving on the road and sailing across the river</i>	No. Would not materially impact demand or incidents at the Blackwall Tunnel. It does not provide a realistic alternative in case of incidents or closures and does hence not offer short- or long term resilience. x	No. Would not materially impact traffic flow in the Blackwall corridor. x	No. Would be too low in capacity to support growth. x	Detailed assessments have not been carried out as this option does not meet the key objectives.	Detailed assessments have not been carried out as this option does not meet the key objectives.	No report on stakeholder engagement included in this assessment.	Road user charging not applicable though fare revenue would be collected.	Amfibuses have been subject to technical difficulties and failures in the recent past.
	Summary (public transport options)	Public transport options are characterised by the same in-principle limitations as walking and cycling options when it comes to solving the three transport problems identified at the Blackwall Tunnel. This means that although any of these schemes may have some merits, they are not sufficient in themselves to fully address these problems. Data collected from road side interviews in 2012 shows that the origins and destinations of trips through the Blackwall Tunnel are widely dispersed. This means that a fixed public transport crossing e.g. in form of a DLR or rail connection would only serve small proportion of trips. This is not simply a limitation of any single public transport intervention. The potential of public transport options to generate sufficient mode shift to alleviate the problem of congestion at the Blackwall Tunnel is hence limited. Furthermore, public transport does not provide a viable alternative diversion route in case of incidents or closures and does hence not provide short- or long term resilience. However it should also be noted that a road-based crossing does not preclude enhanced public transport. Options for a Gallions Reach crossing are being progressed in the River Crossings programme, and include public transport options. The Silvertown Tunnel scheme being proposed comprises public transport elements: a dedicated lane for heavy vehicles including buses, no charge for buses and coaches, and more scope to run better services.							

	Project objectives	PO1	PO2	PO3	PO4	PO5	PO6	PO7	Additional back-check comments
3	Road-based options								
	Vehicle ferry options								
3A	Vehicle ferry at Silvertown (incl. user charging)	No. Would not materially impact demand or incidents at the Blackwall Tunnel. It does not provide a realistic alternative in case of incidents or closures (demand would significantly exceed capacity) and does hence not offer short- or long term resilience. x	Partly. Capacity would be low and the service would be limited by operating conditions and hours. --	Partly. Improved connectivity will support growth in this region. It would be limited due to operating hours and conditions. --	No. It would conflict with the development plans for the areas on either side of the river, particularly on the Greenwich Peninsula. It would entail large vehicles crossing the peninsula and queuing for the ferry through an area designated as residential-led mixed use, and for which development has begun. Ferry approach roads are therefore unlikely to fit with the Greenwich Peninsula Masterplan. x	No. It would conflict with the development plans for the areas on either side of the river, particularly on the Greenwich Peninsula. It would entail large vehicles crossing the peninsula and queuing for the ferry through an area designated as residential-led mixed use, and for which development has begun. Ferry approach roads are therefore unlikely to fit with the Greenwich Peninsula Masterplan. x	No. It is assumed that RB Greenwich may not be supportive (see PO4 & PO5). x	No. Given the lack of journey time benefits for a ferry crossing so close to Blackwall, it is expected that the business case would be negative. x	

	Project objectives	PO1	PO2	PO3	PO4	PO5	PO6	PO7	Additional back-check comments
3B	Woolwich Ferry refurbishment / upgrade / renewal	No. Would not materially impact demand or incidents at the Blackwall Tunnel. It does not provide a realistic alternative in case of incidents or closures (demand would significantly exceed capacity) and does hence not offer short- or long term resilience. x	No. Would not materially impact traffic flow in the Blackwall corridor. x	No. While an existing connection is enhanced, no new connection is provided & this is unlikely to be sufficient to support expected in these sub regions. x	Yes. Achievable as demonstrated by current ferry. ✓	Yes. Achievable as demonstrated by current ferry. ✓	Yes. Achievable as demonstrated by current ferry. ✓	Road user charging not applicable as TfL is currently under obligation to operate the ferry free of charge	The refurbishment and potential replacement of the vessels is being assessed by London River Services.
3C	Vehicle ferry at Gallions Reach (incl. user charging)	No. Would not materially impact demand or incidents at the Blackwall Tunnel. It does not provide a realistic alternative due to location, low capacity and non-fixed nature of the link. x	No. Would not materially impact traffic flow in the Blackwall corridor. It does not provide a realistic alternative due to location, low capacity and non-fixed nature of the link. x	Partly. Improved connectivity will support growth but capacity is comparatively low and it does not provide a fixed link and is thus limited by operating hours and conditions. --	Detailed assessments have not been carried out as this option does not meet some of the key objectives.	Detailed assessments have not been carried out as this option does not meet some of the key objectives.	No. Opposed by RB Greenwich and LB Newham in the 2014 East of Silvertown consultation. x	Yes. It is assumed that a user charge would be required to pay for (part of) the ferry services. ✓	Not being taken further forward following the 2014 consultation on options east of Silvertown which showed low public and stakeholder support for a ferry at this location.
Bridge options									

	Project objectives	PO1	PO2	PO3	PO4	PO5	PO6	PO7	Additional back-check comments
3D	<p>Bridge at Silvertown</p> <p><i>Note: the option refers to the concept of a bridge at Silvertown rather than more detailed design and could include user charging</i></p>	<p>Partly. A road bridge would provide increased resilience of the highway network in the sub regions. Though it would be limited in the case of a lifting bridge due to closures to allow for shipping movements.</p> <p>--</p>	<p>Yes. A road bridge would provide improved road network performance on the Blackwall corridor and ease congestion. Though it would be limited in the case of a lifting bridge due to closures to allow for shipping movements.</p> <p>✓</p>	<p>Yes. Improved connectivity in form of a bridge would support local and sub regional growth. Though it would be limited in the case of a lifting bridge due to closures to allow for shipping movements.</p> <p>✓</p>	<p>Partly. Land has been safeguarded for a river crossing at Silvertown and while overall a bridge integrates with land use policies, a major road bridge would not fit well with the urban neighbourhoods emerging on both river banks, and it is likely that any bridge option would need to be scaled to suit the urban riverfronts.</p> <p>--</p>	<p>Partly. While overall the crossings would seek to minimise impacts, a major road bridge would not fit well with the urban neighbourhoods emerging on both river banks, and it is likely that any bridge option would need to be scaled to suit the urban riverfronts.</p> <p>--</p>	<p>No. Stakeholders responsible for delivering the planned regeneration of the peninsula are strongly opposed to the construction of an elevated highway through the area, or at grade junctions which allow crossing traffic to use roads built for the distribution of residential access traffic.</p> <p>✗</p>	<p>Yes. User charging could be implemented to manage traffic and fund the scheme.</p> <p>✓</p>	<p>A bridge option at Silvertown is technically feasible though brings several disadvantages to a tunnel option. These are outlined in detail under the specific bridge options listed in this matrix.</p>
3E	<p>Lifting bridge at Silvertown (low- or mid-level) (incl. user charging)</p>	<p>No. Frequent closures of up to 5 times per day for up to 30 minutes means that little additional resilience is provided.</p> <p>✗</p>	<p>Partly. Frequent closures to allow for shipping movements mean that road network performance improvements are limited.</p> <p>--</p>	<p>Yes. Improved connectivity in form of a lifting bridge would support local and sub regional growth. Though it would be limited in the case of a lifting bridge due to closures for shipping</p>	<p>No. The large viaduct required and elevated highway will have a negative impact on local land-use.</p> <p>✗</p>	<p>Partly. While it is assumed that the scheme would be implemented so as to minimise impacts, bridge closures for shipping movements will cause a certain level of congestion on</p>	<p>No. Stakeholders responsible for delivering the planned regeneration of the peninsula are strongly opposed to the construction of an elevated highway through the area, or at</p>	<p>Partly. User charging would be required to make the scheme affordable and to manage traffic but it is problematic where some users would incur charge without gaining journey time benefit when</p>	<p>The conclusions of the original work remain relevant. Lifting operations would have significant impacts on the efficiency of the highway network in which the bridge is connected. Due to frequent shipping movements on this stretch of the Thames, the bridge would need to be lifted up to 5 times per day for up to 30 minutes at a time. Cross-river accessibility is therefore limited and this option does not fully address the objectives of improving resilience, reducing congestion and supporting growth.</p>

	Project objectives	PO1	PO2	PO3	PO4	PO5	PO6	PO7	Additional back-check comments
				movements. ✓		approach roads. --	grade junctions which allow crossing traffic to use roads built for the distribution of residential access traffic. ✗	bridge is lifted for shipping movements. --	
3F	High level fixed bridge at Silvertown (incl. user charging)	Yes. A fixed bridge would provide increased resilience of the highway network in the sub regions. ✓	Yes. A fixed bridge would improve road network performance on the Blackwall corridor and ease congestion. ✓	Yes. Improved connectivity in form of a fixed bridge would support local and sub regional growth. ✓	No. The large viaduct required and elevated highway will have a negative impact on local land-use. ✗	No. The impact on the local area would be significant. A large and impacting 3.5km elevated viaduct highway through an inner-urban area may be deemed by most as unattractive reducing the sense of place and public realm a key 'Challenge' set out in the MTS. ✗	No. Stakeholders responsible for delivering the planned regeneration of the peninsula are strongly opposed to the construction of an elevated highway through the area, or at grade junctions which allow crossing traffic to use roads built for the distribution of residential access traffic. ✗	Yes. User charging could be implemented to manage traffic and fund the scheme. ✓	The conclusions of the original work remain relevant. TfL's studies indicated concern about the feasibility of integrating a high bridge due to the long approach ramps creating physical severance. This is now even more of a problem in the context of intensified residential development locally. A further consideration is the decision – following the confirmation of MTS in May 2010 – to take forward the cable car (later known as Emirates Air Line) which also conflicts with a high bridge at this location.

	Project objectives	PO1	PO2	PO3	PO4	PO5	PO6	PO7	Additional back-check comments
3G	Low level bridge at Woolwich (incl. user charging)	No. Would not materially impact demand or incidents at the Blackwall Tunnel. It does not provide a realistic alternative when the bridge is closed to allow for shipping movements and does hence not offer short- or long term resilience. ✘	Partly. Would only marginally impact traffic flow in the Blackwall corridor, especially when the bridge is closed to allow for shipping movements. --	Yes. Improved connectivity in form of a lifting bridge would support local and sub regional growth. Though it would be limited in the case of a lifting bridge due to closures for shipping movements. ✓	No. Due to the nature of the land use in this area, the opportunities to develop a bridge to replace the Woolwich Ferry would be extremely limited. ✘	No. The lifting operation would hold traffic up for up to 30 minutes at a time, holding traffic and causing congestion and associated impacts on local roads, especially at Woolwich Town Centre. ✘	No report on stakeholder engagement included in this assessment.	Partly. User charging would be required to make the scheme affordable and to manage traffic but it is problematic where some users would incur a charge without gaining journey time benefit when bridge is lifted for shipping movements. --	
3H	Bridge at Gallions Reach (incl. user charging)	No. Would not materially impact demand or incidents at the Blackwall Tunnel. It does not provide a realistic alternative due to its location and does hence not offer short- or long term resilience. ✘	No. Would not materially impact traffic flow in the Blackwall corridor. It does not provide a realistic alternative due to its location. ✘	Yes. Improved connectivity in form of a bridge would support local and sub regional growth. Though it would be limited in the case of a lifting bridge due to closures to allow for shipping. ✓	Detailed assessments have not been carried out as this option does not meet some of the key objectives.	Detailed assessments have not been carried out as this option does not meet some of the key objectives.	Partly. RB Greenwich & LB Newham are in favour of a bridge at this location (though not in place of Silvertown), LB Bexley is strongly opposed if built in isolation, neutral if built in parallel with another crossing at Belvedere. --	Yes. User charging at the new bridge would almost certainly be needed to provide a source of revenue to contribute towards the costs of construction. ✓	Bridge options are now being assessed (including potential public transport and walking & cycling elements) as part of the wider river crossings programme for east London.

	Project objectives	PO1	PO2	PO3	PO4	PO5	PO6	PO7	Additional back-check comments
3I	Local low level lifting bridge at Gallions Reach (incl. user charging)	No. Would not materially impact demand or incidents at the Blackwall Tunnel. It does not provide a realistic alternative due to its location and does hence not offer short- or long term resilience. ✘	No. Would not materially impact traffic flow in the Blackwall corridor. It does not provide a realistic alternative due to its location. ✘	Yes. Improved connectivity in form of a lifting bridge would support local and sub regional growth. Though limited due to closures to allow for shipping movements. ✔	Detailed assessments have not been carried out as this option does not meet some of the key objectives.	Detailed assessments have not been carried out as this option does not meet some of the key objectives.	Partly. RB Greenwich & LB Newham are in favour of a bridge at this location (though not in place of but in addition to Silvertown), LB Bexley is strongly opposed if built in isolation, neutral if built in parallel with another crossing at Belvedere. --	Yes. User charging at the new bridge would almost certainly be needed to provide a source of revenue to contribute towards the costs of construction. ✔	This option is not being taken further forward due to the impact of shipping on traffic/bridge availability and major engineering feasibility concerns.
3J	High level fixed bridge at Gallions Reach (incl. user charging)	No. Would not materially impact demand or incidents at the Blackwall Tunnel. It does not provide a realistic alternative due to its location and does hence not offer short- or long term resilience. ✘	No. Would not materially impact traffic flow in the Blackwall corridor. It does not provide a realistic alternative due to its location. ✘	Yes. Improved connectivity in form of a fixed bridge would support local and sub regional growth. ✔	Detailed assessments have not been carried out as this option does not meet some of the key objectives.	Detailed assessments have not been carried out as this option does not meet some of the key objectives.	Partly. RB Greenwich & LB Newham are in favour of a bridge at this location (though not in place of but in addition to Silvertown), LB Bexley is strongly opposed if built in isolation, neutral if built in parallel with another crossing at Belvedere. --	Yes. User charging at the new bridge would almost certainly be needed to provide a source of revenue to contribute towards the costs of construction. ✔	This option is now being assessed (including potential public transport and walking & cycling elements) as part of the wider river crossings programme for east London.

	Project objectives	PO1	PO2	PO3	PO4	PO5	PO6	PO7	Additional back-check comments
3K	Thames Gateway Bridge (incl. user charging)	No. Would not materially impact demand or incidents at the Blackwall Tunnel. It does not provide a realistic alternative due to its location and does hence not offer short- or long term resilience. ✘	No. Would not materially impact traffic flow in the Blackwall corridor. It does not provide a realistic alternative due to its location. ✘	Yes. Improved connectivity in form of a lifting bridge would support local and sub regional growth. ✔	Yes. Land for TGB is safeguarded and the improved connectivity would support development in the local Opportunity Areas. ✔	Yes. The safeguarded corridor for TGB means that local impacts can be managed fairly well, although wider impacts in terms of traffic from the A2 using the crossing is a concern. ✔	No. TGB is strongly supported by the host boroughs of Greenwich and Newham but strongly opposed by Bexley ✘	Yes. User charging was planned for the scheme to manage traffic and fund the scheme. ✔	The option was assessed at this stage for comparison purposes to other schemes. However a bridge option at Gallions reach is being assessed as part of the wider river crossings programme for east London.
3L	Pontoon bridge at Gallions Reach (incl. user charging)	No. Would not materially impact demand or incidents at the Blackwall Tunnel. It does not provide a realistic alternative due to its location, capacity and requirement for closures to allow for shipping movements and does hence not offer short- or long term resilience. ✘	No. Would not materially impact traffic flow in the Blackwall corridor. It does not provide a realistic alternative due to its location. ✘	No. Analysis of shipping movements on this part of the Thames shows that the bridge would need to open around 70 times per day, or 3 times per hour. With this in mind and a 30 minute approximate time of being open, the bridge would be rarely available to road users or pedestrians. ✘	Detailed assessments have not been carried out as this option does not meet some of the key objectives.	Detailed assessments have not been carried out as this option does not meet some of the key objectives.	This option has not been discussed in detail with stakeholders. It is assumed their support would be highly unlikely given the constraints of this option.	Partly. User charging would be required to make the scheme affordable and to manage traffic but it is problematic where some users would incur charge without gaining journey time benefit when bridge is opened for shipping movements. --	The conclusions of the original work remain relevant. Pontoon bridges have been subject to failures, with examples of destructed or sinking bridges due to poor weather which rules out this option.

	Project objectives	PO1	PO2	PO3	PO4	PO5	PO6	PO7	Additional back-check comments
Tunnel options									
3M	Road tunnel at Silvertown <i>Note: This refers to the concept of a road tunnel at Silvertown with potential provision of pedestrian and cyclist facilities through the tunnel and includes user charging</i>	Yes. A tunnel would provide increased resilience of the highway network in the sub regions. ✓	Yes. A tunnel would improve road network performance of the Blackwall corridor and ease congestion. ✓	Yes. Improved connectivity in form of a tunnel would support local and sub regional growth. ✓	Partly. A larger cut and cover section required for an immersed tube tunnel would impact negatively on the circulation of people and vehicles. --	Partly. Significant riverworks required for an immersed tube tunnel option would have negative environmental impacts. --	Yes. The tunnel concept is well supported by stakeholders generally and features in the relevant boroughs' local plans. However the large cut and cover section required for the immersed tube tunnel is likely to conflict with masterplans for the Greenwich Peninsula. ✓	Partly. User charging would be implemented to manage traffic demand and contribute towards the funding of the scheme. Provision of pedestrian & cycle facilities would increase scheme costs & increase affordability gap. --	Current design and safety standards indicate that only a segregated solution – either a separate tunnel bore or a deck underneath the road tunnel – would be acceptable for pedestrians & cyclists. Both of these are very expensive and given the length of the crossing and the need to provide lifts and ramps, would suffer from poor ambience, and be unattractive in terms of safety and security. The scheme cost increase of around £70 million (as a minimum) could bring greater benefits for cyclists if invested in infrastructure elsewhere along the eastern Thames, where schemes have in some cases already been identified and are being given serious consideration. Provision of pedestrian & cyclist facilities through the tunnel is hence excluded from further assessment.
3N	Bored tunnel at Silvertown (includes user charging)	Yes. A tunnel would provide increased resilience of the highway network in the sub regions. ✓	Yes. A tunnel would improve road network performance of the Blackwall corridor and ease congestion. ✓	Yes. Improved connectivity in form of a tunnel would support local and sub regional growth. ✓	Yes. Land has been safeguarded for a river crossing at Silvertown and a bored tunnel option minimises impacts on land-use and the masterplan for the Greenwich Peninsula. ✓	Yes. Environmental impacts can be minimised leading to an overall environmental benefit. ✓	Yes. The tunnel concept is well supported by stakeholders generally and features in the relevant boroughs' local plans. ✓	Yes. User charging would be implemented to manage traffic demand and contribute towards the funding of the scheme. ✓	

	Project objectives	PO1	PO2	PO3	PO4	PO5	PO6	PO7	Additional back-check comments
3O	Immersed tube tunnel at Silvertown (includes user charging)	Yes. A tunnel would provide increased resilience of the highway network in the sub regions. ✓	Yes. A tunnel would improve road network performance of the Blackwall corridor and ease congestion. ✓	Yes. Improved connectivity in form of a tunnel would support local and sub regional growth. ✓	Partly. The cut and cover section would impact negatively on the circulation of people and vehicles. --	Partly. Compares less favourably to bored tunnel as the temporary loss of habitat on the foreshores is a major concern. The effect on the river dynamics due to the foreshore cofferdams will impact on current river flows potentially leading to erosion and deposition within the river. --	Partly. The tunnel concept is well supported by stakeholders generally and features in the relevant boroughs' local plans. However the large cut and cover section required for the immersed tube tunnel is likely to conflict with masterplans for the Greenwich Peninsula. --	Yes. User charging would be implemented to manage traffic demand and contribute towards the funding of the scheme. ✓	
3P	Road tunnel between Charlton & Royal Docks (includes user charging)	Partly. A road tunnel at this location would support resilience in the sub regions but at some distance from the Blackwall Tunnel it only provides an alternative for some trips. --	No. Due to its location, the road network performance of the Blackwall corridor is unlikely to improve sufficiently. ✗	Yes. Improved connectivity in form of a road tunnel at this location would support local and sub regional growth. ✓	No. While a tunnel at this location would offer good local connections it would have a substantial impact on property. ✗	No. The proximity of the tunnel to the Thames Barrier would present a major risk. ✗	No report on stakeholder engagement included in this assessment.	Yes. User charging at the tunnel would almost certainly be needed to provide a source of revenue to contribute towards the costs of construction. ✓	Bridge and ferry options are also being considered as alternatives as part of the wider East London River Crossings Programme.

	Project objectives	PO1	PO2	PO3	PO4	PO5	PO6	PO7	Additional back-check comments
3Q	Road tunnel at Woolwich (integrated with Crossrail)	Partly. A road tunnel at this location would support resilience in the sub regions but at some distance from the Blackwall Tunnel it only provides an alternative for some trips. --	No. Due to its location, the road network performance of the Blackwall corridor is unlikely to improve sufficiently. x	Yes. Improved connectivity in form of a road tunnel at this location would support local and sub regional growth. ✓	No. Traffic diversion/increases would negatively affect (plan for) the local town centre of Woolwich. x	No. Traffic diversion/increases would negatively affect (plan for) the local town centre of Woolwich. The rail alignment requirements do not allow a road element to be provided alongside Crossrail without considerable impact around the portals, particularly in Woolwich Town Centre, where a portal could undermine the planned regeneration of the town centre. x	No report on stakeholder engagement included in this assessment but unlikely to be supported due to lack of connectivity for Opportunity Areas and impact on A2.	No reference to user charging made in this assessment.	The addition of a highway element to a Crossrail tunnel would have added considerable cost, time and risk to Crossrail. If pursued at all, it should be taken forward separately from the rail element of the scheme so as to not to delay its progress. Geography would require southern portal to be at Eltham Common leading to a 6km bored tunnel.
3R	Blackwall Tunnel 3rd bore (includes user charging)	Partly. Replacing the small diameter northbound tunnel with a full gauge tunnel has the potential to address reliability issues. Some	Partly. Congestion relief is limited by tidal operations. --	Partly. While additional capacity is provided for an existing connection this is unlikely to be sufficient to support expected in these sub	Yes. It is expected that a 3rd bore Blackwall Tunnel would fit within the land-use policies of the areas. ✓	Yes. Though benefits would be marginal. ✓	Detailed engagement with stakeholders not carried out as option not feasible in engineering terms.	Yes. User charging would be implemented to manage traffic demand and contribute towards the funding of the scheme. ✓	The conclusions of the original work remain relevant. While overall the option addresses some of the project objectives, it has significant technical construction challenges . The option is not regarded as feasible by the tunnelling engineers consulted, as there is insufficient space to allow tie-in to the road network while meeting current standards for tunnel gradient and visibility.

	Project objectives	PO1	PO2	PO3	PO4	PO5	PO6	PO7	Additional back-check comments
		<p>incidents would remain and in these circumstances there would be no means of diversion. In addition, tidal operations would result in different vehicle restrictions at different times of day. There is a high potential for overheight drivers to arrive and cause difficulties when the new tunnel is running southbound and they are unable to use the Blackwall tunnel.</p> <p>--</p>		<p>regions.</p> <p>--</p>					

	Project objectives	PO1	PO2	PO3	PO4	PO5	PO6	PO7	Additional back-check comments
3S	Blackwall Tunnel Refurbishment (could include user charging)	No. Would not materially impact demand at the Blackwall Tunnel. While the tunnel will be improved to add resilience against failure, some incidents will still occur (including overheight vehicle incidents) which means no diversion alternative would be in place. It does not provide a realistic alternative due to its location and does hence not offer short- or long term resilience. x	No. Would not materially impact traffic flow in the Blackwall corridor. x	No. While an existing connection is enhanced, no new connection is provided & this is unlikely to be sufficient to support expected in these sub regions. x	Detailed assessments have not been carried out as this option does not meet some of the key objectives.	Detailed assessments have not been carried out as this option does not meet some of the key objectives.	No report on stakeholder engagement included in this assessment.	Partly. It may be possible to implement user charging to manage future demand and to pay towards refurbishment costs but it is likely to be met with greater opposition as no new infrastructure would be provided. --	While overall the option does not meet the project objectives, it should be considered as part of a wider package of a refurbishment and new river crossings. The work to refurbish the tunnel has been committed and is ongoing.

	Project objectives	PO1	PO2	PO3	PO4	PO5	PO6	PO7	Additional back-check comments
3T	Local tunnel at Gallions Reach (includes user charging)	No. Would not materially impact demand or incidents at the Blackwall Tunnel. It does not provide a realistic alternative due to its location and does hence not offer short- or long term resilience. ✘	No. Would not materially impact traffic flow in the Blackwall corridor. It does not provide a realistic alternative due to its location. ✘	Yes. Improved connectivity in form of a tunnel would support local and sub regional growth. ✔	Detailed assessments have not been carried out as this option does not meet some of the key objectives.	Detailed assessments have not been carried out as this option does not meet some of the key objectives.	Partly. RB Greenwich & LB Newham are in favour of a bridge at this location (though not in place of but in addition to Silvertown), LB Bexley is strongly opposed if built in isolation, neutral if built in conjunction with crossing at Belvedere. --	Yes. User charging at the new tunnel would almost certainly be needed to provide a source of revenue to contribute towards the costs of construction. ✔	This option is being assessed (including potential public transport elements) as part of the wider river crossings programme for east London.
Other options									
3U	New Lower Thames Crossing (bridge or tunnel)	No. Would not materially impact demand or incidents at the Blackwall Tunnel. It does not provide a realistic alternative due to its location and does hence not offer short- long term resilience. ✘	No. Would not materially impact traffic flow in the Blackwall corridor. It does not provide a realistic alternative due to its location. ✘	No. Due to its location would not directly support growth in London / the Opportunity Areas in this region. ✘	Detailed assessments have not been carried out as this option does not meet some of the key objectives. It is outside the remit of TfL & being taken forward independently of the Silvertown Tunnel by Highways England.	Detailed assessments have not been carried out as this option does not meet some of the key objectives. It is outside the remit of TfL & being taken forward independently of the Silvertown Tunnel by Highways England.	Detailed assessments have not been carried out as this option does not meet some of the key objectives. It is outside the remit of TfL & being taken forward independently of the Silvertown Tunnel by Highways England.	Detailed assessments have not been carried out as this option does not meet some of the key objectives. It is outside the remit of TfL & being taken forward independently of the Silvertown Tunnel by Highways England.	This option falls outside the remit of TfL and is being progressed by Highways England. Due to its location it does not solve the problems in the Blackwall corridor.

	Project objectives	PO1	PO2	PO3	PO4	PO5	PO6	PO7	Comments
	Summary (road-based options)	Some of the road-based options assessed have the potential to address the problems of congestion, closures and lack of resilience at the Blackwall Tunnel. In order to meet these objectives, options need to be located sufficiently close to the Blackwall Tunnel and need to be of sufficient capacity to cope with the demand in the event of a closure of the Blackwall Tunnel. Some options have greater adverse impacts on land use, the environment etc. than others; the latter hence generally being more acceptable to stakeholders. A range of options outlined above as well as road-based crossing options at Belvedere are being considered as part of the wider East London River Crossings Programme.							
4	Demand management and other options								
4A	Do nothing	No. The costs of unreliability are very significant; of those cross-river trips directly affected by closures, a cost of around £16 million per annum is incurred. In addition, as this traffic seeks to use alternatives it impacts routes which are already busy or congested. x	No. Congestion in the Blackwall Corridor is significant. Drivers experience a 15-20 minute delay in crossing the river at peak times. x	No. The current situation at the Blackwall Tunnel does not support growth in east and south east London. x	No. Poor reliability of the crossings and long journey times will worsen over time with background growth. This would have a negative effect on the regeneration potential of the area, and in particular those Opportunity Areas along both sides of the Thames. x	No. Negative impacts arising from congestion and poor reliability would remain. x	No. Local boroughs and local businesses support action to address the current problems associated with the river crossings. Doing nothing is therefore likely to be opposed. x	Road user charging not applicable	

	Project objectives	PO1	PO2	PO3	PO4	PO5	PO6	PO7	Comments
4C	Charging Blackwall Tunnel	No. Would not materially impact incidents at the Blackwall Tunnel. It does not provide an alternative in case of incidents and does hence not offer short- or long term resilience. ✘	Partly. User charging would go some way in alleviating but not eliminating congestion at the Blackwall Tunnel. --	Partly. User charging would support economic development and population growth to a certain extend but have limited impact on connectivity. --	Detailed assessments have not been carried out as this option does not meet some of the key objectives.	Detailed assessments have not been carried out as this option does not meet some of the key objectives.	No report on stakeholder engagement included in this assessment.	Yes. The primary objective of the charge would be traffic management. ✓	The conclusions of the original work remain relevant. Assumes peak direction charging at the Blackwall Tunnel only. Not recommended that user charging is pursued as a means of reducing congestion in isolation; however, it could prove effective in conjunction with new infrastructure which delivers improved road network resilience.
4D	Charging existing crossings e.g. Blackwall, Rotherhithe, Woolwich	No. Would not materially impact incidents at the Blackwall Tunnel. It does not provide an alternative in case of incidents and does hence not offer short- or long term resilience. ✘	Partly. User charging would go some way in alleviating but not eliminating congestion at the Blackwall Tunnel. --	Partly. User charging would support economic development and population growth to a certain extend but have limited impact on connectivity. --	Detailed assessments have not been carried out as this option does not meet some of the key objectives.	Detailed assessments have not been carried out as this option does not meet some of the key objectives.	No report on stakeholder engagement included in this assessment.	Yes. The primary objective of the charge would be traffic management though TfL is currently under obligation to operate the Woolwich Ferry free of charge. ✓	

	Project objectives	PO1	PO2	PO3	PO4	PO5	PO6	PO7	Comments
4E	Dartford crossing toll plaza improvements	No. Would not materially impact incidents at the Blackwall Tunnel. It does not provide an alternative in case of incidents and does hence not offer short- or long term resilience. x	No. Would not materially impact traffic flow in the Blackwall corridor. It does not provide a realistic alternative due to its location. x	No. Due to its location would not directly support growth in London / the Opportunity Areas in this region. x	Detailed assessments have not been carried out as this option does not meet some of the key objectives.	Detailed assessments have not been carried out as this option does not meet some of the key objectives.	Detailed assessments have not been carried out as this option does not meet some of the key objectives.	Not applicable as road user charging already in place	The implementation of this option falls outside the remit of TfL. However MTS Proposal 39 F states that TfL will provide 'support for Government proposals to reduce congestion at the Dartford Crossing'. Free flow tolling has been implemented in autumn 2014 by Highways England.
	Summary (demand management & other options)	Demand management including user charging can achieve behaviour change whereby people drive less, change their journey or switch to (non-charged) sustainable modes, or not make the journey. Demand management could therefore be effective in significantly reducing congestion, which is one of the main problems at the Blackwall Tunnel. TfL assessed the option of congestion charging at the Blackwall Tunnel (with no additional infrastructure). But this approach on its own it would not generate sufficient mode shift to significantly reduce congestion; nor does it provide an alternative diversion route which could address the prevailing issues of closures and lack of resilience which affect private and public transport.							

Appendix B NATIONAL NETWORKS NPS KEY POLICY TESTS AND THE SCHEME

B.1 Introduction

B.1.1 The two tables here show how the Scheme meets the policy tests set out in the National Networks NPS and in the London Plan. More information about these and other policies is set out in Chapter 7.

B.2 National Networks NPS

Topic	Paragraph	Policy wording	How being met
Need	Chapter 2	<p>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.</p> <p>This means:</p> <ul style="list-style-type: none"> - Networks with the capacity and connectivity and resilience to support national and local economic activity 	<p>The Scheme would effectively double road network capacity across the river, reducing congestion and providing resilience in the (frequent) event of incidents at the Blackwall Tunnel. This is detailed in the Preliminary Case for the Scheme and the Preliminary Transport Assessment.</p> <p>The Preliminary Regeneration and Development Impact Report provides details on how the Scheme would support economic activity and facilitate growth and create jobs. The Scheme would reduce the barrier effect of the Thames, with businesses currently able to access fewer customers, workers and suppliers than competitors in other parts of the city, and residents</p>

Topic	Paragraph	Policy wording	How being met
		and facilitate growth and create jobs.	able to access fewer jobs and services because of high levels of congestion combined with a lack of alternative crossings.
Need	Chapter 2	Networks which support and improve journey quality, reliability and safety	The Preliminary Transport Assessment sets out how the scheme meets these objectives. Journey time reliability will be improved with the introduction of the Silvertown Tunnel as it will reduce congestion and provide resilience. Safety has been addressed through the design of the tunnel, approach roads and junction tie-ins. Pedestrian and cyclist safety has been addressed through the design of the junction tie-ins and road crossings (e.g. Boord Street pedestrian and cycle bridge).
Need	Chapter 2	Networks which support the delivery of environmental goals and the move to a low carbon economy.	The PEIR assesses the environmental effects of the Scheme and proposed appropriate mitigation. The Scheme has also been assessed using CEEQUAL which seeks to maximise sustainability in infrastructure projects. The Sustainability Statement

Topic	Paragraph	Policy wording	How being met
			<p>sets this out in detail.</p> <p>The Scheme supports improved public transport provision with plans for much greater bus provision through the tunnel. There will also be walking and cycling enhancements in the areas surrounding the tunnel portals with passive provision provided for these to link up with potential future residential developments in the local area.</p>
Need	Chapter 2	Networks which join up our communities and link effectively to each other	The Scheme would reduce the ‘barrier’ effect of the Thames, connecting businesses, communities and services on either side of the river. It would reduce the severance caused by high levels of congestion at the Blackwall Tunnel and few alternative crossings. This is assessed further in the Preliminary Outline Business Case, the Preliminary Health Impact Assessment and the Preliminary Case for the Scheme.
Benefits	3.2	The Government recognises that for development of the national road and rail networks to be sustainable these should be designed to minimise social	The Preliminary Case for the Scheme sets out how the scheme intends to provide environmental and social benefits such as improved cross-river bus services. The Preliminary EqIA, EIA and HIA look at these

Topic	Paragraph	Policy wording	How being met
		and environmental impacts and improve quality of life.	<p>issues in terms of impacts of the scheme and wider benefits. Work is being undertaken with the host boroughs to identify and address existing environmental issues (e.g. noise) in the vicinity of Blackwall/Silvertown.</p> <p>The Scheme would also include a Community Fund to facilitate environmental and social enhancements in the host boroughs.</p> <p>It is also anticipated that quality of life would be improved by a reduction in congestion and its consequential effects.</p>
Benefits	3.3	<p>In delivering new schemes, the Government will expect applicants to avoid and mitigate environmental and social impacts in line with the principles set out in the NPPF and the Government's planning guidance. Applicants should also provide evidence that they have considered reasonable opportunities to deliver environmental and social benefits as</p>	<p>The PEIR provides a detailed environmental assessment of the Scheme and recommends appropriate mitigation. The Preliminary HIA and EqIA recommend mitigation which has been incorporated into the Scheme.</p> <p>In addition, a number of environmental and social benefits will be delivered as part of the scheme. These include:</p> <ul style="list-style-type: none"> • The potential for significantly increased provision of bus services;

Topic	Paragraph	Policy wording	How being met
		part of schemes.	<ul style="list-style-type: none"> • Enhanced walking and cycling links • Construction and operational apprenticeships, training and employment opportunities • A Community Fund to deliver further environmental and social enhancements <p>Please see Chapter 6 of the Preliminary Case for the Scheme.</p>
Road safety	3.10	As set out in paragraphs 4.60 to 4.66, scheme promoters are expected to take opportunities to improve road safety, including introducing the most modern and effective safety measures where proportionate.	The Scheme includes road (and tunnel) safety measures. These are set out in the Preliminary Engineering Report, the Preliminary Transport Assessment and are summarised in the Preliminary Case for the Scheme. The Scheme would have been designed to the latest safety standards. In terms of road safety, a Road Safety Audit of the reference design was carried out and the scheme meets the urban standards within DfT's Manual for Streets.
Walking and cycling	3.17	There is a direct role for the national road network to play in helping walkers and cyclists. The Government expects applicants to use reasonable endeavours to address the needs of	It is not proposed to include walking and cycling provision in the tunnel due to safety considerations and the inevitably unattractive proposition for the pedestrian or cyclist. In addition, the Emirates Air Line (EAL) was identified in the Mayors Transport Strategy

Topic	Paragraph	Policy wording	How being met
		cyclists and pedestrians in the design of new schemes. The Government also expects applicants to identify opportunities to invest in infrastructure in locations where the national road network severs communities and acts as a barrier to cycling and walking, by correcting historic problems, retrofitting the latest solutions and ensuring that it is easy and safe for cyclists to use junctions.	<p>(MTS) as a scheme to address cross-river walking and cycling need at this location. The EAL was opened in 2012.</p> <p>The Scheme design enhances pedestrian and cycle links on either side of the tunnel, better connecting existing networks and access to the EAL. These are detailed in the Preliminary Design and Access Statement and the Preliminary Transport Assessment.</p>
Walking and Cycling	5.205	Applicants should consider reasonable opportunities to support other transport modes in developing infrastructure. As part of this, consistent with paragraph 3.19-3.22 above, the applicant should provide evidence that as part of the project they have used reasonable endeavours to address any existing severance issues that act as a barrier to non-motorised users.	See above

Topic	Paragraph	Policy wording	How being met
Access	3.20	<p>The Government expects applicants to improve access, wherever possible, on and around the national networks by designing and delivering schemes that take account of the accessibility requirements of all those who use, or are affected by, national networks infrastructure, including disabled users. All reasonable opportunities to deliver improvements in accessibility on and to the existing national road network should also be taken wherever appropriate.</p>	<p>The Preliminary EqlA assesses the effect of the Scheme on accessibility and recommends appropriate mitigation where necessary.</p> <p>The Scheme has been designed to appropriate accessibility standards (e.g. dropped curbs and tactile paving).</p> <p>The Scheme improves access where possible. Improved cross-river bus services would enhance access for those reliant on public transport (buses are accessible). The relocated Boord Street footbridge would incorporate step-free access and be built to the latest shared used standards.</p> <p>The Scheme enhances pedestrian and cycle links on either side of the tunnel, better connecting existing networks. These are detailed in the Preliminary Design and Access Statement and the Preliminary Transport</p>

Topic	Paragraph	Policy wording	How being met
			<p>Assessment.</p> <p>Disabled and Blue badge holders would be exempt from paying the user charge for the Silvertown and Blackwall Tunnels (see Preliminary Charging Report).</p>
Access	5.216	Where development would worsen accessibility such impacts should be mitigated so far as reasonably possible. There is a very strong expectation that impacts on accessibility for non-motorised users should be mitigated.	See above
Severance	3.22	Severance can be a problem in some locations. Where appropriate applicants should seek to deliver improvements that reduce community severance and improve accessibility.	<p>The Scheme design enhances pedestrian and cycle links on either side of the tunnel, better connecting existing networks. These are detailed in the Preliminary Design and Access Statement and the Preliminary Transport Assessment.</p> <p>The footbridge at Boord Street would be replaced and realigned, which would reduce severance caused by the existing A102 Blackwall Tunnel Approach.</p>

Topic	Paragraph	Policy wording	How being met
			<p>Temporary severance during construction would be minimised by providing appropriate diversions to vehicle, pedestrian and cycling traffic.</p> <p>The Preliminary Design and Access Statement and Preliminary Transport Assessment provide further details.</p>
Charging	3.27	<p>Where tolls or road user charges are proposed as part of a highways project that is the subject of a direction given under section 35 of the Planning Act 2008, the Government will expect the applicant to demonstrate that the proposals are consistent with this NPS, the relevant development plan and relevant statutory transport strategies and plans.</p>	<p>Mayors Transport Strategy (MTS) policy allows consideration of user charging to 'support' river crossings in east London and as a demand management tool.</p> <p>A crossing at Silvertown is supported in the London Plan, MTS and in local development plans as set out in the Preliminary Case for the Scheme and Preliminary Charging Report.</p>
Business Case	4.5	<p>Applications for road and rail projects (with the exception of those for SRFIs, for which the position is covered in paragraph 4.8 below) will</p>	<p>A Preliminary Outline Business Case has been prepared for the Scheme.</p>

Topic	Paragraph	Policy wording	How being met
		<p>normally be supported by a business case prepared in accordance with Treasury Green Book principles. This business case provides the basis for investment decisions on road and rail projects. The business case will normally be developed based on the Department's Transport Business Case guidance and WebTAG guidance. The economic case prepared for a transport business case will assess the economic, environmental and social impacts of a development. The information provided will be proportionate to the development. This information will be important for the Examining Authority and the Secretary of State's consideration of the adverse impacts and benefits of a proposed development. It is expected that NSIP schemes brought forward through the development consent order process by virtue of Section 35 of the Planning</p>	

Topic	Paragraph	Policy wording	How being met
		Act 2008, should also meet this requirement.	
Modelling	4.6	Applications for road and rail projects should usually be supported by a local transport model to provide sufficiently accurate detail of the impacts of a project. The modelling will usually include national level factors around the key drivers of transport demand such as economic growth, demographic change, travel costs and labour market participation, as well as local factors. The Examining Authority and the Secretary of State do not need to be concerned with the national methodology and national assumptions around the key drivers of transport demand. We do encourage an assessment of the benefits and costs of schemes under high and low growth scenarios, in addition to the core case. The modelling should be	The Preliminary Transport Assessment sets out the details of the modelling that has been undertaken.

Topic	Paragraph	Policy wording	How being met
		<p>proportionate to the scale of the scheme and include appropriate sensitivity analysis to consider the impact of uncertainty on project impacts.</p>	
Options Appraisal	4.27	<p>All projects should be subject to an options appraisal. The appraisal should consider viable modal alternatives and may also consider other options (in light of the paragraphs 3.23 to 3.27 of this NPS). Where projects have been subject to full options appraisal in achieving their status within Road or Rail Investment Strategies or other appropriate policies or investment plans, option testing need not be considered by the examining authority or the decision maker. For national road and rail schemes, proportionate option consideration of alternatives will have been undertaken as part of the investment decision making process.</p>	<p>A robust options appraisal has been undertaken as part of the development of MTS and London Plan policy supporting a package of river crossings in east London. Further options appraisal was subsequently undertaken, including the detailed refinement of the Scheme.</p> <p>The Preliminary Case for the Scheme sets out the options appraisal that supports the Scheme.</p>

Topic	Paragraph	Policy wording	How being met
		<p>It is not necessary for the Examining Authority and the decision maker to reconsider this process, but they should be satisfied that this assessment has been undertaken.</p>	
Design	4.29	<p>Visual appearance should be a key factor in considering the design of new infrastructure, as well as functionality, fitness for purpose, sustainability and cost. Applying “good design” to national network projects should therefore produce sustainable infrastructure sensitive to place, efficient in the use of natural resources and energy used in their construction, matched by an appearance that demonstrates good aesthetics as far as possible.</p>	<p>The Preliminary Design and Access Statement (DAS) sets out how good design has been applied. This is supported by a sustainability assessment (see Preliminary Sustainability Statement). The Engineering design process is set out in the Preliminary Engineering Report. Work has been carried out with the boroughs to ensure the layout of the scheme demonstrates good design, making passive provision for future development of the surrounding land. The DAS sets out the design principles and indicative designs for structures (e.g. vent stacks, tunnel ventilation buildings, etc.) but it is proposed that the detailed design will be secured through Requirements (planning conditions).</p>

Topic	Paragraph	Policy wording	How being met
Climate change	4.41	Where transport infrastructure has safety-critical elements and the design life of the asset is 60 years or greater, the applicant should apply the UK Climate Projections 2009 (UKCP09) high emissions scenario (high impact, low likelihood) against the 2080 projections at the 50% probability level.	Climate change adaptability has been assessed in the PEIR and through the Preliminary Sustainability Statement.
Health	4.81	As described in the relevant sections of this NPS, where the proposed project has likely significant environmental impacts that would have an effect on human beings, any environmental statement should identify and set out the assessment of any likely significant adverse health impacts.	The impact of the scheme on human health has been assessed in the Preliminary Health Impact Assessment. Mitigation has been proposed where appropriate to minimise any adverse health impacts.

Topic	Paragraph	Policy wording	How being met
Health	4.82	The applicant should identify measures to avoid, reduce or compensate for adverse health impacts as appropriate. These impacts may affect people simultaneously, so the applicant, and the Secretary of State (in determining an application for development consent) should consider the cumulative impact on health.	As above
Air quality	5.12	The Secretary of State must give air quality considerations substantial weight where, after taking into account mitigation, a project would lead to a significant air quality impact in relation to EIA and / or where they lead to a deterioration in air quality in a zone/agglomeration.	The PEIR sets out the assessment of effect on air quality resulting from the Scheme. The initial results of the assessment show a net benefit to air quality.
Air quality	5.13	The Secretary of State should refuse consent where, after taking into account mitigation, the air quality impacts of the scheme will:	As above. The assessment concludes that the Scheme represents a low risk to the Greater London zone/agglomeration achieving compliance.

Topic	Paragraph	Policy wording	How being met
		<ul style="list-style-type: none"> · result in a zone/agglomeration which is currently reported as being compliant with the Air Quality Directive becoming non-compliant; or · affect the ability of a non-compliant area to achieve compliance within the most recent timescales reported to the European Commission at the time of the decision. 	
Air quality	5.14	<p>The Secretary of State should consider whether mitigation measures put forward by the applicant are acceptable. A management plan may help codify mitigation at this stage. The proposed mitigation measures should ensure that the net impact of a project does not delay the point at which a zone will meet compliance timescales.</p>	<p>The PEIR assesses the air quality effects of the scheme and where appropriate proposes mitigation. The key air quality mitigation is the user charge.</p> <p>A programme of monitoring and mitigation will ensure that air quality levels meet compliance timescales. The user charge will be adjusted as necessary to manage the effects of the Scheme. The Preliminary Monitoring and Mitigation Report sets out the role of monitoring in more detail and is appended to the Preliminary Case for the Scheme.</p>
Biodiversity	5.23	<p>The applicant should show how the project has taken advantage of opportunities to conserve and</p>	<p>The effects of the Scheme on biodiversity and geology have been assessed in the PEIR with appropriate mitigation proposed. Significant adverse effects are</p>

Topic	Paragraph	Policy wording	How being met
		enhance biodiversity and geological conservation interests.	not anticipated.
Biodiversity	5.36	<p>Applicants should include appropriate mitigation measures as an integral part of their proposed development, including identifying where and how these will be secured. In particular, the applicant should demonstrate that:</p> <ul style="list-style-type: none"> • during construction, they will seek to ensure that activities will be confined to the minimum areas required for the works; • during construction and operation, best practice will be followed to • ensure that risk of disturbance or damage to species or habitats is minimised (including as a consequence of transport 	See above. Given the specific existing and proposed land use around the Silvertown Tunnel there are limited enhancements possible.

Topic	Paragraph	Policy wording	How being met
		<p>access arrangements);</p> <ul style="list-style-type: none"> • habitats will, where practicable, be restored after construction works have finished; • developments will be designed and landscaped to provide green corridors and minimise habitat fragmentation where reasonable; • opportunities will be taken to enhance existing habitats and, where practicable, to create new habitats of value within the site landscaping proposals, for example through techniques such as the 'greening' of existing network crossing points, the use of green bridges and the habitat improvement of the network verge. 	

Topic	Paragraph	Policy wording	How being met
Waste	5.43	<p>The Secretary of State should consider the extent to which the applicant has proposed an effective process that will be followed to ensure effective management of hazardous and non-hazardous waste arising from the construction and operation of the proposed development. The Secretary of State should be satisfied that the process sets out:</p> <ul style="list-style-type: none"> - any such waste will be properly managed, both on-site and off-site; - the waste from the proposed facility can be dealt with appropriately by the waste infrastructure which is, or is likely to be, available. Such waste arisings should not have an adverse effect on the capacity of existing waste management facilities to deal with other waste arisings in the area; and adequate steps have been taken to minimise the volume of waste 	<p>A Preliminary Site Waste Management Plan (SWMP) has been prepared and is appended to the PEIR. Contaminated waste may be treated on site or removed to licenced facilities depending on the nature of the contamination. The SWMP details the available waste management and disposal sites and their capacities.</p> <p>There would be beneficial reuse of excavated material. Initial discussions with Wallasea Island (RSPB) have indicated that there is sufficient capacity for the 'clean' waste arising from construction of the Silvertown Tunnel. Discussions with RSPB and others will continue as more information about the waste arisings is known.</p>

Topic	Paragraph	Policy wording	How being met
		arisings, and of the volume of waste arisings sent to disposal, except where an alternative is the most sustainable outcome overall.	
Dust, odour, etc.	5.87	The Secretary of State should be satisfied that all reasonable steps have been taken, and will be taken, to minimise any detrimental impact on amenity from emissions of odour, dust, steam, smoke and artificial light. This includes the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation.	A draft Code of Construction Practice (CoCP) has been prepared and appended to the PEIR. The draft CoCP reflects good practice, recognised standards and legislative requirements. The PEIR assesses construction effects and recommends mitigation measures where appropriate.
Flood Risk	5.99	When determining an application the Secretary of State should be satisfied that flood risk will not be increased elsewhere and only consider development appropriate in areas at risk of flooding where (informed by a flood risk assessment, following the Sequential Test and, if required, the	A Flood Risk Assessment has been undertaken and is appended to the PEIR. The Flood Risk Assessment concludes that through the design and operation of a Flood Warning and Evacuation Plan, the Scheme will remain safe in times of flood and that there will be no increase in flood risk to third parties.

Topic	Paragraph	Policy wording	How being met
		<p>Exception Test), it can be demonstrated that:</p> <ul style="list-style-type: none"> · within the site, the most vulnerable development is located in areas of lowest flood risk unless there are overriding reasons to prefer a different location; and · development is appropriately flood resilient and resistant, including safe access and escape routes where required, and that any residual risk can be safely managed, including by emergency planning; and priority is given to the use of sustainable drainage systems. 	
Drainage	5.100	<p>For construction work which has drainage implications, approval for the project's drainage system will form part of any development consent issued by the Secretary of State. The Secretary of State will therefore need to be satisfied that the proposed drainage system complies with any</p>	<p>The Preliminary Engineering Report sets out the drainage design for the Scheme, which includes Sustainable Urban Drainage Systems (SuDS).</p> <p>The draft Development Consent Order would set out who would be responsible for maintaining the SuDS and the land required would be included in the Order</p>

Topic	Paragraph	Policy wording	How being met
		<p>National Standards published by Ministers under Paragraph 5(1) of Schedule 3 to the Flood and Water Management Act 2010.93 In addition, the development consent order, or any associated planning obligations, will need to make provision for the adoption and maintenance of any Sustainable Drainage Systems (SuDS), including any necessary access rights to property. The Secretary of State, should be satisfied that the most appropriate body is being given the responsibility for maintaining any SuDS, taking into account the nature and security of the infrastructure on the proposed site. The responsible body could include, for example, the applicant, the landowner, the relevant local authority, or another body such as the Internal Drainage Board.</p>	<p>Limits.</p>

Topic	Paragraph	Policy wording	How being met
Land instability	5.118	<p>A preliminary assessment of ground instability should be carried out at the earliest possible stage before a detailed application for development consent is prepared. Applicants should ensure that any necessary investigations are undertaken to ascertain that their sites are and will remain stable or can be made so as part of the development. The site needs to be assessed in context of surrounding areas where subsidence, landslides and land compression could threaten the development during its anticipated life or damage neighbouring land or property. This could be in the form of a land stability or slope stability risk assessment report.</p>	<p>Ground investigations studies have been undertaken in July 2015 and a ground investigations report will accompany the main application.</p> <p>A Settlement Assessment Report has been prepared as part of the Reference design indicating the possible risks involved with settlement prior to or post construction of the tunnel. In both Ground Investigation report and Settlement Assessment Report, mitigation and recommendation to deal with the identified risks and hazards, and minimize the effects has been included.</p>
Heritage	5.128 to 5.130	<p>In determining applications, the Secretary of State should seek to identify and assess the particular significance of any heritage asset that</p>	<p>An assessment on the effects of the Scheme on heritage is included in the PEIR. The archaeological assessment methodology and results have been agreed with English Heritage. The assessment</p>

Topic	Paragraph	Policy wording	How being met
		<p>may be affected by the proposed development (including by development affecting the setting of a heritage asset), taking account of the available evidence and any necessary expertise from:</p> <ul style="list-style-type: none"> • relevant information provided with the application and, where applicable, relevant information submitted during examination of the application; • any designation records; • the relevant Historic Environment Record(s), and similar sources of information; • representations made by interested parties during the examination; <p>and</p> <ul style="list-style-type: none"> • expert advice, where 	<p>concludes that there is no effect on listed buildings. However, there is a reported adverse effect on archaeology as a result of the construction of the Scheme. The mitigation approach to be taken will be agreed through ongoing consultation during the EIA process and secured in the DCO, and could include further archaeological investigations and recording.</p>

Topic	Paragraph	Policy wording	How being met
		<p>appropriate, and when the need to understand the significance of the heritage asset demands it.</p> <p>In considering the impact of a proposed development on any heritage assets, the Secretary of State should take into account the particular nature of the significance of the heritage asset and the value that they hold for this and future generations. This understanding should be used to avoid or minimise conflict between their conservation and any aspect of the proposal.</p> <p>The Secretary of State should take into account the desirability of sustaining and, where appropriate, enhancing the significance of heritage assets, the contribution of their settings and the positive contribution that their conservation can make to</p>	

Topic	Paragraph	Policy wording	How being met
		<p>sustainable communities – including their economic vitality. The Secretary of State should also take into account the desirability of new development making a positive contribution to the character and local distinctiveness of the historic environment. The consideration of design should include scale, height, massing, alignment, materials, use and landscaping (for example, screen planting).</p>	
Visual	5.144	<p>Where the development is subject to EIA the applicant should undertake an assessment of any likely significant landscape and visual impacts in the environmental impact assessment and describe these in the environmental assessment. A number of guides have been produced to assist in addressing landscape issues. The landscape and visual assessment should include reference to any landscape</p>	<p>A townscape (urban landscape) and visual impact assessment has been undertaken and is reported in the PEIR. The assessment concludes that whilst the Scheme introduces new infrastructure, it is not at odds with that already present within the local townscape and views.</p> <p>The Scheme includes landscape proposals and design parameters which would integrate the proposals in the existing townscape and enhance the local townscape and views.</p> <p>A Construction Environmental Management Plan</p>

Topic	Paragraph	Policy wording	How being met
		<p>character assessment and associated studies, as a means of assessing landscape impacts relevant to the proposed project. The applicant's assessment should also take account of any relevant policies based on these assessments in local development documents in England.</p>	<p>would be prepared to minimise any impacts during construction.</p>
Land Use	5.165	<p>The applicant should identify existing and proposed land uses near the project, any effects of replacing an existing development or use of the site with the proposed project or preventing a development or use on a neighbouring site from continuing. Applicants should also assess any effects of precluding a new development or use proposed in the development plan. The assessment should be proportionate.</p>	<p>There are committed and aspirational regeneration areas in the vicinity of the tunnel. In Greenwich, the revised peninsula Masterplan is currently pending a decision by the LPA. TfL has been working closely with the developer and LPA (through the Greater London Authority) to ensure that the impact of the tunnel on the development proposals are minimised and vice versa. In Newham TfL has been working with the GLA as landowner and Newham as LPA to make passive provision for a future residential led scheme around the site of the tunnel portal. This is not supported by development plan policy at this stage.</p> <p>It should be noted that the land required to construct and operate the Silvertown Tunnel has been safeguarded by the Secretary of State for Transport (now transferred to the Mayor of London) since 1997.</p>

Silvertown Tunnel

Preliminary Case for the Scheme

Topic	Paragraph	Policy wording	How being met
			<p>Therefore, the development plan and consequently, development proposals in the area respond to the Silvertown Tunnel. One of the reasons a tunnel was selected over a bridge is due to the impact a bridge would have in terms of severance of surrounding land uses. This is explained further in the options assessment within the Preliminary Case for the Scheme.</p>
Green infrastructure	5.181	<p>The Secretary of State should also consider whether mitigation of any adverse effects on green infrastructure or open space is adequately provided for by means of any planning obligations, for example, to provide exchange land and provide for appropriate management and maintenance agreements. Any exchange land should be at least as good in terms of size, usefulness, attractiveness, quality and accessibility. Alternatively, where Sections 131 and 132 of the Planning Act 2008 apply, any replacement land</p>	Not currently an issue

Topic	Paragraph	Policy wording	How being met
		provided under those sections will need to conform to the requirements of those sections.	
Noise	5.189	<p>Where a development is subject to EIA and significant noise impacts are likely to arise from the proposed development, the applicant should include the following in the noise assessment, which should form part of the environment statement:</p> <ul style="list-style-type: none"> • a description of the noise sources including likely usage in terms of number of movements, fleet mix and diurnal pattern. For any • associated fixed structures, such as ventilation fans for tunnels, information about the noise sources including the identification of • any distinctive tonal, impulsive or low frequency characteristics of the noise. • identification of noise sensitive premises and noise sensitive areas that may be 	<p>A noise assessment has been undertaken and is reported in the PEIR. Mitigation is proposed to address adverse effects identified. The assessment of the scheme in relation to short term operational noise indicates that there would be negligible or minor changes in road traffic noise at the majority of receptors with a net gain of 1,302 residential dwellings experiencing a perceptible decrease in noise level. Long term assessment results indicate that there would be negligible, or no-change, in road traffic noise at the majority of receptors during the day time. Moderate adverse impacts would be limited to a small number of receptors in the immediate vicinity of the Tidal Basin Roundabout.</p> <p>Noise barriers and low noise surfacing have been incorporated into the Scheme. Opportunities for addressing existing noise issues in the vicinity of the Scheme are being explored with the host boroughs.</p>

Topic	Paragraph	Policy wording	How being met
		<p>affected.</p> <ul style="list-style-type: none"> • the characteristics of the existing noise environment. • a prediction on how the noise environment will change with the proposed development: • In the shorter term such as during the construction period; • in the longer term during the operating life of the infrastructure; • at particular times of the day, evening and night as appropriate. • an assessment of the effect of predicted changes in the noise environment on any noise sensitive premises and noise sensitive • areas. • measures to be employed in mitigating the effects of noise. <p>Applicants should consider using best available techniques to reduce</p>	

Topic	Paragraph	Policy wording	How being met
Noise	5.191	<p>noise impacts.</p> <p>Operational noise, with respect to human receptors, should be assessed using the principles of the relevant British Standards and other guidance.</p> <p>The prediction of road traffic noise should be based on the method described in Calculation of Road Traffic Noise. The prediction of noise from new railways should be based on the method described in Calculation of Railway Noise. For the prediction, assessment and management of construction noise, reference should be made to any relevant British Standards and other guidance which also give examples of mitigation strategies.</p>	As above
e	5.194	<p>The project should demonstrate good design through optimisation of scheme layout to minimise noise emissions and, where possible, the use of landscaping, bunds or noise</p>	As above.

Topic	Paragraph	Policy wording	How being met
		<p>barriers to reduce noise transmission.</p> <p>The project should also consider the need for the mitigation of impacts elsewhere on the road and rail networks that have been identified as arising from the development, according to Government policy.</p>	
Noise	5.195	<p>The Secretary of State should not grant development consent unless satisfied that the proposals will meet, the following aims, within the context of Government policy on sustainable development:</p> <p>avoid significant adverse impacts on health and quality of life from noise as a result of the new development; mitigate and minimise other adverse impacts on health and quality of life from noise from the new development; and contribute to improvements to health and quality of life through the effective management and control of noise, where possible.</p>	As above. A Preliminary Health Impact Assessment has been undertaken, which covers the impact of noise.

Topic	Paragraph	Policy wording	How being met
Noise	5.199	<p>For most national network projects, the relevant Noise Insulation Regulations will apply. These place a duty on and provide powers to the relevant authority to offer noise mitigation through improved sound insulation to dwellings, with associated ventilation to deal with both construction and operational noise. An indication of the likely eligibility for such compensation should be included in the assessment. In extreme cases, the applicant may consider it appropriate to provide noise mitigation through the compulsory acquisition of affected properties in order to gain consent for what might otherwise be unacceptable development. Where mitigation is proposed to be dealt with through compulsory acquisition, such properties would have to be included within the development consent order land in relation to which compulsory acquisition powers are being sought.</p>	As above.

Topic	Paragraph	Policy wording	How being met
Water resources	5.223	<p>Any environmental statement should describe:</p> <ul style="list-style-type: none"> • the existing quality of waters affected by the proposed project; • existing water resources affected by the proposed project and the impacts of the proposed project on water resources; • existing physical characteristics of the water environment (including quantity and dynamics of flow) affected by the proposed project, and any impact of physical modifications to these characteristics; • any impacts of the proposed project on water bodies or protected areas under the 	<p>An assessment of the effects of the Scheme on the water environment, including: hydrology, hydrological receptors, flood risk and surface water drainage. Has been undertaken and is reported in the PEIR. Appropriate design and mitigation measures would be incorporated into the Scheme, including good practice site management. Consequently there would be a neutral significance during construction and operation. Further details will be developed prior to submission of the DCO.</p>

Topic	Paragraph	Policy wording	How being met
		<p>Water Framework Directive and source protection zones (SPZs) around potable groundwater abstractions; and</p> <ul style="list-style-type: none"> any cumulative effects. 	

B.3 London Plan

Topic	Paragraph	Policy wording	How being met
Growth	1.1	<p>DELIVERING THE STRATEGIC VISION AND OBJECTIVES FOR LONDON</p> <p>Strategic</p> <p>A Growth and change in London will be managed in order to realise the Mayor’s vision for London’s sustainable development to 2036 set out in paragraph 1.49 and his commitment to ensuring all Londoners enjoy a good, and improving quality of life sustainable over the life of this Plan and into the</p>	<p>The Silvertown Tunnel would support development in east London and the expected residential and employment growth in this area. This is set out in the Preliminary Outline Business Case and the Preliminary Case for the Scheme.</p>

Topic	Paragraph	Policy wording	How being met
		<p>future.</p> <p>B Growth will be supported and managed across all parts of London to ensure it takes place within the current boundaries of Greater London without:</p> <ul style="list-style-type: none"> a) encroaching on the Green Belt, or on London's protected open spaces b) having unacceptable Impacts on the environment. <p>The development of east London will be a particular priority to address existing need for development, regeneration and promotion of social and economic convergence with other parts of London and as the location of the largest opportunities for new homes and jobs.</p> <p>C Other mayoral plans and strategies, decisions on development proposals and investment priorities, and borough</p>	

Topic	Paragraph	Policy wording	How being met
		<p>DPDs and development decisions should aim to realise the objectives set out in paragraph 1.50 so that London should be:</p> <ul style="list-style-type: none"> a) a city that meets the challenges of economic and population growth b) an internationally competitive and successful city c) a city of diverse, strong, secure and accessible neighbourhoods d) a city that delights the senses e) a city that becomes a world leader in conserving the environment f) a city where it is easy, safe and convenient for everyone to access jobs, opportunities and facilities. 	
Growth	2.2	<p>POLICY 2.2 LONDON AND THE WIDER METROPOLITAN AREA Strategic A The Mayor and the GLA Group</p>	As above.

Topic	Paragraph	Policy wording	How being met
		<p>will, and other relevant agencies (particularly boroughs and subregional partnerships) should, work with regional, and sub-regional partnerships, local authorities and agencies in the East and South East of England to secure the sustainable development and management of growth in the wider metropolitan area and the greater south east of England and to co-ordinate approaches to other strategic issues of common concern.</p> <p>B The Mayor is committed to working with the planning authorities in the South East and the East of England regions through suitable arrangements to be established with local authorities and other appropriate partners.</p>	

Topic	Paragraph	Policy wording	How being met
		<p>C The Mayor will work with partners in neighbouring regions and appropriate parts of London to broadly align approaches (and, where appropriate, planning policy frameworks) and to lobby for timely and sufficient investment to realise the potential of, and address the challenges facing, the city region as a whole and areas within it (particularly the growth areas and corridors referred to in Policy 2.3), especially those dealing with population and economic growth, infrastructure and climate change.</p> <p>D Through this process the Mayor will seek to ensure that: a appropriate resources, particularly for transport (including ports and logistics) and other infrastructure (including open space, health, education and other services) are made available to secure the optimum development of the growth</p>	

Topic	Paragraph	Policy wording	How being met
		<p>areas and corridors as a whole and those parts which lie within London</p> <p>b common policies and procedures are followed to ensure that there is, so far as possible, a 'level playing field' particularly adjacent to London's boundaries. This will help to promote spatially balanced and sustainable economic growth, and to meet housing, energy and sustainability targets, and standards such as those for parking</p> <p>c integrated policies are developed for adaptation to and mitigation of climate change, logistics provision and the adaptation of shared infrastructure</p> <p>d jointly owned policies are developed to help rationalise commuting patterns, both at different times of the day and to encourage reverse commuting where appropriate, including the promotion of public transport</p>	

Topic	Paragraph	Policy wording	How being met
		<p>improvements to enhance access to key destinations e integration is achieved with other strategies to ensure that appropriate skills training is available and other barriers to work are overcome f common monitoring data are collected, reviewed and assessed on a regular basis with neighbouring local authorities, as appropriate g reviews of the London Plan have regard to relevant plans and strategies of neighbouring local authorities</p>	
Opportunity Areas	2.13	<p>OPPORTUNITY AREAS AND INTENSIFICATION AREAS Strategic A Within the opportunity and intensification areas shown in Map</p>	<p>Greenwich Peninsula and the Royal Docks are Opportunity Areas. Within the wider east London sub-regions there are 14 opportunity areas.</p>

Topic	Paragraph	Policy wording	How being met
		<p>2.4, the Mayor will:</p> <ul style="list-style-type: none"> a) provide proactive encouragement, support and leadership for partnerships preparing and implementing opportunity area planning frameworks to realize these areas' growth potential in the terms of Annex 1, recognising that there are different models for carrying these forward; or b) build on frameworks already developed ; and c) ensure that his agencies (including Transport for London) work collaboratively and with others to identify those opportunity and intensification areas that require public investment and intervention to achieve their growth potential d) encourage boroughs to progress and implement planning frameworks to realise the potential of 	<p>In Greenwich, the Royal Borough of Greenwich has resolved to grant the revised peninsula Masterplan pending a decision by the Mayor. TfL has been working closely with the developer and LPA (through the Greater London Authority) to ensure that the impact of the tunnel on the development proposals (existing or proposed) are minimised and vice versa. In Newham TfL has been working with the GLA as landowner and Newham as LPA to make passive provision for a future residential led scheme around the site of the tunnel portal. This is not supported by development plan policy at this stage.</p> <p>The land required to construct and operate the Silvertown Tunnel has been safeguarded by the Secretary of State for Transport (now transferred to the Mayor of London) since 1997. Therefore, the development plan and consequently, development proposals in the area respond to the</p>

Topic	Paragraph	Policy wording	How being met
		<p>intensification areas in the terms of Annex 1, and will provide strategic support where necessary.</p> <p>Planning decisions</p> <p>B Development proposals within opportunity areas and intensification areas should:</p> <p>a) support the strategic policy directions for the opportunity areas and intensification areas set out in Annex 1, and where relevant, in adopted opportunity area planning frameworks</p> <p>b) seek to optimise residential and non- residential output and densities, provide necessary social and other infrastructure to sustain growth, and, where appropriate, contain a mix of uses</p> <p>c) contribute towards meeting (or where appropriate, exceeding) the minimum guidelines for housing and/or indicative estimates for employment</p>	<p>Silvertown Tunnel.</p>

Topic	Paragraph	Policy wording	How being met
		capacity set out in Annex 1, tested as appropriate through opportunity area planning frameworks and/or local development frameworks d) realize scope for intensification associated with existing or proposed improvements in public transport accessibility, such as Crossrail, making better use of existing infrastructure and promote inclusive access including cycling and walking e) support wider regeneration (including in particular improvements to environmental quality) and integrate development proposals to the surrounding areas especially areas for regeneration. LDF preparation C (Not applicable)	
Regeneration Areas	2.14	AREAS FOR REGENERATION	Greenwich Peninsula is a regeneration area. The

Topic	Paragraph	Policy wording	How being met
		<p>Strategic A Within the areas for regeneration shown on Map 2.5 the Mayor will work with strategic and local partners to co-ordinate their sustained renewal by prioritising them for neighbourhood-based action and investment. LDF preparation B (Not applicable)</p>	<p>Preliminary Regeneration and Development Impact Report sets out how the scheme helps support regeneration.</p>
Equalities	3.1	<p>POLICY 3.1 ENSURING EQUAL LIFE CHANCES FOR ALL Strategic A The Mayor is committed to ensuring equal life chances for all Londoners. Meeting the needs and expanding opportunities for all Londoners – and where appropriate, addressing the barriers to meeting the needs of particular groups and communities</p>	<p>The impact of the scheme on equalities has been assessed in the Preliminary Equalities Impact Assessment.</p>

Topic	Paragraph	Policy wording	How being met
		<p>– is key to tackling the huge issue of inequality across London. Planning decisions B Development proposals should protect and enhance facilities and services that meet the needs of particular groups and communities. Proposals involving loss of these facilities without adequate justification or provision for replacement should be resisted.</p>	
Health	3.2	<p>IMPROVING HEALTH AND ADDRESSING HEALTH INEQUALITIES Strategic A The Mayor will take account of the potential impact of development proposals on health and health inequalities within London. The Mayor will work in partnership with the NHS in</p>	<p>The impact of the scheme on health has been assessed in the Preliminary Health Impact Assessment.</p>

Topic	Paragraph	Policy wording	How being met
		<p>London, boroughs and the voluntary and community sector as appropriate to reduce health inequalities and improve the health of all Londoners, supporting the spatial implications of the Mayor’s Health Inequalities Strategy.</p> <p>B The Mayor will promote London as a healthy place for all – from homes to neighbourhoods and across the city as a whole – by:</p> <ul style="list-style-type: none"> a) coordinating investment in physical improvements in areas of London that are deprived, physically run-down, and not conducive to good health b) coordinating planning and action on the environment, climate change and public health to maximise benefits and engage a wider range of partners in action c) promoting a strong and diverse economy providing opportunities for 	

Topic	Paragraph	Policy wording	How being met
		<p>all. C The impacts of major development proposals on the health and wellbeing of communities should be considered, for example through the use of Health Impact Assessments (HIA). Planning decisions D New developments should be designed, constructed and managed in ways that improve health and promote healthy lifestyles to help to reduce health inequalities. LDF Preparation E (Not applicable)</p>	
Economic growth	4.1	<p>POLICY 4.1 DEVELOPING LONDON'S ECONOMY Strategic A The Mayor will work with partners to:</p>	<p>The contribution of the Scheme towards developing London's economy is set out in the Preliminary Economic Assessment Report and the Preliminary Regeneration and Development Impact Report, which support the Preliminary</p>

Topic	Paragraph	Policy wording	How being met
		<p>a1 promote and enable the continued development of a strong, sustainable and increasingly diverse economy across all parts of London, ensuring the availability of sufficient and suitable workspaces in terms of type, size and cost, supporting infrastructure and suitable environments for larger employers and small and medium sized enterprises, including the voluntary and community sectors</p> <p>a2 maximise the benefits from new infrastructure to secure sustainable growth and development</p> <p>b drive London’s transition to a low carbon economy and to secure the range of benefits this will bring</p> <p>c support and promote outer London as an attractive location for national government as well as businesses, giving access to the highly-skilled London workforce,</p>	<p>Outline Business Case.</p>

Topic	Paragraph	Policy wording	How being met
		<p>relatively affordable work space and the competitive advantages of the wider London economy</p> <p>d support and promote the distinctive and crucial contribution to London’s economic success made by central London and its specialist clusters of economic activity</p> <p>e sustain the continuing regeneration of inner London and redress its persistent concentrations of deprivation</p> <p>f emphasise the need for greater recognition of the importance of enterprise and innovation</p> <p>g promote London as a suitable location for European and other international agencies and businesses.</p>	
Equalities	4.12	IMPROVING OPPORTUNITIES	The impact of the scheme on equalities has been

Topic	Paragraph	Policy wording	How being met
		<p>FOR ALL</p> <p>Strategic</p> <p>A Working with strategic partners, principally the London Enterprise Partnership, the Mayor will provide the spatial context to co-ordinate the range of national and local initiatives necessary to improve employment opportunities for Londoners, to remove barriers to employment and progression and to tackle low participation in the labour market.</p> <p>Planning decisions</p> <p>B Strategic development proposals should support local employment, skills development and training opportunities.</p>	<p>assessed in the Preliminary Equalities Impact Assessment.</p> <p>The scheme would support local employment and skills development through the provision of apprenticeships and local employment opportunities during construction and operation.</p>
Climate Change	5.1	<p>CLIMATE CHANGE MITIGATION</p> <p>Strategic</p> <p>A The Mayor seeks to achieve an</p>	<p>Climate change adaptability has been assessed in the PEIR and through the Preliminary Sustainability Statement.</p>

Topic	Paragraph	Policy wording	How being met
		<p>overall reduction in London’s carbon dioxide emissions of 60 per cent (below 1990 levels) by 2025. It is expected that the GLA Group, London boroughs and other organisations will contribute to meeting this strategic reduction target, and the GLA will monitor progress towards its achievement annually.</p> <p>LDF preparation</p> <p>B Within LDFs boroughs should develop detailed policies and proposals that promote and are consistent with the achievement of the Mayor’s strategic carbon dioxide emissions reduction target for London.</p>	
Sustainable design and Construction	5.3	<p>SUSTAINABLE DESIGN AND CONSTRUCTION</p> <p>Strategic</p>	<p>The Preliminary Design and Access Statement sets out how good design has been applied. This is supported by a sustainability assessment using</p>

Topic	Paragraph	Policy wording	How being met
		<p>A The highest standards of sustainable design and construction should be achieved in London to improve the environmental performance of new developments and to adapt to the effects of climate change over their lifetime. Planning decisions</p> <p>B Development proposals should demonstrate that sustainable design standards are integral to the proposal, including its construction and operation, and ensure that they are considered at the beginning of the design process.</p> <p>C Major development proposals should meet the minimum standards outlined in the Mayor’s supplementary planning guidance and this should be clearly demonstrated within a design and access statement. The standards include measures to achieve other policies in this Plan and the</p>	<p>CEEQUAL and set out in the Preliminary Sustainability Statement.</p>

Topic	Paragraph	Policy wording	How being met
		<p>following sustainable design principles:</p> <ul style="list-style-type: none"> a) minimising carbon dioxide emissions across the site, including the building and services (such as heating and cooling systems) b) avoiding internal overheating and contributing to the urban heat island effect c) efficient use of natural resources (including water), including making the most of natural systems both within and around buildings d) minimising pollution (including noise, air and urban runoff) e) minimising the generation of waste and maximising reuse or recycling f) avoiding impacts from natural hazards (including flooding) g) ensuring developments are comfortable and secure for users, including avoiding the creation of adverse local climatic conditions 	

Topic	Paragraph	Policy wording	How being met
		h) securing sustainable procurement of materials, using local supplies where feasible, and i) promoting and protecting biodiversity and green infrastructure. LDF preparation D (Not applicable)	
Decentralised energy	5.5	5.5 DECENTRALISED ENERGY NETWORKS Strategic A The Mayor expects 25 per cent of the heat and power used in London to be generated through the use of localised decentralised energy systems by 2025. In order to achieve this target the Mayor prioritises the development of decentralised heating and cooling networks at the development and area wide levels,	A Preliminary Energy Statement has been produced and is appended to the PEIR. The Energy Statement explores the potential for decentralised energy networks. Given the negligible heating demands of the Scheme, the potential for carbon savings through connection to a heat network will be minimal. The cost and embodied energy associated with the infrastructure required to allow this connection would therefore significantly exceed the benefits of the connection. In contrast, the extensive electrical requirements expected warrants further

Topic	Paragraph	Policy wording	How being met
		<p>including larger scale heat transmission networks.</p> <p>LDF preparation</p> <p>B Within LDFs boroughs should develop policies and proposals to identify and establish decentralised energy network opportunities. Boroughs may choose to develop this as a supplementary planning document and work jointly with neighbouring boroughs to realise wider decentralised energy network opportunities. As a minimum boroughs should:</p> <ul style="list-style-type: none"> a identify and safeguard existing heating and cooling networks b identify opportunities for expanding existing networks and establishing new networks. <p>Boroughs should use the London Heat Map tool and consider any new developments, planned major infrastructure works and energy supply opportunities</p>	<p>investigation</p>

Topic	Paragraph	Policy wording	How being met
		<p>which may arise</p> <p>c develop energy master plans for specific decentralised energy opportunities which identify:</p> <ul style="list-style-type: none"> – major heat loads (including anchor heat loads, with particular reference to sites such as universities, hospitals and social housing) – major heat supply plant – possible opportunities to utilise energy from waste – possible heating and cooling network routes – implementation options for delivering feasible projects, considering issues of procurement, funding and risk and the role of the public sector <p>d require developers to prioritise connection to existing or planned decentralised energy networks where feasible.</p>	

Topic	Paragraph	Policy wording	How being met
Renewable Energy	5.7	<p>RENEWABLE ENERGY</p> <p>Strategic</p> <p>A The Mayor seeks to increase the proportion of energy generated from renewable sources, and expects that the projections for installed renewable energy capacity outlined in the Climate Change Mitigation and Energy Strategy and in supplementary planning guidance will be achieved in London.</p> <p>Planning decisions</p> <p>B Within the framework of the energy hierarchy (see Policy 5.2), major development proposals should provide a reduction in expected carbon dioxide emissions through the use of on-site renewable energy generation, where feasible.</p> <p>LDF preparation</p>	<p>The Preliminary Energy Statement assesses the potential for on site renewable energy production. There are a number of constraints associated with the Scheme when considering the installation of renewable energy and low carbon technologies. There is the potential for a small amount of Solar PV at the Portal entrances. This will need to be investigated further.</p>

Topic	Paragraph	Policy wording	How being met
		<p>C Within LDFs boroughs should, and other agencies may wish to, develop more detailed policies and proposals to support the development of renewable energy in London – in particular, to identify broad areas where specific renewable energy technologies, including large scale systems and the large scale deployment of small scale systems, are appropriate. The identification of areas should be consistent with any guidelines and criteria outlined by the Mayor.</p> <p>D All renewable energy systems should be located and designed to minimise any potential adverse impacts on biodiversity, the natural environment and historical assets, and to avoid any adverse impacts on air quality.</p>	

Topic	Paragraph	Policy wording	How being met
Urban Greening	5.10	<p>URBAN GREENING Strategic A The Mayor will promote and support urban greening, such as new planting in the public realm (including streets, squares and plazas) and multifunctional green infrastructure, to contribute to the adaptation to, and reduction of, the effects of climate change. B The Mayor seeks to increase the amount of surface area greened in the Central Activities Zone by at least five per cent by 2030, and a further five per cent by 2050.¹⁸⁶ Planning decisions C Development proposals should integrate green infrastructure from the beginning of the design process to contribute to urban greening, including the public realm. Elements that can contribute to this</p>	<p>The Preliminary Design and Access Statement (DAS) sets out the proposals for the urban realm around the portals. Although it is proposed that the details would be provided through a Requirement (planning condition) the design principles are included in the DAS. The intention is to deliver a high quality urban realm with landscaping and green space where possible.</p>

Topic	Paragraph	Policy wording	How being met
		<p>include tree planting, green roofs and walls, and soft landscaping. Major development proposals within the Central Activities Zone should demonstrate how green infrastructure has been incorporated.</p> <p>LDF preparation D (Not applicable)</p>	
Green Roofs	5.11	<p>POLICY 5.11 GREEN ROOFS AND DEVELOPMENT SITE ENVIRONS</p> <p>Planning decisions</p> <p>A Major development proposals should be designed to include roof, wall and site planting, especially green roofs and walls where feasible, to deliver as many of the following objectives as possible:</p> <ul style="list-style-type: none"> a adaptation to climate change (i.e. aiding cooling) b sustainable urban drainage 	

Topic	Paragraph	Policy wording	How being met
		c mitigation of climate change (i.e. aiding energy efficiency) d enhancement of biodiversity e accessible roof space f improvements to appearance and resilience of the building g growing food.	
Flood Risk	5.12	FLOOD RISK MANAGEMENT Strategic A The Mayor will work with all relevant agencies including the Environment Agency to address current and future flood issues and minimise risks in a sustainable and cost effective way. Planning decisions B Development proposals must comply with the flood risk assessment and management requirements set out in the NPPF and the	A Flood Risk Assessment has been undertaken and is appended to the PEIR. The Flood Risk Assessment concludes that through the design and operation of a Flood Warning and Evacuation Plan, the Scheme will remain safe in times of flood and that there will be no increase in flood risk to third parties.

Topic	Paragraph	Policy wording	How being met
		<p>associated technical Guidance on flood risk¹⁸⁹ over the lifetime of the development and have regard to measures proposed in Thames Estuary 2100 (TE2100 – see paragraph 5.55) and Catchment Flood Management Plans.</p> <p>C Developments which are required to pass the Exceptions Test set out in the NPPF and the Technical Guidance will need to address flood resilient design and emergency planning by demonstrating that:</p> <ul style="list-style-type: none"> a) the development will remain safe and operational under flood conditions b) a strategy of either safe evacuation and/or safely remaining in the building is followed under flood conditions c) key services including electricity, water etc. will continue to be 	

Topic	Paragraph	Policy wording	How being met
		<p>provided under flood conditions d) buildings are designed for quick recovery following a flood. D Development adjacent to flood defences will be required to protect the integrity of existing flood defences and wherever possible should aim to be set back from the banks of watercourses and those defences to allow their management, maintenance and upgrading to be undertaken in a sustainable and cost effective way. LDF preparation E (Not applicable)</p>	
Sustainable drainage	5.13	<p>POLICY 5.13 SUSTAINABLE DRAINAGE Planning decisions A Development should utilise sustainable urban drainage systems (SUDS) unless there are</p>	<p>The Preliminary Engineering Report sets out the drainage design for the Scheme, which includes Sustainable Urban Drainage Systems (SuDS).</p>

Topic	Paragraph	Policy wording	How being met
		<p>practical reasons for not doing so, and should aim to achieve greenfield run-off rates and ensure that surface water run-off is managed as close to its source as possible in line with the following drainage hierarchy:</p> <ol style="list-style-type: none"> 1 store rainwater for later use 2 use infiltration techniques, such as porous surfaces in non-clay areas 3 attenuate rainwater in ponds or open water features for gradual release 4 attenuate rainwater by storing in tanks or sealed water features for gradual release 5 discharge rainwater direct to a watercourse 6 discharge rainwater to a surface water sewer/drain 7 discharge rainwater to the combined sewer. 	

Topic	Paragraph	Policy wording	How being met
		<p>Drainage should be designed and implemented in ways that deliver other policy objectives of this Plan, including water use efficiency and quality, biodiversity, amenity and recreation.</p>	
Construction Waste	5.18	<p>CONSTRUCTION, EXCAVATION AND DEMOLITION WASTE Planning decisions A New construction, excavation and demolition (CE&D) waste management facilities should be encouraged at existing waste sites, including safeguarded wharves, and supported by:</p> <ul style="list-style-type: none"> a) using mineral extraction sites for CE&D recycling b) ensuring that major development sites are required to recycle CE&D waste on-site, wherever 	<p>A Preliminary Site Waste Management Plan (SWMP) has been prepared and is appended to the PEIR. Contaminated waste may be treated on site or removed to licenced facilities depending on the nature of the contamination. The SWMP details the available waste management and disposal sites and their capacities.</p> <p>There would be beneficial waste reuse. Initial discussions with Wallasea Island (RSPB) have indicated that there is sufficient capacity for the 'clean' waste arising from construction of the Silvertown Tunnel. Discussions with RSPB and others will continue as more information about</p>

Topic	Paragraph	Policy wording	How being met
		<p>practicable, supported through planning conditions.</p> <p>B Waste should be removed from construction sites, and materials brought to the site, by water or rail transport wherever that is practicable.</p> <p>LDF preparation</p> <p>C (Not applicable)</p>	<p>the waste arisings is known.</p> <p>As far as is practicable, waste would be removed from site and materials brought to site by river. A new jetty would be constructed to facilitate use of the river.</p>
Transport Connectivity	6.4	<p>ENHANCING LONDON'S TRANSPORT CONNECTIVITY Strategic</p> <p>A The Mayor will work with strategic partners in neighbouring regions to:</p> <p>a) ensure effective transport policies and projects to support the sustainable development of the London city region and the wider south east of England</p> <p>b) develop efficient and effective cross-boundary transport services</p>	<p>The Scheme would provide opportunities to enhance the cross-river bus network, linking new and existing communities, businesses, jobs and services, by providing additional river crossing capacity and improving the performance of the existing Blackwall Tunnel. The Silvertown Tunnel would include a dedicated bus/HGV lane and is of sufficient height to accommodate double-deck buses.</p>

Topic	Paragraph	Policy wording	How being met
		<p>and policies – including exploring the scope for high speed rail services reducing the need for short- and some medium-haul air travel.</p> <p>B The Mayor will work with strategic partners to improve the public transport system in London, including cross- London and orbital rail links to support future development and regeneration priority areas, and increase public transport capacity by:</p> <ul style="list-style-type: none"> a) implementing Crossrail, the Mayor’s top strategic transport priority for London (see Policy 6.5 and paragraph 6.21) b) completing upgrades to, and extending, the London Underground network c) implementing a high frequency London wide service on the national rail network d) enhancing the different 	

Topic	Paragraph	Policy wording	How being met
		<p>elements of the London Overground network to implement an orbital rail network</p> <p>e) completing the Thameslink programme</p> <p>f) developing the Chelsea–Hackney line (Crossrail 2) later in the plan period</p> <p>g) improving and expanding London’s international and national transport links for passengers and freight (for example, High Speed 2)</p> <p>h) seeking improved access by public transport to airports, ports and international rail termini</p> <p>i) improving the reliability, quality and safety of inter-regional rail services including domestic services for commuters, while safeguarding services within London</p> <p>j) enhancing the Docklands Light Railway and Tramlink networks</p>	

Topic	Paragraph	Policy wording	How being met
		k) providing new river crossings LDF preparation C (Not applicable)	
Smoothing traffic flow	6.11	<p>SMOOTHING TRAFFIC FLOW AND TACKLING CONGESTION Strategic</p> <p>A The Mayor wishes to see DPDs and Local Implementation Plans (LIPs) take a coordinated approach to smoothing traffic flow and tackling congestion through implementation of the recommendations of the Roads Task Force report. The Mayor will use his powers where appropriate. LDF preparation</p> <p>B DPDs should develop an integrated package of measures drawn from the following:</p> <p>a) promoting local services and e-</p>	<p>The Preliminary Transport Assessment sets out how the Scheme would tackle the significant congestion at the Blackwall Tunnel. The scheme includes a user charge which would be used to manage demand for the new tunnel and for the Blackwall Tunnel.</p>

Topic	Paragraph	Policy wording	How being met
		<p>services to reduce the need to travel</p> <ul style="list-style-type: none"> b) improving the extent and quality of pedestrian and cycling routes c) making greater use of the Blue Ribbon Network d) improving the extent and quality of public transport e) developing intelligent transport systems to convey information to transport users f) developing integrated and comprehensive travel planning advice g) promoting and encouraging car sharing and car clubs h) smoothing traffic flow to improve journey time reliability i) applying the London street-types framework to ensure that the needs of street users and improvements to the public realm are dealt with in a co-ordinated way j) promoting efficient and 	

Topic	Paragraph	Policy wording	How being met
		sustainable arrangements for the transportation and delivery of freight.	
Road Network Capacity	6.12	<p>ROAD NETWORK CAPACITY Strategic</p> <p>A The Mayor supports the need for limited improvements to London’s road network, whether in improving or extending existing capacity, or providing new links, to address clearly identified significant strategic or local needs.</p> <p>Planning decisions</p> <p>B In assessing proposals for increasing road capacity, including new roads, the following criteria should be taken into account:</p> <p>a) the contribution to London’s sustainable development and regeneration including improved</p>	<p>The Scheme would increase network capacity by constructing a new cross-river link. The need for the Tunnel is set out in the London Plan and Mayors Transport Strategy. Further optioneering has been undertaken and is set out in the Preliminary Case for the Scheme.</p> <p>The Preliminary Regeneration and Development Impact Report sets out the effects on the Scheme on regeneration, including faster and more reliable journey times for businesses; improvements in access to jobs, the labour market, customers and suppliers; and higher levels of inward investment and faster rates of development.</p> <p>The Preliminary Transport Assessment sets out</p>

Topic	Paragraph	Policy wording	How being met
		<p>connectivity</p> <p>b) the extent of any additional traffic and any effects it may have on the locality, and the extent to which congestion is reduced</p> <p>c) how net benefit to London's environment can be provided</p> <p>d) how conditions for pedestrians, cyclists, public transport users, freight and local residents can be improved</p> <p>e) how safety for all is improved.</p> <p>C Proposals should show, overall, a net benefit across these criteria when taken as a whole. All proposals must show how any dis-benefits will be mitigated.</p>	<p>the effects of the Scheme on the road network. The implementation of the user charge will manage demand for the Silvertown and Blackwall Tunnels. There would not be any significant growth in traffic as a result of the Scheme. The Scheme would effectively eliminate congestion at the crossings.</p> <p>The PEIR sets out the effects of the Scheme on the environment. There would be a net benefit to air quality and noise as a result of the Scheme. However there are receptors that would experience a worsening. The PEIR sets out proposed mitigation.</p> <p>The Scheme design enhances pedestrian and cycle links on either side of the tunnel, better connecting existing networks. These are detailed in the Design and Access Statement and the Transport Assessment. The Scheme would be designed making passive provision for future</p>

Silvertown Tunnel

Preliminary Case for the Scheme

Topic	Paragraph	Policy wording	How being met
			<p>development on either side thereby seeking to enhance</p> <p>The Scheme supports improved public transport provision with plans for much greater bus provision through the tunnel. A dedicated bus and HGV lane would improve conditions for public transport and freight users.</p> <p>Safety has been addressed through the design of the tunnel, approach roads and junction tie-ins. Pedestrian and cyclist safety has been addressed through the design of the junction tie-ins and road crossings (e.g. Boord Street pedestrian and cycle bridge).</p>

Topic	Paragraph	Policy wording	How being met
Safety	7.13	<p>SAFETY, SECURITY AND RESILIENCE TO EMERGENCY Strategic</p> <p>A The Mayor will work with relevant stakeholders and others to ensure and maintain a safe and secure environment in London that is resilient against emergencies including fire, flood, weather, terrorism and related hazards as set out in the London Risk Register. Planning decisions</p> <p>B Development proposals should contribute to the minimisation of potential physical risks, including those arising as a result of fire, flood and related hazards. Development should include measures to design out crime that, in proportion to the risk, deter terrorism, assist in the detection of terrorist activity and help defer its effects.</p> <p>LDF preparation</p>	<p>The Scheme includes road (and tunnel) safety measures. These are set out in the Preliminary Engineering Report. The tunnel design includes measures, such as footways and cross-passages to allow safe and efficient movement of people in the event of an emergency; a fixed fire-fighting system; Variable Message Signs (VMS) and traffic signals to effectively close the tunnel during an incident; permanent monitoring by closed circuit television (CCTV) from a dedicated control room; automatic incident and fire detection systems linked to automatic system operation (where appropriate) and alerting the operator to the incident location; and tunnel emergency points with fire extinguishers, emergency telephones and alarm call-points to allow road users to make contact with the operators in order to seek assistance.</p> <p>TfL has engaged actively with the emergency services throughout the design of the tunnel.</p>

Topic	Paragraph	Policy wording	How being met
		C (Not applicable)	
Air Quality	7.14	<p>IMPROVING AIR QUALITY Strategic A The Mayor recognises the importance of tackling air pollution and improving air quality to London’s development and the health and well-being of its people. He will work with strategic partners to ensure that the spatial, climate change, transport and design policies of this plan support implementation of his Air Quality and Transport strategies to achieve reductions in pollutant emissions and minimize public exposure to pollution.</p> <p>Planning decisions B Development proposals should: a) minimise increased exposure to existing poor air quality and make</p>	<p>The PEIR sets out the assessment of effect on air quality resulting from the Scheme. This assessment concludes that the Scheme will not result in the delay of the Greater London zone/agglomeration achieving compliance. There will be an overall net benefit in air quality across the study area.</p> <p>A programme of monitoring and mitigation will ensure that air quality levels continue to meet compliance timescales. The user charge will be adjusted as necessary to manage the effects of the Scheme.</p>

Topic	Paragraph	Policy wording	How being met
		<p>provision to address local problems of air quality (particularly within Air Quality Management Areas (AQMAs) and where development is likely to be used by large numbers of those particularly vulnerable to poor air quality, such as children or older people) such as by design solutions, buffer zones or steps to promote greater use of sustainable transport modes through travel plans (see Policy 6.3)</p> <p>b) promote sustainable design and construction to reduce emissions from the demolition and construction of buildings following the best practice guidance in the GLA and London Councils' 'The control of dust and emissions from construction and demolition'</p> <p>c) be at least 'air quality neutral' and not lead to further deterioration of existing poor air</p>	

Topic	Paragraph	Policy wording	How being met
		<p>quality (such as areas designated as Air Quality Management Areas (AQMAs)).</p> <p>d) ensure that where provision needs to be made be made to reduce emissions from a development, this is usually made on- site. Where it can be demonstrated that on-site provision is impractical or inappropriate, and that it is possible to put in place measures having clearly demonstrated equivalent air quality benefits, planning obligations or planning conditions should be used as appropriate to ensure this, whether on a scheme by scheme basis or through joint area-based approaches</p> <p>e) where the development requires a detailed air quality assessment and biomass boilers are included, the assessment should forecast pollutant concentrations.</p>	

Topic	Paragraph	Policy wording	How being met
		<p>Permission should only be granted if no adverse air quality impacts from the biomass boiler are identified.</p>	
Noise	7.15	<p>REDUCING AND MANAGING NOISE, IMPROVING AND ENHANCING THE ACOUSTIC ENVIRONMENT AND PROMOTING APPROPRIATE SOUNDSCAPES Strategic A The transport, spatial and design policies of this plan will be implemented in order to reduce and manage noise to improve health and quality of life and support the objectives of the Mayor’s Ambient Noise Strategy. Planning decisions B Development proposals should seek to manage noise by:</p>	<p>A noise assessment has been undertaken and is reported in the PEIR. Mitigation is proposed to address adverse effects identified. The assessment of the scheme in relation to short term operational noise indicates that there would be negligible or minor changes in road traffic noise at the majority of receptors with a net gain of 1,302 residential dwellings experiencing a perceptible decrease in noise level. Long term assessment results indicate that there would be negligible, or no-change, in road traffic noise at the majority of receptors during the day time. Moderate adverse impacts would be limited to a small number of receptors in the immediate vicinity of the Tidal Basin Roundabout.</p>

Topic	Paragraph	Policy wording	How being met
		<p>a) avoiding significant adverse noise impacts on health and quality of life as a result of new development;</p> <p>b) mitigating and minimising the existing and potential adverse impacts of noise on, from, within, as a result of, or in the vicinity of new development without placing unreasonable restrictions on development or adding unduly to the costs and administrative burdens on existing businesses;</p> <p>c) improving and enhancing the acoustic environment and promoting appropriate soundscapes (including Quiet Areas and spaces of relative tranquillity);</p> <p>d) separating new noise sensitive development from major noise sources (such as road, rail, air transport and some types of industrial development) through the</p>	<p>Noise barriers and low noise surfacing have been incorporated into the Scheme. Opportunities for addressing existing noise issues in the vicinity of the Scheme are being explored with the host boroughs.</p>

Topic	Paragraph	Policy wording	How being met
		<p>use of distance, screening or internal layout – in preference to sole reliance on sound insulation;</p> <p>e) where it is not possible to achieve separation of noise sensitive development and noise sources, without undue impact on other sustainable development objectives, then any potential adverse effects should be controlled and mitigated through the application of good acoustic design principles;</p> <p>f) having particular regard to the impact of aviation noise on noise sensitive development;</p> <p>g) promoting new technologies and improved practices to reduce noise at source, and on the transmission path from source to receiver.</p> <p>LDF preparation C (Not applicable)</p>	

Topic	Paragraph	Policy wording	How being met
Biodiversity	7.19	<p>BIODIVERSITY AND ACCESS TO NATURE Strategic A The Mayor will work with all relevant partners to ensure a proactive approach to the protection, enhancement, creation, promotion and management of biodiversity in support of the Mayor’s Biodiversity Strategy. This means planning for nature from the beginning of the development process and taking opportunities for positive gains for nature through the layout, design and materials of development proposals and appropriate biodiversity action plans. B Any proposals promoted or brought forward by the London Plan will not adversely affect the integrity of any European site of nature</p>	<p>The effect of the Scheme on biodiversity has been assessed in the PEIR with appropriate mitigation proposed. Significant residual adverse effects are not anticipated.</p>

Topic	Paragraph	Policy wording	How being met
		<p>conservation importance (to include special areas of conservation (SACs), special protection areas (SPAs), Ramsar, proposed and candidate sites) either alone or in combination with other plans and projects. Whilst all development proposals must address this policy, it is of particular importance when considering the following policies within the London Plan: 1.1, 2.1-2.17, 3.1, 3.3, 3.7, 5.4A, 5.14, 5.15, 5.17, 5.20, 6.3, 6.9, 7.14, 7.15, 7.25 – 7.27 and 8.1. Whilst all opportunity and intensification areas must address the policy in general, specific locations requiring consideration are referenced in Annex 1.</p> <p>Planning decisions</p> <p>C Development Proposals should:</p> <p>a) wherever possible, make a positive contribution to the protection, enhancement, creation</p>	

Topic	Paragraph	Policy wording	How being met
		<p>and management of biodiversity b) prioritise assisting in achieving targets in biodiversity action plans (BAPs), set out in Table 7.3, and/or improving access to nature in areas deficient in accessible wildlife sites c) not adversely affect the integrity of European sites and be resisted where they have significant adverse impact on European or nationally designated sites or on the population or conservation status of a protected species or a priority species or habitat identified in a UK, London or appropriate regional BAP or borough BAP.</p>	
River Thames	7.29	<p>THE RIVER THAMES Strategic A The River Thames is a strategically important and iconic</p>	<p>The Scheme does not adversely impact on the role or function of the River Thames. The use of the river would be maximised during construction and a navigational risk assessment has been</p>

Topic	Paragraph	Policy wording	How being met
		feature of London. This role should be protected and promoted. Planning decisions B Development proposals within the Thames Policy Area identified in LDFs should be consistent with the published Thames Strategy for the particular stretch of river concerned. LDF preparation C (Not applicable)	undertaken and is appended to the PEIR.

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Appendix C PRELIMINARY MONITORING AND MITIGATION STRATEGY

C.1 Introduction

- C.1.1 This document presents a draft strategy for monitoring and mitigating the traffic and associated noise and air quality impacts arising from the operation of the Silvertown Tunnel scheme ('the Scheme').
- C.1.2 It outlines the scope of the monitoring that Transport for London (TfL) proposes to undertake in relation to each impact, the potential range of mitigation measures that could be employed, where necessary, to address any adverse impacts, and the process by which the triggers for mitigation would be developed in consultation with the relevant boroughs and other stakeholders.
- C.1.3 The draft strategy is one of a number of preliminary documents relating to the Scheme being presented by TfL for the purposes of statutory consultation on the proposed Development Consent Order (DCO) application for the Scheme. The draft strategy will be further developed taking into account responses received during the consultation and will be informed by the results of continuing traffic and environmental modelling and assessments that TfL will be completing prior to submitting the DCO application.
- C.1.4 A final Monitoring and Mitigation Strategy will be submitted with the DCO.

C.2 Background

- C.2.1 TfL is undertaking an Environmental Impact Assessment (EIA) in accordance with the Infrastructure Planning (Environmental Impact Assessment) Regulations 2009 to form part of an application for a DCO for the Silvertown Tunnel. The EIA will assess the likely significant environmental effects, including traffic and transport effects, of constructing and operating the Silvertown Tunnel, including those associated with imposing a user charge on both the Silvertown and Blackwall Tunnels. The EIA process will also identify where mitigation is proposed to prevent, reduce and where possible offset any significant adverse effects of the Scheme on the environment. A Preliminary Environmental Information Report has been prepared setting out the likely significant effects as TfL understands them at this stage of the project.

- C.2.2 Where the EIA identifies the need for mitigation of effects of the Scheme, appropriate measures will be secured through the DCO. The EIA is based on robust modelling and assumptions about how east London will change socially, economically and environmentally between now and the Tunnel opening in 2022/23 (and beyond). East and south-east London is changing rapidly and significant population and economic growth is expected in the next few years. The GLA forecasts show that London will grow by around 1.2m people between 2011 and 2031. The east and south-east London boroughs are expected to accommodate more than a third of this growth, while the three Silvertown Tunnel host boroughs plus Barking and Dagenham will account for nearly a quarter in themselves.
- C.2.3 These changing conditions affect the degree of precision that can be accorded to predictions of detailed likely significant effects occurring many years into the future. While the strategic implications of this forecast growth are clear now, at the detailed planning level it will shape the area in ways that cannot be entirely accurately predicted today. For example, Appendix C of the Preliminary Transport Assessment explains the sensitivity of traffic flows at local junctions in response to even small changes to the transport network. TfL and the boroughs are working on a wide-ranging programme of local network and junction improvements across east and south-east London, some of which could potentially interact with the Scheme's area of influence. Many of the projects and programmes will have relatively short gestation periods as they can be delivered under existing highway and traffic authority powers. Therefore, it is appropriate at this stage to adopt a flexible approach to mitigation based on a comprehensive monitoring regime to identify actual impacts following Scheme opening.
- C.2.4 Noise and air quality impacts may also be sensitive to changes in traffic flows, even at the local level. Therefore relatively small changes resulting from external factors, for example local development, uptake of new technology (e.g. low emission vehicles), or implementation of currently uncommitted traffic and transport schemes, could have unforeseen impacts.
- C.2.5 Therefore, in addition to mitigating any significant adverse impacts that are specifically identified by the EIA process, TfL is committed to monitoring of the noise, air quality and traffic impacts of the Scheme after the Silvertown Tunnel has opened. This monitoring regime would ensure that the effects of the Scheme are properly understood on a continuing basis and that appropriate mitigation measures can be put in place. The

regime will address all significant impacts that are attributable to the Scheme, whether or not they had been predicted by the EIA.

- C.2.6 This approach is also in the spirit of the 2014 EIA Directive which requires projects identifying significant adverse effects to be monitored. The amended Directive must be transposed into national legislation by Member States by 2017 and therefore does not currently apply to the Silvertown Tunnel EIA process. However, TfL is proposing to adopt the principle of this approach as good practice.

C.3 Traffic monitoring

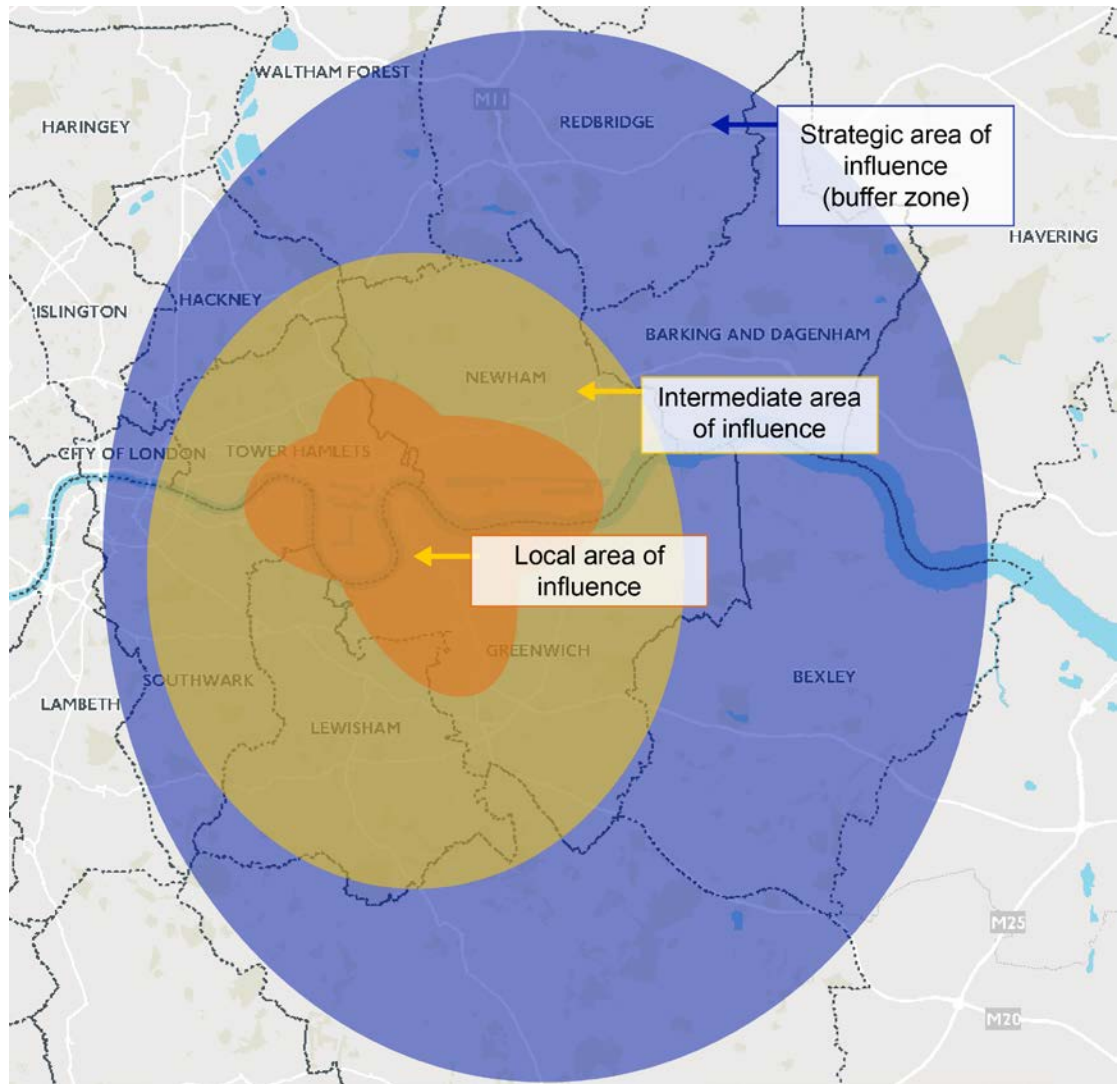
- C.3.1 This section sets out TfL's proposed approach to monitoring the traffic impacts of the Scheme and the process for designing and implementing measures to mitigate any significant adverse traffic effects across the affected road network. The monitoring of traffic is fundamental to the overall monitoring and mitigation strategy of the Scheme because it is primarily the traffic flows and changes in those flows that may or may not give rise to any adverse noise and/or air quality impacts.

- C.3.2 Designing the traffic monitoring and mitigation strategy has been informed by the nature, scale, timing and location of traffic impacts, based on the Preliminary Transport Assessment for the Scheme.

Geographical scope

- C.3.3 The geographical scope of the traffic monitoring regime needs to be wide enough to fully capture the discrete traffic impacts of the Scheme on the network while being able to distinguish effects of changes brought about by other interventions and factors that are independent of the Scheme.
- C.3.4 The proposed boundaries of the geographical scope of the traffic impacts monitoring are shown in Figure C-1. They have been drawn based on the area of influence (in terms of changes in traffic flow and delay) identified in the Assessed Case with the addition of a buffer zone around it. The proposed boundaries for monitoring are drawn generously and the strategy retains flexibility to adapt to be able to address where necessary any emerging pattern of effects and to manage stakeholder requirements.

Figure C-1: Geographical scope of traffic monitoring



C.3.5 Within this geographical area TfL would, in particular, evaluate traffic effects attributable to the Scheme on:

- strategic routes including the A2, A102, A13 and A12;
- the main local distributor roads including Trafalgar Road (A206), Lower Road (A200), Aspen Way (A1261), Silvertown Way/North Woolwich Road (A1020) and Victoria Dock Road (A112);
- adjacent river crossings (both the approaches to the crossings and the crossings themselves) including Woolwich Ferry, Rotherhithe Tunnel and Tower Bridge;

- major junctions including Kidbrooke Interchange, Preston's Roundabout and Leamouth Circus;
- areas of particular sensitivity including town centres e.g. Greenwich, Canning Town, Poplar and Woolwich (among others); and
- other local roads (to be agreed with the relevant boroughs)

C.3.6 TfL would identify and agree the locations for monitoring traffic and traffic effects in liaison with the relevant boroughs in advance of the commencement of the monitoring programme prior to Scheme opening. This will ensure 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 and enable pre-Scheme data to be collected for comparison purposes. The pre-Scheme monitoring area would be drawn widely to ensure data is available from a maximum number of locations to allow for effective pre- to post-Scheme comparisons. In addition, there are a number of existing data sources, such as Trafficmaster and Inrix, which can be used to enhance monitoring coverage, even if they lie outside the boundaries originally defined.

Timing and duration of monitoring

C.3.7 The traffic and associated effects of the Tunnel Scheme would be likely to become apparent over a range of timescales. For example, while changes to traffic patterns might be expected to reach a relatively stable position between three and six months after the opening of the Scheme, traffic effects resulting from the strategic operational decisions of businesses relating to relocation and the new commercial opportunities being unlocked by the Scheme would be likely to become apparent over a longer time period.

C.3.8 It is reasonably expected that the identifiable traffic impacts on the wider road network occurring as a result of the Scheme being introduced would likely materialise within five years of the Tunnel coming into operation. This is, accordingly, the timescale set for the traffic monitoring and mitigation strategy.

C.3.9 TfL would start the pre-Scheme monitoring process and carry out local modelling two to three years in advance of Scheme opening. This would form the baseline for comparison purposes with post-Scheme opening traffic conditions. If modelling at this stage showed a clear need for

mitigation at Scheme opening, this would be implemented following the same procedures as post-Scheme opening mitigation outlined here.

- C.3.10 Following the opening of the Silvertown Tunnel, detailed traffic data would be collected on an annual basis for a period of five years. This would include a combination of data sources, some of which allow for data to be continuously collected throughout the year (e.g. traffic cameras, Trafficmaster, ibus, mobile phones) and others which apply to a fixed point in time (e.g. additional counts, road side interviews). Further information on data sources is provided in Table C-1.
- C.3.11 At the end of the five year period, the traffic monitoring would revert to TfL's general network performance monitoring programme and form part the ongoing data gathering and analysis exercise conducted by TfL in carrying out its network management duty under the Traffic Management Act 2004.

Traffic metrics, data collection methods

- C.3.12 There are a range of different traffic metrics that would provide requisite information on the traffic impacts attributable to the opening and operation of the Scheme.
- C.3.13 Change in traffic flows is an important metric to assess the impacts of the Scheme. It is also important in order to assess the ability of the existing road network to cater for future demand. For example, an increase in traffic flows as a result of the Scheme could cause problems locally. However, an increase in flow would not necessarily lead to an adverse effect if there was sufficient network capacity (i.e. link or junction). Analysing the ratio of traffic volume to the capacity of the road would provide an insight into this – e.g. a link operating at 80% capacity may experience a greater adverse impact from a 10% increase in flow than a link operating at 40% capacity would from a 20% increase in flow.
- C.3.14 Link delay and junction delay, as well as queue lengths would also be important metrics to inform the judgment as to whether, and if so how, the local road network is being affected by the Scheme in operation.
- C.3.15 For future monitoring TfL would employ a combination of traffic data collection methods to enable a detailed picture of the effects of the Scheme to be built up. Table C-1 presents a 'menu' of these data collection methods. TfL would consult with the boroughs on the choice of method or combination of methods best suited to each relevant network

location. This exercise would be supplemented by the use of relevant existing data sources relating to these locations.

- C.3.16 The proposed menu of traffic data collection methods is shown in Table C-1. It is noted, however, that technology is improving and therefore the appropriate data collection method would be finally adopted closer to time of commencement of monitoring. The methodology adopted would then be kept under review throughout the monitoring period.

Table C-1: Menu of data collection methods

Data collection method	Description and purpose
Automatic traffic counts (ATCs)	Provide information on overall flow levels/traffic volumes for specific links. In its simplest form ATCs collect data on traffic volumes; also able to collect data on vehicle classification and speed. Most useful where large volumes of data are required and flows vary across the day. There are a number of technologies available: tubes/radar used for shorter term (typically two weeks); permanent counters can be installed (induction loops etc.) for longer term monitoring. These counters have difficulty distinguishing between vehicle types.
Manual classified counts (MCCs)	Most useful where there is an interest in the mix of traffic as even the most sophisticated ATCs have difficulties in distinguishing between certain types of vehicles. Can be used to supplement ATC data. MCC data can replace ATC data if collected over multiple days.
Junction turning counts	MCCs carried out as junction turning counts provide useful information on changes in traffic flow following the introduction of new schemes. Reliability is reduced when MCCs are only carried out on a single day

Data collection method	Description and purpose
Queue length surveys	Queue length surveys are essential to calibrate traffic models, and provide evidence of congestion and delays. Queue length data can be collected in vehicle numbers or distance. These can be done by on street observation or using cameras. These surveys are subject to the same reliability issues as other data if collected only on a single day.
Use of CCTV cameras	Taking full account of data protection principles, by using a process securing anonymity, data from TfL's traffic cameras along key corridors may be used to gain information on traffic volumes, vehicle classification and general traffic patterns.
Trafficmaster GPS data	Provides average journey time, delay and speed data. Can be used to obtain information on speed and delay on major roads including the Transport for London Road Network (TLRN), as well as local roads, though sample size for the latter is substantially smaller. Origin Destination and routing information is also available for the sample contained within the data.
Road side interviews	Road side interviews are a cost and resource intensive form of data collection but are extremely useful at providing information on why vehicles are using a particular route and the origins and destinations of trips. They also provide purpose, occupancy and other information. Further, questions can be added to the survey to focus on particular points.

Data collection method	Description and purpose
Automatic number plate recognition (APNR) data	Taking full account of data protection principles, by using a process securing anonymity, data from TfL's APNR cameras which would be installed at the Blackwall and Silvertown tunnels for user charge collection purposes could be used to obtain information on traffic volumes using the two tunnels. Can also provide journey time information when using multiple sets of cameras linked together (e.g. congestion charge or LCAP cameras). The DVLA database can also be interrogated to obtain information vehicle type, tax category etc.
Interview surveys	Data on traffic volumes could be supplemented with data from interviews (e.g. telephone, online) with charge payers to determine which routes they are using, why they are using particular routes and the origins and destinations of their trips.
Other GPS data (e.g. from Inrix , TomTom or ibus)	Data on traffic speeds, journey times and routes taken through the network can be extracted from this dataset. Origin Destination information can also be extracted.
Mobile Phone Network Operator Data	This has the potential to provide detailed origin destination information for users of the crossings or surrounding roads over time (e.g. by time of day, year etc.). It can also be used to monitor the impact of disruptions e.g. re-routing and journey times. This technology is very new and would require further validation of the capability; however, it is likely to have become more advanced by the time its implementation of the monitoring and mitigation strategy for the Scheme.
TfL SCOOT (Split Cycle Optimisation Offset Technique) data	There is an ongoing project looking at whether SCOOT loops installed at signalised junctions can be used to provide estimates of the level of traffic on particular links as well as queues and delays.

- C.3.17 Following the data collection process TfL would present an analysis and evaluation of the data in the form of an Annual Monitoring Report (see also Section C.7) and propose suitable mitigation measures in consultation with the relevant boroughs and other key stakeholders as required.

C.4 Air quality monitoring

Baseline establishment

- C.4.1 The air quality baseline would be updated prior to the Scheme coming into operation. This would allow a comparison of air quality concentrations with and without the Scheme in operation. The methodology for establishing the baseline, including the study area, will be discussed with the relevant boroughs and included in the detailed strategy to be included with the DCO submission.

Monitoring locations

- C.4.2 The monitoring locations will be discussed with the relevant boroughs and set out in a detailed strategy submitted with the application for the DCO. This will be developed with reference to the methodology adopted for the EIA. It is also proposed that specific monitoring would be required at or close to the tunnel portals. The location of air quality monitoring for the Scheme would need to be complimentary to the Local Air Quality Management (LAQM) strategy and support the objectives of the relevant borough/s Air Quality Management Areas (AQMAs).

Methodology

- C.4.3 The detailed methodology for monitoring air quality concentrations will be discussed with the boroughs and set out in a detailed strategy to be included with the DCO submission. A combination of diffusion tubes and continuous monitoring is proposed. The sufficiency of the existing local air quality monitoring sites will be evaluated with the relevant boroughs and, if necessary, additional monitoring sites will be identified.

Frequency and duration

- C.4.4 The air quality monitoring would be repeated annually for the first five years of operation. The results of the monitoring would be reported to the relevant boroughs in an Annual Monitoring Report (see section C.7),

which would be available within two months of completion of the monitoring year.

C.5 Noise monitoring

Baseline establishment

- C.5.1 The noise baseline would be updated prior to the Scheme coming into operation. This would allow an up to date comparison of noise levels with and without the Scheme in operation. The methodology for establishing the baseline, including the extent of the study area, would be discussed with the relevant boroughs prior to submitting the application for the DCO. This information would be included in the detailed strategy to be included with the DCO submission. However, it is proposed that the methodology to set the baseline would be similar to that set out in the noise chapter of the Preliminary Environmental Information Report.

Monitoring locations

- C.5.2 The monitoring locations would be discussed with the relevant boroughs and set out in a detailed strategy submitted with the application for the DCO. The study area would be developed with reference to relevant standards and guidance and would be mindful of any relevant Noise Important Areas.

Methodology

- C.5.3 The detailed methodology for monitoring noise levels will be discussed with the boroughs and set out in a detailed strategy to be included with the DCO submission. The methodology would be developed with reference to relevant standards and guidance.

Frequency and duration

- C.5.4 The noise monitoring survey would be repeated annually for the first five years of the operation of the Scheme. The results of the surveys would be reported to the relevant boroughs in the Annual Monitoring Report (see section C.7).

C.6 Mitigation

- C.6.1 Based on the Assessed Case, the principal effect of the Silvertown Tunnel is expected to be a significant improvement in the efficiency of traffic movement on the A102 corridor within the AM and PM peak hours, with little change in levels of demand during the wider three-hour peak periods.

This largely reflects the fact that the Scheme entails embedded mitigation for potential traffic impacts in the form of the user charge, which acts to manage demand stimulated by the newly improved conditions. The reduced congestion results in some air quality improvements, particularly to the north of the Blackwall Tunnel. There is also an overall net benefit to the noise environment (see the Preliminary Environmental Information Report).

- C.6.2 Aside from the congestion relief and journey time benefits at the A102, 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 significant enough to justify 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.
- C.6.3 As outlined in Appendix C of the Preliminary Transport Assessment, if specific junction mitigations become necessary in the future it is expected that they would not be of a scale that requires work outside of the existing highway boundary. Indeed, many mitigation responses to junction impacts would not require physical works and could potentially be managed through changes to signalisation or signal timings.
- C.6.4 In the event that the future monitoring data demonstrates that there is an impact that requires mitigation, TfL would develop appropriate measures in consultation with the relevant host borough/s. There are numerous mitigation options available to TfL, which would be capable of being implemented either under the DCO or under TfL's existing powers. Table C-2 sets out the range of mitigation options, the effect that a specific option is likely to have and the mechanism for delivering the mitigation.

Trigger levels to consider mitigation

- C.6.5 There are no absolute traffic thresholds that trigger a need for mitigation. Instead the need for mitigation is location dependent and based on a combination of network characteristics, local knowledge, engineering judgement and data analysis. Similarly it is difficult to set specific trigger levels for noise or air quality mitigation at this stage (beyond those identified in the EIA). However, TfL will engage with the relevant boroughs and other stakeholders to seek to agree levels or thresholds at which TfL would consider mitigation in consultation with the boroughs. The results of the Preliminary Transport Assessment and Preliminary Environmental Information Report will inform this process prior to the DCO submission.

C.6.6 It is proposed that the recommended action would be set out in the Annual Monitoring Report.

Table C-2: Mitigation options and delivery mechanisms

Mitigation	Effect	Delivery
Changes to the Silvertown/ Blackwall Tunnel user charge	The ability to adjust the charge in the future in response to changing conditions (e.g. higher rate of growth, significant change in oil prices impacting on levels of car ownership or total rates of driving) to maintain an appropriate balance between the effects of the Scheme and to ensure that it continues to meet its objectives	Using the provisions of the DCO.
Change in existing signal timings	By re-distributing the length of total green time received by each arm, more green time can be given to the arm experiencing an increase in flow and/or delay in order to smooth the operation of the junction. Where operational, SCOOT will respond automatically to fluctuations in traffic flow through the use of on-street detectors embedded in the road.	In relation to all roads in London, functions in respect of traffic signals under sections 65, 73, 74 and 75 of the Road Traffic Regulation Act 1984 are vested in TfL. See section 275 Greater London Authority Act 1999.

Mitigation	Effect	Delivery
Introduction of new signals	In certain circumstances the introduction of signals at priority junctions, or additional signals at part-signalised junctions can aid in smoothing traffic flow and thereby reduce delay where it is problematic.	In relation to all roads in London, functions in respect of traffic signals under sections 65, 73, 74 and 75 of the Road Traffic Regulation Act 1984 are vested in TfL. See section 275 Greater London Authority Act 1999.
Minor junction or geometry changes	Minor changes to junctions or links (e.g. small scale widening, changes to turning movements, flare lengths, crossing locations) can add capacity to a link or junction where constraints and hence delay are being experienced.	<p>Within TfL's or the boroughs' remit (to be funded by TfL) where changes are implemented within the existing highway boundary.</p> <p>TfL has power to carry out works within or adjacent to a GLA road for the improvement or maintenance of the highway.</p>
Traffic management measures	To control and restrict traffic by direction, time of day and/or vehicle class/type to mitigate local environmental impacts	TfL's existing powers under the Road Traffic Regulation Act 1984.
Priority measures for different user groups e.g. bus lanes	To improve journey times for particular user groups to ensure they are not adversely affected	TfL's existing powers under the Road Traffic Regulation Act 1984.

Mitigation	Effect	Delivery
Implement user charge at other crossings (e.g. Rotherhithe Tunnel)	Charging other crossings can help to manage cross-river traffic flows at these locations, should this become necessary	Greater London Authority Act 1999, section 295 and Schedule 23.
Noise barriers and/or low noise surfacing	Noise barriers and low noise surfacing can be effective in reducing the impact of noise on receptors	TfL has power to carry out works within or adjacent to a GLA road for the improvement or maintenance of the highway.
Adjust speed limits	In certain circumstances a reduction in speed limit could smooth traffic flows and reduce congestion. A change to speed limits may also influence journey times and consequently traffic flows, potentially leading to local environmental improvements	TfL's existing powers under the Road Traffic Regulation Act 1984

Mitigation	Effect	Delivery
Extension of Low or Ultra-Low Emission Zone and/or Low Emission Neighbourhoods	The Low Emission Zone and the Ultra-Low Emission Zone incentivise low emission vehicles. An extension of either zone to east and south east London could improve air quality in this sub-region (although this would need to be balanced against other effects). A Low Emission Neighbourhood would include a comprehensive set of solutions tackling various sources of emissions, changing behaviour and raising awareness.	Greater London Authority Act 1999, section 295 and Schedule 23.

C.7 Securing the monitoring and mitigation strategy

C.7.1 This draft strategy will be developed in consultation with the relevant boroughs and other stakeholders. A final Monitoring and Mitigation Strategy will be submitted with the DCO application. The implementation of the measures set out in the monitoring and mitigation strategy will be secured either by a DCO requirement (equivalent to a planning condition) or by means of a legal agreement.

C.7.2 This would include an obligation to prepare an Annual Monitoring Report prior to the opening of the Scheme and annually thereafter for the first five years of operation.

C.7.3 The Annual Monitoring Report would include the data collected during the monitoring period, the analysis of that data, an indication of whether it meets criteria or trigger levels warranting consideration of intervention and a recommended approach to mitigation (if adverse impacts are identified requiring mitigation). The Annual Monitoring Report would be submitted to

the relevant boroughs for consideration before a final decision on mitigation is taken.

C.8 Next steps

- C.8.1 This strategy is currently at an outline stage. A detailed methodology for monitoring traffic, noise and air quality impacts, and trigger levels for thresholds for consideration of mitigation will be provided in the final version submitted with the DCO. The scope of the strategy will be kept under review and developed taking into account responses received during the consultation and will be informed by the results of continuing traffic and environmental modelling and assessments that TfL will be completing prior to submitting the DCO application.

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