Crossrail 2: regional and national benefits

September 2015

MAYOR OF LONDON

NetworkRail

TRANSPORT FOR LONDON

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Figure 10 amended with correct North West region spend figure

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1. About Crossrail 2

1.1.1 On the back of a strong economy, the wider South East – London, the South East and the East of England – is experiencing rapid population growth. In London alone there are now a record 8.6 million people; this is forecast to be 10 million in 2030.

1.1.2 That puts massive and growing pressure on infrastructure, transport and housing. If we fail to tackle these challenges they will not only make life much harder for the wider South East's 23 million people; they will also damage our economy and erode our international competitiveness.

1.1.1 Yet these pressures are also a huge opportunity for dynamic economic growth. We know that cities have higher productivity: their large workforces support the most productive, knowledge-based sectors. So exploiting cities' potential for growth will improve the productivity of the UK as a whole – our greatest economic challenge.

1.1.2 This potential will only be realised if people have places to live and ways of getting to work. Better regional transport infrastructure is the key to growth – and thus to more jobs, housing and higher productivity. Many other transport improvements are already in progress on the Tube and rail networks, including Crossrail 1, but they will only partially offset the pressure, and only in the shorter term. We need to plan for longer term growth.

1.1.3 This is why we need Crossrail 2, a new railway serving the wider South East: so that the most productive and competitive parts of the nation's economy can continue to grow. Crossrail 2 would:

- Allow up to 270,000 more people to get into central London during the weekday morning peak period – an increase of around 10 per cent on current rail and Tube capacity. This would also help reduce crowding at mainline stations and on the Tube

- Complement and strengthen the impact on the transport network of the wider programme of investment in rail and Tube services

- Tackle significant capacity constraints on the rail network, particularly on the South West Mainline from and between destinations in Surrey, Hampshire and into London Waterloo. Peak morning demand already exceeds capacity at Waterloo and demand for rail services into it is set to soar by 40 per cent by 2043

- Ensure that HS2 is integrated into the regional transport network

- Improve public transport connectivity to and from some of the region's key opportunity areas, such as the Upper Lea Valley, driving growth and regeneration there

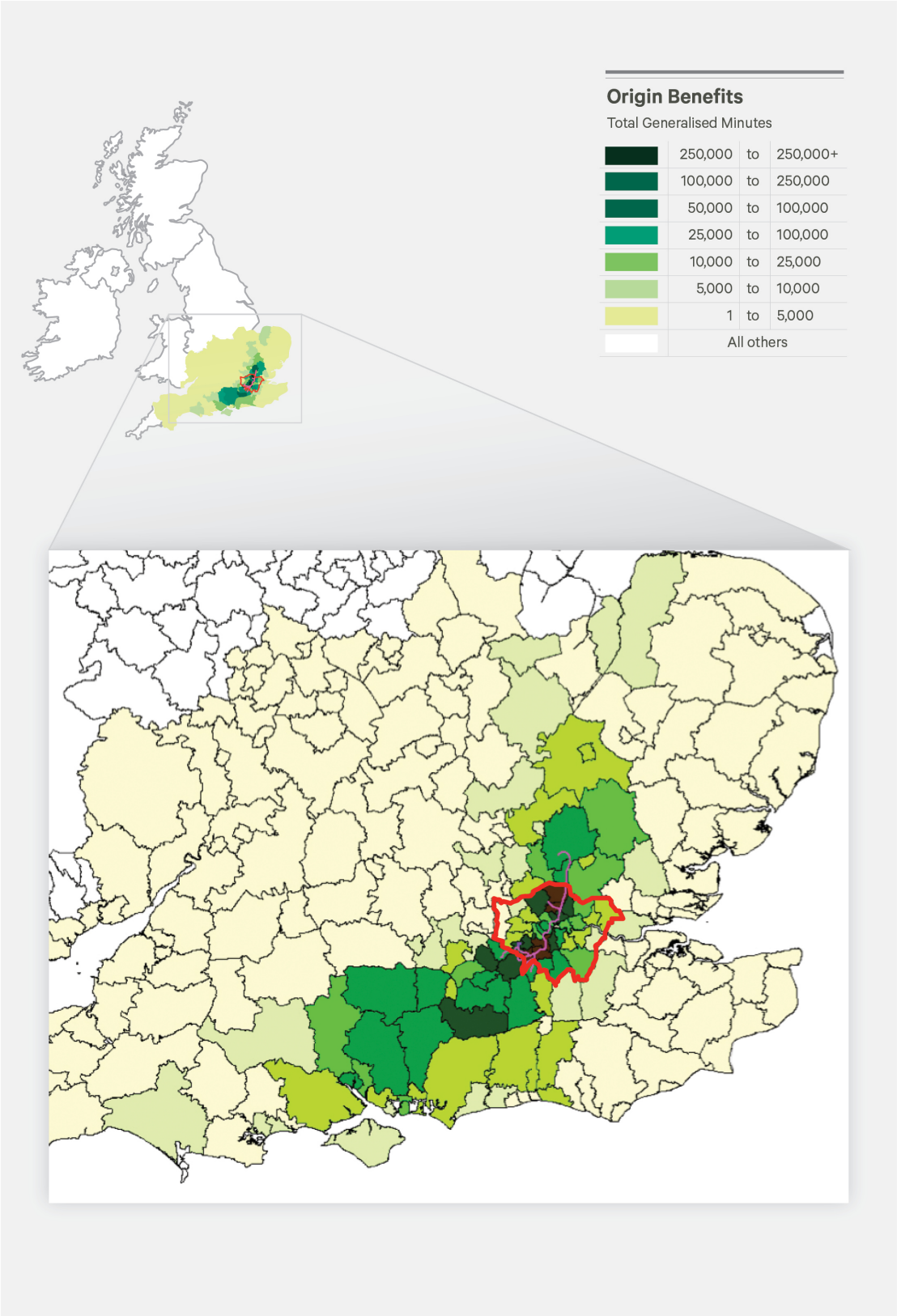
- Support long-term growth in housing, by driving the development of 200,000 new homes across the region, and employment, by supporting 200,000 new jobs

1.1.4 Crossrail 2 would connect the existing National Rail networks in Surrey and Hertfordshire with trains running through new twin-bore tunnels beneath central London, between Wimbledon in the southwest and Tottenham Hale and New Southgate in the north. It would connect with existing Underground and National Rail stations, providing connections and direct services across the wider South East to destinations around the country. Figure 1 shows how the new railway would provide these links. By providing an alternative rail route into London for many suburban rail services, Crossrail 2 would free up space on the existing rail network for longer-distance trains.

1.1.5 Through these connections, and through unlocking new capacity in existing railway lines, Crossrail 2 would transform connectivity and capacity on trains across the whole wider region, from the Solent to the Wash. The distribution of travel time benefits is shown below in Figure 2.

Figure 1. Crossrail 2: key regional connections (not all stations shown)

Figure 2. Distribution of travel time benefits (journey time and crowding relief) in a typical morning peak period



1.1.6 This report sets out the challenges facing the region in terms of growth, infrastructure and housing, before exploring the transport and economic benefits Crossrail 2 could bring.

1.1.7 It then examines how the railway could be funded. More than half of the funding for Crossrail 2 would come from London, while central government would recoup much of its investment through increased Stamp Duty and other tax revenues.

1.1.8 On the basis that Crossrail 2 will take five years to develop and another ten to construct, services could be operating by 2030.

1.1.9 Crossrail 2 has cross-party support, including a commitment in the Government's election manifesto. It is supported by the Chancellor of the Exchequer and features in the National Infrastructure Plan, the London Plan, the Mayor's Transport Strategy and Network Rail's route strategies. Crossrail 2 is being developed as a joint project by TfL and Network Rail, with financial support from the Department for Transport (DfT). It also has strong support from South East businesses: nine out of ten 'strongly support' or 'support' Crossrail 2.[1]

1.1.10 The map on the next page (figure 3) shows the currently proposed Crossrail 2 route. It has been developed to support the wider South East's long-term economic growth. The options for Crossrail 2 date back to 1944, when the concept of cross-London tunnelled rail services was first introduced in the Greater London Plan. Following this, in 1974 the London Rail Study identified the Chelsea-Hackney Underground line as a possible scheme to serve future demand. Land was safeguarded for this in 1991.

1.1.11 Since 2007, a detailed optioneering process has been underway to determine the optimum route to address transport and growth challenges. This looked at more than 60 possible routes, which were assessed and sifted down to two options which were consulted on in 2013 – a self-contained metro scheme and a regional option (which, through diverting existing national rail services through a new tunnel, delivers significant capacity benefits on the key corridors into Waterloo and Liverpool Street). Since then, and following further consultation in 2014, planning of the scheme has continued, leading to the regional railway proposal we have developed today.

[1] ComRes Polling, Autumn 2014

Figure 3. Safeguarded Crossrail 2 route

2. The major challenges facing the region

2.1 Population growth

2.1.1 The economic success of the wider South East has led to population growth in recent years, as skilled workers have been attracted to jobs in London and the surrounding region. London's population is forecast to reach 10 million by around 2030 and over 11 million by 2050[2]. The East and South East are also forecast to experience rapid growth – growing by around a fifth by 2037[3].

2.1.2 This will not be at the expense of other cities – right across the country, urban areas are also experiencing population growth.

2.1.3 This will be accompanied by further employment growth[4], mainly in existing employment centres. But the region's new workers need to be housed and to be able to get to work. Population and job growth are already driving demand for transport and housing, which will increase significantly in future years. The consequences for housing and the transport network are considered in sections 2.2 and 2.3 respectively.

Figure 4. London employment figures

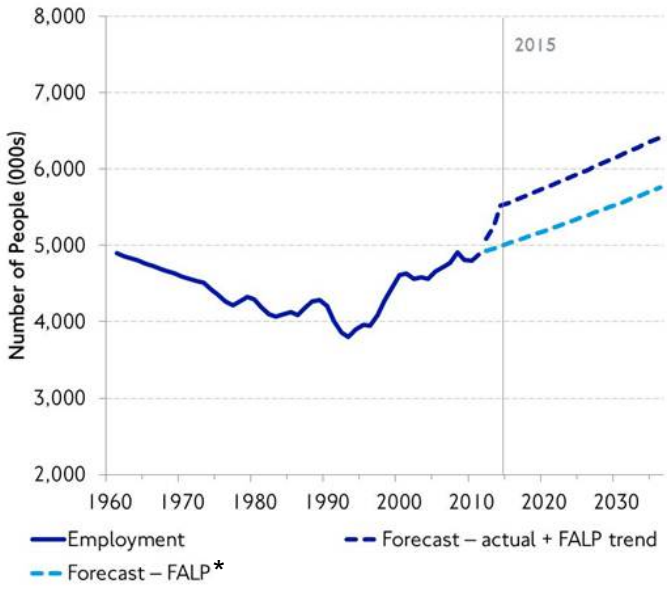
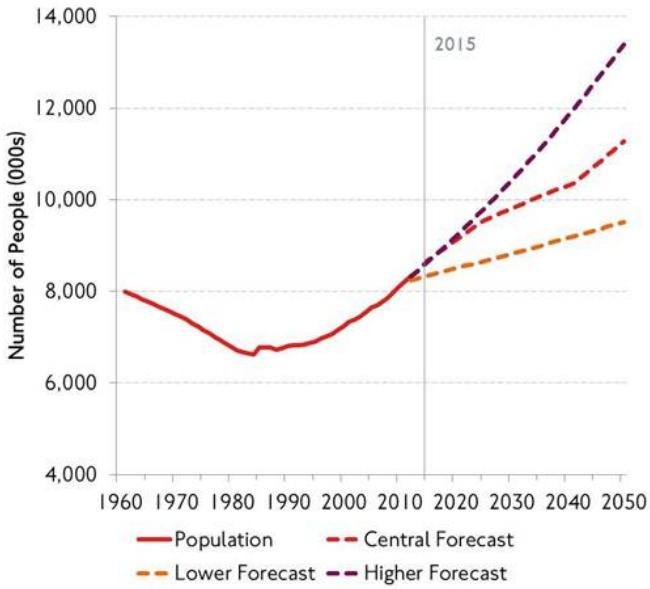


Figure 5. London population figures



[2] Source: London Infrastructure Plan 2050 (Mayor of London).
* Further Alterations to the London Plan
[3] Source: ONS 2012 population projections
[4] Source: GLA Economics

2.2 The housing challenge

2.2.1 Population growth will put further pressure on the housing market and make housing less affordable - unless we build sufficient homes to accommodate newcomers.

2.2.2 It is widely recognised that there is a housing shortage now, particularly in London, but the challenge is set to become significantly greater. We need to build a new home every 10 minutes, on average, to meet our targets. We are building too few homes across the wider South East. The housing shortage squeezes living standards – and threatens future growth.

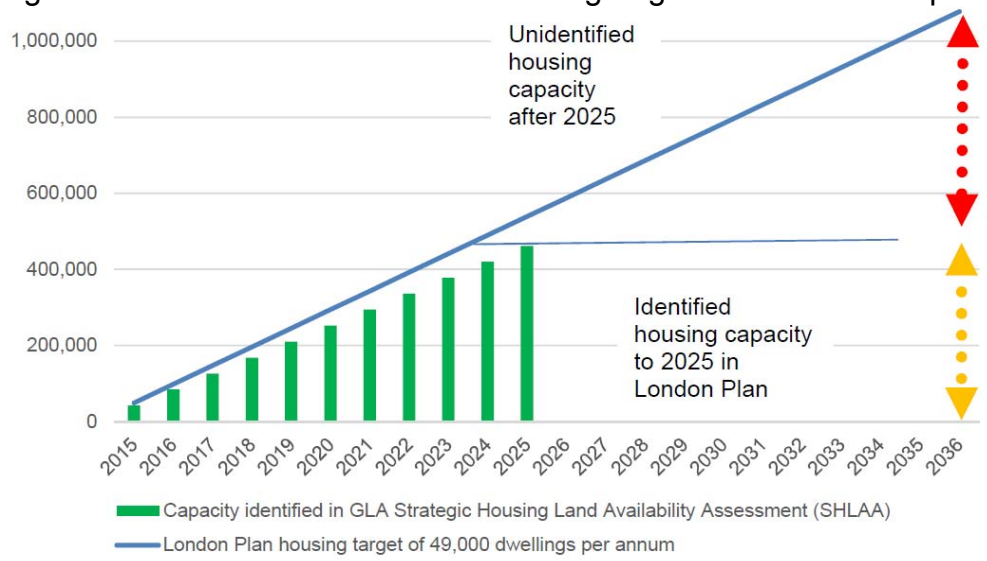
2.2.3 House prices have increased significantly faster than household income since the 1990s. The ratio of house prices to earnings is now at record levels in London and more than double the ratio in the early 1990s[5].

2.2.4 A recent CBI London Business Survey found that[6]:

- 61 per cent of firms list housing costs and availability as having a negative impact on recruitment of entry level staff, with half listing it as being an issue for recruiting mid-level managerial staff
- 42 per cent have to pay a premium to attract and retain staff
- 24 per cent said employees were moving away from the local area and were leaving jobs because housing costs were too high

2.2.5 In recent years, the capital has delivered around half of the 49,000 new homes it needs to build every year. The Mayor's Strategic Housing Market Assessment identifies new sites for development until 2025; sites beyond 2025 have not been identified.

Figure 6. Cumulative London Plan housing targets vs identified capacity



[5] Nuffield Foundation Report (2015) Housing Trends in Prices, Costs and Tenure
[6] CBI London Business Survey, April, 2014

2.3 The transport challenge

2.3.1 The wider South East's transport network suffers from high levels of crowding and congestion - and it is getting worse. The periods when demand is highest are becoming longer.

2.3.2 Although significant investment is being made in the transport network, in line with the Network Rail Route Studies and the Mayor's Transport Strategy – such as Crossrail 1, the Tube modernisation plan and investment in National Rail services crowding and congestion are set to become more acute at key locations. To avoid this, we will need to make significant infrastructure investments beyond those already planned.

2.3.3 Across the wider South East, the dominant challenge is providing sufficient capacity in the peak periods to and from London. The capital's rail infrastructure has developed historically with mainline stations located in a loose ring around central London's key employment hub. The lines that serve them are heavily congested: nearly two-thirds of all UK rail journeys start or end at these termini.

2.3.4 As a result, it is commonplace for passengers to have to stand for long distances. Meanwhile there are high levels of interchanging passengers at terminal stations: during the morning peak period; around 500,000 people transfer from Network Rail services to London Underground or Docklands Light Rail (DLR). This puts pressure on both the National Rail termini and the onward Tube and DLR lines.

2.3.5 Providing more National Rail services into these termini will exacerbate the challenge at these stations. Without new onward connectivity, and as the number of people travelling around the network grows, interchange between services will become increasingly difficult and time consuming and crowding more widespread.

2.3.6 Today, Waterloo has the highest proportion of passengers standing in the morning peak of any London terminal, at almost 30 per cent. Demand for National Rail services into Waterloo is set to soar by 40 per cent by 2043 and by a similar level across the Tube network.

2.3.7 Severe crowding on the Tube is forecast to double by 2041. This challenge is particularly severe for inbound passengers at major rail termini. It is likely to lead to significant operational difficulties, passengers being unable to board services, and the increased use of crowd control measures such as temporary access restrictions.

2.3.8 Transport also presents a challenge for growth in the flourishing Cambridge-Stansted corridor. Employers there need to be able to draw in more workers from London and elsewhere but at present there are significant transport constraints.

2.3.9 A number of upgrades to the existing transport network are already underway or have been delivered to help address this. Others, such as Crossrail 1, provide essential new transport connectivity but do not provide benefits travelling through the broad south-west to north-east corridor where there are significant transport constraints and growth opportunities. In all cases, the existing capacity is finite and inevitably, new infrastructure will be required.

2.3.10 If we fail to tackle the challenges associated with rapid population growth, they will not only make life tougher for people living and working in the South East, they will also damage the UK's most productive economic sectors - thereby eroding our international competitiveness.

3 Crossrail 2 provides a solution to these challenges

3.1 How Crossrail 2 would help

3.1.1 Crossrail 2 would help the UK to address the population, housing and associated transport challenges described above in three ways:

1. Crossrail 2 would provide vital new transport capacity to allow our growing population to continue getting to jobs, services and supporting the economy

2. Crossrail 2 would improve transport connections to under-developed areas where land is available and connectivity is poor. This would open up these areas for redevelopment and new house building

3. By providing new transport capacity to link homes with jobs, Crossrail 2 would support employment growth, enabling firms to draw from a large talented workforce. This would enable growth in both national productivity and the UK economy

3.1.2 Each of these benefits is considered below in turn.

3.2 The transport benefits of Crossrail 2

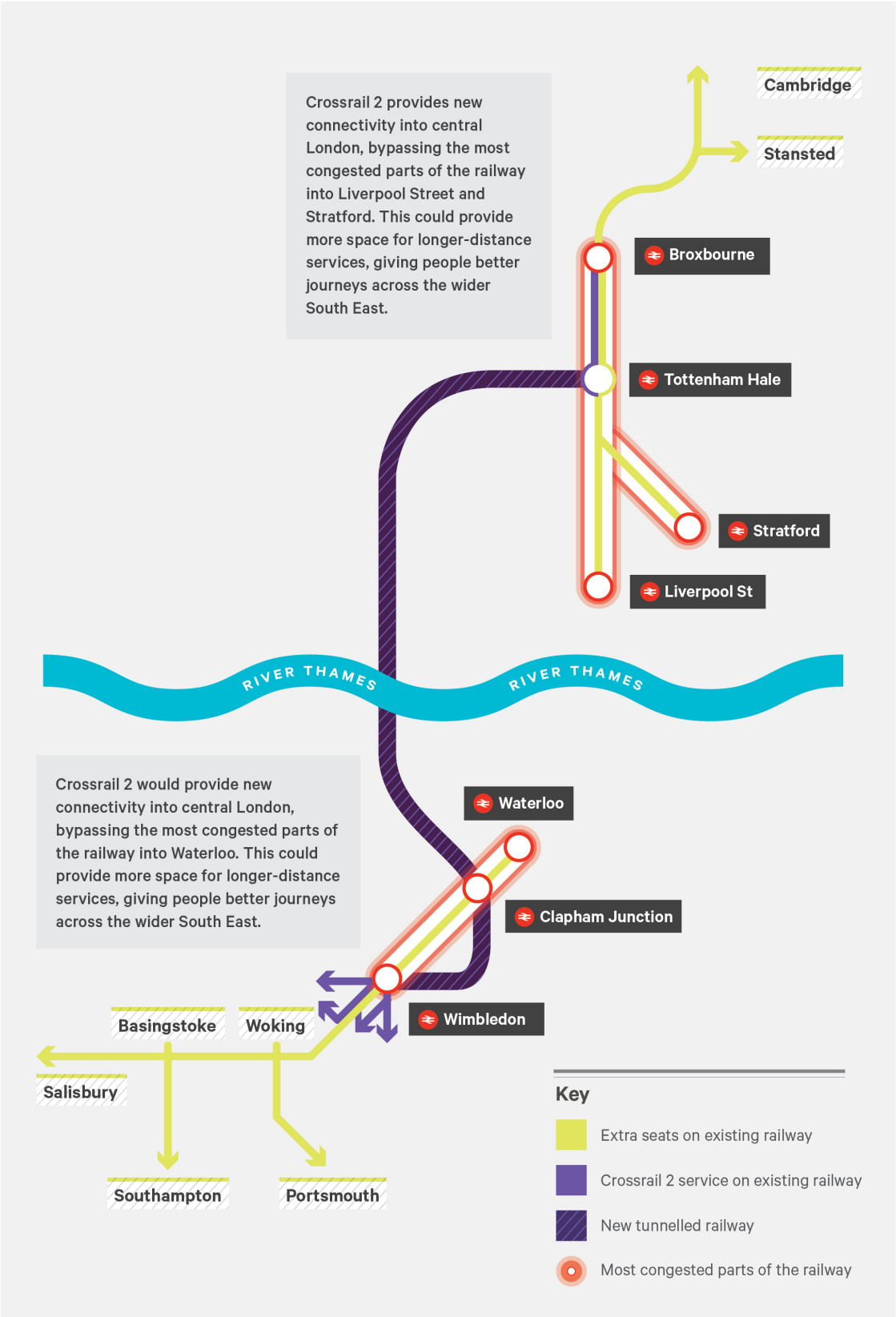
3.2.1 Crossrail 2 would connect National Rail lines across the wider South East, significantly boosting transport capacity. It should be the keystone of transport infrastructure investment for the whole region.

3.2.2 A new cross-region rail link would help reduce the pressure around rail termini by providing direct connections across central London. It would provide fast and frequent services – with up to 30 trains per hour, or a train every two minutes, in both directions in the central core at peak periods – and would also help relieve crowding on the wider public transport network.

3.2.3 Crossrail 2 would provide a huge boost to rail capacity across the wider South East. Services would run for over 100km, and would enable around 270,000 additional people to access central London in the morning peak period. This represents an increase of around 10 per cent on current rail and Underground network capacity.

3.2.4 The benefits of Crossrail 2 would be felt far beyond the route. Some suburban services which currently run on National Rail lines would be diverted through the new tunnel on Crossrail 2.

Figure 7. Crossrail 2: relief to congested parts of the National Rail Network



3.2.5 Crossrail 2 would release vital capacity for additional longer distance services on the main lines into Waterloo and Liverpool Street. For example, in the morning peak period, around 15 more trains from Hampshire and Surrey could provide 11,800 more seats into Waterloo - in addition to thousands of seats available on new Crossrail 2 services. Consequently, journeys to destinations across the wider South East, including those far beyond the Crossrail 2 route, would be improved.

3.2.6 As such, Crossrail 2 could benefit towns, cities and employment centres across the wider South East such as Cambridge, Stansted, Portsmouth, Woking, Basingstoke and Southampton. Some services to these locations are amongst the UK's busiest[7] and new capacity is urgently needed.

3.2.7 Crossrail 2 would join up transport networks across the wider South East and beyond, giving passengers new opportunities to interchange directly between the Underground network, South West Main Line, West Anglia Main Line, Crossrail, Thameslink and the National Rail networks running out of Victoria, King's Cross/St Pancras and Euston, and to international services to Europe.

3.2.8 By connecting these rail networks, Crossrail 2 would provide passengers with direct services to more destinations and would create new opportunities to interchange with transport links to the whole of the UK. Thirty-five per cent of the total UK rail network – more than 800 stations around the country, including in the North and Midlands – will have a direct service to a Crossrail 2 interchange. Connecting with so many of the UK's most intensively used rail lines would improve national connectivity.

3.2.9 Crossrail is particularly important as an interchange for those arriving on HS2 services at Euston. Without Crossrail 2, those passengers could have to wait for up to five southbound Victoria line trains to pass until they could board a train to their onward destination. With Crossrail 2, the average passenger would be able to get on the first Victoria line train that arrives in the station.

3.2.10 These easier journeys would generate significant journey time savings, giving people access to thousands more jobs within a 45- minute commute (table 1).

[7] Department for Transport rail passenger numbers and crowding statistics, September 2015

Table 1. Potential number of jobs accessible within 45 minutes of a Crossrail 2 station

Example station	Current number of jobs accessible	Potential number of jobs accessible with Crossrail 2
Brimsdown	400,000	1,800,000
Dalston	3,100,000	3,600,000
Wimbledon	2,200,000	2,800,000
Kingston	400,000	800,000
New Southgate	2,100,000	2,500,000

3.2.11 Crossrail 2 would make the region's transport network significantly more accessible and sustainable. It would significantly improve step-free access across the wider South East. Step-free access would be provided at all Crossrail 2 stations. The railway would be served by a new fleet of trains which would be designed with wide doors and aisles, have dedicated wheelchair spaces, be well lit and have on-board passenger information.

3.2.12 Once operational, the new railway would also reduce pressures on road traffic across the wider South East. This could have an economic benefit of £4.5bn from time savings, as well as having a beneficial impact on the environment.

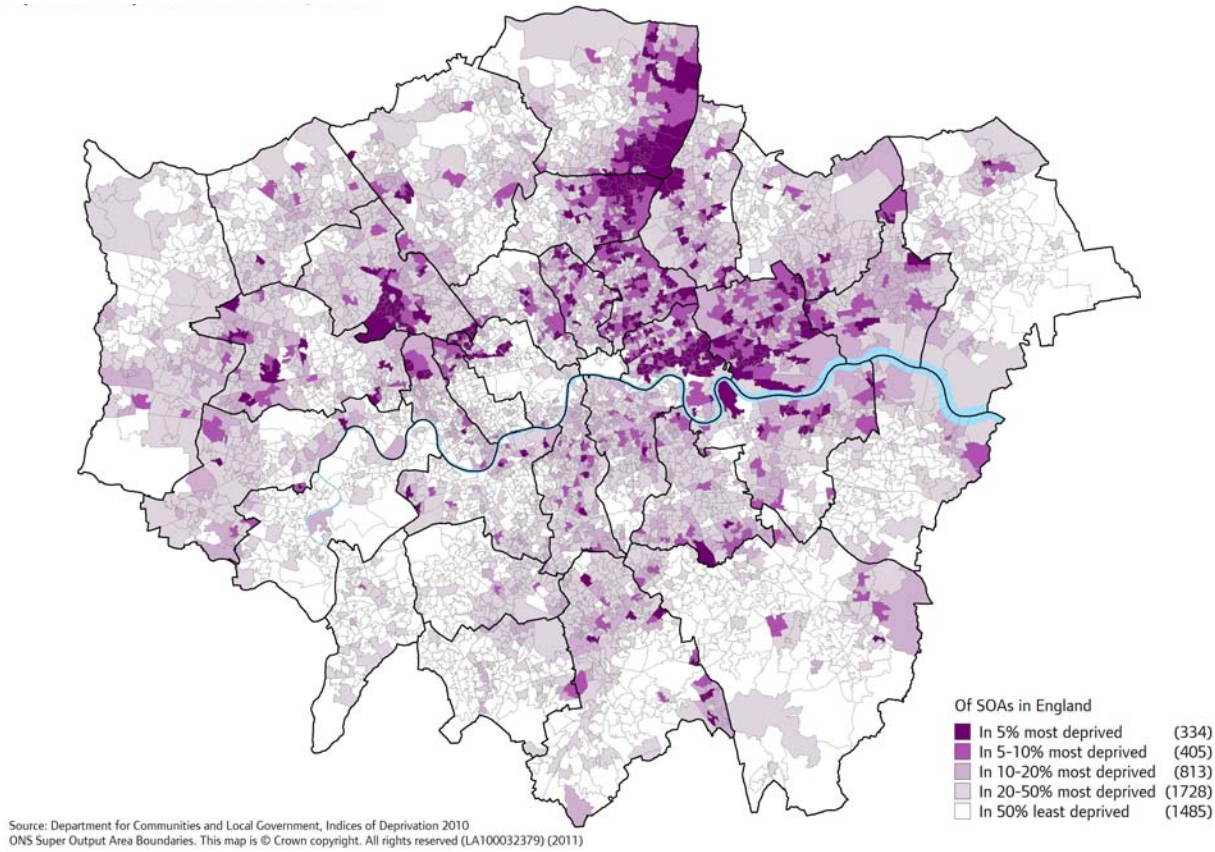
3.2.13 It would improve air quality, reduce noise and make the city more sustainable. Every year, 23,000 tonnes of carbon dioxide could be saved as people switch from making journeys by road to using Crossrail 2, and removing around 11,000 road trips during the morning and evening peak periods.

3.3 What Crossrail 2 would do for housing and regeneration

3.3.1 Better transport connections would drive new housing development and regenerate deprived areas.

3.3.2 Some of London's former industrial areas offer the greatest opportunities for building new homes. The Upper Lea Valley especially – one of London's largest Opportunity Areas – has unrealised development potential. It is close to central London but because of poor transport links, it has not experienced significant investment and new house building. This has led to areas like this becoming increasingly deprived (figure 8).

Figure 8. Greater London Authority income deprivation



3.3.3 There is strong evidence to demonstrate that Crossrail 1 has resulted in substantial housing development years ahead of the railway actually opening. Significant development at sites such as Woolwich, which may not have been viable without the railway, are already experiencing rapid growth. Crossrail 2 would have a similar effect, enabling and accelerating the development of 200,000 new homes across the wider South East.

3.3.4 These new homes are vital. The Mayor's London Housing Strategy is clear that shortage of homes for London's workforce is as great a barrier to growth as an underperforming transport network[8].

3.3.5 Crossrail 2 would serve some of the UK's most deprived areas, acting as a catalyst for regeneration of the Upper Lea Valley. New transport connections would make them far more appealing to potential residents and house builders. This would help drive the development of better-quality housing and help local people get to jobs.

3.3.6 Areas like the Upper Lea Valley thus have the greatest potential to grow Central London's labour supply, further serving very dense and productive employment there as well as supporting employment areas such as Stansted outside of London.

[8] Mayor of London, Homes for London: The Housing Strategy. June 2014

3.4 What Crossrail 2 would do for jobs and productivity

3.4.1 The Chancellor has described raising productivity as 'the challenge of our time'. The UK has the second-lowest productivity rate in the G7 group of world's richest economies, and productivity growth is now slower than at any time since the 1990s[9]. Low levels of infrastructure investment have been identified as a contributing factor[10] and the importance of infrastructure as a tool to grow the economy is recognised by Government.

3.4.2 Globally, cities are playing an ever more important economic role. In the UK, urban areas produce 19 per cent more output per worker than those in non-city areas. Cities have more potential to drive growth and create jobs because their concentration of economic activity allows them to be more productive. In an increasingly competitive and globalising world, our cities specialise in knowledge intensive sectors that are crucial to the UK's future competitiveness.

3.4.3 Cities are so productive because they enable people to exchange ideas, be more creative and use resources more effectively. This is what economists call agglomeration – where the clustering of people and businesses generates higher productivity.

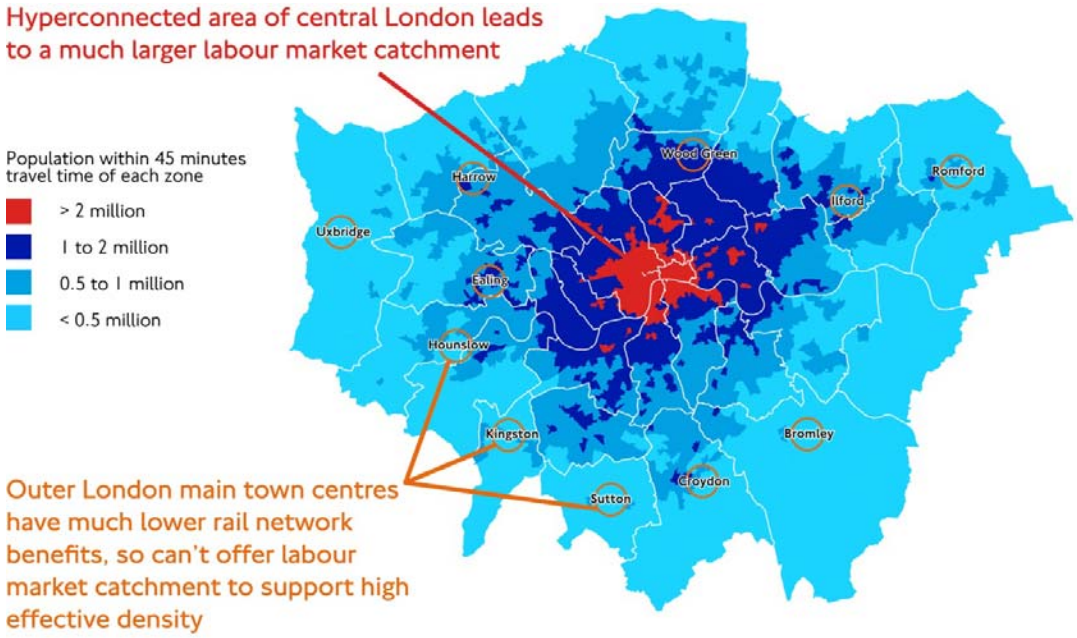
3.4.4 Across the wider South East, a dense public transport network links workers to highly productive centres of employment. This provides a huge and diverse labour market and large 'economies of agglomeration'. When linked by High Speed rail to the economy of the Northern Powerhouse, the dense transport network and employment hubs offer enormous potential for economic growth.

3.4.5 This dense transport network is a vital asset that cannot be easily replicated – only a few places in the world have comparable transport networks offering similar benefits and it allows London to retain highly valuable economic sectors that are internationally mobile including finance, law, technology and skilled advisory services.

1.1.3 Figure 9 shows the population living within 45 minutes travel time of different parts of London. It shows that firms in central London have access to a working population of more than two million within 45 minutes, many of whom travel from destinations across the wider region.

[9] Source: Office for National Statistics
[10] Source: Organisation for Economic Co-operation and Development

Figure 9: Population living within 45 minutes travel time by area



3.4.6 Crossrail 2 would help grow high-density employment centres and boost productivity by bringing nearly half-a-million more people within a 45-minute commute of the City, West End and Canary Wharf, as well as helping workers access jobs in Stansted, Cambridge and other destinations across the region.

3.4.7 Crossrail 2 would also increase transport capacity into central London by around 10 per cent, supporting 135,000 new jobs in the highly productive central area, as well as a further 65,000 elsewhere – a total of 200,000

3.4.8 The benefits of investing in Crossrail 2 would be felt across the UK. For businesses around the country, Crossrail 2 could help provide them with better access to customers, suppliers, staff and markets across the UK and beyond.

3.4.9 It would also support and advance the UK's engineering, construction and manufacturing sectors, many of which are concentrated in the Midlands and North. The project would provide significant orders for small and medium sized enterprises (SMEs) that could benefit from more than £5bn of spend.

3.4.10 Crossrail 2 could support around 60,000 full-time jobs across the UK through its supply chain, in addition to the 18,000 people who would be employed directly on the project during peak construction. It would also support more than 1,300 net additional jobs that would be created to operate and maintain the railway once operational.

3.4.11 Analysis of the potential Crossrail 2 supply chain shows that the project could add over £1bn to the West Midlands economy, more than £200m to the North East and up to £170m to the Scottish economy[11]. This would create new opportunities for investing in skills and jobs – as Crossrail 1 has done – in firms like Watson Steel in Bolton which employs approximately 280 people.

3.4.12 By creating orders across the country, Crossrail 2 would provide greater investment certainty and new growth, which would support thousands of apprenticeships and training programmes.

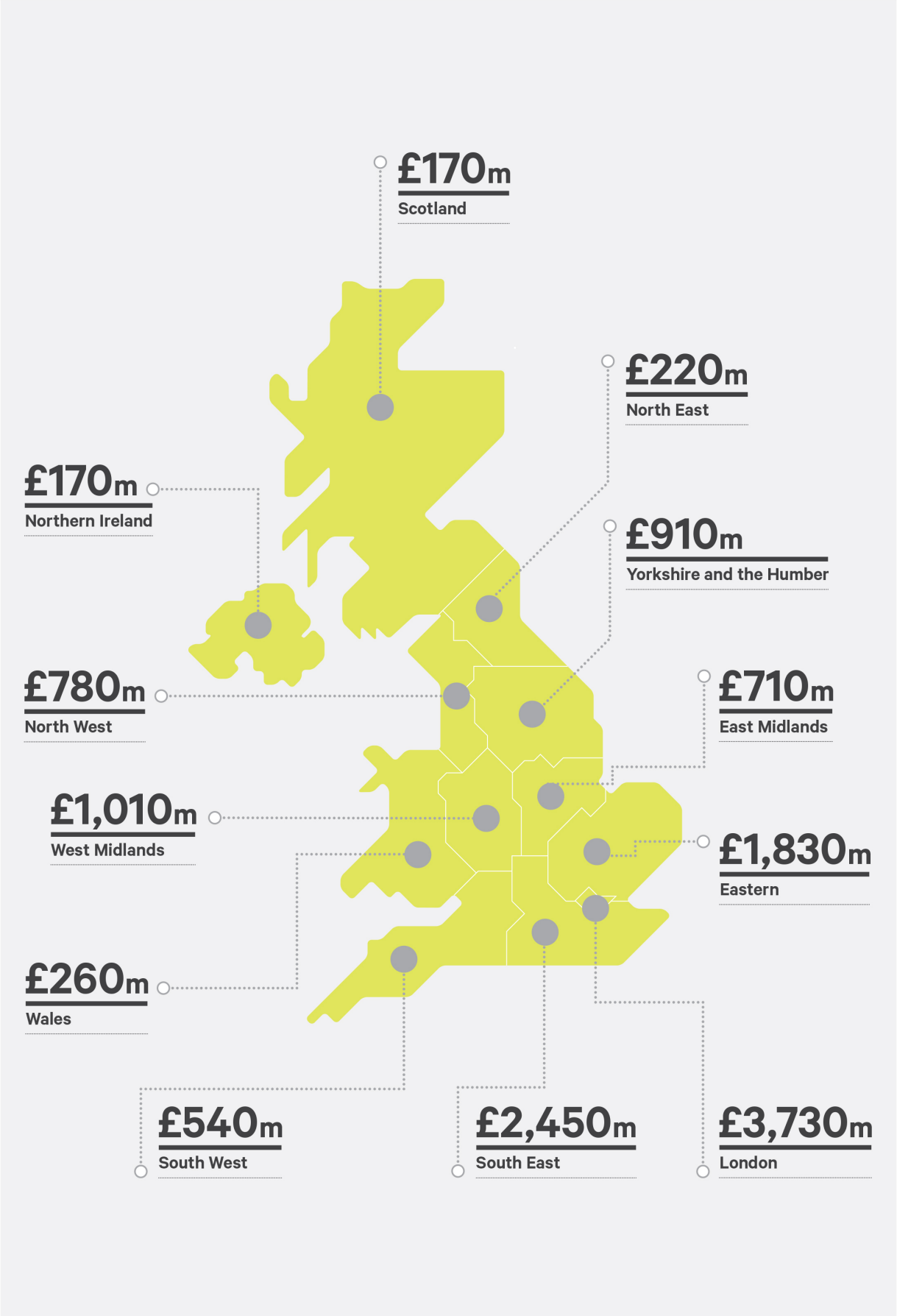
3.4.13 The skills base that the UK is building now, particularly from schemes such as Crossrail, will naturally flow to work on (in the short term) the Thames Tideway Tunnel and HS2. But by the early 2020s these projects will be near completion. Developing projects like Crossrail 2 now would help to fill future gaps in the pipeline and make best use of resources in the long-term - though at this stage, Crossrail 2 requires relatively limited funds in order to be progressed. Crossrail 2 would provide the longer-term skilled jobs and help retain skilled engineers for this growing employment sector.

3.4.14 Employment growth in the wider South East would also help to stimulate a range of economic sectors around the country. Every day more than 800,000 people from across the UK travel into the capital to work. These employees living beyond London spend wages locally, which in turn supports several hundred-thousand jobs in the local economies of towns and cities across the South East and beyond.

3.4.15 Expenditure through the supply chain, along with the wages their employees spend locally, spread economic benefits across the country and contributes very significantly to regional economies around the UK.

* [11]Analysis assuming 80 per cent UK based companies based on analysis of the Crossrail supply chain and discussions with their supply chain team

Figure 10. Estimated regional Crossrail 2 supply chain spending*



4 The economic case for Crossrail 2

4.1 Approach

4.1.1 In the Government's 2014 Autumn Statement, HM Treasury asked TfL to work with the Department for Transport to produce a comprehensive Business Case for Crossrail 2. The case has been developed with reference to HM Treasury and DfT guidance, based on three components:

- A qualitative assessment of Crossrail 2 (and a number of alternative schemes) against a set of strategic objectives
- An analysis of Crossrail 2's impact on the national economy – using a cutting edge methodology that draws on the latest academic research
- A quantitative assessment of costs and benefits of Crossrail 2 and the alternatives, following DfT's standard appraisal guidance ('WebTAG')

4.2 Qualitative assessment – Crossrail 2 and the alternatives

4.2.1 The Mayor's Transport Strategy (2010) and the London Plan (2011) together provide an integrated development and transport strategy for London. This work identifies the northeast and southwest corridors as requiring investment because they will benefit less than other areas from the TfL and Network Rail's existing investment programme.

4.2.2 The following strategic goals were agreed with the DfT for this corridor:

1. Support the UK economy, by maintaining or increasing London's competitiveness and sustaining its position as a 'global city'
2. Meet the housing and transport needs of a growing and diverse population
3. Improve the quality of life and the environment in London and supports the UK's climate change objectives
4. Develop a solution that is safe, feasible and offers value for money

4.2.3 Crossrail 2 was compared with three alternative schemes in comparison with a 'Do Minimum' scenario to understand how well it addressed these goals and the objectives beneath them.

4.2.4 The alternatives assessed were:

1. The Crossrail 2 regional scheme
2. A metro scheme, operating in a tunnel between Wimbledon and New Southgate
3. The same metro scheme, along with a series of improvements to the West Anglia Main Line and South West Main Line
4. A National Rail alternative – as above, but without the metro

4.2.5 A comprehensive assessment demonstrated that the Crossrail 2 regional scheme best met the strategic goals and objectives. The regional scheme was strongest in unlocking the greatest growth potential, delivering transport benefits, increasing rail capacity, and providing integrated travel across the region.

4.2.6 The regional scheme has strong public and stakeholder support, and offers the ability to secure financial contributions from a wide range of beneficiaries across London, building on the Crossrail 1 funding structure.

4.3 Crossrail 2's impact on the national economy (Gross Value Added)

4.3.1 Supporting the UK's economy is a key strategic goal of Crossrail 2. It is widely acknowledged that economic performance can be improved by increasing the density of economic activity - the principle of 'agglomeration'. Central London, broadly comprising the 'Central Activities Zone' and Docklands, offers both the highest economic density and the greatest productivity in the UK. Economic density can be increased by unlocking the constraints (in particular transport) that are preventing businesses from locating close together, and ensuring these dense centres of economic activity are linked to housing – as Crossrail 2 does.

4.3.2 The dramatic changes in Canary Wharf over the past 20 years, which new transport connections (notably the Jubilee Line Extension) enabled, are a reminder of how transport schemes can drive economic transformation; Crossrail 2 could maximise the potential of areas across the South East such as the Upper Lea Valley in a similar way.

4.3.3 A study undertaken by KPMG to support the case for Crossrail 2 has sought to estimate the impact of the additional economic activity unlocked by Crossrail 2 on net national Gross Value Added (GVA) and consequently, on tax revenues. KPMG developed an approach that draws on the latest academic research and which considered three key factors (variables), and a range of scenarios for each factor:

1. The extent to which the transport capacity provided by Crossrail 2 results in new jobs in the Central Activities Zone. The 'high' scenario cautiously assumes 135,000 additional jobs there – half the theoretical maximum capacity of 270,000 over the 3 hour morning peak

2. The net impact of this activity on overall UK economic density, taking into account London's global role and the impact of London employment growth on other parts of the country

3. The strength of the relationship between economic density and productivity, drawing on recent academic work for the DfT[12].

4.3.4 The scenario analysis was supported by runs using the London Land Use and Transport Interaction (LUTI) model which helped identify the more likely scenarios. The results from these more likely scenarios are shown in Table 2 below:

Table 2. Net national GVA scenarios

Scenario	Medium scenario*	High scenario*
Net national Gross Value Added impact (£bn pa, 2041 figure, in 2011 prices)	2.6 – 3.6	5.9 - 7.9
Net present value (£bn, 60-year appraisal following opening in 2031 with 10 year gradual build up to full use, 2011 prices)	33 - 47	77 – 102

* The lower end of the range shown assumes a linear relationship between economic density and productivity, and the higher end assumes a non-linear relationship.

4.3.5 KPMG's work shows that, once operational, the scheme could deliver net annual GVA benefits of up to £7.9 billion, which equates to £102 billion in present value terms to the UK economy. Even under a medium scenario, the additional economic activity resulting from Crossrail 2 would generate sufficient additional tax income to at least 'break even'[13].

[12]Transport Investment and Economic Performance (TIEP) - a report for the Department of Transport which identifies lower bound values for this relationship in terms of national output by Anthony J. Venables, James Laird, and Henry Overman, published December 2014.
[13] Assuming a Government contribution of half the cost and assuming that the additional GVA generates tax revenues equivalent to 35 per cent of their value.

4.3.6 This analysis, which is cautious in many key respects, is at the forefront of work to better understand the true relationship between transport and the economy, particularly in respect of transformational schemes such as Crossrail 2. It represents a fundamentally different approach from the conventional transport appraisal, described below.

4.4 The business case: conventional scheme appraisal

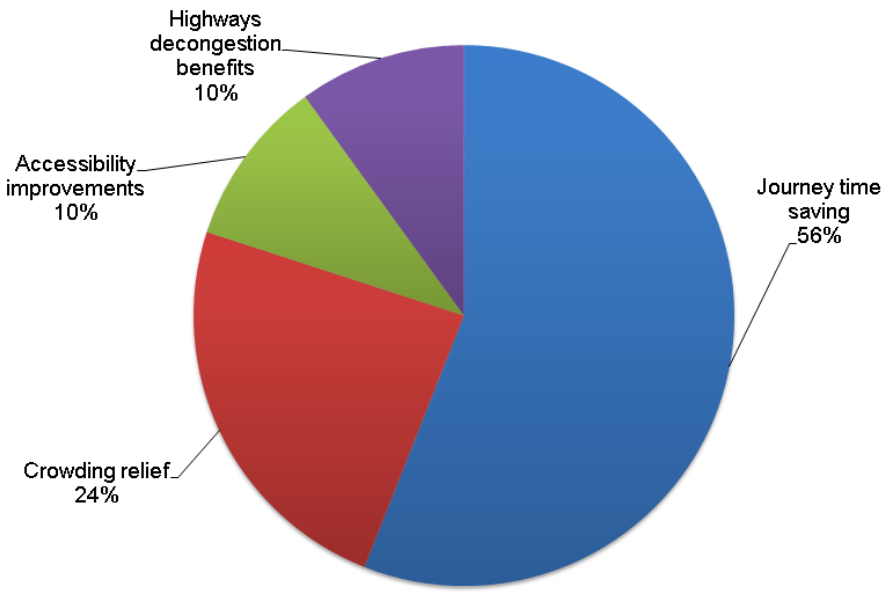
4.4.1 This element of the conventional appraisal for transport projects compares a scheme's costs (capital and operating) against an assessment of direct transport benefits (such as time savings, reduced congestion and a limited view of wider economic benefits), in order to derive a 'Benefit: Cost Ratio' (BCR). It adopts a standard methodology, described in DfT Guidance ('WebTAG').

4.4.2 Since the publication of the Crossrail 2 Funding and Financing Study in November 2014, we have updated the capital and operating cost estimates for the scheme. We have made specific provision for risks to the project, based on comparison to similar projects and Treasury guidelines.

4.4.3 We estimate Crossrail 2 will cost between £27bn and 32bn, in 2014 prices and including rolling stock and Network Rail works. In line with Treasury requirements, this includes 'Optimism Bias' at 66 percent for projects at an early stage of development. As the project is further developed and risks are identified and mitigated, the required level of risk provision can be reduced.

4.4.4 The new railway would generate a host of transport benefits. Their relative importance is broken down below in figure 11.

Figure 11. WebTAG transport benefits of Crossrail 2



4.4.5 This report has also set out how transport infrastructure investment supports new jobs, economic agglomeration and increased productivity. The DfT assessment guidance permits a number of wider economic benefits to be considered in a benefit-cost ratio (BCR) calculation. WebTAG recognises the following benefits:

- Shift to more productive jobs as jobs concentrate in central London, where productivity is higher, resulting in greater output per worker
- Agglomeration benefits to all existing central London jobs as Crossrail 2 supports higher employment densities
- Increased labour force participation, as more people work because of time savings from Crossrail 2
- Imperfect competition where firms benefit from reduced transport costs and increase output

4.4.6 These benefits reflect Crossrail 2's goal of relieving capacity constraints on the South East's rail network and supporting growth in the most productive parts of the economy. The wider economic benefits are additional to the conventional transport appraisal. However, these wider economic benefits do no capture all of the likely benefits associated with growth and new jobs. It assumes jobs are displaced from elsewhere in the country. In practice, a proportion of job relocation is likely to be new to the UK as a consequence of foreign direct investment or jobs moving here from abroad.

4.4.7 The total costs of Crossrail 2 are compared with the benefits of the project to giving a benefit to cost ratio (BCR). BCRs including traditional transport benefits and Wider Economic Impacts are shown below. These use London values of time and include demand from future housing growth unlocked by Crossrail 2.

Table 3. Scheme cost benefit ratio

	Benefit Cost Ratio
BCR for core transport scheme excluding Wider Economic Impacts	1 : 2.1
BCR including Wider Economic Impacts	1 : 2.7

4.4.8 Under a more cautious assessment which assumes no demand growth from new housing and uses the top end of the range cost estimate, the BCR would be 1 : 1.4 – 1.7 – thus still demonstrating that the scheme's benefits are more than outweighed by its costs.

4.4.9 Crossrail 2 is a project that would transform under-developed areas on the periphery and drive growth and productivity in knowledge-based businesses in the centre. Its benefits in terms of faster journeys, more capacity and better connectivity across the regions would be enormous and economically hugely valuable.

5 Funding Crossrail 2

5.1.1 The funding and financing report produced by PricewaterhouseCoopers (PwC) in 2014 showed that more than half of the costs of Crossrail 2 could be met by London using existing funding mechanisms.

5.1.2 Using the example of Crossrail 1, the report suggests paying back investment through existing methods – a combination of fares revenue, the Business Rate Supplement (BRS) and Mayoral Community Infrastructure Levy (CIL). The report also looked at options that could see funding raised through retaining the existing Council Tax precept as well as potentially increasing the Mayoral CIL. Funding from developments over stations and of worksites required for construction could also contribute.

5.1.3 Since then, PwC has reviewed the original study to further examine a number of assumptions in light of the latest forecasts on cost, revenue and funding sources. This work shows that the key conclusion of the 2014 study – that London could pay for at least half the cost of the scheme – remains valid. The revised funding contributions are shown in table 4.

Table 4. Potential percentage funding contributions for different funding streams

Funding stream	Percentage contribution to scheme funding
Net Operating Surplus (Fares)	11.6*
Mayoral Community Infrastructure Levy (CIL)	16.9
Business Rate Supplement (BRS)	20.3
Council Tax Precept	1.4
Over Station Development (OSD)	6.3
TOTAL funded	56.5

*excludes impact of national rail abstraction

5.1.4 There has been a shift in the balance of local contributions since PwC's 2014 study towards income from London's property market. This reflects an increase in the perceived stability of the property-related funding streams such as BRS and CIL, and takes fuller account of the planned growth in housebuilding that is set out in the Further Alternations to the London Plan.

5.1.5 Crossrail 2 is unique among major planned transport investments in that local funding sources can meet over half of the cost of the project. This increases value for money for the national taxpayer.

5.1.6 As set out previously, by growing the economy, Crossrail 2 would provide new and increased tax revenues which would payback the Government's investment. Additional revenues for the exchequer are forecast to include around £20bn in Stamp Duty receipts – a quarter of which results from 200,000 additional homes unlocked by the scheme, the remainder from growth in value of existing properties around Crossrail 2 stations. As a result, Crossrail 2 would generate more money for Government than it spends on the project.

6 Conclusion

6.1.1 The case for investing in Crossrail 2 is compelling. It would transform the economy of the wider South East, driving growth by tackling housing supply and transport capacity. It would help regenerate some of the UK's most deprived areas and support local economies and jobs across the whole country. In the process it would boost the UK's productivity and international competitiveness.

6.1.2 It works better in these respects than any alternative project. A number of sensitivity appraisals have been undertaken to assess the project against alternative scenarios for growth, cost, revenue, congestion, demand and phasing. In all scenarios, the case is resilient and delivers a solid return on investment.

6.1.3 The benefits of Crossrail 2 significantly outweigh its costs, and by supporting economic growth, it would generate large enough returns to pay for the Government's contribution to the project. At the same time, there is potential for at least half the scheme's cost to come from local funding sources. This reflects the contribution that Crossrail 2 would make to the South East and the UK's future economic prosperity.

6.1.4 There is evidence to suggest that the transformational benefits of major infrastructure projects like Crossrail 2 will exceed initial forecasts. Transport projects are traditionally evaluated independently of their impact on the economy or interaction with other policies. This report has sought to demonstrate the wider economic impact Crossrail 2 could generate, beyond that captured in a simple benefit-cost ratio. These wider economic returns would generate tax revenues to pay back the investment many times over.

6.1.5 Crossrail 2 would help support 200,000 new homes and 200,000 new jobs. It is the only infrastructure project capable of delivering economic benefits from the Solent to the Wash and beyond. Its contribution to national productivity and growth will be absolutely vital. Now that we are close to the completion of Crossrail, on time and to budget, we must move quickly to the next transformational growth project. That project is Crossrail 2.