Crossrail 2:
Supporting London's growth

Interim report of London First's working group

May 2012

London First

Contents

Introduction

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 depends on sustained investment to maintain and grow its infrastructure, and its transport infrastructure in particular. Yet London's rail and underground networks are currently heavily congested in peak hours. Committed investment through Crossrail 1, the Tube upgrade programme and Thameslink will boost commuting capacity over the coming decade by around a third. But even with this investment, demand on rail and Underground services over the next twenty years is set to outstrip capacity.

Accordingly we need to begin detailed planning for the next generation of transport improvements now if London's future growth is to be assured. The Mayor's Transport Strategy identifies a number of priority projects to meet these future needs. These range from incremental improvements to existing infrastructure, through significant enhancements to key pinch points on the network, to a major new SW-NE line, Crossrail 2, based on the long safeguarded Chelsea-Hackney route. Transport for London (TfL) is currently engaged in a programme of work to reassess this latter proposal, ahead of a review of the currently safeguarded route in 2013.

Our approach

It was against this backdrop that in October 2011, London First established a working group of senior business people (see Appendix 1), chaired by former Transport Secretary Andrew Adonis, to examine the need for additional transport capacity to meet future demand and support London's continued competitiveness. In particular, the group was tasked with assessing the case for a large-scale intervention in the form of Crossrail 2 and what sort of scheme it should be. This paper sets out the working group's initial conclusions on the need for Crossrail 2 and identifies a number of key principles that should underpin further work.

The challenge

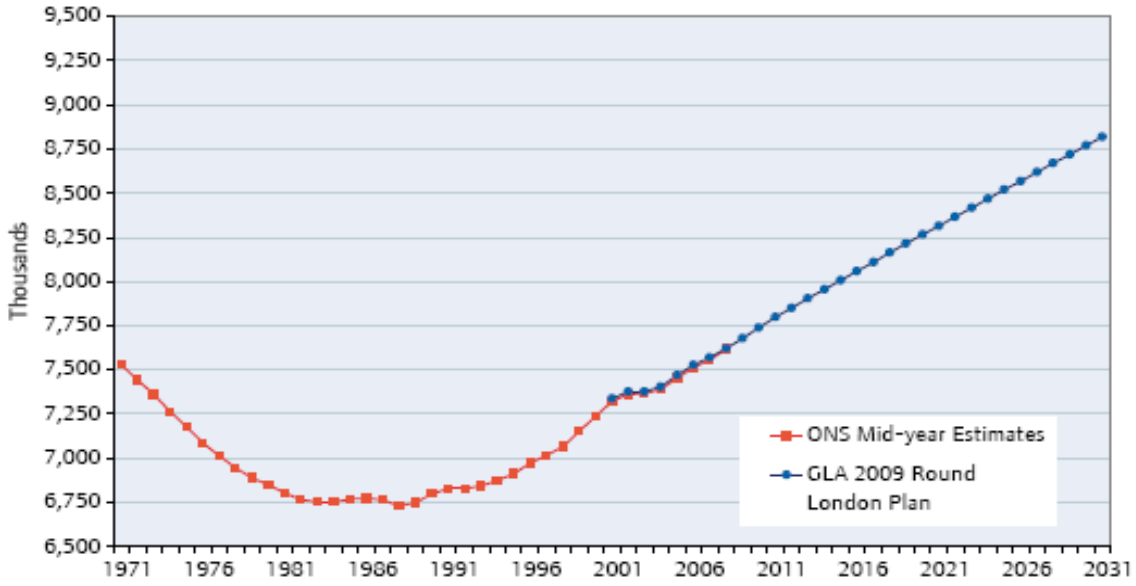
In order to understand the case for Crossrail 2, the working group held a series of discussions with TfL, Network Rail, the GLA, HS2 Ltd and others (see Appendix 2) on the key future challenges facing London's transport networks and how they might be addressed. These discussions identified the following key challenges.

i. Demographic 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. The 2011 London Plan forecasts that by 2031 there could be 1.2 million more Londoners (taking the population of London to 8.82 million) and 0.7 million more jobs (see Figure 1). This would take London's population up to a level experienced only in the 1930s, when population density in the overcrowded innermost London boroughs was far higher than it will ever be again, and when travel-to-work distances were shorter and less dependent on rapid transit public transport.

These projections are being driven by strong natural population growth (at present London has two and a half times as many births as deaths) rather than migration and are not expected to be affected significantly by the current economic downturn. Even with currently committed investment, TfL projects that such growth would lead to serious increases in crowding on rail and the Underground. Without substantial additional investment in enhanced services London and its economy will suffer.

Figure 1: Forecast population growth in London to 2031



Source: Greater London Authority DMAG

ii. Demand on the Tube

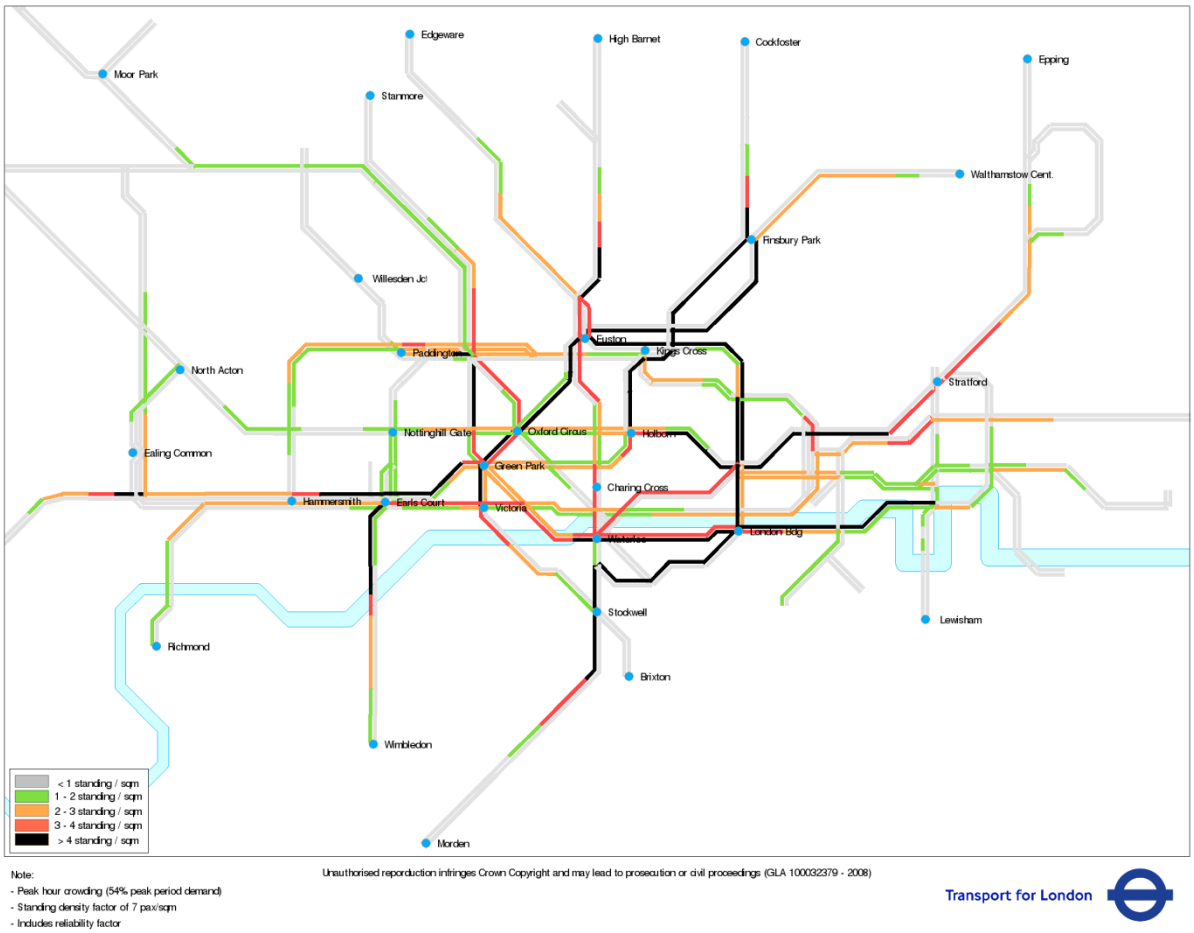
London's continued growth is putting significant pressure on the Tube. The Tube has witnessed a 40% growth in demand over the last 15 years, with 14% growth over the past five years. A record 1.1 billion journeys were made on the Tube in 2010/11, with 4.17 million journeys on Friday 9th December 2011 – the highest daily figure in the Tube's history. Demand is projected to continue rising in the coming years.

The maps below (Figures 2–4) 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) in the morning peak hour, taking into account committed investment. Investment in Crossrail 1, Thameslink and the Tube upgrade programme reduces crowding levels from 2007 to 2021. However, population and employment growth will mean that by 2031 the Tube network is again under pressure. Serious crowding problems are projected on key north-south routes, particularly on a SW-NE alignment which hardly benefits from the new east-west Crossrail 1 line, and which gains only partial relief from the north-south Thameslink upgrade. In particular, neither Crossrail 1 nor Thameslink provide substantial relief for the Victoria, Piccadilly, Northern and District lines in central, north-east and south-west London, nor for suburban overground services from south-west London into Clapham Junction and London Waterloo, which are projected to become unsustainably congested parts of London's Tube and rail system in the 2020s and beyond unless there is significant new rail infrastructure.

TfL defines crowding as anything above three passengers standing per square metre (ppsm). In 2031 the peak crowding level on the Victoria line occurs between Euston and Warren Street (one station south) and is forecast to be 5.3 ppsm; on the Piccadilly line this figure is 4.8 ppsm between King's Cross St. Pancras and Caledonian Road (one station north); on the southbound Northern line the figure is 5.5 ppsm between King's Cross St. Pancras and Angel (one station south); and on the northbound Northern line it is 5.6 ppsm between Stockwell and Clapham North (one station south). All of these figures are averages for the morning peak, meaning that some individual services will experience crowding above these levels.

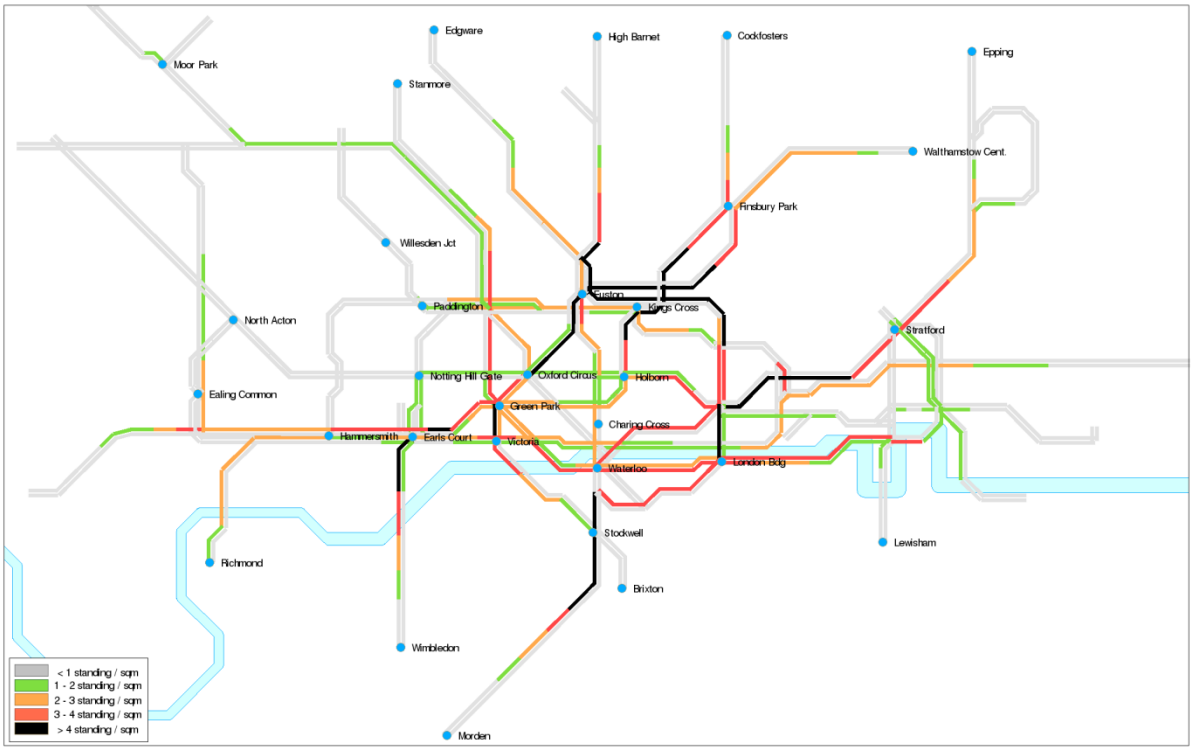
Overcrowding is also projected elsewhere across the network, albeit at lower levels. In 2031 it is expected that crowding levels of between two and three ppsm will be seen on the Victoria line southbound between Seven Sisters and Finsbury Park and on the northbound Northern line between Balham and Clapham South.

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



Source: Transport for London

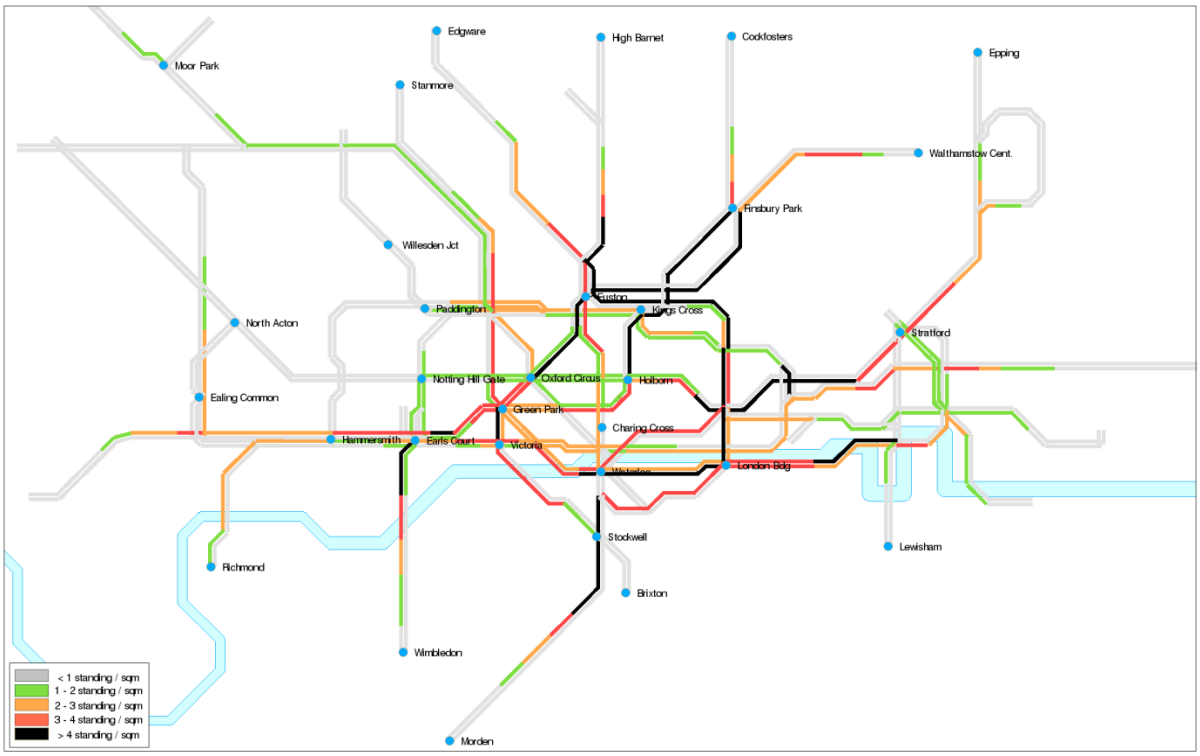
Figure 3: Projected crowding on the Tube and DLR networks in 2021 (morning peak hour)



Note:
- Peak hour crowding (54% peak period demand)
- Standing density factor of 7 pax/sqm
- Includes reliability factor

Transport for London

Figure 4: Projected crowding on the Tube and DLR networks in 2031 (morning peak hour)



Note:
- Peak hour crowding (54% peak period demand)
- Standing density factor of 7 pax/sqm
- Includes reliability factor

Transport for London

Source: Transport for London

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 rail, roughly equating to a quarter of total central London employment. Network Rail estimates demand for rail travel into central London to rise by 36% by 2031. Without additional action, this will translate into serious overcrowding on key routes and at key stations.

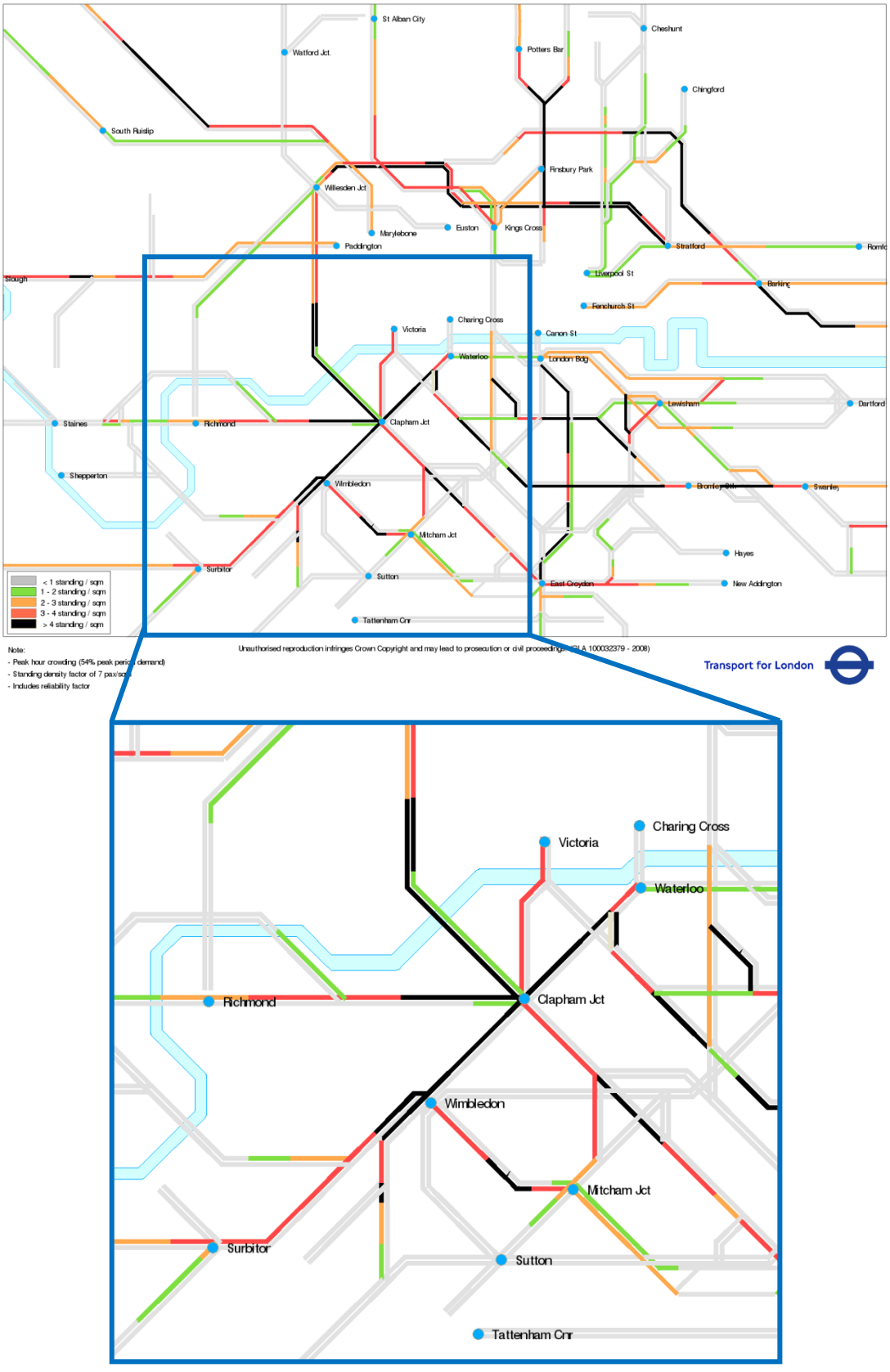
Network Rail's analysis of long-term demand and the potential options for meeting it is set out in its London and South East Route Utilisation Strategy (RUS), published in July 2011. The RUS highlighted a number of significant capacity constraints on important radial National Rail routes, in particular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

The maps below (Figures 5–7) show crowding levels on the National Rail and Tramlink networks for 2007 (Figure 5) and TfL's projections for 2021 (Figure 6) and 2031 (Figure 7) in the morning peak hour, taking into account committed investment. Severe crowding is forecast for South West Main Line (SWML) services into London Waterloo from Surbiton, Wimbledon and Richmond and also for Great Northern services through Finsbury Park. Lower levels of crowding (of two to three ppsm) are forecast for services such as those between Clapham Junction and London Victoria.

The RUS identifies regional services on the SWML as the route with the greatest capacity challenge, where planned interventions are insufficient to meet forecast demand. It forecasts significant peak crowding on SWML trains, with a capacity shortfall (meaning the difference between the demand and the number of seats, plus an acceptable standing capacity on services) of over 6,100 passengers in the high peak hour in 2031, even if every main line train is at maximum length.

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. Further proposals, such as adding a fifth track between London Waterloo and Surbiton, would be high cost (likely over £1 billion in this instance) and would provide a relatively small increase in overall available capacity for additional SWML services.

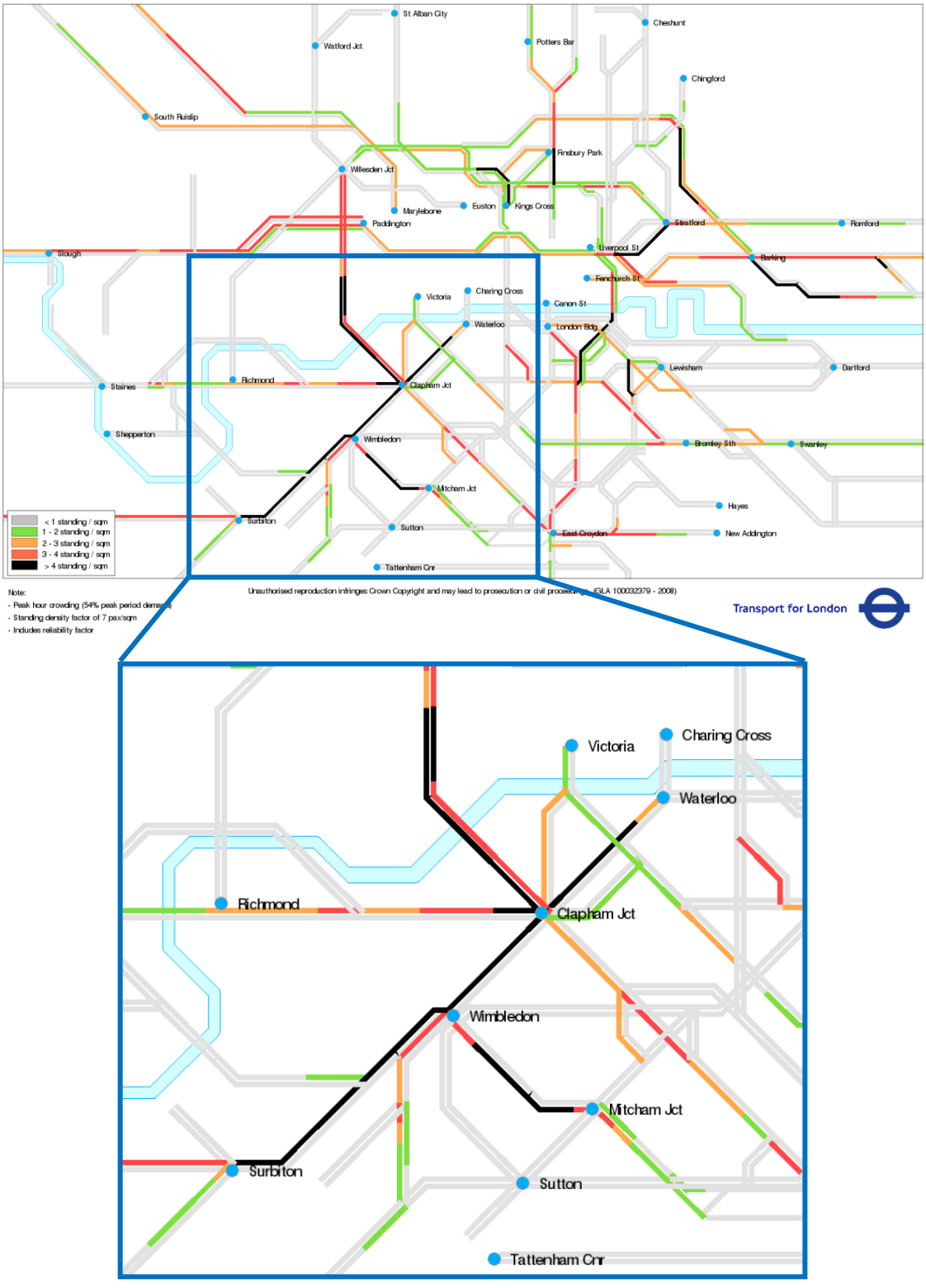
Figure 5: Crowding on the National Rail and Tramlink networks in 2007 (morning peak hour)



Enlarged area

Source: Transport for London

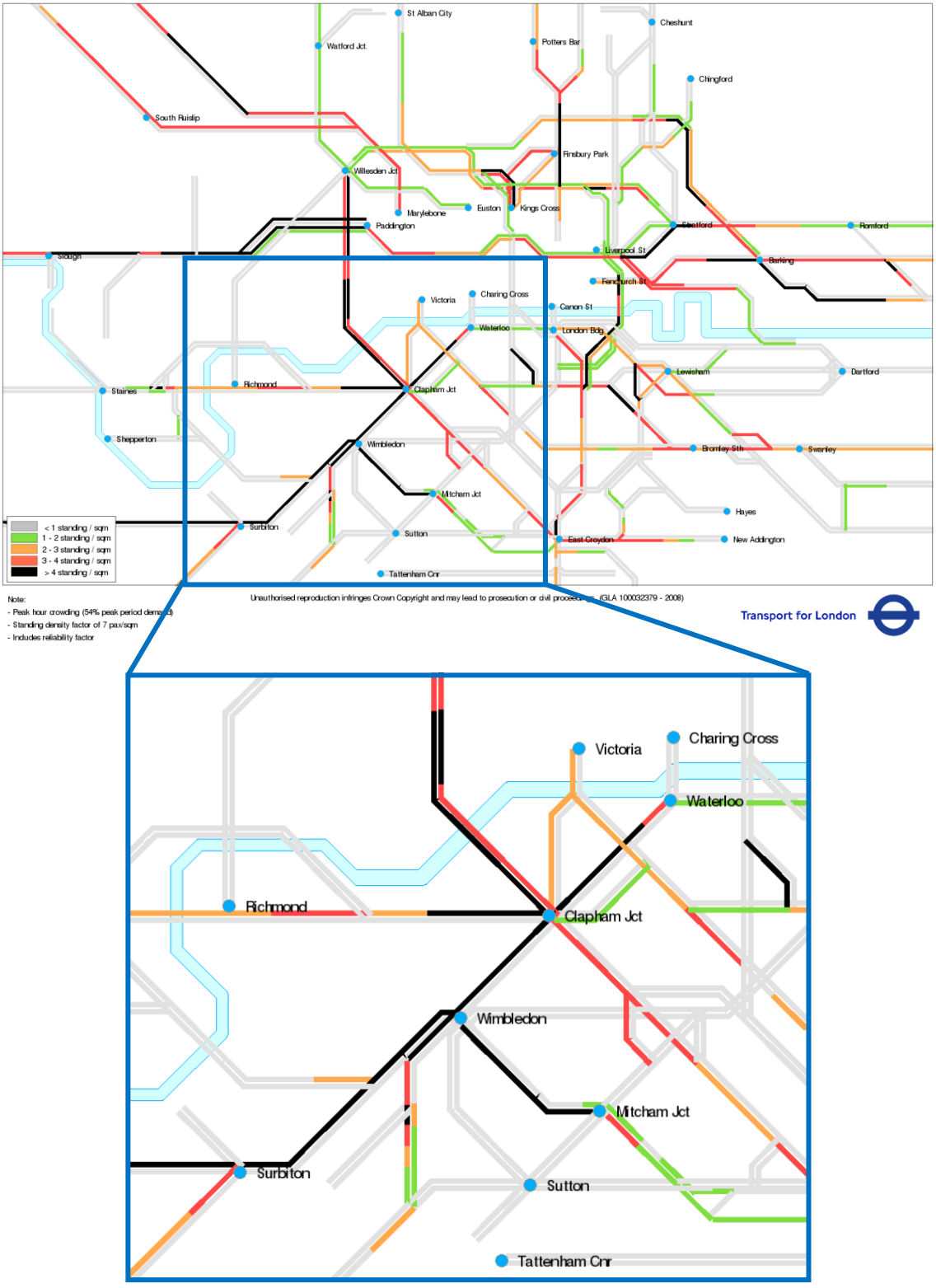
Figure 6: Projected crowding on the National Rail and Tramlink networks in 2021 (morning peak hour)



Enlarged area

Source: Transport for London

Figure 7: Projected crowding on the National Rail and Tramlink networks in 2031 (morning peak hour)



Enlarged area

Source: Transport for London

iv. Demand from HS2

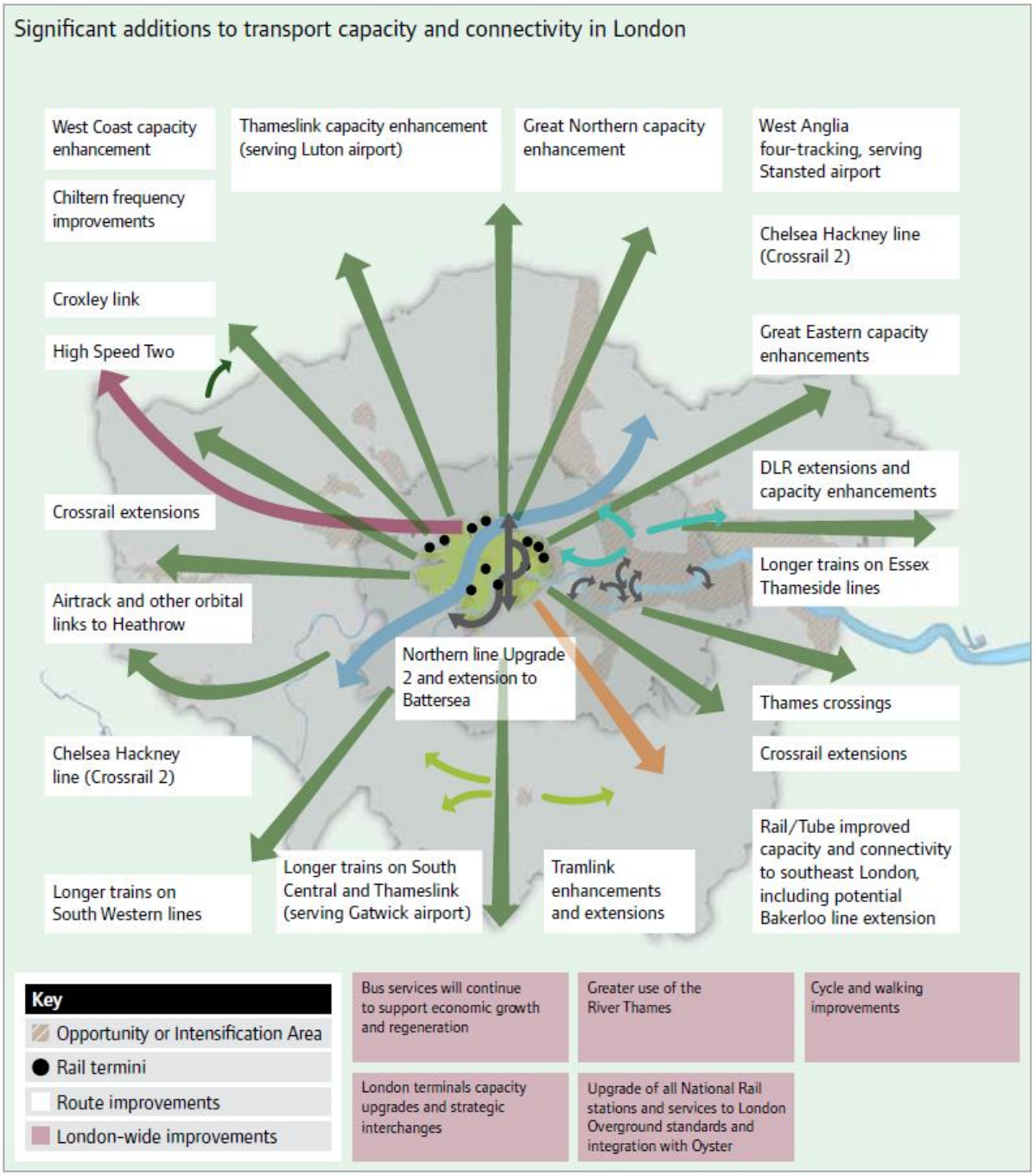
There are significant crowding problems on the Victoria and Northern lines through Euston today. Despite extra capacity brought about by the committed Tube upgrades, these problems will still exist in 2031, as the new capacity will only just keep up with growing passenger demands. An entirely new line, such as Crossrail 2, is needed to address these persistent problems, whether HS2 goes ahead or not.

By 2031, without HS2 in place, passenger arrivals at Euston are forecast to increase by around 30%, leaving London Underground crowding at Euston comparable to today even after the significant line upgrades currently underway. However, the Government's plans for a new high-speed rail 'Y' network to Leeds and Manchester would make the pressures on the underground network at Euston particularly acute by more than doubling the number of passengers arriving at Euston over the morning peak period (compared to today). These impacts would also be highly visible the instant an HS2 line comes into operation, in contrast to demographic pressures which build up more gradually. The precise impact of HS2 on the London transport network is under discussion between HS2 Ltd and TfL. TfL estimate that with an intermediate station at Old Oak Common but without further mitigation measures, maximum wait times for boarding a southbound Victoria line service during the busiest part of the morning peak could be over 30 minutes. Even with further proposed mitigation measures (such as extending Crossrail 1 to the West Coast Main Line and providing direct subsurface links to Euston Square station), maximum wait times are forecast to be around 20 minutes. As such there is a compelling case to amend the safeguarded route for Crossrail 2, such that it serves Euston, and caters for the uplift in demand brought about by HS2.

Future transport strategy for London

It is clear from these challenges that additional interventions will be required beyond current plans for London's transport system to support future competitiveness. The Mayor's Transport Strategy, published in May 2010, sets out his transport vision for London to address the big challenges over the next twenty years. Figure 8 below identifies schemes for implementation in the period following current investment programmes (from 2014 for schemes funded by Network Rail and from 2020 for schemes funded by TfL and others). 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 key London airports including Heathrow, Gatwick, Stansted and Luton.

Figure 8: Schemes in the Mayor's Transport Strategy for implementation beyond 2014



Source: Mayor's Transport Strategy (May 2010)

Crossrail 2 (or the Chelsea-Hackney line) is included as the major scale intervention which could offer a significant step change in capacity for London's transport network. The Mayor's Transport Strategy's assessment of the Chelsea-Hackney line is set out in the box below.

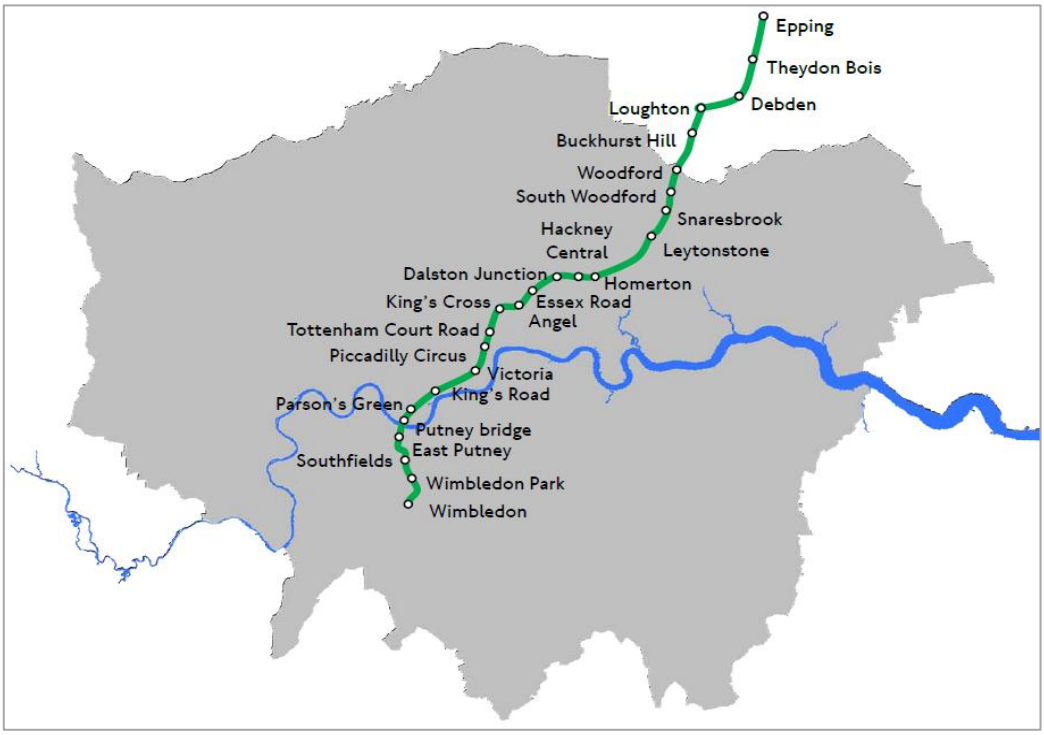
Chelsea-Hackney line – Mayor's Transport Strategy (Chapter 5, paragraphs 263-264)

The Chelsea Hackney line (or Crossrail 2) provides significant new rail capacity on the northeast to southwest corridor and major congestion relief to existing rail and Tube lines. The route of the line is safeguarded by Government and it is essential that this safeguarding remains in place to protect this important new line. Forecast demand shows that crowding and congestion remains a significant issue in this corridor, even with new investments such as Crossrail and Thameslink in place. This new line is needed in the longer term to reduce crowding on existing routes, but also to provide the capacity that is required to meet London's growth and provide connections to the National Rail network, including dispersal of people across London from the main line termini. The introduction of HS2 will increase this need considerably. It is important that the route of the Chelsea Hackney line is reviewed to ensure it is providing the maximum benefits and value for money.

Proposal 9: The Mayor will support new rail capacity in the broad southwest to northeast 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 route for the Chelsea-Hackney line has been safeguarded since 1991 and was most recently confirmed in 2008. The currently safeguarded route is shown in Figure 9 below. One significant question for future consideration is the extent to which this route might be amended to take account of today's changed context.

Figure 9: The safeguarded Chelsea-Hackney route



Source: Transport for London

The role for Crossrail 2

Over the past six months, the working group has undertaken extensive analysis of the future pressures on London's rail and underground networks and the potential contribution of Crossrail 2, courtesy of detailed discussions with TfL, Network Rail, the GLA and HS2 Ltd. The group has also engaged wider expertise through a 'challenge session' which considered whether there might be other ways of meeting future demand, such as alternative investment in rail or underground infrastructure or through enhanced demand management measures.

Based on this analysis, the working group agrees that forecast demand will require additional interventions to London's transport network, beyond currently committed plans. The working group also recognises the limited scope for demand management or incremental enhancements to significantly increase capacity on the Tube and key parts of the National Rail network. Upgrades to existing signalling, rolling stock and stations have made a significant contribution towards expanding capacity – and will continue to do so over the coming decade – but there is a limit to what can physically and cost-effectively be done to enhance legacy infrastructure, particularly on the Tube.

The working group therefore supports TfL's view that there is a strong case for an additional large-scale intervention, along the lines of Crossrail 2, to provide a step change in SW-NE transport capacity. The working group did not consider detailed route issues in this initial phase of work. In considering the high-level case for a Crossrail 2 scheme it did, however, consider some of the broader issues for the three key route sections: the central section, and the south-west and north-east sections. The group's findings follow below.

Central section

A Crossrail 2 alignment via the West End offers considerable scope to alleviate congestion on sections of the Tube that are projected to suffer intense crowding. These include the Victoria and Piccadilly lines as well as key interchanges with National Rail such as King's Cross and London Victoria. A Crossrail 2 scheme through the central section would also offer scope for interchange with Crossrail 1, Thameslink and HS1, and thus offer enhanced connectivity to international air and rail links.

The emergence of the Government's plans for a new high-speed rail network, terminating at Euston, makes the addition of a Crossrail 2 station at Euston highly desirable. Network Rail's London and South East RUS notes that Crossrail 2 "has the potential to provide significant additional dispersal capacity from the High Speed Rail network at London Euston, as well as at London St Pancras International. This would significantly alleviate severe crowding on the Victoria line at Euston Underground station, so further consideration of including a Euston stop in any Crossrail line 2 scheme is recommended." The Government's intention to introduce an HS2 Bill in 2013 makes this work more pressing as it would make sense to incorporate 'passive 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.

South-west section

The key issue in the south-west of London is the extent to which any scheme could alleviate crowding on the District and Northern lines, and also on main line and suburban National Rail services into London Waterloo, London Victoria and Clapham Junction from Wimbledon and south-west London and beyond. Network Rail forecasts significant capacity constraints on south-west London rail services in future years, to which there are no straightforward solutions as measures like longer trains and platforms and better signalling have already been implemented. Network Rail is developing proposals to add a fifth track between London Waterloo and Surbiton, at a cost likely to exceed £1 billion, but even this scheme, which would have substantial impacts, will not deliver the kind of step change in capacity that Crossrail 2 is able to offer.

North-east section

The north-east section of the route also has strong potential to relieve crowding, especially on the Victoria and Piccadilly lines. Through interchanging at Tottenham Hale and/or Seven Sisters, Crossrail 2 is able to significantly reduce crowding levels, through offering a fast, high-capacity alternative, from north-east London into the West End and beyond, which also helps reduce National Rail crowding, given the high levels of demand on the Tube from Great Northern and West Anglia services.

Crossrail 2 could also provide vital new connectivity to support economic development in the Upper Lee Valley, potentially stimulating far more regeneration potential than enhancing existing rail links in the area could otherwise provide. The Lower Lee Valley, which includes Stratford and the Olympic Park, 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 drive regeneration in these areas 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 1980s. An issue for further work is to better understand where and when growth is likely to take place over the next thirty years, particularly along the Lee Valley.

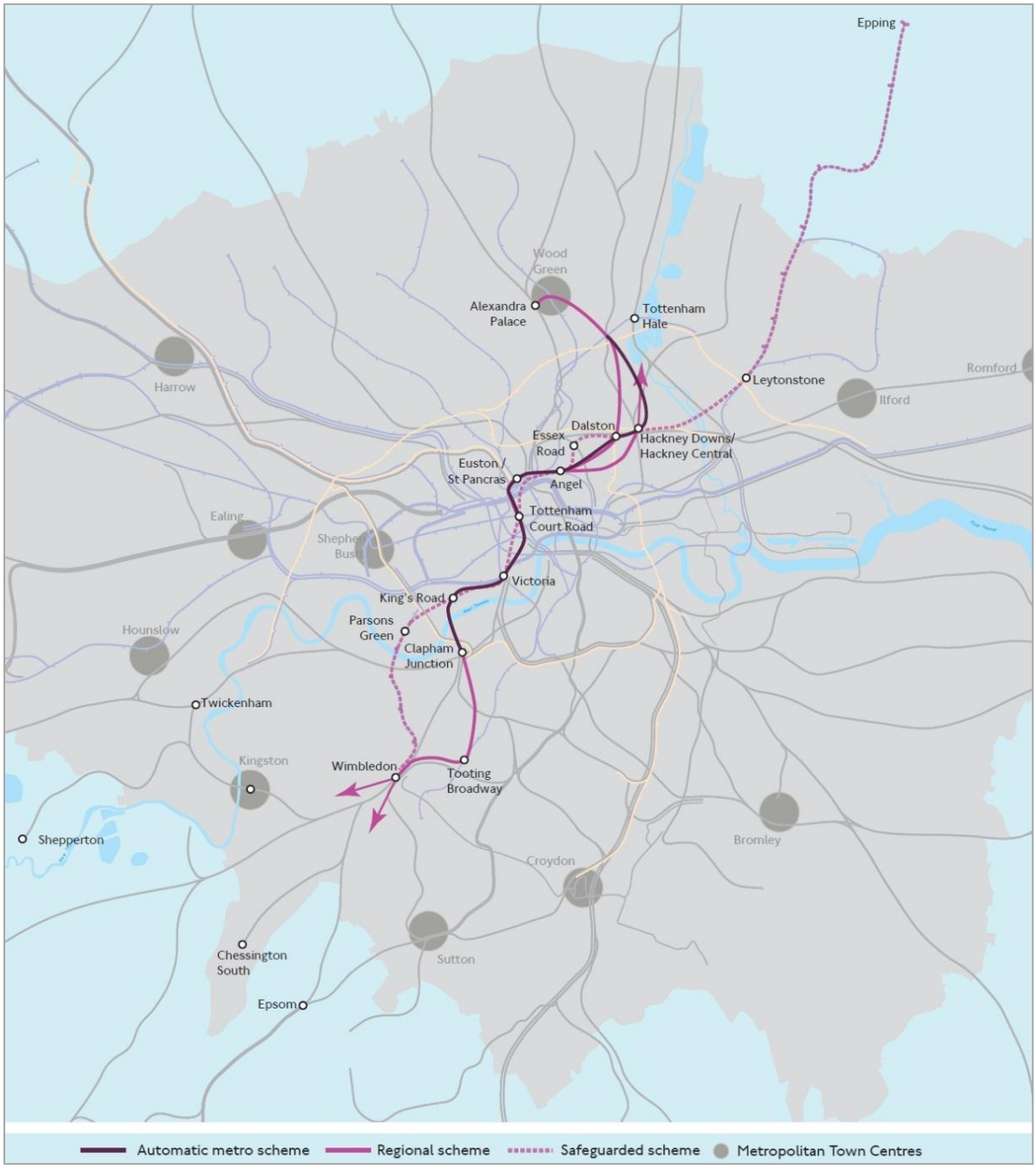
Issues for further consideration

The working group will now undertake further work, with TfL, Network Rail and wider stakeholders including London businesses, on detailed scheme and route options for Crossrail 2. The group will also continue to investigate whether there may be other ideas for alleviating the problems arising from London's future growth. Boris Johnson, recently re-elected as Mayor, has given a strong commitment to develop and promote Crossrail 2. Indeed, all main political parties in London are committed to Crossrail 2 – an important factor given the importance of cross-party consensus to long-term infrastructure delivery in this country.

What sort of scheme is Crossrail 2?

A fundamental consideration is what sort of scheme Crossrail 2 should be. This essentially boils down to a choice between two options: a metro scheme or a regional one. Figure 10 below shows two options assessed by TfL.

Figure 10: Options for Crossrail 2



Source: Transport for London

A metro scheme, which itself could be shorter or longer in length, would be a self-contained automatic Tube line focused on providing congestion relief to the Tube in central London. A regional scheme would be more like Crossrail 1, offering larger trains able to run on the National Rail network and to serve Greater London and potentially beyond. A metro scheme 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 bigger scheme, the second option 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.

The group did not seek to opt definitively for one of these options in this first phase of work. Further work is now needed to assess them in more detail and to develop cost-benefit ratios for different options bearing in mind the inevitable uncertainties at this early stage in the project's life. Initial calculations suggest a cost of between £10–15 billion for a Crossrail 2 scheme, depending on the sort of scheme and number and location of stations. Initial calculations suggest the scheme would be good value for money, particularly the regional scheme which would generate benefits more than twice the costs (and that's excluding any wider economic benefits).

Principles to guide further work

In undertaking further work the group proposes that options should be assessed against their contribution towards meeting the following key principles. Crossrail 2 should:

- Offer essential congestion relief and help meet future demand on heavily crowded sections of the Underground in central London.
- Help meet increasing demand for commuter rail travel into central London.
- Relieve congestion and support future growth at major London National Rail interchanges, including from HS2.
- Improve transport connectivity with areas of south-west and north-east London.
- Generate significant overall benefits from what will be a substantial investment.

Next steps

The working group would welcome views on its findings to date and on these underlying principles. Responses should be sent to **crossrail2@londonfirst.co.uk**. The group will issue a further report later in 2012, ahead of TfL's review of the safeguarded route in 2013. This will also support further work on the impacts of HS2 on London's transport network to inform and enable the successful introduction of a Bill late in 2013.

Appendix 1: Members of working group

Members of the working group are as follows:

Lord Adonis (Chair)

Roger Madelin, Chief Executive, Argent

Duncan Wilkinson, Director, Arup

Roy Hill, European Managing Director, CH2M HILL

Tim O'Toole, Chief Executive, FirstGroup

Nick Bliss, Partner, Freshfields Bruckhaus Deringer

Richard Threlfall, Partner, KPMG

Michael Dyke, Managing Director, Project Management & Construction EMEA, Lend Lease

Sir David Rowlands, Chairman, London Gatwick Airport

Simon Babes, Client Portfolio Manager – Rail, SKM Colin Buchanan

Trevor Lampen, Vice President Strategy, Sales and Marketing, Thales UK

Appendix 2: Participants in working group discussions

The working group took evidence from key organisations including TfL, Network Rail, the GLA and HS2 Ltd. It also held a 'challenge seminar' with a wider cross-section of transport experts and commentators to expose some of the issues around Crossrail 2 to wider scrutiny. The following gave evidence or otherwise participated in the working group's discussions:

Michèle Dix, Managing Director, Planning, TfL

Stephen Pauling, Principal Transport Planner, TfL

Chris Rowley, Lead Network Planner, London & South East, Network Rail

Andrew Barry-Purssell, Head of London Plan, GLA

Bridget Rosewell, Consultant Chief Economic Adviser, GLA

Alison Munro, Chief Executive Officer, HS2 Ltd

Cllr Feryal Demirci, London Councils Transport & Environment Committee

Professor Tony Travers, Director, LSE London

Jim Steer, Director & Founder, Steer Davies Gleave

Professor Stephen Glaister CBE, Director, RAC Foundation

Keith Berryman

Christian Wolmar

Professor David Begg, Chief Executive, Transport Times

Michael Schabas

We are very grateful to all those who gave generously of their time and experience. The analysis and conclusions of this paper are of course the working group's own, and no agreement should be presumed from any of those referred to above.

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