

Further Information on the Crossrail Business Case – January 2004

Cross London Rail Links Ltd
Strategic Rail Authority
Transport for London

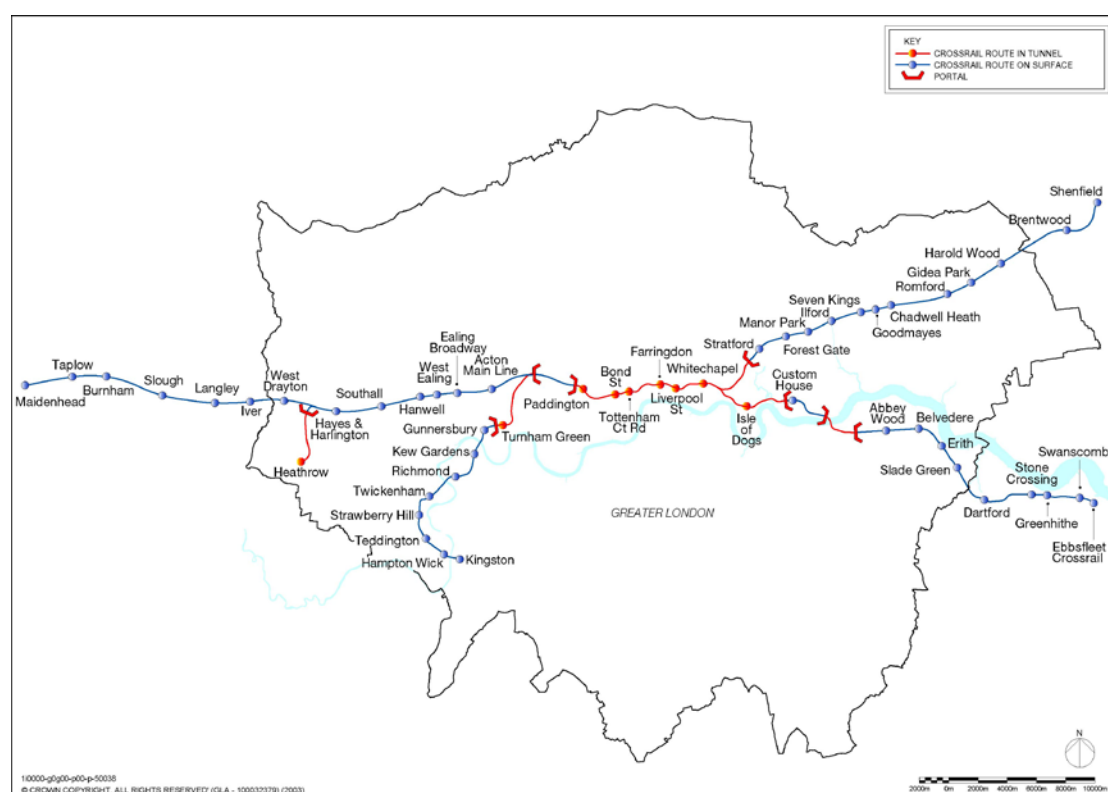
Executive Summary

The Crossrail Business Case submitted to Government in July 2003 indicated a strong economic performance that has been confirmed by further scheme development work undertaken since then¹.

The July Case indicated that detailed specification for the western routes was still under development. This development work has been informed by public consultation requested by Government that was undertaken during the latter half of 2003.

Further examination of arrangements for access to Heathrow has concluded that a revised arrangement to that published is required. The proposed definition now envisages Crossrail serving Heathrow alongside Heathrow Express. In addition Crossrail also serves other stations on the Great Western Main Line, particularly within London.

January 2004 Benchmark – The Route



An extension of four Crossrail trains to Maidenhead and two to West Drayton is also necessitated by this change, as is a more expensive connection to Heathrow at Airport Junction. A contribution to these costs is expected from the Airport operator, although as with other potential developer contributions, this has not been assumed in the appraisal. The result is a Great Western Crossrail service of ten trains per hour in the peak hour.

The service to Richmond and Kingston now assumes that the District Line would be diverted to Wimbledon and Ealing Broadway. There would be a Crossrail station at

¹ An update to the Procurement and Finance Strategy was separately reported to Government in December 2003.

Turnham Green and this location would take on more significance as a transport node. This suggests there would be advantage in Piccadilly Line trains stopping there too, subject to appropriate Phase 2 PPP arrangements.

The net increase in capital costs arising from the increased scope of the scheme have been taken into account. Operating and maintenance costs have also been reviewed.

Net revenue performance has also improved, principally because of the extra net revenue now arising from Heathrow with Crossrail running alongside Heathrow Express.

Appraisal performance has been maintained with the benefit - cost ratio now exceeding 2:1, which confirms earlier work that the project demonstrates a robust performance using Treasury Green Book criteria.

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1. Introduction

- 1.1 The Strategic Rail Authority, Transport for London and their joint venture company Cross London Rail Links (CLRLL) submitted the business case for the Crossrail project to the Secretary of State for Transport on 14 July 2003.
- 1.2 Since then CLRLL has undertaken a public awareness campaign and consultation round one². This consultation has informed the significant development work undertaken on scheme definition, project costs and the appraisal since July 2003. The results of this work are reported here³.
- 1.3 The July 2003 Business Case indicated that the detailed specification for the routes in the west was still under development. The further development work since then has focused on these routes such that the recommendation for access to Heathrow, serving other destinations on the Great Western Main Line, has been finalised. The previous findings for Richmond and Kingston are also confirmed.
- 1.4 The remainder of the report is organised as follows:
 - Chapter 2 **Further Development of the Benchmark Definition**
 - Chapter 3 **Project Costs**
 - Chapter 4 **The Business Case**

² Crossrail, Public Awareness Campaign and Consultation Round one (in preparation to be submitted to DfT at the end of January)

³ The development of the Finance and Procurement Strategy was submitted to DfT on the 17th December 2003

2. Further Development of the Benchmark Definition

Introduction

- 2.1 The Crossrail proposal presented here has been termed the “Crossrail January 2004 benchmark scheme”. This section outlines the service pattern and infrastructure assumptions underlying this proposal, concentrating particularly on changes made since the July 2003 benchmark scheme.

Heathrow and Great Western

- 2.2 Several factors have contributed to the development work for Heathrow:
- Further investigation of the pattern of crowding on Airport services between Heathrow and Paddington;
 - Concerns of Airport interests over the proposal to replace Heathrow Express with Crossrail;
 - Consultation feedback that Crossrail should serve additional destinations on the Great Western Main Line;
 - Further investigation of operational constraints on the line between Airport Junction and Paddington.
- 2.3 The operation of additional services to Heathrow is inextricably linked to that of other services on the Great Western Main Line. It has therefore been necessary to develop an integrated service pattern for the Relief Lines. This involves some Crossrail trains serving destinations west of Airport Junction as far as Maidenhead.
- 2.4 Additionally, further work on the infrastructure around Airport Junction has identified that Crossrail could be operated alongside the existing Heathrow Express service. Operation of both of these services to Heathrow would require amendments to existing track layouts and the construction of new infrastructure between Southall and Airport Junction. The whole cost of this additional infrastructure has been included in the appraisal even though there is an expectation that the Airport operator would make a contribution. This is consistent with the rest of the appraisal where no developer contributions have been assumed.
- 2.5 The result is a service specification for 10 Crossrail trains in the peak hour operating alongside Heathrow Express and a residual “Thames Trains” service of 2 trains per hour (tph) Reading to Slough and 2 tph Reading to Paddington. This represents a significant improvement over the assumption in the July Business Case. It allows more destinations on the Great Western Main Line to be served by Crossrail, it responds very positively to the concerns of Airport interests by retaining Heathrow Express and also provides a more even distribution of traffic across the Crossrail services, thereby alleviating some of the crowding evident on the Airport services in the July specification.

2.6 This has required some amendment to the infrastructure required on the Great Western Main Line:

- A revision to the arrangement at Canal Way Junction;
- Electrification of the lines between Airport Junction and Maidenhead;
- Lengthening platforms at intermediate stations where necessary;
- Amendments to the flyover at Airport Junction.

Richmond and Kingston

2.7 Although the same Crossrail service frequency is proposed for the branch, with 4 tph commencing at Kingston and 8 tph at Richmond, a new Crossrail station is now confirmed at Turnham Green with interchange provided to the District Line.

2.8 On the District Line, it is now assumed that the service to Richmond, Kew Gardens and Gunnersbury is withdrawn, rather than just slightly reduced as in the July specification. This change is a result of analysis carried out since July which shows that there is insufficient track capacity between Gunnersbury and Richmond for the existing District Line and North London Line services to continue to operate alongside the proposed 12 tph Crossrail service. Under the revised proposals, passengers for the District Line from the Richmond branch would need to interchange from Crossrail services at Turnham Green. This would increase the importance of Turnham Green as an interchange and suggests there would be significant advantage in Piccadilly Line trains stopping there too. This change has been quantified for appraisal purposes and is included in the assumptions, but is subject to a detailed feasibility study and agreement with LUL in the context of its PPP contracts.

2.9 It is now proposed that the District Line service from Richmond is diverted to the Ealing Broadway and Wimbledon branches, with each receiving half of the displaced 7 tph service. The resulting improvement in service frequency from Wimbledon would help address the significant existing crowding problem on this branch.

2.10 The withdrawal of the entire District Line service from Richmond would allow the North London Line service to be retained from Richmond. This varies from the July specification where it was assumed that the service would be terminated at Gunnersbury.

East of Central London

2.11 In the east, no changes are proposed to the July 2003 benchmark service pattern. A 12 tph service would operate in the morning peak hour from Shenfield, replacing much of the existing "Great Eastern Metro" services, although a number of these services would continue to operate between Gidea Park and Liverpool Street. From north Kent, 4 tph would operate from Ebbsfleet, with a further 8 tph starting at Abbey Wood. Operation of the 4 tph Crossrail service would require the substitution of two existing London Bridge trains through Dartford. It is still assumed that the North London Line service would be rerouted to start at Abbey Wood with Silvertown and North Woolwich stations being closed. The detailed arrangements for connections between the

North London Line, Docklands Light Railway and Crossrail in this area will be developed further during preparation for the hybrid Bill.

- 2.12 An option remains to extend Crossrail services beyond Ebbsfleet to Gravesend. The case for this extension will be examined in the light of the emerging proposals for the Kent Integrated Franchise.
- 2.13 The most significant amendment to the Crossrail infrastructure in the east is the relocation of the tunnel portal from Bow to Pudding Mill Lane, just west of Stratford station. This change would avoid significant permanent and construction impacts on the area around Bow. The most significant permanent impacts would have included adverse visual, noise and land-take effects on surrounding residential properties and community facilities.

Depots and Stabling

- 2.14 CLRLL has undertaken extensive study of potential depot sites since July 2003. This has identified a site on the Great Eastern Line at Romford as the preferred location. This has the advantage in planning terms of being a brownfield site
- 2.15 Stabling sites for the benchmark scheme have also been assumed at Gidea Park, Ebbsfleet, Slade Green, Twickenham or Feltham, Old Oak Common, West Drayton and Maidenhead.
- 2.16 The final preferred location for both the Crossrail depot and the stabling will be dependent on the final scheme to be promoted in the hybrid Bill and expectations regarding construction phasing. However, the work done thus far has identified that solutions to both of these matters are available for inclusion in a hybrid Bill.

London's Proposed Bid for the 2012 Olympic Games

- 2.17 Pudding Mill Lane is a focus for activity for both Crossrail construction and facilities to support the Olympics. The revised location for the tunnel portal at Pudding Mill Lane lies on the currently planned site for the Olympics media village. The sidings at Pudding Mill Lane have also been identified as a potential site for the inward transport of aggregates and concrete linings and for the management of spoil being excavated for the tunnel. Further work will be required on construction phasing to ensure work around Pudding Mill Lane is compatible with the emerging Olympic site utilisation plan.

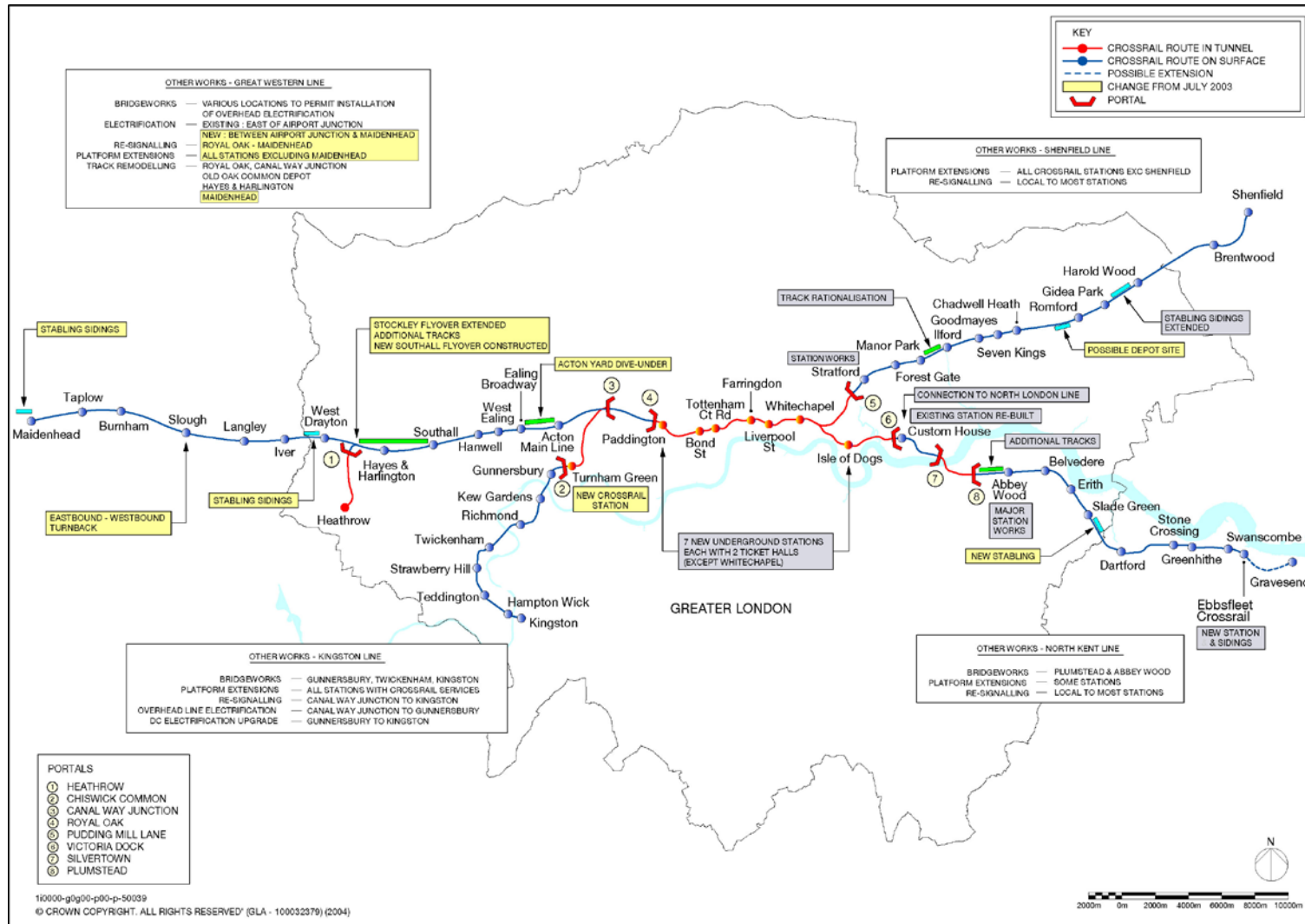
January 2004 Benchmark Scheme

- 2.18 The updated scheme definition and infrastructure requirements for the January 2004 benchmark scheme are shown in Figure 2.1. This comprises:

- The currently protected alignment between Paddington and Liverpool St;
- East from Liverpool St to Whitechapel and then branching to Stratford and on to the Great Eastern Line serving stations to Shenfield;
- East from Whitechapel to the Isle of Dogs and on through the Royal Docks, crossing the Thames to join the North Kent Line at Abbey Wood and serving stations to Ebbsfleet;
- West from Paddington and then south west to serve stations to Richmond and Kingston;
- West from Paddington to serve stations on the Great Western Line to Maidenhead with a branch to Heathrow.

2.19 A more detailed description of infrastructure requirements are contained within Appendix A.

Figure 2.1 January 2004 Benchmark Scheme – Infrastructure Requirements



2.20 The proposed Crossrail peak service frequencies at stations served by the January 2004 benchmark scheme are shown in Figure 2.2. These frequencies relate only to the peak direction of travel at these stations. The Great Western service pattern is now:

10 tph Crossrail on the Relief Lines

- 4 tph Heathrow
- 4 tph Maidenhead
- 2 tph West Drayton

2 tph Crossrail turn at Westbourne Park

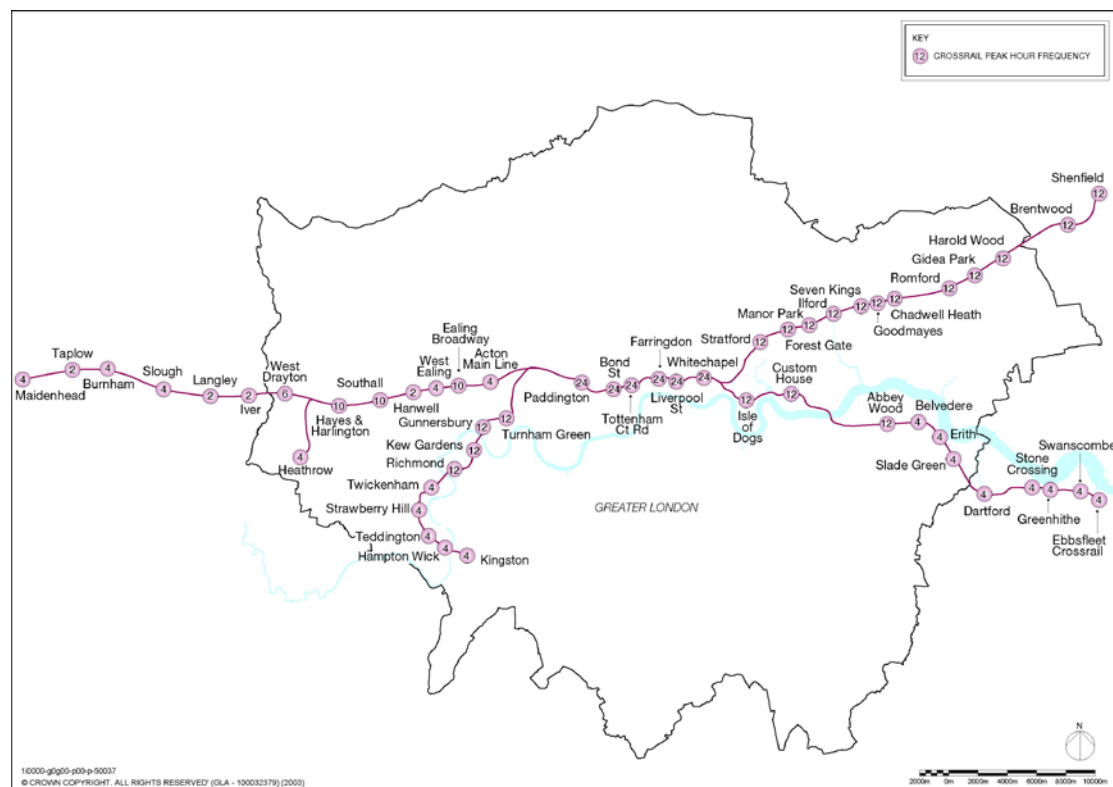
2 tph "Thames Trains" on the Relief Lines

- 2 tph Reading to Slough
- 2 tph Reading to Paddington

4 tph Heathrow Express via the Main Lines.

2.21 An additional stop is provided at Turnham Green on the route to Richmond.

Figure 2.2 January 2004 Benchmark Scheme – Crossrail Peak Service Frequency



3. Project Costs

Introduction

- 3.1 Project costs have been revisited to adjust for changes in project scope since July 2003. Other scheme components reflect assumptions on scope and costs as presented in the July 2003 benchmark scheme except where specified.

Capital Cost

- 3.2 Changes in the scope of the benchmark scheme since July 2003 have resulted in the net base capital cost of the project increasing from £6.886bn to £7.578bn at 1st Quarter 2002 prices. The changes accounting for this amended cost are summarised in Table 3.1.

Table 3.1 Capital Cost Changes Since July 2003

July Benchmark (net) Base Cost Estimate	£6.886bn
Changes	
Revised service option to Richmond & Kingston incorporating Turnham Green station (and interchange with Piccadilly Line)	+£73m
Crossrail services to Maidenhead including modifications to GW route infrastructure (excludes cost of resignalling)	+£350m
Revised infrastructure to overcome operational constraints at Heathrow	+£120 m
Revised tunnel alignment to Pudding Mill Lane portal instead of Bow portal	+£149m
January 2004 Benchmark (net) Base Cost Estimate	£7.578bn

- 3.3 This represents the net capital cost of Crossrail in that it has been adjusted for two specific items of cost avoided which total £160m. These cost items are:
- Power supply upgrade to the Richmond & Kingston section – preliminary studies on power requirements indicate roundly £10m;
 - Works arising from the deferment of the Thameslink 2000 project until after Crossrail – the scope of works for closure of the Moorgate branch has yet to be defined but will result in additional ticket hall costs, removal of tracks and changes to existing railway systems. An allowance of £150m is being assumed at this stage of scope definition for these works.
- 3.4 The section of route to Maidenhead will require resignalling. Because this work is included in Network Rail’s investment plan and scheduled for completion by

2012, it has been assumed that it will already have been completed ahead of the Crossrail works on this route.

Contingency Analysis

- 3.5 The contingency analysis presented in the July benchmark is being revisited, principally to reflect the major scope changes highlighted, but for consistency, the percentage has been retained at the same aggregate level as in the July Case.
- 3.6 The overall result is that the contingency adjustment has increased to £3.107bn on the net base cost of £7.578bn.

Operating and Maintenance Costs

- 3.7 The principal changes to the operating and maintenance costs arise from:
- Reduced maintenance costs for new infrastructure (following a review of assumptions on scope and timing of interventions and removal of cost duplication for on-network maintenance costs already deemed included in track access charges);
 - Additional operating costs for collateral services (principally on West Anglia services into Liverpool Street);
 - Additional operating costs for Crossrail services to Maidenhead;
 - Review of assumptions on rolling stock costs, staff salaries, driver only operation (with enhanced staffing at certain times of day) and train length during low-demand times.
- 3.8 The aggregate results for the January 2004 benchmark are summarised in Table 3.2. These represent a reduction in average rail annual operating and maintenance cost of roundly one-fifth against the July Case:

Table 3.2 Operating, Maintenance and Renewal Costs for Crossrail

	Operating Cost (Including Maintenance on NRN @1Q2002 prices	New Infrastructure Maintenance Cost @1Q2002 prices	Total @1Q2002 prices
Net Costs	£96.2mpa	£75.2mpa	£171.4mpa
PV	£2,159m	£1,130m	£3,289m

- 3.9 For the purposes of financial analysis, the contingency on these costs has been maintained at 20% despite the more robust assumptions used here. The Present Value (PV) of the revised contingency is £658m (previously £834m PV).

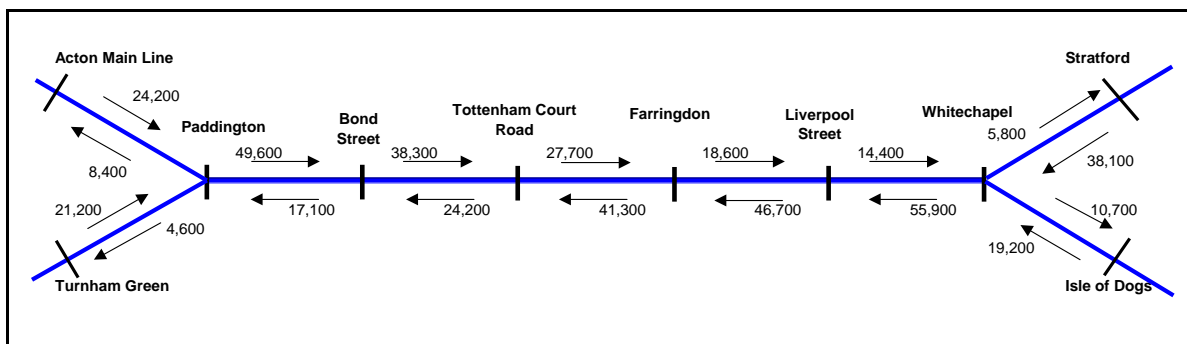
4. Business Case

Crossrail Usage

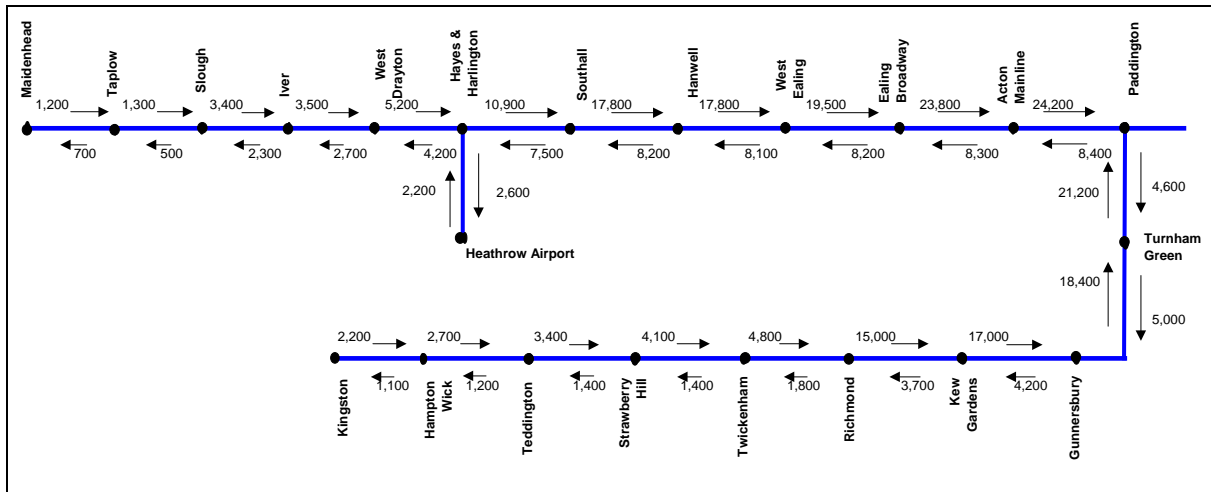
- 4.1 Crossrail is forecast to be used by a total of 190,000 passengers in the morning peak period in 2016 (0700-1000hrs). This is an increase of approximately 30,000 over the July figure and primarily reflects:
- A higher Crossrail frequency on the Great Western Main Line with a greater number of stations served (additional 16,500 boarders);
 - Higher flows on the Kingston branch due to the introduction of a Turnham Green stop on Crossrail and District Line service changes (additional 5,500 boarders);
 - Improved modelling of central area stations reflecting better connections to the rest of the transport network (additional 4,000 boarders).
- 4.2 By principally adding boarders to Crossrail services from the west, changes to the July service specification have significantly improved the overall balance of flows from the east and the west of central London. Total boarders from the two western branches now equal 80% of the total of the two eastern branches; in July 2003 the equivalent figure was just 57%.
- 4.3 Forecast passenger loadings on Crossrail are shown in Figure 4.1. The maximum loadings on each of the branches into the Central area are forecast to be:
- 38,000 from the Shenfield branch (approaching Whitechapel from the east);
 - 20,000 from the Isle of Dogs/North Kent branch (approaching the Isle of Dogs from the east);
 - 21,000 from the Kingston branch (approaching Paddington from Turnham Green);
 - 24,000 from the Great Western branch (approaching Paddington from Acton Main Line).

Figure 4.1 Crossrail Passenger Loadings (0700 – 1000hrs)

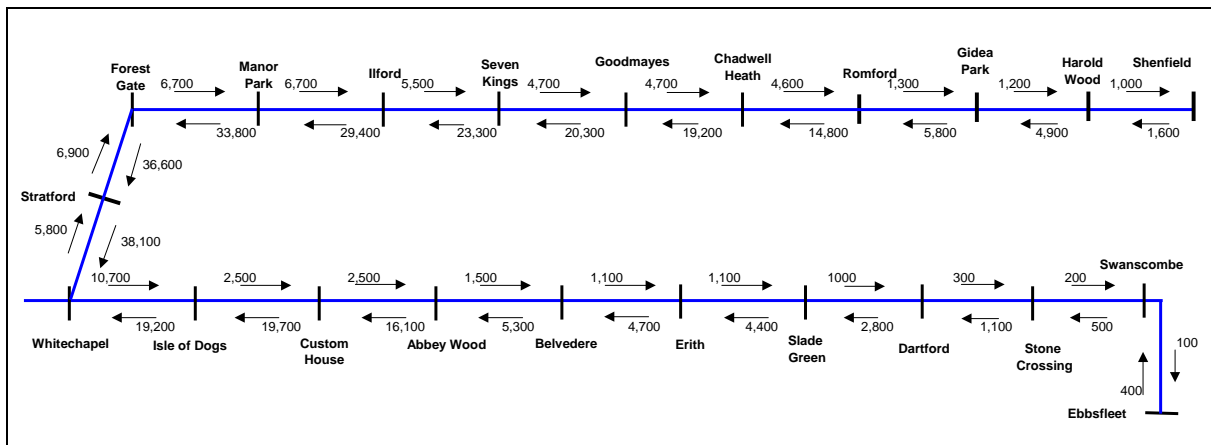
Central Area



West



East



Impact of Crossrail on LUL and NRN networks

- 4.4 The January 2004 benchmark achieves higher levels of crowding relief on the London Underground network, in particular on the Bakerloo, Hammersmith & City/Circle, District and Piccadilly Lines. This primarily reflects:
- The revised Crossrail service pattern on the Great Western Main Line which increases passenger abstraction from the Piccadilly Line in west London and reduces interchange to LUL services at Paddington;
 - Alterations made to the District Line service pattern that increase services on the very crowded Wimbledon branch.
- 4.5 The majority of the National Rail network (NRN) has similar levels of crowding relief to the July 2003 benchmark. The main exceptions are the services into Paddington where the additional Crossrail capacity provided in the January benchmark substantially improves crowding relief on this set of services.

Appraisal

- 4.6 Appraisal of the benchmark scheme differs from July 2003 as follows:
- The revised definition of the benchmark scheme, reported in Chapter 2;
 - Revised capital, maintenance and operating costs, reported in Chapter 3;
 - Development of the appraisal methodology (details given in Appendix B).
- 4.7 The development of an integrated Great Western service with Crossrail running alongside Heathrow Express results in quantified benefits for many more passengers.
- 4.8 The principal change to the appraisal methodology surrounds the calculation of Heathrow benefits with particular attention focused on reducing the uncertainty reported in July 2003. Benefits are now calculated solely on the basis of the Department for Transport's (DfT) SERAS models, thereby removing the interface between SERAS and the Railplan model used to forecast the overall effects of the scheme.
- 4.9 Some uncertainty remains with Crossrail running alongside Heathrow Express. This relates to the share of traffic between the two services, particularly at Heathrow where they would share platforms. An attractive Crossrail service is still assumed, but as Heathrow Express is retained in the specification, sensitivity to assumptions on attractiveness is significantly reduced compared to the July 2003 appraisal. The principal effect of changing the attractiveness is to shift the balance of demand between Heathrow Express and Crossrail.
- 4.10 Revenue is now calculated using a multiplier of 12.2 pence per passenger kilometre compared with 11.4p previously, which gives an increase of £0.1bn (PV). The revenue multiplier is a weighted average of the revenue per passenger kilometre figures of the other public transport modes, based on the relative proportions of demand that Crossrail abstracts from those modes. This will change as the scheme definition changes with the 11.4p figure being based on an earlier scheme which had a higher proportion of demand abstracted from the TOCs.
- 4.11 In addition, the Crossrail Heathrow service now generates additional revenue of £0.4bn (PV). This revenue comes from the Crossrail premium fare and from the overall increase in public transport mode share. Under the January 2004 benchmark scheme, Crossrail attracts airport demand from London Underground and the Heathrow Suburban Service, both of which have lower Heathrow fares than that assumed for Crossrail. Compared with July 2003, total net revenue has grown from £2.2bn to £2.7bn (PV).
- 4.12 Revenue counts as a negative cost in the appraisal and when added to the revised costs of the scheme reported in Chapter 3, the benefit - cost ratio (BCR) becomes 2.14:1, compared to the 1.99 previously reported. The TEE-table supporting this result is attached as Appendix C.
- 4.13 Table 4.1 shows the benefits and costs (excluding revenue) for each of the January 2004 benchmark increments, where each increment is appraised as if it

were the final scheme. The costs shown are the total PV of the net capital, operating and maintenance costs and do not include revenue and taxation effects.

Table 4.1 Staged Appraisal⁴

Increments	Benefits (£m PV)	Cost (excluding revenue) (£m PV)	BCR
1. Paddington to Farringdon	894	-	-
2. Paddington to Isle of Dogs	2477	7884	0.33
3. Paddington to Shenfield and Isle of Dogs	9547	9384	1.15
4. Paddington to Shenfield and Ebbsfleet	13637	10685	1.46
5. Maidenhead/Heathrow to Shenfield and Ebbsfleet	18802	11524	1.97
6. Kingston/Richmond and Maidenhead/Heathrow to Shenfield and Ebbsfleet	22330	12751	2.14

4.14 Overall, the development work undertaken since July has resulted in a slightly higher benefit - cost ratio, due to improvements to the scheme definition, costings and appraisal methodology. The degree of uncertainty surrounding calculation of benefits for Heathrow has been significantly reduced, which suggests increased robustness of results compared to those reported in July 2003.

Agglomeration

4.15 Agglomeration benefits refer to the increased productivity of labour with respect to employment density. Crossrail would relieve the transport constraint on future central London employment growth, thereby increasing employment and productivity.

4.16 The July 2003 Business Case reported that DfT were commissioning their own studies on this effect. Since then, discussions with the DfT have concluded that:

- There would be productivity gains due to the additional central area jobs, but at an individual level these would be balanced out by other non-pecuniary costs. However a "tax wedge" would remain, equivalent to 40% of the productivity increase attributable to new central area jobs, which would be captured by government;
- The increase in central area employment would increase the productivity of all central area jobs resulting in a second productivity rise.

4.17 Analysis by CLRL suggests that the value of these benefits is substantial:

- The "tax wedge" from the additional central area jobs has a PV of £3bn;

⁴ Note: It is possible that Crossrail could result in cost savings on other schemes at locations such as Tottenham Court Road, where LUL have planned improvements. The appraisal assumes no such savings.

- The productivity gains from the increase in central area employment density are worth some £4.6bn in PV terms.

These represent a substantial additional benefit of the project.

Environment

- 4.18 Service pattern changes have resulted in minor changes to predicted **noise** impacts since the July benchmark scheme.
- 4.19 There would be a **slight adverse** impact due to operational railway noise on a section of the Kingston branch around Strawberry Hill station, between West Ealing and Greenford and between Airport Junction and Heathrow, where railway noise levels are predicted to increase by 3dB or more. The July benchmark predicted a **neutral** impact overall, since all predicted increases were less than 3dB.
- 4.20 Increases in operational railway noise levels are forecast to occur in other locations. However, the impact would not be significant since the increases are predicted to be less than 3dB.
- 4.21 There would also be some decreases in noise on the Great Western Main Line between Royal Oak and West Drayton due to the replacement of diesel trains by quieter electric trains. These reductions in noise levels are not considered significant as they are predicted to be less than 3dB.
- 4.22 The installation of overhead line electrification equipment between Airport Junction and Maidenhead may result in visual impacts. Overall, the score of **slight adverse** impact on **landscape** contained in the July benchmark is unchanged.
- 4.23 The **major adverse** impact on **heritage and historic** resources contained in the July benchmark is unchanged. The on-going planning and design has sought to mitigate against the impacts on heritage and historic resources. The listed building at Liverpool Street (75-80 Old Broad Street) that was identified for demolition in the July benchmark would now be retained, since an alternative site has been identified. However, further design work has also revealed the potential need to demolish a listed building at Tottenham Court Road.
- 4.24 A **slight adverse** impact on **biodiversity** is predicted, similar to the July benchmark. Compared to the July 2003 benchmark, an additional 3 Sites of Importance for Nature Conservation (SINCs) would be affected by Crossrail. These sites are all located along the route between Airport Junction and Maidenhead.

Interchange

- 4.25 By calling at the intermediate stations between Paddington and Maidenhead, the journey opportunities for Crossrail in west London and the Thames Valley

are increased. Of note in Greater London are Southall and West Drayton stations which are both important local transport nodes with bus interchange. Outside of Greater London, Slough is a regional transport centre, with the Windsor branch and also many bus routes serving the nearby bus station. Maidenhead is also a significant local transport node.

- 4.26 With the withdrawal of through District Line services to Richmond there are some broken links for passengers between south west London suburbs and the southern parts of Hammersmith, Kensington and Westminster. However, there are compensating effects with the potential for Turnham Green to become a significant transport interchange hub, especially if the Piccadilly Line trains call there. This would also provide a direct interchange between Crossrail and Piccadilly Line services. The retention of through North London Line services to Richmond now maintains the links from there to inner North London.

Regeneration

- 4.27 The July 2003 Business Case estimated that Crossrail would enable or attract 56,000 to 110,000 jobs within key regeneration areas along the route as a result of new development. Between 70-80% of these jobs would be located in the Thames Gateway.
- 4.28 As the January benchmark closely resembles the July benchmark in the east, the overall regeneration benefits are likely to be similar. The key differences between the two schemes for regeneration benefits are the inclusion of stations in regeneration areas in west London at Southall and at Acton Main Line.
- 4.29 The draft London Plan identifies Hayes/Southall as an Opportunity Area with potential for 35,000 jobs and 5,800 homes by 2016. The area contains wards which fall within the top 10% most deprived wards in the national Index of Multiple Deprivation.
- 4.30 The inclusion of a direct Crossrail service to Southall would improve accessibility to and from central London and Heathrow. Crossrail would generate average time savings of 7 minutes from Southall. Sites such as the Southall gas works are significant brownfield development opportunities which would benefit from Crossrail. It is estimated that Crossrail could facilitate around 6,500 jobs as a result of an increase in economic activity on this and other sites. This represents a net increase on the July benchmark scheme for Southall of over 5,000 jobs. Based on the increase in development activity, increased accessibility to job opportunities, and current skills levels and unemployment rates, it is estimated that around 4,300 jobs (a net increase of over 3,000 jobs on the July scheme) could be taken up by residents who are unemployed or economically inactive.
- 4.31 Unlike Southall, Acton does not have significant amounts of land earmarked for redevelopment or physical regeneration. However, Acton does have areas of acute deprivation, which fall within the top 10% most deprived wards in the national Index of Multiple Deprivation.
- 4.32 The inclusion of a direct Crossrail service to Acton Main Line would improve accessibility to and from central London and Heathrow. Crossrail would generate average time savings of 5 minutes from Acton Main Line. However, the net

increase on the July benchmark employment figures for Acton is likely to be minimal as a shortage of development sites would constrain potential employment arising from development opportunities.

Impact of Sustainable Communities Plan

- 4.33 The Deputy Prime Minister's vision for the delivery of the Sustainable Communities Plan was published in tandem with the July business case. This set out the anticipated population and employment growth in the Thames Gateway. These forecasts were broadly in line with those assumed for the purposes of the regeneration analysis.

Appendix A

The January 2004 Benchmark Scheme – Infrastructure Requirements

The January 2004 Benchmark Scheme – Infrastructure Requirements

- A.1 The Maidenhead route would use the Great Western Relief Lines west of Airport Junction to Maidenhead. Some bridge works would need to be carried out to accommodate the new overhead electrification.
- A.2 The Heathrow route would require new track in the form of modifications to Airport Junction to allow additional train movements from the Great Western Relief Lines to the Airport but would utilise existing and future Heathrow Express tunnels and platforms.
- A.3 The Kingston route would utilise a tunnel from the Ladbroke Grove area to Turnham Green before using the existing alignment via Gunnersbury to Richmond. New underground Crossrail platforms would be constructed at Turnham Green and interchange to the District and the Piccadilly Lines would be provided (subject to LUL agreement to stop Piccadilly Lines services at Turnham Green). Crossrail services would then go forward to Kingston via the existing route via Twickenham and Strawberry Hill.
- A.4 The central area tunnel would run from a portal at Royal Oak to portals at Pudding Mill Lane and the Royal Docks. There would be new stations at Paddington, Bond Street, Tottenham Court Road, Farringdon, Moorgate/Liverpool Street, Whitechapel and the Isle of Dogs.
- A.5 All new stations would provide interchange to existing Underground services, National Rail stations and/or other transport modes. Platforms would be 205 metres long to accommodate trains of up to 10 car, 20 metre vehicles. Most stations would have two ticket halls to maximise the catchment area and improve safety. They would be designed to enhance effective passenger movement and maximise security and comfort. Crossrail central area stations would be fully accessible, with interchanges and existing stations made step free where reasonably practicable.
- A.6 A link would be provided from the tunnel portal at Pudding Mill Lane to Stratford and Crossrail trains would then run on existing track to Shenfield. Improved station facilities and extended platforms would be provided at some stations between Stratford and Shenfield to support a 10 car service. Shenfield Station would be remodelled, and sidings would be constructed at Romford and Gidea Park for the stabling of rolling stock.
- A.7 The Ebbsfleet route would run from the portal at Royal Victoria Dock. A new station would be built at Custom House. Sections of the North London and North Kent Lines would be used to create a new route from Docklands to Ebbsfleet via a new tunnel beneath the Thames emerging at a portal near Plumstead Station. Major works beyond Plumstead would comprise additional tracks, re-modelling and extra platforms at Abbey Wood, and safeguarding for a new station at Ebbsfleet. An extension to Gravesend is possible but in that instance there would be no new station at Ebbsfleet and trains would stop instead at the existing Northfleet station.

Appendix B

Changes to Appraisal Methodology since July 2003

Changes to Appraisal Methodology since July 2003

B.1 A number of changes have been made to the modelling and appraisal methodology since the July 2003 Business Case. These are as follows:

Modelling changes

- Central area Crossrail stations walk times corrected (**reduces BCR**);
- Modelling of cross-platform interchange at Stratford corrected (**reduces BCR**);
- Modelling of street level connections to Tottenham Court Road station improved (**increases BCR**);
- Farringdon station re-modelled (**increases BCR**).

Appraisal changes

- Revised annualisation factors derived from 2002 passenger counts, as opposed to 2001 counts used for July 2003 Business Case (**reduces BCR**);
- Correction to 2026 benefit figure following reassessment of 2026 growth assumptions (**reduces BCR**);
- Reassessment of bus impacts, based on updated TfL London Buses business plan (**reduces BCR**);
- Calculation of crowded/uncrowded benefit proportions improved following model development by TfL, which enables a break down of benefits by type to be calculated at a detailed demand zone level, rather than globally (**increases BCR**);
- Recalculation of revenue factor based on January 2004 benchmark scheme, which increases from 11.4 pence/passenger km to 12.12p (**increases BCR**);
- Correction to calculation of taxation revenue lost (**increases BCR**).

B.2 The overall net effect of these changes is a slight increase to the BCR, though it is difficult to disassociate this from scheme development since July 2003.

B.3 In addition to the above, Heathrow benefits are now calculated using generalised costs, including mode constants, from the SERAS model, rather than from the Railplan model. This ensures consistency between the Heathrow demand forecasts and the calculation of Heathrow benefits, and removes the previous uncertainty arising from the interface between the two models. There still remains some uncertainty over the relative attractiveness of Crossrail, Heathrow Express and the Heathrow Suburban Service, which is expressed through parameters such as mode constants and premium fares.

B.4 Composite generalised costs have been calculated across all modes, for each market segment, as this correctly measures the impact of the introduction of a new mode.

B.5 Compared with July 2003 the Business Case is less reliant on Heathrow benefits, partly because Heathrow Express is retained and partly because there are benefits from serving additional destinations on the Great Western Main Line.

Appendix C

TEE Table

This TEE table is based on a layout developed by the DfT. The project costs are consistent with those given in the report text, but have different values here arising from the manipulations necessary for the purposes of cost – benefit analysis.

Appendix D

Appraisal Summary Table