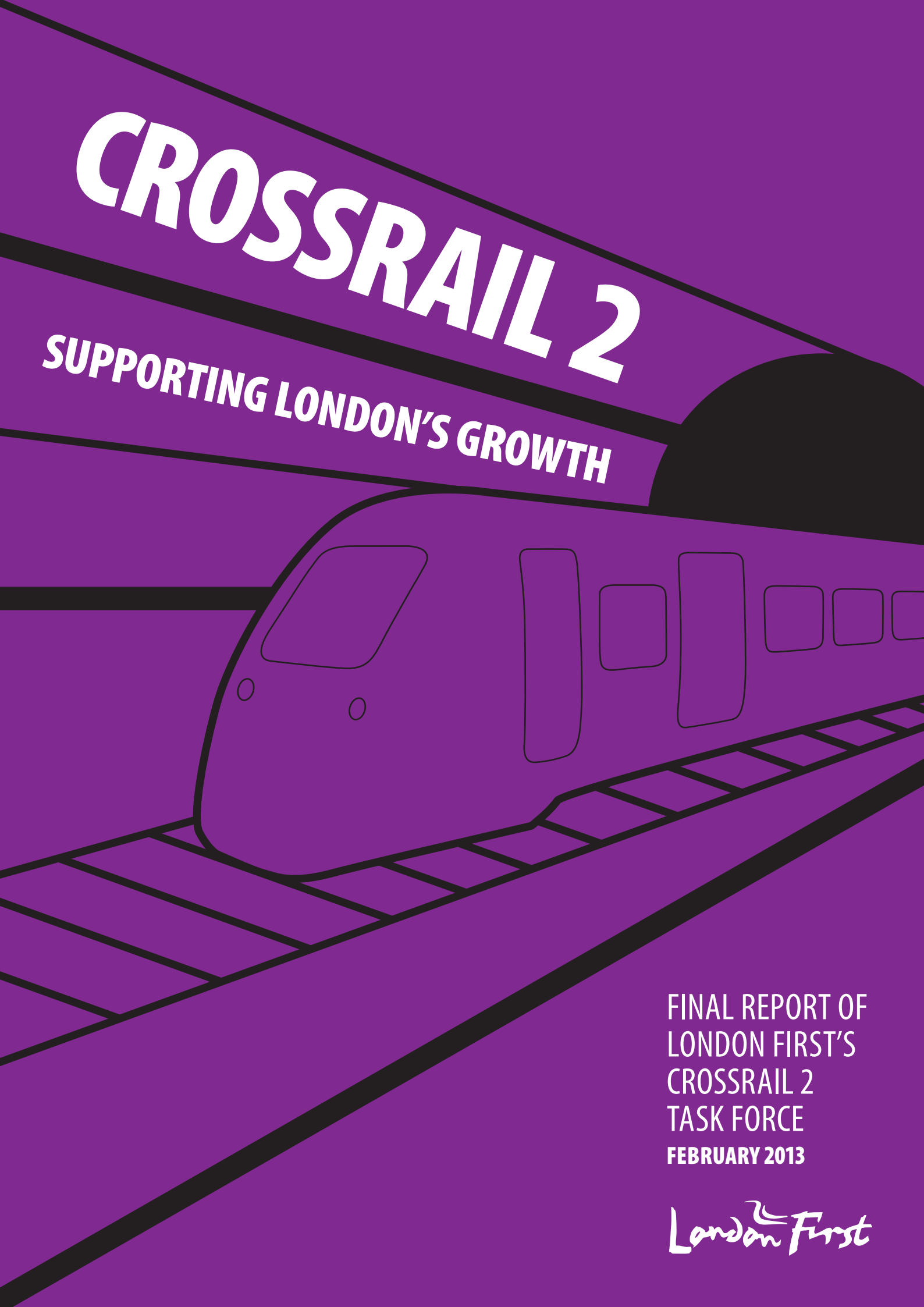
CROSSRAIL 2

SUPPORTING LONDON'S GROWTH



FINAL REPORT OF
LONDON FIRST'S
CROSSRAIL 2
TASK FORCE

FEBRUARY 2013

London First

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CROSSRAIL 2: SUPPORTING LONDON'S GROWTH

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FOREWORD

JO VALENTINE

Some 22 years ago, a group of business leaders in London joined together to create an organisation that would promote essential investment in the capital's infrastructure.

At the time, between the abolition of the Greater London Council and the creation of the office of Mayor and the Greater London Authority, there was concern that with no single body to champion major schemes that crossed multiple London boroughs London was starting to slip behind its international competitors.

Top of their list of essential projects was a new railway, spanning the city from east to west. That was Crossrail and the organisation set up to mobilise support for it across the political and business communities became London First.

That campaign took some 17 years to achieve its objective, marked by the passing of the Crossrail Bill in 2008, and, even though the project has progressed well since work began in 2009, it will be another five years before the first Crossrail trains run. This vividly illustrates the need to think a long way ahead when considering investment in transport infrastructure.

London First's Crossrail 2 task force has done just this. I would like to express my thanks to all its members, and especially to its chair, Andrew Adonis, who demonstrated how consensus can be achieved on major infrastructure projects with his work on the High Speed 2 rail proposal.

The task force has looked ahead to the 2030s, analysing forecasts for London's population and employment growth. It has assessed both the impact this will have on the existing and planned transport system and the requirements it will create for further infrastructure.

The task force's findings are striking. Even with the major improvement and expansions programmes that are already planned or underway, overcrowding on the majority of London's rail and tube network will increase beyond acceptable levels by the late 2020s. On some parts of the network, demand will be such that the system will be unable to meet demand for large parts of the travelling day. Resilience – to enable the network as a whole to cope with unexpected disruption – will be negligible.

Some may argue that this points to a need for government intervention to force businesses – and therefore people – out of London and to other parts of the country. This is understandable but unrealistic. As we see in almost every part of the world, from the technology start-ups in Silicon Valley to the sock manufacturers of Datang, businesses operate most effectively when they are physically close to their customers, their counterparties and competitors.

This clustering of trade has been one of the driving forces in London's success over many centuries. It is one of the reasons why businesses in London and the south-east are considerably more productive and contribute proportionately more to the UK economy than those elsewhere in the country. It provides the rationale for accepting – even embracing – London's success and ensuring that it receives the investment that it needs to continue functioning effectively as a city. In short, an economically viable UK needs an economically thriving capital. And for that capital to thrive, its citizens need to be able to move around freely and easily.

The recommendation in this report, of a new rail line running across London on a south-west to north-east alignment, should therefore be welcomed. It offers the prospect of relieving the already congested routes into central London from the outer suburbs to the south-west. It will provide much needed additional capacity across the central area – particularly at Euston, which will come under additional pressure when High Speed 2 is built, and Victoria. And it will support regeneration along the Lee Valley.

Importantly, the task force's initial assessment of current transport investment suggests that delivering Crossrail 2 would not require a significant increase above current levels. A number of less ambitious proposals, requiring less investment, were considered, but the task force's conclusion was that the proposed scheme would provide a greater return on investment than either a less ambitious project or a package of incremental improvements.

There is clearly much work now to be done to develop the optimal funding model and this will form the next stage of London First's work on this project. However, this should not delay the detailed route planning to finalise a new safeguarded route, following consultation later this year.

I urge the Mayor, London's borough leaders, its MPs and its businesses to give Crossrail 2 their support and ensure that work can begin as quickly as possible.

JO VALENTINE
5 February 2013

INTRODUCTION

ANDREW ADONIS

Crossrail 2 – London's next tube line, needed by 2030

London is a flourishing world city that drives the UK economy. Its ability to support major population and jobs growth and to attract talent and investment from around the world – for the benefit of the UK as a whole – depends upon it having an adequate transport infrastructure. This is not an optional extra. Without good transport links to take people to and from work, London will stall in the future just as surely as it did in the 1970s and 1980s when there was a failure to invest adequately.

London is especially reliant upon public transport. Half of the people who work in London take public transport to work, compared with only 9% of workers in the rest of the UK. Bus use is far higher than elsewhere in the UK; so is rail (including the Tube), which predominates for longer journeys. Rail use – both in terms of numbers of journeys and proportion of journeys – is out of all proportion higher than in the rest of the UK. Two facts speak to this: there are almost as many journeys on the Tube each year as on the entire National Rail network; and over two thirds of all journeys on the National Rail network begin or end in London.

Most of these journeys are not optional: they are commuters getting to and from work, or people going about essential business. If congestion and inadequate transport links stop or discourage people from taking jobs in London, especially in central London, then its economy suffers. Wider public policy may be able to encourage some jobs to locate out of London (civil service jobs, for example). Nonetheless the number of jobs in London is projected to grow by 700,000 over the next 20 years as London's population rises to 9.7 million (from 8.2 million today). Jobs in central London are typically among the most productive in the country. So a failure to cater properly for this employment growth will undermine prosperity in the UK at large, not just in London.

The last 20 years has seen sustained investment and improvement in London's transport infrastructure, which has been critical to London's growth and prosperity. Bus, tube and rail services have all improved significantly. Crossrail is under construction, adding 10%

to London's public transport capacity and enabling far more people to access jobs in central London. There is now a strong business-led consensus on the importance of sustained investment in London's infrastructure, and its transport infrastructure in particular.

Yet London's rail and underground networks are still heavily congested in peak hours. Committed investment through Crossrail 1, the Tube upgrade programme and the Thameslink programme will increase commuting capacity over the coming decade by around a third. But even with this investment, demand on rail and underground services over the next 20 years is set to significantly outstrip capacity.

So we need to begin detailed planning for the next generation of transport improvements now if London's future growth is to be secured. The Mayor's Transport Strategy identifies a number of priority projects to meet London's future needs. These range from desirable incremental improvements to existing infrastructure and services, through significant enhancements to tackle key pinch points on the network, to a major new rail line across London, known as Crossrail 2, based on the Chelsea-Hackney route which was first planned in the 1970s.

A Chelsea-Hackney route has been safeguarded from development since 1991. It is due to be reviewed by the Department for Transport (DfT) this year. Ahead of this review, Transport for London (TfL) has been reassessing the original Chelsea-Hackney proposal to see how it measures up to London's changing needs. The Government's plans for a high speed rail network, terminating at Euston, make this work even more pressing, as a Crossrail 2 scheme could play a vital role in helping to disperse passengers from Euston.

It was against this backdrop that London First established a task force of senior business and transport leaders (see annex), which I have had the privilege of chairing. The task force was asked to examine the need for additional transport capacity to meet future demand and support London's continued competitiveness. We were in particular tasked with assessing the case for a new rail line through central London - Crossrail 2.

The task force published an Interim Report in May 2012, which concluded that there was a strong case for investment in new infrastructure, along the lines of Crossrail 2, to provide a step-change in capacity. In this further report, we spell out in more detail the case for Crossrail 2. We conclude that Crossrail 2 would:

- Offer essential congestion relief and help meet future demand on heavily crowded sections of the Underground in central London, particularly those serving the mainline stations of Waterloo, Victoria, Euston, King's Cross and St Pancras;

- Radically improve services and capacity for commuter rail travel into central London, particularly from suburban south-west London (including Wimbledon, Kingston, Surbiton, Twickenham and Chelsea); main line services from Hampshire and Surrey (including Portsmouth, Basingstoke, Southampton and Farnham); and north-east London (including Islington, Hackney and Tottenham); and

- Generate significant overall benefits – including huge regeneration potential around the stations in Hackney and the Lee Valley – from what will be a substantial investment.

We have examined the most credible options for Crossrail 2, and conclude that the central underground section of the line from Wimbledon in the south-west to Tottenham Hale in the north-east should be connected to the suburban lines at both ends to allow for through-running of suburban trains as with Crossrail 1. This significantly enhances the benefits from a conventional 'tube' line offering no through trains.

We urge the Mayor and central government to take forward preparations for Crossrail 2, including a credible funding plan embracing the public and private sectors, with a view to construction in the 2020s.

London has opened only one and a half new underground lines since the Second World War (the Victoria line and the Jubilee Line Extension). Crossrail 2 will be as essential as Crossrail 1 for London to provide jobs and prosperity in the next generation.

ANDREW ADONIS
5 February 2013

EXECUTIVE SUMMARY

In 2011, London First established a task force of senior business leaders to examine the need for additional transport capacity to meet future demand and support London and the nation's continued competitiveness. In particular, the task force was asked to assess the case for a new rail line through central London.

The task force published an Interim Report in May 2012, which concluded that there was a strong case for investment in new infrastructure to provide a step-change in capacity. It has since undertaken a second phase of work, to look at route options in more detail.

It concludes that a new south-west to north-east (SW-NE) rail line, Crossrail 2, should be built to provide suburban and regional services between Hertfordshire and parts of Surrey and Middlesex, via a new central tunnel between Tottenham and Wimbledon.

The main rationale for this is that rapid population and central London employment growth will require the provision of significant additional capacity on London's transport networks from the mid 2020s onwards. Over the next 20 years, employment in London – mostly in central London – is projected to rise by 700,000 and the capital's population is expected to rise by 1.5 million to almost 10 million, its highest level ever.

Congestion is projected to be particularly severe on a SW-NE alignment which receives limited benefit from Crossrail 1 and Thameslink. A step-change in capacity and connectivity, which would be provided by Crossrail 2, is required on this alignment. Congestion relief and additional connectivity would be provided as follows:

- Crossrail 2 would transform capacity and services on some of the most crowded sections of the Underground network, particularly those which serve the congested central London termini of Waterloo, Victoria, Euston, King's Cross and St Pancras, and the equally congested interchange station of Clapham Junction. It would relieve the entirety of the Victoria line, and much of the Northern and Piccadilly lines, all of which are forecast to see substantial growth in demand and congestion despite expected improvements from line upgrades;

- Wimbledon, Kingston, Surbiton, Epsom and Twickenham in south-west London would be direct beneficiaries, gaining significant extra capacity and service frequency and reliability, and substantially shorter journey times into central London – in some case more than halved. Destinations further afield, such as Woking, Basingstoke, Southampton and Portsmouth, would be indirect beneficiaries;

- Crossrail 2 would also provide vital new connectivity for Islington, Hackney, Tottenham and the Lee Valley in north-east London. It would help drive regeneration in these areas in the same way that the extension of the Tube into London's north-west suburbs drove London's expansion in the 1930s and the extension of the Jubilee line eastwards spurred regeneration of the Docklands and east London through the 1990s and onwards;

- The proposed route would also provide much-needed capacity at Euston, which will be congested to unmanageable levels by the late 2020s, even without the first phase of the planned high-speed rail link to Birmingham, High Speed 2 (HS2). The plans to extend HS2 beyond Birmingham to Leeds and Manchester would make the pressures on the Underground network at Euston even more acute and further strengthen the case for Crossrail 2. We recommend that a single Crossrail 2 station serves Euston, King's Cross and St Pancras, with below surface connections to all three.

Initial calculations suggest the cost of the recommended option for Crossrail 2 would be around £12 billion. The task force also considered a range of other options for increasing capacity. These included a package of incremental improvements to existing infrastructure, costing around £6 billion but bringing only a fraction of the benefits. Two other potential routes and types of service, costing around £9.5 billion, were also examined but, again, these provided significantly less capacity. The task force concluded that the proposed Crossrail 2 scheme with suburban and regional services was by far the most cost-effective method of delivering the necessary step-change in capacity required and providing good value for money (which could be greater if wider potential impacts are taken into account).

An assessment of current and projected transport investment in London indicates that Crossrail 2 would not require a significant increase in spending above current levels. While the Tube upgrade programme will be an ongoing process, public investment in Crossrail 1 and Thameslink will come to a close by the end of this decade. Without Crossrail 2, public investment in major new capacity would substantially reduce, despite acute capacity and employment pressures in central and suburban London.

Undertaking a detailed study of potential options for funding and financing Crossrail 2 is a priority for future work. The task force's expectation is that a diverse range of funding streams will be required, as was the case with Crossrail 1, which included contributions from public spending, borrowing against future passenger fares, and developer and business contributions. It recommends that London First convene a further group to assess possible funding and financing options. Further work should also take place on the appropriate delivery vehicle, taking into account the lessons learned from Crossrail 1, Thameslink and HS2.

The Mayor should now take forward detailed planning and consultation, which should form the basis of a new safeguarded route when the Department for Transport goes out to consultation in late 2013/early 2014. This would enable construction to begin in the 2020s, Crossrail 2 to open in the early 2030s and London and the nation's continued competitiveness to be secured.

1 THE NEED FOR CROSSRAIL 2

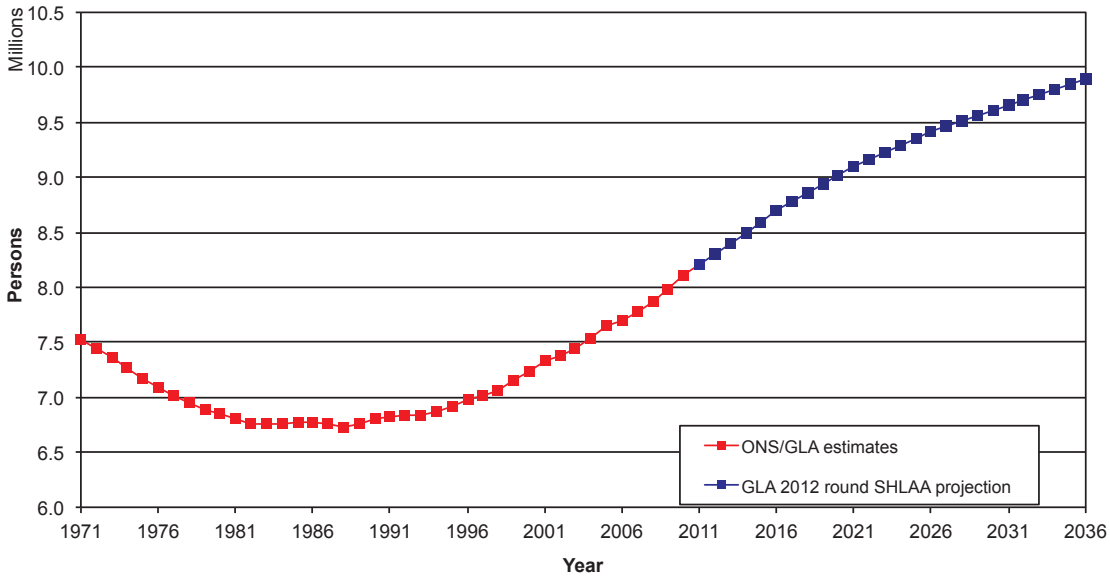
In order to assess the case for Crossrail 2, the task force held a series of discussions with TfL, Network Rail, the Greater London Assembly (GLA) and others on the key future challenges facing London's transport networks and how they might be addressed. These challenges were set out in its Interim Report, published in May 2012, and are recapped below.

I) DEMOGRAPHIC AND EMPLOYMENT PRESSURES

The Mayor of London publishes a statutory spatial development strategy for London (the London Plan). This provides the framework for London's future development and growth and is subject to extensive consultation and examination in public by an independent panel and planning inspector. GLA population projections, produced for the London Plan in 2009, forecast that by 2031 there could be over 1.2 million more Londoners, taking the city's population to 8.8 million.

However, the recent 2011 Census suggests that the population of London is higher than was previously thought; the London Plan estimated a 2011 population of 7.8 million whereas the Census showed a population of 8.17 million. The GLA's latest 2012 round of projections, which include the new Census baseline, have a projected 2031 population of 9.66 million (see Figure 1), which is 1.5 million more than today. Importantly, the latest projections for jobs are also up on the London Plan figures – to 5.6 million jobs in 2031 rather than the 5.45 million in the Plan, most of which would be in central London. This represents an additional 700,000 jobs compared to the 2011 estimate of 4.9 million.

Figure 1
Forecast Population growth in London to 2036



On these projections London's previous peak population of 8.6 million, in 1939, would be exceeded in 2016 – far sooner than the London Plan's projection of 2027, made only four years ago. When London's population was last at such levels, in the 1930s, population density in the overcrowded innermost London boroughs was far higher than now and travel-to-work distances were shorter and less dependent on rapid transit public transport.

These projections are being driven primarily by strong natural population growth (at present London has two and a half times as many births as deaths), which is not expected to be affected significantly by the current economic downturn. Net migration is also a contributory factor. Even with currently committed investment, TfL and Network Rail predict that growth in central London employment will lead to serious increases in crowding on National Rail and the Underground. Without substantial additional investment in enhanced services London and its economy will suffer.

II) DEMAND ON THE TUBE

London's continued growth is putting significant pressure on the Tube. The Tube has witnessed a 40% growth in demand over the last 15 years, with 14% growth over the past five years alone, despite the recession. A record 1.2 billion journeys were made on the Tube in 2011/12. There were 4.7 million journeys on Tuesday 7th August 2012 at the height of the Olympic Games – the highest daily figure in the Tube's entire history. The effective use of Travel Demand Management can help passengers make better informed choices about their journeys, particularly when dealing with planned disruption or major events, as was illustrated during the Olympic and Paralympic Games. However, the mismatch between available capacity and projected demand for journeys to and from work is such that major new capacity, such as Crossrail 2, will be needed. Tellingly, before the Olympics, the previous busiest day, with 4.17 million journeys, was Friday 9th December 2011, a normal working weekday, despite the weak post-2008 economy.

The impacts of increased demand
The maps opposite show crowding levels on the Tube and DLR networks for 2007 (Figure 2) and TfL's projections for 2021 (Figure 3) and 2031 (Figure 4, overleaf) in the morning peak hour, taking into account committed investment in new capacity. Investment in Crossrail 1, Thameslink and the Tube upgrade programme will reduce congestion from 2007 to 2021. However, population and employment growth will mean that by 2031 the Tube network will again be under pressure, at least equivalent to that experienced today across the network – and worse on north to south lines.

Serious crowding problems are projected on key north to south routes, particularly on a south-west to north-east alignment which barely benefits from the new east-west Crossrail 1 line, and which gains only partial relief from the north to south Thameslink programme. Neither Crossrail 1 nor Thameslink provide substantial relief for the Victoria, Piccadilly, Northern and District lines in central, north-east and south-west London.

TfL defines crowding as anything above three passengers standing per square metre (ppsm). By 2031 very severe crowding levels of well over 4ppsm are projected on a number of key routes: around Euston and King's Cross on the Victoria, Northern and Piccadilly lines; around Stockwell on the southern part of the Northern line; between Victoria and Oxford Circus on the Victoria line; between Finsbury Park and Holborn on the Piccadilly line; and between Fulham and Earls Court on the District line.

Figure 2
Crowding on the Tube and DLR networks in 2007 (morning peak hour)

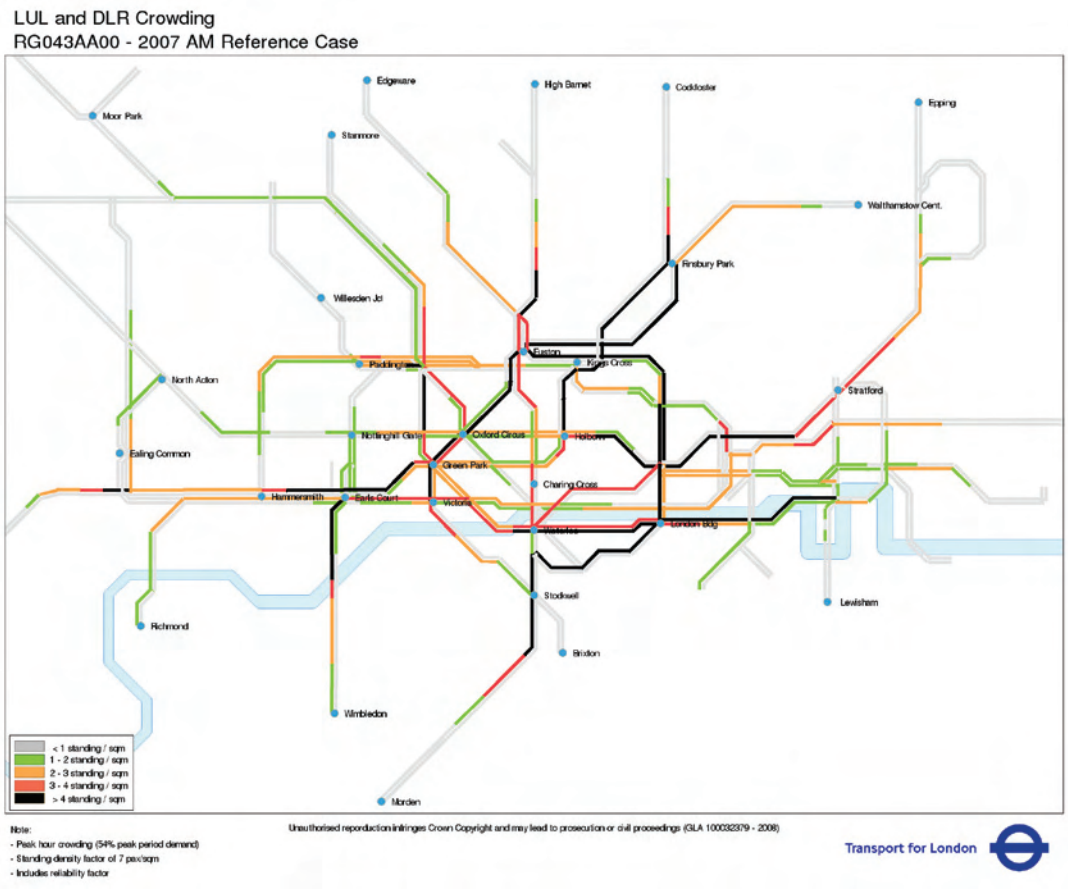
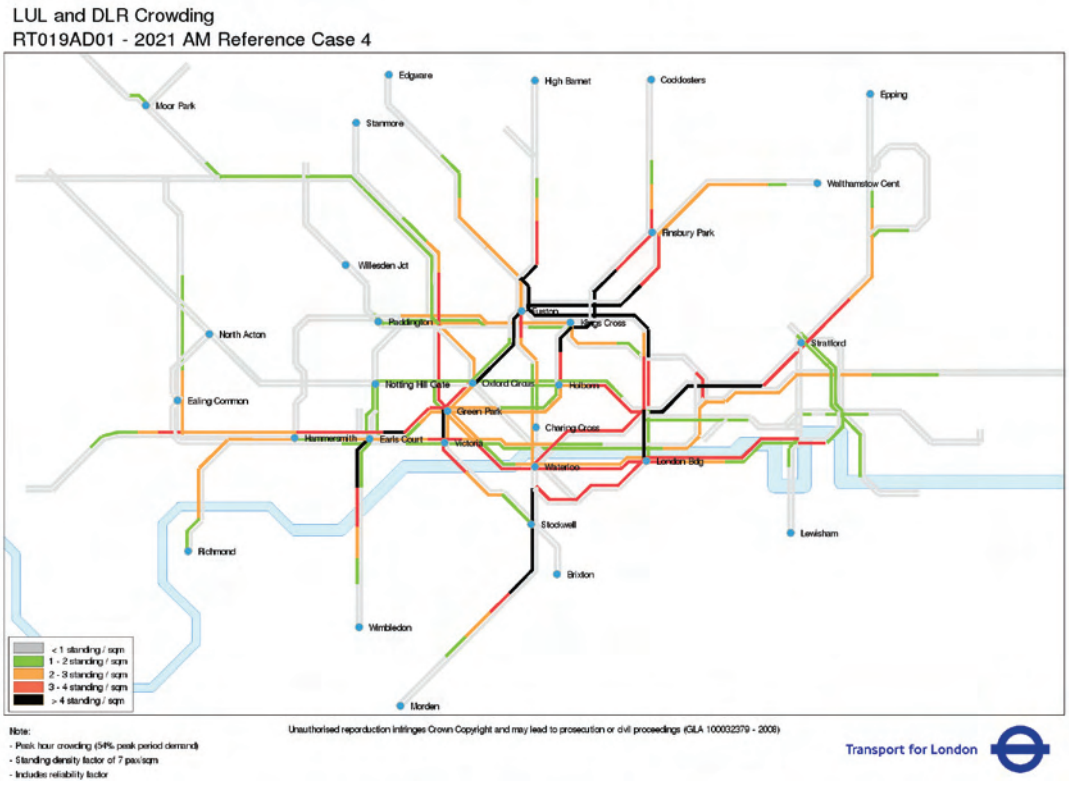


Figure 3
Projected crowding on the Tube and DLR networks in 2021



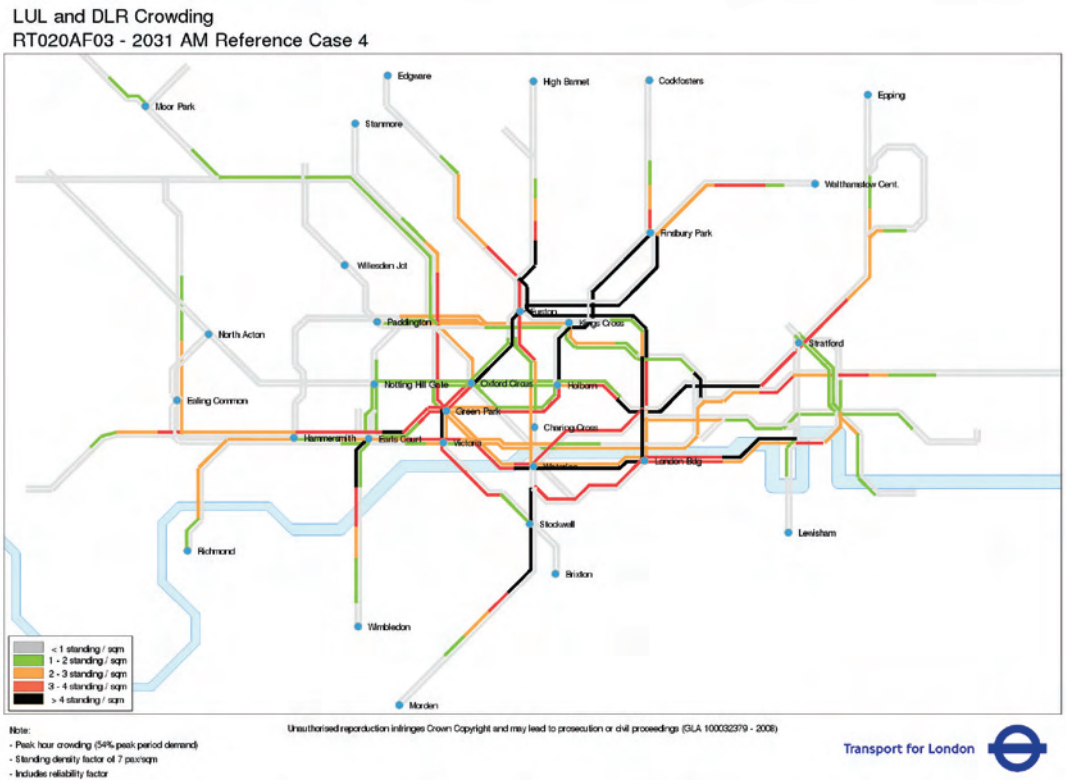


Figure 4
Projected crowding on the Tube and DLR networks in 2031

III) DEMAND ON THE NATIONAL RAIL NETWORK

In autumn 2010 a typical weekday three-hour morning peak period saw over 575,000 passengers travel into central London by overground rail, equating roughly to a quarter of total central London employment. Network Rail estimates demand for rail travel into central London will rise by 36% by 2031. Without additional capacity, this will translate into even worse overcrowding than now on key routes and at key stations.

Network Rail's analysis of long-term demand and the potential options for meeting it is set out in its London and South East Route Utilisation Strategy (RUS), published in July 2011. The RUS highlighted a number of significant capacity constraints on important radial National Rail routes, in particular in south-west London.

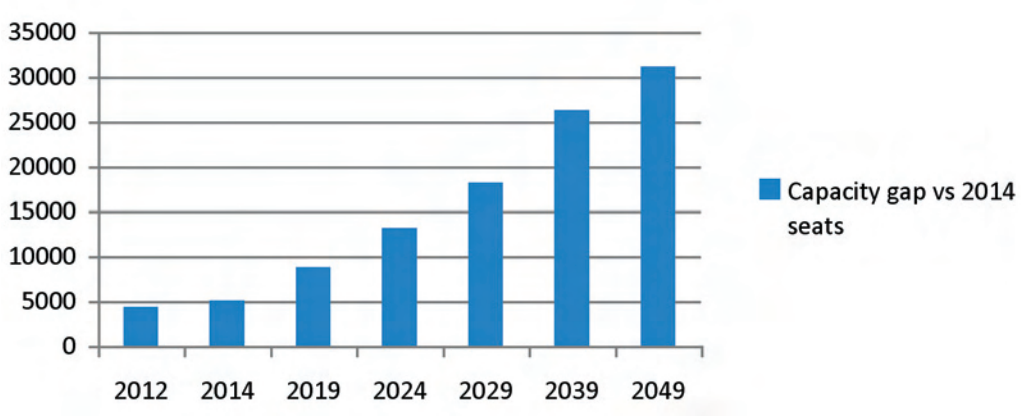
The figures below show crowding levels on the National Rail networks for 2007 (Figure 6) and TfL's projections for 2021 (Figure 7) and 2031 (Figure 8) in the morning peak hour, taking into account committed investment. Severe crowding (significantly above four ppsm and often above five ppsm) is forecast for South West Main Line (SWML) services from Surrey and Hampshire into London Waterloo, on suburban south-west services through Wimbledon and Richmond and also on Great Northern services through Finsbury Park. Significant levels of crowding are also forecast for many other services, particularly between Clapham Junction and London Victoria. Clapham Junction still lacks a tube connection, although it is a vital interchange and one of the busiest stations in inner London.

The RUS identified regional services on the SWML as the route with the greatest capacity challenge, where, already, planned interventions are insufficient to meet forecast demand. It forecast significant peak crowding on main line services to/from Surrey and Hampshire, with a capacity shortfall (meaning the difference between the demand and the number of seats, plus what is deemed an acceptable standing capacity on services) of around 7,000 passengers in the high peak hour in 2031, even if every main line train is at maximum length.

During 2012, Network Rail and South West Trains began work to review demand forecasts in light of recent demand trends which have significantly exceeded previous estimates. This work, set out in Figure 5 below, has revealed that the capacity shortfall by 2031 on main line services alone into Waterloo is likely to be closer to 20,000 passengers in the single high peak hour, the equivalent of up to 20 train loads of passengers.

The RUS also noted the difficulty of identifying additional cost-effective options for increasing capacity (such as train lengthening) in this area beyond what will already have been done. This issue is examined further below including reflection on recent workstreams undertaken by Network Rail since the London and South East RUS was published.

Figure 5
Forecast capacity gap on South West Main Line to 2050



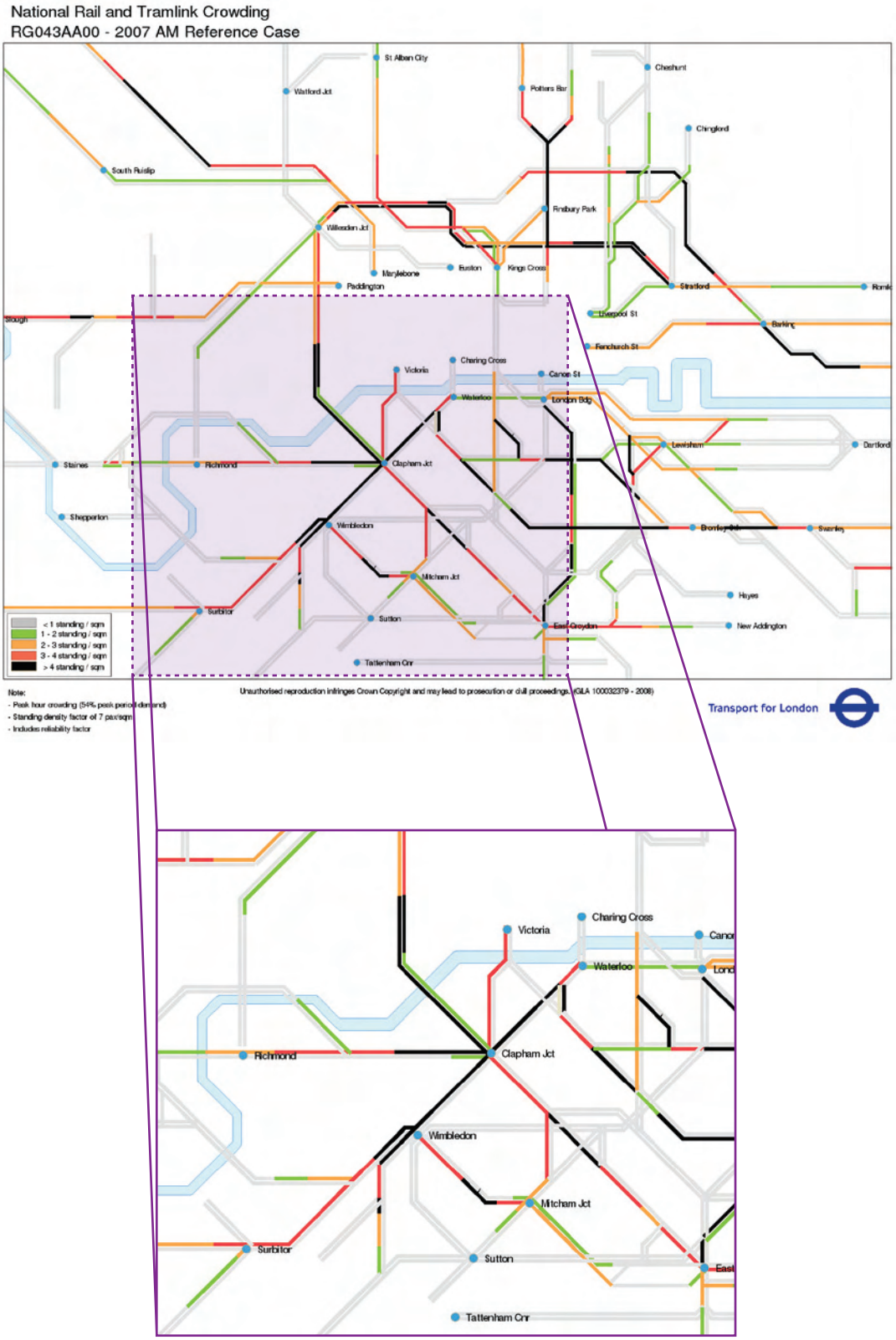
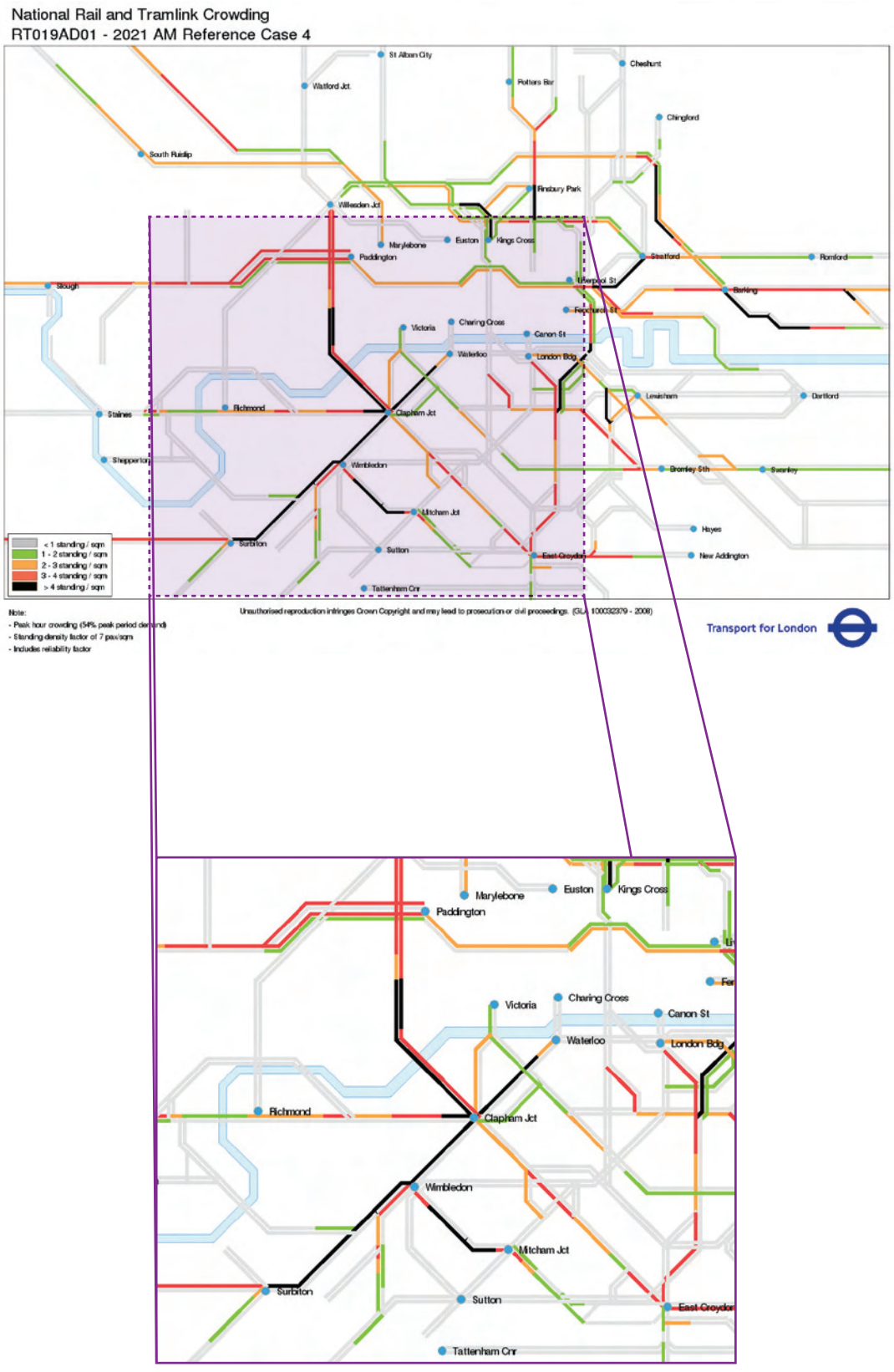


Figure 6
Crowding on the National Rail and Tramlink networks in 2007

Figure 7
Projected crowding on the National Rail and Tramlink networks in 2021



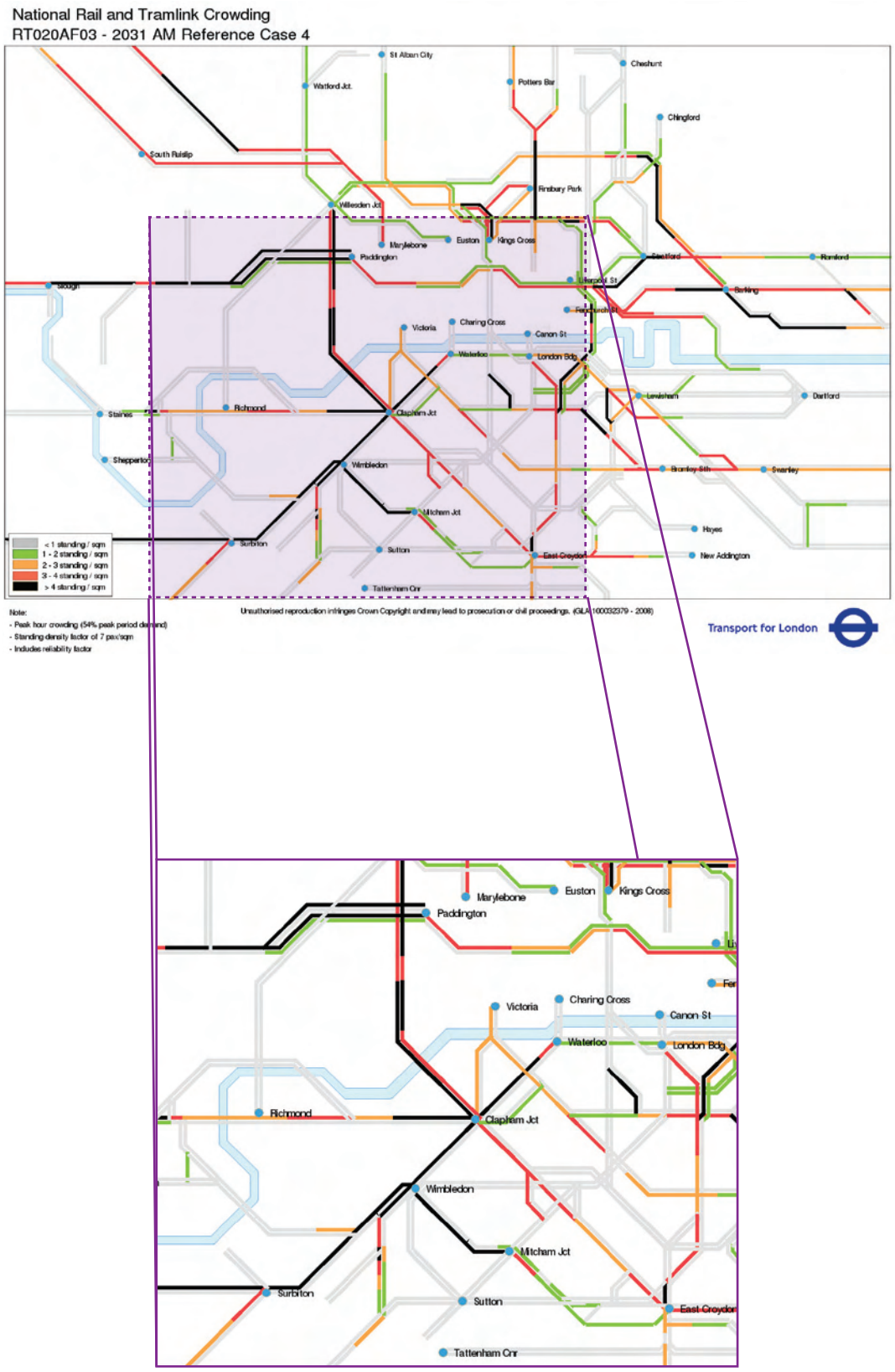


Figure 8
Projected crowding on the National Rail and Tramlink networks in 2031

IV) THE IMPACT OF HS2

Even without HS2, Euston will be so congested by the late 2020s that the significant additional capacity of Crossrail 2 will be needed. Passenger arrivals at Euston in the morning peak period are forecast to increase by around 30% by 2031, putting unbearable strain on the Victoria and Northern lines. This level of crowding will be effectively unmanageable. An entirely new line is required to address this chronic problem.

The plans for a new high speed rail network (HS2) from London to Birmingham, Leeds and Manchester, would make the pressures on the Underground network at Euston even more acute by more than doubling the number of passengers arriving at Euston over the morning peak period (compared with today).

The precise impact of HS2 on the London transport network remains under discussion between HS2 Ltd and TfL and will be addressed by a Transport Assessment, being led by HS2 Ltd. TfL estimates that even with the second proposed London HS2 interchange station at Old Oak Common – just west of Paddington, on the Crossrail 1 line - wait times for boarding a southbound Victoria line service at Euston during the busiest part of the morning peak could be as much as 30 minutes. In practice, however, the tube station at Euston would have to be closed whenever congestion became unmanageable, so there would often be no service at all – an experience already familiar to rail passengers arriving at Victoria station and attempting to transfer to the Tube.

There are further, albeit expensive, possible mitigation measures. These include: extending Crossrail 1 with a connection to the suburban services from Euston; full separation of the two branches of the Northern line; and providing direct subsurface links to Euston Square station. However, even with these measures implemented maximum wait times are forecast to be substantial, and crowding on the Victoria line is forecast to remain well over 4 ppsm. A Crossrail 2 interchange at Euston is therefore essential (and the subject of further consideration in chapter 4 below).

2 OPTIONS FOR MEETING FUTURE TRANSPORT DEMAND

It is clear from the challenges set out in the previous chapter that substantial additional capacity, beyond current plans, will be required in London's transport system to get people to and from work and prevent the capital from seizing up.

The Mayor's Transport Strategy, published in May 2010, sets out his transport vision for London over the next 20 years. Figure 9 below identifies priority schemes for implementation in the period following current investment programmes. These range in scale from incremental upgrades to completely new schemes and are targeted at relieving heavily crowded transport corridors, improving accessibility in areas of most need and supporting wider regeneration. Further schemes include continued upgrades to the Tube and DLR, and significantly improved National Rail services, including enhanced connectivity to London airports including Heathrow, Gatwick, Stansted and Luton.

The figure highlights the wide range of interventions that can be made to sweat London's existing transport systems ever harder – ranging from longer trains and platforms and improved signalling through to extensions of existing lines. However, these incremental improvements are not of themselves capable of meeting the future capacity gap that London faces.

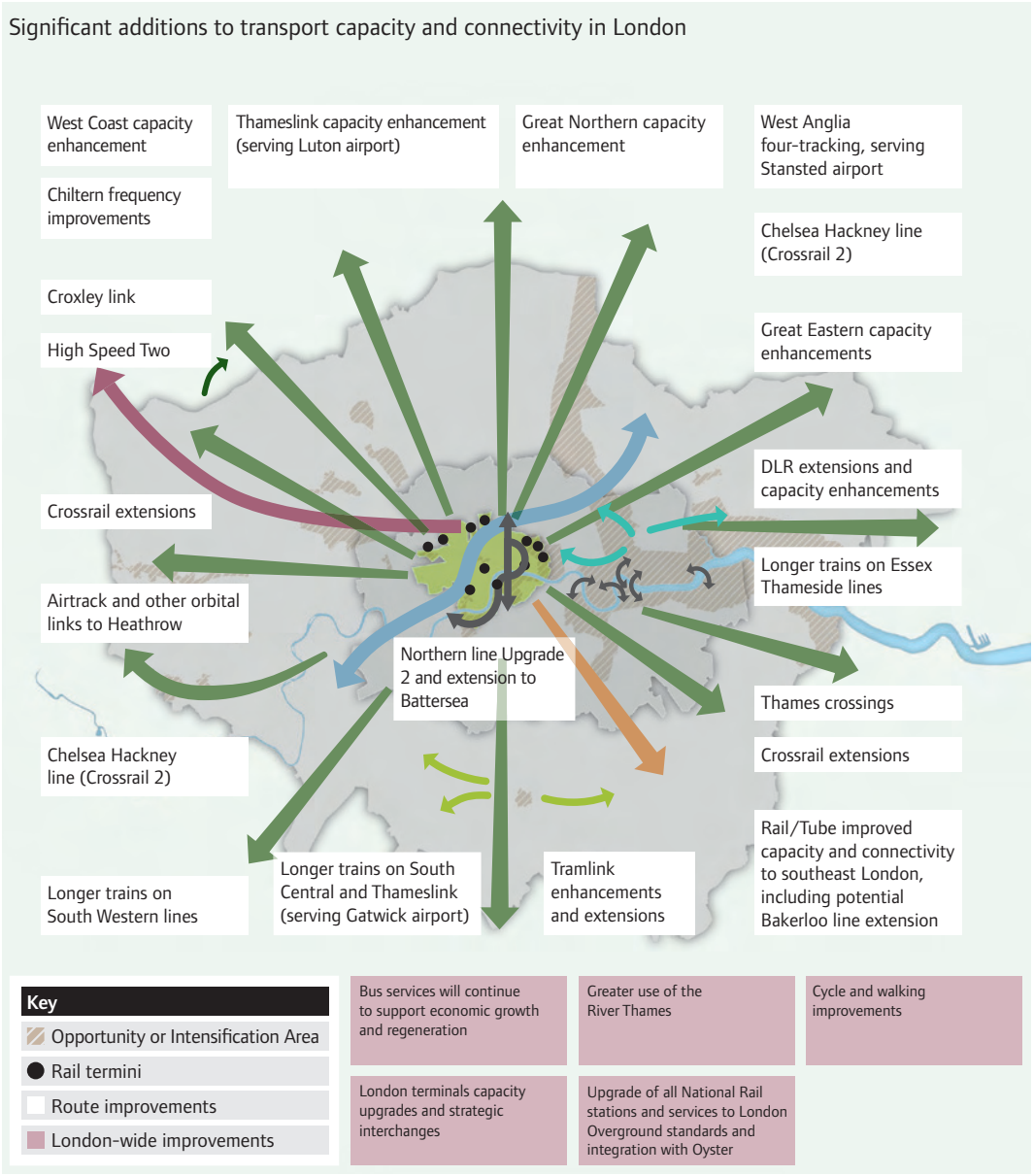
Crossrail 2 (an amended and extended version of the existing proposal formerly known as the Chelsea-Hackney line) is included in the Mayor's Transport Strategy (MTS) as the major new transport infrastructure project that could offer a significant step change in capacity and connectivity for the SW-NE corridor. The strategy states that "The Mayor will support new rail capacity in the broad south-west to north-east corridor, for example, new lines or services using the Chelsea Hackney line safeguarded alignment. TfL will undertake a review of the route to ensure it is providing the maximum benefits, including helping the onward dispersal of passengers from central London termini and value for money".

A significant question addressed by the task force was the extent to which alternative - particularly cheaper – options for addressing future crowding challenges on the SW-NE corridor had been explored adequately.

TfL and Network Rail have undertaken a detailed examination of alternative options for meeting future demand growth if a Crossrail 2 scheme were not to go ahead. In particular, TfL has considered an "alternatives package", including longer trains on key routes like the South West Main Line and Southern services; easterly and westerly extensions to Crossrail 1; and Underground and DLR extensions, such as an additional extension to the Northern Line to take it to Clapham Junction.

A striking feature of these proposals is that, although each is an incremental enhancement of the status quo, they are almost all very complex and very expensive. In general, the most cost-effective options, such as longer trains and platforms and modern signalling, have already been implemented on these parts of the Tube and rail network, leaving few straightforward options. As a result, TfL's analysis identifies far fewer benefits from this package when compared to Crossrail 2 – notably far less additional capacity and reliability - yet the cost still reaches £6 billion.

Figure 9
Schemes in the Mayor's Transport Strategy for implementation beyond 2014



An important conclusion of all the modelling work undertaken by TfL and Network Rail is that there is no convincing alternative to Crossrail 2 that delivers the necessary step-change in capacity on the Victoria, Northern and Piccadilly lines and on the South West Main Line.

Network Rail's own work on capacity enhancement options on the SWML, for example, indicates that yet longer trains (beyond those increments shortly to be committed for the five year rail control period from April 2014) would require a major remodelling of Waterloo, which is already one of the busiest terminal stations in the world, as well as a large number of other stations and associated junctions along the route. Even if this can be achieved it would be likely to meet less than a third of the growth projected by the 2030s.

Network Rail therefore regards further train lengthening options, should they prove practical and affordable, as only a short term step towards solving main line capacity constraints. An alternative would be to lay new line, for example a fifth track between the Nine Elms area and Surbiton. All such additional options would, however, entail significant costs (around £1.5 billion in the case of the fifth track) while providing significantly fewer benefits than Crossrail 2 for both Main Line and suburban passengers in the South West.

To ensure a variety of options were tested, TfL also modelled a further expansion of the Northern line with the construction of an additional eastern branch from Archway to Finsbury Park. However, this would have a negligible impact on overall congestion, reducing demand on the Victoria line by just 2%. Even the most

crowded section of the Victoria line would see only a reduction in crowding from 5 to 4.9 ppsm, while crowding on the Northern line between Highgate and Archway would increase from 2.2 to 3.9 ppsm. The task force concluded that this was also an unattractive option.

This pattern of high costs and limited benefits is repeated throughout the package of alternatives to Crossrail 2. It is additionally worth noting that the alternatives package was also unable to provide significant additional capacity for Euston to help alleviate the dispersal of passengers arriving on HS2, particularly after the second phase opens in 2033.

In other words, the best 'counterfactual' to Crossrail 2 costs around two-thirds as much for only a fraction of the benefits and does not meet the central London congestion challenge of the late 2020s. So, the task force does not consider the alternatives package to be a credible alternative to Crossrail 2. On the contrary, if patch-and-mend measures are taken, it is most likely that once these have been attempted Crossrail 2 will still be inevitable, adding significantly to the costs and delaying the benefits.

The task force has therefore concluded that there is a strong case for an additional large scale project, in the form of Crossrail 2, to provide a step-change in SW-NE transport capacity. The key next question is what route Crossrail 2 should serve to maximise its overall benefits.

CROSSRAIL 2

3 ROUTE OPTIONS

A route for the Chelsea-Hackney line has been safeguarded since 1991 and was most recently confirmed in 2008 (see Figure 10 below). The safeguarded route is being reviewed at the moment and may be amended/ refreshed in late 2013/ early 2014.

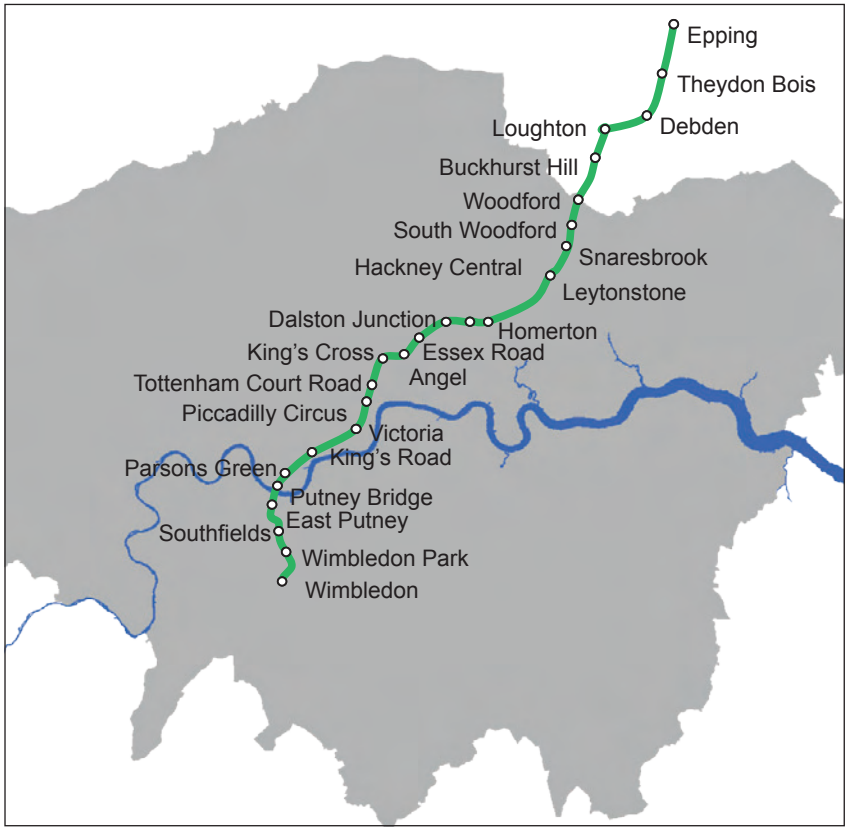


Figure 10
The currently safeguarded Chelsea-Hackney route

Since the Chelsea-Hackney scheme was first proposed, London's transport system, and the demands placed on it, has evolved considerably. Taking the safeguarded route as a starting point, TfL has therefore undertaken extensive analysis of alternative route options along both existing and new rail corridors to ensure that any Crossrail 2 scheme best addresses the challenges we face today and, importantly, will face in 20-30 years' time. This process generated a long list of potential routes which have been whittled down to two key options which were summarised in the Interim Report: Option A: Crossrail 2 without suburban and regional services (Figure 11); or Option B, Crossrail 2 with suburban and regional services (Figure 13).

The main pros and cons of the two options were summarised in the Interim Report. Option A would be a self-contained automatic tube line focused on providing congestion relief to the Tube in central London. Option B would be more like Crossrail 1, offering larger trains able to run on the National Rail network and to serve Greater London and beyond. Option A would cost less, and as a self-contained

line, would be easier to operate. However it would offer significantly fewer benefits, particularly for rail commuters from outer London and beyond. As a longer scheme, with larger trains, platforms and tunnels, option B would inevitably be more expensive, but it offers potential for significantly greater benefits, particularly by alleviating capacity constraints on South-West rail services into London.

Since the Interim Report, TfL has undertaken further work to test and refine the two options. The emerging findings of this further work and the task force's discussions are summarised below.

OPTION A VARIANTS

Option A (Crossrail 2 without suburban and regional services) would provide significant additional new capacity for London's transport network while relieving a number of heavily congested tube lines. The principal benefits include congestion relief for the Victoria, Piccadilly and Northern lines, significant new connectivity for both Chelsea and Hackney, and new interchanges with Crossrail 1, Thameslink, HS1 and HS2.

One of the weaknesses of option A was its impact on any potential terminus station, specifically Clapham Junction, which already handles huge volumes of passengers every day and is heavily congested at peak times. The station would therefore have required substantial – and possibly unachievable - rebuilding to cope with the significant number of additional passengers who would have been attracted to use Crossrail 2 services.

In response to questions from the task force and beyond, TfL has developed possible variants for option A that would extend beyond Clapham Junction, reducing the impact on the station itself. The most attractive of these options, known as option A+ (Figure 12), would extend the line to Wimbledon. This would make increased passenger volumes more manageable by spreading passenger interchange movements across both Clapham Junction and Wimbledon. It would also provide additional Northern line relief on its highly congested southern branch through an interchange at Tooting Broadway.

As a result of the analysis TfL has undertaken, the original option A will now be dropped, as it appears unfeasible,

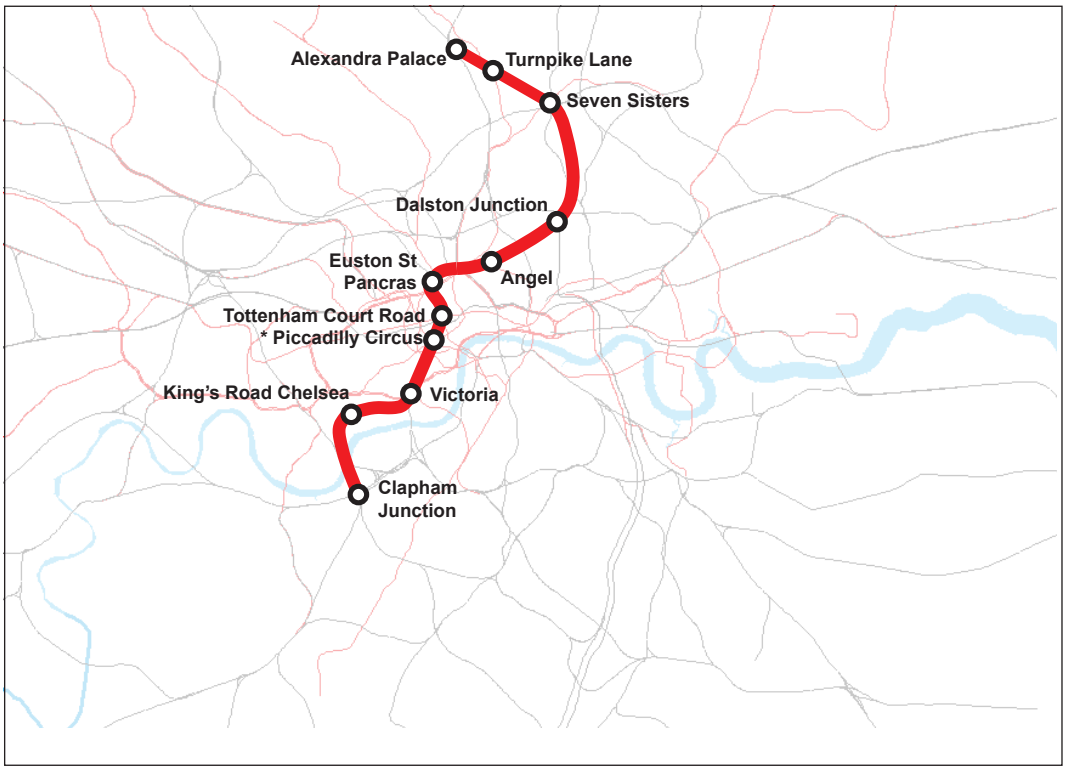
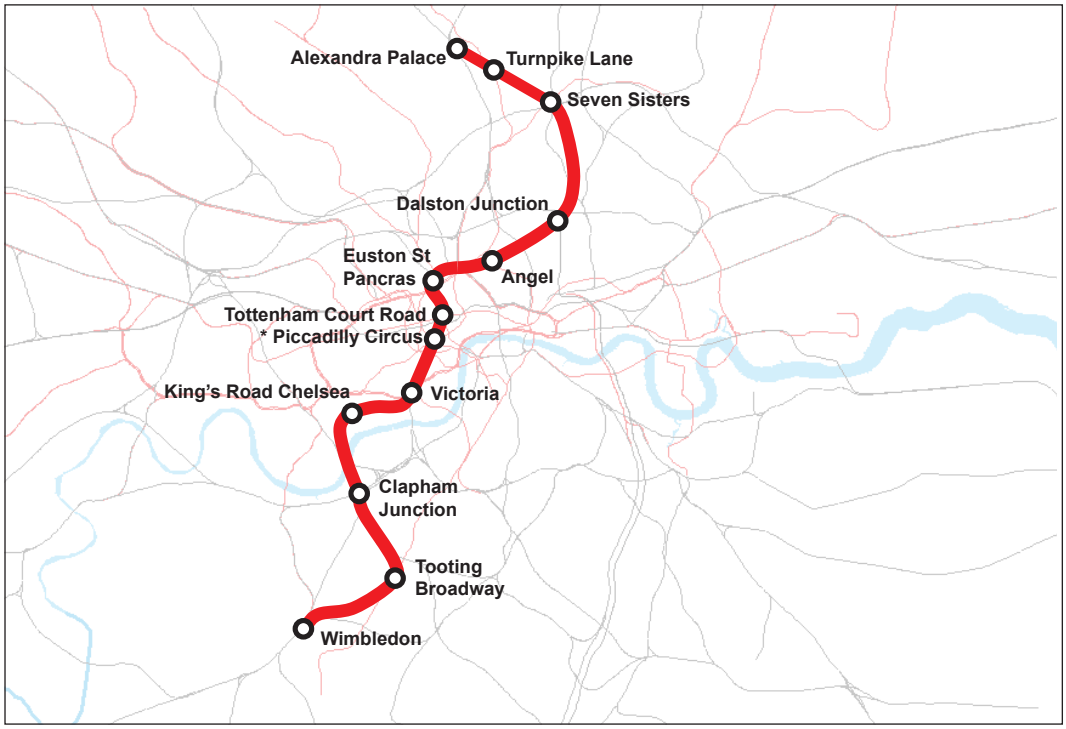


Figure 11
Option A: Crossrail 2 without suburban and regional services

Figure 12
Option A+: Crossrail 2 without suburban and regional services



and the revised option A+ will be taken forward by TfL as the alternative to option B, Crossrail 2 with suburban and regional services. The task force supports this.

OPTION B

In addition to the benefits outlined above under option A, a Crossrail 2 scheme with suburban and regional services offers significant benefits to both SW and NE London and areas well beyond. Starting in the SW, option B offers enormous potential to relieve congestion on key SW commuter routes into London Waterloo, London Victoria and Clapham Junction. Since the Interim Report, TfL and Network Rail have undertaken further work on the practicalities of integrating Crossrail 2 with the National Rail network in the SW, and on the scale of potential wider benefits Crossrail 2 might bring.

This work shows that commuters from SW London and beyond would be significant beneficiaries of Crossrail 2. By creating a tunnel from Wimbledon and providing an additional 5th track from Surbiton to the entrance to the tunnel, significant additional capacity can be released for two key groups of beneficiaries.

First, main line commuters from Hampshire and Surrey would see an increase of between 35 and 40% in the number of high peak trains serving Waterloo – providing widespread overcrowding relief. This would be achieved by a combination of a 5th track between Surbiton and Wimbledon and main line services making use of freed up capacity between Wimbledon and Waterloo (capacity created by suburban trains now using the Crossrail 2 tunnel from Wimbledon inwards). Feasibility work undertaken by Network Rail has shown that around 9 additional trains per hour could be accommodated from Portsmouth, Basingstoke, Southampton and Farnham, serving stations in Hampshire and Surrey.

Second, commuters using suburban services on the Kingston, Epsom, Chessington and Hampton Court routes into Waterloo, would be offered a step change in capacity, journey times and choice of central London destination from their local station. For example, Kingston, which has among the poorest rail connections of London's metropolitan centres, would have its service frequency more than doubled to 12 trains per hour as well as having faster journeys to many central London locations. Figure 14 below shows indicative journey time savings from various destinations to Tottenham Court Road. All destinations show significant journey time savings, with journey times in some cases more than halved.

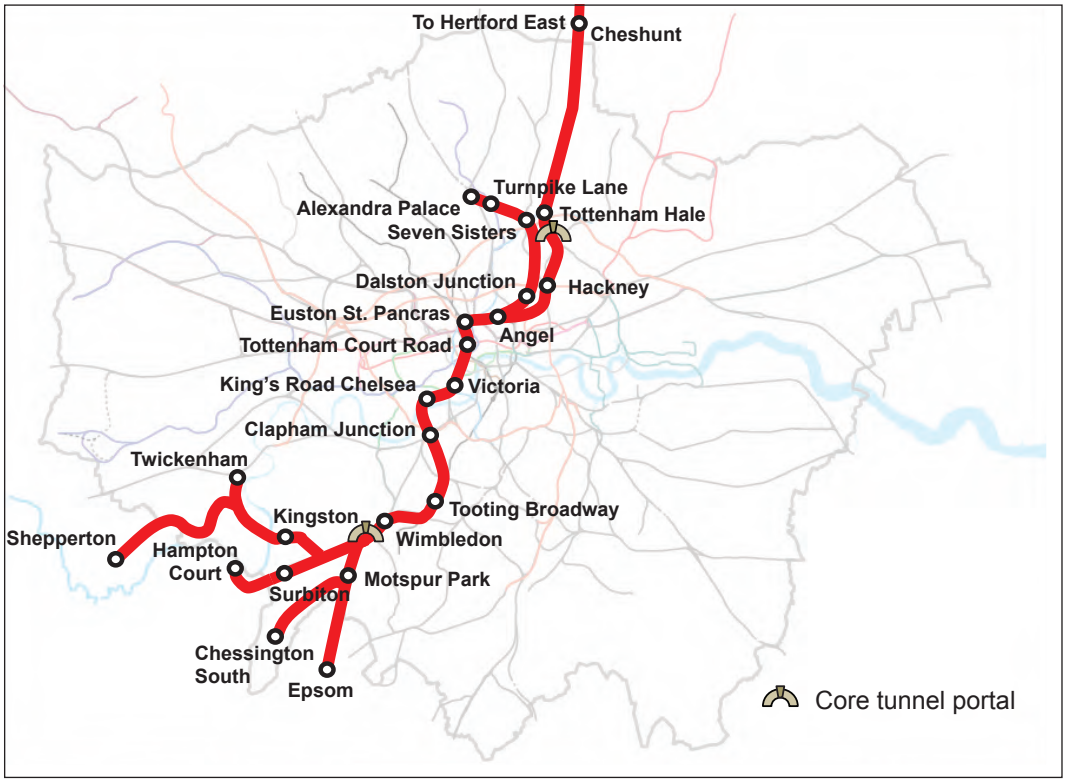


Figure 13
Option B: Crossrail 2 with suburban and regional services

The benefits for commuters into Waterloo station are also considerable in the form of reduced congestion and crowding. The combination of Crossrail 2 and new fast services provides capacity for over 100,000 new trips into central London in the peak period.

The further work undertaken by TfL and Network Rail also shows that potential conflicts between Crossrail 2 services and other services on the National Rail network can be minimised to ensure a robust operational railway. For the most part, Crossrail 2 services would be able to run on dedicated lines – sharing tracks only with a residual suburban service into Waterloo. The suburban tracks used are already grade separated from all main line operations, meaning conflicting moves between Crossrail 2 services and other National Rail service groups would not occur. Despite this, high capacity turnback facilities have been identified at Wimbledon to ensure the balance of service between the core underground section and national rail infrastructure can be optimised to protect performance - particularly in times of disruption.

The NE section of route offers strong potential to relieve crowding on the Victoria and Piccadilly lines, as well as on West Anglia, Thameslink and Great Northern rail services through interchanges at Seven Sisters, Tottenham Hale and Alexandra Palace. Option B also provides for a station at Hackney, as well as at Dalston Junction. In addition, Crossrail 2 could also provide vital new connectivity to support economic development in the Upper Lee Valley, potentially stimulating greater regeneration than enhancing existing rail links in the area could otherwise support.

The Lower Lee Valley, which includes Stratford and the Olympic Park, which have excellent transport connections, comprises 1,400 hectares with capacity for 50,000 more jobs and up to 40,000 homes. The Upper Lee Valley comprises 3,800 hectares with capacity for 15,000 more jobs and 9,000 homes. Together, these two areas have the potential to deliver about 13% of London's projected additional housing need and 8% of projected employment growth. A Crossrail 2 link could help push regeneration beyond Stratford in the same way that the extension of the Tube into the north-west drove London's expansion in the 1930s and the extension of the Jubilee line eastwards spurred regeneration of the Docklands and east London from the mid-1990s.

Since the Interim Report, TfL has undertaken further work on alternative route options in the Northeast, including

Figure 14
Crossrail 2 journey time comparison

Crossrail 2 Journey Time Comparison

Journey Times to Tottenham Court Road

From	Present Day	With Crossrail 2	Saving
Kingston	49 mins	27 mins	22 mins
Surbiton	33 mins	22 mins	11 mins
Wimbledon	35 mins	14 mins	21 mins
Cheshunt	42 mins	34 mins	8 mins
Tottenham Hale	27 mins	16 mins	11 mins
Turnpike Lane	26 mins	14 mins	12 mins
Tooting Broadway	30 mins	12 mins	18 mins
Dalston Junction	30 mins	8 mins	22 mins

Please note: All Crossrail 2 journey times are indicative and are extracted from model run times. Present Day journey times taken from TfL journey planner

modelling of additional or alternative branches directly into east London. However, while no final conclusions have been reached, these do not appear to have a sufficiently strong case to justify their relatively high additional cost.

CONCLUSION ON ROUTE OPTIONS

Analysis at this stage suggests Crossrail 2 would be good value for money, particularly option B, Crossrail 2 with suburban and regional services, which would generate significant benefits by providing enhanced connectivity for a wider catchment that extends significantly beyond London. Option A+ represents less good value for money, largely because it retains a considerable proportion of high cost tunnelling under central London, but captures far fewer benefits.

The task force believes that option B, Crossrail 2 with suburban and regional services, is by some margin the scheme which best meets the principles it set out in its Interim Report. Option B should therefore be the priority for further work from TfL and form the basis of a new safeguarded route for Crossrail 2 when the DfT goes out to consultation in late 2013/early 2014.

4 FURTHER FEASIBILITY ISSUES

The task force also considered a host of further issues, including the feasibility of a Crossrail 2 interchange with HS2 at Euston; the wider engineering feasibility of the scheme; costs and value for money; the extent of potential wider economic benefits; and initial thoughts on funding and financing. Its findings on these issues are set out below.

INTERCHANGE WITH HS2

As outlined in chapter 1 above, forecast crowding at Euston, even without HS2, makes a Crossrail 2 interchange there highly desirable. The Government's plans for a new high-speed rail network, terminating at Euston, make it essential. The Government's intention to introduce an HS2 Bill in 2013 makes a decision on this issue even more pressing as it would be essential to make provision in the Bill for a Crossrail 2 interchange at Euston, as has already been done in the recent remodelling of Tottenham Court Road Underground station (which is on the existing safeguarded route).

Following extensive discussions with TfL, HS2 Ltd agrees that the design for the remodelled Euston station should be compatible with a Crossrail 2 interchange. Detailed feasibility studies have identified a credible option for a Crossrail 2 interchange station between Euston and King's Cross St Pancras, and HS2 will include provision for an interchange with Crossrail 2 in the Hybrid Bill due to be submitted by the end of 2013.

We therefore recommend that the existing safeguarded route for Crossrail 2 be amended so that it serves Euston, and improves connectivity with King's Cross and St Pancras. Given the length of the Crossrail 2 trains, and the stations to cater for them, it would be possible to construct a single Euston-King's Cross-St Pancras interchange station for Crossrail 2, connecting all three terminals underground, and we recommend this. Crossrail 2 should come into operation no later than the completion of HS2 to Manchester and Leeds, in the early 2030s.

Wider engineering feasibility

TfL has also commissioned an engineering feasibility and cost study focused on the central London tunnel and related stations. This examined the deliverability of the new central tunnel section and refined previous cost estimates. This work has concluded that both option A+ and option B are feasible and further work will be undertaken in 2013 to continue to develop the engineering proposals and better understand their implications.

Network Rail has conducted some initial engineering feasibility covering alterations that would need to be made to its network between Wimbledon and the Surbiton area, and is also shortly to conduct a similar assessment at the North East end of the Route proposed as Option B.

COSTS AND VALUE FOR MONEY

TfL has undertaken further work on the costs and value for money of Crossrail 2, including on wider economic benefits. The costs of Crossrail 2 remain subject to detailed analysis and will vary depending on the precise route and number and location of stations. However, initial calculations suggest a capital cost of around £9.5 for option A+ and £12 billion for option B. The higher costs for option B reflect the fact that it is a larger network with interfaces with National Rail, has slightly larger tunnels and station platforms to cater for longer and larger trains, which in turn require a larger depot and more stabling for a significantly larger fleet.[1]

Since the Interim Report, TfL has commissioned Bridget Rosewell of Volterra to assess the possible scale of the wider economic benefits (WEBs) of the scheme. WEBs are related to conventional transport benefits but are additional and arise as a result of various forms of 'market failure', i.e. the presence of less than perfectly competitive markets.

The work has concentrated on two main types of WEB. Firstly, pure agglomeration benefits, whereby improvements in the transport system increase the effective density of employment, which is linked to productivity. Secondly, as land uses respond to improvements in transport accessibility there is a further benefit as people move to more productive jobs. Currently government guidance takes a conservative view of the latter and allows the assessment only to consider the scope for new jobs to be created at the expense of elsewhere in the UK. For a major scheme in central London, such as Crossrail 2, this is likely to underestimate the benefits, as it is reasonable to anticipate that there would be some net additional jobs created in London following such a major improvement to its transport system.

The results are still to be verified. Nevertheless, initial indications are that there are significant WEBs associated with both options and that they are both larger and have a wider geographic spread for option B than for option A+. Sensitivity tests have also been carried out to assess the effect of relaxing the assumption that Crossrail 2 would create no net additional jobs and these indicate the potential for significantly higher levels of benefit under both options.

In parallel, TfL has commissioned a planning consultant to study the potential impact on the development capacities of the areas served by the scheme and also those areas that will benefit indirectly through rail capacity released on other lines. Initial indications are that there are likely to be significant additional opportunities for housing and employment growth in many areas, including substantial regeneration in areas of east and north-east London.

[1] These costs would rise to £15.5 and £20 billion respectively if one were to include an 'optimism bias' of 66%.

FUNDING AND FINANCING

Undertaking a detailed study of potential options for funding and financing Crossrail 2 is a priority for future phases of work. The task force's expectation is that a diverse range of funding streams will be required, as was the case with Crossrail 1 which included contributions from public spending, borrowing against future passenger fares, and developer and business contributions.

An initial assessment of current transport investment in London indicates that Crossrail 2 would not require a significant increase in spending above current levels. While the Tube upgrade programme will be an ongoing process, investment in Crossrail 1 and Thameslink will come to a close by the end of this decade. Without Crossrail 2, public investment in major new capacity will therefore substantially reduce, despite the capacity and employment pressures outlined above.

Given the economic importance of London to the whole UK, as well as the scale of growth forecast, the task force believes that Crossrail 2 should become the priority major infrastructure investment programme for London and the SE in the 2020s. This programme should take place alongside the national infrastructure priority – HS2 – to ensure London and the UK's continued competitiveness.

Further work will need to take account of the Government's commitment to greater devolution which could give London greater discretion over spending within the capital. The London Finance Commission, established by the Mayor under the chairmanship of Professor Tony Travers of the London School of Economics, is currently looking at options which would give greater financial autonomy for London as its population continues to rise towards 10 million.

Suggested improvements put to the Commission have included the potential devolution of stamp duty, the ability to raise new taxes and greater control over capital investment in London. Summarising the findings of the Commission's first phase of work Tony Travers said: "The evidence we have received overwhelmingly suggests a need for greater devolution of financial power to London. The Commission must now decide how best to allow the Mayor and the boroughs greater freedom to use public money in such a way as to promote growth. In doing this, we recognise the need to accommodate the rapid growth in the city's population - equivalent to an extra borough every three years. More people will need more train capacity, more schools and increased health provision. London can pay for these itself if it were given the means to do so." The Commission will set out its final recommendations in the spring.

Further work should also take place on the appropriate delivery vehicle for Crossrail 2, taking into account the lessons learned from Crossrail 1, Thameslink and HS2.

5 NEXT STEPS

The task force is extremely grateful to TfL and to Network Rail for the quality of their work to date and for the collaboration they have shown both to the task force and each other. It is also grateful for the input from the many others who have contributed to its deliberations.

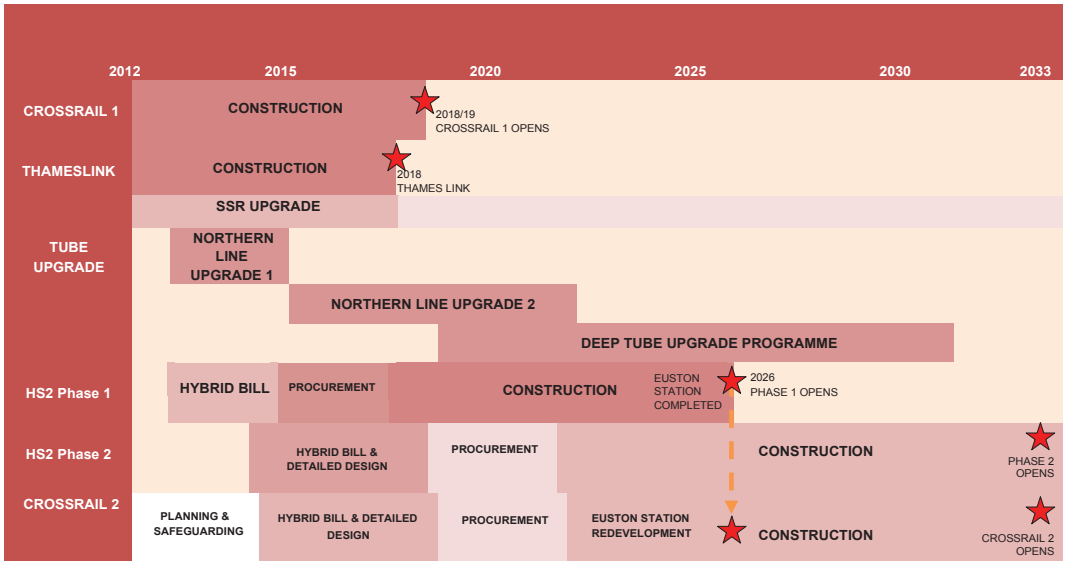
The task force now urges the Mayor to bring forward detailed planning and consultation on Crossrail 2 in 2013, in particular on option B which offers significant potential to relieve some of the most crowded sections of the Underground, as well as to deliver the step-change in connectivity and capacity for south-west and north-east London that will be essential by 2030. Option B should form the basis for a new safeguarded route for Crossrail 2.

The task force recognises the challenge of planning, funding and financing, and delivering a major new infrastructure project on top of those commitments already underway. However, it believes Crossrail 2 to be an essential and complementary addition to these projects and that the clear lesson of major infrastructure planning in the UK over recent decades is that detailed work should begin now. Figure 15, below, plots how Crossrail 2 could fit with other projects already underway.

For its part London First will now seek to build a broad consensus behind the need for Crossrail 2, as exists for Crossrail 1. This should reach across the political parties and across the wider South East.

We must not repeat the mistakes of Crossrail 1 and spend 40 years planning and generating support for a scheme needed within 20 years. Serious work must begin now.

Figure 15
Crossrail 2 programme in context of other major rail projects



ANNEX

MEMBERS OF WORKING GROUP

Members of the Task Force are as follows:

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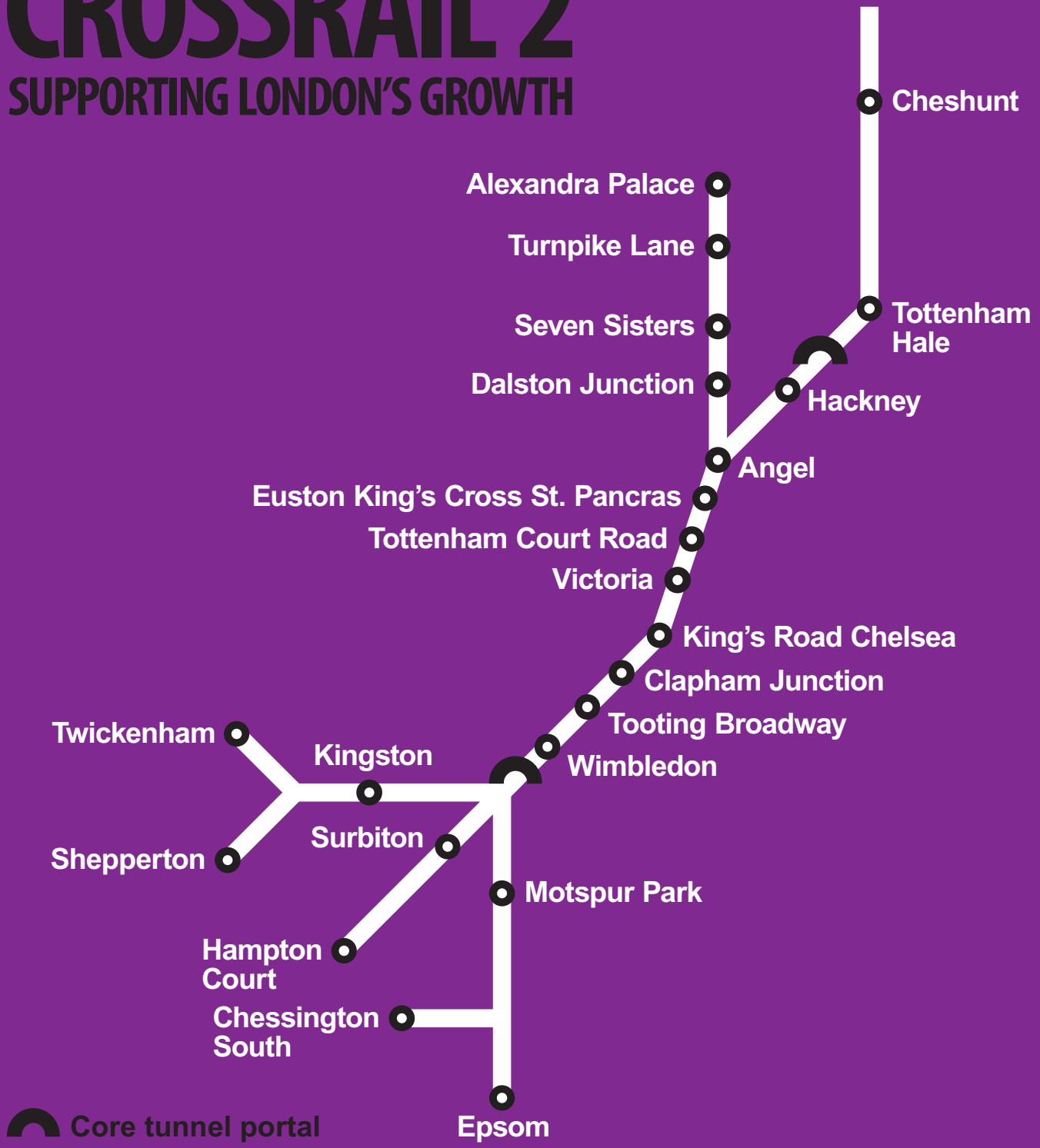
THANKS

We are extremely grateful to Michele Dix of TfL and Chris Rowley of Network Rail who, together with their teams, provided expert advice throughout this project. David Leam of London First gave superb support and guidance throughout.

Design **David Carroll & Co**

CROSSRAIL 2

SUPPORTING LONDON'S GROWTH



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