Transport for London

A13 Barking Riverside Tunnel

Draft Strategic Outline Business Case

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Executive Summary

Purpose of this document

1. Transport for London (TfL) is assessing a major tunnelling scheme on the A13. The tunnel is proposed to be just over a kilometre in length and would provide grade separation of the A13 at the existing junctions with Renwick Road, Gale Street and Lodge Avenue in the London Borough of Barking and Dagenham.

2. The core GLA and local objectives of the scheme are to:

- **Accelerate housing delivery in Opportunity Areas and contribute to the London Plan's aim to building 49,000 new homes every year.**
  - o Enable the redevelopment of the 39ha Castle Green industrial site for housing led urban regeneration.

- **Secure the strategic function of the Transport for London Road Network (TLRN).**
  - o Mitigate the increasing congestion on the A13 to maintain its strategic economic function as a freight corridor and major link between the eastern industrial lands, the M25 and Inner London.

- **Improve the quality of life of residents through more efficient transport networks and reduced negative externalities.**
  - o Enhance local residents' quality of life by improving urban realm, reducing severance caused by the A13 and improving local access for all road users.

Figure ES 1: A13 and Castle Green location
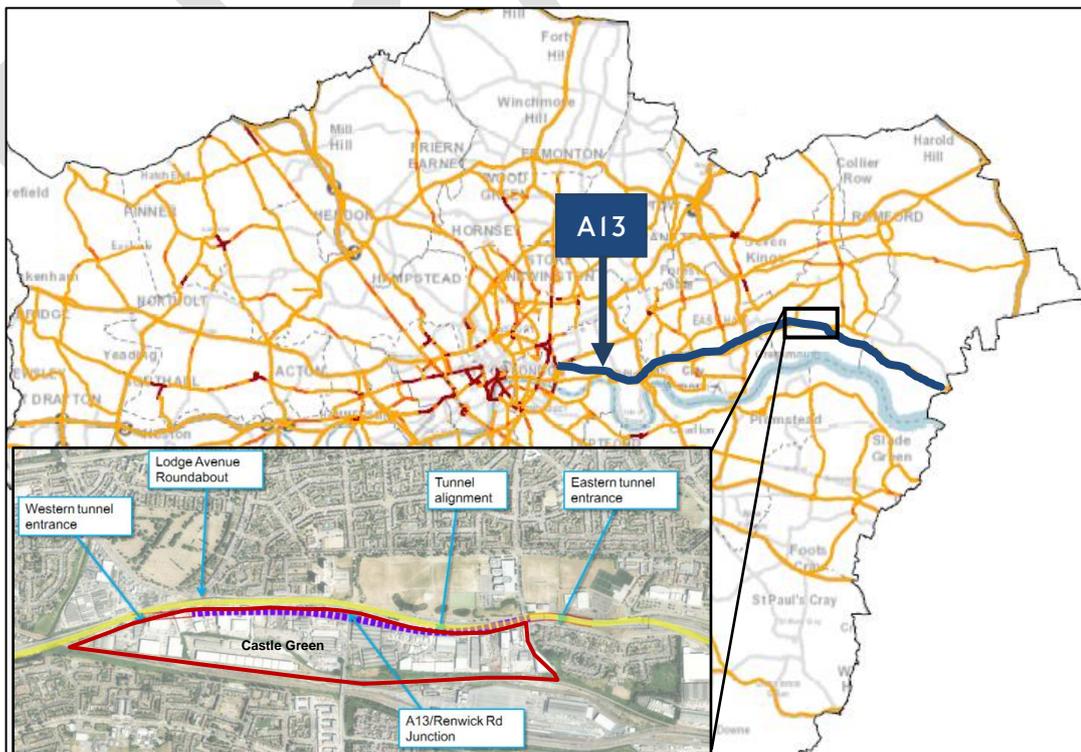
3.   This document is the **Strategic Outline Business Case (SOBC), the first phase of the decision making process.** The SOBC sets out the strategic fit for the scheme and scopes out the initial intervention proposal.

Figure ES 2: Decision making process
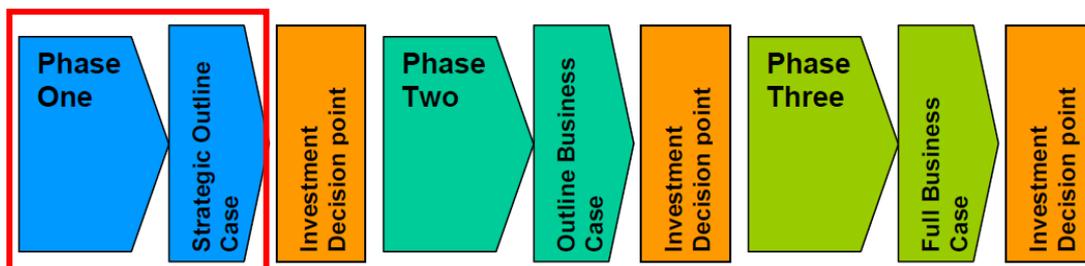
4.   This SOBC is presented in accordance with the DfT's Business Case Guidance which stipulates a five case model to developing transport business cases which considers whether the scheme:

- is supported by a robust case for change that fits with wider public policy objectives – the 'strategic case';
- demonstrates value for money – the 'economic case';
- is commercially viable – the 'commercial case';
- is financially affordable – the 'financial case'; and
- is achievable- the 'management case'.

Policy framework

The Mayor's Roads Task Force (RTF) has set the vision for London's roads and streets

5.   The RTF report, 'Vision for London's Roads and Streets' (2013) sets out three core aims:

- To enable people and vehicles to move more efficiently on London's streets and roads;
- To transform the environment for cycling, walking and public transport; and
- To improve the public realm and provide better and safer places for all the activities that take place on the city's streets, and provide an enhanced quality of life.

6.   Particular objectives from the RTF report and of relevance to this business case include:

- Release land at the surface for development;
- Improve the public realm;
- Create new green space;
- Provide better facilities for pedestrians, cyclists and public transport users;
- Relieve congestion and improve journey time reliability;
- Reduce severance;
- Reduce the negative impacts of roads on noise and air quality.

7. Following the publication of the RTF report, TfL undertook a series of studies to identify opportunities for decking over or tunnelling under roads at a number of locations around London in order to unlock development opportunities.

8. The initial phase of work identified 70 potential locations, and sifting work identified 15 locations suitable for high level feasibility work. This feasibility work identified five of these locations with the potential to make a significant contribution to achieving the aims and objectives of the Roads Task Force. Further feasibility work was carried out for each of these five locations resulting in the production of a Strategic Outline Business Case for each scheme. These locations are:

   • **A13 Barking Riverside**;
   • A4 Hammersmith;
   • A316 Chalkers Corner;
   • A406 New Southgate;
   • A3 Tolworth.

Overall, a tunnel conforms to policy at all levels, helping to secure London and the UK's continued prosperity

9. Due to the role of the A13 tunnel in addressing the challenges London faces, it makes a significant contribution to policy at all levels. At a National level the proposal strongly supports the intended outcomes in the DfT's priorities for the transport network. The A13 tunnel also supports London-wide and local policy – in particular in the Mayor's Spatial Development Strategy (known as the London Plan), the Mayor's Transport Strategy (MTS), and London 2050 Infrastructure Plan. It is also included within the London Riverside Opportunity Area Planning Framework, published in September 2015.

Introduction to the scheme

Castle Green is a major London brownfield site with a high potential for growth

10. Castle Green is a 39ha site situated on the strategic A13 road corridor linking the M25 and the east of England to central London. The site is currently characterised by industrial units in a variety of uses from storage and distribution to industrial. The area has the potential to accommodate up to 5,000 homes; thereby contributing to the need for over 49,000 new homes to be built every year to address London's housing shortage.

11. TfL is planning to improve the public transport accessibility of the area through the extension of the Overground from Barking station to the planned Barking Riverside development, enabling the delivery of 10,800 new homes. The Overground extension is planned to open in 2020. TfL is making passive provision for a new rail station to be delivered along this corridor at Renwick Road, bordering the Castle Green site.

12. The proposed rail station at Renwick Road would play a significant role in enabling delivery of new housing at Castle Green by transforming levels of rail connectivity. However, to realise the plans for growth on the Castle Green site, first the constraints imposed by the A13 dual carriageway need to be addressed.

The A13 hinders potential development opportunities at Castle Green

13. The site's potential for housing development is currently constrained by the severance of both the A13 and the Essex to London railway line, which respectively form the northern and southern boundary of Castle Green.

Figure ES 3: Existing urban forms and severance at Castle Green
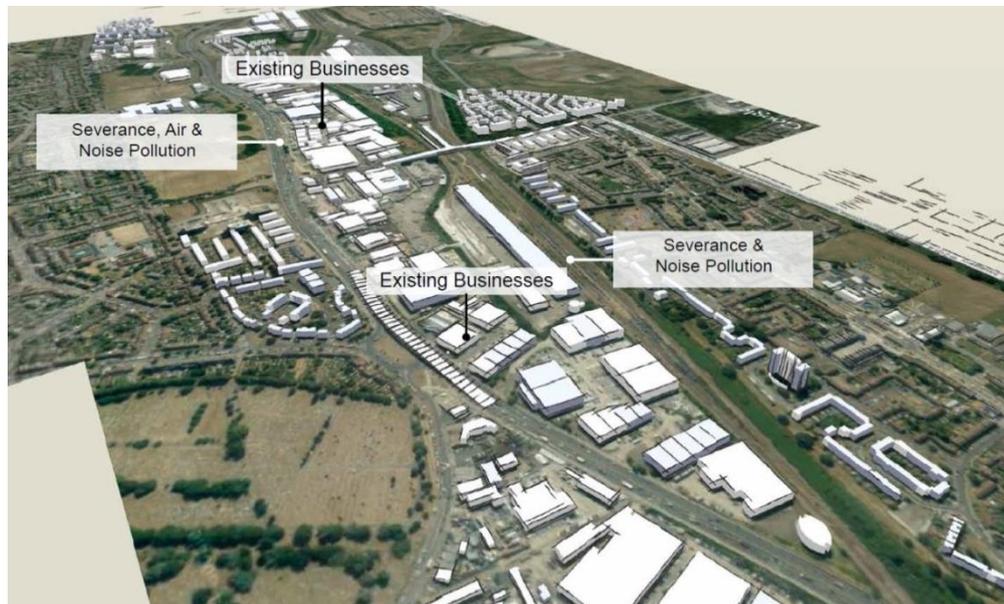
14. The A13 is of particular concern due to the limited number of north-south routes crossing this corridor and the limited number of pedestrian crossing opportunities. As a major arterial road, the A13 carries high volumes of traffic, including heavy goods vehicles, which contributes to relatively high levels of noise pollution, poor air quality and negative visual impact. The A13 is in the top five of the worst roads in London in terms of NO2 emission rates (i.e. tonnes per kilometre per year (2012 ranking).

15. The limited access to Castle Green and other negative impacts of the A13 on the local amenity and urban realm severely inhibits the viability of any new housing development.

16. Any solution to address this must recognise that while the A13 could preclude a housing development at Castle Green, it is also a key link in the Transport for London Road Network (TLRN), the strategic London road network that is the responsibility of TfL. The A13 carries flows of 80 to 100,000 units of annual average daily traffic (AADT), of which 8 to 11 per cent are heavy goods vehicles. Safeguarding this strategic movement function between East London and Central London is vital to securing the region's wider economic performance.

TfL has identified a cut and cover tunnel option to help unlock the redevelopment of the Castle Green site, whilst maintaining the capacity and function of the A13

17. An option has been developed that meets policy objectives in the London Plan and the Mayor's Transport Strategy (MTS), is considered to be practical to construct, is environmentally acceptable, is in a suitable location, and could be affordable.

18. This option is for a 1.3km cut and cover road tunnel providing grade separation of the A13 at the existing junctions with Renwick Road, Gale Street and Lodge Avenue in the

London Borough of Barking and Dagenham. The tunnel would be tied in with the A13 at surface level through the provision of tunnel portals, one west of Lodge Avenue roundabout and the other east of Gale Street.

Together with other transport infrastructure improvements, including a new Overground Station at Renwick Road, it forms an integral infrastructure component of plans to deliver a new residential area of 5,000 new homes

19.   Once covered, the visual impact of the A13 as well as its associated noise pollution will be contained, although further analysis will be required to assess the impact of the tunnel on air pollution, especially at the portals and potential ventilation shafts locations.

20.   New surface roads catering for local traffic, cyclists and pedestrians will link Castle Green to established residential areas and services located north of Castle Green, including schools, Barking Hospital and two stations of the District Line (Upney and Becontree stations).

21.   The improved accessibility of Castle Green and its enhanced urban realm will increase the site's potential for residential development. It is estimated that up to 5,000 homes could be built on site. A visualisation of how the site could be redeveloped is shown in Figure ES 4.

Figure ES 4: Potential urban forms at Castle Green

22.   The tunnel will assume the current arterial function of the A13, delivering shorter travel times and reducing the existing high volumes of traffic at surface level. The tunnel would be able to accommodate all types of road vehicles, including double decker buses and heavy good vehicles.

There is overwhelming support for the A13 tunnel scheme

23.   The A13 tunnel proposal has strong political support with regular meetings between TfL senior management, the Deputy Mayor for Transport, local MPs and the Leader of Barking and Dagenham Council. Key stakeholders such as the London Borough of Barking and Dagenham support the principle of the tunnel and are working with TfL as

the tunnel option is assessed. The tunnel is also referenced in the London Riverside Opportunity Area Planning Framework (OAPF, September 2015).

1. *The Strategic Case*

24. The Strategic Case demonstrates the problems identified, the need for an intervention, and the possible solutions to the problems.

The future of the UK's economic performance lies in improving the performance of its cities. In particular, London is the driver of the UK's economic growth

25. Cities drive the UK economy – they are home to 54 per cent of the population, generating 60 per cent of its GVA, containing 53 per cent of all businesses and 72 per cent of all highly skilled workers[1] within just 9 per cent of the UK's land area. London contributes an estimated 21 per cent of total UK tax revenues[2].

26. London's rapidly growing population is linked to and necessary to its strong economic performance. Over the period 1991 to 2011, London's population increased by 1.4 million, enabling the number of jobs in the capital to increase by 900,000. London's population surpassed its 1939 peak of 8.6 million in early 2015 and is forecasted to reach 10.1 million by 2036.

27. Since 1994, on average, 29,700 new jobs a year have been created within London. This employment growth is expected to continue. London Plan forecasts suggest that the number of jobs in London is expected to grow by 1.4m between 2011 and 2036.

London is ranked alongside New York as the most competitive city in the world[3]; however, its success cannot be taken for granted

28. Recent evidence suggests some deterioration in London's international rankings, including cost of staff (a result of a high cost of living) and quality of life. The housing issues that lie behind these factors are fundamental to maintaining London's competitiveness and will be exacerbated by continued population growth.

London's future economic growth depends on having an increased housing availability supporting labour supply

29. The scale of the projected employment and population growth provides both an opportunity for driving London and the UK's economy, but also presents a considerable challenge. To reduce the gap between offer and demand and drive down high costs of living that undermined London's competitiveness, the Greater London Authority (GLA) has set the aim to building 49,000 new units each year, although it is estimated that up to 62,000 new units per year would be required to meet the existing backlog.

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[1] Centre for Cities website, 'City by City', http://www.centreforcities.org/cities/
[2] Research Report: London's Finances and Revenues: City of London Corporation & CEBR (2014)
[3] based on the Global Financial Competitive Index assembled by Longman Finance and the Qatar Financial Centre Authority, 2015

Figure ES 5: London's housing challenge at a glance
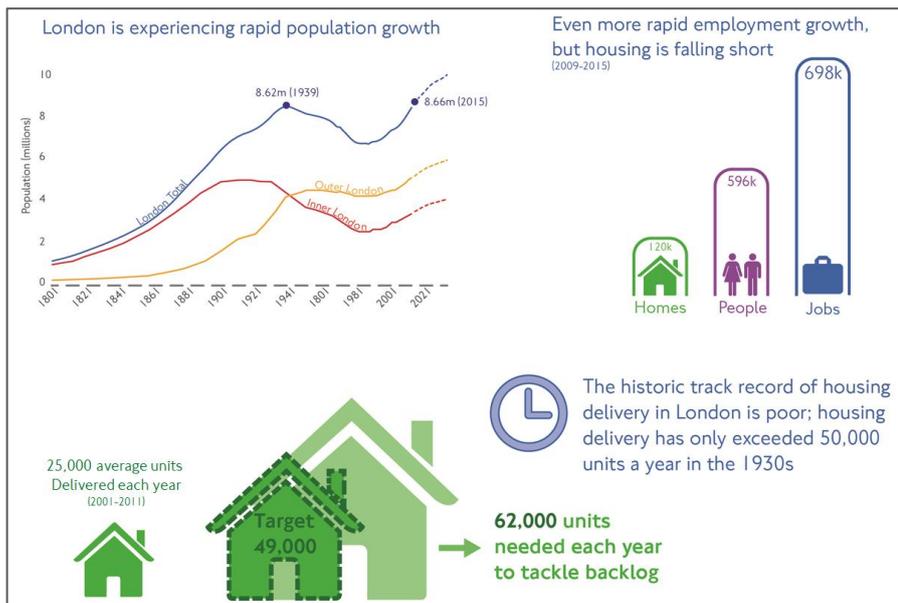
London must unlock new development opportunities to support delivery of new housing and jobs

30. London's supply of new land to support housing and jobs growth is limited and the development potential of brownfield land must be maximised. An innovative approach to unlocking this land to support new development is therefore urgently required if the Capital's housing needs are to be met.

31. A number of key sites with potential to host high levels of housing growth, such as Castle Green, are currently under-utilised due to the negative impacts of busy roads and congestion on public realm, connectivity and environmental quality. By unlocking these areas, thousand of new homes and large numbers of jobs could be created.

32. Opportunity areas (OAs) have been identified and prioritised for housing development across the GLA, including in LBBD. However, housing delivery rates in East London in the Thames Gateway area have been relatively slow compared to the numbers achieved within other opportunity areas, as Figure ES 6 shows. Despite being the second largest opportunity area, the London Riverside area has had one of the slowest housing delivery rate.

Figure ES 6: London's Opportunity Areas and housing delivery
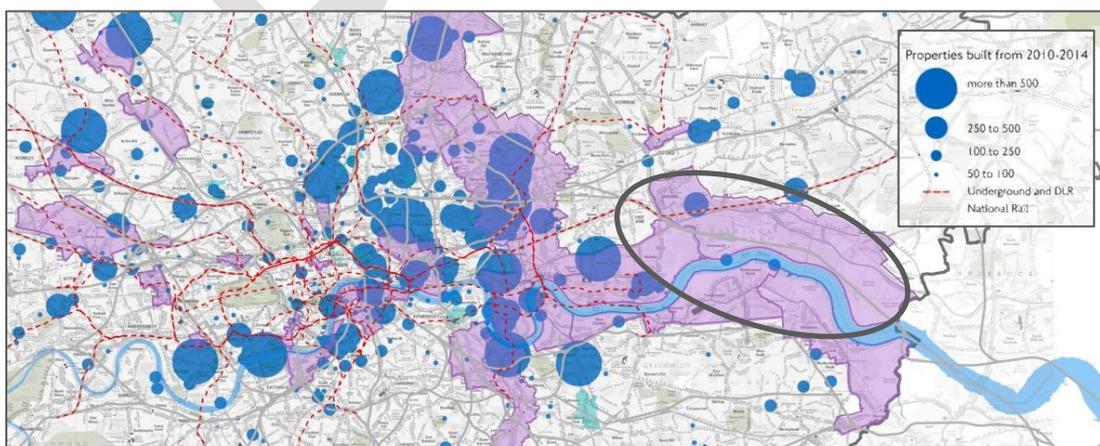
The A13 Riverside Tunnel scheme, together with a new Overground station at Renwick Road, will support the delivery of over 5,000 homes (gross) and 1,350 jobs in a key London growth area

33.   The tunnel and new Overground station (the location of which is shown in Figure ES 7) could together enable delivery of over 5,000 new homes (gross) and 1,350 new jobs within the Castle Green site, supporting the creation of a sustainable and attractive new neighbourhood. Enabling the delivery of these homes would make an important contribution to helping meet the London Plan requirement for the delivery of 49,000 new homes per annum to support London's growth. As the tunnel proposals are developed further, the potential homes growth will also be assessed, to ensure that the benefits from a tunnel are fully capitalised upon.

Figure ES 7: Map of the planned extension of the Overground network to Barking Riverside, showing the location of the proposed new station at Renwick Road

34.   Without the tunnel scheme and Renwick Road station, the comprehensive redevelopment of the Castle Green site to deliver 5,000 new homes would not be viable.

At the same time, it is critical to preserve the function and traffic capacity of the A13, which is a key part of the Transport for London Road Network

35.   The Transport for London Road Network (TLRN) is network of strategic roads representing 4 per cent of London's road network but carrying 30 per cent of all traffic in London. The A13 is a key part of this network, carrying high volumes of strategic, economically important traffic between the east of England and central London. It is the third busiest corridor in London with an average 73,986 Passenger

Car Unit (PCU) per day. This is more than double the average PCU flow for a Core Road[4].

36.   The A13 is also a key freight corridor linking ports in the easts to central London. In average through the year, 30 per cent of the traffic on the A13 is related to freight movement[5].

37.   It is vitally important that TfL protects the strategic role of key corridors including the A13, given the crucial role played by the road network in supporting the economy of east London. Along the A13 corridor, there are a number of logistics, distribution and construction-related businesses, which are particularly reliant on the road network. Therefore the TLRN in this part of east London is expected to face increasing demands from growth in volumes of road-based freight

There is a case for new road tunnels to be built along strategic corridors to unlock housing developments and realise the potential of key areas of London whilst protecting the vital movement role of these core roads

38.   Some areas with high potential for housing developments are currently "sterile" due to the severance and other negative externalities caused by major roads. With the existing housing crisis affecting the region's economy and quality of life of residents, London can no longer afford to leave these areas under-developed. Innovative solutions are required to maintain the strategic role of these core roads while realising the housing potential of these sites.

39.   Removing road capacity on the surface in order to unlock development opportunities at Castle Green would cause significant disruption to this strategic traffic corridor, with subsequent negative economic impacts for London.

40.   Without any intervention at this site, this traffic growth will increase the negative impacts of traffic on the A13 that dominate the corridor - leading to higher levels of noise and air pollution, worsening existing severance, and having substantial negative impacts on health. In turn, these impacts from traffic growth will make the Castle Green area even less attractive for development and would harm the prospects of regeneration.

41.   The A13 tunnel scheme is the only infrastructure solution capable of safeguarding the strategic road movement on the A13, whilst simultaneously delivering the transformational change needed to enable development at Castle Green.

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[4] Data from TfL Traffic Data team in 2012
[5] Freight data is HGV and LGV flow combined (i.e. vans included)

Figure ES 3 Change in PCU hour delay, 2009 – 2031
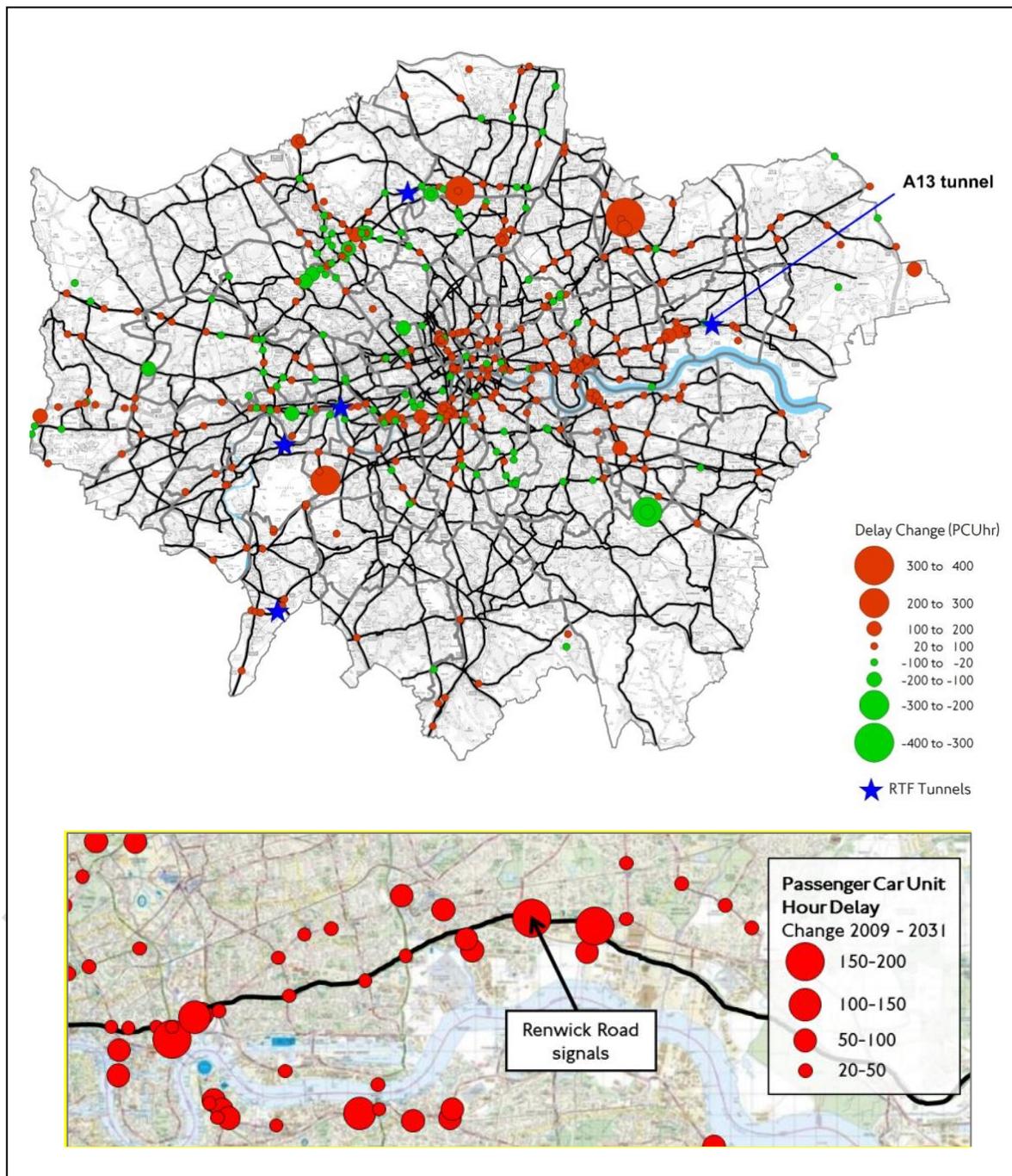
42. In summary, a tunnel, alongside the construction of a new Overground station at Renwick Road, can address significant challenges that currently limit the development potential of Castle Green, enabling the delivery of thousands of new homes and jobs, reducing these constraints on London's future productivity and competitiveness, helping to maintain its position as one of the leading global cities. By enabling new housing along its route, a road tunnel on the A13 will also enable LB Barking and Dagenham to make a significant contribution towards supporting regional population growth, and will connect new and existing residents to new local employment opportunities, benefiting businesses by broadening and deepening the labour market available to them leading to productivity gains.

The key points arising from the Strategic Case can therefore be summarised as:

- London is a key driver of the UK's economic growth. Its success benefits the UK as a whole, but this cannot be taken for granted

- London's future employment growth depends on having an increased labour supply, but the city faces significant housing and space pressures, exacerbated by a growing population.

- London must unlock more development opportunities to support delivery of new housing and jobs and maximise the potential of under-developed areas within the GLA.

- There is significant support for the A13 tunnel scheme, and the scheme conforms to policy at all levels, helping to secure London and the UK's continued prosperity by unlocking housing development.

- The A13 Riverside Tunnel scheme, alongside a new Overground station at Renwick Road, can support the delivery of over 5,000 homes (gross) and 1,350 jobs in a key London growth area.

- At the same time as enabling this development, the scheme would protect the strategic traffic flow on the economically important A13, linking east and central London and part of the TLRN.

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2. The Economic Case

43. The economic impacts of the A13 tunnel scheme have been assessed.

The scheme represents a "high" value for money, with a BCR of 2.17

44. Over the 60 year appraisal period of the scheme, using TfL's London Value of Time (VoT), the net present value (NPV) of the tunnel scheme (without development at Castle Green) is estimated at £422m with a Benefit Cost Ratio (BCR) of 2.17 (including land acquisition costs for the tunnel). Based on these values of time, the scheme would represent "high" value for money.

45. In a 'with development' at Castle Green scenario, the scheme has an NPV of £264m and a BCR of 1.73 (using London VoT and including costs of land needed for the tunnel), representing "medium" value for money. However this doesn't account for the wider regeneration and strategic benefits that this development would unlock for London, which would include thousands of much needed homes to support London's future growth. Using a transport based appraisal for this scheme does not reflect its full benefits. Therefore using the BCR alone would not be an appropriate metric to judge the scheme.

The project in combination with a new Overground station at Renwick Road enables significant regeneration benefits at the London level, unlocking a net 2,235 additional new homes, 1,350 new jobs and £740m of GVA at Castle Green

46. The A13 tunnel scheme in combination with a new Overground station at Renwick Road would deliver substantial regeneration benefits. The tunnel scheme and station would support the unlocking of the Castle Green development site that has the capacity to deliver over 2,235 net additional new homes at the London level (allowing for displacement)[6]. Whilst there is a need to allow for displacement in the methodology, given the very high demand for housing in London, there is a strong argument to suggest that all 5,000 units will be additional. The scheme will generate £740m gross value added (GVA) at the London level, as well as over 1,350 net additional jobs at the London level. These are significant economic benefits that would strengthen London's economy and boost tax receipts.

47. These benefits are summarised in Table ES1 below:

Table ES1 Summary of additional impacts of A13 Tunnel (at London level)

Figures rounded to nearest 10	Net Additional homes/ jobs / GVA
Additional homes	2,235
Additional jobs (direct and indirect)	1,350
GVA generated by additional jobs (direct and indirect) (£m PV)	740

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[6] Displacement captures the proportion of economic activity/outputs which would have occurred elsewhere in the target area and are expected to be displaced as a result of developments brought forward by the scheme.

48. The scheme would also improve quality of life through an improved public realm and reduced severance and noise impacts, with additional associated economic impacts. Over 11,000 residents would benefit from reduced severance as a result of the scheme, and noise benefits can be quantified at a net present value of £13m. Should the scheme be progressed, a more detailed assessment of urban realm benefits should be undertaken, which would be able to quantify the economic benefit of the improved public realm.

49. In addition to the above benefits, there are also further additional quantifiable benefits which include health, road safety and air quality benefits. It is likely the quantification of these benefits will improve the Benefit Cost Ratio of the scheme. These other benefits will be described in detail in an Outline Business Case should the scheme be progressed.

The key points arising from the Economic Case can therefore be summarised as:

- The A13 tunnel scheme on its own performs strongly in conventional transport appraisal, representing a "high value" for money and returning £2.17 of benefits for every £1 spent, with a NPV of £422m.

- The BCR falls to 1.73:1, and the NPV is £264m in a 'with-development' scenario. However given that a key focus of the A13 tunnel is on unlocking regeneration, the BCR alone is not an appropriate metric by which to judge the scheme.

- In regeneration terms the A13 tunnel, alongside a new Overground station at Renwick Road, performs very strongly. These improvements unlock significant economic benefits for London, including thousands of much needed homes.

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3. The Financial Case

50. The Financial Case sets out the project and ongoing operating costs and financing and funding arrangements to deliver the scheme.

51. Cost estimates suggest the tunnel will cost approximately £700m to construct in 2015 prices, including 66 per cent optimism bias. This cost also includes allowances for CPO costs (£260m in current 2015 prices), preliminaries/design fees and a 30 per cent risk allowance. Further design work is being undertaken which may see this cost figure revised.

52. Cost figures presented do not include costs of traffic management measures that might be required during construction.

53. Once built, it is estimated that operations and maintenance for the tunnel will cost £1m per annum (in 2015 prices). A further £20m will need to be invested roughly every fifteen years on lifecycle costs.

A significant proportion of the funding for a tunnel could be met from non-grant funding sources

54. The following funding sources for this scheme have been considered:

- Funding from taxes on new development (incremental Borough Community Infrastructure Levy, business rates and stamp duty);
- Funding from developing land directly on the schemes and additional land purchased around them;
- Funding from potential Vehicle Excise Duty (VED) devolution;
- Funding from taxes on existing residential development (council tax).

55. Given the early stage of the scheme, sources of funding are only indicative at the moment. However TfL has had a significant level of engagement with the borough of Barking and Dagenham to explore the local funding sources that would be most feasible and acceptable.

56. A funding package for the tunnel would need to come from a combination of sources. However, some of these sources are not currently devolved from Central Government to the Mayor.

57. TfL appointed Jones Lang LaSalle (JLL), the property consultants, to evaluate the possible funding that could be derived from the residual land value on the land to be acquired for tunnel delivery. TfL has also carried out in-house analysis of other possible funding streams including Borough CIL, New Homes Bonus and Road User Charging.

Around 40 per cent of the construction cost of the A13 tunnel could be secured through development-related sources, VED devolution and the Roads Modernisation Programme. With further fiscal devolution and further borough support around 50 per cent of the project cost could be met. Other means of covering tunnel costs such as partial government funding will also need to be considered

58. TfL has considered stamp duty as a possible funding source for this project, given the link between the tunnel delivery and the number of additional houses that this project could enable. Stamp duty land tax (SDLT) is currently payable on the purchase of

property above £125,000. This is a national tax and there are no current plans of devolving it to local authorities. If the stamp duty revenue within a designated zone was devolved, or an equivalent earnback arrangement created, then this could provide a potential funding source for the A13 Tunnel. Work on estimating the size of the stamp duty receipts on new development is currently underway. It is worth noting that financing against stamp duty would be difficult, given the uncertain nature of property sales transactions. A direct Government contribution, reflective of the size of the stamp duty receipts the new development could yield over time, would be more desirable.

59. The borough may also be willing to direct some of its CIL receipts collected in the wider borough towards the A13 tunnel project. Addition of stamp duty on new development and extra borough CIL to the funding package could cover around 50 per cent of the funding requirement of the project.

60. TfL has also looked at business rates capture and council tax precept as alternative sources of project funding. The Castle Green development is proposed to be residentially-led and will be replacing what is currently an area of land in industrial use. This means that there is likely to be a net loss in business rates proceeds and there is no argument for establishing a business rates capture mechanism. At present, it is also not felt that a council tax precept is an acceptable funding option, given the significant level of resistance that is likely to be shown by local residents towards higher council tax liabilities. It is possible however, that with time, feasibility of the council tax precept option may alter.

The key points arising from the Financial Case can therefore be summarised as:

- The tunnel has an estimated construction cost of £700m, including 66% optimism bias and CPO costs.

- A significant proportion of the funding for a tunnel could be met from non-grant funding sources

- TfL is seeking further powers and fiscal devolution to enable a significant proportion of the cost of construction to be raised from local funding sources

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4. The Commercial Case

61. This sets the commercial structure, the accounting treatment and procurement approach for the project.

62. The tunnel is being promoted by TfL in partnership with the London Borough of Barking and Dagenham (LBHF). All potential suppliers will be required to consider the Mayor of London's Responsible Procurement Policy in their bid as part of any Invitation to Tender (ITT) for the design and build contract.

TfL has substantial experience of delivery of complex highway and tunnelling projects, which we will apply to the procurement, funding and financing of the A13 Riverside Tunnel

63. TfL has significant experience in the procurement and construction of major infrastructure projects, including rail tunnels and highway improvements, on projects such as Crossrail, Docklands Light Railway extensions, and major station schemes such as King's Cross St Pancras. Examples of significant highway improvements delivered by TfL include the Chiswick Bridge refurbishment, and the Cycle Superhighways programme.

64. It is expected that the construction stage of the project would be led by TfL and where involving infrastructure owned by other parties, such as the London Borough of Barking and Dagenham, will be delivered in partnership with these other organisations.

TfL can achieve efficiencies by delivering the A13 tunnel within a wider programme of tunnel projects and linked into a wider highway capital investment programme

65. TfL is undertaking and proposing a range of large capital infrastructure projects that involve procurement of skills and services that will all be highly relevant to approaches that will need to be adopted for the A13 tunnel. For example, Crossrail and the Northern Line Extension have led to an increase in skills associated with deep bored tunnel design and construction procurement, whilst the Cycle Superhighways and Better Junctions programmes have led to an increase in skills associated with large-scale highway engineering and construction traffic management.

66. Other tunnels and decking over at a range of locations throughout London are at various stages of development, including the Silvertown Tunnel, the most advanced road tunnel project, which will link the Greenwich Peninsula and Silvertown. Other tunnel and decking over proposals similar to the scheme proposed at Castle Green are also being developed. If these projects are progressed, some significant economies and efficiencies could be achieved through co-ordination of delivery with the A13 tunnel.

TfL utilises supply chains from across the UK – work for a tunnel would support jobs outside London

67. Although TfL undertakes procurement for projects implemented in the capital, the wider benefit to the UK is extensive, with over 60,000 jobs estimated to be supported by services TfL procures from outside of London. The construction of the A13 tunnel would add to the pipeline of capital investment that supports jobs across the UK.

68. The procurement strategy for this stage of the project will be refined and improved as the scheme is further developed.

The key points arising from the Commercial Case can therefore be summarised as:

- TfL has substantial experience of delivery of complex highway and tunnelling projects, which we will apply to the procurement, funding and financing of the A13 tunnel

- TfL can achieve efficiencies by delivering the A13 scheme within a wider programme of tunnel projects and linked into a wider highway capital investment programme

- TfL utilises supply chains from across the UK – work for a tunnel would support jobs outside London

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5.   The Management Case

69. The purpose of the Management Case is to assess whether a proposal is deliverable. It reviews evidence from similar projects, sets out the project planning, governance structure, risk management, communications and stakeholder management, benefits realisation and assurance.

TfL will make full use of best practice within the company and from industry

70. TfL has extensive experience in developing, promoting and implementing significant infrastructure projects. This ranges from modifications to existing infrastructure (such as repairs to the A4 Hammersmith flyover, modernisation of the London Underground, extensions to Tramlink and DLR) to major schemes such as Crossrail. TfL also has demonstrable experience in delivering major road junction improvements, pedestrian and cycle schemes, and wider public realm improvements. These projects share similarities to the A13 tunnel scheme, involving processes and aspects of design and construction which would be faced by a road tunnel. TfL will continue to actively incorporate best practice and experience from these schemes into the development of the A13 tunnel project.

71. The A13 Riverside Tunnel project is part of the wider Roads Task Force programme sponsored by the Managing Director of TfL Planning. There are a number of programme linkages with other schemes being taken forward as part of the RTF Key Corridor Interventions Programme, which will present opportunities to share best practice as these schemes progress.

A comprehensive and robust project management framework will be applied, helping to ensure scope, cost and benefits are controlled

72. TfL uses a number of mechanisms to improve the management of its major projects in order to help ensure the objectives and benefits of a scheme at inception are realised following implementation. TfL's project management framework, known as 'Pathway' provides consistency in approach and the tools required for planning and delivery teams, whilst retaining flexibility in its application to manage and control a project. Embedded into Pathway is a delivery assurance process using stage gates, upon which TfL utilises industry-leading external expertise to review and challenge all aspects of the project.

Rigorous assurance processes will provide close scrutiny and challenge of risk management and decision-making throughout the project

73. TfL also receives project review and assurance from the Independent Investment Programme Advisory Group (IIPAG), which report to the Mayor of London concerning TfL's Investment Programme. This includes all maintenance, renewal, upgrades and major projects (excluding Crossrail).

74. TfL has the option of establishing an Independent Peer Review Group (IPRG). This approach has been followed for other major TfL projects, so given the scale of the A13 Riverside Tunnel project, this could warrant a similar approach. If appropriate, an IPRG can be set up for the scheme if further development of the project is approved. Initially it could oversee the refinement of delivery sub-options and review engineering feasibility studies and scheme appraisal undertaken.

75. Stakeholder engagement has already been undertaken and there is strong support for the scheme from the London Borough of Barking and Dagenham. A future programme of stakeholder engagement as the scheme progresses has been developed.

76. The current anticipated key milestones for the project are shown in Table ES2 below. Any changes to baseline scope, cost and schedule will be reviewed, impact assessed and approved following the change control process.

Table ES2 Key project development milestones

Milestone Description	Date[7]
Planning, design, approval and procurement	2016 – 2026
Construction	2026 – 2031

The key points arising from the Management Case can therefore be summarised as:

- TfL will make full use of best practice within the company and more widely from industry

- A comprehensive and robust project management framework will be applied, helping to ensure scope, cost and benefits are controlled

- Rigorous assurance processes will provide close scrutiny and challenge of risk management and decision-making throughout the project

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[7] Subject to tender returns and TWAO process.

6.   *Conclusions*

There are compelling development benefits of the A13 Riverside Tunnel project and TfL should continue to progress and develop this scheme

77.   The A13 Riverside Tunnel Strategic Outline Business Case demonstrates that across the Five Case Model:

- there is a clear robust **case for change** for the A13 tunnel scheme to address issues of severance, quality of public space and environmental quality, and to cater for the needs of future population and economic growth without undermining the movement function of the A13. This 'strategic case' is closely related to national, London-wide and local road policy objectives, with a particular reference to the London Plan and the Mayor's Transport Strategy

- the analysis demonstrates that the scheme would deliver **significant economic and regeneration benefits** for London by, alongside a new Overground station at Renwick Road, enabling a net additional 2,235 new homes and a net additional 1,350 new jobs at the London level. This will add £740m worth of GVA at the London level. This new development will also generate additional Stamp Duty revenues and Corporation Tax and VAT revenues. With London Values of Time, in the 'with development scenario, the scheme delivers a Benefit to Cost Ratio (BCR) of 1.73 to 1 and a Net Present Value (NPV) of £264m. This BCR, based on transport benefits only, does not take in consideration the housing delivery benefits, which represent the primary objective of the scheme.

- is **financially affordable** – the 'financial case' analysis demonstrates that a significant portion of some costs may be recoverable from land value uplift and operating surplus, but would require significant further mechanisms for the Mayor and TfL to achieve this.

- is **commercially viable** – this business case sets out the procurement, commercial structure, and proposed allocation of risk and payment mechanisms for the project

- is **achievable**- the 'management case' sets out a clear governance, process and programme for the further development of the scheme by TfL, an authority with a very successful experience and record in major project delivery

It is suggested that further feasibility and scheme development work takes place to further investigate the tunnel

78.   While the Strategic Outline Business Case has reported on the initial assessment of the likely impacts of the scheme, further work is required on the air quality, noise and social/distributional impacts in any future Outline and/ or Full Business Case. A clear understanding of the air quality impacts will need to be developed. In addition this further work will elaborate on the potential commercial case and charging policy and various sensitivity tests. TfL will continue to liaise closely with LB Barking and Dagenham during any further work.

Given the strong case for the A13 tunnel scheme, TfL is proposing the following to facilitate its delivery:

- A zonal trial of stamp duty devolution;
- An extension of CPO powers to TfL for 'transport-enabled' development;
- Investigation of a loan facility to enable early land acquisition to secure value uplifts arising from a tunnel.

79.   To capitalise on those the Mayor / TfL and GLA propose to:

- Consider establishment of a Mayoral Development Corporation covering Castle Green;
- Commit to take risk on land values that accrue;
- Use existing public land as far as possible to enhance and speed delivery of development;
- Commit to use of CPO powers to ensure land for development is utilised to its full extent; and
- Commit to ongoing use of the tunnelling expertise and supply chains which have been developed for other TfL projects to reduce infrastructure provision costs.

1. The Approach to the Business Case

Introduction

1.1 Transport for London (TfL) is assessing a major tunnelling scheme on the A13. The tunnel is proposed to be just over a kilometre in length and would provide grade separation of the A13 at the existing junctions with Renwick Road, Gale Street and Lodge Avenue in LBBD. Figure 1-1 below shows the proposed location of the tunnel.

1.2 The A13 Riverside Tunnel would enable a transformational change for the local area by tackling problems of severance, air pollution, and local congestion. Together with other transport infrastructure improvements, including a new Overground Station at Renwick Road, it would also facilitate the redevelopment of the 39 hectare Castle Green site which has the potential to accommodate up to 5,000 homes whilst maintaining the vital strategic function of the A13.

1.3 This document is the Strategic Outline Business Case for the project.

Figure 1-1 Detailed scheme location plan

Lodge Avenue Roundabout

Tunnel alignment

Eastern tunnel entrance

Western tunnel entrance

Castle Green

London Thameside railway line

A13/Renwick Rd Junction

Barking Riverside
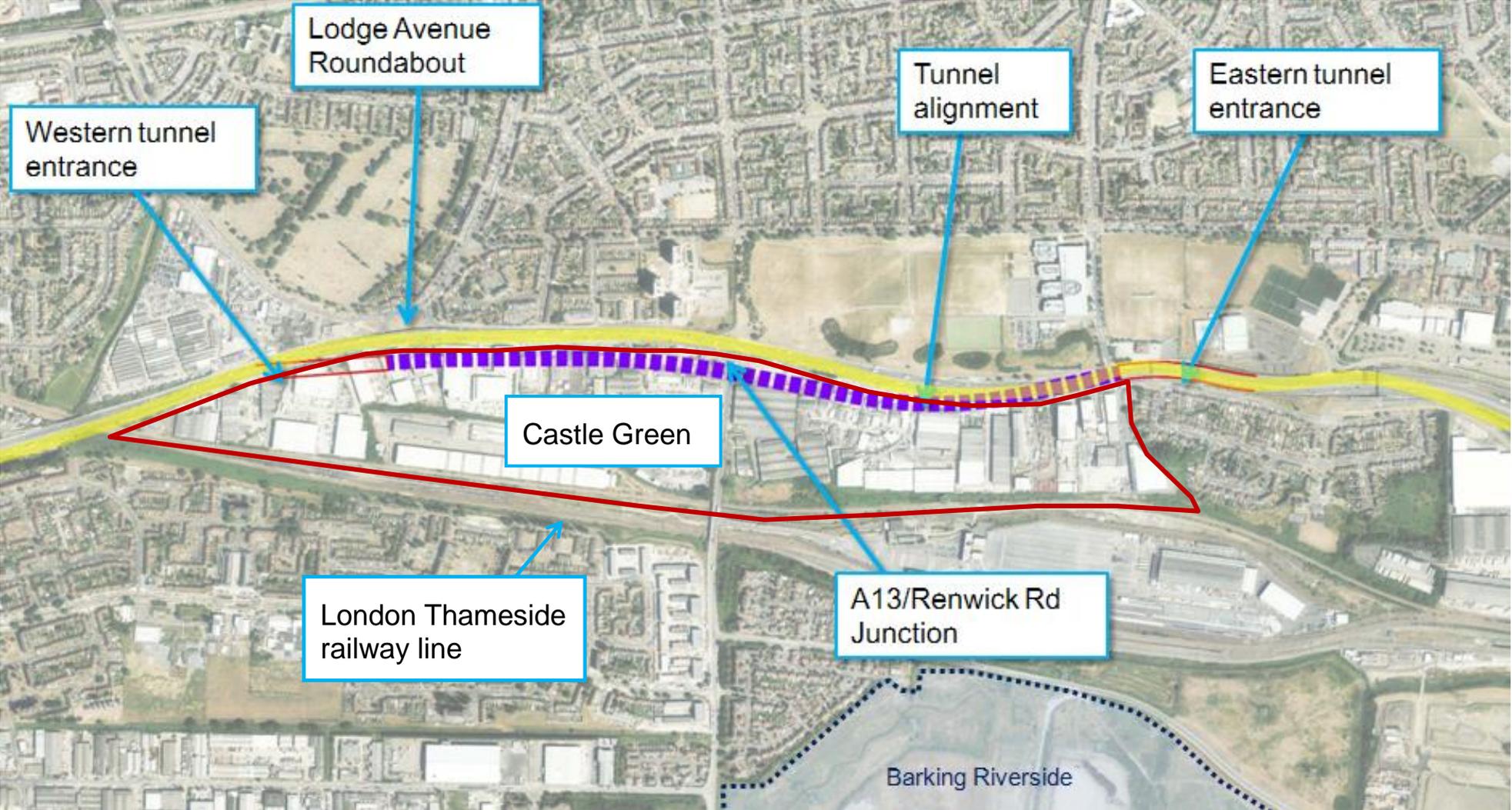
The Five Case Model for Transport Appraisal

1.4 The purpose of a business case is to provide evidence-based information in relation to investment programmes. Guidance for the preparation of Business Cases for Transport Schemes has been published by the DfT8. This is based on H.M. Treasury's advice on evidence-based decision making as set out in the Green Book9 and uses the best practice five case model approach.

1.5 This approach assesses whether schemes:

- are supported by a robust case for change that fits with wider public policy objectives – the '**strategic case**';
- demonstrate value for money – the '**economic case**';
- are commercially viable – the '**commercial case**';
- are financially affordable – the '**financial case**'; and
- are achievable – the '**management case**'.

1.6 The evidence gathered as part of the business case preparation process has been prepared using the tools and guidance provided by the DfT notably WebTAG10. This approach ensures that the evidence produced is robust and consistent for all the options examined in detail. This applies equally to those options proposed for investment and those, which following assessment, are not to be developed further.

The Decision making process

1.7 The decision making process, of which this Strategic Outline Business Case forms part, usually takes place in three phases. Each phase includes the preparation of a business case followed by an investment decision point. Each business case builds upon that previously prepared. Evidence is reviewed to ensure that it remains up to date, accurate and relevant. The current Strategic Outline Business Case is in Phase One of this iterative process, with two further future stages of development to follow, as shown below.

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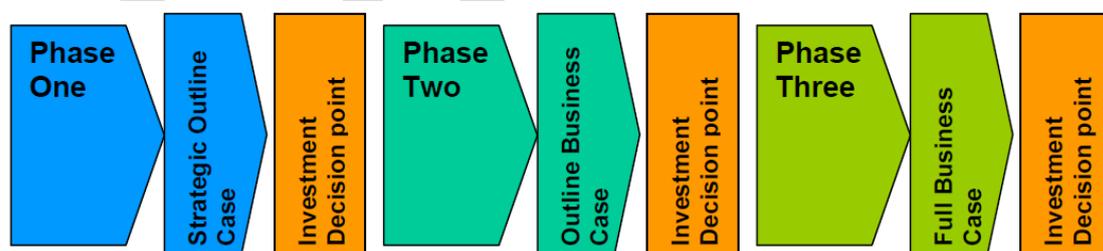
8 See https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/85930/dft-transport-business-case.pdf – accessed 5 September 2014

9 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/220541/green_book_complete.pdf accessed 5 September 2014

10 See https://www.gov.uk/transport-analysis-guidance-webtag accessed 5 September 2014

1.8   The current Phase One of this process focuses on articulating the need for the intervention and summarising the range of options developed and considered. This phase

- is used to set out the strategic fit of the project with achieving relevant national and London Mayoral and TfL policy objectives;
- confirms the strategic fit and the case for change;
- scopes out the initial investment/intervention proposal; and
- provides details of the project's overall balance of benefits and costs against objectives.

1.9   In the next stage, Phase Two which will follow in 2016 TfL will reconfirm the conclusions from Phase One and will concentrate on a more detailed assessment of the options to find the best solution, culminating in the preparation of an Outline Business Case, which will build on the Strategic Outline Business Case:

1.10   The final phase in the process, Phase Three, will result in the production of the Full Business Case – this will accompany the required application for consent to build the scheme.

The role of the Mayor of London and TfL

1.11   This initial investment proposal is made by TfL acting as the body responsible for planning, organising and controlling and, in some instances, operating transport within London for the Mayor, who is charged with setting the policy and strategy for transport which he has done by the publication of the Mayor's Transport Strategy (MTS).

1.12   TfL is responsible for operating, maintaining and improving the strategic road network in London. This road network known as the Transport for London Road Network (TLRN) makes up 4% of the total road length in London but carries more than 30% of London's traffic.

1.13   The strategy of TfL is decided by the Mayor through the MTS. The MTS is the principal policy tool through which the Mayor exercises his responsibilities for the planning, management and development of transport in London, for both the movement of people and goods. It takes into account the policies in the London Plan and the Mayor's Economic Development Strategy (EDS). It provides the policy context for the more detailed plans of the various transport-related implementation bodies, particularly TfL and the London boroughs.

1.14   The legislative framework for the MTS is laid down by the GLA Act 1999 as amended by the GLA Act 2007. The GLA Act 1999 sets out the general transport duties of the Mayor and the GLA. It specifies that the transport strategy must contain policies for 'the promotion and encouragement of safe, integrated, efficient and economic transport facilities and services to, from and within Greater London', and proposals for securing the transport facilities and services needed to implement the Mayor's policies over the lifetime of the MTS, with regard to the movement of people and goods. TfL is under a duty to use its powers to facilitate and implement the policies and proposals of the MTS.

Summary of consultations to date

1.15   No formal public consultation has taken place to date. Given the early stages of the project consultation has been limited to engagement with key stakeholders: the GLA and LBBD.

1.16   The A13 tunnel is referenced in the London Riverside Opportunity Area Planning Framework, published in September 2015.

1.17   As the project develops TfL would seek to consult with the public and stakeholders at the earliest appropriate opportunity.

2. The Strategic Case

Introduction

2.1   This Strategic Case has been prepared by TfL, in close consultation with the London Borough of Barking and Dagenham, and with support from an independent Expert Group comprised of experts in economic appraisal of major transport infrastructure projects. It forms the first of the five cases forming the Strategic Outline Business Case. Its purpose is to set out the need for investment in the transport system on the A13 at Barking.

2.2   The Strategic Case demonstrates how the scheme responds to the following regional and local objectives:

- **Accelerate housing delivery in Opportunity Areas and contribute to the London Plan's aim to building 49,000 new homes every year.**
    - o Enable the redevelopment of the 39ha Castle Green industrial site for housing led urban regeneration

- **Secure the strategic function of the Transport for London. Road Network (TLRN).**
    - o Mitigate the increasing congestion on the A13 to maintain its strategic economic function as freight corridor and major link between the eastern industrial lands, the M25 and Inner London.

- **Improve the quality of life of residents through more efficient transport networks and reduced negative externalities.**
    - o Enhance local residents' quality of life by improving urban realm, reducing severance caused by the A13 and improving local access for all road users.

The Strategic Case is structured into seven sections:

Part A: The role of London in the UK economy

Part B: The role of housing supply and the strategic road network in supporting London's growth

Part C: TfL's proposal to free-up road space for urban regeneration whilst securing the TLRN strategic movement function

Part D: Barking Riverside and A13, local context

Part E: Objectives for the A13 tunnel scheme and options considered

Part F: How the tunnel option addresses the problems and meets the objectives

Part G: Strategic policy context

PART A: THE ROLE OF LONDON IN THE UK ECONOMY

> **Section Summary:**
>
> 1. **London is the UK's powerhouse**
>
>   - London makes a significant and growing contribution to the UK economy in employment, GVA and tax revenues.
>
>   - Employment levels in London are growing rapidly, helping to encourage population growth in response.
>
> 2. **There are threats to the continued competitiveness of London**
>
>   - Many of London's key economic activities are global, its businesses and workforce are increasingly footloose, and as a result London and the UK's success cannot be taken for granted.
>
>   - There has been some deterioration in London's international rankings, notably around cost of staff and quality of life[11]. Housing shortage and the associated worsening of housing affordability could constrain employment growth.

London is the UK's powerhouse

London makes a significant and growing contribution to the UK economy in employment, GVA and tax revenues.

2.3   London is the UK's core engine of economic growth, contributing 22 per cent of total UK Gross Value Added (GVA) in 2013 and generating £56,687 GVA per worker compared to the UK average of £41,088[12]. Evidence suggests that within large cities, greater employment density drives higher productivity through skills specialisation and clustering[13]. These agglomeration effects help London to drive UK's international competitiveness through increasing employment densities in the Central Activities Zone (CAZ).

2.4   The strength of London's economy makes it a vital contributor to the UK's finances. In 2013/14, an estimated £127 billion of tax revenue was estimated to have been generated through economic activity in London, comprising an estimated 21 per cent of total UK tax revenue[14]. Investing to support the growth of London is essential to build strong public finances.

2.5   Since 1994, on average, 29,700 new jobs a year have been created within London. The city's economic growth is forecast to be 4.2 per cent in 2014 and 3 per cent each year to 2020. This is faster than the projected UK growth rate overall, partly driven by forecast increases in population and the size of the workforce. The latest GLA employment forecasts suggest that on average, 41,000 new jobs a year in London will be created to 2036[15].

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[11] Global Liveable Cities Index

[12] GLA Economics, GVA per Workforce Job http://data.london.gov.uk/dataset/gva-per-workforce-job (February 2015)

[13] Transport investment and economic performance, October 2014 (Venables, Laird and Overman)

[14] Research Report: London's Finances and Revenues: City of London Corporation & CEBR (2014)

[15] GLA Economics Employment Forecasts, May 2015

Employment levels in London are growing rapidly, helping to encourage population growth in response.

2.6 After reversing a steady period of decline London has been on a growth trajectory since the 1980s. These trends are shown Figure 2-1.

Figure 2-1 Historic trends and projected growth in London's employment and population (1961– 2036)
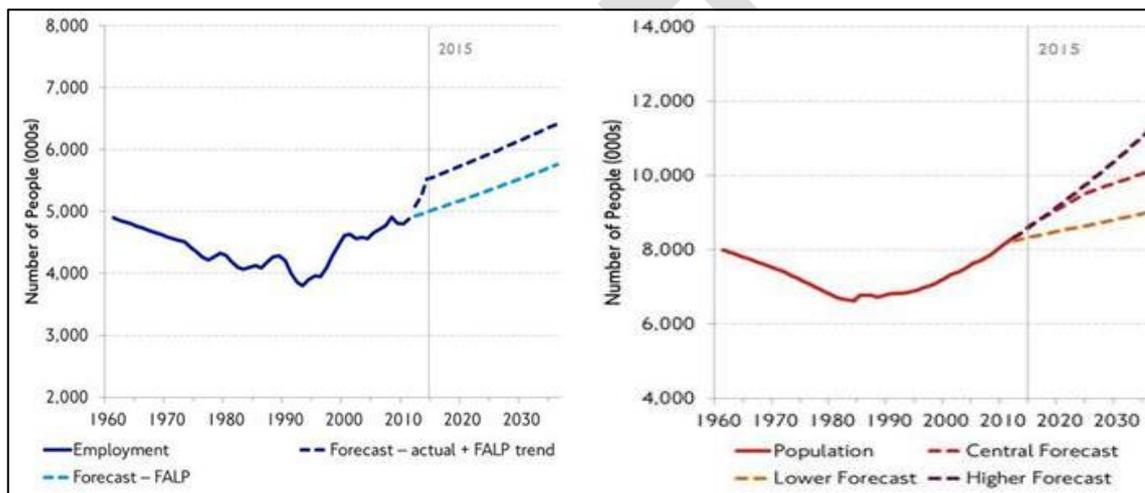
2.7 Between 1991 and 2011, the number of jobs in London rose by 900,000 and over the same period, the population rose by 1.4m. The number of jobs in London is expected to grow by 1.4m between 2011 and 2036. As the left hand graph in Figure 2-1 above shows, a total of 650,000 of these jobs have already been created between 2012 and 2014[16]. Rapid employment growth in London has been driven by a range of factors including the UK's flexible labour markets, high skill levels and openness to Foreign Direct Investment. Employment growth has been felt most acutely within central London, where connectivity is highest.

2.8 The UK Office for National Statistics projections expect a 23 per cent rise London's Population between 2011 and 2031 which equates to a 1.9m increase, taking the population to 10.1m[17] by 2036, as shown in the right hand graph in Figure 2-1. The London Infrastructure Plan predicts a 37 per cent increase in population between 2011 and 2050.

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[16] This trend is regarded as a short term phenomenon reflecting London's resilience to economic shocks in recent years and it is expected that job growth will revert to historic trend levels going forward.
[17] FALP (2014) – GLA Population forecasts

There are threats to the continued competitiveness of London

Many of London's key economic activities are global, its businesses and workforce are increasingly footloose, and as a result London and the UK's success cannot be taken for granted.

2.9 The World Economic Forum Global Competitiveness Report for 2014-15 highlights that there are a number of factors businesses consider as problematic in the UK for doing business – with infrastructure and access to skilled and educated workforce amongst the top 6 factors.

There has been some deterioration in London's international rankings, notably around cost of staff and quality of life[18]. Housing shortage and the associated worsening of housing affordability could constrain employment growth.

2.10 Addressing the housing supply and affordability issues that lie behind these factors is fundamental to London's future growth and competitiveness, and is a key part of the Government's Productivity Plan launched in July 2015.

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[18] Global Liveable Cities Index

PART B: THE ROLE OF HOUSING SUPPLY AND THE STRATEGIC ROAD NETWORK IN SUPPORTING LONDON'S GROWTH

Section Summary:

1. **London's housing supply is not keeping up with population growth**

- London is delivering only 25,000 new homes a year, when it needs to deliver at least double this volume.

- London's growth is being constrained by a chronic shortage of housing which is driving up housing costs as a proportion of household income.

- Dense cities are the way to accommodate growth most sustainably and most efficiently.

- To meet housing targets, existing brownfield land must be unlocked.

- TfL can help unlocking more land for urban regeneration and contribute to meeting London's housing targets.

2. **The Transport for London's Road Network is vital to London's economy**

- The strategic road network is vital for London, but as the city grows the level of congestion is forecast to grow, even with sustained investment in public transport capacity.

- The TLRN is not only critical to commuters from Outer London but also to strategic freight movements.

- A growing city population will travel more using different modes, resulting in more congestion and crowding, and poorer air quality, reducing the overall quality of life

3. **It is incredibly important to balance the sense of place and the movement function of the road network by mitigating severance effects**

- Road corridors with a strong "movement" emphasis cause severance impacts that inhibit connectivity, sustainable transport modes and quality of life.

- Reducing the footprint of strategic roads can improve quality of place and unlock additional development, but this needs to be balanced against continued needs for movement.

- The Mayor's Transport Strategy and the 2013 Roads Task Force set the objectives for the TLRN corridors, which include the need to protect their movement function and unlock development.

London's housing supply is not keeping up with population growth

2.11 London's rapid population growth is driving the need for an additional 1.5m additional homes and a 50 per cent increase in public transport capacity over and above what is already planned[19].

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[19] London Infrastructure Plan 2050

2.12   As Figure 2-2 shows, in recent years, London's continued economic growth and competitiveness is increasingly being threatened by a constrained supply of housing.

Figure 2-2 Percentage change in jobs, people and homes in London 2009-2014
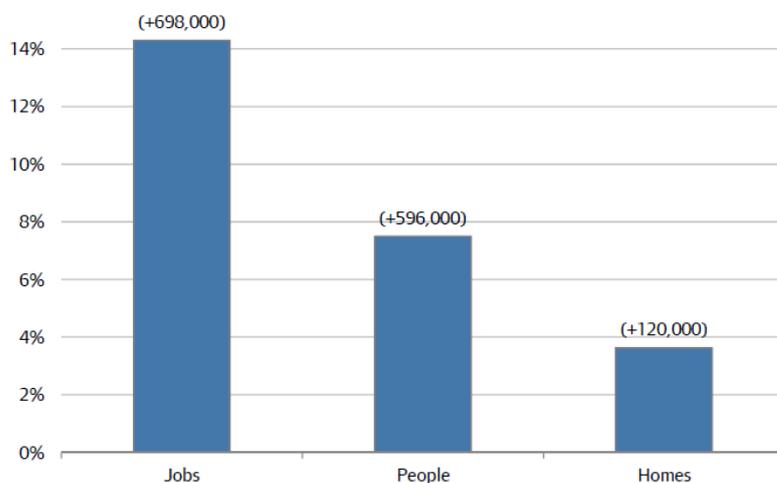
> **Key Finding:**
>
> London's population and employment levels are growing rapidly. This is due to the clustering of economic activity, particularly within central London. London's future economic success depends on its ability to continue to accommodate population and employment growth.

London is delivering only 25,000 new homes a year, when it needs to deliver at least double this volume.

2.13   Demand for new housing is outstripping supply by a factor of three to one. Over the decade when London's population grew by more than a million, its housing stock grew by less than 300,000.

2.14   As a result, house prices have spiralled, with the average house in London now costing over 11 times the average full time wage, and properties in Barking and Dagenham Borough, one of the most affordable Boroughs in London, costing 7 times the average full time wage for that Borough. The ratio of house prices to both income and earnings are shown in Figure 2-3 below for the UK and for London, showing how housing in London is significantly less affordable than in the rest of the UK. This is pricing many people on modest incomes out of large parts of the city and leading to longer, less sustainable commuting patterns.

Figure 2-3 House price to income and earnings ratios for the UK and London
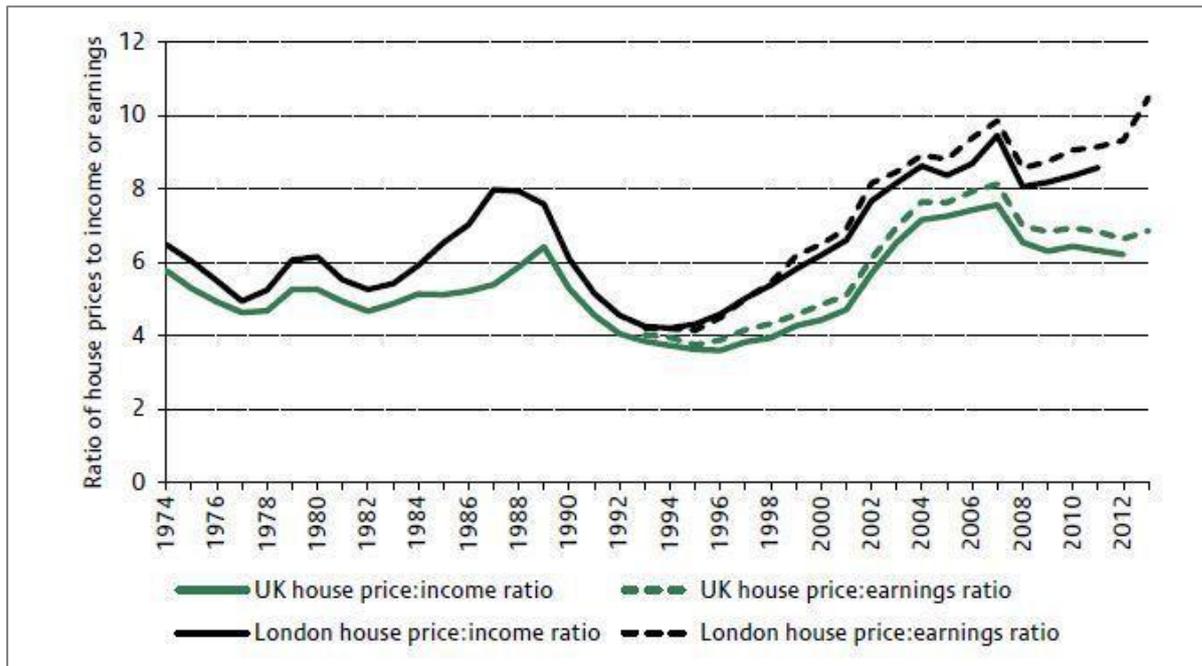
Source: Nationwide, Labour Force Survey, Family Expenditure Survey and Family Resources Survey

London's growth is being constrained by a chronic shortage of housing which is driving up housing costs as a proportion of household income.

2.15   Providing sufficient housing to meet demand is essential to London's ability to attract and retain talented workers and in turn maintain the city's competitiveness. It is also critical to provide affordable housing in order to retain lower paid workers who are essential to the city's functioning.

2.16   This shortage of housing is raising the cost of living and ultimately undermining London's and the UK's competitiveness.

2.17   Providing sufficient – and sufficiently affordable - housing is also important if the city's communities are to remain cohesive and vibrant and avoid the problems associated with social polarisation.

2.18   London needs to build 49,000[20] new homes per year between 2015 and 2036 to house the growing population, around a 50 per cent increase compared with current levels of delivery.

2.19   A total of 15 of the 32 London boroughs fell short of annual targets between 2010 and 2013[21]. Housebuilding targets are set by the Mayor but it is accepted that more incentives have to be put into place in order for boroughs to meet their targets[22]. The ten year target for the London Borough of Barking and Dagenham is to deliver 12,355 homes between 2015 and 2025.

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[20] London Plan March 2015
http://www.london.gov.uk/sites/default/files/London%20Plan%20March%202015%20%28FALP%29.pdf
[21] London First, Carrots and Sticks: a targets and incentives approach to getting more homes built in London (May 2015) http://londonfirst.co.uk/wp-content/uploads/2015/05/Carrots-and-Sticks-Report_Web.pdf
[22] London First propose a London Housing Delivery Bonus (LHDB) scheme for boroughs and greater powers for the Mayor of London to determine planning of all applications for 50 homes or more

Dense cities are the way to accommodate growth most sustainably and most efficiently.

2.20   Densification reduces the capital and operating costs of infrastructure as well as increasing agglomeration benefits. Within London, there are opportunities to increase the density of housing development and there are opportunities to create new sites for development, but these require co-ordinated investment.

2.21   London has grown sustainably through densification and efficient recycling of redundant or under-utilised land. In the period 2001-10 London lost over 800 hectares of industrial land (10 per cent of its total stock) enabling this land to be recycled into other uses, predominantly residential.

2.22   This densification has been made possible by increases to the capacity of the public transport network, to meet increased levels of travel demand from a growing population and enable higher density of development. Alongside growth in use of rail and bus networks, recent travel trends have seen increased levels of walking and cycling. Alongside this, the road network plays a vital role in the efficient functioning of the city.

To achieve housing targets, existing brownfield land must be unlocked.

2.23   London has limited opportunities for accommodating large scale development. A range of suitable areas are identified in the Mayor's London Plan (March 2015), including 38 Opportunity Area. London's 38 Opportunity Areas represent "London's major source of brownfield land with significant capacity for new housing, commercial and other development linked to existing or potential improvements to public transport accessibility[23]".

2.24   East London has a particularly high potential for housing developments. The London Riverside Opportunity Area, which includes the Castle Green site, is one the largest areas identified for housing densification, and the OA has been identified as having the capacity to deliver 26,500 new homes.

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[23] London opportunity areas for large-scale development
https://www.london.gov.uk/priorities/planning/opportunity-areas

Figure 2-4 London's Opportunity Areas

Opportunity Areas

1 Bexley Riverside	11 Elephant and Castle	21 London Bridge, Borough & Bankside	31 Tottenham Court Road
2 Bromley	12 Euston	22 London Riverside	32 Upper Lea Valley
3 Canada Water	13 Greenwich Peninsular	23 Lower Lea Valley	33 Vauxhall, Nine Elms & Battersea
4 Charlton Riverside	14 Harrow & Wealdstone	24 Old Kent Road	34 Victoria
5 City Fringe/ Tech City	15 Heathrow	25 Paddington	35 Waterloo
6 Colindale/Burnt Oak	15 Heathrow Core	26 Park Royal	36 Wembley
7 Cricklewood/Brent Cross	16 Isle of Dogs	27 Old Oak Common	37 White City
8 Croydon	17 Isle of Dogs	28 Royal Docks & Beckton Waterfront	38 Woolwich
9 Deptford Creek/Greenwich Riverside	18 Kensal Canalside	29 Southall Hinterland	
10 Earls Court	19 King's Cross – St Pancras	29 Southall Development Sites	
	20 Lewisham, Catford & New Cross	30 Thamesmead & Abbey Wood	

Area of Intensification

42 Farringdon/Smithfield
43 Haringey Heartlands/Wood Green
45 Holborn
46 Kidbrooke
47 Mill Hill East
48 South Wimbledon/Colliers Wood
49 West Hampstead Interchange

> **Key Finding:**
>
> There is a need to maximise the housing development potential of brownfield sites, particularly those well serviced by transport networks.

2.25   If London is to meet its housing needs then it has to utilise its land as effectively as possible and be creative about assembling sites for development and identifying more usable space. Or as Policy 3.3E of the London Plan states: "Boroughs should identify and seek to enable additional development capacity to be brought forward to supplement these targets having regard to the other policies of this Plan and in particular the potential to realise brownfield housing capacity through the spatial structure it provides".

2.26   Infrastructure schemes can play a role in creating the right incentives for developers through boosting the attractiveness of locations through provision of enhanced transport accessibility and public realm improvements.

TfL can help unlocking more land for urban regeneration and contribute to meeting London's housing targets.

2.27   Figure 2-5 shows that in 2005, 12.3 per cent of the total area of London was taken up with roads, more than the amount of land occupied by domestic dwellings. Better use of road space is a potential source of development land that is worth exploring further. However, given the challenges of increasing congestion and the economic impacts of this, it needs to be done in such a way that also protects the function of key strategic road corridors.

Figure 2-5 London Area by Land Use
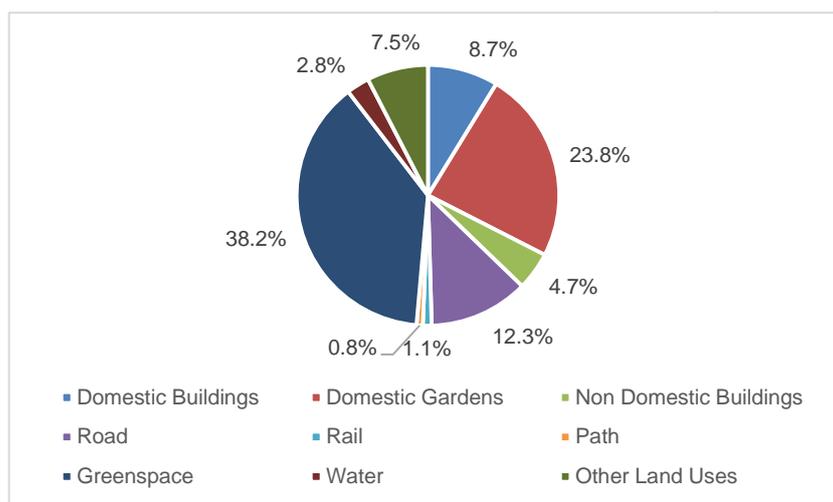
Source: Land Use Generalised Land Use Database 2005

Key Finding:

There is a need for innovative ways of unlocking housing potential within London's boundaries. A better use of the TLRN, balancing the sense of place and its strategic movement function, could enable higher housing densities.

The Transport for London's Road Network is vital to London's economy

The strategic road network is vital for London, but as the city grows the level of congestion is forecast to grow, even with sustained investment in public transport capacity.

2.28   The Mayor's 2020 Vision[24] is for London to be the greatest city in the world to live, play, study, invest and do business.

2.29   Inevitably, this Vision is dependent on balancing the competing spatial demands for transport infrastructure, urban realm and housing – all of which are crucial to attracting skilled labour to work in London's agglomeration clusters.

2.30   Whilst motorised traffic has fallen by 10 per cent in Greater London Area between 2000 and 2011, congestion has risen by about the same amount. In central London, this is partly due to an increase in construction activities disrupting the road network. It is also due to the reallocation of road space from

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[24] Mayor's 2020 Vision https://www.london.gov.uk/mayor-assembly/mayor/vision-2020

private traffic to public transport, cycling and walking. This reflects existing trends in modal shift and TfL's vision for better quality public spaces and more sustainable transport.

2.31   In outer London where densities are lesser and public transport accessibility lower, road-based travel is still critical to local residents and businesses.

2.32   Motorised traffic remains critical to London, whether it is for deliveries, buses, taxis, emergency services or commuters, further investment in roads is required to keep London moving.

2.33   London's strategic road network is relied upon by businesses and it provides residents with access to employment and services across the city. It forms the backbone for freight and servicing movements and the bus network. To compete as a world city, London needs to maintain an efficient road network.

Figure 2-6 Transport for London Road Network (TLRN)
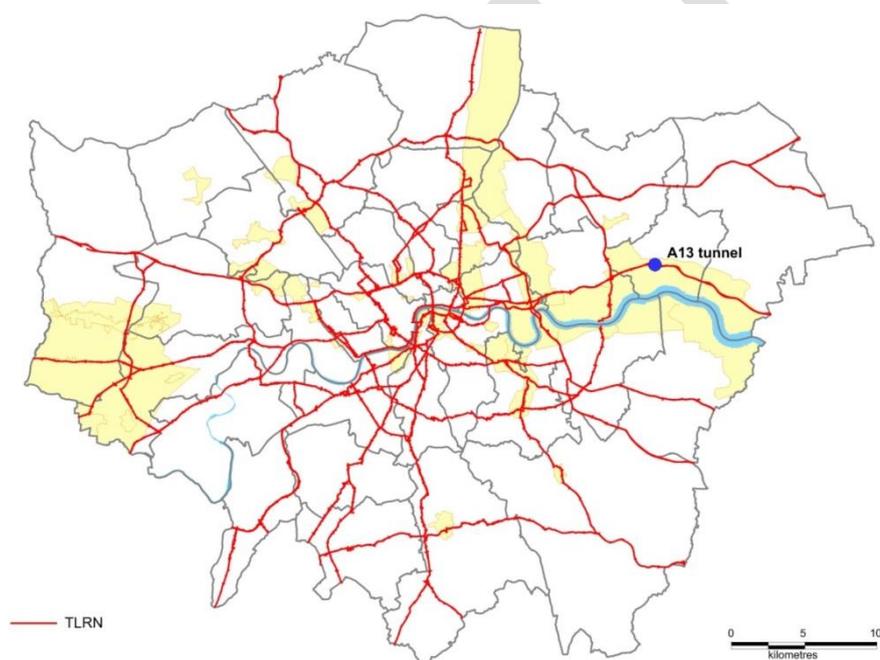
2.34   Road congestion cost the London economy £5.4bn in 2013, accounting for 41 per cent of costs to all of UK's large urban areas[25].

2.35   Around two-thirds of these costs accrue from delays in Outer London where car driver/passenger share within/to/from Outer London accounts for 48 per cent of modal share compared to 10 per cent in within/to/from Central London[26].

2.36   London's growing population, as well as supporting employment growth across the city, will strain TfL's strategic road network as car-dependency and meeting the needs of freight movements remains a key issue in Outer London. In particular, this will lead to significant increases in congestion on key strategic arterial roads into London.

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[25] The future economic and environmental costs of gridlock in 2030, Centre for Economics and Business Research/INRIX, July 2014 http://www.cebr.com/wp-content/uploads/2014/10/INRIX_costs-of-congestion_Cebr-report_v5_FINAL.pdf

[26] Based on percentage of average daily trips in three year period 2007/8 to 2009/10

> **Key finding:**
>
> London's road network remains critical to the region and the UK's productivity, particularly in Outer London and along major freight corridors.

2.37   The Government's National Infrastructure Plan 2014[27] clearly sets out the scale of investment required for the UK's Strategic Road Network (SRN), committing £15.2bn between 2015-16 and 2021-21 to transform the SRN – the biggest programme of investment since the 1970s with investment tripling from current levels by 2020.

2.38   However, the £15bn precludes any investments to improve the Transport for London Road Network (TLRN) – the Roads Task Force Vision states that at least £30bn of investment is required over the next 20 years on London's streets and roads.

2.39   Without significant investment to match that which is occurring outside the Capital, congestion and road traffic delay will grow in many areas as illustrated in Figure 2-7. Given the importance of London's strategic network to the UK economy, this is not just an issue for London but for the country as a whole.

2.40   A planned 70 per cent increase in rail capacity through Tube upgrades, Crossrail and Thameslink programmes is underway. This is likely to aid modal shift from private vehicles to rail but is not sufficient by itself to address London's road congestion issues.

> **Key finding:**
>
> The pressures on London's roads are growing and there is a critical need for a major investment programme to modernise the road network and address congestion.

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[27] National Infrastructure Plan 2014
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/381884/2902895_NationalInfrastructurePlan2014_acc.pdf

Figure 2-7 Change in PCU hour delay, 2009 – 2031 (AM Peak)
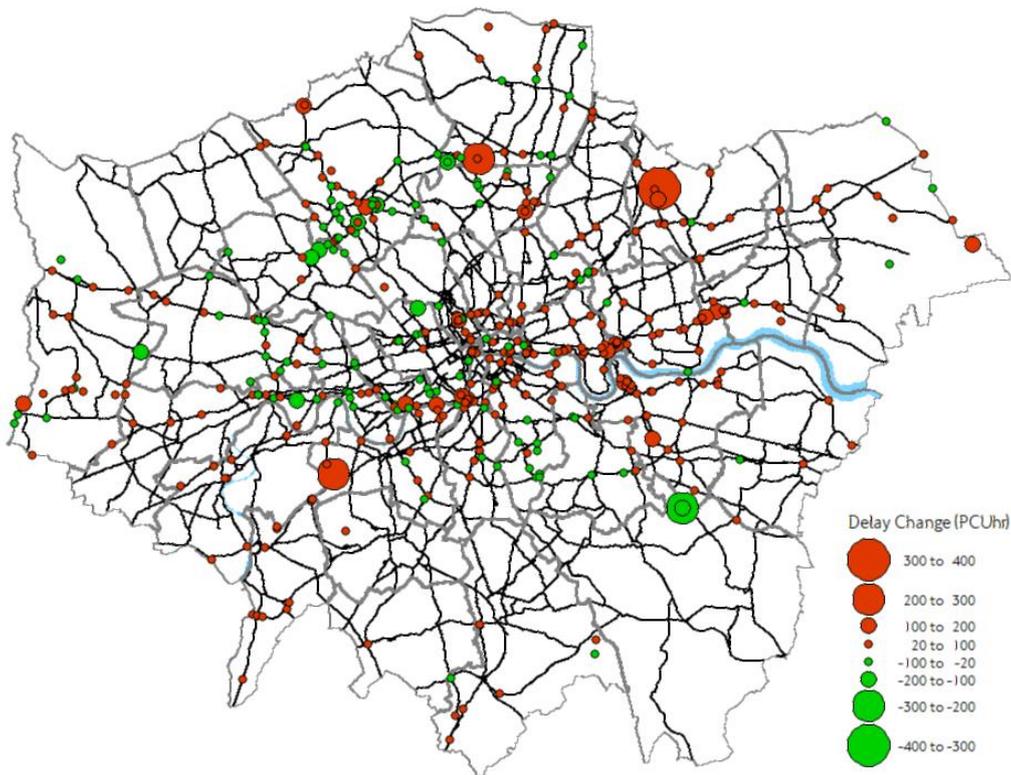
The TLRN is not only critical to commuters from Outer London but also to strategic freight movements.

2.41 The Transport for London Road Network (TLRN) corridors play an important role in facilitating radial movements of buses, cars, coaches and HGVs from areas of outer London towards central London, and inter-Borough movements within outer London. 80% of trips overall within London make use of the road network, which is also heavily relied on for freight movements.

2.42 In 2011, 69% of households in outer London owned a car, compared to 43% of households living in central London. In 2011, 36% of outer London residents drive to work by car, compared to 13% in central London. Despite the prevalence of road-based travel, buses are not widely used in outer London: only around 20% of road-based travel-to-work journeys in Outer London are by bus, compared to 50% of road-based journeys in inner London.

2.43 As the population of London grows, congestion on the TLRN will increase.

A growing city population will travel more using different modes, resulting in more congestion and crowding, and poorer air quality, reducing the overall quality of life.

2.44 A higher employment base and higher population in London will result in increased demand for travel and for freight and servicing. This will generate a need for investment to accommodate the increasingly diverse demands being placed on strategic roads - such as more bus passengers, cyclists, pedestrians and growth in freight movements to service more people.

2.45   To enable the city to grow London will require investment to increase the capacity and efficiency of its road-based and rail, underground, DLR and tram systems.

2.46   If this investment is not forthcoming, congestion will worsen and levels of crowding on public transport systems will increase. This will lead to longer and less predictable journey times for London residents and in-commuters from the rest of the South East.

2.47   These increases in travel times will result in longer commutes and increased risk of employees arriving late for work. A less efficient transport system will result in a more stressful and frustrating travel experience for its users. This will have an impact on the productivity of workers. Londoners and employees' quality of life will deteriorate.

2.48   This will result in some choosing to relocate to areas that offer a better quality of life or skilled workers choosing to work elsewhere, which would be detrimental to overall UK productivity given the agglomeration gains of dense cities.

> **Key Finding:**
>
> There is a need to maintain or increase the TLRN traffic capacity to mitigate increasing congestion levels due to employment and population growth.

It is incredibly important to balance the sense of place and the movement function of the road network by mitigating severance effects

Reducing the footprint of strategic roads can improve quality of place and unlock additional development, but this needs to be balanced against continued needs for movement.

2.49   The road network in London serves a wide range of functions. At one end of the scale, core roads and main corridors form the TLRN function as the principal routes for movement of vehicular traffic.

2.50   At the other end of the scale, streets with lower traffic flows often have a primary 'place' function. TfL and boroughs need to work together to find the appropriate balance between the movement and place demands on roads and streets.

2.51   The Roads Task Force (RTF) report[28] identifies nine typologies of road corridors or streets that reflect their balance between a strategic or local movement or place function. These nine street types are shown in the matrix in Figure 2-8.

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[28] Roads Task Force Report (July 2013) – https://tfl.gov.uk/corporate/publications-and-reports/roads-task-force

Figure 2-8 The RTF Street Types Matrix
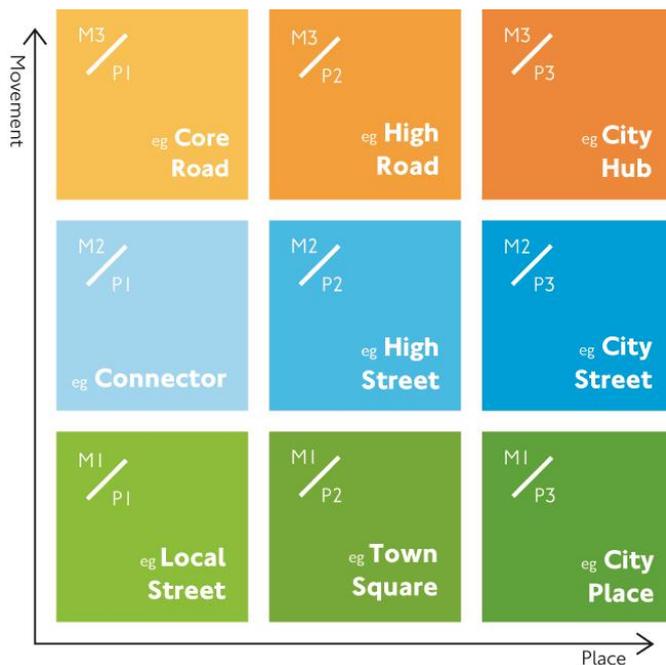
2.52 Roads such as the A13, the A40 Westway and A406 North Circular have a strategic movement function, which takes priority over place functions, so have an "arterial road typology". Other roads such as Kensington High Street have to balance a clear movement function with an equally important place function.

2.53 The higher traffic volumes become, the more the quality of the public realm can be adversely affected, and the less willing people would be to use the street to meet, interact with others, to shop, enjoy food or drink or take a break.

2.54 In some cases, the current typology of a road or street may not reflect a borough's place-making aspirations or be conducive to achieving proposed land use changes in an area. Heavy traffic volumes in those typologies towards the top left of Figure 2-8 have the effect of discouraging new residential development and lowering property prices.

2.55 With good planning, careful design and investment, more emphasis can be given to the place function of a particular TLRN road corridor without unduly compromising its strategic movement role. Such win-wins are increasingly important in a growing world city where the competing demands on places are ever increasing.

> **Key Finding:**
>
> Land in the vicinity of TLRN corridors has the potential to help accommodate new housing development to help meet some of London's need but the current performance of the road network does not enable this.

Road corridors with a strong "movement" emphasis cause severance impacts that inhibit connectivity, sustainable transport modes and quality of life.

2.56 Road corridors with a strong 'movement' function present barriers that inhibit crossing movements by cyclists and pedestrians. If there is not provision in the form of at-grade crossings or over-bridges or subways at sufficient intervals, this can act as a significant deterrent to movement by these modes.

2.57   These severance impacts can also reduce the willingness of nearby residents to use public transport if the walking trip to access a station or bus stop is too circuitous or unpleasant.

2.58   If streets on either side of a busy road are impermeable and not pedestrian and cycle friendly, and the busy road is difficult to cross, this can reduce the propensity to walk or cycle to access services or facilities by these modes.

2.59   If people find it more convenient to drive to access shops or services, then this can also adversely affect the vitality of district or neighbourhood shopping areas and lead to their decline.

2.60   Other severance effects such as high noise levels, poor air quality and negative visual impacts also affect the quality of life of residents and in turns reduce the area's potential for housing development.

> **Key Finding:**
>
> A road corridor with strategic movement functions can cause severance reducing the area's housing development potential.

The Mayor's Transport Strategy and the 2013 Roads Task Force set the objectives for the TLRN corridors, which include the need to protect their movement function and unlock development.

2.61   Any proposal seeking to strike a better balance between the movement and place function of a road must also comply with and seek to meet wider public policy objectives for the area.

2.62   These arise from two key sources, the Mayor's Transport Strategy and the 2013 Roads Task Force "Vision for London's Roads and Streets".

2.63   The Mayor's Transport Strategy (MTS) sets out six goals for transport in London:

> - Support economic development and population growth;
> - Enhance the quality of life for all Londoners;
> - Improve the safety and security of all Londoners;
> - Improve transport opportunities for all Londoners;
> - Reduce transport's contribution to climate change, and improve its resilience; and
> - Support delivery of the London 2012 Olympic Games and its legacy.

2.64   The Roads Task Force Vision sets out the following core objectives:

> - To enable people and vehicles to move more effectively on London's streets and roads;
> - To transform the environment for cycling, walking and public transport; and
> - To improve the public realm and provide better and safer places for all the activities that take place on the city's streets, provide an enhanced quality of life and help to unlock development and deliver new homes.

PART C: TFL'S PROPOSAL TO FREE UP ROAD SPACE FOR URBAN REGENERATION WHILST MAINTAINING THE TLRN STRATEGIC MOVEMENT FUNCTION

Section Summary:

The Roads Task Force report 2013 recommends that TfL consider the delivery of major highway interventions on the TLRN, including tunnels, fly-unders and over-decking.

A process of prioritisation has been followed. A list of 70 locations was assessed using Multi-Criteria Analysis to identify which locations tunnel, fly-under and decking solutions would deliver the greatest benefits.

From a short list of 15 schemes, five have been taken forward as a first tranche of projects for further feasibility work. The A13 Tunnel is one of these five.

A joined-up approach to planning and infrastructure investment by the GLA, TfL and Boroughs will help to unlock development in areas with high regeneration and growth potential.

2.65 Investment to enhance the attractiveness of locations both for businesses and also local residents and potential workers will stimulate regeneration of under-utilised land.

2.66 There is a clear role for public intervention in the form of targeted investment, enabling sites to maximise their development potential in areas of opportunity, such as in Barking. There are co-ordination/market failures that act as constraints on urban sites coming forward for development even in areas where the development gains are potentially quite high.

2.67 A package of measures at various scales and geographies will be required to ensure that land and potential sites for development within all parts of London are used efficiently to support sustainable growth.

In 2013, the Mayor of London's independent Roads Task Force (RTF) published a document setting out the strategic direction for London's roads.

2.68 The Roads Task Force comprised a diverse group of road users, developers, local authorities and other statutory highway authorities. The RTF vision is designed to tackle congestion, support a shift to more sustainable modes of travel and improve quality of life in London.

2.69 A key recommendation of the RTF report, published in July 2013, was that the potential of major highway interventions on the TLRN such as tunnels and 'fly-unders' should be investigated to determine the role they could play in achieving the vision for London's roads and streets across the strategic highway network.

2.70 In particular, whether major interventions at key locations could 'relocate or provide substitute capacity for motorised traffic to unlock surface space for 'living', more sustainable modes and development – enabling different use of space above and reducing impacts such as severance and noise, while maintaining network functioning'.

2.71   This view built on experience from other cities around the world such as Paris, Oslo and Boston, which have undertaken these kinds of ambitious projects and have seen dramatic results.

Since the publication of the RTF recommendations, TfL has conducted a number of strategic studies to understand opportunities for roofing over or tunnelling roads.

2.72   These studies were aimed at understanding the opportunities for roofing over or tunnelling under existing infrastructure at particular locations. Three main types of infrastructure were considered:

- Tunnels to release land at the surface for either development, green space, improved public realm or better facilities for pedestrians, cyclists and public transport users but also relieve congestion and improve journey time reliability (where relevant)
- Fly-unders to release land at the surface for either development, green space, improved public realm or better facilities for pedestrians, cyclists and public transport users but also relieve congestion and improve journey time reliability (where relevant)
- Decking of roads to provide public parks, reduce severance and the negative impacts of roads including noise and poor air quality and helping to bring forward development on neighbouring land especially where there is good existing or future public transport connectivity which can support high density development

2.73   To identify locations where tunnels, fly-unders or decking solutions would deliver strong potential benefits, a prioritisation process has been followed

From an initial list of approximately 70 locations, through a Multi-Criteria Analysis (MCA) a shortlist of fifteen sites was identified.

2.74   These sites were identified as having sufficient potential for initial feasibility studies. A combined score was developed from SAF[29] and RTF appraisals. For each identified site, the following was also investigated:

- Potential intervention types;
- Engineering feasibility;
- Transport impact for all users including those travelling by car, foot, cycle and public transport;
- Local and strategic environmental impacts including on visual amenity, noise and air quality;
- Level and quality of enabled development;
- Likely programme;
- Route to consent; and
- Cost of delivery

As part of a rolling feasibility assessment programme, the following five locations are being taken forward for further assessment.

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[29] TfL Strategic Assessment Framework (SAF) is a tool that allows planners, managers and sponsors across Transport for London (TfL) to assess projects and programmes using a set of strategic criteria. SAF is used as part of the process of developing projects and programmes within TfL.

- A13, Barking Riverside
- A406 North Circular Road, New Southgate
- A316, Chalkers Corner
- A4, Hammersmith
- A3, Tolworth

2.75   TfL is now beginning to look at the options for the next tranche of schemes in further detail.

The road tunnel schemes being considered are aimed at releasing the potential of specific areas for housing and wider development, while maintaining the vital movement function of strategic roads, thereby helping underpin London's growth more widely.

2.76   The scope to regenerate and develop land along busier TLRN corridors is currently reduced by the adverse impacts of traffic. High traffic volumes and severance, air quality and noise impacts can significantly limit the viability of development.

2.77   If nothing is done to reduce the impact of the road corridor, then it is unlikely that development will come forward, or it will come forward only at a significantly lower density, as new properties will be harder to sell or less profitable than alternative sites.

2.78   If these negative impacts can be reduced through improvements to 'place' and local connectivity, then redevelopment is likely to become a more attractive and viable commercial investment proposition. However, this needs to be done without undermining the movement function or there will be wider adverse economic impacts. Therefore the aim is for investment to improve quality of place that addresses these issues and enables significant quantities of new housing to be unlocked whilst maintaining or enhancing the TLRN's movement function.

2.79   Road tunnels and decking schemes will do this in the following ways:
- They will provide companies with access to a larger and higher quality workforce, customers and suppliers, supporting the agglomeration impacts arising from faster or more reliable journey times by road.

- They will enable development of housing and employment on under-utilised land along the road corridor which might otherwise be constrained to a lower density or not take place at all.

- They will provide a focus for regeneration and improvements in quality of life, including urban realm improvements, which can help drive investment and jobs in local economies through increased footfall or attracting new employers and residents.

2.80   Each tunnel or decking scheme will have a different mix or focus.

2.81   This is part of a major shift to needing to support greater growth in London and the changing role of town centres and the increasing importance of the quality of place in our city's success.

2.82   Figure 2-9 illustrates a number of visualisations of proposed public realm improvements for selected roads and streets associated with the decking-over,

fly-under and tunnelling schemes. The top left shows a proposed fly-under at Chalkers Corner, which would help reduce traffic congestion and delays at a key traffic signal controlled crossroads and reduce severance for pedestrian and cycle movements. The top right shows a linear park that could be constructed above the A3 at Tolworth, enabling new high density residential development to come forward within a parcel of land that lies between the A3 and the railway station, if Crossrail 2 were to serve this rail corridor. The bottom left visualisation shows the eastern portal of the short Hammersmith tunnel option. It would enable the redevelopment plots of land on both sides of the tunnel for high density office and residential use, and would create new high-quality public spaces. The bottom right visualisation shows what urban forms could be achieved at Castle Green by tunnelling the A13 (see Part F of the Strategic Case for more details).

Figure 2-9 Urban realm improvements: Chalkers Corner (top left), Tolworth (top right), Hammersmith (bottom left) and Castle Green (bottom right)

> **Key Finding:**
>
> Investment in decking-over, tunnelling and fly-under schemes on London's road network will help to enable regeneration and economic growth

To retain London's competitiveness, further investments in transport links and the public realm are required to facilitate delivery of more successful places and new housing in areas adversely impacted by traffic.

2.83   Some of the most successful cities around the world have invested in improvements to the quality of the urban realm alongside investment in public transport and road network capacity. Providing cover over ring roads and building tunnels helps to maintain road network functioning while reducing traffic impacts, creating new spaces for city life and delivering high quality cycle and walk paths.

2.84   London's streets account for 80 per cent of public space in London and therefore schemes which are able to unlock spaces for living and working whilst not impeding network functioning are 'win-wins'.

2.85   Three important dimensions to helping ensure London's continued growth and competiveness are: expanding the capacity of its transport network, releasing more land for housing and protecting and enhancing quality of place.

- Insufficient transport capacity to access jobs and enable reliable servicing or freight access across the city would hinder employment growth and agglomeration impacts. **Decking-over, tunnelling and flyunder schemes would address congestion pinchpoints on and around strategic corridors into London**.

- Housing within or close to London is becoming increasingly unaffordable for many workers. The failure to supply new volumes of housing to meet increasing demand has resulted in rapid house price and rental inflation, reducing disposable income. **Decking-over, tunnelling and flyunder schemes would release land and enable higher density developments to be brought forward**.

- A deteriorating quality of place and quality of life for Londoners and workers could make the city comparatively a less attractive place for footloose companies to be based. **Decking-over, tunnelling and flyunder schemes would reallocate road space on the surface to pedestrians and cyclists, reduce severance and noise impacts.**

Key Finding:

Solutions which continue to support the functioning of the strategic road network whilst reducing traffic impacts to communities around London's ring roads, gyratories and town centres and enhance conditions for pedestrians and cyclists must be found. Delivering 'win-win' solutions is increasingly important to London's continued success.

PART D: BARKING RIVERSIDE AND A13, LOCAL CONTEXT

1.2.Section Summary

1. **A growing population in London requires higher density, high-quality residential development in accessible locations, with east London as key focus for this**

   - Barking and Dagenham's population is growing rapidly, and this is projected to continue into the future.

   - Projected population growth is outstripping delivery of new homes

   - Over the last decade, the number of households on the Council Housing waiting list has grown by over 10,000.

   - Housing affordability and condition is a significant problem in Barking and Dagenham.

2. **Barking and Dagenham suffers from significant economic deprivation**

   - Barking and Dagenham is one of the most deprived areas in the UK.

   - Since 1998, the borough has lost 14% of all local jobs (7,500 jobs in total).

3. **The capacity and function of the A13 strategic road corridor must be maintained**

   - The A13 serves a key strategic movement function, which delivers substantial economic benefits to London and the UK.

   - The A13 suffers from high levels of delay and congestion.

   - Low quality public realm, severance and air and noise pollution reduces viability of new residential and commercial development.

4. **The A13 creates significant severance affecting the quality of life of existing and potential residents**

   - Poor urban realm and local access to Castle Green inhibits its potential for housing development.

   - Air and noise pollution along the A13 corridor in Barking is extremely high.

A growing population in London requires higher density, high-quality residential development in accessible locations, with easet London as key focus for this

Barking and Dagenham's population is growing rapidly, and this is projected to continue into the future.

As set out in Part A of this Strategic Case, London's population is growing, placing an ever growing pressure on the city's infrastructure, housing stock, and road network. This pattern of population growth is reflected within LB Barking

and Dagenham: the borough's population rose over 22,000 from 2001 to 2011, an increase of 13 percent[30], a trend that is projected to continue into the future (Figure 2-10).

2.86 The majority of future population growth is projected to be concentrated in the south of the borough, in close proximity to the Castle Green site. Development of brownfield land in this area is therefore required in order to accommodate this projected growth.

Projected population growth is outstripping delivery of new homes.

2.87 The projected growth in population in Barking and Dagenham is not matched by a similar rate of growth in home building. Based on current levels of delivery, the borough is projected to complete just over 5000 homes over the ten years to 2025 (a shortfall of around 7300 homes against the Borough's housing target of 12,355 homes)[31]. In 2014/15 there were just 800 housing completions of all types (200 private sector and 600 Local Authority)[32], only half as many completed in neighbouring Tower Hamlets and Newham[33]. This means that at present there is a rapidly growing shortfall in housing supply in the Borough.

Over the last decade, the number of households on the Council Housing waiting list has grown by over 10,000.

2.88 Barking and Dagenham's s housing stock comprises around 71,000 dwellings of which approximately 19,200 (27%) are Council rented, almost three times the average rate for England and Wales (10%). At just 53%, private owner occupied dwellings represent a much lower proportion of the housing stock than the average for England (70%). Reflecting historic low rates of activity by Housing Associations, properties rented from Registered Social Landlords (RSLs) represent only 5% of the stock, compared to 8% across England.[34]

2.89 Barking and Dagenham has seen a steep rise in the number of households on the Council's Housing Need Register (the "waiting list") from 2,157 in 2001 to over 12,000 by 2011. As a result an additional 1,333 affordable homes will be needed every year for the next five years[35].

2.90 Although parts of Barking and Dagenham are included in the Opportunity Areas identified for urban regeneration, housing delivery rates in the area, and in East London in general, have been relatively slow compared to other Opportunity Areas.

Housing affordability and condition is a significant problem in Barking and Dagenham.

2.91 With an average house price of £250,674 [36] and the average monthly rent for a two bedroom property around £850 per month[37], Barking and Dagenham property prices are amongst the lowest in London. Nevertheless the affordability of

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[30] GLA 2014 Round Trend-based population projections: Long-term migration scenario.
[31] London Plan Annual Monitoring Reports 1- 11 (2005 – 2015)
[32] Permanent dwellings started and completed 2013/14, Live Table 253, DCLG
[33] Permanent dwellings started and completed 2013/14, Live Table 253, DCLG
[34] Barking & Dagenham Housing Strategy 2012-2017
[35] Barking and Dagenham Housing Strategy 2012 – 2017, p.22
[36] Land Registry HPI (July 2014)
[37] Valuation Office Agency, Private Rental Market Statistics Apr 2013 to Mar 2014

housing for local residents is a problem: the average property costs about 10 times the average household income for the borough (£25,833)[38].

2.92   About 18,000, or 38%, of the private sector stock (owner occupied and rented) in the borough is defined as non-decent[39].

Key finding:

Barking requires a substantial increase in the delivery of new homes in order to meet demand, prevent a future accommodation shortage and stem rising unaffordability in house prices

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Figure 2-10 Projected population growth in Barking and Dagenham (2011- 2041)

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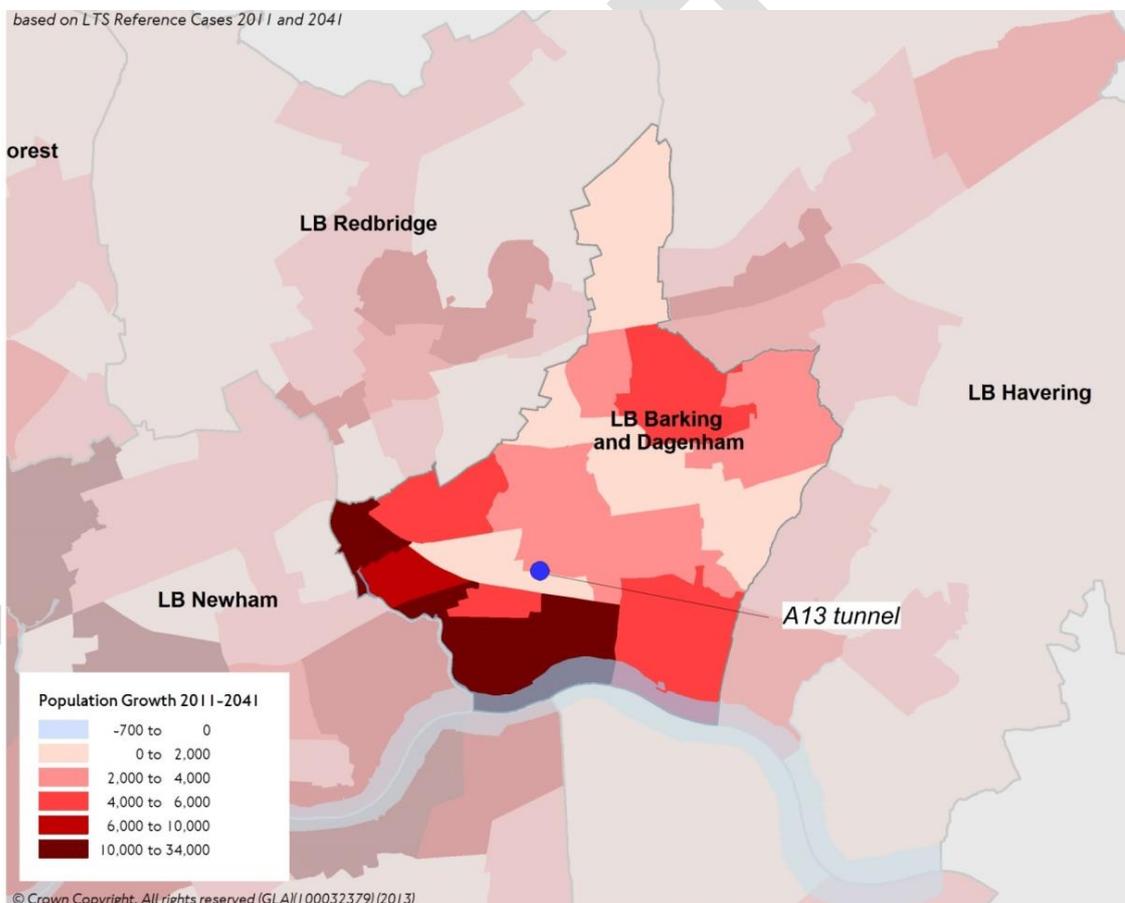
[38] CACI PayCheck data (2013)
[39] Investment Needs and Stock Condition in Barking and Dagenham's Private Rented Sector, 2011, The Living and Working Select Committee, p.1

Barking and Dagenham suffers from significant economic deprivation

Barking and Dagenham is one of the most deprived areas in the UK.

2.93   Barking and Dagenham suffers from some of the highest levels of deprivation in the UK. In 2010, the borough was ranked 22nd of the 326 authorities in the Index of Multiple deprivation[40], with half the Borough falling within the 20 per cent most deprived areas in London. A number of sites – including existing residential areas located in the vicinity of Castle Green – also fall into the 10 per cent most deprived in London (Figure 2-11).

2.94   Characterised by a low skill and low wage sectoral mix, the borough has had a different economic trajectory since 2004 than neighbouring areas of east London and was hit harder by the 2008 recession. The borough now exhibits some of the worst economic indicators of any London borough[41]. Three out of ten residents of the borough are currently economically inactive, and in contrast to surrounding areas this rate has not improved since 2001[42]. The total unemployment rate (claimant count) in Barking and Dagenham is the highest of any London borough (5.6 per cent in June 2013 compared to a London average of 3.8 per cent)[43], and over 20,000 local residents were claiming some form of out-of-work benefit (nearly 11% of the total population).

Since 1998, the borough has lost 14% of all local jobs (7,500 jobs in total).

2.95   These job losses have been compounded by below average and below inflation wage increases suggesting that in real terms wages have fallen by more than 1% each year in Barking & Dagenham since 2001. The borough has the lowest average pay (median) of any London borough, 18% below the London average (see Figure 2-12). This was during a period when jobs increased significantly in surrounding areas of east London, with jobs increasing by 89% in Tower Hamlets, by 30% in Southwark, by 21% in Newham and by 12% in Greenwich. No relative jobs losses occurred in Lewisham and Bexley over the same period.

2.96   There is current demand for additional jobs in the borough with four jobseekers for every job advertised at a local job centre.

> **Key finding:**
>
> Barking and Dagenham is suffering from significant deprivation and loss of employment, and requires investment and creation of new jobs to halt the ongoing decline in the borough's economic indicators

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[40] Index of Multiple Deprivations, DCLG, 2010
[41] Various sources Office for National Statistics (ONS), Department for Work and Pensions (DWP), Business Register and Employment Survey (BRES)
[42] NOMIS, Labour Market Profile Barking and Dagenham, retrieved September 2014
[43] Claimant Count Model Output, GLA, July 2014

Figure 2-11 Deprivation in Barking and Dagenham
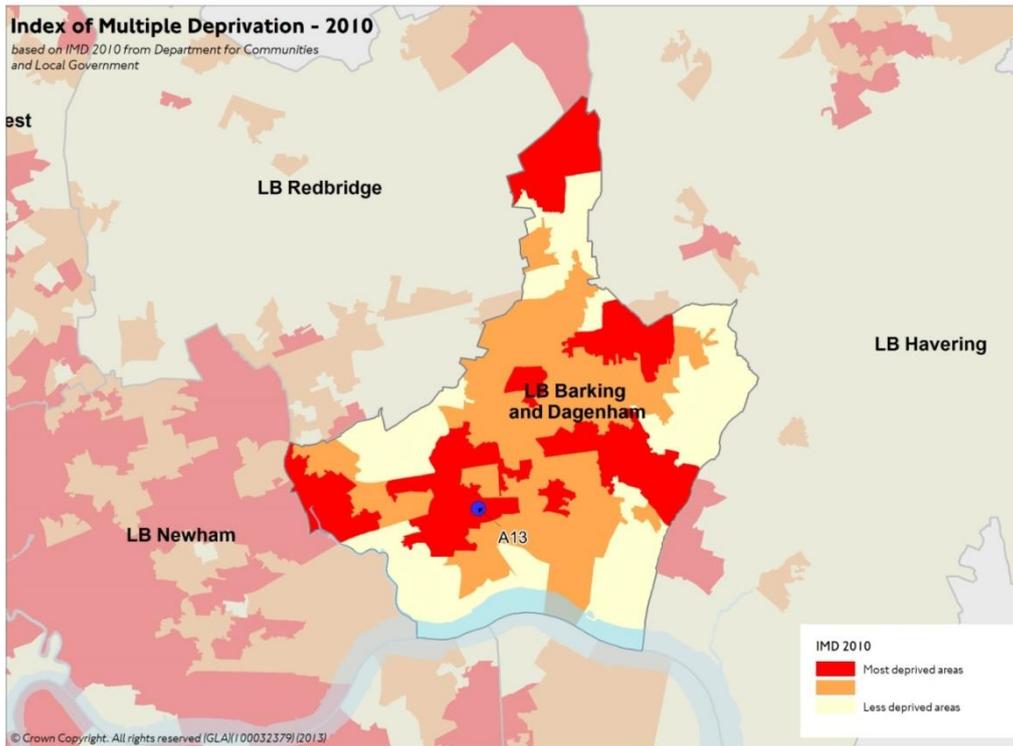
Figure 2-12 Average Household Income (2012/13)
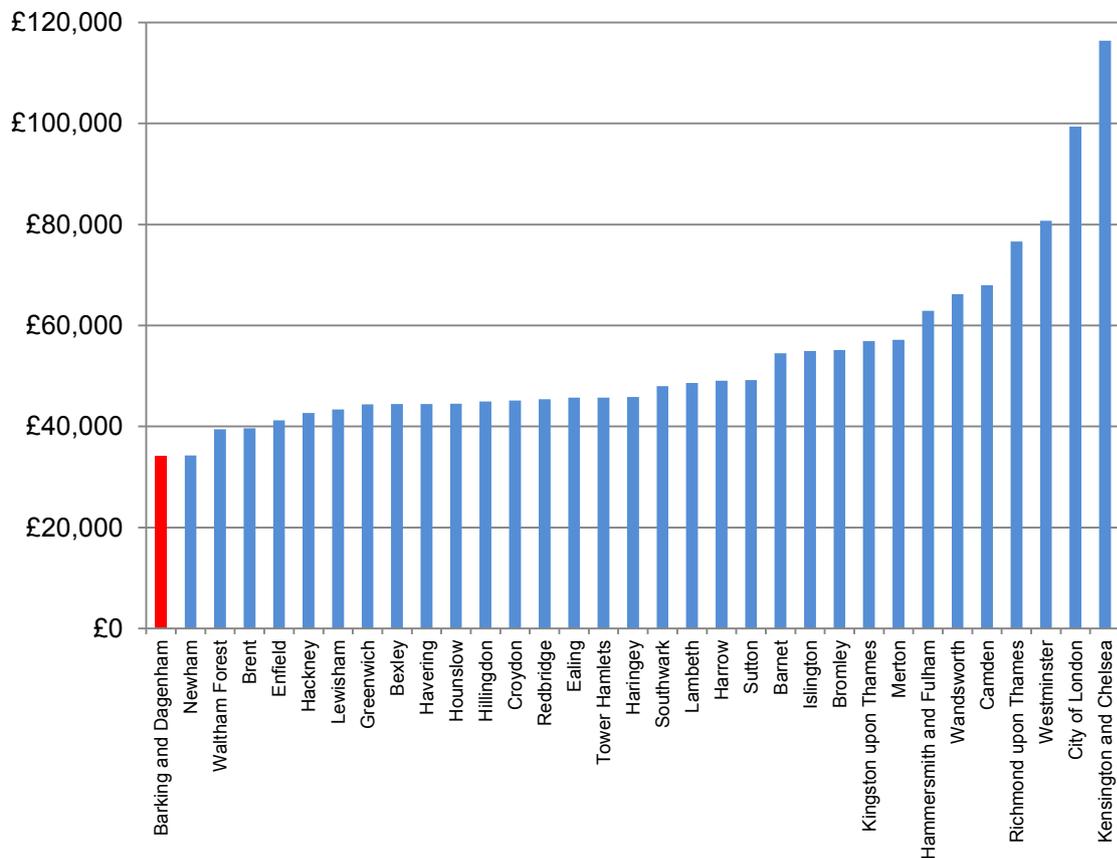
The capacity and function of the A13 strategic road corridor must be maintained

2.97 The A13 corridor is part of the Transport for London Road Network (TLRN), the strategic London road network that is the responsibility of TfL. The TLRN comprises only 4% of London's road length but carries 30% of London's traffic, and provides links to those sections of motorway and primary routes managed by the Highways Agency, which in turn connect the TLRN to the London's orbital motorway the M25.

Figure 2-13 Opportunity Areas in proximity to the TfL road network
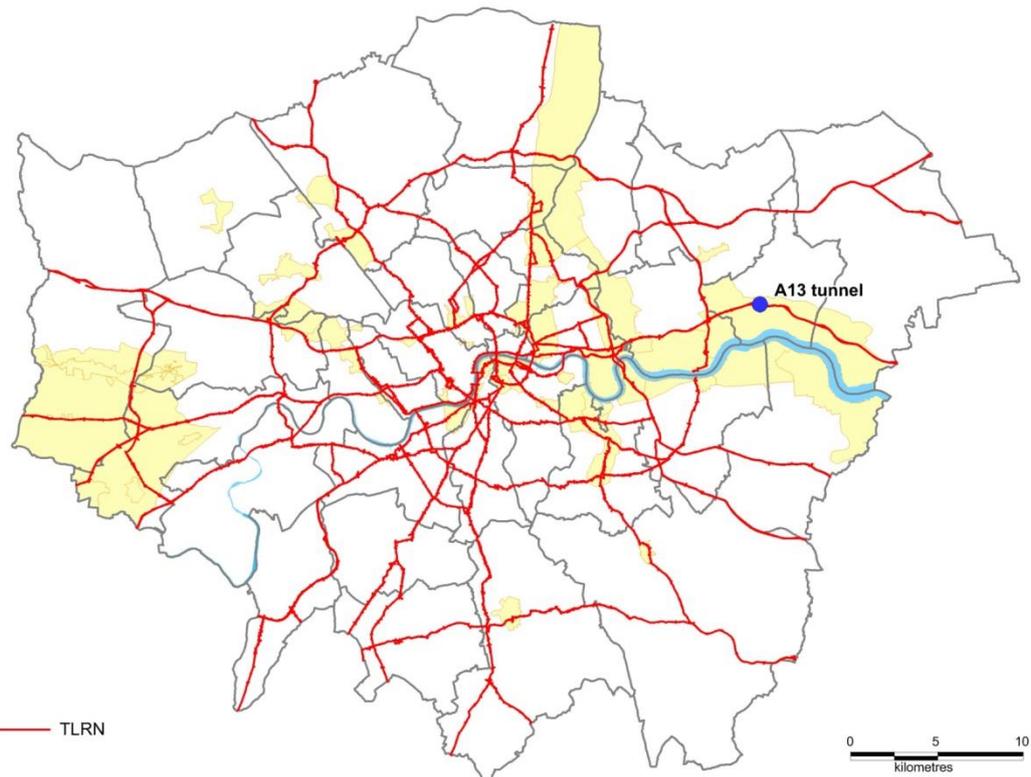
The A13 serves a key strategic movement function, which delivers substantial economic benefits to London and the UK.

2.98 The A13 is a key link in the TLRN: traffic data indicates that the road consistently carries flows of 80 – 100,000 annual average daily traffic (AADT), of which a higher than average proportion are heavy vehicles. The road carries high flows of strategic traffic between central London, east London, and the east of England.

2.99 Mode shares within the east London sub-region show that travelling by motorised vehicle is the most popular mode of choice, and accounts for around 38% percent of all journeys[44].

2.100 Given its importance as a strategic road corridor, maintaining the capacity and function of the A13 is a critical part of any proposal to develop the Castle Green area.

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[44] East and South East Sub Regional Plan Poster, 2014

The A13 suffers from high levels of delay and congestion.

2.101 The A13/Renwick Road junction is a major bottleneck as illustrated in Figure 2-14. This level of delay is projected to increase into the future as the absolute number of vehicles on London's roads continues to increase, freight and servicing requirements increase, and the demands on road space diversify. Development at Castle Green without any wider intervention could be expected to worsen this congestion, due to increased demand for road travel and poor local public transport, walking and cycling links.

> **Key findings:**
>
> Any proposal to address the negative impacts of the A13 by removing road space on the surface must maintain the important movement function of the road corridor, and address future concerns over increasing local congestion.

Figure 2-14 AM peak traffic delay
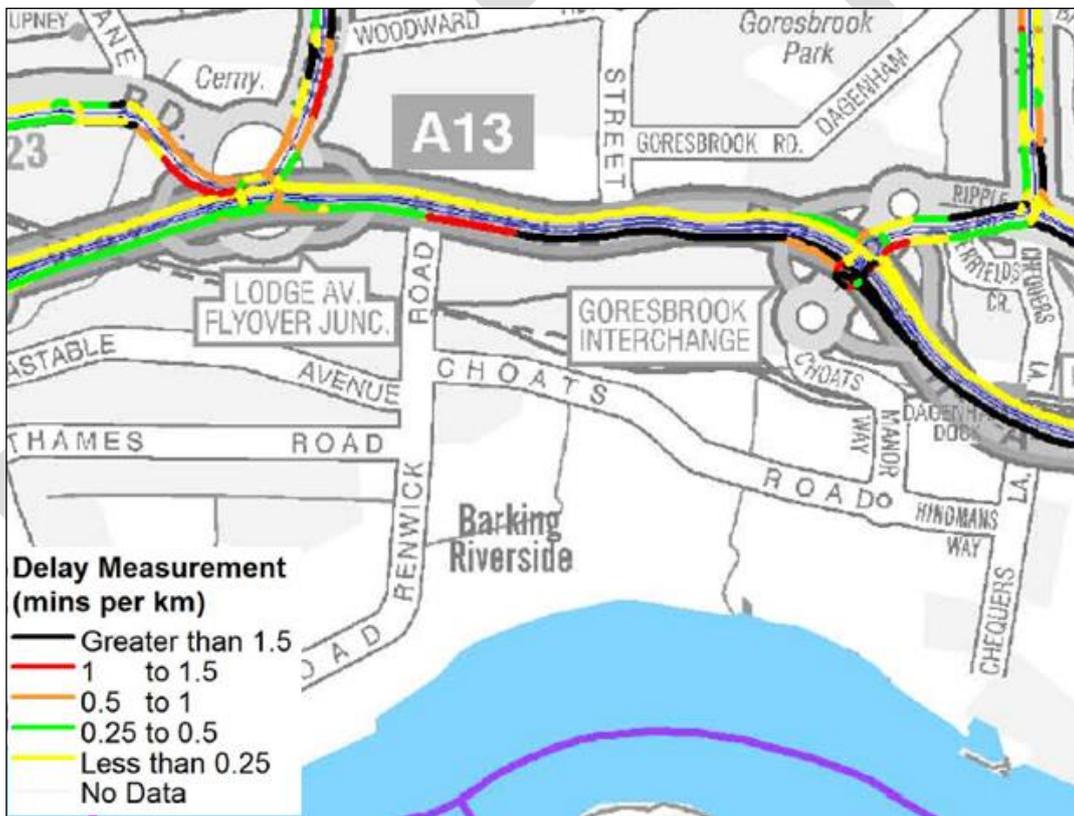
The A13 creates significant severance affecting the quality of life of existing and potential residents

2.102 Castle Green has the potential to host thousands of new jobs and homes to help support London's wider growth. However, despite its potential and Barking's pressing need for such homes, the site is currently unable to deliver any new residential development. This underperformance is largely due to the severance and negative environmental effects of the A13.

Poor urban realm and local access to Castle Green inhibit its potential for housing development.

2.103 The Castle Green site has very limited highway, public transport, pedestrian and cycle access (Figure 2-15). This is due to the physical severance caused by the A13, coupled with the perceptual severance caused by the noise and visual impact of 80-100,000 fast-moving vehicles daily and the high priority given to vehicles at junctions.

2.104 All road connections into and out of the site link directly to the A13, a route subject to peak hour congestion, particularly around the Renwick Road junction, and public transport provision comprises bus links to local centres and interchange points, specifically Barking, Ilford, and Dagenham Dock.

2.105 Pedestrian and cycle links are limited to the existing road network, which is limited and extensively used by industrial traffic, causing safety concerns for pedestrians and cyclists and resulting in a poor journey experience, blighted by the combination of high noise and air pollution and the low priority given to non-motorised traffic.

2.106 The combination of these impacts means that the A13 currently severely limits north-south connectivity into Castle Green, isolating the site and creating a significant barrier between it and the rest of Barking.

2.107 The combination of these impacts severely limits the attractiveness of the site as a place to live, meaning that the viability of any residential development on the site is undermined.

> **Key finding:**
>
> Severance impacts severely constrain the development potential of the Castle Green site by substantially limiting its accessibility and appeal to residents.

Figure 2-15 Castle Green accessibility
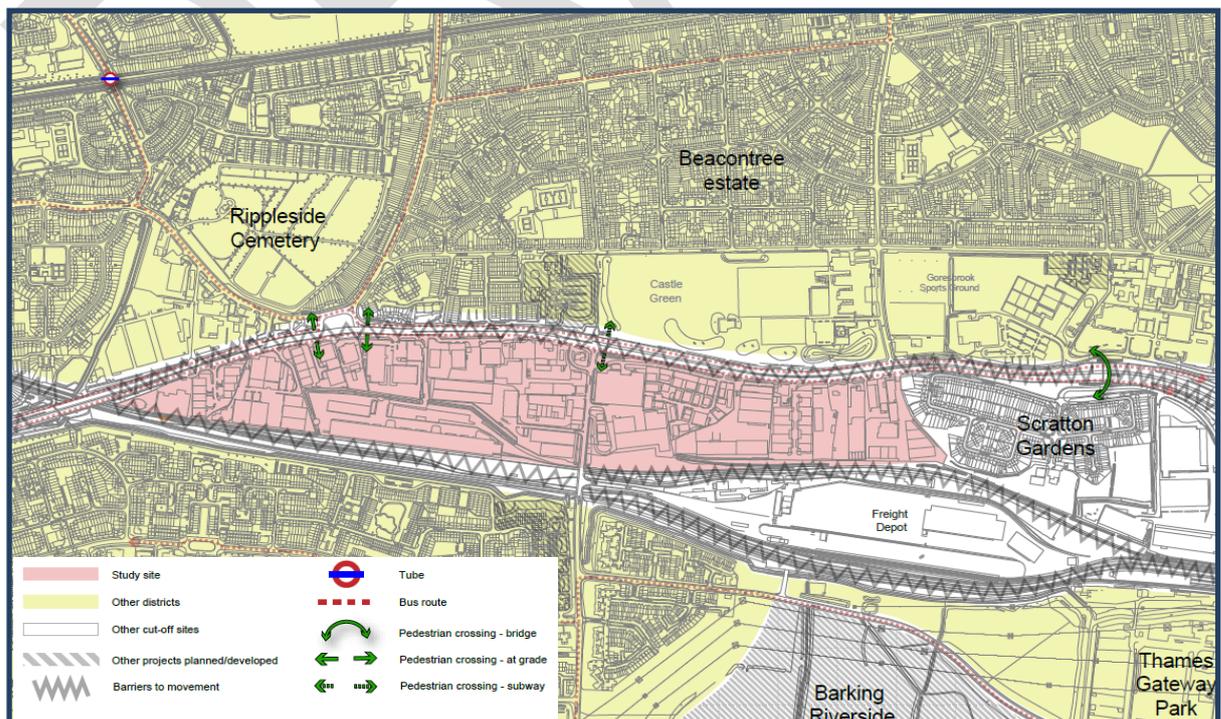
Air and noise pollution along the A13 corridor in Barking is extremely high.

2.108 The physical and perceptual severance caused by the A13, coupled with the noise, air quality and visual impacts of up to 100,000 vehicles using the A13 daily, means that local quality of life is substantially negatively impacted within Castle Green.

2.109 The A13 reaches the highest measured daily noise level for roads of 75+ decibels, whilst air pollution levels along the road corridor are so high that they breach European Union limits on air quality (Figure 2-17). The road is considered one of the 5 most polluted roads in London[45]. This creates an unpleasant, polluted environment for any potential pedestrians and non-motorised transport users of the road.

2.110 Air and noise pollution are known to have significant health impacts on residents exposed to them: it is estimated that between 6 and 9 per cent of deaths in London are currently attributable to long-term exposure to particulate matter as a result of poor air quality[46]. Building residential development along this highly polluted road corridor would expose new residents to high levels of pollution and potential negative health impacts.

2.111 Together, these factors act as a key constraint on the viability of residential development, making the area less attractive to potential buyers and in turn to developers.

> **Key finding:**
>
> Severance impacts, and high noise and air pollution combine to create a poor quality public realm along the A13 in Barking. This in turn severely limits the development potential of Castle Green.

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[45] Clean Air in London (2013) Carcinogenic diesel exhaust disclosed for every significant road in London http://cleanair.london/sources/carcinogenic-diesel-exhaust-disclosed-for-every-significant-road-in-london/
[46] TfL (2015) Transport Health Action Plan https://tfl.gov.uk/cdn/static/cms/documents/improving-the-health-of-londoners-transport-action-plan.pdf

Figure 2-16 High noise levels along the A13 in Barking

Legend:
Road, Lden

Noise Bands
- 75+ dB(A)
- 70.0-74.9 dB(A)
- 65.0-69.9 dB(A)
- 60.0-64.9 dB(A)
- 55.0-59.9 dB(A)
- 00.0-54.9 dB(A)

Features
- Inland water
- Building
- Road
- Unmapped

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Figure 2-17 NO2Emissions along the A13

EU LIMIT

NO₂

<16 16 19 22 25 28 31 34 37 40 43 46 49 52 55 58 61 64 67 70 73 76 79 82 85 88 91 94 >97
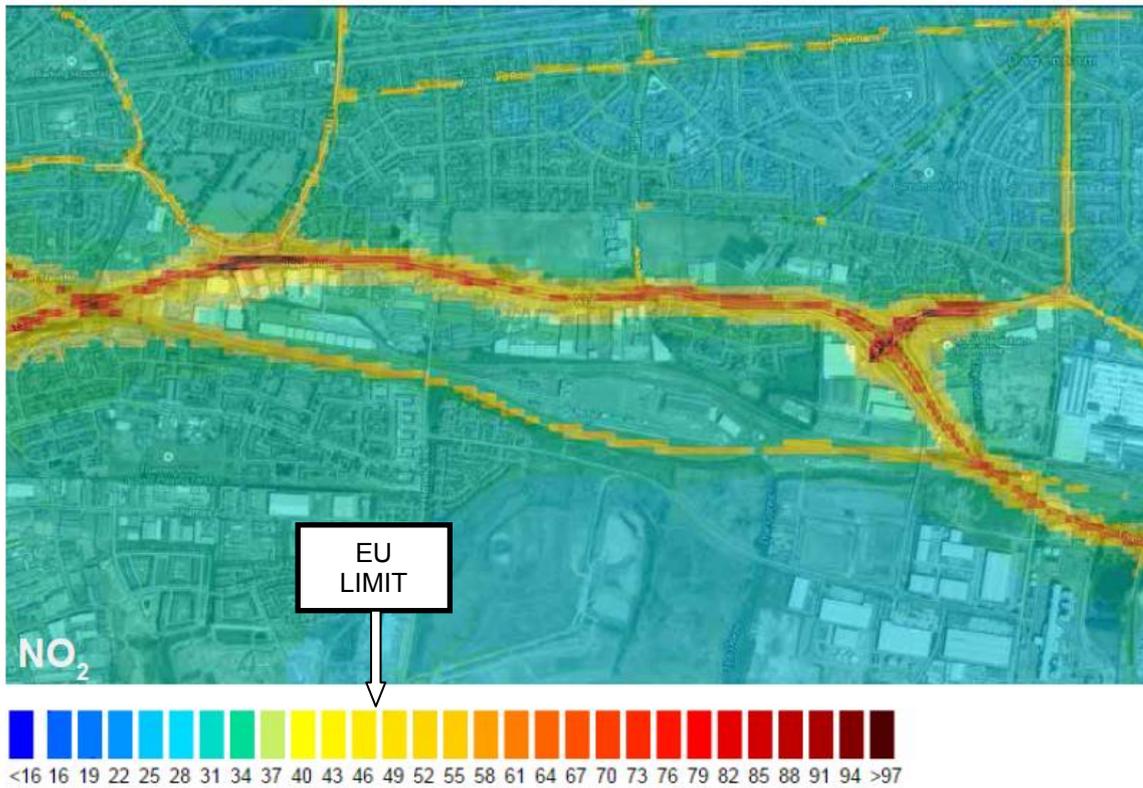
PART E: OBJECTIVES FOR THE A13 TUNNEL SCHEME AND OPTIONS CONSIDERED

2.112 The objectives and related measures of success for the A13 tunnel scheme are as outlined below:

Strategic challenges	Objective of the A13 tunnelling scheme	Measures of success
Housing supply: London's housing and office supply is not keeping pace with its population growth. London must unlock development opportunities to support delivery of new housing and jobs. There is a need to maximise the development potential of brownfield sites.	Accelerate housing delivery in Opportunity Areas and contribute to the London Plan's aim to build 49,000 new homes every year. Enable the redevelopment of the 39ha Castle Green industrial site for urban regeneration.	Enable maximisation of the contribution of Castle Green to meeting London's housing needs. Facilitate the rezoning of 39ha of Strategic Industrial Land for mixed residential development.
TLRN efficiency: Road congestion cost the London economy £5.4bn in 2013 with two thirds of these costs accrue from delays in Outer London. With a sustained growth in population and employment, TLRN traffic levels will increase significantly in the future, worsening congestion and deteriorating the quality of life of surrounding residents and the experience of road users.	Secure the strategic function of the Transport for London Road Network (TLRN). Mitigate the increasing congestion on the A13 to maintain its strategic economic function as freight corridor and major link between the eastern industrial lands, the M25 and Inner London.	Reduce delays on the A13 between the Lodge Ave flyover junction and the Goresbrook interchange.
Severance & quality of life: In many cases, severance effects from major transport corridors result in local residents having a greater reliance on the private car. The potential of regeneration sites can be undermined by local severance effects from major transport corridors (e.g. poor air quality, limited surface access to surrounding areas, visual impact, noise levels).	Improve the quality of life of residents through more efficient transport networks and reduced negative externalities. Enhance local residents' quality of life by improving urban realm, reducing severance caused by the A13 and improving local access for all road users.	Creation of new surface links between Castle Green and Barking Town Centre. Provision of safe cycling and walking routes. Enable new bus services to Castle Green. Reduced noise pollution. Improved air quality.

2.113 A number of options were appraised to determine the best highway solution to achieve the objectives outlined above. On behalf of TfL, Atkins investigated 4 potential options:

- Off line tunnel option
- On line tunnel option
- Realigned A13
- Do nothing

2.114 The off line tunnel option Figure 2-18) is proposed to be just over a kilometre in length and would provide grade separation of the A13 at the existing junctions with Renwick Road, Gale Street and Lodge Avenue. It would use cut and cover construction techniques for the tunnelled section.

2.115 The off line alignment allows the A13 to operate as normal with minimal traffic disruption during construction. Temporary traffic management measures would be required when the portals to the tunnels are linked up with the A13.

2.116 However, the on-line tunnel option, Figure 2-19, is similar to the off line option as it would provide grade separation of the A13 at the existing junctions with Renwick Road, Gale Street and Lodge Avenue. It would also use cut and cover construction techniques for the tunnelled section.

2.117 The on line option would cause significant traffic disruption during construction as it would require long term part and full closures of the A13. The arterial flow of the A13 would need to be diverted on to other roads with likely sub regional traffic impacts.

2.118 The realigned A13 option, Figure 2-20, would result in the existing A13 being relocated south to run in parallel with the existing railway lines. 2 sub options were identified each with a different tie in to the existing A13 to the east. This option would result in minimal disruption to traffic as much of the construction would not involve any traffic management to be implemented apart when the realigned A13 is linked up with the rest of the A13.

2.119 It is estimated this option would enable up to 27 hectares of Castle Green to be redeveloped. This is substantially less than the amount of land released by the tunnel options and is a result of the land take required for the surface road and the undevelopable land created to the south of the realigned A13.

2.120 A do nothing option was also considered, this would see no new road infrastructure built in this location to enable the development of Castle Green.

2.121 By undertaking a high level assessment against the objectives identified above a preferred option was selected. This option selection process involved close working with LBBD officers.

2.122 Despite having the potential to achieve all of the objectives, the on-line tunnel option was discounted. The determining factor for ruling out this option for further consideration is the unacceptable impact it would have on the operation of the A13 during the tunnel's construction.

2.123 The realigned A13 option partially addresses some of the objectives as it provides the opportunity for improved north south connections across the A13 helping to address local severance. However despite these positive outcomes this option was discounted. By retaining the arterial flow of the A13 at surface the level the transformational change required to make Castle Green a desirable redevelopment site would not be achieved. Therefore the realigned A13 option was not taken forward for further consideration.

2.124 The do nothing option does not achieve any of the defined objectives and therefore was discounted.

2.125 The off line tunnel option was selected as the preferred option as it helps to achieve each of the objectives identified above while limiting the traffic impacts during construction. The tunnel facilitates the development of Castle Green, improves local air quality and enables transformational changes to the urban realm while maintaining the strategic movement function of the A13.

> **Key finding:**
>
> A number of options were appraised to determine the best highway solution for the A13 in Barking. The A13 off line tunnel proposal was progressed for further appraisal as part of this business case.

Figure 2-18 Off-line tunnel option
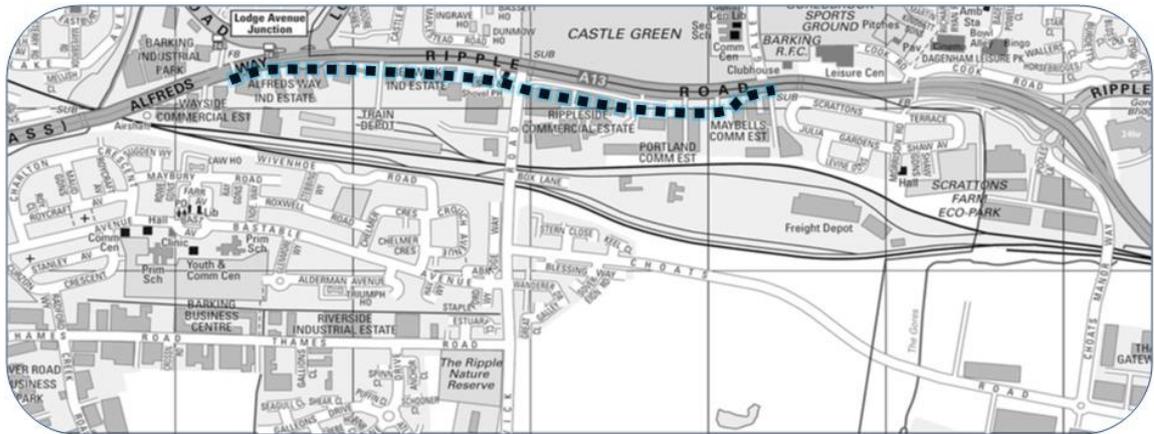
▪▪▪▪▪▪▪ Off line tunnel alignment

Figure 2-19 On-line tunnel option
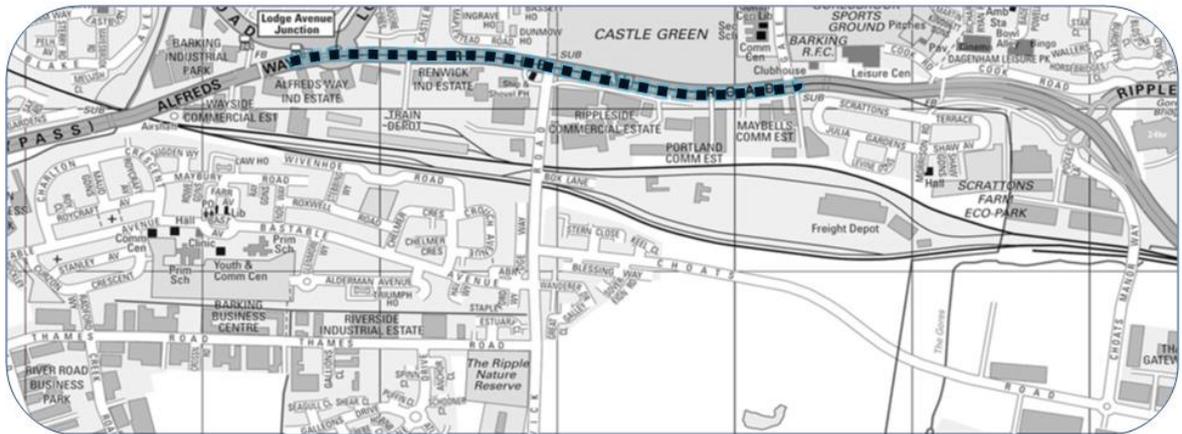
▪▪▪▪▪▪▪ On line tunnel alignment

Figure 2-20 Realigned A13
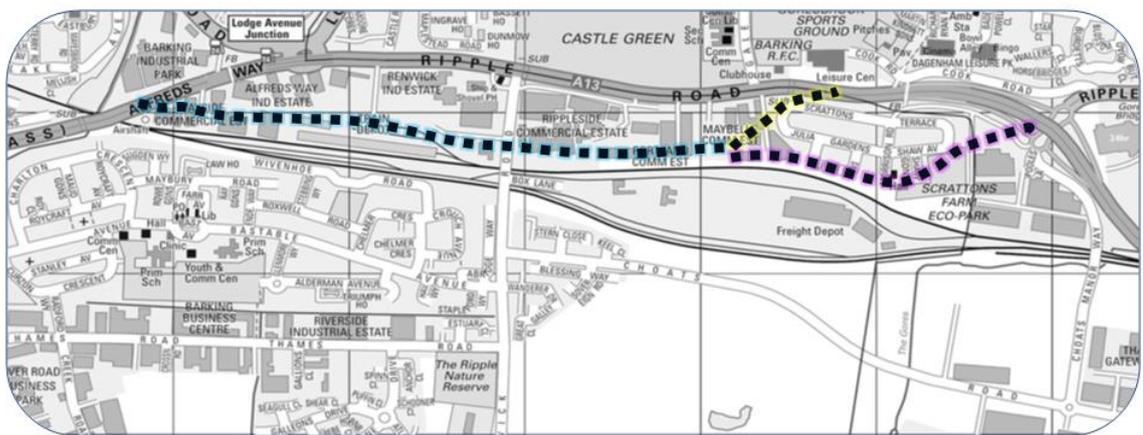
▪▪▪▪▪▪▪ Realigned A13

▪▪▪▪▪▪▪ Options for connection back into existing A13

PART F: HOW THE TUNNEL OPTION ADDRESSES THE PROBLEMS AND MEETS THE OBJECTIVES

Section Summary

1. **Better connections on the surface road network are critical to enabling a housing development at Castle Green**

   - The removal of the severance caused by the A13 at Castle Green, alongside improvements to public transport connectivity, would be the catalyst for greater development densities and enable the construction of around 5,000 new homes.

   - The new surface road network would provide better north-south links to the London Riverside Opportunity Area, therefore supporting on-going housing developments and community building.

2. **The proposed tunnel will reduce traffic volumes on surface roads and improve travel times on the A13**

   - Traffic modelling shows that delays on the A13 at Castle Green are expected to significantly improve with the proposed tunnel.

3. **Tunnelling the A13 will improve local residents' quality of life**

   - Placing the A13 in a tunnel would provide the opportunity to create new pedestrian, cycling and public transport links between Castle Green and surrounding areas including Barking Town Centre and London Riverside.

   - Tunnelling the A13 would remove strategic movements from the surface road network; therefore significantly reducing existing noise levels and improving the urban realm.

   - By reducing delays on the A13, an important freight corridor, it is expected that the scheme will improve air quality at Castle Green

4. **Without the tunnel scheme, Castle Green would fail to deliver a high quantum of residential unit**

   - Not building the tunnel would prevent the Castle Green development site from meeting its potential to deliver high levels of housing and job growth

Better connections on the surface road network are critical to enabling a housing development at Castle Green

The removal of the severance caused by the A13 at Castle Green would be the catalyst for greater development densities and enable the construction of around 5,000 new homes.

2.126 A master-planning/development capacity study jointly led by TfL and LBBD indicated that the Castle Green site has the potential to effect a transformative change for Barking and Dagenham. The site could accommodate the construction of 5,000 new homes and 1,000 jobs, creating a new neighbourhood and stimulating further positive change and regeneration in the borough.

2.127 This growth in homes and jobs could be accommodated both within land freed up by the removal of surface infrastructure, and through the redevelopment of existing sites. An indicative land use plan for the site is illustrated in

2.128 Figure 2-21.

The new surface road network would provide better north-south links to the London Riverside Opportunity Area, therefore supporting on-going housing development.

2.129 The London Riverside Opportunity Area within which Castle Green is located has the potential to accommodate a further 16,000 new jobs and over 26,000 homes. Tunnelling of the A13 would also support the wider development potential of one of London's largest Opportunity Areas.

2.130 This new supply of homes would contribute towards Barking and Dagenham's long-term need for housing, and would help to address the issues of housing shortage which can drive up house prices, worsen pressure on council and social housing, and cause problems of social polarisation.

> **Key finding:**
>
> Castle Green has the opportunity to support 5,000 homes and 1,000 jobs following tunnelling of the A13. Without the tunnel, the site will not be viable for residential development, delivering no jobs or homes, weakening the wider success of one of London's largest Opportunity Areas.

2.131 The growth in homes and jobs enabled by the A13 tunnel, alongside the new Overground station at Renwick Road, would attract new businesses and residents to Barking, with this inward investment providing an economic boost to existing businesses. This would increase local access to employment, improving opportunities for local people to access the labour market. In turn, this could help to address the severe problems of deprivation which affect the borough at present.

> **Key finding:**
>
> The A13 tunnel scheme will create new jobs and attract inward investment to Barking and Dagenham, increasing opportunities for local residents.

Figure 2-21 Castle Green Masterplan
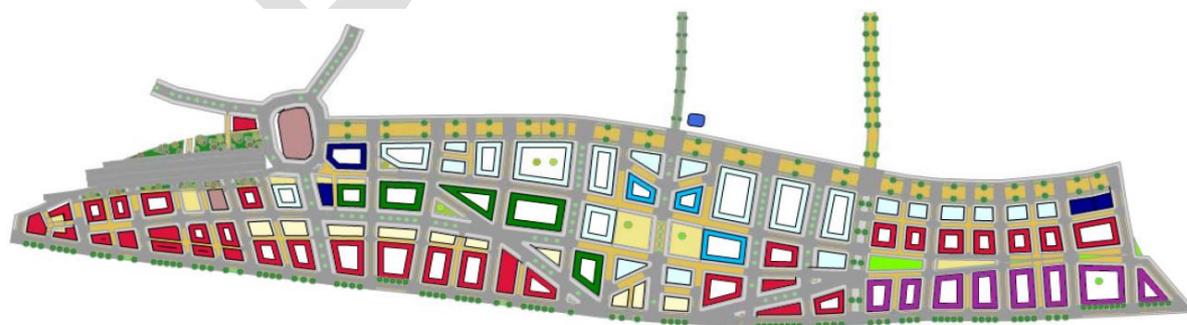
Dwellings (C3)
Shops (A1)
Public Space - Hard Landscaping
Car Park
Restaurants and cafes (A3)
Other sui generis land-use
Lawn
Business (B1)

Live Work (sui generis)
Assembly & Leisure (D2)
Woodland
Hot food takeaways (A5)
Managed green area
Drinking establishments (A4)

The proposed tunnel will reduce traffic volumes on surface roads and improve travel times on the A13

Traffic modelling shows delays on the A13 are expected to significantly improve with the proposed tunnel.

2.132 Traffic modelling of the potential tunnel and additional development in the Barking Riverside section of the A13 was undertaken by CH2M using ELHAM models. Below is the summary of this high level traffic impact study.

2.133 The traffic analysis shows that the 2031 Reference Case (without the proposed tunnel and without the proposed additional development) traffic flows into, out and through the affected section of the A13 are 13% higher than 2009 flows in the AM peak hour and 9% higher than 2009 flows in the PM peak hour. With increased traffic volumes, journey times are also expected to increase between 2009 and 2031 (see Table 2-1 and Table 2-2).

2.134 Overall, the 'tunnel only' situation results in significantly increased travel distance and significantly decreased travel time in the AM and PM weekday peak hours – totalling approximately +14,100 pcu-kms and 1,370 pcu-hrs for both peak hours. The magnitude of the travel distance disbenefit is significant, and indicates that a tunnel on the A13 at Barking Riverside attracts traffic from shorter routes. As expected, travel distance disbenefits increase and travel time benefits decrease in the 'tunnel plus additional development' situation.

2.135 A tunnel on the A13 at Barking Riverside attracts substantial volumes of traffic to the A13 between central Newham in the west and the M25 in the east. Traffic flows also increase significantly on the A406 northbound between the A13 and M11 and decrease on the 'parallel' (or 'equivalent') section of the M25 northbound in the AM peak hour. This effect is not evident in the PM peak hour.

2.136 Traffic flows along the directly affected section of the A13 and on crossing or side roads increase by as much as 15% overall in the AM peak hour and 11% in the PM peak hour as a result of the scheme. Traffic volumes along or crossing the A13 corridor between the Lodge Avenue Interchange in the west and the eastern tunnel portal, however, drop by a significant 60%. Traffic volumes entering the relieved corridor at these points reduce by a higher amount (approximately 75%).

2.137 The tunnel itself carries approximately 6,900 pcus two-way in both the AM and PM peak hours, with a 55/45 split in favour of westbound in the AM peak hour and a 60/40 split in favour of eastbound in the PM peak hour.

2.138 With just a few exceptions, additional development generally results in small (single figure %s) flow increase.

2.139 Eastbound and westbound modelled journey times on the 19.7 km section of the A13 between the M25 in the east and Canning Town in the east reduce by as much as 12 minutes in the peak directions as a result of the scheme. Journey time reductions in the non-peak directions are much less pronounced. Peak direction journey times increase slightly with additional development.

Table 2-1: AM Peak Journey Time (minutes) on the A13 between the M25 and Canning Town

	2009 Base (min)	2031 Reference Case (min)	2031 Reference Case with Scheme		2031 Reference Case with Scheme and Development	
			Min	Journey time difference	Min	Journey time difference
Westbound	33.2	38.3	26.6	–30%	27.4	–28%
Eastbound	18.1	19.4	17.5	–10%	17.5	–10%

Table 2-2: PM Peak Journey Time (minutes) on the A13 between the M25 and Canning Town

	2009 Base (min)	2031 Reference Case (min)	2031 Reference Case with Scheme		2031 Reference Case with Scheme and Development	
			Min	Journey time difference	Min	Journey time difference
Westbound	17.6	23.6	18.6	–21%	18.7	–21%
Eastbound	25.3	35	22.1	–37%	22.5	–36%

2.140 The above result summary has been taken from ELHAM. The scheme has also been run in RXHAM (which includes the new Silvertown Crossing). Examination of these model outputs shows that in the AM peak, whilst there are some numerical differences, the overall pattern of flow and delay changes is as per ELHAM. In the PM peak, the pattern remains the same as ELHAM although the numerical differences are more significant – for example to the east of the tunnel RXHAM forecasts an additional 1,300 PCUs (in comparison to 600 in ELHAM). As a result of this additional traffic, delays on links connecting to the A13 (such as the A123) increase dramatically – with delays in excess of 6 minutes on one approach in RXHAM.

Tunnelling the A13 will improve local residents' quality of life

Placing the A13 in a tunnel would provide the opportunity to create new pedestrian, cycling and public transport links between Castle Green and surrounding areas including Barking Town Centre and London Riverside.

2.141   Placing the A13 in a tunnel in the vicinity of Castle Green would create a calmer, quieter environment on the surface, creating the opportunity to provide new pedestrian, cycle and public transport links between the site and the neighbouring areas.

2.142   Figure 2-22 sets out potential new north-south links that could be created following tunnelling of the road.

2.143   Reducing severance would improve access from the site to local schools, amenities, open spaces and retail opportunities. It would also improve access through the site between Barking Riverside and Becontree.

2.144   Placing the A13 in a tunnel would also improve connectivity for the London Riverside Opportunity Area, to the south of Castle Green, which includes the Barking Riverside development and which will accommodate 10,800 new homes. The scheme would therefore also help to support the viability of this Opportunity Area, and would create new local links to ensure its integration into the fabric of the borough.

Figure 2-22 A13 tunnel, North-South links opportunities
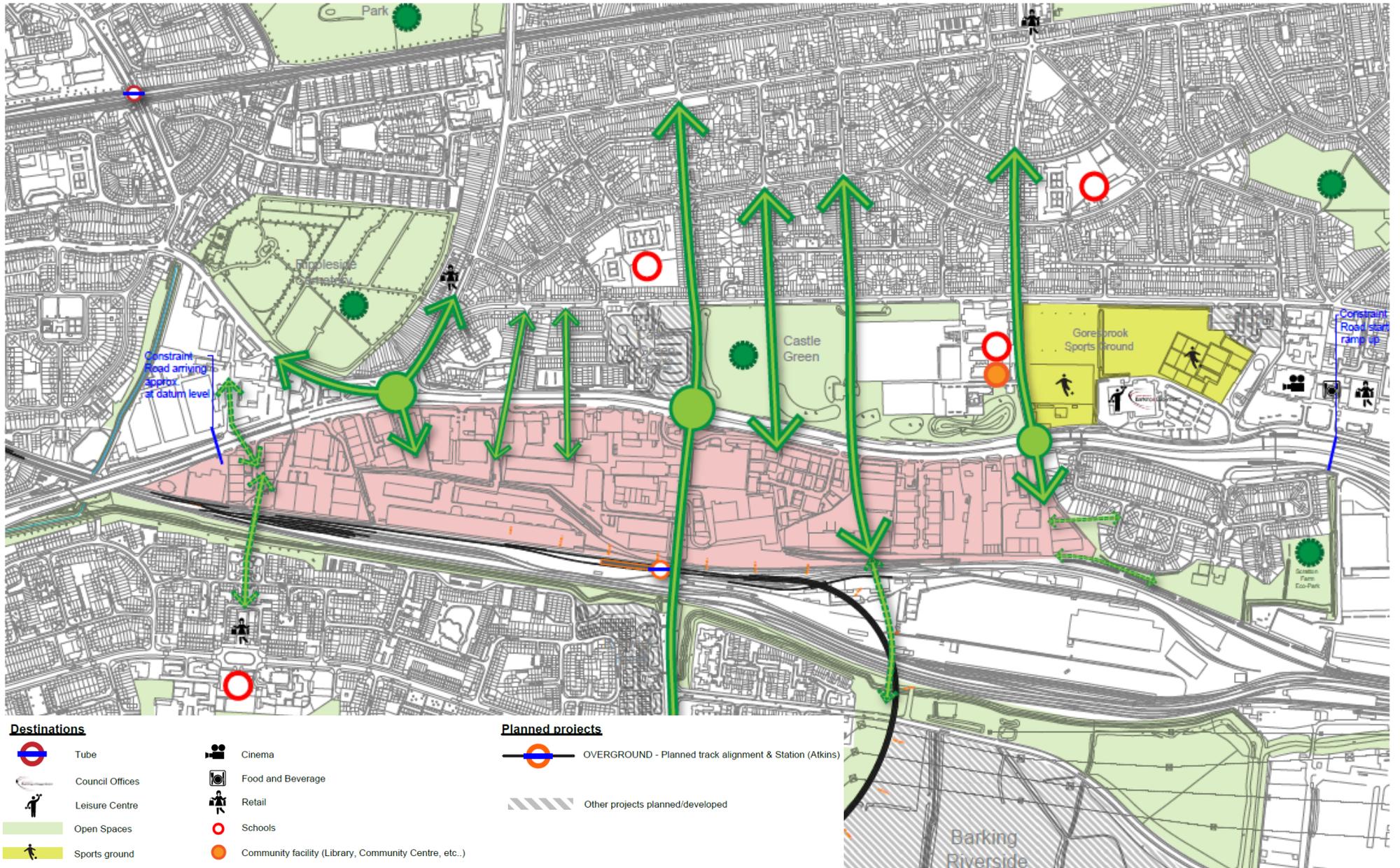
Destinations

- Tube
- Council Offices
- Leisure Centre
- Open Spaces
- Sports ground
- Cinema
- Food and Beverage
- Retail
- Schools
- Community facility (Library, Community Centre, etc..)

Planned projects

- OVERGROUND - Planned track alignment & Station (Atkins)
- Other projects planned/developed

Tunnelling the A13 would remove strategic movements from the surface road network; therefore significantly reducing existing noise levels and improving the urban realm.

2.145   The scheme provides the opportunity to create opportunities to deliver new open, green space for recreation and leisure activities. To support the redevelopment of Castle Green a new surface road network would be created. This would be designed to accommodate exemplar bus, cycle and pedestrian facilities.

Figure 2-23 Tunnelling the A13 provides the opportunity to create new public space

By reducing delays on the A13, an important freight corridor, it is expected that the scheme will improve air quality at Castle Green

2.146   The existing air quality at Castle Green is poor. This is partly due to the at-grade intersection between the A13 and Renwick Road, which is responsible for delays on a strategic corridor carrying high volumes of freight traffic. The tunnelling of the A13 includes the removal of the Renwick Road junction, removing an important source of delays. Travel time savings along this section of the A13 are expected to have a direct impact on vehicle emissions and improve local air quality.

2.147   Further air quality modelling will be required to assess more accurately the impact of the scheme on air quality in key locations, especially at portals and potential ventilation shafts locations.

Without the tunnel scheme, Castle Green would not reach its housing potential

Not building the tunnel would prevent the Castle Green development site from meeting its potential to deliver high levels of housing and job growth.

2.148 The impact of a decision to not progress with an A13 tunnel would mean:

- A deterioration of the quality of the urban realm and environmental quality as traffic volumes on the A13 increase and air quality and noise worsen
- Congestion and delay would worsen on the A13, including at the A13/Renwick Road junction
- The A13 will remain as a significant barrier for local movement, and will cause residents in the emerging Barking Riverside neighbourhood to be 'disconnected' from the rest of the borough
- The land at Castle Green would fail to deliver a high quantum of new residential units and make no contribution towards addressing London, and Barking and Dagenham's, housing need
- Increasing housing shortages and worsening affordability of housing within the borough
- Productivity and GVA levels and tax receipts would be lower.

Key finding:

Not building the A13 Riverside Tunnel project would have a number of negative impacts. These would include deteriorating environment and urban realm; rise in housing shortages and a decrease in affordability; and a failure to tackle severance issues for the new Barking Riverside development.

PART G: STRATEGIC POLICY CONTEXT

> **Section Summary:**
>
> This section describes how the A13 tunnel is supported by policy at all spatial scales.
>
> Existing national, regional and local policies give general and specific support to tunnelling of the A13 in Barking to address strategic and local needs to unlock land for development, reduce severance, improve public realm and local connectivity, and promote walking and cycling.

National policy context

2.149 The Department for Transport's nine priorities for the transport network are:

1. continuing to develop and lead the preparations for a high speed rail network
2. improving the existing rail network and creating new capacity to improve services for passengers
3. tackling congestion on our roads
4. continuing to improve road safety
5. encouraging sustainable local travel
6. promoting lower carbon transport, such as walking and cycling as well as introducing more environmentally-friendly buses and trains
7. supporting the development of the market for electric and other ultra-low emission vehicles
8. supporting the development of aviation, improving passenger experience at airports
9. maintaining high standards of safety and security for passengers and freight

> **Key finding:**
>
> The A13 Riverside Tunnel project contributes towards DfT priority numbers 3, 4, 5, and 6.

2.150 The **National Planning Policy Framework (NPPF)** published in 2010 sets out a policy framework for how the land-use planning system should function.

2.151 The NPPF seeks to secure economic growth to create jobs and prosperity. The Government is committed to ensuring that the planning system does everything it can to support sustainable economic growth and a competitive economy and so significant weight should be placed on the need to support economic growth through the planning system.

2.152 The NPPF states that the transport system needs to be balanced in favour of sustainable transport modes, giving people a real choice about how they travel. Encouragement should be given to solutions which support reductions in greenhouse gas emissions and reduce congestion.

By improving the public realm, the sustainable transport modes of walking, cycling and public transport will be made more attractive travel options.

2.153 The NPPF states that planning plays a key role in helping shape places to secure radical reductions in greenhouse gas emissions, minimising vulnerability and providing resilience to the impacts of climate change, and supporting the delivery of renewable and low carbon energy and associated infrastructure.

2.154   The NPPF says that the planning system should contribute to and enhance the natural, local and historic environment.

2.155   The **National Policy Statement (NPS) for the National Road and Rail Networks** published in December 2014 states "The national road and rail networks that connect our cities, regions and international gateways play a significant part in supporting economic growth, as well as existing economic activity and productivity and in facilitating passenger, business and leisure journeys across the country. Well-connected and high-performing networks with sufficient capacity are vital to meet the country's long-term needs and support a prosperous economy."

2.156   The NPS states that: "Improved and new transport links can facilitate economic growth by bringing businesses closer to their workers, their markets and each other." By inference there is a risk that insufficient investment in these transport connections and not increasing capacity of road and rail networks will acts as a major barrier to and brake on economic growth.

2.157   The pressure on the road network is forecast to increase with economic growth, substantial increases in population and a fall in the cost of car travel from fuel efficiency improvements. The NPS states that 2014 DfT traffic forecasts predict that by 2040, a quarter of travel time will be spent delayed in traffic.

2.158   It suggests that without improving national road networks, including its performance, it will be difficult to support further economic development, employment and housing and this will impede economic growth and reduce people's quality of life. It is reasonable to argue that the same rationale applies to the TfL Road Network.

> **Key finding:**
>
> The A13 Riverside Tunnel scheme demonstrates a close fit with national policy goals, including the DfT's nine transport priorities, the NPPD, and the NPS for the National Road and Rail Networks.

Regional and Sub-Regional policy context

The Mayor's Transport Strategy (MTS) seeks to better integrate land-use and transport planning within London.

2.159   The **Mayor's Transport Strategy** (MTS), published in 2010 by the Greater London Authority seeks to better integrate land-use and transport planning within London. The MTS sets out the following vision for travel and transport in London:

2.160   'London's transport system should excel among those of world cities, providing access to opportunities for all its people and enterprises, achieving the highest environmental standards and leading the world in its approach to tackling urban transport challenges of the 21st century.'

2.161   Alongside this vision, the MTS identifies six strategic goals for London:

1.   Supporting economic development and population growth
2.   Enhancing the quality of life of all Londoners
3.   Improving the safety and security of all Londoners

4. Improving transport opportunities for all Londoners
5. Reducing transport's contribution to climate change and improving its resilience
6. Support delivery of the London 2012 Olympic and Paralympic Games and its legacy

> **Key finding:**
>
> The A13 Riverside Tunnel project contributes towards MTS goals 1-5.

2.162 London's road network provides arteries for the movement of people and goods to help Londoners and those from surrounding areas to access employment, education, retail and leisure opportunities. A well-functioning and efficient highway network is essential for the proper functioning of the London economy and to maintain the quality of life of the residents of the city. Improvements to streetscapes and the public realm will help to create safer, more walkable neighbourhoods, support place-shaping and regeneration and attract investment. Improvements to traffic management will help to make the TfL and Borough road network more resilient.

New road schemes will be considered where there is an overall net benefit against specific criteria.

2.163 This includes a contribution to improved connectivity, and contribution to improvements in conditions for pedestrians and cyclists. Table 2-3 Relevant Mayor's Transport Strategy policies sets out how the A13 Riverside Tunnel project conforms to relevant MTS policies.

Table 2-3 Relevant Mayor's Transport Strategy policies

Policy no.	Policy description	How the A13 Riverside Tunnel project conforms with the policy
1	The Mayor, through TfL, will seek to develop London's transport system in order to accommodate sustainable population and employment growth.	The A13 tunnel scheme, alongside a new Overground station at Renwick Road will help unlock housing and create new employment opportunities by enabling the redevelopment of Castle Green.
3	The Mayor, through TfL, and working with the DfT, Network Rail, train operating companies, London boroughs and other stakeholders, will seek to improve public transport accessibility and conditions for cycling and walking in areas of lower PTAL, where there is an identified need for improving accessibility; and to improve access to economic and social opportunities and services for all Londoners.	The creation of a new surface road network through Castle Green will enable new public transport connections helping to boost PTAL levels. This will help to improve access to employment and services for residents.
4	The Mayor, through TfL, will seek to improve people's access to jobs, business' access to employment markets, business to business access, and freight access by seeking to ensure appropriate transport capacity and connectivity is provided on radial corridors into central London.	The A13 Riverside Tunnel scheme will improve access to employment by removing the barrier to movement caused by the A13 and improving north south connectivity between Castle Green and areas north of the A13 while maintaining access on this key radial corridor.

Policy no.	Policy description	How the A13 Riverside Tunnel project conforms with the policy
6	The Mayor, through TfL, and working with the DfT, Network Rail, train operating companies, London boroughs and other transport stakeholders, will seek to provide appropriate connectivity and capacity on radial transport corridors into current and potential metropolitan town centres and to Strategic Outer London Development Centres.	The A13 Riverside Tunnel scheme will improve connectivity for road users and pedestrians, facilitating the redevelopment of Castle Green whilst retaining the strategic movement function of the A13. The reduction in severance caused by the A13 and the construction of 5,000 new homes at Castle Green, within the catchment area of Barking station, will strengthen Barking town centre.
9	The Mayor, through TfL, and working with the DfT, Network Rail, train operating companies, London boroughs and other transport stakeholders, will use the local and strategic development control processes to seek to ensure that: • All high trip generating developments are located in areas of high public transport accessibility, connectivity and capacity (either currently or where new transport schemes are committed) • The design and layout of development sites maximise access on foot, cycle and to public transport facilities, for example, via safe walking and cycling routes and provision of secure cycle parking • Access for deliveries and servicing, maximise the opportunities for sustainable freight distribution where possible • Land for transport use is safeguarded in line with London Plan policy and Supplementary Planning Guidance • Planning contributions are sought for transport improvements where appropriate	The A13 Riverside Tunnel scheme will reduce local severance and traffic volumes, creating safer walking and cycling routes. The financial case for the A13 tunnel explores how funding for the scheme can be recouped through planning contributions.
11	The Mayor, through TfL, will seek to reduce the need to travel, encourage the use of more sustainable, less congesting modes of transport (public transport, cycling, walking and the Blue Ribbon Network), set appropriate parking standards, and through investment in infrastructure, service improvements, promotion of smarter travel initiatives and further demand management measures as appropriate, aim to increase public transport, walking and cycling mode share.	The A13 Riverside Tunnel scheme will encourage modal shift from the private car by providing additional cycle/pedestrian facilities.

Policy no.	Policy description	How the A13 Riverside Tunnel project conforms with the policy
13	The Mayor, through TfL, and working with the DfT, Network Rail, train operating companies, London boroughs and other stakeholders, will expand the capacity and quality of public transport services, improve passenger comfort and customer satisfaction, reduce crowding, and improve road user satisfaction.	The A13 Riverside Tunnel scheme will improve road user satisfaction by providing improved facilities for drivers on a major strategic route.
14	The Mayor, through TfL, and working with the DfT, Network Rail, train operating companies, London boroughs and other stakeholders, will seek to improve transport's contribution to the built and natural environment.	The A13 Riverside Tunnel scheme will improve the public realm and environment in Castle Green and its immediate environs, by placing the heavily trafficked A13 underground, improving noise and air quality, and improving local connectivity,
16	The Mayor, through TfL, and working with the DfT, Network Rail, train operating companies, freight operators, London boroughs and other stakeholders, will seek to reduce noise impacts from transport.	The A13 Riverside Tunnel scheme will reduce noise impacts from transport for residents in the surrounding area by 10dB for dwellings close to the A13, and 5dB for those further away.
17	The Mayor, through TfL, and working with the DfT and other government agencies, the London boroughs, health authorities and other stakeholders, will promote healthy travel options such as walking and cycling.	The A13 Riverside Tunnel scheme will reduce severance, and improve public realm and environmental quality, creating a more welcoming environment for pedestrians and cyclists
22	The Mayor, through TfL, and working with the LDA, DfT, Network Rail, train operating companies, London boroughs and other stakeholders, will seek to enhance connectivity, reduce community severance, promote community safety, enhance the urban realm and improve access to jobs and services in deprived areas.	The A13 Riverside Tunnel scheme will reduce community severance by placing the busy A13 underground. The urban realm will be enhanced by removing the roads visual intrusion and creating new public spaces on the surface. Better connections in the area will improve access to jobs and services for residents.
30	The Mayor, and TfL, will make the case to Government for long-term investment in the transport network to secure the outcomes set out in this strategy.	This business case sets out the case for investment in improving part of the strategic road network.
36	The Mayor, and TfL, will work with the London boroughs and other stakeholders, to seek to secure further investment from a variety of sources that help improve the quality and range of transport services available to Londoners.	The Financial Case for this project has considered a range of sources of funding that could be utilised to enable the delivery of the scheme.

The London Plan (updated in March 2015), sets out the strategic spatial planning framework for London as a whole.

2.164 The London Plan sets out the following vision for London:

1.3.'Over the years to 2036 – and beyond, London should:

> *1.4.excel among global cities – expanding opportunities for all its people and enterprises, achieving the highest environmental standards and quality of life and leading the world in its approach to tackling the urban challenges of the 21st century, particularly that of climate change.'*

2.165 This high level, over-arching vision is supported by six detailed objectives that will inform place-making and land-use planning for new development, all of which are in some way relevant to this business case:

- A city that meets the challenges of economic and population growth;
- An internationally competitive and successful city;
- A city of diverse, strong, secure and accessible neighbourhoods;
- A city that delights the senses;
- A city that becomes a world leader in improving the environment;
- A city where it is easy, safe and convenient for everyone to access jobs, opportunities and facilities.

Key finding:

The A13 Riverside Tunnel project contributes towards London Plan objectives 1-6.

2.166 This project will help to support the wider London economy by acting as a catalyst for investment in improving the public realm, thereby opening up redevelopment opportunities for denser development on underutilised land at Castle Green. By enabling new housing, this will help London to retain its status as a competitive global city. A better, more walkable public realm with reduced severance will improve safety for Londoners of all ages and backgrounds. The project will result in environmental improvements through supporting modal shift from the private car towards public transport, cycling and walking, with positive impacts on air quality, noise and townscape. As a result, the neighbourhood around the project will be more permeable and easier to navigate around for pedestrians and cyclists.

2.167 The Plan states that east London, with its large areas of ex-industrial brownfield land and improving transport links, should play a major role in London's growth, and that with investment in infrastructure, many of London's new jobs and homes can be accommodated in the east sub-region. The plan forecasts an additional 650,000 jobs and an increase in population of 1.2 million up to 2031. Of these increases, 22% of the additional employment and 37% of the additional population will be in the east sub-region. Achieving this level of development will require investment in transport infrastructure.

2.168 The Plan identifies London Riverside as one of the thirty three Opportunity Areas across London. These are the major reservoirs of brownfield land with significant capacity to accommodate new housing, commercial and other development. The plan states that some of the Opportunity Areas, particularly in east London, will require substantial public investment or other intervention to bring forward, and

these will be given priority in the Mayor's Economic Development Strategy and in the programmes of the GLA Group to address market failure or weakness.

The Roads Task Force (RTF) is an independent body, with a remit to tackle the challenges facing London's streets and roads.

2.169   The body brings together a wide range of interests and expertise united in the belief that the Capital needs a long-term strategy for roads and a commitment to major investment in the road network.

2.170   The RTF report, published in July 2013, focuses on three core aims:

- To enable people and vehicles to move more efficiently on London's streets and roads
- To transform the environment for cycling, walking and public transport
- To improve the public realm and provide better and safer places for all the activities that take place on the city's streets, and provide an enhanced quality of life

2.171   The RTF's highlights 'unlocking major growth and regeneration' as a key part of its vision for the city. The report notes that the potential of many areas to deliver growth is constrained because of a lack of connectivity, and/or the impact of roads on 'place value', and cites mitigation of severance as key to unlocking this potential growth.

> **Key finding:**
>
> The A13 Riverside Tunnel project contributes to all 3 core aims of the RTF

The TfL Surface Transport Plan 2015/16 sets out the approach towards managing the organisation's transport networks.

2.172   The Surface Transport Plan includes the bus, taxi, coach, river networks, freight deliveries, Santander cycle hire, Congestion Charge and Low Emission Zone schemes and the approach towards the management of the TfL Road Network (TLRN).

2.173   The Plan sets out a goal: 'to keep London working, growing and to make life in London better'. Alongside this goal, the Plan has an ambition: 'to provide, manage and improve the services, streets and places that connect London for all, sustaining its position as a world leading city'. The Plan has identified ten outcomes for surface transport in London.

> **Key finding:**
>
> The A13 Riverside Tunnel contributes to Surface Outcomes 1-9.

2.174   Table 2-4 below summarises how this project supports outcomes 1-9.

Table 2-4 Surface Outcomes 1-9

Surface Outcome	How this project contributes towards the outcome
1 - Quality bus network: Maintaining and enhancing a reliable, safe, accessible bus network and supporting coach operations, across all of London.	The development will allow creation of a new surface road network, designed for exemplar bus facilities.

Surface Outcome	How this project contributes towards the outcome
2 - Reliable roads: Ensuring a reliable and resilient road network for all of London by managing congestion and improving connectivity.	The tunnel project will result in reduced journey times on the A13.
3 - Improving the environment: Continuing to deliver environmental improvements, by reducing pollutants from ground based transport and enhancing the natural environment.	The placing of the A13 road underground will result in reduced emissions at surface level, due to fewer vehicles using the surface road network.
4 - More and safer cycling: Enabling more people to cycle, more safely, more often.	The placing of the busy A13 road underground will reduce severance, helping to improve conditions for cyclists. The new road network will be designed to provide exemplar cycle facilities.
5 - Better places to walk: Creating and supporting safe attractive, accessible streets and places that people can use, enjoy and choose to walk more.	The placing of the busy A13 road underground will reduce severance and achieve a higher quality public realm, helping to improve the pedestrian environment. The new road network will be designed to provide exemplar pedestrian facilities.
6 - Reduced casualties: Continuing the downward trend in casualties on London's roads and public transport networks	The placing of the busy A13 road underground will improve safety for pedestrians and cyclists.
7 - Sustainable freight: Enabling safer, cleaner and more efficient delivery and servicing activity to support London's economy.	The scheme will reduce noise levels generated by HGVs. The scheme will help maintain the strategic road function of the A13 corridor, key to maintaining efficient and reliable freight and servicing activity.
8 - Quality door-to-door transport: Supporting provision of safe, reliable, accessible door-to-door services, including regulating London taxi and private hire services and operating Dial-a-Ride services.	The tunnel project will reduce current journey times on the A13, benefitting all road users.
9 - Reduced crime: Continuing the downward trend in crime, antisocial behaviour and fear of crime on London's transport networks.	A more attractive public realm and higher pedestrian flows will help reduce the fear of crime.
10 - Realising rivers' potential: Harnessing the potential of London's rivers and waterways to carry people and goods.	Not applicable.

The London Infrastructure Plan 2050[47] sets out the Mayor's long-term aspirations for the infrastructure to support London's future growth.

2.175 The central projection is a 37 per cent increase in population from 2011 to 2050. It notes that the road network caters for 80 percent of people's journeys and 90 percent of freight journeys and is vital for the continued economic success and functioning of the city.

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[47] The London Infrastructure Plan, GLA, 2014 –
https://www.london.gov.uk/sites/default/files/LIP%202050%20update%20report%20March%202015_0.pdf

2.176 The **Transport Supporting Paper** of the London Infrastructure Plan 2050 sets out the capital's infrastructure requirements and how best to deliver them. The document sets out the following transport requirements that are relevant to this business case:

- 12: A new inner orbital tolled tunnel and series of mini-tunnels and decking over to help transform places across the city.
- 23: A comprehensive network of high quality cycle and pedestrian routes

> **Key finding:**
>
> The A13 tunnel scheme will enable TfL to meet the requirements of the 2050 Infrastructure Plan.

The London Housing Strategy sets out the scale of the housing shortage facing London.

2.177 This Strategy, which was formally adopted in October 2014, states that London is 'facing an epic challenge: to double house-building and build 49,000 new homes a year, every year, for the next 20 years'. This requires a level of house building unseen in the capital since the 1930s, and can only be achieved by the various parties – the boroughs, the government, the Mayor, the private sector and the public sector – working together towards a common goal.

2.178 The strategy emphasises the importance of bringing forward land for development, particularly the Opportunity Areas. If all the Opportunity Areas were developed to their full potential over the next ten years, it would represent nearly seventy percent of the 490,000 new homes needed in London over the coming decade. Barking Riverside is part of the London Riverside Opportunity Area, and is identified in the strategy as London's largest brownfield regeneration project, and a twenty first century garden suburb.

2.179 The conclusion is that east London, with its large areas of ex-industrial brownfield land and high potential for growth, should play a major role in London's growth and that with investment in infrastructure, many of London's new jobs and homes can be accommodated in the east and southeast sub-region. This sub-region is projected to increase by 600,000 people with 160,000 more jobs by 2031, which is nearly a third of London's projected growth overall.[48] However, it is recognised that achieving this growth is likely to require investment in infrastructure, including road infrastructure, and improvements in public realm and connectivity.

> **Key finding:**
>
> Castle Green can play a key role in supporting the goals of the London Housing Strategy

Local policy context

2.180 References to specific project drivers of change or other relevant policies in local planning documents are summarised in Table 2-5. LB Barking and Dagenham is strongly supportive of the tunnel scheme, which forms a key part of their vision for the development of the Barking Riverside area.

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[48] East and South East London Sub Regional Transport Plan, 2014

> **Key finding:**
>
> LB Barking and Dagenham are strongly supportive of the principle of delivering improvements to the A13, subject to concerns about local impacts.

Table 2-5 Local policy context summary

Document	Relevant content
LB Barking and Dagenham Core Strategy – 2010[49]	The Barking and Dagenham Core Strategy identifies key regeneration sites in the borough, including Barking Riverside. It sets out the need for new and improved transport infrastructure, and other measures that would improve north-south connectivity within the borough.
	Strategic Objective SO.1 refers to meeting the housing needs of existing and future residents, most significantly within key regeneration areas, including Barking Riverside.
	Strategic Objective SO.7 states that the borough will promote vibrant town centre and district centres, including a new District Centre at Barking Riverside.
	Policy CM4 states that transport infrastructure improvements will be supported where they: • Contribute to and facilitate the regeneration of the borough • Promote alternatives to the car • Serve development in a sustainable way commensurate with the land use and densities envisaged. • Do not have significant negative environmental impacts which cannot be mitigated or compensated for • Promote social inclusion and economic opportunities. • Improve transport links in areas of low accessibility.
London Riverside Opportunity Area Planning Framework (OAPF) – 2015	Barking Riverside is the single most significant development project within the OAPF. The OAPF sets out a number of planned and proposed improvements to the transport network in the London Riverside Opportunity Area.
	The OAPF Transport Strategy states that transport investment is crucial to achieving the transformational changes planned for the Opportunity Area. It cites the A13 as a key source of local severance, constraining north-south movement and limiting opportunities for walking, cycling and public transport.
	The OAPF proposes placing a section of the A13 underground to improve north-south connectivity and enhance the public realm, whilst maintaining the strategic arterial function of the road.
	Cycling infrastructure and routes should be a key part of any new development, and reducing the severance caused by the A13 is key to achieving this aim.

Stakeholders

2.181 Table 2-6 outlines the main stakeholder groups that will be involved with or interested in the project.

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[49] https://www.lbbd.gov.uk/wp-content/uploads/2014/10/Adopted-Core-Strategy.pdf

Table 2-6 Stakeholder groups

Stakeholder	Description
Affected boroughs: LB Barking and Dagenham	Local authority, protecting interests of residents and local businesses. Responsible for design review/approvals, and reviewing the impact on local residents
Adjoining boroughs: LB Havering, LB Newham, LB Tower Hamlets	Local authority, protecting interests of residents and local businesses Likely to be concerned about congestion impacts
Borough councillors and MPs	Protecting policy and constituent interests
Local community/interest groups	Groups representing those who live and/or work in the local area Interested in local impacts of the scheme, scheme design
Affected landowners	Individual or groups who own land affected by the scheme.
Business Groups	Umbrella organisations (e.g. London First) and representative groups (Barking Chamber of Commerce) protecting local businesses
Greater London Authority (GLA)	Statutory planning authority, protecting interests of Londoners and policy interest
Deputy Mayor for Transport	Providing policy advice and direction, setting priorities and taking decisions relating to transport issues on behalf of the Mayor
HM Treasury	Maintaining control over public spending, setting the direction of economic policy
Department for Transport (DfT)	Setting national policy for transport

2.182 There will be ongoing liaison with these stakeholders in relation to the project, and mapping of views and requirements and where these may conflict. Affected boroughs will continue to be updated regularly by the programme team.

2.183 As the programme advances, the stakeholders engaged are likely to expand considerably, and will include the public. Accordingly, the Stakeholder Management Plan is subject to ongoing review and will be updated/expanded as necessary

Constraints

There are a number of constraints which may have a bearing on the tunnel options under consideration.

2.184 Engineering feasibility work has been carried out on the A13 tunnel. This work has identified alignments and portal locations that are considered to be feasible, that avoid key constraints on the route, and that minimise the impact on operational infrastructure.

2.185 However, at this early stage of the design, some aspects carry a high risk and hence an optimism bias of 66 per cent for a non-standard civil engineering project has been applied. A Quantified Risk Assessment is currently being undertaken for the options, and once completed this will result in an agreed level of optimism bias for the scheme.

2.186 Constraints identified are shown in Table 2-7. Suitable mitigation measures have been identified for each constraint and in some cases have been resolved. None

of the constraints represent an insurmountable challenge. TfL is confident that they could be sufficiently addressed through suitable design.

Table 2-7 Constraints

Constraint	Type of constraint	Potential impact	Potential mitigation
Acquisition of properties	Land take	Scheme will involve permanent acquisition of commercial properties	Working closely with LB Barking and Dagenham to minimise impact on those affected by the scheme.
Unmanageable construction traffic	Construction	Risk that disruption to traffic during construction is unmanageable	Use best practice to understand innovative construction techniques. Careful traffic management will be required to ensure delays and disruption are minimised, and both traffic and pedestrian access are maintained throughout.
Proposed Masterplan layout	Planning	No formal consent for number of dwellings/construction as outlined in Masterplan and current London Plan policy does not support the development of this Strategic Industrial Land for housing.	Working closely with LB Barking and Dagenham and GLA to agree way forward.

Interdependencies

2.187 This scheme has a number of interdependencies with other proposed transport improvements in the London Riverside area that enhance connectivity and facilitate additional housing and industrial development. A direct rail link provided by the extension of the London Overground to Barking Riverside is one such scheme which could improve connections to Barking town centre and central London. The Overground extension supports the development of Barking Riverside, which has outline planning consent for 10,800 homes.

2.188 Further investment is required, with improvements to the Renwick Road/A13 junction, revisions to bus services and new walk and cycle links all part of a package of transport improvements. The A13 Riverside Tunnel scheme would help to maximise the benefits from this rail extension by improving local links into Barking Riverside so the new development in this area can access Barking town centre by all modes of transport, not just rail.

2.189 Addressing this congestion pinch point at Renwick Road Junction also helps to address future potential traffic volume increases linked to a number of proposed river crossings at Gallions Reach and Belvedere (promoted by TfL) as well as Tilbury Docks/Gravesend (promoted by Highways England).

STRATEGIC CASE SUMMARY

The Key points arising from the Strategic Case can be summarised as:

- London is a key driver of the UK's economic growth. Its success benefits the UK as a whole, but this cannot be taken for granted.

- Central London's future employment growth depends on having an increased labour supply, but the city faces significant housing and space pressures, exacerbated by a growing population.

- London must unlock brownfield land to support delivery of new housing and jobs

- There is a case for new road tunnels at key locations to unlock land for development whilst maintaining the critical movement function of the TLRN.

- The A13 Riverside Tunnel scheme can, alongside a new Overground station at Renwick Road, support the delivery of over 5,000 homes and 1,000 jobs in Castle Green, a key London growth area, as well as enhancing more widely the potential of the London Riverside OA.

- The tunnel scheme and Overground station would unlock growth by tackling the problems of poor connectivity, urban realm and environment which currently negatively affect quality of life for residents and the site's housing potential.

- There is significant support for the A13 tunnel scheme, and the scheme conforms to policy at all levels, helping to secure London and the UK's continued prosperity.

3. The Economic Case

Section summary:

This section outlines the economic analysis regarding the tunnel scheme. In line with WebTAG guidance, cost-benefit analysis has been undertaken to assess the scheme's value for money in transport terms. This has been carried out with TUBA, a DfT modelling appraisal tool.

Over the 60 year appraisal period using TfL's London Value of Time (VoT), the net present value (NPV) of the tunnel scheme is estimated at £427m with a Benefit Cost Ratio (BCR) of 2.20 (including the land acquisition costs required for the delivery of the scheme, rather than the cost of land for the whole Castle Green site). Based on these values of time, the scheme would represent "high" value for money.

In a 'with development' scenario, the scheme has an NPV of £269m and a BCR of 1.76, representing "medium" value for money. However this doesn't account for the wider regeneration and strategic benefits that this development would unlock for London, which would include thousands of much needed homes. The BCR is therefore not sufficient on its own to judge the merits of the scheme.

Option Appraised

3.1   The A13 is a major arterial road, running through the heart of the London Riverside area. It is a strategically important route for freight and is one of the busiest roads in London providing a direct link from Tilbury Docks and the M25 to the City. The A13 carries flows of between 80,000 to 100,000 vehicles per day of which 8-11% are heavy goods vehicles.

3.2   The tunnel alignment runs through Strategic Industrial Land (SIL) which has the potential for release to housing as identified by the London Riverside Opportunity Area Planning Framework. To the south lies the Barking Riverside development – the largest single development site within the Opportunity Area (OA) with planning permission for up to 10,800 new homes. To the north west of the scheme area is Barking Town Centre – congestion and severance associated with the A13 reduces connectivity from the town centre to the Riverside development.

3.3   Physical barriers to travel created by the A13 constrain north-south movement across the OA for walking, cycling and public transport. The A13 suffers from highway congestion particularly around the Lodge Avenue Flyover and Renwick Road/A13 junction, causing congestion in the Barking Riverside area for cars, buses and heavy goods vehicles travelling into London.

This economic analysis appraises a single tunnelling option

3.4   This option is to underground a stretch of the A13 with the western portal to the east of the Lodge Avenue Flyover and the eastern portal to the east of Renwick Road junction. This scheme serves to address the current bottleneck at the Renwick Road junction – one of the worst bottlenecks into London. The tunnel facilitates further development through the release of land, improvements in the public realm and reduced severance for those living and working south of the A13.

Modelling Approach & Assumptions

DfT transport appraisal guidance (WebTAG) has been followed for all sections of this report

3.5 A cost-benefit analysis has been undertaken to assess the scheme's value for money. That is, the monetised benefits are weighed against the costs of the scheme to form a Benefit to Cost ratio which quantifies the benefit received to the economy for every £1 invested in the scheme.

3.6 TUBA is a DfT modelling appraisal tool used to compute an appraisal of road transport schemes. Comparing the base (or do nothing scenario) to the scheme, TUBA assesses the difference in costs and travel time by journey purpose as well as change in fuel costs and CO_2 emissions. The demand matrices used for this analysis are consistent with the LTS forecasts of transport growth, which assumes zero percentage growth in traffic.

3.7 WebTAG also outlines approaches to the social and environmental aspects of an appraisal. This includes aspects such as severance, journey quality, and noise and air quality. This economic analysis focuses on severance and noise reduction associated with the A13 tunnel, as these impacts are deemed to be the most important.

TUBA Analysis

Purpose of this section:

This section explores both road user and non-road user benefits in terms of travel time savings. TUBA is the main economic appraisal software for transport schemes. It is compliant with DfT's WebTAG by implementing a willingness-to-pay approach to economic appraisal for multi-modal schemes with a fixed or variable demand. The TUBA analysis does not take into consideration the wider, non-transport related benefits of the scheme. The BCR resulting from the analysis does not reflect housing delivery benefits, which are the scheme's primary objective.

3.8 Assumptions for the A13 Barking Riverside tunnel scheme are as follows:

- Scheme opening year: 2030
- 60 year appraisal period
- Model years: 2031 and 2041
- Modelled periods: AM, IP and PM peaks
- Price base and base year for discounting: 2010
- Discount rate 3.5% for 30 years from current year, then 3% thereafter
- 2031 demand matrix held constant in 2041
- Road demand growth: 0% in line with TfL LTS low-car scenario
- Development scenarios: A Housing-led development scenario assuming provision of 4,700 new homes and 27,844 gross commercial/industrial floorspace is included in the modelling. Assumes that a new Overground station at Renwick Road is not delivered (impacts of this would be modelled as part of a business case for a new station).

3.9 The cost of the scheme includes land acquisition costs for the tunnel. CPO Costs are derived from JLL research into acquisition costs for the Castle Green site.

The land acquisition costs for constructing the scheme have been estimated based on the proportion of land in the development area which would be required for the tunnel, and hence retained in public ownership. The costs of the scheme include land acquisition costs for the tunnel which are assumed to occur in the year before start of construction.

3.10 Results of the TUBA analysis for the 'without development' scenario are shown in Table 3-1.

Table 3-1 TUBA headline results 'without development' of Castle Green site

| | 2010 prices and values (£'000s) | |
	DfT VoT	London VoT
Economic Efficiency: Consumer Users (Commuting)	96,878	132,391
Economic Efficiency: Consumer Users (Other)	151,647	193,820
Economic Efficiency: Business Users and Providers	345,902	471,324
Wider Public Finances (Indirect Taxation Revenues)	-13,756	-13,756
Present Value Benefits (PVB)[50]	580,671	783,779
Present Value Costs (PVC)	361,989	361,989
Net Present Value (NPV)	218,682	421,790
Benefit Cost Ratio (BCR)	1.60	2.17

3.11 The Present value of benefits (PVB) is estimated to be £581m in 2010 prices (£784m with TfL VoT) and the Present value costs (PVC) is expected to be £362m. Two separate Values of Time (VoT) have been used to calculate the monetary benefits of time savings based on DfT WebTAG and TfL BCDM.

3.12 A BCR of one to one (1:1) shows a project 'break-even' point where for every £1 invested in the scheme, there are £1 benefits received from the scheme. Therefore any BCR above unity shows value for money in terms of receiving higher benefit for every £1 of invested cost. This BCR exclude wider benefits such as the addition of up to 5,000 new homes, which is the primary goal of the scheme. Therefore the scheme should not be judged on the BCR alone.

3.13 Table 3-1 shows a BCR of 1.60 (using DfT VoT) which suggests that the 'scheme without development' is medium value for money. Using London VoT for transport user time savings shows a BCR of 2.17 which suggests the scheme is 'high' value for money, in a scenario where no redevelopment of Castle Green were to be delivered. However, as the tunnel is intended to be an enabler of development of the Castle Green site for housing and commercial, this is not a realistic scenario.

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[50] Greenhouse gas emission benefits and costs have been excluded from the PVB as WEBTAG Unit A3. Environmental Impact Appraisal requires that all 8760 hours of the year are represented in the analysis. The traffic modelling undertaken models a one hour time slice in each of the AM, IP and PM weekday peak periods.

3.14 **With the redevelopment of Castle Green, the scheme is 'medium' value for money (using London Values of Time).**

3.15 **Table 3-2** summarises the results of TUBA analysis of the A13 Riverside Tunnel scheme in a 'with development' at Castle Green scenario.

Table 3-2 TUBA headline results 'with development' of Castle Green site

	2010 prices and values (£'000s)	
	DfT VoT	London VoT
Economic Efficiency: Consumer Users (Commuting)	68,876	95,807
Economic Efficiency: Consumer Users (Other)	113,234	146,923
Economic Efficiency: Business Users and Providers	291,017	395,208
Wider Public Finances (Indirect Taxation Revenues)	-12,162	-12,162
Present Value Benefits (PVB)	460,965	625,776
Present Value Costs (PVC)	361,989	361,989
Net Present Value (NPV)	98,976	263,787
Benefit Cost Ratio (BCR)	1.27	1.73

3.16 Under a scenario where development of 4,700 new homes are brought forward by 2030 , the Present value of benefits (PVB) is estimated to be nearly £626m with TfL VoT (reducing to £461m if DfT VoT are used – both figures are in 2010 prices) and the Present value costs (PVC) is expected to be nearly £362m. Applying London VoT, the scheme has an NPV of £264m (reducing to £99m if DfT VoT are used).

3.17 The 'with development' scheme has a BCR of 1.73 (with TfL VoTs) which suggests that the scheme represents 'medium' value for money.

3.18 The remainder of the TUBA analysis relates to the 'with development' scheme.

3.19 TUBA results can be analysed in terms of the distribution of time saved. The distribution of time savings by time saved per trip is displayed in Table 3-3. It shows that a total of 47% of positive time benefits are for savings of between zero and two minutes whilst 30% are for trips greater than 5 minutes long.

Table 3-3 Distribution of time savings by user class[51]

	Time benefits £'000s					
	<-5 mins	–5 to -2 mins	-2 to 0 mins	0 to 2 mins	2 to 5 mins	>5 mins
Car-	-16,141	-26,998	-137,128	173,075	73,570	97,519

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[51] The time savings benefits illustrated in this table are not in discounted prices

business						
Car – commuting	-9,457	-13,221	-61,643	83,063	33,787	58,299
Car – other	-10,716	-15,114	-99,077	139,609	68,073	61,161
LGV	-18,874	-12,239	-73,206	90,532	59,208	78,659
OGV	-5,809	-3,456	-20,597	23,921	10,803	27,936
Total	-60,997	-71,028	-391,651	510,200	245,441	323,574
Percentage of total	12%	14%	75%	47%	23%	30%
	100%			100%		

3.20 Table 3-4 shows the distribution of time savings by distance travelled and user class with the highest percentage band of time savings in the 20-50km category (38%).

Table 3-4 Distribution of time savings by distance travelled and user class

	Time benefits £'000s							
	<1km	1-5km	5-10km	10-15km	15-20km	20-50km	50-100km	>100km
Car- business	-3,525	8,012	22,906	17,320	21,262	71,826	21,723	4,372
Car – commuting	-555	5,811	12,277	9,328	10,384	39,359	12,060	2,165
Car – other	-534	14,320	25,547	16,697	16,253	53,622	14,859	3,170
LGV	-193	6,597	22,979	27,937	9,652	37,933	17,286	1,890
OGV	6	2,636	5,978	5,180	5,425	9,923	3,770	-122
Total	- 4,801	37,376	89,687	76,462	62,976	212,663	69,698	11,475
Percentage of total		7%	16%	14%	11%	38%	12%	2%

Summary of TUBA benefit analyses

3.21 The Present Value of Benefits relating to the provision of the A13 tunnel without any dependent development is £581m (£784m with TfL VoT). In this 'without development' scenario, the scheme results in journey time savings for strategic east-west traffic towards central London via the A13 through removal of the Renwick Road junction and existing Lodge Avenue flyover which are congestion bottlenecks. There are also slight increases in benefits associated with the extension of Renwick Road over the A13 which results in improved north-south movement. This supports improved accessibility in the Castle Green area. Partially offsetting these benefits are the downgrading of the existing A13 surface into a boulevard which effectively reduces vehicle capacity for local traffic.

The scheme BCR using TfL values of time is 1.73:1 with development at Castle Green (which does not include wider regeneration impacts brought forward by the scheme)

3.22 With a development scenario including provision of 4,700 new dwellings and 27,844 sqm of commercial/industrial floorspace, the PVB falls to £461m (£626m with TfL VoT). This reflects additional traffic from the new housing and employment uses. The majority of benefits relate to trips over 20km in length (52% of gross time savings benefits) which reflect benefits to strategic traffic using the A13. The resulting BCR is 1.73 (using TfL Values of Time) which is 'medium' value for money according to DfT VfM Assessment criteria. However, this BCR does not include the regeneration and wider impacts of changes in land use and mixed use development brought forward by the scheme. Indeed these positive impacts and objectives of the scheme 'count against' it in this traditional transport user benefits approach to appraisal.

Key finding:

> If traditional transport user benefits were considered in isolation, the A13 tunnel (with development) would offer 'medium' value for money. However, given that the tunnel's focus is on enabling regeneration, the BCR of 1.73 to 1 (using London VoT) should be considered alongside the significant benefits of regeneration and land use change brought forward by the scheme.

Appraisal Summary Table

Table 3-5 Appraisal summary table

Appraisal Summary Table		Date produced:	16	9	2015		Contact:	
Name of scheme:	Barking Tunnel					**Name**		
Description of scheme:	tunnelling option to underground a stretch of the A13 with the western portal to the east of the Lodge Avenue Flyover and the eastern portal to the east of Renwick Road junction					**Organisation**	TfL	
						Role	Promoter/Official	

	Impacts	Summary of key impacts	Assessment			
			Quantitative	Qualitative	Monetary £(NPV)	Distributional 7-pt scale/ vulnerable grp
Economy	Business users & transport providers	Business users benefit from the time savings are mostly within the >5 min category	Value of journey time changes(£) £191,002,000 / Net journey time changes (£) / 0 to 2min £16,357,000 / 2 to 5min £30,959,000 / > 5min £143,686,000	positive benefit	£291,017,000	
	Reliability impact on Business users	The scheme is likely to increase reliability for strategic traffic between Greater and Central London from removal of the Renwick Junction congestion hotspot			N/A	
	Regeneration	Tunnel releases land for development	1213 net additional jobs and 2,350 homes at London - level; £791m of GVA		N/A	
	Wider Impacts				N/A	
Environmental	Noise	The scheme will have a beneficial impact on the noise levels for residents in the tunnel scheme area. By realigning the road layout to have traffic passing through a tunnel rather than on surface roads will reduce noise pollution from the heavily used A13. The impact of the noise level has been estimated using a basic noise level calculation. The reduction in noise provided by the tunnel is considered to be 10dB for dwellings close to the A13and 5dB for dwellings further away.	The scheme will lead to a reduction in noise from traffic (including HGVs)	slight beneficial	£13,022,606	
	Air Quality	An environmental assessment has not been carried out, however, the scheme is not expected to impact air quality levels.		neutral	N/A	
	Greenhouse gases	Not able to estimate as TUBA is only run for peak periods and not for all 8760 hours of the year. The scheme is likely to have a slight beneficial impact given less stop-start queuing which increases fuel usage	Change in non-traded carbon over 60y / Change in traded carbon over 60y (CO2e)	neutral	N/A	
	Landscape	The scheme will complement the current pattern of the landscape, being an urban strategic route.		neutral	N/A	
	Townscape	The scheme fits well with the current layout and future development plans for the area		slight positive beneficial	N/A	
	Historic Environment	The scheme does not impact on historic landscape		neutral	N/A	
	Biodiversity	The scheme does not really impact biodiversity - it may help slightly with the park planned on top of the decking but effects are likely to be minimal		neutral	N/A	
	Water Environment	This scheme does not impact the water environment		neutral	N/A	
Social	Commuting and Other users	Commuters users benefit from the time savings, however most time savings are small: within the 0-2min category	Value of journey time changes(£) £150,834,000 / Net journey time changes (£) / 0 to 2min £30,363,000 / 2 to 5min £34,637,000 / > 5min £85,834,000	positive benefit	£182,110,000	
	Reliability impact on Commuting and Other users	The scheme is likely to increase reliability for strategic traffic between Greater and Central London from removal of the Renwick Junction congestion hotspot		slight beneficial	N/A	
	Physical activity	The scheme will not impact on physical activity to a large extent. It may encourage more walkers and cyclists as the journey will be more pleasant and safer		neutral	N/A	
	Journey quality	The scheme is expected to bring either neutral/slightly beneficial benefits in terms of journey quality. A reduction in queuing times will reduce driver stress		neutral/slight beneficial	N/A	
	Accidents	The scheme is expected to have a slight benefit in terms of reducing the numebr of accidents from bypassing the Renwick junction		neutral/slight beneficial	N/A	
	Security	This scheme is not expected to have security impacts		neutral	N/A	
	Access to services	The scheme will ensure better access to the Riverside development to/from Barking Town Centre and Station		neutral	N/A	
	Affordability	This scheme is not expected to have affordability impacts		neutral	N/A	
	Severance	The scheme is expected to have a significant impact on severance.The A13 constrains north to south movements for residents towards the south in accessings the town centre and stations on the north side. Severance is a particular issue where the population affected are dependents: those being under the age of 16 or over the age of 65, given the vulnerability this group of people sometimes feel.	11,094 residents located in and around the scheme area are expected to experience reduced severance, of which 4,170 are of dependent age.	positive benefit	N/A	
	Option and non-use values	This scheme is not expected to have option & non-use value impacts		neutral	N/A	
Public Accounts	Cost to Broad Transport Budget				£356,434,000	
	Indirect Tax Revenues				-£12,162,000	

Supplementary Analysis – Net Additional Homes, Jobs and GVA unlocked

> **Purpose of this Section:**
>
> This section sets out the methodology and results of an approach which has been developed by TfL to assess the value of the additional jobs and houses at Castle Green that could be unlocked by transport infrastructure investment including the A13 Tunnel and Overground station at Renwick Road.

3.23   This section presents an overview of the additionality approach and its results. In order to maintain clarity, technical details are omitted. An additional Technical Appendix presents further information on various aspects: methodology, factors, assumptions, data sources, and detailed results.

This approach has been developed to address a number of recommendations made in the TIEP report

3.24   This approach has been developed in light of emerging research, advice and discussion on the economic impacts of transport schemes, and in particular to fulfil some of the recommendations of the "Transport investment and economic performance" (TIEP)[52] report, commissioned by the Department for Transport (DfT) and published in October 2014.

3.25   The authors of the TIEP report sought to examine the "impacts of transport investments on economic performance with a view to informing the appraisal techniques that are used in project selection."[53] Their final recommendations will inform future revisions of the DfT WebTAG appraisal guidelines.[54]

3.26   TfL has developed this approach to specifically address 3 of the 7 recommendations of the TIEP report[55]:

> 1) Appraisal of larger projects should direct more attention to impacts on private sector investment decisions and associated changes in employment and economic activity.
>
> 2) Land-use change (and more general changes in the level and spatial distribution of private investment) should be estimated and reported in a wider range of projects.
>
> 3) In some circumstances it will be appropriate to produce estimates for a range of different scenarios concerning private sector responses and related government policies.

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[52] 'Transport investment and economic performance', Venables, Laird & Overman (2014). URL:
https://www.gov.uk/government/publications/transport-investment-and-economic-performance-tiep-report
[53] Ibid, p. 9
[54] As outlined in 'Understanding and valuing the impacts of transport investment: progress report (Dec 2014)', Department for Transport (2014). URL:
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/389960/understanding-and-valuing-the-impacts-of-transport-investment-progress-report-2014.pdf
[55] Venables et al. (2014): pp. 62-63

The approach to calculation of net additional homes and jobs and GVA impacts is in line with Government guidance

3.27 As a framework, this approach follows published guidance[56] from the Homes and Communities Agency (HCA), and is consistent with both the HM Treasury 'Green Book'[57] and the '3Rs'[58] guidance published by the Department for Communities and Local Government (DCLG). In addition, Professor Peter Tyler, lead author of research into additionality for DCLG[59] and the Department of Business, Innovation and Skills (BIS)[60], has advised TfL throughout the development process.

3.28 Additionality is defined as "the net changes that are brought about over and above what would take place anyway."[61]

3.29 This approach has been developed to estimate:

- **Jobs** – the number of additional jobs unlocked by the schemes
- **Homes** - the number of additional homes unlocked by the schemes
- **GVA** - the value of the additional jobs unlocked by the schemes, in Gross Value Added (GVA) to London

3.30 It is important to note that the estimates presented in this section are assessments of additional impact at the regional (London) level. They represent the additional impact of the scheme across London; although it is important to consider possible scheme impacts outside London, they have not been included in the additionality results

3.31 The key components of the methodology include the following:

> **Direct effects** – an estimate of the overall impact of implementing a scheme, including immediate, consequential, and induced effects
>
> **Leakage effects** – an estimate of the effects on those outside of the target area. These should be deducted from the direct effects at the assumed proportion of leakage for each case.
>
> **Displacement effects** – an estimate of those impacts that are transferred from elsewhere within the target area. These should be deducted from the direct effects at the assumed proportion of displacement for each case.

---

[56] 'Additionality Guide' 4th ed., Homes and Communities Agency (2014). URL:
https://cfg.homesandcommunities.co.uk/sites/default/files/aboutus/additionality_guide_2014_full.pdf
[57] 'The Green Book: appraisal and evaluation in central government', HM Treasury (2003, updated 2013). URL:
https://www.gov.uk/government/publications/the-green-book-appraisal-and-evaluation-in-central-governent
[58] 'Assessing the impacts of spatial interventions: regeneration, renewal and regional development', Office of the Deputy Prime Minister (2004). URL:
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/191509/Regeneration__renewal_and_regional_deveopment.pdf
[59] 'Valuing the benefits of regeneration', Tyler et al. (2010). URL:
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/6382/1795633.pdf
[60] 'Research to improve the assessment of additionality', Tyler et al. (2009). URL:
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/191512/Research_to_improve_the_assessment_of_additionality.pdf
[61] HCA (2014): p. 3

> **Multiplier effects** – activity associated with additional local income, local supplier purchases and longer term development, such as through supply chains and expenditure on other activity. These need to be added to the direct effects.

3.32 For the A13 Tunnel, the following options were assessed for additional impact:

- Reference case (or 'deadweight') – no tunnel, and no redevelopment on the Castle Green site; and
- Intervention Case – The A13 Riverside Tunnel option, and associated redevelopment of the Castle Green site.

3.33 These intervention options assume a scheme opening year of 2031.

3.34 The employment impacts of a scheme are the sum of direct and indirect effects. Indirect employment effects, a product of the additional housing unlocked by the two schemes, can be identified through two separate effects:

- **Enhanced connectivity**
  - In areas where there is a relatively high demand for housing – e.g. most of London – the lack of new housing constrains the ability to generate higher employment densities than currently available. Therefore additional housing unlocked by a transport scheme provides dynamic benefits by enabling households to relocate closer to employment centres, or to enhanced transport links to access jobs. In line with research undertaken for DCLG[62], it is assumed that 25% of additional housing generates additional indirect employment. For London, this is probably a conservative assumption.

- **Increased local household spending**
  - Additional housing generates indirect jobs as a result of new households' spending on community, leisure and retail services in the local economy. Following a review of 2011 Census data for London, it is assumed that 171 jobs are created for every 1,000 additional homes provided.

3.35 The value of the additional jobs unlocked by the two schemes is assessed individually for each type of employment effect:

- GVA generated by additional direct jobs
- GVA generated by additional indirect jobs sustained by additional housing (due to enhanced connectivity)
- GVA generated by additional indirect jobs sustained by additional housing (due to increased local household spending)

3.36 The overall methodology of the approach is summarised in Figure 3-1:

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[62] Tyler et al. (2010)

Figure 3-1 Summary of TfL additionality approach
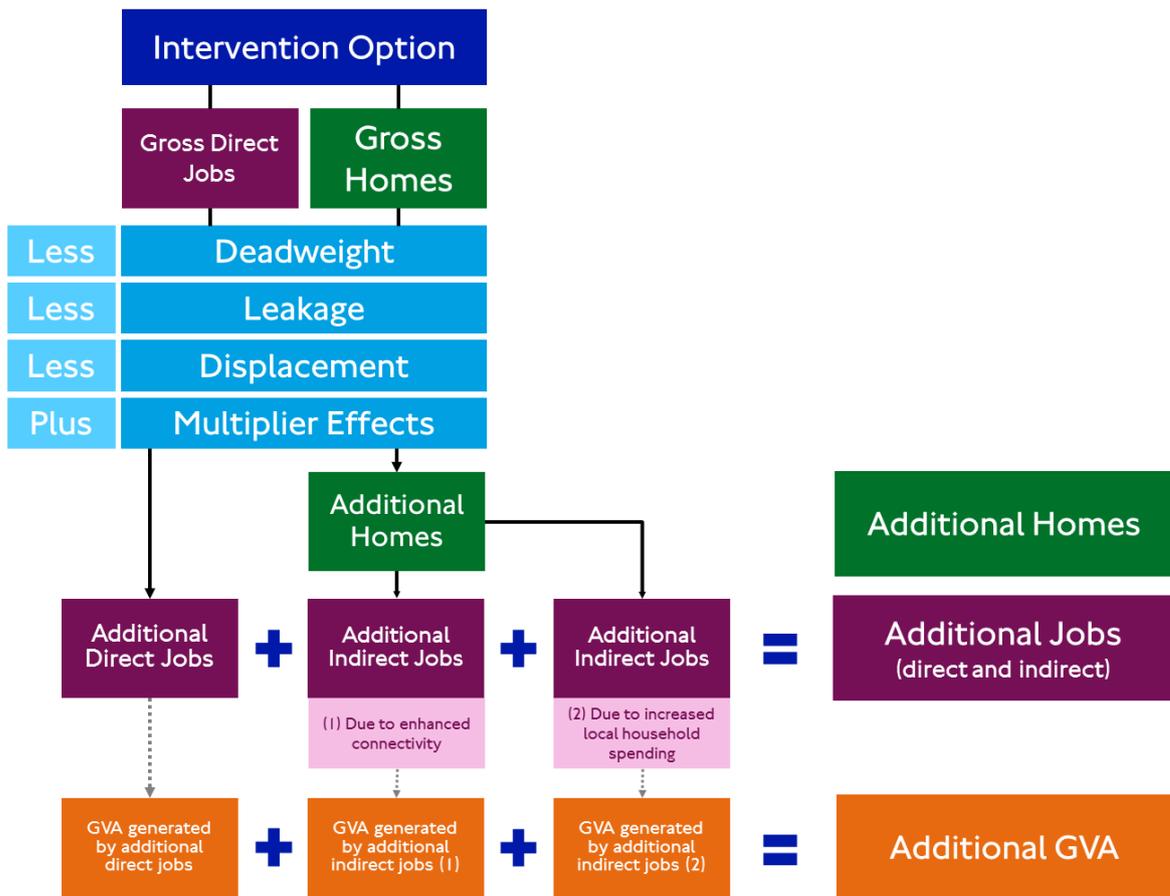
Investment in transport infrastructure in the vicinity of Castle Green, including the A13 Tunnel and a new Overground station at Renwick Road will help to deliver significant volumes of new housing, jobs and GVA

3.37   The results of the additionality approach are summarised in Table 3-6, below:

Table 3-6 Summary of additional impacts of A13 Tunnel (at London level)

Figures rounded to nearest 10	
Additional homes	2,235
Net additional jobs (direct and indirect)	1,350
GVA generated by additional jobs (direct and indirect) (£m PV)	740

3.38   The net additional jobs figure above sets out the direct and indirect employment associated with the new housing. Updated research published by GLA Economics in October 2015 (Working Paper 71) suggests that an increase in the resident population of 1,000 will on average have the potential to give rise to a further 171 jobs in the locality.

3.39   It is assumed that existing employment on commercial and industrial land at Castle Green that would be redeveloped for residential/retail use would not be lost to the London Riverside OA, as it is likely that this employment would be relocated to other remaining employment areas within the OA through densification of existing industrial land.

3.40   As indicated in Table 3-6 the A13 Tunnel (together with a new station at Renwick Road) could support the delivery of up to 2,235 new homes, and new office floorspace and other employment floorspace on the Castle Green site which would support up to 1,350 new jobs. This new employment would generate an additional GVA for the London economy of up to £740m. However, given that housing market constraints in London are very different to other parts of the UK, following the additionality guidance and assuming that 50% of housing displaces housing delivery elsewhere is a conservative assumption. This is not reflective of reality in the London context, so it could reasonably be argued that the full 5,000 new housing units at Castle Green are genuinely net additional.

3.41   Realising this growth is dependent on more flexible planning policies being adopted that support redevelopment of Strategic Industrial Land (SIL) at Castle Green for residential and commercial uses to higher densities than existing adjacent areas. These benefits are contingent on a level of housing delivery that would require higher density development at sites in the vicinity of the existing A13. However, they demonstrate potentially major economic benefits for both the local area – the borough of Barking and Dagenham – and for the London economy.

Public Realm

The A13 Tunnel will deliver significant Public Realm benefits

3.42   The core aims of the Roads Task Force (RTF) seek to improve the quality of the city's public realm and transform the environment for cycling, walking and public transport. In recent years, exciting new places for city life have been created that deliver high quality cycling networks and re-imagined streets with a safer, cleaner and greener walking environment. Public realm investments can enhance connectivity, attract more tourism and reduce severance amongst communities. Making cities more walkable reduces reliance on car, contributes to better health and stimulates more spending in district town centres

TfL has applied a robust approach to quantifying the value of urban realm improvements

3.43   The monetary benefits of better open spaces for walking and cycling can be uncovered by analysing the traded prices of goods linked to public realm improvements (e.g. house prices, retail rents or Gross Value Added) or undertaking stated preference-based surveys which uncover the willingness to pay of non-traded goods (e.g. the value of better experiences on streets and in places).

3.44   Table 3-7 illustrates some of the potential mechanisms through which better quality public realm is realised.

Table 3-7 Mechanisms that capture benefits realization of public realm improvements

Benefit	Valuation technique
Tourism, retail activity and inward investment	Higher tourism footfall, retail spending and inward investment in town centre
Walk/cycling time savings from improved local connectivity	Pedestrian time savings gained from reduced severance and increased permeability of surroundings
Health-related productivity benefits through reduced absenteeism	Valuation of net GVA gained through reduced absenteeism
Residential property prices and retail rents	Boost in prices observed in residential and commercial property markets
Reduced accidents and crime	Gain in welfare, economic output and decrease in medical, healthcare costs
Modal shift from car to public transport/cycling and walking	Reduction in fuel consumption, CO_2 emissions and improved air quality from shift from private car to other modes
Noise reduction	Gain in social benefit modelled through revealed preferences techniques drawing on house price data
User experience	Gain in social benefit modelled through willingness-to-pay surveys for higher quality public realm

3.45 It is important to note that double-counting could arise if each of these benefits were added together. For example, a boost to house prices due to provision of quieter, safer open space will also partly capture the social benefits uncovered by a noise or accident assessment. A distinction can be made between aspects of better public space which result in a *welfare* gain as captured by time savings, higher house prices, enhanced user experience) and those which result in changes in *economic output* (higher investment and productivity).

Further work using the TfL Valuing Urban Realm Toolkit as a basis for quantification of public realm enhancements will be carried out as this business case is developed

3.46 For this study, it is proposed that future phases of work will quantify the benefits of greater quality public realm through use of the Valuing Urban Realm Toolkit (VURT)[63] developed by TfL. This tool provides objective, evidence-based monetization techniques for less tangible benefits of better streets and spaces. The outputs of the VUR toolkit are as follows:

- User Benefits (the values people say they give to changes in urban realm quality)
- Property benefits (increases in residential prices and retail rents)

3.47 The VURT derives monetised urban realm value of a scheme using the Pedestrian Environment Review System (PERS) which assesses the quality of the existing and proposed streetscape through a seven-point quality scale from -3 to +3. Research has been undertaken to derive robust 'Willingness-to-Pay' values for every minute spent in the urban environment for different levels of streetscape quality,

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[63] TfL's Business Case Development Manual now recognises the VURT toolkit as the approved means of producing values for the User Experience of Public Realm

as measured using PERS. Similar research has been undertaken to derive the impacts of a change in quality of streetscape on residential property prices and retail rents. However, the two measures should be reported separately as there would be 'double-counting' as enhanced experiences for local residents could also filter through into higher house prices and retail rents.

3.48   The VURT toolkit methodology follows a two-stage approach:

> 1) **Pedestrian counts**: an initial day long count of pedestrian activity in the scheme area is undertaken to determine the peak period taken forward for analysis. Further PERS assessments and pedestrian activity counts are undertaken at a more local level to acknowledge the diverse character of streetscapes and footways within schemes. Counts are obtained for people walking and staying in public places (e.g. public seating, café tables etc.).

> 2) **Baseline and forecast PERS assessment:** the forecast scenario will have to be understood in sufficient level of detail to enable changes in certain dimensions to be accurately measured and for there to be clarity about, for example, the proposed location of street furniture, crossing points, light etc. Realistic scheme visualizations will also enable a rational assessment of some of the less tangible scheme attributes such as Personal Security and Quality of Environment.

3.49   The forecast scenario requires an assessment of the likely number of people using the urban environment under the scheme. TfL's London Walkability Model can be utilized as a tool to forecast changes in pedestrian density as a result of reduced severance.

TfL's Better Junctions and Cycle Superhighways Study has shown there to be significant benefits of improving public realm

3.50   For example, an East-West 'Crossrail for the Bike' for a sample section of Victoria Embankment between Northumberland Avenue and Savoy Street/Place was shown to generate £1.1m-£1.9m of user experience benefits over the lifetime of the scheme.

3.51   Table 3-8 illustrates the magnitude of social benefits that can be achieved from schemes which have similar public realm improvements.

Table 3-8 Better Junctions and Cycle superhighways VUR modelled user experience benefits

Scheme	Present Value of User benefits (£m)
Victoria Embankment East-West 'Crossrail for the Bike'	1.1-1.9
Old Street Superhighway City Hub	7.0-26.5
Ludgate Circus North-South 'Crossrail for the Bike'	0.3-0.5

3.52   The above estimates illustrate the scale of user experience benefits as modelled by the VUR toolkit – the change in PERS attributes and the predicted volume of pedestrian activity over the lifetime of the scheme are the underlying drivers for the calculations.

A more detailed assessment of the urban realm benefits is expected to be undertaken should the scheme progress to the next stage of development

3.53 A more detailed assessment of the urban realm benefits is expected to be undertaken should the scheme progress to the next stage of development. Understanding the relative values of different PERS attributes can also help shape design development in subsequent stages of the scheme. The Willingness-to-Pay values for different attributes are a reflection of the benefits that people appreciate and we can thus focus on improving attributes that people value more highly than others.

3.54 The benefits of quality public realm can be monitored against policy objectives over the longer term, for example through performance indicators such as crime/accident statistics, London Travel Demand Survey (LTDS), town centre performance indicators, permanent pedestrian counter installations.

Severance

The A13 currently creates severance between Barking town centre and the Castle Green site

3.55 Severance is defined in WebTAG unit A4.1 section 5 as 'the separation of residents from facilities and services they use within their community caused by substantial changes in transport infrastructure or by changes in traffic flows'. Severance is an issue where traffic flows impede pedestrian movement or when infrastructure presents a physical barrier to movement.

3.56 Maintaining the important movement function of this strategic corridor, whilst mitigating the severance effect it has on the local area is the core challenge. The A13 and A1306 constrain north-south movement across the OA in particular for walking, cycling and public transport. A total of between 80,000 to 100,000 vehicles per day use the route. The Barking to Pitsea via Rainham and Grays railway lines, which follow the broad alignment of the A13, also limit north-south movement. Beam River and Rainham Creek limit east-west movement across the employment sites south of the A13. With no river crossings, any trips from the scheme area to the south of the river have to use the Dartford Crossing to the east or the Blackwall Tunnel to the west.

3.57 At present severance is described as severe given the lack of crossing opportunities by foot or cycle for residents from the south of the A13 to access Barking Town Centre and the Underground/Overground station. North of the A13, local residents seeking to access jobs and local amenities provided in the Barking Riverside area face issues of severance. The PTAL score assesses the transport connectivity of an area in terms of time to reach frequent transport connections. The latest PTAL score, published in 2011, is 1b for those located to the south of the A13 as shown in Figure 3-2. The PTAL score then increases for those north of the A13 and west of the rail line. For those residents living north of the A13, there is less severance due to faster walk times to Barking station.

Figure 3-2 PTAL rating for A13 tunnel scheme area, 2011
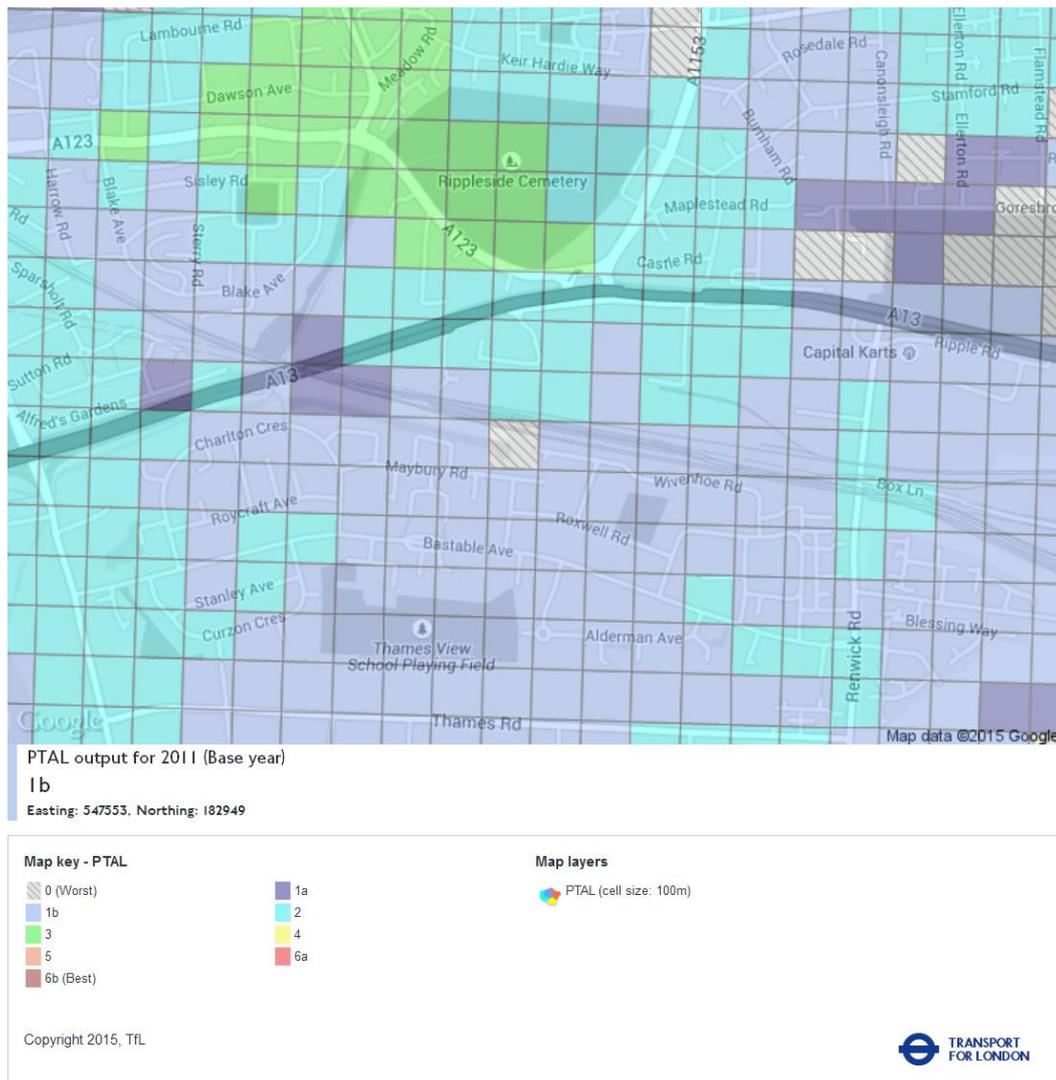
Source: TFL WebCAT for the A13 tunnel area

Up to 11,000 current residents in the immediate area in and around the A13 would benefit from reduced severance

3.58   Severance is a particular issue where the population affected are dependents: those being under the age of 16 or over the age of 65, given the vulnerability of this group of people. The A13 scheme area crosses the Thames Ward to the south of the A13 and Eastbury Ward to the north. Taking the whole Thames ward as well as all LSOAs adjoining the A13 on either aside, a total of 11,094 current residents (based on 2012 numbers) would benefit from reduced severance through provision of a tunnel. Of these, 38% (4,170) would be of dependent age and are likely to benefit more from reduced severance than those of working age.

3.59   More people in the future will benefit, as a significant proportion of the residents of the 5,000 new units at Castle Green would also benefit from this reduced severance.

3.60   Placing the stretch of the A13 between the Lodge Avenue Flyover and Renwick Junction underground would significantly reduce the level of north-south severance for pedestrians and remove the east-west pinch point for vehicles.

This would enable pedestrians and cyclists safe ways to cross the alignment of the A13 which would be downgraded to an urban street environment fitting with the character of the area and planned developments. This would provide better connectivity to the town centre and tube stations for pedestrians and cyclists as well as improve east to west movements across between housing and SIL sites.

> **Key finding:**
>
> The A13 tunnel scheme will reduce severance impacts for up to 11,094 current residents in the immediate area in and around the road corridor, and with the delivery of new housing at Castle Green, a significant proportion of the residents of the 5,000 new units would also benefit from this reduced severance.

Noise

The A13 Riverside Tunnel will deliver a reduction in traffic noise, affecting over 300 existing residents

3.61   A high level WebTAG compliant noise appraisal has been carried out to assess the benefits of the tunnel on the local residents. The noise levels have been calculated from a Basic Noise Level (BNL) as described in the Calculation of Road Traffic Noise (CRTN) and the calculated noise levels have been corrected for distance, angle of view and screening. The angle of view correction has been based on the percentage of the route that has been covered by the tunnel (for the 'with scheme' scenario only).

3.62   Only dwellings within 100m of the tunnel and A13 shown in the area bordered in red on Figure 3.3 below) are considered for this analysis. Only the traffic using the A13 was considered as the noise source and the same flow of traffic has been assumed for the opening and 15th year. As with severance, in the future, the new residents of the Castle Green site in close proximity to the A13 will benefit from the road being in a tunnel.

Figure 3.3 – Area covered by noise impacts analysis

3.63   The noise analysis concluded that the covered area of the road network will cause a slight reduction in noise for those dwellings immediately alongside the A13. The reduction in noise provided by the covered area is considered to be 10dB for dwellings close to the A13 and 5dB for dwellings further from the A13.

Quantified results are shown in Table 3-9. Overall the scheme is expected to reduce the number of people annoyed by noise disturbance by 331 for the tunnel, producing a net present value of roughly £13 million[64] (discounted 2010 prices). Adding the noise benefits to the transport user benefits raises the BCR under a 'with development' scenario to 1.76.

Table 3-9 Estimated noise appraisal results

Parameter	Value
Barking Tunnel	
Estimated population annoyed (base)	698
Estimate population annoyed (with-scheme)	367
Net noise annoyance change in 15th year after opening (number of people)	-331
Net present value (60 year period)	£13,022,606

Note: positive NPV values and negative net noise annoyance figures denote a net benefit (i.e. noise reduction)

3.64   For dwellings further away and those near the portals, there will be some reduction in noise although not to the same degree as those residing near the tunnel. It is expected that night-time changes in noise would be similar to that of the daytime.

> **Key finding:**
>
> The A13 tunnel will deliver significant noise benefits, quantified at a net present value of £13m, which would increase the 'with development' BCR for the scheme to 1.76.

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[64] Please note the NPV from the noise appraisal WebTAG spreadsheet has been adjusted to incorporate income (GDHI) differences between the UK and LB Barking and Dagenham, as outlined on page 11 of WebTAG Unit A3.

ECONOMIC CASE SUMMARY

The key points arising from the Economic Case can therefore be summarised as:

- The A13 tunnel scheme on its own performs strongly in conventional transport appraisal, representing a "high value" for money and returning £2.17 for every £1 spent. The BCR falls to 1.73:1 in a with-development at Castle Green scenario.

- However given that a key focus of the A13 tunnel is on enabling regeneration and delivering new housing at Castle Green, the merits of the scheme should not be judged using the BCR alone.

- In regeneration terms the A13 tunnel performs very strongly, alongside the new Overground station at Renwick Road, enabling significant economic benefits for London, including 5,000 gross new homes (2,235 net additional, which would support 1,350 new jobs, generating £755m of additional GVA.

4. The Financial Case

> **Section summary:**
>
> The Financial Case sets out the project construction and ongoing operating costs, together with sources of possible financing and funding.
>
> The project currently has an Estimated Final Cost (EFC) of around £700m, although further design work is being undertaken which may see this figure revised. The EFC comprises around £50m for preliminaries and design costs, a £260m allowance for land acquisition and £390m for construction and risk allowance. A significant proportion of the funding for a tunnel could be met from non-grant funding sources, with around 40 per cent secured through land value uplift capture, taxation of new development, Vehicle Excise Duty (VED) devolution or hypothecation and using Roads Modernisation Fund resources.
>
> TfL is seeking further powers and fiscal devolution to enable a significant proportion of the cost of construction to be raised from local funding sources to deliver the scheme.

Project costs

4.1   The cost estimates set out below were developed by Atkins based on engineering assessments of the tunnel options. All costs are presented in 2015 prices.

Cost estimates suggest the A13 tunnel will cost around £700m to construct

4.2   The total construction cost of the tunnel, including 66 per cent optimism bias, is approximately £700m, although further design work undertaken in future may see this figure revised. This figure includes design and supervision of works, concrete structures, excavation, and utilities, and a risk allowance of 30 per cent of total physical works. It also includes £260m for land acquisition. The land acquisition cost is significant because it is currently the intention to acquire a bigger plot of land than what is required for the tunnel construction alone. The intention is to redevelop this land, delivering up to 5,000 new homes, and use land sale proceeds as part of the A13 funding package. The land is currently in industrial use.

4.3   These figures do not include costs of traffic disruption as a result of construction.

4.4   The operational cost is estimated to be approximately £1m per annum, made up of routine and reactive maintenance costs. A further £20m is set aside every 15 years, to cover the lifecycle costs.

Risk Allowance and Optimism Bias

Engineering assessments have informed the development of the tunnel costs

4.5   A contingency and risk allowance of 30 per cent has been applied to the construction and preliminaries and design costs.

4.6   Optimism Bias has been applied to all constructions costs at a rate of 66 per cent given the early stage of project development. This rate is expected to reduce as the schemes are taken forward and become better defined.

4.7   Detailed cost estimates will follow in future stages of the project once more detailed modelling and engineering work has been undertaken.

Spend Profile

4.8   The spend profile is shown in Figure 4.4-1. As the project develops further, a more detailed estimate of construction programme and spend profile, to be used in future business case work, will be prepared.

4.9   At this stage of the project's planning, these costs are assumed to be borne directly by TfL, with funding to cover them having to come from a variety of sources. See Funding for more details.

Figure 4.4-1 A13 tunnel construction spend profile
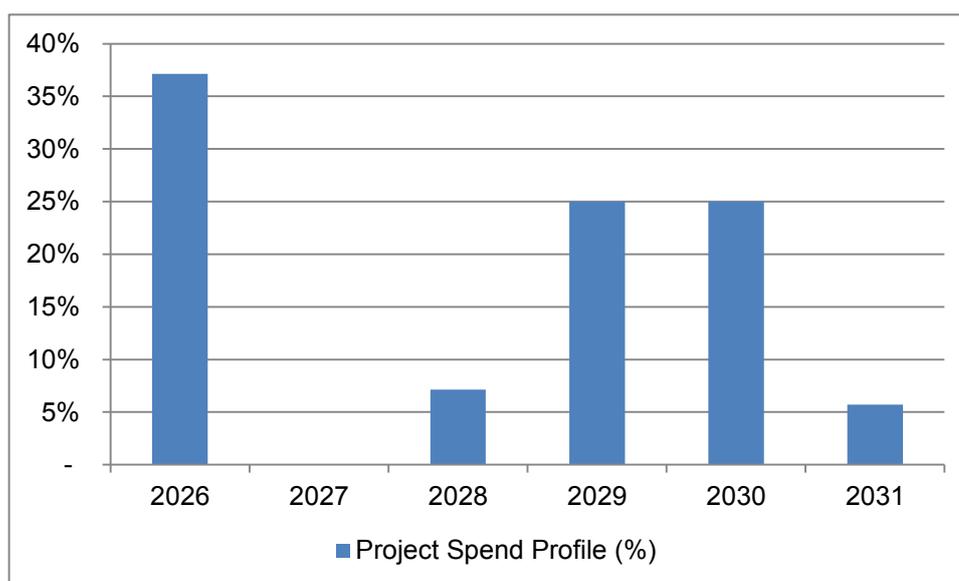
Funding

A significant proportion of the funding for a tunnel could (and will need to) be met from non-grant funding sources

4.10   The following funding sources for this scheme have been considered:

- Funding from taxes on new development (incremental Borough Community Infrastructure Levy, business rates and stamp duty);
- Funding from developing land directly on the schemes and additional land purchased around them;
- Funding from VED devolution or hypothecation;
- Funding from taxes on existing residential development (council tax).

4.11   Given the early stage of the scheme, sources of funding are only indicative at the moment. However TfL has had a significant level of engagement with the borough of Barking & Dagenham to explore the local funding sources that would be most feasible and acceptable. A funding package for the tunnel would need to come from a combination of sources.

Given the significant amount of development planned for the local area, there is potential for development-related funding to be captured

4.12 This could be through capturing residual land value (RLV) from development, on the plot of land which will be acquired by the public sector for the tunnel construction, known as Castle Green, or from borough Community Infrastructure Levy (CIL). The value of CIL captured will depend on factors such as the extent of new floorspace, and the percentage of affordable housing provided. It will also be influenced by the borough's other infrastructure expenditure needs. Both RLV and borough CIL will require borough support.

4.13 TfL appointed Jones Lang LaSalle (JLL), the property consultants, to evaluate the possible funding that could be derived from the residual land value on the land to be acquired for the tunnel delivery. TfL has also carried out in-house analysis of other possible funding streams. The findings of these analyses are presented in the summary funding table below.

Around forty percent of the construction cost of the tunnel could be secured through development-related sources and sources such as VED devolution (or if a workable solution could be found potentially from user charges)

4.14 The identified sources of funding could cover around 40 per cent of the tunnel construction costs, unadjusted for financing costs. The borough is very supportive of the tunnelling scheme and have shown positive engagement and willingness to explore the full potential of funding sources arising from new development in the area and adjusting affordable housing policy to accommodate its realisation. The summary table in Figure 4.4-2 below presents the amount of funding as % of the project construction cost:

Figure 4.4-2 Summary of funding sources explored

Availability	Option	£ m (NPV 2015/16)	% of Total Cost of £700m (2015/16 prices)
🟩	Residual Land Value, 10% Affordable Housing	210	30%
🟩	Borough CIL	15	2%
🟩	New Homes Bonus	20	3%
🟧	User Charging	55	8%
	Total Funding	**300**	**43%**

🟩 Funding option that could make contribution, subject to borough approval and relevant central Government policies carrying on

🟧 Funding options that could make contribution, but require central Government support and/or face some implementation challenge

Key finding:

The identified sources of funding could cover around 40 per cent of the tunnel

Funding sources presented are dependent on the proposed redevelopment of the Castle Green area and the potential implementation of road user charges for the tunnelled stretch of the A13

4.15   If the development does not progress or progresses at a slower rate, there will be a knock-on effect on whether/when the funding will become available. It is considered therefore that there is some degree of risk associated with these funding sources and the amount of upfront finance that they could support needs to be assessed and adjusted for this risk. This work will be completed as the project progresses.

4.16   The Borough is willing to consider tolling the stretch of the tunnelled A13 and the figure for User Charging in the summary funding table above presents indicative findings based on the engagement with the borough. More traffic modelling work needs to be done to understand the feasibility of tolling. Any such measures would need to avoid diverting traffic from the A13 onto less suitable alternative routes. Alternatively, the Mayor is arguing for a proportion of devolution of VED revenues to support investment on the strategic road network within London.

TfL is seeking further powers and fiscal devolution to enable a significant proportion of the cost of construction to be raised from local funding sources

4.17   In addition to the funding options presented above, TfL has considered stamp duty as a possible funding source for this project, given the link between the tunnel delivery and the number of additional houses that this project could enable. Stamp duty land tax (SDLT) is currently payable on the purchase of property above £125,000. This is a national tax and there are no current plans of devolving it to local authorities. If the stamp duty revenue within designated zones or corridors was devolved, or an equivalent earnback arrangement created, then this could provide a potential funding source for strategic infrastructure projects, which could include the A13 Tunnel. Work on estimating the size of the stamp duty receipts on new development is currently underway. It is worth noting that financing against stamp duty would be difficult, given the uncertain nature of property sales transactions. A direct Government contribution, reflective of the size of the stamp duty receipts the new development could yield over time, would be more desirable.

4.18   The borough may also be willing to direct some of its CIL receipts collected in the wider borough towards the A13 tunnel project. Addition of stamp duty on new development and extra borough CIL to the funding package could cover around 50 per cent of the funding requirement of the project.

4.19   TfL has also looked at business rates capture and council tax precept as alternative sources of project funding. The Castle Green development is proposed to be residentially-led and will be replacing what is currently an area of land in industrial use. This means that there is likely to be a net loss in business rates proceeds and there is no argument for establishing a business rates capture mechanism. At present, it is also not felt that a council tax precept is an acceptable funding option, given the significant level of resistance that is likely to be shown by local residents towards higher council tax liabilities. It is possible however, that with time, feasibility of the council tax precept option may alter.

With further fiscal devolution and further borough support around 50 per cent of the project cost could be met from land value capture and road user charging sources. Other means of covering tunnel costs such as partial government funding will also need to be considered

Financing

4.20   There is a mismatch between the timing of the project expenditure and when potential funding to pay for the project would come forward – the majority of the redevelopment is planned to occur after the A13 tunnel is delivered. This creates a need to raise upfront finance and there are a number of options available to TfL to do this. TfL could potentially use a privately financed solution to deliver the A13 Tunnel project. A privately financed solution would see the private sector take on the responsibilities for design, construction and other risks of the project, in return for a series of payments by TfL. The risk transfer to the private sector would however come at a higher financing cost. The level of the financing cost would be dependent on the appetite of the private sector for this type of a road project.

4.21   Alternatively, the public sector could borrow from a variety of sources. The public sector borrowing rate is usually lower than the private sector's. There is however some uncertainty associated with the funding sources that would be used to repay the borrowing and the amount of borrowing that the identified funding would support would need to be considered. This will be done in the due course, as the project progresses.

4.22   Other financing options could include grant funding which is received from central and local government.

FINANCIAL CASE SUMMARY

The key points arising from the Financial Case can therefore be summarised as:

- Cost estimates suggest the A13 tunnel will cost around £700m to construct
- A significant proportion of the funding for a tunnel could be met from non-grant funding sources
- TfL is seeking further powers and fiscal devolution to enable a significant proportion of the cost of construction to be raised from local funding sources

5. The Commercial Case

Section summary:

The Commercial Case provides details on the commercial structure, procurement approach, and accounting implications of the project.

TfL will apply its substantial experience of delivering complex highway and tunnelling projects to the procurement, funding and financing of the A13 tunnel. TfL will also achieve efficiencies by delivering the A13 tunnel scheme within a wider programme of tunnel projects.

The A13 tunnel project would support many jobs outside of London.

Procurement Strategy and Sourcing Options
Design

5.1 The scheme is being promoted by TfL and will be developed through close working with LB Barking and Dagenham who are closely engaged with the project.

5.2 TfL is responsible for the Transport for London Road Network (TLRN), which the A13 is part of. Changes to this key part of the road network could have an impact on the surrounding road network for which the local borough is the Highway Authority.

5.3 It is expected that the construction stage of the project would be led by TfL and where involving infrastructure owned by other parties, such as the London Borough of Barking and Dagenham, will be delivered in partnership with these other organisations.

TfL has substantial experience of delivery of complex highway and tunnelling projects, which we will apply to the procurement, funding and financing of the A13 tunnel

5.4 TfL is an experienced organisation, with a successful track record on procuring and managing highways improvement works (such as the recent completion of life extension works to the Hammersmith fly-over, the Cycle Superhighways programme, and the Chiswick Bridge refurbishment).

5.5 The procurement and construction of major infrastructure projects, including rail tunnels, is also an area TfL has extensive experience in, with sub-surface construction works having been undertaken across a multitude of projects in constrained and heavily populated areas of London, such as Crossrail, DLR extensions, major station schemes such as King's Cross St Pancras and Green Park. All potential suppliers will be required to consider the Mayor of London's Responsible Procurement Policy in their bid as part of any Invitation to Tender (ITT) for the design and build contract.

TfL can achieve efficiencies by delivering the A13 tunnel scheme within a wider programme of tunnel projects and link into a wider highway capital investment programme

5.6 TfL is undertaking and proposing a range of large capital infrastructure projects that involve procurement of skills and services that will all be highly relevant to approaches that will need to be adopted for the A13 tunnel. For example,

Crossrail and the Northern Line Extension have led to an increase in skills associated with deep bored tunnel design and construction procurement, whilst the Cycle Superhighways and Better Junctions programmes have led to an increase in skills associated with large-scale highway engineering and construction traffic management.

5.7   Other tunnels and decking over at a range of locations throughout London are at various stage of development, including the Silvertown Tunnel, the most advanced road tunnel project, which will link the Greenwich Peninsula and Silvertown. Other tunnel and decking over proposals similar to the scheme proposed at Castle Green are also being developed. If these projects are progressed, some significant economies and efficiencies could be achieved through co-ordination of delivery with the A13 tunnel.

5.8   TfL will also seek to incorporate best practice from Highways England's own highways works and approaches to procurement given the larger volume of capital infrastructure works the agency undertakes across the country.

In addition to internal staff, consultancy support will be required to support future scheme development and consents process

5.9   It is anticipated that consultancy support will be required in the following areas:

- Legal
- Environmental Impact Assessment
- Engineering
- Transport Planning
- Planning and Socio Economics
- Architecture and Urban Design
- Cost Estimating
- Property Surveyors/Land referencing

Construction and Operations

5.10   As the scheme progresses and further details concerning the design of the tunnel are determined (i.e. construction methodology), a procurement strategy will be developed which can incorporate the necessary design aspects, the operation and management approach, and the funding and financing approach to the scheme given the potential sources of funding as covered in the Financial Case. The risks associated with each element will be a consideration in the approach taken to procuring both construction and operational and maintenance of the new tunnel.

5.11   The Silvertown tunnel river crossing project will have provided a contemporary example of a tunnelled road scheme in inner London, and hence will provide an important benchmark that TfL and the market can use to determine that the risks are tolerable and generate appetite from the market. Capacity of the market will need to be monitored given there are other potential tunnelled road schemes, such as the Lower Thames Crossing, that may overlap.

5.12   Dependent on the form of contract, an assessment of the likely accounting treatment of any commercial structure under ESA95/10 would need to be

undertaken to determine whether the project is likely to be treated as "off budget" and therefore whether liabilities would score towards TfL's borrowing.

Methods for the mitigation of construction impacts will be investigated

5.13   TfL has extensive experience of developing and delivering Traffic Management Plans. As part of the TLRN, the A13 will continue to ultimately be managed by TfL, acting as the client on any subsequent procurement of operations and maintenance contracts that could be let.

5.14   Further consideration will need to be given to the management of the new open space and public realm, the day to day management of which could be passed to LB Barking and Dagenham, but with maintenance privileges for the tunnelled section over the A13 to be retained.

5.15   An EU-compliant procurement route following the Competitive Dialogue procedure, under the Public Contracts Regulations 2006, can be adopted to enable TfL to obtain certainty that the Contractor is capable of developing a compliant design.

5.16   Throughout a procurement process for both construction and operations / maintenance, TfL would undertake bi-lateral discussions with selected Contractors to seek views on the proposed procurement route, contract form and risk allocation. In addition, legal resource would be procured to provide commercial advice and contract drafting support, whilst Insurance advice would enable determination of the most cost-effective means of insuring risk during construction and operations.

5.17   As a public body, TfL has to meet the requirements of the Mayor of London's Responsible Procurement Policy consisting of the following themes:

- Environmental Sustainability
- Supplier Diversity
- Community Benefits
- Skills and Employment
- Sustainable Freight
- Fair Employment
- Ethical Sourcing

5.18   In compliance with the Mayor's responsible procurement policy, all potential suppliers will be asked to consider these elements in their bid as part of the Invitation to Tender (ITT) for any future project support or the design and build contract. Each appointed consultant or contractor will be subject to a supplier performance plan.

TfL utilises supply chains from across the UK – work for a tunnel would support many jobs outside of London

5.19   Although TfL undertakes procurement for projects implemented in the capital, the wider benefit to the UK is extensive, with over 60,000 jobs estimated to be supported by services TfL procures from outside of London. The construction of the A13 tunnel would add to the pipeline of capital investment that supports jobs across the UK.

5.20   The procurement strategy for this stage of the project will be refined and improved as the scheme is further developed.

COMMERCIAL CASE SUMMARY

> **The key points arising from the Commercial Case can therefore be summarised as:**
>
> - TfL has substantial experience of delivery of complex highway and tunnelling projects, which we will apply to the procurement, funding and financing of the A13 tunnel
> - TfL can achieve efficiencies by delivering the A13 tunnel scheme within a wider programme of tunnel projects and link into a wider highway capital investment programme
> - TfL utilises supply chains from across the UK – work for a tunnel would support many jobs outside of London

6. The Management Case

Section summary:

The purpose of the Management Case is to assess whether a proposal is deliverable. It reviews evidence from similar projects, sets out the project planning, governance structure, risk management, communications and stakeholder management, benefits realisation and assurance.

Evidence of similar projects

TfL will make full use of best practice within the company and from industry

6.1 TfL has extensive experience in developing, promoting and implementing significant infrastructure projects and securing necessary consents required.

6.2 This ranges from modifications to existing infrastructure (such as repairs to the A4 Hammersmith flyover, modernisation of the London Underground, extensions to Tramlink and DLR) to major schemes such as Crossrail. TfL also has demonstrable experience in delivering major road junction improvements, pedestrian and cycle schemes, and wider public realm improvements. These projects share similarities to the A13 tunnel scheme, involving processes and aspects of design and construction which would be faced by a road tunnel. TfL will continue to actively incorporate best practice and experience from these schemes into the development of the A13 tunnel project.

6.3 With a range of highway and public realm improvements identified within the current Business Plan, this experience will have been furthered by the time consent stage for the project is reached and will be transferrable to this scheme. If necessary, additional support and advice from experienced promoters of major highway schemes and operators of similar projects can be sought. This could include for example Highways England and other urban transport agencies.

6.4 The A13 tunnel project is part of the wider Roads Task Force programme sponsored by the Managing Director of TfL Planning. There are a number of programme linkages with other schemes being taken forward as part of the RTF Key Corridor Interventions Programme, which will present opportunities to share best practice as these schemes progress.

Linkages

The A13 tunnel scheme has a link with the delivery of improvements to the A13 to support the Barking Riverside development. There is also a link with the scheduled replacement of the Lodge Avenue Flyover.

6.5 There are some potential synergies with these projects and in order to avoid abortive or unnecessary work and to ensure the programmes complement one another, close coordination is required between the relevant business areas within TfL.

Key project assumptions

6.6 It is currently assumed that sufficient funding is available to support the planning and development stages of the project up to securing the necessary powers. TfL

does not have a budget for the main design and build costs, but as identified in Section 4 *The Financial Case* a number of potential funding sources have been identified. Further work is ongoing to identify the optimal funding solution for the scheme.

6.7   It is assumed that the land for the proposed route can be acquired through the Planning and Compulsory Purchase Act (2004).

Project risk

6.8   As the scheme is further developed, more detailed plans will be developed and will be subject to further assurance and project controls, including a Quantified Risk Assessment to further improve forecast costs and the economic appraisal.

6.9   At this early stage of design, some aspects carry a high risk and hence the optimism bias of 66 per cent for a non-standard civil engineering project has been applied. A quantified risk assessment (QRA) will be undertaken should the scheme be progressed, in order to provide more certainty on costs. Following submission of this business case in July 2015, TfL will liaise with the Treasury / DfT to update the forecast costs following the completion of the QRA, and to agree a new working assumption on the level of optimism bias to continue to apply in future scheme appraisal.

In general, TfL considers the scheme relatively standard given the company's extensive experience

6.10   This experience includes planning, procuring and constructing large-scale infrastructure projects, such as the Cycle Superhighways, the Northern line extension and Crossrail. The design and construction of these schemes has provided a wealth of contemporary and relevant comparators against which to benchmark, helping to guide proposed construction approaches for the A13 tunnel scheme.

Governance, organisational structure and roles

Internal governance

6.11   Tunnelling of the A13 at Castle Green is part of the Roads Task Force Key Corridor Intervention Programme (Figure 6.6-1). The programme is overseen by the RTF Steering Group, which is made up of representatives from across the organisation and the TfL Leadership Team. Once the scheme is finalised and becomes committed, responsibility for its delivery will be overseen by TfL Surface Transport.

6.12   As part of future scheme development, an Independent Peer Review Group (IPRG) may be established to provide independent expert scrutiny of the A13 tunnel project, initially regarding the selection of a preferred tunnel option. An IPRG would remain in place to undertake reviews on technical and engineering matters at key stages during the design, procurement and delivery of the project.

Figure 6.6-1 RTF Internal Governance Structure

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                    ┌──────────────────┐
                    │    The Mayor     │
                    └──────────────────┘
                             ▲
                    ┌──────────────────┐
                    │ TfL Leadership Team │
                    └──────────────────┘
                             ▲
         ┌──────────────────┐        ┌──────────────────┐
         │ RTF Steering Group │ ◄──► │ Surface Transport │
         └──────────────────┘        │ (once committed)  │
                  ▲                   └──────────────────┘
         ┌──────────────────┐   ┌──────────────────┐
         │   RTF Key        │◄─►│  Working         │
         │ Corridors Team   │   │  Group           │
         └──────────────────┘   └──────────────────┘
          ↙        ↓        ↘
┌──────────┐ ┌──────────┐ ┌──────────┐
│Study kick-│ │          │ │ Direct   │
│off meeting│ │ Other    │ │ borough  │
│(internal) │ │ Projects │ │engagement│
└──────────┘ └──────────┘ └──────────┘
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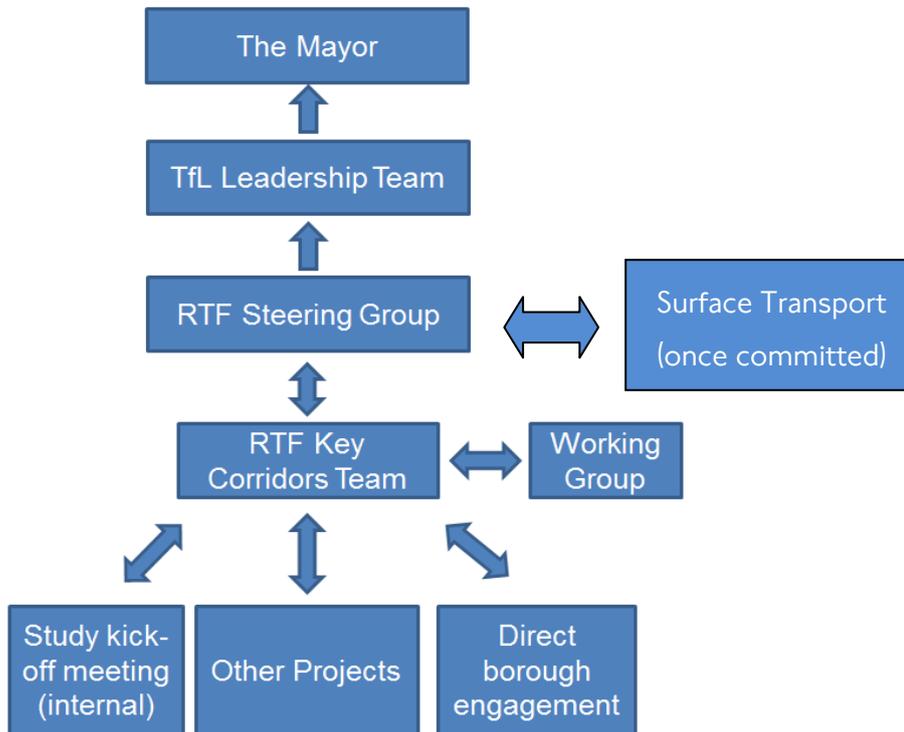
Assurance and approvals plan

A comprehensive and robust project management framework will be applied, helping to ensure scope, cost and benefits are controlled

6.13   The assurance and approvals process will follow TfL's established project assurance procedures which include assurance at three levels: internal, Programme Management Office (PMO) and external.

6.14   TfL uses a number of mechanisms to improve the management of its major projects in order to help ensure the objectives and benefits of a scheme at inception are realised following implementation. TfL's project management framework, known as 'Pathway' provides consistency in approach and the tools required for planning and delivery teams, whilst retaining flexibility in its application to manage and control a project. Embedded into Pathway is a delivery assurance process using stage gates, upon which TfL utilises industry-leading external expertise to review and challenge all aspects of the project.

6.15   The number and timing of the stage gates are established by the delivery organisation, based on guidance in Pathway, and informed by a characterisation tool that considers such things as scale, complexity, novelty, project team experience and the strategic importance of the project. A number of Products are required to be completed to provide evidence at the stage gate that the project is fit to proceed to the next stage.

6.16   Products are outputs that are signed off by authorised individuals, and include such documents as project execution plans, risk management plans, project estimates and design compliance certificates

6.17   Underlying these stage gates are a number of assurance activities conducted by both TfL and the suppliers and include activities such as design reviews, safety

assessments, risk reviews, commercial assessments, estimate validation, material testing, site inspections and product testing.

Rigorous assurance processes will provide close scrutiny and challenge of risk management and decision-making throughout the project

6.18   The PMO is part of TfL but is not accountable for delivery. These reviews are typically Integrated Assurance Reviews (IAR), staffed by a combination of PMO staff, consultant external experts (EE) or peer groups from outside the delivery organisation.

6.19   The EEs are selected on the basis of their relevant experience and suitability to the project under review. Each review is covered by a Terms of Reference that sets the scope and the brief to the EE, who is procured from a TfL consultancy framework. The Terms of Reference is based on the Pathway IAR Lines of Enquiry, aimed at generating a comprehensive review. Each Line of Enquiry includes up to 20 detailed challenges, devised to match the maturity of the project at its particular point in its lifecycle.

6.20   The Lines of Enquiry were developed as part of the Corporate Gateway Approval Process (CGAP) in 2008, following a comprehensive benchmarking process that assessed the assurance regimes in other organisations and the Office of 3 Government Commerce who produced gateway processes and guidance (now part of the Cabinet Office). Some additions have been made since 2008, including more explicit challenges covering cost benchmarking following consultation with IIPAG.

6.21   The IAR report is considered by appropriate bodies prior to seeking authorisation. For projects over £50m the Finance and Policy Committee and Board are informed of the assurance reviews carried out.

6.22   IARs are conducted at key stages of the project:

- initiation;
- option selection;
- pre-tender;
- contract award;
- project close out;
- benefits delivery; and
- annual review (where no other IAR would happen within 12 months).

6.23   TfL also receives project review and assurance from the Independent Investment Programme Advisory Group (IIPAG), which report to the Mayor of London concerning TfL's Investment Programme. This includes all maintenance, renewal, upgrades and major projects (excluding Crossrail).

6.24   The involvement of the IIPAG is determined on both a risk based approach and a project value threshold. The IIPAG reviews are normally commissioned on projects with a value of £50m or more. The IAR process is as detailed above and the IIPAG then attends the Gate Review Meeting once the EE Interim Report has been produced. The IIPAG then produces its own reports, which are submitted at the relevant approval meetings alongside the PMO Report, based on its review of the IAR material and discussions at the final Gate Review Meeting.

6.25 TfL has the option of establishing an Independent Peer Review Group (IPRG). This approach has been followed for other major TfL projects, so given the scale of the A13 tunnel project, this could warrant a similar approach. If appropriate, an IPRG can be set up for the scheme if further development of the project is approved. Initially it could oversee the refinement of delivery sub-options and review engineering feasibility studies and scheme appraisal undertaken.

Communications and stakeholder management

6.26 The RTF Key Corridors Team is responsible for keeping internal and external stakeholders appropriately engaged and informed. In accordance, formal, minuted meetings with set agendas and actions have been arranged with all stakeholders. There are a number of internal working groups and external stakeholder meetings are held on a regular basis.

A Stakeholder Management Plan has been prepared for the project

6.27 This Stakeholder Management Plan provides a brief on the objectives of the stakeholder engagement, target audience and methodology. This plan is under ongoing review and will be updated/expanded as necessary.

6.28 Stakeholder engagement has already been undertaken and there is strong support for the scheme from the London Borough of Barking and Dagenham. A future programme of stakeholder engagement as the scheme progresses has been developed.

6.29 The external stakeholders identified are summarised below:

- Boroughs
- Political Stakeholders
- Statutory Stakeholders
- Local Communities

Programme/Project Reporting

TfL will develop programme controls supported by robust reporting processes

6.30 These will align with the Project governance framework, integrating key stakeholder requirements, facilitating continuous monitoring, and incorporating accurate performance measurement. The purpose is to provide accurate project information in a timely way to ensure well informed decisions are made and appropriate action is taken.

6.31 The project management model will be designed to deliver a robust reporting regime, including:

6.32 Governance meetings which form part of the reporting process as the forum where performance issues are raised, possible mitigation is discussed and key decisions required are made; and

6.33 Project reporting requirements will be fully defined, together with content requirements, target audience and timing.

Key project milestones

6.34 The current anticipated key milestones for the project are shown in Table 6-1 below. Any changes to baseline scope, cost and schedule will be reviewed, impact assessed and approved following the change control process.

Table 6-1 Key project development milestones

Milestone Description	Date[65]
Planning, design, approval and procurement	2016 - 2026
Construction	2026 - 2031

MANAGEMENT CASE SUMMARY

The key points arising from the Management Case can therefore be summarised as:

- TfL will make full use of best practice within the company and from industry
- A comprehensive and robust project management framework will be applied, helping to ensure scope, cost and benefits are controlled
- Rigorous assurance processes will provide close scrutiny and challenge of risk management and decision-making throughout the project

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[65] Subject to tender returns and TWAO process.

7. Conclusion

There are compelling regeneration benefits of the A13 tunnel project and TfL should continue to progress and develop this scheme

7.1 The A13 Riverside Tunnel SOBC demonstrates that across the Five Case Model:

- there is a clear robust **case for change** for the A13 tunnel scheme to address issues of severance, public realm and environmental quality, and to cater for the needs of future population and economic growth. This 'strategic case' is closely related to national, London-wide and local road policy objectives, with a particular reference to the London Plan and the Mayor's Transport Strategy

- the analysis demonstrates that the scheme would act as a catalyst for regeneration delivering **significant economic and regeneration benefits** for London. The tunnel (as part of a package of transport infrastructure investment) will support growth by enabling development at Castle Green. With investment to unlock the site, Castle Green would deliver a net additional 2,235 new homes and a net additional 1,350 new jobs at the London level. This will add over £740m of GVA at the London level. This new development will generate new Stamp Duty revenues and Corporation Tax and VAT revenues. Using London VoTs, the A13 Riverside Tunnel scheme represents 'medium' value for money in a scenario with development at Castle Green, achieving a BCR of 1.73 to 1 and a NPV of £264m.

- is **financially affordable** – the 'financial case' analysis demonstrated that a significant portion of project costs may be recoverable from land value uplift and operating surplus, but would require significant further mechanisms for the Mayor and TfL to achieve this.

- is **commercially viable** – this business case sets out the procurement, commercial structure, and proposed allocation of risk and payment mechanisms for the project

- is **achievable**- the 'management case' sets out a clear governance, process and programme for the further development of the scheme by TfL, an authority with a very successful experience and record in major project delivery

It is suggested that further feasibility and scheme development work takes place to investigate the proposed tunnel option

7.2 While the Strategic Outline Business Case has reported on the majority of the likely impacts of the scheme, further work is required on the air quality, noise and social/distributional impacts in any future Outline and/ or Full Business Case. In addition this further work will elaborate on the potential commercial case and charging policy and various sensitivity tests. This work will be undertaken prior to any future statutory consultation. TfL will continue to liaise closely with LB Barking and Dagenham during any further work.

Given the strong case for the A13 tunnel scheme, TfL is proposing the following to facilitate its delivery:

- A zonal trial of stamp duty devolution;
- An extension of CPO powers to TfL for 'transport-enabled' development;

- Investigation of a loan facility to enable early land acquisition to secure value uplifts arising from a tunnel.

7.3 To capitalise on those the Mayor / TfL and GLA propose to:

- Consider establishment of a Mayoral Development Corporation covering Castle Green;
- Commit to take risk on land values that accrue;
- Use existing public land as far as possible to speed delivery of development;
- Commit to use of CPO powers to ensure land for development is utilised to its full extent; and
- Commit to ongoing use of the tunnelling expertise and supply chains which have been developed for other TfL projects to reduce infrastructure provision costs.

Technical Annex – Full methodology for calculation of Additionality

Introduction

1. In preparing this business case, TfL has sought to incorporate emerging advice and thinking on the economic impacts of transport schemes as set out in the Transport Investment and Economic Performance (TIEP) Report[66]. Alongside the conventional TUBA calculations of the transport user benefits of the A13 tunnel scheme set out above, this section sets out the method and results of an approach to additionality that has been developed by TfL to assess the value of net additional jobs and houses enabled by private sector investment triggered by the scheme. The amount of new homes and jobs and GVA which the tunnel and new Overground station unlock is significant.

2. The methodology utilises as a framework established guidance from the Homes and Communities Agency (HCA) 'Additionality Guide' which takes into account factors such as displacement and leakage. The approach followed is simpler and more transparent than the use of a Land Use Transport Interaction (LUTI) model.

General approach

3. The aim is to estimate the gross and net effects of jobs and houses at the local and regional level in terms of total employment and Gross Value Added effects. As with all RTF Key Corridor Intervention schemes, the approach relies on 'bottom-up' development capacity studies which utilize design-led masterplanning as well as property-market led assessments. Both of these approaches assess the additional land and density effects of the planned schemes. Scenarios for the 'reference' and 'intervention' case have been formulated and additionality has been assessed at two spatial levels:

    * The local level at which impacts will be directly felt, in this case defined as the London Borough of Barking and Dagenham;
    * The city-wide level i.e. the net impact for London as a whole.

4. For each of the two target area levels (local district/borough and London Government Office Region), leakage, displacement and multipliers have been taken into account. These terms are defined below.

Development Scenarios

5. Table 0-1 sTable 0-1ets out the gross jobs and homes scenario for both the Reference Case and the defined Intervention Case.

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[66] For example, DfT-commissioned research into Transport Investment and Economic Performance (Venables, Laird, Overman, October 2014) and Assessing new approaches to estimating the economic impact of transport intervention using gross value added approach (Byett, Laird, Stroombergen, Trodd March 2015)

Table 0-1 Gross Development Scenarios

Sector	Reference case	Intervention case
Office – jobs	0	288
Retail – jobs	0	306
Industrial – jobs	0	251
Housing – dwellings	0	4,700

6. The Reference Case figures represent the *deadweight* jobs and dwellings that would take place without the tunnel investment. The gross jobs estimates are based on the net increase in commercial floorspace (business/office, retail and industrial) which is brought forward by under reference and intervention cases. For business/office uses, a density of 11.3 sqm Gross Internal Area (GIA) per person has been assumed based on the London Office Policy Review's (July 2014) recommendations for Further Alteration to the London Plan (FALP)[67]. A retail employment density of 23.8 sqm (Gross Internal Area) per FTE has been assumed which is based on estimates from the HCA Employment Densities Guide 2010[68]. The industrial employment density is assumed to be 36 sqm (GIA) per FTE which is based on Atkins socioeconomic analysis into the A13 Tunnelling scheme.

Leakage

7. Leakage captures the proportion of jobs and homes which are not expected to be taken up by residents within the target area of the scheme. The level of leakage has been assessed within two target areas: the London Borough of Barking and Dagenham the London Government Office Region.

8. The level of leakage for employment at the local level is assumed to be 24 per cent which is the proportion of workers in the Borough of Barking and Dagenham who do not travel to work from somewhere within the borough. At the regional level, 9 per cent of workers do not travel to work from somewhere within London. Utilising these figures, leakage ratios for office and retail have been devised (Table 0-2).

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[67] London Office Floorspace Projections Report – July 2014
https://www.london.gov.uk/sites/default/files/LOPR%20update%20%28July%202014%29.pdf
[68] Homes and Communities Agency Employment Densities Guide 2010
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/378203/employ-den.pdf

Table 0-2 Leakage ratios for employment at local and regional target area level (percentage)

Sector	Barking and Dagenham	London
Office	24	91
Retail	24	91
Industrial	24	91
Average across all sectors	24	91

9.   For housing, the level of leakage at the local level is assumed to be 70 per cent (Table 0-3) which is the proportion of new homes which is expected not to be designated as affordable housing. Of the remaining homes, it is likely that a proportion would be taken up by local residents and so assumptions used are conservative. At the regional level, the level of leakage reflects the proportion of homes which are likely to be taken by individuals migrating from regions outside London (inward migration) or from outside the UK (international migration). According to GLA Economics estimates[69], the average annual flow of migration from these two sources represent 5 per cent of total London residents in a typical year and has therefore been taken as the expected level of leakage at the London level.

Table 0-3 Leakage ratios for housing at local and regional target area level (in percentage)

Sector	Barking and Dagenham	London
Housing	70	5

Displacement

10.   Displacement captures the proportion of economic activity/outputs which would have occurred elsewhere in the target area and are expected to be displaced as a result of developments brought forward by the scheme. Displacement for construction (including housing) activity relates to how much of the construction activity would have been in a neighbouring area but switches. Displacement for the jobs in retail and commerce reflects market share taken by the new businesses in the target area from surrounding businesses in those sectors.

11.   The transport intervention makes the land use possible (housing or retail or commerce) relative to the reference case by reducing constraints that would otherwise prevented it. Once the new land use is attracted (whether housing, retail or office) there is the issue of market displacement.

12.   Displacement normally refers to competitive market effects whereby a business on the new site takes market share from a business on another site in the surrounding area. For retail and commerce the issue is fairly clear and the displacement will be less at the local area level the more market differentiation is possible between the businesses on and off site. Even in retail if there are specialised retail operations on the site they may not be in competition with retail off the site.

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[69] GLA Economics Focus on London – Population and Migration (October 2010)
http://data.london.gov.uk/dataset/focus-on-london-population-and-migration

13.   For house building activity, the question is the extent to which there is market displacement in the same manner. In London, there is substantial unsatisfied demand for housing and so provided the building industry has the capacity to meet it then actual market displacement might be expected to be relatively small.

14.   Strategic Industrial Land (SIL) is located on both sides of the A13 scheme. This could be release to housing as identified by the London Riverside Opportunity Area Planning Framework. To the south lies the Barking Riverside development – the largest single development site within the OA with planning permission for up to 10,800 new homes.

15.   To the north west of the scheme area is Barking Town Centre – congestion and severance associated with the A13 reduces connectivity from the centre to the Riverside development. A physical barrier to travel created by the A13 constrains north-south movement across the OA for walking, cycling and public transport in a similar fashion to the existing east-west rail line. The A13 suffers from highway congestion particularly around the Lodge Avenue Flyover and Renwick Road/A13 junction, causing delays in the Barking Riverside area for local residents and heavy goods vehicles travelling into London.

16.   A displacement ratio of 38% has been assumed at the local level which is consistent with Homes and Communities Agency (HCA) guidance on additionality[70].

17.   In determining displacement ratios, firstly, land availability for similar developments at the borough and regional level is considered (as well as whether transport infrastructure acts as a binding constraint to unlocking development in the target area). Secondly, evidence of clustering of specific economic activities within the locality has been considered when estimating displacement impacts from elsewhere in London. This has drawn on Location Quotient (LQ) analysis using workplace-based employment figures by standard occupation codes (SOC) provided by the 2011 Census. Location Quotients do two things. They give some indication of the relative competition that new land uses made possible by the transport scheme (i.e. office, retail etc.) might experience from similar companies in and around the area (thus displacement possibility). However, on a more positive note they also give a measure of effective density and thus some insight into a possible positive agglomeration multiplier.

18.   To help assess displacement at the London-wide level, location quotient analysis by SOC provides evidence of particular clusters of activity in the Barking and Dagenham area. Figure 0-1below illustrates the top ten location quotients for Barking and Dagenham by SOC based on 2011 census data.

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[70] Homes and Communities Agency (HCA) Additionality Guide 2014 – Table 4.5 Displacement rates by City Challenge http://cfg.homesandcommunities.co.uk/sites/default/files/aboutus/additionality_guide_2014_full.pdf

Figure 0-1 Barking & Dagenham Location quotients relative to London
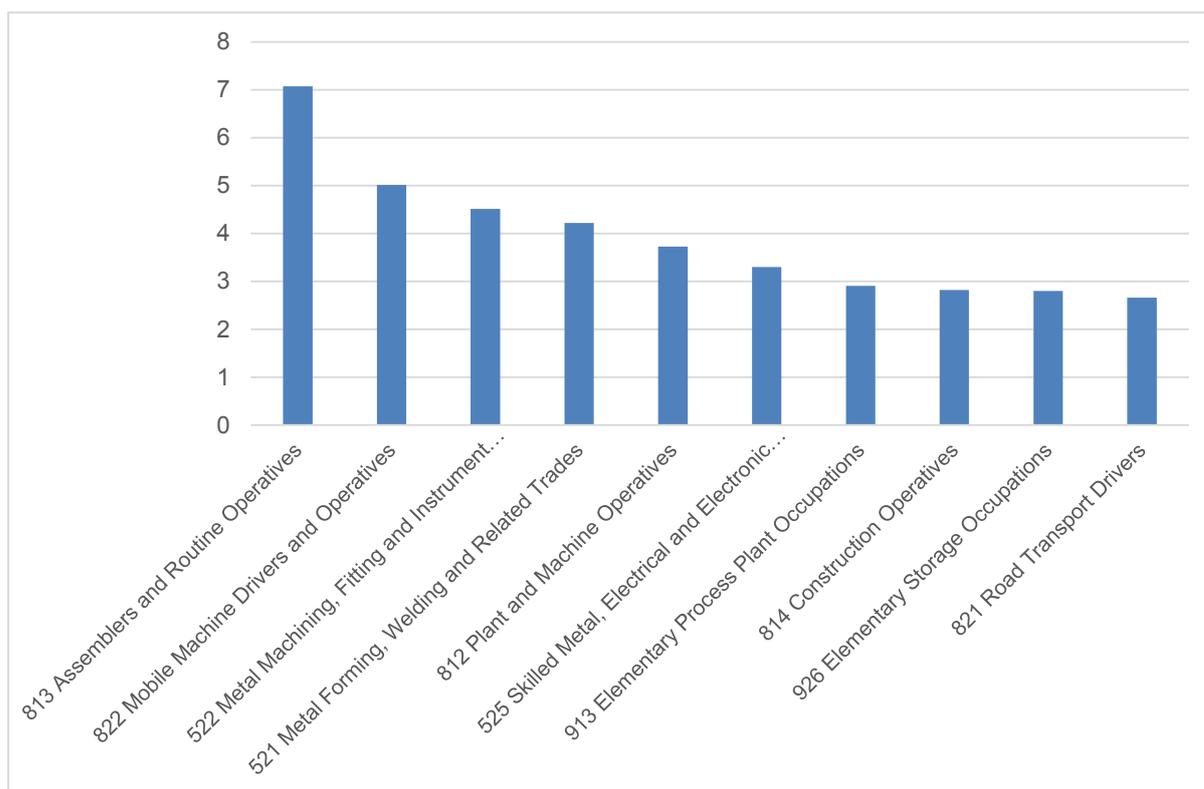
19. The findings show evidence of higher levels of concentration of activity relating to manual skilled labour (assemblers and routine operatives, plant and machine, and construction operatives) could be employed in new industrial developments unlocked by the scheme. However, for consistency, it has been assumed the displacement at the regional level will at the level recommended by the HCA additionality guidance (89%). Table 0-4 illustrates commercial development displacement ratios by target area.

Table 0-4 Commercial development displacement ratios by target area

Sector	Barking & Dagenham	London
Office	38	89
Retail	50	89
Industrial	38	89

20. Retail displacement is set higher than office to reflect that retail spending in the high street is more easily substituted from other shops within the locality and other town centres at the London level. However, not all is displaced from other retail centres for this scheme, as the absence of transport infrastructure is assumed to be a binding constraint in the creation of retail floorspace and further retail activity beyond existing levels of spend. This reflects the opportunity for a minority of retail space to be taken up by specialist outlets which are more likely to encourage additional spend at the London level (e.g. instead of online spend).

21. For housing, displacement ratios have taken into consideration the chronic level of suppressed demand for housing across the whole of London. The London Plan

requires an additional 49,000 homes per year between 2015 and 2036 although there is capacity for only a minimum of 42,000 additional homes per year according to the Strategic Housing Land Availability Assessment (SHLAA). As such, there is a strong case for assuming a proportion of housing development brought forward by transport schemes does not displace development from elsewhere within London. However, it is recognised that there will be some supply-side constraints (e.g. finance; house building resources).

22. The HCA additionality guide[71] advises of housing displacement ratios of 38% at the local level and 100% at the regional level. However, given that the constraints on land availability are lessened by the transport intervention and, specifically, the land parcels created by the tunnelling project we have set displacement for housing at the regional (London) level at 50%.

Multipliers

23. Standard multipliers to capture the indirect and induced effects of direct job increases have been applied based on the HCA Additionality Guide as illustrated in Table 0-5 below. Multiplier effects arising from new housing accommodated in the area means more people in the area buying more local goods and consuming more local services.

24. There are two main multiplier effects arising from new business land use in the area (retail and commercial). The first is often referred to arise through new businesses in the target area buying from other businesses (linkage effect) and the second is the induced household income multiplier effect whereby worker's incomes in the new jobs are spent in and around the area (induced income effect). The analysis uses values consistent with the latter effect, although it can be argued that the former will also have a role to play and would represent an upside to the business case.

Table 0-5 Multipliers for indirect and induced job impacts

	Local (Borough level)	Regional (London)
Office	1.29	1.44
Retail	1.21	1.38

25. The above parameters are taken from Table 4.12 of the HCA Additionality Guide. The analysis presented here may be seen to be conservative, in that it does not reflect agglomeration benefits ('wider effects'). These arise through increased density enabling increasing returns (falling average costs) for businesses in the area through supply chain linkages, knowledge spillover effects etc. These have not historically been incorporated in the HCA/ BIS additionality guidance but where discussed in the BIS 2009 additionality research work. The A13 tunnel is expected to increase density and this can effect and increase the size of an agglomeration 'multiplier'. A further factor is that there may also be dynamic density enhancing benefits from additional housing being enabled in the area since the new housing allows existing and new businesses in the area to employ more people in their activities in the area.

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[71] Homes and Communities Agency (HCA) Additionality Guide 2014 – Table 4.5 Displacement rates by City Challenge http://cfg.homesandcommunities.co.uk/sites/default/files/aboutus/additionality_guide_2014_full.pdf

Results

26.   Three distinct mechanisms have thus been considered in quantifying the net additional job impacts. These are:

i) Direct employment from commercial floorspace provision – these jobs are generated directly through the scheme facilitating further investments in commercial developments;

ii) Indirect employment from better job connectivity – these jobs are generated as a result of households being able to relocate closer to employment centres or transport links to access jobs. These are the dynamic benefits of new housing in relatively high demand areas like much of London being able to enable higher job employment densities that are currently frustrated by a lack of housing in the area. It is assumed that 25 per cent of new homes generate additional employment for households, in line with research undertaken for DCLG[72]. For London, this is probably a conservative assumption. Average household sizes and employment rates for the borough have been applied in line with Homes and Communities Agency guidance. A London-wide average GVA per worker of £56,867 is used as a basis to calculate uplifts for GVA per office worker and downward adjustments for retail, community and leisure jobs[73]. An adjustment is also made for a lower GVA/job for those who live and work in the local area. For Barking and Dagenham this proportion is 35%.

iii) Indirect employment from spending by new households – these jobs are generated as a result of new households spending money on community, leisure and retail services in the local economy (standard induced income multipliers effects). Based on research by the GLA on the relationship between number of households and services of this nature, it is assumed that 171 jobs are created for every 1,000 homes provided. These jobs are assumed to occur at a local service/retail GVA/head rate.

Applying the additional approach to the Barking Tunnel scheme for the reference and intervention case provides total net additional jobs figures for two target area levels: local borough and for London as a whole. The figures presented in Table 0-6 summarises the findings which take into account deadweight (i.e. the reference case), displacement and multiplier effects.

Leakage effects have been excluded from the analysis below to reflect total employment created at the target area level regardless of whether residents take up these jobs.

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[72] Valuing the Benefits of Regeneration Economics paper 7: Volume I - Final Report p83. P.Tyler at al. 2010.
[73] The £56,867 GVA per worker figure is taken from GLA Economics Working Paper 63: Gross Value Added per Workforce Job in London and the UK:
http://www.london.gov.uk/sites/default/files/GLAE%20Working%20Paper%20-%20GVA%20per%20Workforce%20Job%20in%20London%20and%20the%20UK%20-%20February%202015%20-%20FINAL.pdf
This research calculates GVA per 'attributable' worker and in doing so removes market and imputed rents attributed to each industry. This results in a lower estimate of GVA per worker when compared against the Office for National Statistics figure of £63,971 per workforce job.

Table 0-6 Net additional jobs and homes

Additionality elements accounted for	Direct employment	Barking & Dagenham	London-level
	Gross direct employment in reference case	0	0
	Gross direct employment in intervention	834	834
Less Deadweight	Net direct employment	834	834
Less Displacement effects	Net additional direct employment	519	94
Plus Multiplier effects	Net additional direct employment	643	132
Additionality accounted for	**Indirect employment from housing provision**	**Barking & Dagenham**	**London-level**
	Gross dwellings in reference case	0	0
	Gross dwellings in intervention	4,700	4,700
Deadweight	Net dwellings built	4,700	4,700
Deadweight and displacement	Net additional dwellings built	2,914	2,350
Deadweight and displacement	Net additional employment from enhanced accessibility through housing		814
Deadweight and displacement	Indirect employment from spending by new households		402
Additionality accounted for	**Direct and indirect employment**	**Barking & Dagenham**	**London-level**
Deadweight, displacement and multipliers	Total net additional employment	1,631	1,350

27. The above illustrates that at the London level, 1,348 jobs and 2,350 homes are provided which primarily reflect displacement effects across the city area. Table 0-7 summarises the gross and net additional figures for the scheme.

Table 0-7 Gross and net additional jobs and homes

Employment	Barking & Dagenham	London-level
Gross direct employment	834	
Net additional employment (including indirect jobs)	1,631	1,350
Housing	**Barking & Dagenham**	**London-level**
Gross dwellings	4,700	
Net additional dwellings	2,914	2,350

28. The net additional employment impacts are appraised in terms of Gross Value Added from opening of the scheme over a ten-year period for direct job impacts and thirty year period for indirect job impacts – the latter is assumed to have a longer persistence in line with the permanence of housing stock. Average GVA per worker of £31,250 reflects Barking and Dagenham Borough data for jobs in the local retail, education,

health, social and recreation service sectors[74]. Table 0-8 summarises the Present Value of net additional GVA impacts at the Barking and Dagenham and at the London region level.

Table 0-8 Present value of net additional GVA from development, millions of pounds (2010 discounted prices)

	London-level
Direct employment from commercial developments £mPV	40.7
Indirect employment enhanced accessibility through housing £mPV	511.5
Indirect employment from spending by new households £mPV	204.5
Net additional GVA £mPV	**756.7**

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[74] Based on London Borough-level GVA by industry