LINKING LONDON: A NEW GENERATION OF RIVER CROSSINGS TO REVITALISE THE EAST THAMES

Sam Sims
Martin Tedder

On behalf of
The Commission
on East Thames
Crossings, chaired
by Andrew Adonis

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Published by *Centre for London*, October 2014

Published by:
Centre for London 2014

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Charity Number: 1151435

Typeset by Soapbox, www.soapbox.co.uk

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ABOUT THE COMMISSION ON EAST THAMES CROSSINGS

In 2013 the Centre for London began work on a project investigating why East London and the area east of London has consistently failed to deliver on its potential for significant employment and housing growth. This work was published in 2014 as the report *Go East: unlocking the potential of the Thames Estuary*. One of the key conclusions from this work was that the area was being held back by a severe lack of crossing capacity on the East Thames. In spring 2014 we set up the Commission on East Thames Crossings with the following aim: *to develop a set of politically and financially robust proposals to deliver a step change in crossing capacity on the East Thames.*

The Commission has been chaired by Andrew Adonis and research support has been provided by Sam Sims (Centre for London) and Martin Tedder (Atkins). A public call for evidence was made in May 2014 and remained open until July 2014. We engaged widely, and as part of our evidence gathering we met with a range of groups including local authorities, local business representatives, environmental groups, transport campaigns, London government agencies and academic experts. We held meetings with all interested parties that contacted us to request one. The Commission considered a wide range of evidence including previous consultations and supporting documentation, public enquiries, local authority commissioned reports, academic journal articles and books. We conducted original data analysis and modelling and also commissioned short papers from a range of experts.

The commissioners met four times between May and September to discuss evidence papers and put together our proposals. Our commissioners were carefully selected to ensure a range of expertise, experience and geographical and political allegiances. They include architects, planners, housing and transport experts, academics, local government and business representatives and former ministers from both the Labour and Conservative parties. What unifies them is a desire to connect North-East and South-East London and unlock the potential of this area and its residents. They are: Professor Kate Ascher (Buro Happold), David Bayliss (RAC Foundation), Ed Clarke (Infracapital), Nicola Clay (Royal Haskoning DHV), Christopher Hall (GVA), Stephen Howlett (Peabody), Mark Jenkinson (Siemens), David Leam (London First), Ian Mulcahey (Gensler), Richard McCarthy (Capita Symonds), Robin Mortimer (Port of London Authority), Steve Norris (Norris McDonough LLP), Rt. Hon Nick Raynsford MP, Sir Michael Snyder (City of London), Eric Sorensen (former CEO Thames Gateway Partnership), Martin Tedder (Atkins), Janette Withey (Docklands Business Club) and Ben Rogers (Centre for London). This work is a collaborative effort between all of us.

ACKNOWLEDGEMENTS

The authors would like to thank all the individuals and organisations who have given up their time to help us with this research. Particular thanks go to our sponsors – the City of London Corporation, GVA, Atkins and the Port of London Authority – without whose support this project would not have been possible. We would also like to thank the Commissioners for giving up their time to take part in the project. Additional thanks go to Gensler for contributing original concept images for the publication.

Any errors in the report remain solely those of the authors.

EXECUTIVE SUMMARY

The Thames chasm

London's development as a global city is intimately connected with its location on the Thames.[1] The river provided the basis for the original Roman settlement, allowed for trade with coastal towns as the city developed, and made London the central hub for imperial trade during the days of empire. The banks and insurance firms that grew up around the shipping industry eventually morphed into today's financial services cluster, trading around the world.

But rivers divide as well as connect, and for a long time London was effectively split down the middle by the Thames. It was only in the middle of the 18th century that Londoners started to bridge this divide, but in the following one hundred and fifty years many new crossings were constructed right along the river, knitting together the two banks and helping the city to become the prosperous, fast-moving place it is today.

Figure 1: The East Thames disconnect
Source: Original work by Gensler

That is, except for in East London, where very few road crossings were ever built. While there are now 16 road bridges on the 20 miles of the river west of Tower Bridge, there is only one road bridge and two low-capacity road tunnels on the equivalent stretch to the east.[2] The Commission believes that tackling the lack of crossings here represents

a huge opportunity to unlock a new stage of growth in the capital that could transform East London for the better. Indeed, the longer East Londoners have waited for new crossings, the stronger the case for constructing them has become.

The case for new crossings

The case for action is now overwhelming. New crossings will improve access to jobs, customers and suppliers, increasing business productivity and employment. The increased accessibility will also provide a boost for house building, so helping to tackle London's severe housing shortage. Crucially, new crossings will also connect otherwise somewhat isolated communities to the opportunities which are now beginning to spread across the area. The Commission believes that a programme of new crossings construction will therefore both revitalise the East Thames and lay the foundations for London's next stage of growth. Both businesses and local residents are strongly in support.

We estimate that new crossings would:

- Cut cross-river journey times by up to 40 minutes;
- Catalyse the development of up to 45,000 homes to 2031 (and more in the long term);
- Improve the productivity of existing firms in the area by over £55 million per year;[3] and
- Catalyse the development of up to 60,000 jobs to 2031, two thirds of which would be in London and one third in Essex and Kent. This could result in over £1 billion additional GVA per annum.

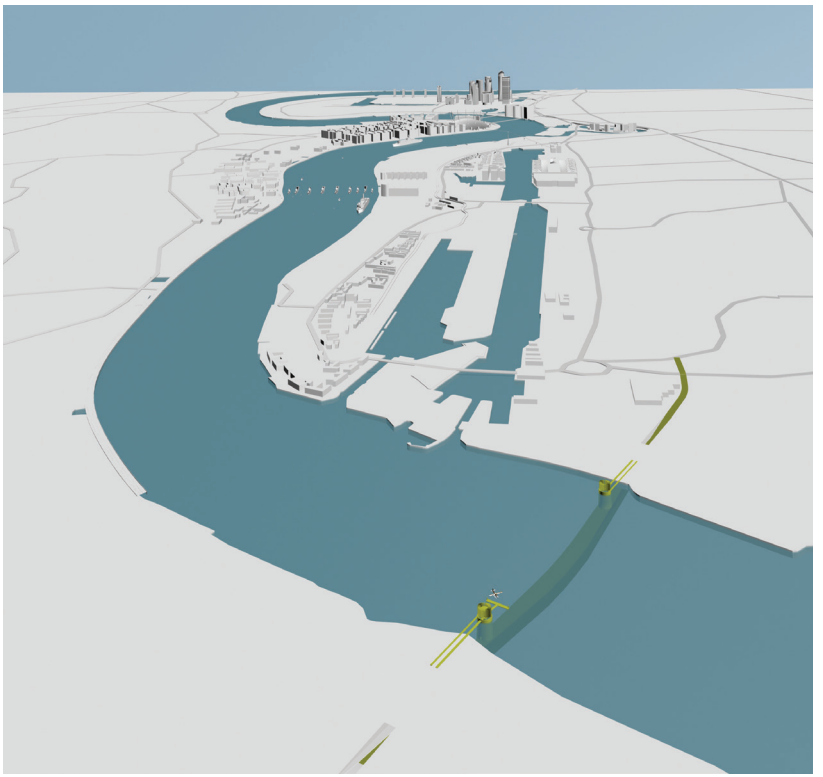
Which crossings, where?

The Commission believes that investment in new crossings is now so long overdue that what is required is not one new crossing but a package of four, supporting a wave of new development travelling eastwards along the Thames. Although each crossing will have a different role, and will come forward at a different time, we are convinced that all four will need to be built in order to achieve the maximum economic benefit, while minimising impact on local roads and local communities.

The innermost crossing, the Silvertown Tunnel, is in essence a done deal: the economic case has been made, public support for the crossing is proven to be strong, and the technical preparations are well

advanced. Transport for London estimate the earliest operational date to be 2021. The priority is to ensure the tunnel is delivered by this date, and no later.

Figure 2: Proposed Gallions Reach Tunnel Linking Thamesmead and Beckton
Source: Original work by Gensler



Heading east, the next potential location is at Gallions Reach. Many attempts have been made to deliver a new crossing on this site and the case is now stronger than ever. A new crossing here would transform the local area by linking major new centres of employment in the Royal Docks and Stratford to the large (and potentially much larger) residential communities on the south bank. A Transport for London (TfL) consultation in July 2014 included options for either a bridge or a ferry on this site.[4] The Commission argues however, that both of these options are inferior to an immersed tunnel. Although a tunnel would cost around £175 million more than a bridge,[5] we argue that it represents a superior, more cost effective option because:

- A bridge would protrude around 700m inland on either side of the river and would therefore sterilise significantly more riverside land than a tunnel.[6] The Commission estimates that the additional land freed up by a tunnel would support up to 260 residential units on the south side of the river and up to 230 industrial jobs on the north side, which would generate around £8 million GVA per year.

- In order to accommodate ships travelling up the Thames, and planes taking off from City Airport, a bridge on this site would have to be a 50m high concrete box girder design.[7] This would be a large, high and somewhat alienating presence, making the surrounding area less attractive for residential and office uses, which runs counter to the strategy for the regeneration of the Royal Docks.

- A tunnel will be more reliable than a bridge which, due to its height, may have to close in extreme weather conditions.[8] This is an important consideration, given that the increase in road network resilience is a key part of the case for new crossings.[9]

- The public enquiry into the Thames Gateway Bridge concluded that steep approach ramps would make a bridge on this site inappropriate for cyclists. Examples such as the Maastunnel in Rotterdam show how tunnels can accommodate brightly lit, fully segregated tunnels which are popular with pedestrians and cyclists.

A new crossing at Gallions will need to be in place by 2024 at the latest, when the Woolwich Ferry needs to be decommissioned.

Moving east again, the next potential crossing location is at Belvedere-Rainham. This option was added to the 2014 consultation and is supported by the London Borough of Bexley.[10] The Commission believes that it would be a valuable part of a programme of new crossings, not least in helping unleash the significant potential for industrial development on the large derelict area around Bronze Age Way. Given limitations on funding however, we argue that a new crossing at Gallions should be prioritised over Belvedere.

Ultimately, the Belvedere crossing would cost between £125 million and £250 million more than Gallions[11] and, whilst the number of new homes and jobs that could be unlocked would still be significant, it is likely to be less than that at Gallions, where land values are higher.[12] Nevertheless, as soon as the expected housing and population growth from the Silvertown, Gallions and Crossrail investments have materialised, the Commission recommends that a new crossing

at Belvedere should be also be developed to spur the next wave of redevelopment in the area.

The most eastward new crossing required on the river is the Lower Thames Crossing, which will augment the existing bridge and tunnel at Dartford. As with Silvertown, the overriding imperative here is to bring forward development as soon as possible. The Department for Transport announced three options for this new crossing back in 2009, but all that has been achieved in the intervening five years is to rule out one of these three options. Development needs to be accelerated significantly.

Financing and delivering the new crossings

At a time of fiscal constraint, competition for central government funding for infrastructure is fierce. We argue that tolling should play a key part in funding new crossings and estimate that tolling revenue could cover the entire cost of the Silvertown tunnel and the new Lower Thames Crossings, and would likely cover around a half of the costs of an immersed tunnel at Gallions, depending on the specifics of the tolling regime.[13] The proportion of the costs of a crossing at Belvedere-Rainham (in addition to Silvertown and Gallions) that could be covered by tolling would however be much lower.

Some funding from non-tolling sources is therefore also required to fund the full package of crossings. The Commission has considered various land value and business rate capture mechanisms, but we caution against their use on the grounds that they are likely to raise only modest amounts and may hold back development along the East Thames. We argue instead that a public grant is justified to cover the modest funding gap, both in order to unlock the benefits described above, and because of the significant increases in tax revenue that would be generated.[14] Some of this public support could come from the windfall revenues generated in the Royal Docks Enterprise Zone, which are controlled by the Mayor. Investing some of this money in the East Thames would partly make amends for the historic lack of investment in crossings here, relative to Central and West London. The rest of the public grant should come from central government which, through unlocking significant private investment, would achieve a high rate of return.

Opportunities to deliver new crossings on the East Thames have been missed in the past. The Commission believes that modest institutional reforms would help ensure that future efforts are more successful. For the three crossings inside London, we recommend that a special purpose company, along the lines of Crossrail, should be set up as a subsidiary of TfL to oversee the delivery of new crossings. This reform would provide the single-minded focus and arms-length

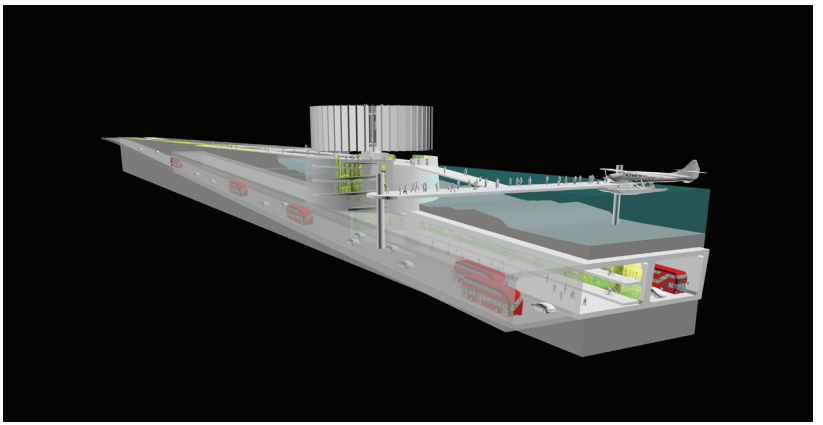
independence required to enable efficient delivery, with a minimum of disruption. This organisation should develop proposals, consult on them, and secure planning permission before appointing a contractor to design, build and finance the crossings.

Taking environmental concerns seriously

The ultimate rationale for developing new crossings on the East Thames is to encourage the further regeneration of the area: creating new jobs and homes for London's growing population. This will likely contribute to additional demand for all modes of travel, including car. We have therefore taken care to develop our recommendations with a view to ensuring that new crossings minimise congestion and environmental impact, and favour public transport, walking and cycling.

A key benefit of delivering a package of four new crossings is that traffic will be spread over a number of new routes. Indeed the traffic modelling for a new crossing at Gallions Reach, developed in conjunction with Silvertown, shows that it would actually *reduce congestion across the London network*.[15] At present, the bus networks north and south of the river are almost totally separated by the Thames, so a single new link at Gallions would provide a step-change in connectivity by integrating the East London bus networks for the first time. We also develop proposals for a world class, fully segregated cycle lane under the river at Gallions Reach, which would have a similarly transformative effect on cycling connectivity. We believe that new crossings will therefore play an important part in creating a less car-dependent East London.

Figure 3: Conceptualisation of the Gallions Reach Tunnel, with Segregated Walking and Cycling Tube
Source: Original work by Gensler



Some environmental campaigners have argued against constructing new crossings on the grounds that this will lead to increased emissions or reduced air quality. But the Commissions believes that these important policy aims will be better achieved by systematic and city-wide policies – such as reforming emissions standards or expanding low emission zones – than by a localised block on the construction of new river crossings.

Summary of the Commission's recommendations

1—A package of new crossings should be developed in order to unlock a wave of regeneration travelling eastwards along the Thames Estuary:

i) The Silvertown tunnel should be developed as soon as possible;

ii) Whilst crossings should be developed at both Gallions and Belvedere, Gallions should be prioritised and will need to be operational before 2024;

iii) A new crossing at Belvedere should be constructed as and when the expected regeneration benefits of other road and rail investments are realised, in order to help spur the next stage of development in the area;

iv) Plans for the Lower Thames Crossing should be finalised no later than summer 2015, and developed as soon as possible after that.

2—TfL should fully work up, and seriously consider, the case for an immersed tunnel at Gallions, rather than a bridge or ferry:

i) This should include a fully segregated section for cyclists and pedestrians;

ii) The opportunities which this creates for integrating the bus network in East London should be fully exploited.

3—A special purpose company, along the lines of Crossrail, should be established to oversee the delivery of new crossings:

i) This should be established by early 2015 and a high-profile individual should be appointed to oversee the organisation;

ii) It should determine the location and type of crossings and secure planning permission, before appointing a concessionaire to design, build and finance them.

4—The crossings should be funded from a mixture of sources:

i) Tolling should be used to raise revenue and manage traffic flows on all new crossings, with a discount available for local residents;

ii) Public grant, potentially including some of the Newham Enterprise Zone windfall revenue, should be used to cover the remaining shortfall.

Figure 4: Linking East London
Source: Original work by Gensler

1
INTRODUCTION: THE THAMES CHASM

Cities and rivers are intimately connected. Before the development of agriculture, rivers provided fish – one of the few food sources rich enough to sustain significant urban settlements.[16] Once modern farming techniques were developed, rivers became critical for delivering agricultural produce and carrying away waste on the necessary scale. Prior to the harnessing of fossil fuels, rivers also provided one of the few forms of transport cheap enough to enable bulk trade, and therefore allow the development of major urban trading hubs. It is no surprise then that at the turn of the 20th century all 20 of America's largest cities were located on rivers.[17]

London is no different. Its location on the Thames made it a strategically important location and helps explain why the Romans established a settlement there and began building today's London.[18] Shipping trade expanded in post-Roman London because the Thames provided access to the prosperous markets of North East Europe.[19] Support industries then grew up around this shipping activity, which in turn helped London to become the key hub for trade across the British Empire.[20] The banking and insurance industries that developed around this time also provided the expertise which would eventually morph into London's current cluster of financial services.[21] The Thames therefore drew the British to London and then linked Londoners to the rest of the world. Churchill reportedly referred to the river as "the silver thread that runs through British history."

But rivers divide as well as connect. The Romans found that the efficient movement of troops in the South East was seriously hindered by the Thames. Their response was to set about building the first bridge across it, close to the site of modern London Bridge. When the population of London began to expand rapidly again in the 17th century, the city found itself hemmed in by the river. Again, the response was to build more bridges: the opening of Blackfriars Bridge in 1796, for example, spurred the development of new suburbs in South London.[22] Since then, Londoners have hardly stopped building new crossings: five bridges were built in the 18th century, eight more and a tunnel were completed in the 19th century, and another three crossings were developed prior to the Second World War. By the mid-20th century the banks of the Thames upstream from the City of London had been knitted closely together.

The bridges across the Thames have come to play a central role in London's history and popular consciousness. The construction of the first London Bridge, with its small arches, slowed the flow of the river, sometimes causing it to freeze over in winter. This led to the famous Frost Fairs, in which Londoners came onto the river to eat, drink and

play sports.[23] An elephant was reportedly walked over the frozen river near Blackfriars Bridge![24] Later, in 1887, popular pressure led to the removal of tolls on the bridges. The opening ceremonies proved popular with 'common' Londoners who turned out in numbers to exercise their new-found freedom; a symbolic moment in the history of the capital. More recently, the bridges have become iconic way-markers in the world famous Oxford-Cambridge boat race. And who can forget the Olympic Rings hanging from Tower Bridge during the London 2012 Olympic Games?

London's river crossings have therefore played a vital role in integrating and unifying the city, both physically and culturally. They have also played a crucial part in facilitating its economic and physical expansion.

That is, except to the east of Tower Bridge, where in stark contrast to Central and West London, few crossings have ever been built. This is partly understandable: the need to maintain shipping access to the docks meant bridges here would have to be higher, the broadening of the river meant they would have to be wider and the softening of the rock meant tunnelling would be harder than it would be to the West. These factors conspired to ensure that, even as industrial London spread eastwards along the Thames, the river here remained an impenetrable wedge, separating the communities on its northern and southern banks.

The next section reviews the history of the development of new road crossings on the East Thames in order to provide context for the current debate and to highlight some of the difficulties that policy makers have faced with respect to building new crossings. Those who want to go straight to the economic case for new crossings should skip to chapter three.

2
HISTORY: HOW DID WE GET HERE?

Plans for new crossings on the East Thames can be traced back to Sir Charles Bressey's 1937 *Highway Development Plan for Greater London*.[25] Although the Second World War arrived before it could be implemented, much of the work in this report found its way into the Greater London Plan of 1944, which served as the key blueprint for post-war London. Its author, Patrick Abercrombie, intended to create five concentric ring-roads around the city. The third of these rings was to bring together the 'North Circular' and 'South Circular' over a new fixed link at the eastern end of the Royal Docks (from now on referred to as Gallions Reach).[26] The plan also included a proposal to add a second bore to the existing Blackwall Tunnel.[27] Rapid traffic growth led to revision of Abercrombie's road building plans, and fiscal constraints after the war – and a growing opposition to urban road building programmes – meant many of the proposals were either abandoned or delayed. But while Abercrombie's road scheme was still-born, the plan to add new crossings at Blackwall and Gallions Reach lived on.

In the 1960s the GLC administration developed a new and equally ambitious scheme for a series of 'Ringway' roads around London as part of the Greater London Development Plan.[28] Ringway 2 was again planned to constitute a substantial upgrade of the 'South Circular' to link it to an expanded North Circular and would again have gone across the river on a fixed link at Gallions Reach. The plan proved extremely unpopular however, since constructing the Ringway would have required the demolition of 20,000 homes. A total of 28,392 complaints were lodged against the Ringway plan[29] and it was dropped in 1973. But while the Ringways proved to be as unrealistic as Abercrombie's ring roads, they did at least succeed in keeping the idea of a new crossings at Gallions Reach alive.

In 1957 the Ministry of Transport finally gave the go-ahead for Bressey's duplication of Blackwall, and the new bore was eventually opened in 1967.[30] This was the first new road crossing on the East Thames since 1906 and it remains the most recent to open in East London.

Beyond the London boundary the only road crossing on the East Thames at this time was a tunnel at Dartford, linking Essex and Kent. When the M25 was completed in 1986 this fairly low capacity crossing became an important part of the strategic road network, both for London and at a national level. Traffic soon exceeded the capacity of the existing tunnels and construction of a new crossing was given the go-ahead in 1988.[31] The toll-funded QEII Bridge opened in 1991.

But while new capacity had been delivered in inner-east London at Blackwall and well beyond the London boundary at Dartford, a long

stretch of the Thames running through five outer East London boroughs remained without any fixed road crossings at all. A third lease of life was given to such a crossing at Gallions Reach with the Department for Transport's 1985 proposal to build a new north-south regional trunk road across the river. This new road would have gone directly through Oxleas Wood in Greenwich which is an ancient woodland dating back at least to the 12th century, and a Site of Special Scientific Interest.[32] Perhaps unsurprisingly, this attracted a great deal of opposition and a campaign developed in which local people adopted individual trees in the wood. National environmental charities helped local residents to run a persuasive media campaign against the development.

A public inquiry was launched which lasted for several years. By the time permission to continue was granted however, the design of the bridge had to be changed to accommodate the newly opened London City Airport flight path. The redesign of the bridge then opened the way for a new public inquiry and permission wasn't given again until 1991. But then in 1993, in the face of continuing local opposition to the specifics of the scheme, the plans were dropped by the Secretary of State for Transport. It was finally removed from national road building plans altogether in 1997.

Meanwhile, the existing crossings on the East Thames were becoming ever more strained and plans for major development of the surrounding 'Thames Gateway' area only served to underline the need for new crossing capacity.[33] This led to the development of proposals for the Thames Gateway Bridge at Gallions Reach by the new Mayor of London, Ken Livingstone. This time the bridge was consciously branded as a 'local crossing' rather than being part of a new regional trunk road development. A consultation was carried out in 2003 but was criticised both for failing to consider enough options and failing to consider the environmental impacts of the bridge. The Secretary of State called a public inquiry in 2005 which found several faults with the scheme, not least that having three lanes of traffic in each direction was not consistent with a crossing designed to feed into the minor local road networks on either side of the river. The Secretary of State asked the mayor to address the inspectors' concerns and the bridge was redesigned, but by this point it had already generated a well-organised opposition group. In 2007 a new Secretary of State reopened the public enquiry and in 2008 the new Mayor of London, Boris Johnson, cancelled the new crossing.

London continued to grow, despite the lack of any new crossing, and the case for tackling this bottleneck became still more urgent. In 2012 Transport for London released a consultation on the 'principle'

of whether new crossings should be built. More than 90% of respondents agreed.[34] There was then a second consultation, beginning in late 2012, on a list of options including: a Silvertown Tunnel, a new ferry at Gallions Reach and overhauling the existing ferry at Woolwich. This consultation led to TfL giving the go-ahead for a crossing at Silvertown and pledging to begin a detailed consultation on the tunnel in summer 2014, after an option had been selected for replacing the ageing Woolwich ferry. A further consultation was launched in summer 2014 which included options for a modern ferry at either Gallions or Belvedere, or a four-lane (two in each direction) bridge on the same site as the unrealised Thames Gateway Bridge. The Department for Transport are now also consulting on plans for a third expansion of the Dartford Crossings.

This short history shows how difficult policy makers have found it to build new fixed crossings within the densely-packed confines of the city: this is not an easy policy problem. The slow progress of the Blackwall duplication demonstrates how the best laid plans for new crossings can often be delayed significantly by periods of fiscal constraint, while the speed with which the QEII Bridge was developed shows the value of considering alternative funding mechanisms. The history of East Thames crossings also provides a cautionary tale about the dangers of trying to develop new crossings in conjunction with major road building schemes or, conversely, ignoring the constraints of the existing road network. Ultimately, it serves to underline the importance of developing an environmentally, politically and financially robust plan for delivering new crossings, which is our aim in this report.

3
THE CASE FOR NEW RIVER CROSSINGS

There is now a substantial evidence base that supports the case for new crossings. In this section we draw together the available evidence to make the case for new crossings on the grounds that they will improve transport connectivity and therefore unlock new housing and economic development on the East Thames. We argue that the crossings will be instrumental in unlocking London's next stage of growth and that, with London's population growing at its fastest rate in almost a century, and with a severe housing crisis which is starting to become a major risk to its economic prosperity, crossings should be developed with all possible speed.

Improving transport connectivity and reliability

Demand for cross-river movements is currently well in excess of capacity, generating significant traffic congestion at existing river crossings.[35] This is particularly the case at the Blackwall Tunnel, which now operates above capacity between 6am and 10am northbound and 2pm and 8pm southbound.[36] TfL surveys show that the average wait reaches 19 minutes in the morning peak period making this one of the most congested roads in London during rush hour.[37] The cost of the congestion this creates on the A102 has been estimated at £17.5 million per year, and rising.[38]

The lack of crossing capacity also makes the surrounding road network vulnerable to delay. Of the three road crossings that do exist in East London (Blackwall, Rotherhithe and the Woolwich Ferry), all suffer from limited capacity and/or restrictions on height, width and load. This has caused serious problems at Blackwall, where lorries attempting to fit through the Victorian tunnel have a record of getting stuck due to the low roof and tight bends. Incident data show that there were 1088 unplanned closures of the northbound tunnel and 291 similar closures of the southbound tunnel during 2012,[39] though better management has since led to some improvement.[40] The bends were apparently included in the original design to stop horses bolting when they saw daylight on the other side!

Because of the strategic significance of the crossing, these closures can have dramatic impacts across the London road network. In 2009 a vehicle fire in the tunnel caused three days of delays, spreading from Commercial Rd in Whitechapel to Orpington in Kent.[41] Resilience is also a priority issue for local businesses, contributing to increased operating costs and general uncertainty. Recent research on behalf of TfL found that 67% of firms located in the study area consider that poor reliability of cross-river travel acts as a constraint on or disruption to their business.[42]

As well as damaging reliability, the lack of crossings means the Thames effectively splits the road networks of East London across the

middle, lengthening journeys that could take minutes, as the crow flies. A clear illustration of this 'barrier effect' is evident by comparing cross-river movement in East and West London. Data collected by TfL shows that, excluding trips via Central London, there are 10 times as many road-based trips across the Thames in West London as in the East.[43]

This lack of connectivity has implications for people's ability to access employment opportunities. With major employment growth planned north of the river, at Stratford, Canary Wharf and the Royal Docks, and major residential development planned south of the river at Greenwich, Woolwich, Thamesmead and Belvedere, new crossings are the key to connecting people to jobs, raising the attractiveness of the area and bringing new development forward. With billions of pounds of public money already invested in regeneration north of the river, with a particular focus at Stratford, it would be a serious strategic failure if the fruits of this investment remained inaccessible to Londoners south of the river because of a basic lack of river crossings.

Building just one new crossing would dramatically improve journey times in the area. Table 1, below, shows how a new crossing at Gallions Reach would cut journey times across the river by 22 minutes, by shortcutting the Blackwall tunnel, and this is when traffic is good in and around the Blackwell tunnel. Adding in the average 19 minute delay in the morning rush hour, a new bridge will cut the length of the journey by up to forty minutes.

Table 1: Travel times: Thamesmead to Beckton & Belvedere to Rainham
Source: TfL (2014) *River Crossings: East of Silvertown Crossings.* Needs and Options Report

THAMESMEAD TO BECKTON	DISTANCE	FREEFLOW TIME	AVERAGE SPEED
VIA DARTFORD CROSSING	36KM	34MINS	64 KM/H
VIA WOOLWICH FERRY	9KM	35MINS	15 KM/H
VIA BLACKWALL TUNNEL	18KM	25MINS	43 KM/H
AS CROW FLIES	3KM	3MINS	50 KM/H
BELVEDERE TO RAINHAM	**DISTANCE**	**FREEFLOW TIME**	**AVERAGE SPEED**
VIA DARTFORD CROSSING	24KM	23MINS	63 KM/H
VIA WOOLWICH FERRY	20KM	45MINS	27 KM/H
VIA BLACKWALL TUNNEL	28KM	34MINS	49 KM/H
AS THE CROW FLIES	3KM	3MINS	50 KM/H

Unlocking new housing development

London's population has grown faster over the last ten years than at any other time in its 2000 year history. Between the 2001 and 2011 census

sweeps, an additional 850,000 people became Londoners.[44] This growth is set to continue, with the GLA estimating that the population will reach nine million by 2020 and ten million by 2030 – the equivalent of adding the population of the UK's second biggest city, Birmingham, every ten years.[45] This population boom has largely been driven by London's economic boom: the city has created significantly more jobs than any other region of the UK since the recession.[46]

But while the population is increasing rapidly, the number of homes being built each year has remained stubbornly flat. Indeed, over the last decade, the population grew four times faster than the housing stock.[47] The result is that affordability has declined sharply and overcrowding has started to rise.[48] This is now having an impact across London, with almost a quarter of Londoners now citing housing affordability as a "major problem" with quality of life. A particularly depressing consequence of this is that the poverty rate in London almost doubles when housing costs are taken into account.[49]

If London is unable to provide homes to meet growing demand, its economy will suffer. London's recent success has been built on its ability to attract talented graduates from across the UK, and further afield. But estimates suggest a total shortfall of between 50,000 and 90,000 homes for professionals in London over the next ten years. Research by the FT shows that, with an average graduate starting salary, renting a one bedroom flat is now unaffordable (i.e. costs more than 50% of income) in every single London Borough.[50] Shutting off the graduate talent pipeline could have serious costs for the capital, with a potential loss of economic output of between £15 billion and £35 billion over the next decade.[51] Essential manual and clerical workers will find it even harder to afford housing in the capital.

Accommodating an additional two million Londoners will therefore require a dramatic step change in housing development right across London. Many of the best opportunities for development however, remain to the east of the city.[52] This is shown clearly by the Draft Further Alterations to the London Plan, which states that 40% of the potential housing delivery is expected to come forward in just eight boroughs either side of the River Thames in East London.[53] Recent analysis for TfL has also identified the potential for almost a quarter of a million homes and up to three million square metres of commercial floor space in these boroughs.[54]

But housing growth in this area is currently being held back by a range of factors, not least the fact that East London is split across the middle by the Thames.[55] Many of the areas that front onto the Thames in East London are some of the most poorly accessible in the city. This

restricts the number of jobs that are accessible within an acceptable commute time (see more on this below) and makes transport more costly and less reliable.[56] This serves to make these areas less attractive places to live, reduces land values and worsens development viability.

New crossings have the potential to create a step change in access to jobs and create a more coherent sense of place, stitching together the otherwise disjointed communities on both sides of the Thames. This could directly catalyse the development of an additional 27,000 homes in East London, and a further 20,000 homes in Essex and Kent.[57]

Unlocking significant economic development

The third and final benefit of new crossings is that they will help generate significant economic growth in of the most deprived parts of the South East.

Connectivity is closely related to economic growth. Better connectivity expands the pool of skilled labour which employers can access, increasing the efficiency with which people are matched to jobs. While businesses in West London typically benefit from a 'circular' catchment area that includes a certain radius on both the north and south sides of the river, those in East London are generally restricted to a semi-circular catchment area.[58] This 'barrier effect' means firms aren't necessarily finding the 'best person for the job' and workers might not be in the job in which they can add most value, and earn the highest wages.

There are equivalent benefits for people already living in the area. A new crossing at Belvedere, for example, would mean that residents there would be able to access 230% more jobs within the average commute time. These employment benefits would be concentrated in one of London's most deprived areas, where the access to jobs is currently much lower than in most other parts of London.[59]

There will also be benefits from increased competition in product and service markets, because existing firms will be able to access a much larger number of customers and suppliers within an acceptable travel time. For example, it is estimated that a new crossing at Gallions will see an increase in the number of people that are accessible within a 30 minute drive from Thamesmead of 163%, dramatically increasing the attractiveness of the location for retailers and other business-to-customer firms.[60]

Not surprisingly, businesses are strongly in favour of new crossings. A recent TfL survey of local businesses showed that 83% expect new crossings to improve the local economy overall, with half of all businesses expecting to expand and take on new staff if new crossings become operational.[61]

Research conducted on behalf of the LB Newham suggests that a bridge at Gallions Reach will result in productivity growth for existing businesses estimated at £55.7 million in annual GVA.[62] Productivity benefits from the full package of crossings are likely to be much higher. However, by far the biggest economic impacts will come from the new jobs which the improved connectivity will unlock. Work commissioned by TfL estimates that there could be almost 40,000 new jobs that come forward in London as a result of the crossings, whilst the Lower Thames Crossing could unlock a further 20,000.[63] Together these would generate a net gain of over £1 billion in GVA for the South East economy each year.[64]

Summary

The absence of crossing capacity on the East Thames has been a serious barrier to the development of better public transport connections, new homes and new jobs. Indeed, these three factors have reinforced each other. But there is now a chance to connect the huge economies of North-East and South-East London, as well as Essex and Kent, to improve access to jobs, customers and suppliers from some of the least accessible parts of London, boosting business, and providing a significant spur to house building. The evidence suggests that new crossings would:

- Cut cross-river journey times by up to 40 minutes;
- Catalyse the development of over 45,000 homes to 2031 (and more in the longer term);[65]
- Catalyse the development of over 60,000 jobs to 2031, two thirds of which would be in London and one third in Essex and Kent.[66] This could result in over £1 billion additional GVA per annum;
- Improve the productivity of existing firms in the area by over £55 million per year.

4
WHICH CROSSINGS, WHERE?

The previous section outlined the general case for new crossings, this one will discuss the specifics: how many crossings should be built, what sort of crossing should they be, and where should they be located? The Commission believes that investment in new crossings on the East Thames is now so long overdue that what is required is not one new crossing but a package of four: Silvertown, Gallions, Belvedere and a new Lower Thames Crossing. We will argue that this programme of crossing construction will support a wave of new development along the Thames Estuary. We will also make the case that TfL should not further develop their plans for either a bridge or a ferry at Gallions and should instead build an immersed tunnel with a segregated cycling and pedestrian route. The Commission believes this will offer superior value for money to a bridge, not least because it will free up land on either end of the tunnel for development – a bridge will involve long, ramped roads that will intrude far into the banks on both sides of the river. We begin our argument on the Greenwich Peninsula and work our way eastwards along the river, explaining the distinctive contribution of each crossing and timeframes for delivery.

Blackwall/Silvertown

Greenwich and the surrounding area is currently served by the Blackwall Tunnel. The tunnel first opened for horse-drawn traffic in 1897, was later converted for cars, and had a further bore added in 1967. The tunnel also acts as a de facto strategic link for vehicles travelling north/south into and out of London, despite being structurally inadequate for this purpose (see previous chapter).

Despite being overstretched, the tunnel hasn't been upgraded since the sixties, because planners have been pinning their hopes on developing the elusive new crossing downstream at Gallions. When Boris Johnson cancelled the fourth incarnation of this bridge in 2008, he argued that a new tunnel, the 'Silvertown Crossing', should be built next to the Blackwall Tunnel instead. The tunnel has since been deemed a 'nationally significant infrastructure project' by the Secretary of State.[67]

Despite vocal opposition from some campaign groups, the public are highly supportive of a new tunnel crossing at Silvertown. A 2012 TfL consultation found that 76% of respondents either supported or strongly supported the proposal, against just 15% who opposed or strongly opposed it.[68] The London Borough of Newham have also conducted a representative survey of the five closest boroughs and found that 80% of residents would support a Silvertown tunnel (56% strongly support).[69]

In the view of this Commission, the arguments for the Silvertown tunnel are settled. The design work for this tunnel is now all but finalised

and it is estimated to cost around £700 million, with the earliest possible operational date estimated to be around 2021.[70] The role fulfilled by the Silvertown Tunnel is that of a long-overdue upgrade to the strategic transport network. It will relieve the overcrowded Blackwall Tunnel and in the process dramatically improve the resilience of the road network.

Gallions/Woolwich/Belvedere

As the last section showed, this is the most difficult and contentious crossing on the river, and is therefore the main focus of our argument. A crossing here would serve partly to replace the nearby Woolwich Ferry, which is now reaching the end of its viable lifespan. This ferry is largely a local service, with 68% of northbound passengers going from one riverside borough to another.

Having dropped the Thames Gateway Bridge in 2008, TfL reintroduced the idea of a bridge at Gallions in the July 2014 consultation. The full range of options included in this paper are:

1—A replacement ferry at Gallions Reach.

2—A replacement ferry at Woolwich.

3—A bridge at Gallions (making this the fifth time this bridge has been seriously proposed).

4—A bridge further downstream at Belvedere/Rainham.

The last of these was added to the range of options in the previous consultation, and is the preferred option of the London Borough of Bexley, who have previously opposed a bridge at Gallions Reach.

Research by Atkins has carefully weighed up the job creation and development benefits of each of these options. It shows clearly that the ferry options perform very poorly on all criteria, due to their limited capacity.[71] The public also overwhelmingly favours a bridge, rather than a ferry. A representative poll carried out on behalf of the London Borough of Newham shows that 75% of all respondents across the five local boroughs supported a bridge, compared to just 16% that supported a ferry.[72] The Commission therefore strongly recommends that all ferry options are dropped from future consideration.

Prioritisation of crossings

The Commission strongly believes that in time London will need road crossings at Gallions and Belvedere, in addition to the more

strategic crossings that look likely to go ahead at Silvertown and the Lower Thames Crossing. However, the limited resources available for new transport infrastructure mean that the crossings will need to be prioritised according to their potential economic and connectivity benefits.

Table 2 provides a summary of the connectivity benefits of fixed crossings at the Gallions and Belvedere locations.[73] The analysis is presented assuming each crossing is mutually exclusive to allow a direct comparison of benefits of each. It shows that a bridge at Gallions will provide the best connectivity benefits in terms of access to jobs, the labour market, other businesses, and consumers.

Table 2: Connectivity Benefits of Fixed Crossings

Source: Atkins (2014) *River Crossings: East of Silvertown Crossings.* River Crossings Development Study. Transport for London. Table E1

	FIXED CROSSING AT GALLIONS	FIXED CROSSING AT BELVEDERE
AVERAGE INCREASE IN NUMBER OF JOBS ACCESSIBLE TO EAST LONDON RESIDENTS BY ROAD (WITHIN THE 37 MINUTE LOCAL AVERAGE COMMUTE TIME)	112,600	90,900
AVERAGE INCREASE IN NUMBER OF WORKERS ACCESSIBLE TO EAST LONDON BUSINESSES BY ROAD (WITHIN THE 37 MINUTE LOCAL AVERAGE COMMUTE TIME)	105,100	100,800
AVERAGE INCREASE IN NUMBER OF BUSINESSES ACCESSIBLE TO OTHER EAST LONDON BUSINESSES BY ROAD (WITHIN A 45 MINUTE JOURNEY TIME)	5,500	3,200
AVERAGE INCREASE IN NUMBER OF CUSTOMERS ACCESSIBLE TO EAST LONDON BUSINESSES BY ROAD (WITHIN 30 MINUTES JOURNEY TIME)	133,800	122,200

Work for TfL has also analysed the development benefits in terms of new housing and job development that would be facilitated by each crossing. Table 3 shows the central estimates for each option against a range of criteria, again assuming that each crossing is mutually exclusive.

Table 3: Development Benefits of Fixed Crossings

Source: Atkins (2014) *River Crossings: East of Silvertown Crossings.* River Crossings Development Study. Transport for London. Table E1

	FIXED CROSSING AT GALLIONS	FIXED CROSSING AT BELVEDERE
HOUSING UNITS SUPPORTED	21,100	19,650
OFFICE FLOORSPACE (SQ.M)	248,200	188,500
RETAIL FLOORSPACE (SQ.M)	54,100	46,150
LEISURE FLOORSPACE (SQ.M)	26,800	26,200
INDUSTRIAL FLOORSPACE (SQ.M)	106,800	154,400
TOTAL PERMANENT JOBS (NET)	29,750	25,550

Again, a crossing at Gallions has the highest benefits on all criteria, except on the amount of industrial floorspace, where Belvedere performs better, as less industrial floorspace is redeveloped for housing. Crucially, a crossing at Gallions creates more jobs than one at Belvedere. The ferry also performs relatively poorly on these criteria.

The next table, Table 4, compares the congestion-relief that would be achieved by the two options, in addition to a tunnel at Silvertown.[74] Again, it shows that Gallions creates greater benefits than Belvedere.

Table 4: Change in delay across the traffic network in the AM peak in 2021 (vehicle-hours)
Source: Georgeson, N. (2014) *River Crossings: East of Silvertown Crossings.* Traffic Impact Report. Transport for London.

		FIXED CROSSING AT GALLIONS	FIXED CROSSING AT BELVEDERE
		-310	-277
AVERAGE NORTHBOUND JOURNEY TIME SAVINGS TRAVELLING TO STRATFORD, DAGENHAM, ROYAL DOCKS AND BARKING	FROM WOOLWICH	-16	-14.5
	FROM THAMESIDE	-29.25	-16
	FROM BELVEDERE	-23.5	-18.75
	FROM BEXLEYHEATH	-5.25	-3.5

Finally, it is necessary to compare the costs of each of these options. Here too, Gallions scores better than Belvedere (see Table 5). It is the lower cost option, irrespective of whether the crossing is a bridge or tunnel.

Table 5: Total construction costs in outturn prices (central estimate)
Source: Transport for London (2014) *River Crossings: East of Silvertown Crossings.* Cost Estimate Summary (Report K).

	GALLIONS REACH	BELVEDERE
BRIDGE	£450M	£700M
TUNNEL (IMMERSED TUBE)	£625M	£800M

In conclusion, given the limitations on funding (see next chapter) the Commission believes that a new crossing at Gallions Reach should be prioritised over Belvedere. Ultimately, Belvedere would cost between £125 million and £250 million more than Gallions[75] and would unlock fewer new homes; allow less office, retail and leisure space to be developed; and create fewer new jobs.[76] Furthermore, a crossing at Gallions is the only suitable replacement for the ageing Woolwich Ferry, which needs to be replaced by 2024.

Nevertheless, as soon as the expected regeneration, housing and population growth facilitated by the Silvertown, Gallions and Crossrail

investments are realised, the Commission recommends that a new crossing at Belvedere should be also be developed to spur the next wave of Thames Estuary redevelopment.

Number of lanes

The number of lanes on a new crossing at Gallions Reach has been closely linked to the failure of several previous attempts to build a crossing there. The East London River Crossing (the precursor proposal to the Thames Gateway Bridge) was planned to be a strategic link, with three lanes in each direction, but was killed off because building the necessary approach roads would have destroyed ancient woodland, provoking significant local opposition. A decade or so later, the Thames Gateway Bridge was presented as a local crossing, with no new road connections, to avoid these problems. Unfortunately, the design still included three lanes in each direction, creating the potential for significant new traffic flows on the local road network.[77]

The Commission has considered alternative solutions to rerouting traffic, including a visionary idea for a tunnel under Shooters Hill that would have seen the traffic emerging further south and linking to the 'South Circular' at Falconwood.[78] However, after consideration, we came to the conclusion that all these options were either too expensive or ultimately ineffective. We therefore recommend restricting the crossing to two lanes. This will ensure that the crossing remains a local link, and therefore avoid a repeat of past failures. Traffic modelling shows that a fixed crossing at Gallions with two lanes in each direction would be used overwhelmingly by locals: 93% of northbound and 80% of southbound traffic would originate in the local area.[79] The Commission therefore recommends that, in order to win both the planning and the political argument, the bridge should be limited to two traffic lanes in each direction. Given that the strategic crossing at Silvertown is now all but confirmed to go ahead, the crossing at Gallions should be planned and designed as a local crossing with the function of unlocking regeneration benefits in the local areas on either side of the Thames. The issue of pedestrian and cycling capacity will be addressed in the next chapter.

Type of crossing at Gallions

The three main options for a high-capacity crossing at Gallions are an opening bridge, a fixed bridge, or a tunnel. The July 2014 consultation implicitly rules out both an opening bridge and a tunnel. The Commission has considered all three.

The first option is for an opening bridge. A key consideration with this design is how often it would have to be open and therefore

be unusable. The PLA have provided us with a range of technical information about the specifications for an opening bridge.[80] Assuming a closed air draught of 40m and taking into account traffic projections for large ships, we estimate that an opening bridge would be required to be open for a maximum of 520 openings per year; though clearly these could be coordinated to some extent so that multiple ships used a single opening. The other key variable is how long the bridge would have to be open for on each occasion:

- Vessels departing Enderby Wharf and the Greenwich Ship Tier (around half of all vessels) would require the bridge to be open for 60 minutes;

- Departures from the Thames Refinery would require it to be open for 30 minutes;

- Vessels coming upstream would require it to be open for 30 minutes.

In addition to the number of times the bridge would need to open, we need to consider how disruptive each opening would be. Most vessel movements occur at high tide to take advantage of the free tidal energy and additional water depth, which makes the opening times fairly predictable. We calculate that around a fifth of all peak travel periods would be affected by coinciding with high-tides, therefore causing serious disruption.[81] This Commission considers this to be a serious drawback.

A second option is a fixed bridge. This is now the only type of fixed crossing which TfL is still considering at Gallions.[82] Technical work by Mott MacDonald has shown that a bridge here would require the following specifications:[83]

- 50m max air draft (equivalent to eleven new Routemaster buses), in order to accommodate modern ships;

- Approach ramps of 600–700m on each side, in order to gain the necessary height;[84]

- A concrete box-girder design.[85]

There are several advantages to a fixed bridge. Foremost among these is that the costs are low, with central estimates of £406.5m.[86]

A fixed bridge would also be open to traffic almost all the time; though like the QEII Bridge would likely have to shut from time to time due to poor weather conditions. However, the Commission believes that a fixed bridge also has significant drawbacks. Foremost among these is how far the bridge would intrude inland (600–700m) on either side of the river, and the amount of land blight that would be caused.[87] Moreover, box girder bridges don't have the lightness or elegance of modern cable-stayed bridges. This means that land values could be negatively affected in the area within the line-of-sight of the 50m high bridge. Another significant downside to the fixed bridge option is that it will be seen as a return of the Thames Gateway Bridge, and so is likely to be opposed with particular ferocity by the opposition groups who succeeded in getting the Thames Gateway Bridge dropped just six years ago. A final consideration is whether a bridge would be useful for non-motorised transport. The Public Inquiry into the Thames Gateway Bridge expressed a range of concerns about the suitability of the bridge for pedestrians and cyclists and concluded that "the combined effect of crosswinds and the long, steep section would make cycling difficult."[88] Special protective measures such as separate decks, windbreaks, and lifts for disabled people would therefore have to be considered, with the attendant cost implications.

The third and final design option is a tunnel.[89] In terms of design, an immersed tunnel (sunken into the river bed) is significantly cheaper than a bored tunnel (drilled under the river bed), and provides the same functionality, so is therefore preferable.[90] TfL have, however, ruled out any tunnel on the grounds that even the immersed tunnel would cost significantly more (£625 million) than the fixed bridge (£406.5 million).[91] A tunnel, however, would involve significantly less land blight on each side of the river than would a bridge. This would allow the land on either side to be used for residential or office development. Finally, tunnels can accommodate walkers and cyclists in a safe, well lit, wind-free, fully segregated tube, as with the famous Maastunnel in Rotterdam.[92] Figure 3 (pages 18 and 51) shows how this could be achieved at Gallions Reach.

Table 6 summarises the costs and benefits of the three options reviewed above. Because of the significant reliability issues with an opening bridge, the Commission agrees with TfL that this option should not be taken forward. This leaves the fixed bridge and (immersed) tunnel as the remaining options. The tunnel is more expensive and this appears to be the reason why it is not included in the current consultation document. However the Commission believes that ruling out a tunnel on cost grounds does not take into account the significant benefits of a tunnel for development in the area. A bridge will sterilise

more land than a tunnel and as result will impede the scale and type of development that a new link could facilitate. The Commission's high level analysis estimates that a tunnel could free up enough space on the south side of the river to accommodate up to 260 homes. On the north side of the river, the current proposed bridge alignment would cut straight through a potentially high value development site in the Royal Docks. We estimate that a tunnel could free up enough land to support an additional 8,000sq.m. of industrial floorspace, which would support around 230 jobs and £8 million of GVA per year. The bridge will also be very high and have a significant visual impact in the area surrounding the structure. Very tall bridges with long approach roads generally mean lower land values and a higher concentration of industrial and distribution firms in close proximity to the approach. This could constrain the move towards higher value employment uses particularly in the Royal Docks.

In light of these additional benefits, the Commission therefore recommends that the immersed tunnel option at Gallions be fully developed and assessed by TfL, with a view to making it the lead option. In the next chapter we make some recommendations about how the money could be found to cover the costs involved.

Table 6: Summary of costs and benefits, Gallions Reach
Source: Original work by Gensler

	OPENING BRIDGE	FIXED BRIDGE	TUNNEL
COST93	UNKNOWN, BUT LIKELY HIGH	£406.5M	£625M
TIME TO CONSTRUCT	UNKNOWN, BUT LIKELY HIGH	3–4 YEARS	3–4 YEARS
RELIABILITY	WILL HAVE TO CLOSE REGULARLY	MAY HAVE TO CLOSE OCCASIONALLY DUE TO WEATHER	HIGH RELIABILITY
CAPACITY	LIMITED TO 25,000 BY LOCAL ROAD NETWORK	LIMITED TO 25,000 BY LOCAL ROAD NETWORK94	LIMITED TO 25,000 BY LOCAL ROAD NETWORK
PEDESTRIANS/ CYCLISTS	STEEP INCLINE AND EXPOSURE TO ELEMENTS LIKELY TO DETER PEDESTRIANS AND CYCLISTS. SEPARATE DECK AND WEATHER PROTECTION REQUIRED (AT ADDITIONAL COST)	STEEP INCLINE AND EXPOSURE TO ELEMENTS LIKELY TO DETER PEDESTRIANS AND CYCLISTS. SEPARATE DECK AND WEATHER PROTECTION REQUIRED (AT ADDITIONAL COST)	MORE PEDESTRIAN AND CYCLIST FRIENDLY. SEPARATE TUBE REQUIRED (AT ADDITIONAL COST)
LAND BLIGHT	MEDIUM	HIGH (LONGER RAMPS)	LOW

Figure 2: Proposed Gallions Reach Tunnel Linking Thamesmead and Beckton
Source: Original work by Gensler

Lower Thames

The first crossing on the site was a tunnel linking Essex and Kent, opened in 1963. A second tunnel was opened in 1980[95] and the M25 was completed just six years later, at which point the crossing became an important link in regional and national motorway network. Traffic growth on the M25 outstripped expectations and soon exceeded the capacity of the existing tunnels.[96] Construction of the QEII Bridge, to relieve the overcrowded tunnel, began in 1988 and the bridge opened in 1991. High demand meant that the crossing paid for itself in tolls by 2002, but charges continued to be levied in order to manage demand.[97]

By the late 2000s the existing bridge was becoming congested with the sheer weight of traffic, exacerbated by the need for users to stop at toll booths before crossing. A DfT review in 2009 set out a plan to introduce free-flowing tolling (due to become operational in October 2014), and set out three options for an additional crossing to relieve congestion in the longer term. In May 2013 the DfT consulted on these three options (A, B and C) for a replacement, and announced in December 2013 that option B would be dropped. The DfT are now conducting further work on the remaining two options: A, which is an expansion of the existing crossing; and C, which crosses the Thames further downstream, linking Tilbury and the M2. Option A is far cheaper (£1.25 billion) than Option C (£3.25 billion), but the overall cost-benefit ratios are very similar, as Option C provides significant new connectivity in addition to the congestion relief provided by both options.

There is now an urgent need to progress work on the new Lower Thames Crossing. The Highways Agency refers to the Dartford Crossing as the least reliable section of the strategic road network nationwide, and congestion or closures on the bridge can have severe knock-on effects across the local road network and around the M25. The proposed Garden City at Ebbsfleet and Paramount theme park on the Swanscombe Peninsula will, if delivered, also put significant additional strain on the crossing. In the last five years the DfT have done no more than narrow down three possible options to two possible options. Work on developing a new crossing now needs to be sped up significantly.

5
ENVIRONMENT AND PUBLIC TRANSPORT

This chapter lays out the Commission's views on issues of carbon emissions and air quality, and bus, cycling and walking integration. Our key argument is that by linking existing bus and cycling networks, a new crossing at Gallions Reach will increase the range of transport options available to East Londoners, making them less car dependent.

Emissions

We accept that new crossings will create an increase in vehicle journeys – the regeneration benefits are premised on being able to increase road connectivity across the area.[98] It is worth pointing out, however, that there are two factors mitigating the impact of this increase. Firstly, the increase in emissions will be partly offset by reduced congestion at the existing crossings. Although environmental groups have argued that new crossings will increase congestion, the latest TfL traffic modelling shows that a fixed crossing at Gallions will reduce congestion by 310 vehicle hours in the AM peak period across the London road network.[99] Second, new crossings will reduce the length of many existing journeys by allowing much more direct routes to be taken. Both of these factors will help hold down emissions.

The Commission believes there are much better ways of reducing the environmental impact of traffic than capping cross-river road connectivity in East London. For example, changes to the London bus fleet, expanding low emission zones, or the reform of road pricing all offer a more targeted and systematic approach to reducing emissions than capping cross-river connectivity in one part of the city.

Public transport only crossings

Environmental groups have also made the case to us that public transport only crossings should be developed, on which private cars and HGVs would not be allowed. The Commission believes that this would not be best way of bridging the Thames, for three reasons.

First, it doesn't take account of the nature of transport need in Outer East London. Even with ambitious investment in the public transport network, including increasing cross-river public transport capacity by ten times during the last 20 years,[100] very many of the journeys currently completed by car will not be replaced by public transport, even in the medium term. As the Roads Task Force have shown, the road network provides a more uniformly-concentric and 'predictable' level of accessibility compared to public transport.[101] This means that for many point-to-point journeys in Outer London, the car will remain the quickest and most attractive mode. Moreover, London's largely radial rail network means that orbital public transport trips are

not competitive when compared to road-based modes. This is unlikely to change unless we see significant investment in multiple rail-based orbital travel schemes, not just across the river but throughout Outer London. Unfortunately, the likelihood of this remains low given that the cost would be very high and because Outer London's lower population and employment densities make such a proposition less viable.

The second reason is that the economic case doesn't stack up, or at least hasn't been made. East London contains a high proportion of road-dependent businesses that are unlikely to be able to transfer all of their trips to public transport modes. This includes many businesses in the distribution, construction and manufacturing sectors that rely on good road links to access customers and suppliers. These sorts of road-dependent sectors were most likely to state that a new road crossing would lead to their business expanding,[102] and are particularly concentrated in areas in close proximity to the river.[103]

The third and final reason is that it will not tackle the resilience and congestion issues outlined in chapter three. The population in the East Thames boroughs is due to grow substantially over the next two decades. There is capacity for over 240,000 residential units and almost four million square metres of commercial floorspace,[104] which is highly likely to significantly increase the demand for road based trips. A public transport only crossing would deliver some capacity, but this would likely be inadequate to manage congestion and resilience over the short or long term.

The most detailed evidence submitted to the Commission relating to public transport only crossings does not deal adequately with any of these points, instead providing only (in its own words) an "outline broad brush appraisal" of different options.[105] In particular, it provides no estimates of the impact of different crossing options on job creation. The Commission therefore recommends that the new crossings are open to non-public as well as public transport. In the next chapter we consider how public transport integration on the new crossings can be maximised, therefore minimising the increase in private car use, within the parameters of a bridge open to all.

Maximising public transport integration

The bus network in East London is currently split down the middle by the Thames. The only London bus route that currently goes across the river east of Tower Bridge is the 108, running from Lewisham to Stratford via the Blackwall tunnel). The effect of the 'Thames Chasm' can also clearly be seen by comparing the number of cross-river bus movements in West and East London. Each day there are 9,266 cross-river bus movements between the South-West[106] and North-West[107] London boroughs; but only 2,508 movements between the South-East[108] and North-East[109] boroughs.[110]

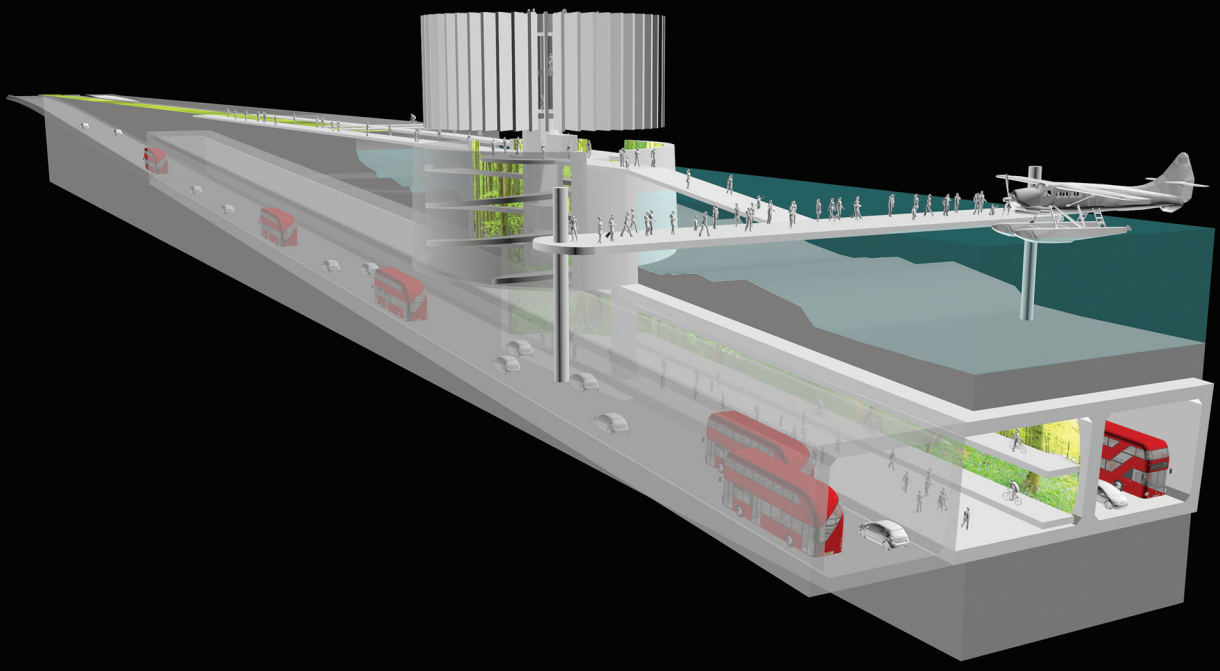


Figure 3: Conceptualisation of the Gallions Reach Tunnel, with Segregated Walking and Cycling Tube
Source: Original work by Gensler

A new crossing at Gallions Reach would be able to link bus stations on the south bank such as Woolwich with hubs on the north side of the river and on to major bus stations at Barking and Stratford. This single additional link would therefore provide a step-change in connectivity by integrating East London's otherwise segregated bus network. It would also link those living south of the river to the tube network via the DLR at Gallions Reach, the Barking to Gospel Oak branch of the London Overground and the District and Hammersmith and City lines at Barking.

East of Tower Bridge there are only three pedestrian/cycling crossings on the Thames: the Greenwich Foot Tunnel, Emirates Airline, and the Woolwich Foot Tunnel. A new crossing at Gallions would add a fourth. The cross-section in Figure 3 (pages 18 and 51) shows how a fully segregated cycling and walking tube could be added to the immersed tunnel. This would allow cycling through the tunnel, in contrast to the Woolwich and Greenwich foot tunnels which require cyclists to dismount.

No formal assessment has been carried out of the additional costs involved in adding such a fully segregated walking and cycling tube at the Gallions tunnel. However, having consulted with immersed tunnel experts, we believe that indicative estimates can be made by looking at similar schemes elsewhere in the world. The Fehmanbelt Tunnel, which is currently being built between Denmark and Germany, was at one point planned to include a cycling lane, though this idea was subsequently dropped in favour of incorporating room for cyclists in the trains that run through the 19km long tunnel. As part of the design work, detailed analysis was carried out on the costs of an additional segregated cycling tube. The additional cost of the cycling tube was estimated at €228 million, which is the equivalent of €12million/km or 4% of the total cost of the tunnel. The equivalent figure for a tunnel at Gallions, which is 0.85km in length, would therefore be between £8 million and £23 million in total. This additional tube could also be used for emergency vehicles in the event of a serious incident, as happens in some of the major river crossings in New York and in the Channel Tunnel.

A tunnel would also link major parts of London's cycling and walking network, providing a major increase in overall connectivity. Specifically it would allow the following links to be created:

- The Thames Path and the Thamesmead-Greenwich cycle path on the south bank could be linked to the network of Olympic Greenway cycles routes on the north bank, via the Lower Lee Valley and Elevated Greenway routes, both of which terminate near the tunnel mouth.

- A radial link could be created between Cycle Superhighway 4 (which runs from Woolwich to London Bridge on the south bank) and Cycle Superhighway 3 (which runs from Barking to Tower Gateway on the north bank).

- This could all be linked in with the new network of semi- and fully-segregated cycling lanes being developed in Bexley with funding from the Mayor of London.[111]

The Gallions Reach cycling tunnel could therefore form an important part of the Mayor's £1 billion new cycling network for London.[112] The new crossing could also be linked directly to the network of local cycle routes due to be developed as part of the master plan for regenerating the area immediately around the southern mouth of the tunnel.

Summary

We accept that a new road crossing at Gallions Reach will likely increase the number of vehicle journeys, including car journeys – at least in the short term. Indeed, the case for new bridges is partly based on the regeneration benefits of making the area more accessible to private motorised transport. But while we agree that reducing emission and improving air quality are crucial policy objectives, freezing the construction of new crossings in one part of London is a blunt and somewhat arbitrary way of going about this. There are other policy levers available which would be more effective and which avoid freezing housing and employment growth across the area. The use of an immersed tunnel with a fully segregated cycling lane will create a step change in connectivity on bus, pedestrian and cycling routes in the area. By integrating this with new housing development on the north and south bank, and existing schemes under the Mayor of London's Cycling Vision, we believe that a tunnel at Gallions is actually a significant step in creating a less car dependent East London.

6
DELIVERY AND GOVERNANCE

Opportunities to deliver new crossings on the East Thames have been missed in the past. The authorities have dropped plans for a range of reasons, including shortcomings in design or in the consultation process. But these failures have been wrapped up with, and exacerbated by, general failures of governance and leadership. The planning system has at times created unnecessary obstacles, for example, and rapid ministerial turnover has encouraged policy makers to kick the can down the road. New crossings have served as pawns in the game of London politics – sacrificed in order to win elections. Though much progress has been made in recent years, the GLA has failed to deliver a single new crossing since it was created fourteen years ago.

This Commission explored the proposal, initially supported by several commissioners, that some form of roving Development Corporation might be a good way to overcome some of these problems and ensure that new crossings were delivered. In the course of discussions however, we have decided against this. Ultimately, we agreed that excluding key stakeholders and creating an entirely new institution would only serve to increase risks and delay. Some of the worst features of the old planning system have also since been reformed.

Nevertheless, the Commission believes that some institutional reform would help support the delivery of new crossings. Specifically, the Commission recommends that a new special purpose company should be established to manage the development of the three new crossings within the London boundary. The company should be a subsidiary of TfL and would be staffed by people who have had significant involvement and experience with the work done on the current generation of proposals. This would be a similar model to that being used to deliver Crossrail. The mayor should appoint an experienced executive to lead the organisation.

The Commission believes this modest reform would have significant benefits. First and foremost, it would ensure, for the first time, that a fully focused approach was taken to delivering new crossings – the new agency would live or die based on whether it succeeded in doing so. Appointing a respected and influential individual to lead the project and ensuring that they are personally associated with its success (as David Higgins is with HS2), would also serve to increase the institutional pressures to deliver new crossings. This special delivery vehicle would be responsible for developing proposals, consulting on them, securing planning permission at a national level and then appointing a private sector body to design, build and finance each of the crossings. It would also be responsible for setting a tolling level that will both manage demand effectively and create a reasonable payback period for the concessionaire.

The situation with the Lower Thames Crossing is complicated by ongoing reforms to the Highways Agency, and the Commission believes this makes it inappropriate to recommend any institutional reform on the crossings outside the London boundary.

In summary, these arrangements represent a realistic set of reforms that minimise disruption to the delivery of new crossings, while seeking to remedy some of the governance issues which have contributed to the difficulties experienced trying to deliver new crossings in the past.

7
FINANCING NEW CROSSINGS

There is no shortage of major infrastructure projects competing for public funding in London. Indeed, the London Infrastructure Plan identifies a requirement for over £1.3 trillion of capital investment to meet the needs of the growing city to 2050, over a third of which is for transport projects.[113] This strong competition means that only those projects which are attractive enough to secure significant private sector investment, or those which can demonstrate excellent return on investment for the public purse, are likely to be successful in the race for funding. We argue that new crossings on the East Thames score highly on both fronts.

A basic principle that should govern infrastructure funding is that those that benefit most from a project should help pay for the investment. In the current fiscal climate, this principle is particularly pertinent: HM Government is not set to close the budget deficit until 2019, and reducing public debt may take decades longer.[114] In the case of the Thames Crossings this user-pays principle can be realised in a number of different ways. Revenue can be raised from:

- Those using the crossings, through the collection of tolls;
- The developers and land owners that will benefit from the increase in property values, through land value capture mechanisms such as CIL;
- The businesses that will benefit from increased economic activity, through the retention of business rates.

We assess each of these mechanisms in turn, before assessing the likely level of public funding that will be required to cover the remaining costs and making the case that bridging the remaining funding gap represents a sound investment for HM Government.

Revenue from tolling

International experience suggests that toll roads can be highly effective generators of revenue under certain conditions. Broadly speaking, they are more likely to be successful when they link areas for which there is high travel demand and when they have little in the way of competition from alternative routes. The Dartford Crossing, for example, fits both of these criteria and generated sufficient revenue from tolling to pay for itself within 14 years, six years earlier than expected.[115] Where these conditions are not met, for example with the M6 toll road or the Humber Crossing, revenue generation has proven to be more limited.[116]

How do new crossings at Gallions Reach and Silvertown measure up against these criteria? We argue that demand will likely be high given that the crossings are located in this densely populated and fast-developing area of London, with limited crossing opportunities. This is supported by TfL's own estimates of crossing demand, which run to 2021, with demand likely to continue rising after this date as jobs and homes are delivered.

There are also strong reasons for introducing tolling beyond revenue raising. Charging users is an important tool for managing demand on the crossings to ensure that the crossings do not become overly congested, thus ensuring the resilience benefits are not wiped out by an increase in demand. Tolls are also an important way of discouraging unnecessary car journeys and encouraging the use of walking and cycling as a way of crossing the river, when appropriate. Lastly, tolling the crossings allows private financing to be used to fund the construction of the crossings. There is strong private sector demand for financing such projects, conditional on the details of the specific package.

For all of these reasons there is a strong case for tolling forming a key part of the funding package. Crucially, our consultation with various stakeholders suggests that, despite tolling not being popular with people in the area, there is now a pragmatic recognition that tolling is necessary in order to secure the delivery of these long overdue crossings. There is also evidence showing that a majority of people support tolling on new crossings if it means the crossings get built.[117] A majority of businesses also support the introduction of tolling on East Thames crossings if it makes journey times more reliable.[118]

The proportion of the total costs which could be covered by tolling, and therefore the share required from other sources, is of course highly dependent on the specific crossing package and tolling regime. For the sake of argument, we make four key assumptions:

1—In line with TfL, we assume that the existing Blackwall Tunnel and the new Silvertown Tunnel would be tolled. Tolling Blackwall would be necessary for traffic management reasons: it is not feasible to have a free crossing right next to a tolled crossing.

2—We assume that an immersed tunnel will be built at Gallions in line with the proposals in the previous section. We assume that this will also be tolled.

3—In line with TfL working assumptions, we assume that the tolls are introduced at half the level of the Dartford Crossing outside of peak time, and the full level during peak time.

4—We assume that tolls are introduced on the Lower Thames Crossing at the same rate as those on the existing Dartford Crossing in order to manage network demand.

Although the Commission has not undertaken detailed technical work projecting the costs and revenues of the various options, we have developed high-level estimates in order to guide our broader decision-making process. If the assumptions above are applied to the demand forecasts for 2021, the Commission estimates that Blackwall and Silvertown together could generate over £60 million a year from tolls. Taking account of maintenance and operation costs, as well as the costs of borrowing, we calculate that the entire costs of Silvertown could be covered from tolling revenue alone, along with around half of the cost of an immersed tunnel at Gallions, depending on the specifics of the toll regime. The contribution of tolling to a crossing at Belvedere-Rainham (in addition to Silvertown and Gallions) would be much lower. The Lower Thames Crossing could likely be funded entirely by the tolls collected from the existing Dartford Crossing, as well as the Lower Thames Crossing itself. Some funding from non-tolling sources is therefore also required to fund the full package of crossings.

Land value capture

New transport links allow for development, growth and regeneration. Financial mechanisms can be used to capture some of this value growth in order to help repay some of the cost of the initial investment. Crossrail made use of such a mechanism in order to contribute towards the funding of some of its capital costs, and Crossrail 2 is expected to do so to a similar or greater extent.[119] Work commissioned by TfL estimates that there is capacity for up to 375 million square metres of Community Infrastructure Levy-chargeable floor space to come forward by 2036 in the eight East London boroughs that face the Thames.[120] If a charge similar to the current Mayoral CIL was applied to this development, this could generate well over £100 million to help fund the crossings.

However, caution is needed when considering the amount of value that can realistically be expected to be captured from new development. Many of the development sites in East London are of uncertain viability and introducing an additional levy, on top of the existing Mayoral CIL, Borough CILs and other competing demands for affordable housing and infrastructure, could affect their delivery. Ultimately, the Commission believes that the additional complexity created for both potential private sector funders of new crossings and housing developers in the area is hard to justify, given its relatively small contribution to total scheme

costs (around £100 million). The Commission therefore recommends that land value capture is not included as part of the funding mix for the crossings. This does not however preclude the boroughs using their own CIL's to part-fund the various highway improvements that will be required to mitigate the impact of traffic flow on roads that connect to the crossings.

Business rate capture

The enhanced connectivity that will be created by new crossings is expected to increase productivity, economic activity and job creation. Work commissioned by TfL estimates that there could be up to 34,000 additional jobs as a result of crossings at Silvertown and Gallions alone,[121] the majority of which will generate tax revenue.

The Commission is however against levying any supplementary business rates on businesses in the local area on the grounds that it is likely to be counterproductive in terms of encouraging development in what remains one of the most deprived areas in London. An alternative and, in the Commission's view, superior approach, would be to direct the business rates within the Royal Docks Enterprise Zone (EZ) towards the funding of new crossings. Currently all business rate uplift over the next 25 years is set to go to the London LEP, which can decide where to spend the money on projects across the city. Due to major new investments recently announced by ABP and the Silvertown Partnership, the total amount expected to be raised over this period has increased significantly. Specifically, work by the London Borough of Newham estimates that businesses in the EZ could now generate a total of £183 million of business rate revenue during the next 25 years.[122] This raises the potential to spend some or all of this windfall on East Thames crossings. We argue that there is a strong *moral* case for doing so. As outlined above, East Londoners now have a pragmatic view about the need for tolling to get new crossings built. But, given that Central and West London have benefited from centuries of new crossing construction while East London has continually missed out, and that nobody in Central or West London currently has to pay tolls to use the river crossings there, it seems only right that some of the revenues generated from the Royal Docks enterprise zone should be spent correcting this historic injustice. The revenue is, after all, generated in the direct vicinity of where both of these crossings would be constructed.

The case for public grant

The Commission's high level analysis suggests that the vast majority of the costs of new crossings at Silvertown and Gallions could be funded by

tolling: Silvertown would likely be fully fundable by tolling revenue, but once Gallions is included there would be a requirement for additional non-toll funding. Adding the costs of a new crossing at Belvedere complicates the matter because it depends in which year a new crossing at Belvedere would be developed. Either way, the Commission believes that there is a strong case for public funding to fill the gap that remains. The economic and regeneration benefits of new crossings have already been laid out in detail in chapter three. These benefits alone provide a clear rationale for public investment. Given that the gap which would need to be covered by public grant is likely to be relatively modest, the return on investment for the government is likely to be high. In addition to these private and social benefits, the additional economic activity generated by new crossings would provide direct tax revenue benefits to the public purse. For example, the estimated 10,000 jobs that could be unlocked as a result of Belvedere Bridge alone could generate around £140 million of Income Tax, National Insurance and Corporation tax revenue per year.[123]

In conclusion, we have argued that new Thames Crossings score highly on two key criteria for public investment: they will attract a good deal of private sector funding and they will offer a high return on investment for the public sector.

SUMMARY OF RECOMMENDATIONS

A package of new crossings would unify East London, connect riverside communities to new opportunities and help create the right conditions for London's next wave of growth. In order to bring this about, the Commission recommends that:

1—A package of new crossings should be developed in order to unlock a wave of regeneration travelling eastwards along the Thames Estuary:

i) The Silvertown tunnel and Lower Thames Crossing should be brought forward as soon as possible;

ii) Whilst crossings should come forward at both Gallions and Belvedere, Gallions should be prioritised given the potentially higher development and economic impacts. Gallions will replace the ageing Woolwich Ferry and will therefore need to be operational before 2024;

iii) A new crossing at Belvedere should be constructed as and when the expected regeneration benefits of other road and rail investments are realised, in order to help spur the next stage of development in the area;

iv) Plans for the Lower Thames Crossing should be finalised no later than summer 2015.

2—The crossing at Gallions should be an immersed tunnel, rather than a bridge or ferry:

i) This should include a fully segregated section for cyclists and pedestrians;

ii) The opportunities which this creates for integrating the bus network in East London should be fully exploited.

3—A special purpose company, along the lines of Crossrail, should be established to oversee the delivery of new crossings:

i) This should be established by early 2015 and a high-profile individual should be appointed to oversee the organisation;

ii) It should determine the location and type of crossings and secure planning permission, before appointing a concessionaire to design, build and finance them.

4—The Crossings should be funded from a mixture of sources:

i) Tolling should be used to raise revenue and manage traffic flows on all new crossings, with a discount available for local residents;

ii) Public grant, potentially including some of the Newham Enterprise Zone windfall revenue, should be used to cover the remaining shortfall.

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The development of the East Thames could be the key to ensuring the success of London's next stage of growth. However, despite years of attention from policymakers, the area is yet to deliver on its significant potential – potential which can only be realised through the construction of new river crossings. Centuries of investment has ensured that, west of Tower Bridge, the banks of the Thames have been tightly knitted together by tunnels and bridges. To the East, however, the river still separates people from jobs, businesses from suppliers, and families from affordable homes.

This report provides a financially and politically robust plan for delivering a new generation of river crossings that will unify the area, transform economic connectivity and, at long last, unleash the potential of the East Thames.

Thanks go to the City of London Corporation, GVA, Atkins and the Port of London Authority, without whose support this project would not have been possible.

ISBN 978-0-9576912-8-5

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