National Audit Office

Report
by the Comptroller
and Auditor General

Department for Transport

Crossrail

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Department for Transport

Crossrail

Report by the Comptroller and Auditor General

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This study examines the Department for Transport's investment and role in the Crossrail programme and the likelihood that this will provide value for money for the taxpayer.

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Contents

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This report can be found on the National Audit Office website at www.nao.org.uk/2014-crossrail

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Key facts

£14.8bn	**£5.2bn**	**£1bn**
available infrastructure funding for the Crossrail programme	contribution for Crossrail infrastructure set aside by the Department for Transport	estimated cost of Crossrail trains

December 2019	Crossrail full opening date
14 years	the time from Crossrail Bill being presented to Parliament, to Crossrail opening fully
43.7 per cent	of the Crossrail infrastructure works complete against a target of 45.2 per cent, as at September 2013
42	kilometres (26.2 miles) of new Crossrail tunnels under London
24	Crossrail trains per hour which will run in each direction on the central section at peak times
9	new stations being built

Summary

1 The Department for Transport (the Department) is jointly sponsoring, with Transport for London, the Crossrail programme to deliver a new rail service for London and the South East. When complete, the new line will run from Maidenhead and Heathrow Airport in the west, to Abbey Wood and Shenfield in the east.

2 Crossrail Limited, a wholly-owned subsidiary of Transport for London, is delivering the programme, with Network Rail undertaking work to improve existing surface infrastructure to meet the needs of the new service. About half of the infrastructure work is now complete, which is just behind schedule, but Crossrail Limited remains confident that it will meet the planned delivery date. Forecast costs remain within available funding of £14.8 billion and Crossrail Limited has taken steps to improve the progress against schedule. In summary, the programme involves:

- building a new underground railway across central London, improving existing tracks on the western and eastern branches, building nine new stations and improving 29 existing stations;
- buying a fleet of new trains and a maintenance depot, with an estimated cost of £1 billion; and
- appointing a company to operate the service.

3 The Department and Transport for London have established a £14.8 billion funding package to build the infrastructure. The funding is a combination of direct grant funding from both bodies, borrowing by Network Rail and Transport for London, and contributions from businesses, including a supplement to London business rates. The Department's contribution is likely to be £5 billion.

4 Both the Department's and Transport for London's decision to invest is based on forecast growth to the population in London and the South East, and resulting increased demand for public transport. The business case for the line estimates that Crossrail will produce £1.97 of benefit for every £1 of cost, through reduced journey times, reduced crowding on public transport and quicker interchanges between services.

Scope of the report

5 This report, our first on the programme, examines whether the Department has protected the taxpayers' interests in its investment in Crossrail, in relation to the programme's:

- development (Part One);
- funding (Part Two); and
- oversight of progress to date (Part Three).

Although the programme is jointly sponsored by the Department and Transport for London, we have focused on the Department's role as we are not Transport for London's auditors.

6 Our audit approach and methods are described in Appendices One and Two.

7 Crossrail is a major engineering programme cutting through the complex geography of London and integrating with several existing rail systems. It is being built at a time when the Department has a challenging programme of rail infrastructure and other major programmes to manage. In assessing whether the Department is an effective sponsor, we have examined the extent to which it:

- established that there was a strong case for investment in Crossrail;
- set the programme up on a sound basis with clearly defined and agreed roles and responsibilities, and objectives and scope;
- put in place an appropriately skilled and capable team in the Department, and in Crossrail Limited;
- established an appropriate level of funding based on robust estimates, and provided certainty of funding; and
- maintained oversight of the programme as a whole.

8 The programme's oversight arrangements are integrated and the two sponsors have worked closely together to place the programme on a firm footing, establish Crossrail Limited and monitor progress. This means that for some issues, such as assurance over progress to date, it is not possible or appropriate to separate the Department's role from that of Transport for London. Where this is the case, we refer to both sponsors jointly.

Key findings

Establishing that there was a strong case

9 **Despite a consensus on the need to increase capacity on the London and South East rail network, it took eight years for the government and Parliament to be convinced that Crossrail would be a cost-effective means of addressing this need**. A Strategic Rail Authority review in 2000 found that new rail links were needed to relieve congestion on east–west routes across London. The government's initial business case for Crossrail, in 2003, found that the line would reduce crowding by more than 25 per cent on a number of London Underground lines. The Secretary of State commissioned an independent review of the business case, in 2004, which confirmed the need for Crossrail but raised concerns about the scheme's deliverability. The government introduced the Crossrail Bill in 2005. The Bill did not gain royal assent until 2008 (paragraphs 1.8 to 1.11).

10 **Crossrail's expected benefits outweigh its costs**. The benefit–cost ratio in the latest update of the business case, in 2011, is 1.97. This is within the Department's definition of 'medium' value for money, a range of 1.5 to 2. If estimated wider economic benefits are included, the benefit–cost ratio increases to 3.1. Transport for London and the Department are developing a plan for realising the benefits of Crossrail (paragraphs 1.12 to 1.14).

11 **The Crossrail route currently terminates in the west at Maidenhead; the sponsors are considering whether it should run to Reading**. The Department expects that this change would result in a slight reduction in the construction costs of the Crossrail programme, largely because some works at Slough and Maidenhead would no longer be required. The cost of electrifying the Great Western Main Line and of redeveloping Reading station is being paid for as a separate project. In addition to the relative costs and benefits of each option under consideration, the Department will need to consider the impact on the programme schedule (paragraph 1.14).

Setting up the programme on a sound basis

12 **It took three years to set up the programme, and the Department together with Transport for London and Crossrail Limited did so thoroughly, setting a strong foundation for the programme, which has stood it in good stead**. In his March 2013 report on the management of major programmes, Lord Browne, the government's lead non-executive director, emphasised the need to hold projects to a very high standard of scrutiny before proceeding. The Crossrail programme has adhered to this principle by, for example:

- Clear formal agreements signed by the relevant parties, setting out the roles and responsibilities of sponsors, the approach to delivering the programme and Network Rail's involvement.

- Crossrail Limited earned its autonomy to deliver the programme by passing a series of challenging review points at the outset to demonstrate that the programme was sufficiently well-developed to proceed.
- There was strong internal and external challenge to Crossrail Limited from the Project Representative, a team of senior engineers that reviews and challenges Crossrail Limited's work on behalf of sponsors, and from the Major Projects Review Group in the Cabinet Office.
- Either sponsor could withdraw from the programme and the programme could be cancelled up until the final review point, which concluded in April 2011. We believe that this stopped the review points from becoming a formality and meant that real progress had to be made.
- The scope was clearly defined. To date, sponsors have proposed only ten changes to the programme, of which four have been implemented. If, however, sponsors decide to extend the western section of the route from Maidenhead to Reading, as discussed in paragraph 11, this will constitute a further scope change (paragraphs 1.15 to 1.18).

Skills and capability

13 **As with other Department for Transport programmes, the Department's senior representatives overseeing the programme have changed frequently, reflecting the number of programmes that the Department is sponsoring and a scarcity of staff with the right skills and experience**. The impact of this has been lessened, however, because a small number of departmental staff have worked in rotation on the Joint Sponsor Board. In addition, there has been continuity in Transport for London staff on the programme, and Crossrail Limited's senior team has a strong track record (paragraphs 3.4 and 3.11).

Establishing appropriate funding based on robust cost estimates

14 **Both sponsors and Crossrail Limited did well to reduce construction costs when they threatened to escalate in the early years of the programme, although they were facilitated in this by the Spending Review 2010 and the recession**. In 2007, the Department and Transport for London agreed to make £15.9 billion available for the programme. This was based on costings developed by Cross London Rail Links. In 2009, the anticipated cost of the programme had escalated to £17.8 billion, and Crossrail Limited initiated a project to reduce costs and risks. Against the background of the government-wide need to reduce expenditure, sponsors worked with Crossrail Limited to further reduce costs. This resulted in the anticipated cost of the programme being reduced to £14.8 billion. To do this, the schedule for opening the railway has been extended. This has had little impact on the benefit–cost ratio, but the sponsors' decision not to extend the payment schedule to Crossrail Limited has resulted in a large cash balance, which could have been put to more effective use (paragraphs 2.1 to 2.10).

15 **In addition to grants, sponsors also agreed significant funding from businesses which stand to benefit from the railway, but the Department's direct contribution is likely to increase since it expects that not all of it will be delivered**. Around £5.3 billion of the funding package is expected to come from businesses in and around London, mainly through an increase in business rates. The Department for Transport's planned direct contribution was £4.8 billion but it set aside £5.2 billion of grant funding in case it failed to secure funding from private sector sources. In the event, failure to secure all the expected funding from Heathrow Airport Limited is likely to result in the Department's direct contribution being closer to £5 billion. In addition, the Department's rationale for agreeing the amount the City of London Corporation would contribute is not clear (paragraphs 2.11 to 2.17).

16 **The £14.8 billion funding package covers only the construction of the railway**. Costs outside the £14.8 billion funding package include the estimated £1 billion cost of buying trains, the majority of which will be funded directly by Transport for London, with the Department providing £100 million. The Department also contributed £175 million of the £316 million cost to develop plans for the railway, with Transport for London paying for the remainder. Other additional costs are funded by Transport for London, Network Rail or will be met by the future Crossrail operating company (paragraphs 2.18 to 2.21).

Maintaining oversight of the programme

17 **The Department has a clear view of Crossrail Limited's progress, and has asked for more information on progress with work being undertaken by Network Rail**. The Department's oversight benefits from:

- its role on the Joint Sponsor Board;
- the presence of a Department-nominated non-executive director on the board of Crossrail Limited;
- the Project Representative, who reviews and provides commentary on Crossrail Limited's regular progress reports, as well as carrying out focused reviews of particular aspects of the programme. These reports help the Department and Transport for London to engage with and challenge Crossrail Limited effectively; and
- clear, high quality monthly and semi-annual reports on progress, which, on the whole, focus on the main issues of interest for sponsors.

Crossrail Limited receives detailed information on Network Rail's works, and includes a summary of this in its regular reports to sponsors. The Department – which is responsible for costs of the Network Rail programme above £2.3 billion – has asked for greater clarity and detail on progress with the elements of the programme delivered by Network Rail (paragraphs 3.1 to 3.10).

18 The information available allows both sponsors to monitor progress and to challenge Crossrail Limited. Crossrail Limited uses a probability-based approach to forecasting the delivery date and final cost, and to monitor and manage risks. The approach is regarded as good practice in major engineering projects. This allows the sponsors and Crossrail Limited to identify when there are risks to delivery and to take action to mitigate those risks. Costs are forecast to be at or below £14.51 billion, with a 95 per cent probability, compared to the available funding for infrastructure of £14.8 billion (paragraphs 3.6 and 3.12 to 3.20).

19 The infrastructure element of the programme is well advanced but a number of significant risks and challenges remain. The process of awarding the contract for the trains that will run on the line has suffered some delay due to a change in the approach to funding the procurement. Sponsors are focused on achieving the April 2014 deadline for awarding the contract but failure to do so could result in delays to some services starting and a reduction in the programme's benefits. Crossrail Limited has been planning how the railway will operate since it was established, and the process for appointing an operator for the railway is under way. Although the Department is not funding the trains or the operator, it needs to maintain oversight of the total programme to ensure that its investment is protected (paragraph 3.21).

Conclusion on value for money

20 On the whole and to date, the Department together with its co-sponsor Transport for London and its delivery body, Crossrail Limited, have done well to protect taxpayers' interests in the Crossrail programme. In the early years, they took effective action to stop costs escalating and to obtain more competitive rates from suppliers during the recession. During the construction phase, the governance arrangements and oversight of the project have ensured tight management of the programme so that delivery to both cost and schedule are well managed. The late decision to change funding of the rolling stock introduced a new delivery risk, but this is now being managed. The strategic need for Crossrail has become clearer over time as forecasts of population and employment growth in London have increased. The Department forecasts that Crossrail will bring £1.97 of transport benefits for every £1 of cost. Overall, if progress to date can be maintained, and risks managed, Crossrail is on track to achieve value for money.

Recommendations

21 To build on the strong foundation of the Crossrail programme and the good progress to date, the Department now needs to:

a **Finalise its plans for the development of governance arrangements as appropriate for the transition from construction to operations, over the next five years**. The Department should work with Transport for London, Crossrail Limited and Network Rail to produce a transition plan of similar clarity to the founding programme agreements.

b **Work with Transport for London to continue to develop and then implement a clear plan to monitor the delivery of the expected benefits of Crossrail, including both the transport benefits and the expected wider economic benefits**.

c **Enhance scrutiny of Network Rail programme management information, to assure itself that information provided to Crossrail Limited and onwards to sponsors sets out a clear picture of progress and risk**. This is particularly important for the Department because it is responsible for funding any increase in Network Rail's costs beyond the £2.3 billion available funding.

In delivering future major projects, the Department should:

d **Do more to secure private sector funding contributions**. The Department should ensure that when it negotiates contributions to projects from businesses and other organisations, these are based on robust and realistic calculations of the benefits to business. The Department should also work to understand private sector funders' interests in its projects and how these may affect the certainty of funding.

e **Consider how to achieve greater continuity in departmental officials' oversight of major programmes**. The Department should identify how it will manage staff assignments to its various programmes, ideally to appoint officials for longer periods, and to manage the 'handover' process, where necessary, to achieve a smooth transition.

f **Monitor all costs on major programmes including development, start-up and sponsorship costs so that it can develop an understanding of the true costs of major programmes, to help it keep these costs under control. We would expect all government departments to do this on their major programmes**.

g **Ensure that programmes have sufficient cash available to provide security and flexibility to the delivery body, while minimising opportunity costs**.

Part One

The development of Crossrail

1.1 The Department for Transport (the Department) is joint sponsor, with Transport for London, of the £14.8 billion Crossrail programme to construct a new rail service for London and the South East. This report focuses on whether the Department is protecting taxpayers' interests through its investment in the programme and in its sponsorship role during the development and construction phases.

The programme and its objectives

1.2 The Crossrail line will run from Maidenhead and Terminals 1–4 of Heathrow Airport, to Shenfield, Essex and Abbey Wood in south-east London (**Figure 1**). The central section between Paddington and Canary Wharf is a new underground railway. The western and eastern sections run on existing track, which is being improved and integrated with the central section. Construction began in 2009 and about half of the Crossrail infrastructure is complete. The contract to supply the new Crossrail trains is expected to be awarded in April 2014 and the Crossrail operating company selected in autumn 2014. The central section of the railway is scheduled to start running from December 2018 and the whole line is due to be fully operational in December 2019.

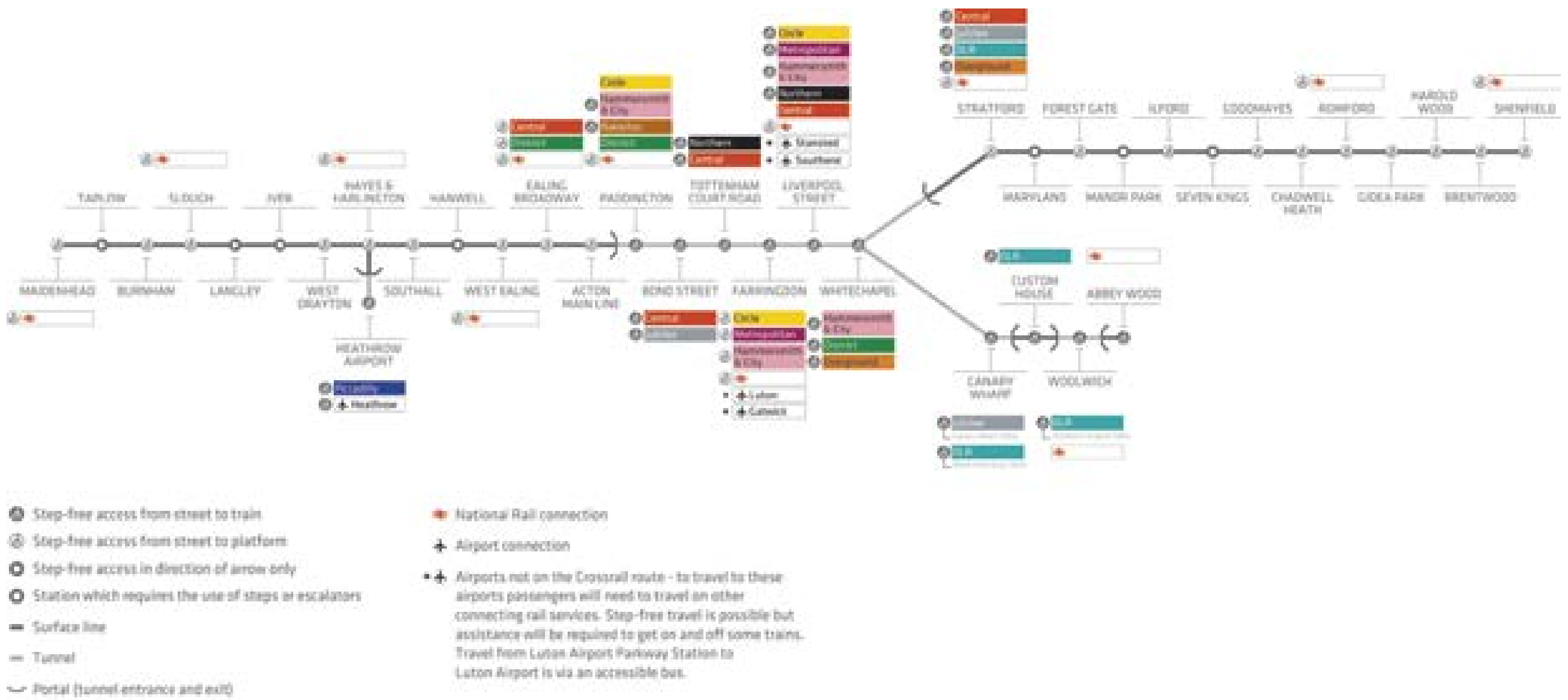
1.3 The objectives of the new railway are to:

- relieve congestion to the transport network in and around London;
- accommodate future travel demand growth;
- improve connectivity and reduce journey times; and
- deliver wider economic impacts, including supporting economic growth.

Project history

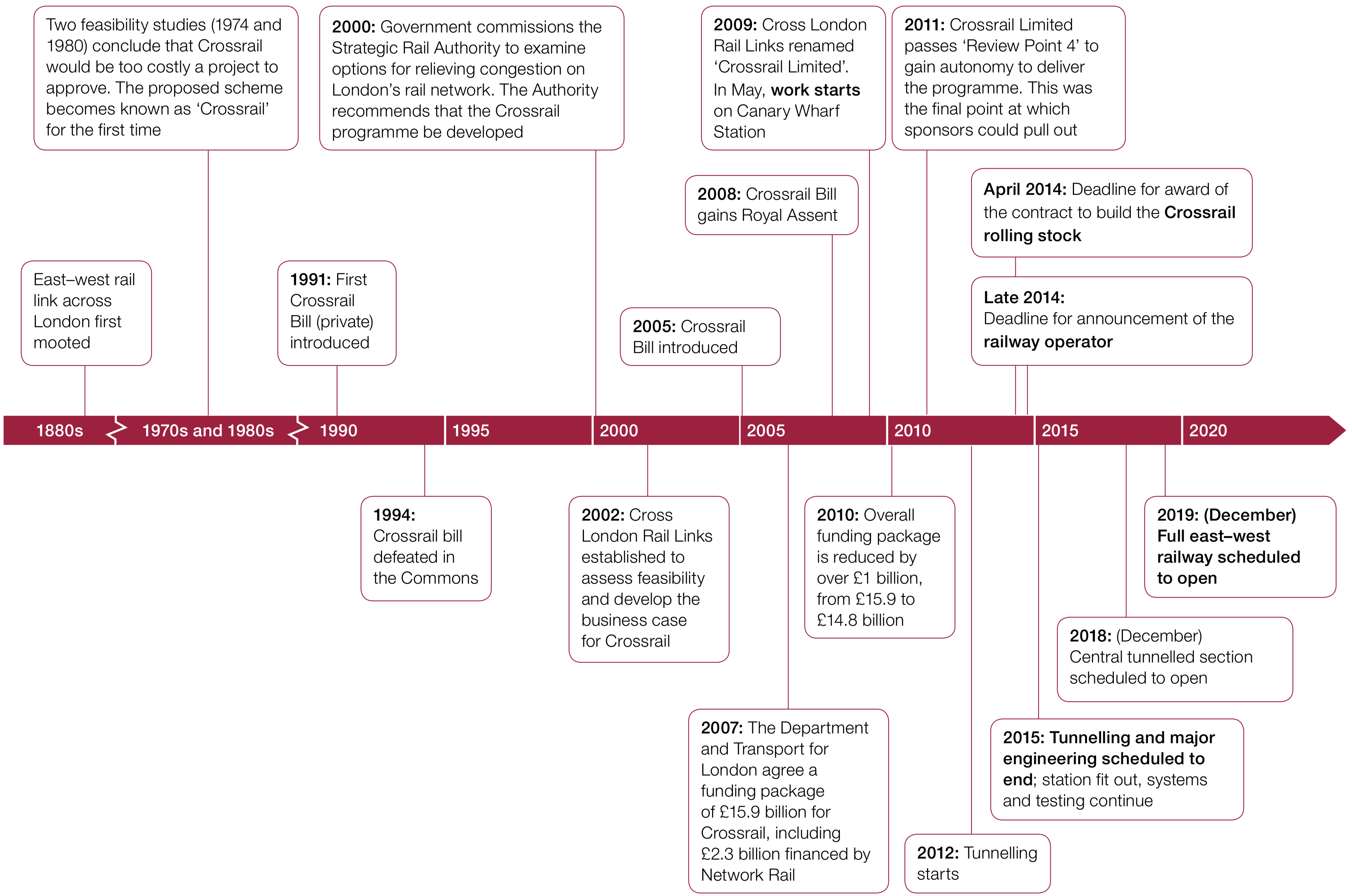
1.4 The idea of an east–west railway through London was first raised in the 1880s and reconsidered in the 1940s, 1970s, 1980s and 1990s (**Figure 2** on page 14). Each time it failed at an early stage. In 1994, for example, Parliament rejected a Private Members' Bill for Crossrail and although government support for the idea continued, in 1996 it was dropped in favour of other transport projects including extending the London Underground Jubilee Line.

Figure 1
Crossrail route



Source: Crossrail Limited

Figure 2
Crossrail timeline



Source: National Audit Office

1.5 In 2000, the Strategic Rail Authority recommended that new rail links should be built across London to relieve existing and forecast overcrowding and to reduce congestion on the rail network from east to west. In 2001, the Strategic Rail Authority and Transport for London established a joint venture, Cross London Rail Links, to develop the business case for Crossrail, develop the scheme and draft the required legislation.

1.6 The Department took on Crossrail when the Strategic Rail Authority was abolished in 2005. In the same year the Department introduced the Crossrail Bill to Parliament, following consultation on various options for the route.

Key players

1.7 **Figure 3** shows the roles and responsibilities of the organisations involved in Crossrail.

Figure 3
Major stakeholders in Crossrail

Organisation	Role
Department for Transport	Joint sponsor and funder
Transport for London	Joint sponsor and funder
Crossrail Limited	Wholly-owned subsidiary of Transport for London, delivering the Crossrail programme
Crossrail Project Representative	A senior engineer, supported by a small team, who challenges and reviews Crossrail Limited's progress with the programme, and reports to the joint sponsors
Network Rail	Financing the surface works through borrowing which will primarily be repaid by fees from the Crossrail train operating company. Network Rail is also a contractor to Crossrail Limited for the construction of the eastern and western surface sections in addition to its wider responsibility for the national rail network
Bechtel	Project management contractor, working with Crossrail Limited to oversee construction of the central, tunnelled section
Transcend (joint venture between AECOM, CH2M Hill and Nichols Group)	Project management contractor, working with Crossrail Limited to oversee the overall Crossrail programme
City of London Corporation Heathrow Airport Limited	Agreed to contribute funding towards Crossrail
Canary Wharf Group	Contributing towards the construction of the Crossrail station at Canary Wharf
Berkeley Homes	Contributing towards the funding of the Crossrail station at Woolwich
Office of Rail Regulation	Regulating Network Rail

Source: National Audit Office

Business case

1.8 In September 2003, the Department and Transport for London (the sponsors) and Cross London Rail Links produced a business case to inform the decision on whether to invest in Crossrail. In 2004, the Secretary of State commissioned an independent review of the business case including alternative routes. The review confirmed the need for Crossrail, but raised concerns about the scheme's deliverability. The business case was updated:

- in 2005, to reflect changes to the proposed route, and was submitted as part of the Crossrail Bill;
- in 2010, to confirm the coalition government's support for the programme and to form part of the Mayor of London's 2010 transport strategy; and
- in 2011, to reflect changes to the programme costs and schedule following the 2010 Comprehensive Spending Review.

This is in line with the usual practice of updating the case at key points in developing of major programmes.

1.9 Central to the strategic case, which sets out the need for Crossrail, are the Greater London Authority's predictions of London population and employment growth and Transport for London's forecasts of transport demand. The 2003 business case predicted that London's population would increase by 700,000 between 2001 and 2016, and that employment would increase by around 600,000 over the same period, with demand for public transport during peak times expected to grow by 0.7 per cent per year. It stated that Crossrail would help to meet the increased demand for public transport by carrying around 158,000 new passengers each day. The business case also stated that the line would reduce crowding on other lines, including reductions of between 27 and 31 per cent on the Bakerloo, Central and Waterloo & City lines of the London Underground. It is not clear whether the Department or the Strategic Rail Authority validated these forecasts.

1.10 The 2010 revision of the business case showed that the need for Crossrail had increased from the initial case in 2003. Using updated information it forecast that:

- London's population would continue to grow, with nearly 1.3 million additional people living in London and 750,000 new jobs being created between 2010 and 2031;
- annual growth in demand for peak-time public transport would increase to around 1.5 per cent per year;
- Crossrail would carry around 200,000 people each day during the morning peak; and

- the impact of Crossrail on overcrowding would be higher than previously forecast, with peak-time reductions of between 20 and 60 per cent on the Bakerloo, Central, District and Jubilee lines of the London Underground (**Figure 4**), as well as reductions on the national rail network.

1.11 The economic case for Crossrail, from which sponsors produce estimates of the benefit–cost ratio, is closely linked to the strategic case. As **Figure 5** overleaf shows, the main benefits are expected to be:

- passenger travel time savings, for example from passengers switching to Crossrail from slower modes of transport, and less need to change; and
- congestion relief on currently crowded road, rail and London Underground links.

Transport for London and the Department are in the early stages of developing a plan to realise the benefits. The main costs are:

- building and maintaining the infrastructure;
- operating the new train service; and
- lost revenue from the wider rail network.

These are partly offset by the train operator's income, which at this stage is estimated.

Figure 4

Forecast congestion relief due to Crossrail on London Underground in 2026

Source: 2010 Crossrail Business Case

Figure 5
Summary of the programme costs and benefits

	£m (2002 prices)		
Description of benefits	**2005**	**2010**	**2011**
Passenger travel time savings	7,874	7,187	6,369
Congestion relief	7,372	5,912	5,343
Journey ambience and station accessibility	428	417	425
Other benefits	423	303	281
Reduced indirect tax revenue because of fall in car use[1]	N/A	N/A	-1,392
Net benefits	**16,097**	**13,820**	**11,025**
Construction costs of new infrastructure	-10,455	-10,165	-9,379
Net costs of running and maintaining new infrastructure	-3,276	-3,548	-3,879
Net additional revenue	5,978	7,529	7,412
Developer contributions	0	235	235
Reduced indirect tax revenue because of fall in car use[1]	-1,207	-1,425	N/A
Net costs	**-8,960**	**-7,375**	**-5,610**
Benefit cost ratio	**1.8:1**	**1.87:1**	**1.97:1**
Benefit cost ratio including wider economic benefits	**2.6:1**	**3.1:1**	**3.1:1**

Note

1 In 2011 the Department changed its guidance on carrying out economic appraisals by treating reduced indirect tax revenue as a benefit that would not be realised, rather than a cost.

Source: National Audit Office analysis of Crossrail business cases

1.12 In 2005 the benefit-cost ratio was 1.8, within the Department's definition of 'medium' value for money, a range of 1.5-2. With each iteration of the business case, the benefit-cost ratio has changed to reflect, for example, changes in the design of the route, revised economic growth forecasts following the 2008 financial crisis, and cost reductions following the 2010 Comprehensive Spending Review (see Part 2). In 2011 the benefit-cost ratio had improved to 1.97.[1]

1 The 2005 business case reflected London salaries. The 2010 and 2011 business cases used a value reflecting national average salaries. Had the 2005 business case used national average salaries, the benefit-cost ratio would have been 1.63. Transport for London estimates of the benefit-cost ratio for Crossrail are higher than the Department's figures, since Transport for London values time savings using London workers' salaries. In the 2011 business case, for example, Transport for London's estimated benefit-cost ratio was 2.55 compared to the Department's 1.97.

1.13 Each iteration of the business case has also stated that Crossrail will bring wider economic benefits, such as increased productivity from greater clustering of firms, increasing economic activity and labour market effects. These benefits are inherently more difficult to estimate than the direct transport benefits, due to the difficulties in isolating Crossrail's impact from other factors that can affect economic growth. They were not included in the benefit–cost ratio, in line with HM Treasury guidance. However, the Department estimates that by including these benefits, the benefit–cost ratio increases to 3.1.

1.14 The Department, Transport for London, Crossrail Limited and Network Rail are currently considering the relative costs and benefits of the options, and the programme schedule for extending the western section of the railway beyond Maidenhead to Reading. The Department originally decided not to run Crossrail services to Reading, mainly due to the additional cost of electrifying a significant section of the Great Western Mainline, and the need to improve stations on the line. Since then, the government has announced separate funding to electrify the Great Western mainline and upgrade stations, including Reading. The Department expects that extending Crossrail to Reading would result in a slight reduction in the cost of the construction part of the Crossrail programme because some works at Slough and Maidenhead would no longer be required.

Setting up the programme

1.15 In his March 2013 report on the management of major programmes, Lord Browne, the government's lead non-executive director, emphasised the need to hold projects to a very high standard of scrutiny before proceeding. The Crossrail programme adhered to this principle through its extensive development process. Between 2007, when the sponsors agreed the funding package, and 2011, when Crossrail Limited earned its autonomy to manage the programme, the sponsors, Crossrail Limited, and Network Rail focused on setting up the programme. This included the development of detailed agreements on all parties' roles and responsibilities:

- The Sponsors' Agreement, signed in 2008 between the Department and Transport for London, sets out the overall management of Crossrail, the governance of the sponsors' relationship and the circumstances in which either party could withdraw.
- The Project Development Agreement, signed in 2008 between the Department, Transport for London and Crossrail Limited, established Crossrail Limited as the delivery organisation and defined its roles and responsibilities. This also defined sponsors' requirements, the funding arrangements and a four-stage review process to be passed before Crossrail Limited would be given autonomy for delivery.
- The protocol between the Department, Crossrail Limited and Network Rail, lays out Network Rail's responsibilities for delivering the surface sections of the Crossrail route. This protocol is separate from Network Rail's normal relationships with the Department and the Office of Rail Regulation, and sets out how the regulator retains its oversight of Network Rail with regard to Crossrail.

1.16 The four review points defined in the Project Delivery Agreement are a feature of the programme set-up which has proved particularly beneficial. These were designed to give assurance that the programme was set up well and to set out an exit route if sponsors' expectations of Crossrail Limited were not met. Up to and including Review Point 4, each sponsor could have withdrawn.

1.17 Sponsors, with the help of the Project Representative, robustly challenged Crossrail Limited during the review point process. In addition, the Major Projects Review Group was involved in review points 2 to 4. The most important review points were Review Point 3 in 2009 and Review Point 4 in late 2010 (**Figure 6**).

1.18 The sponsors took a pragmatic approach to the review point process, balancing their need for assurance with the need to maintain programme momentum. For example, in December 2010, based on a detailed report by Crossrail Limited, sponsors granted permission to Crossrail Limited to award the four contracts for tunnelling work in the central section of the railway. The four contracts were worth around £1.3 billion in total. These contracts were time-critical, so it was important that sponsors allowed Crossrail Limited to award them before it had met all the conditions of Review Point 4, so it could start tunnelling work on time and avoid potential costs from delays.

Figure 6

Review points during the establishment of the Crossrail programme

Review point	Scope	Date	Outcome
1	To gain royal assent for the Crossrail Bill	July 2008	Parliament grants the powers required by government to build Crossrail
2	Signing of the core project documents (Project Delivery Agreement, Sponsors' Agreement and Network Rail Protocol)	2008	Establishes the roles and responsibilities of the sponsors and delivery bodies
3	To gain assurance about progress with detailed cost estimates, programme schedule and the development of Crossrail Limited's programme management processes	September 2009 – March 2010	Sponsors concluded that planning was well advanced, and provided Crossrail Limited with clear direction for how to improve its programme management processes to meet the requirements of Review Point 4
4	Final withdrawal point for either sponsor. Crossrail Limited granted full operational powers including tendering contracts and managing contingency	April 2011	Passed with conditions for Crossrail Limited to fulfil to strengthen programme controls. These conditions were all met in 2011

Source: Crossrail Project Delivery Agreement

Part Two

Funding the Crossrail programme

Challenging cost estimates and setting appropriate funding

2.1 In 2001, the Strategic Rail Authority and Transport for London required Crossrail Limited's predecessor, Cross London Rail Links, to develop outline cost estimates. This work focused on the infrastructure costs, which account for the majority of the programme costs. The estimates were based on an analysis of itemised costs and a comparison of these costs to other relevant projects. It included provision to cover the cost of risks to the programme, should they emerge.

2.2 Based on these estimates, in 2007, the government announced a funding package of £15.9 billion for the infrastructure element of the programme. Cost estimation techniques indicated there was a 95 per cent probability that actual costs would be £15.9 billion or less. At this time the Department for Transport (the Department) expected to fund £5.2 billion of the infrastructure, Transport for London £2.4 billion, and businesses £6.0 billion. Network Rail also committed to obtain financing of £2.3 billion to pay for works on the existing rail infrastructure.

2.3 Between 2008 and 2010, during detailed planning and early preparatory work, Crossrail Limited's cost estimates rose above the available funding. By January 2010, Crossrail Limited estimated that total costs would be £17.8 billion, £1.9 billion more than the £15.9 billion available (**Figure 7** overleaf). This rise was a result of Crossrail Limited developing a more mature understanding of costs and risks for the programme at the time.

2.4 The cost estimates in 2007 allowed £2.3 billion for delivery of the infrastructure works by Network Rail, based on Cross London Rail Links' designs and cost estimates. During 2009, however, Network Rail estimated that it would cost £3.1 billion to do this work; £0.8 billion more than was available. Over the next year Network Rail, working with Crossrail Limited and the sponsors, reduced its costs to within the available £2.3 billion through more detailed design work, construction planning and risk assessments, and revisions to forecasts due to the global recession. The protocol covering Network Rail's work on Crossrail contains incentives encouraging it to deliver the work for £2 billion.

2.5 In early 2010, Crossrail Limited considered how it could reduce costs by reducing risk before construction began and by re-sequencing the programme. By July 2010, Crossrail Limited estimated it could reduce total costs to £16.4 billion.

Figure 7

Movements in the infrastructure cost estimates and available funding

	September 2007 (£m)	January 2010 (£m)	December 2010 (£m)
Construction	8,028	9,585	8,694
Risk	4,571	4,928	2,959
Subtotal	**12,599**	**14,512**	**11,653**
Network Rail work	2,310	2,300	2,300
Canary Wharf station	496	523	401
Other	501	421	413
Anticipated cost	**15,906**	**17,756**	**14,767**
Available funding	**15,900**	**15,900**	**14,800**

Notes

1 'Other' includes charges such as selected costs for the train depot.

2 Some costs in this table do not add up exactly to the relevant subtotals and anticipated costs, due to rounding.

Source: Crossrail Limited analysis of investment model

2.6 In June 2010, HM Treasury required the Department to reduce its costs as part of the comprehensive spending review. In turn, the Department worked with Crossrail Limited to reduce cost estimates further. Crossrail Limited subsequently found an additional £1.6 billion of savings from:

- further reducing risks by simplifying integration works, re-sequencing work and reducing scope, saving £800 million; for example, deciding not to create a direct connection from Crossrail to the District and Circle Line platforms of the London Underground at Paddington Station;
- lowering the costs of inflation to reflect the impact of recession upon economic forecasts, saving £300 million; and
- agreeing contracts with lower target prices, as a result of the global recession which encouraged construction companies to deliver very competitive bids, saving £500 million.

2.7 In total, the savings identified during Network Rail's cost reduction exercise and the comprehensive spending review reduced the estimated costs from £17.8 billion to £14.8 billion, £1.1 billion less than the available funding. Sponsors then reduced the available funding to £14.8 billion to reflect the revised cost estimates. As part of this the Department's contribution reduced by £400 million.

2.8 Sponsors also agreed to extend the timetable for full opening from May 2018 to December 2019. This approach reduced the level of risk in the programme and therefore the costs allocated to cover risk.

2.9 The preceding paragraphs highlight the importance of establishing a robust baseline and the role that sponsors of infrastructure projects can and should play in developing cost estimates and the funding package. In particular, it shows:

- inevitable uncertainty about early estimates made before detailed work is carried out;
- the merits of taking on a more challenging role further into the planning process once more information is available; and
- that delivery bodies need to work closely with suppliers to achieve savings.

Managing the Department's financial contribution

2.10 The bank account for Crossrail Limited's work is currently £1.8 billion in surplus as the Department and Transport for London provide funding in excess of Crossrail Limited's planned spending. When the programme schedule was extended by 18 months (paragraph 2.8) the Department and Transport for London did not extend the payment schedule to Crossrail Limited. Holding a significant cash balance is contrary to HM Treasury guidance; surplus funds held in the Crossrail bank account cannot be used in the short term to fund the Department's other objectives, nor returned to HM Treasury to minimise the amount of government borrowing. There are some benefits to the large balance, which Crossrail Limited is using to offset Network Rail's financing costs and which also allows Crossrail Limited some flexibility to start work early. With the Department's last payment due in January 2016, the funding should also be protected from potential revision under the next spending review. However, we consider that the level of surplus funding is high and the opportunity costs may outweigh the benefits.

Funding for the Crossrail programme

2.11 **Figure 8** overleaf sets out the funding sources and the contributions towards the funding required for the Crossrail programme, which were agreed in principle in 2007. Of the total, £12.5 billion is funding Crossrail Limited's work, while the remaining £2.3 billion is for work by Network Rail.

2.12 In addition to its direct contribution of £4.8 billion, the Department is also ultimately responsible for:

- expenditure by Network Rail above its £2.3 billion financing;
- expenditure by Crossrail Limited above its £12.5 billion funding; and
- any shortfall in the £480 million of private sector funding that the Department has tried to secure for infrastructure.

Figure 8
Funding the Crossrail programme's infrastructure

Crossrail infrastructure programme £14.8bn

Transport for London direct funding £1.9bn

Department for Transport direct funding £4.8bn

Private sector funding for which Transport for London is responsible £5.2bn

- Business Rate Supplement, borrowing and direct contribution £4.1bn
- Community Infrastructure Levy £300m
- Sale of surplus land and property £500m
- Developer contributions £300m

Private sector funding for which the Department is responsible £480m

- City of London Corporation committed funding £250m
- Heathrow Airport Limited £230m

Network Rail financing for work on the existing network £2.3bn

Voluntary funding from London businesses £100m

Notes

1 The Community Infrastructure Levy is a planning charge that the Greater London Authority has chosen to charge new developments in the Greater London Authority area. Charges are based on the size and type of development.

2 The Business Rate Supplement is charged at 2p per £1 on commercial properties with a rateable value over £55,000 in the Greater London Authority area. It is collected on the same bills as general business rates.

3 Developer contributions relate to those agreed in planning applications for office space above 465 square metres in central London and the northern Isle of Dogs.

4 The voluntary funding from London businesses was to be raised by the City of London Corporation working with the Mayor of London and the government.

Source: National Audit Office analysis of data from the Department, Transport for London and Crossrail Limited

Private sector contributions

2.13 As Figure 8 shows, both the Department and Transport for London have worked to secure financial contributions from those who stand to benefit from the programme, including private businesses. The Department has developed funding agreements by negotiating directly with two major organisations. Transport for London has used a combination of types of funding: direct negotiation with organisations; local taxation; and the sale of surplus land and property it acquired for the project.

2.14 The Business Rate Supplement is a new source of funding, introduced in 2010, which has helped to fund Crossrail. Before government introduced the legislation, the Greater London Authority consulted with London businesses. The supplement is charged according to the rateable value of commercial property in the Greater London Authority area. As a form of local taxation, the business rate income is less sensitive to economic circumstances than individual private sector contributions. The income from the supplement will be collected over at least the next 30 years and is expected to pay back £3.5 billion of borrowing by the Greater London Authority for the programme. Income is currently being received in line with the expected rate.

2.15 The Department currently expects that one-third of the private sector funding it negotiated for Crossrail infrastructure will not actually be received (**Figure 9** overleaf). The Department negotiated agreements worth a total of £480 million, although it is not clear how the expected City of London Corporation contribution was calculated. These contributions are now likely to total £320 million, 67 per cent of the Department's expectation. This leaves a potential shortfall of £160 million which the Department will need to meet, from funds it had already set aside for the purpose.

2.16 The Department encountered a range of different challenges in securing private sector funding for Crossrail infrastructure:

- In 2008, the Department expected Heathrow Airport Limited (HAL) to pay £230 million, based on an estimate of the benefits Crossrail would bring to Heathrow. This contribution was subject to the approval of the Civil Aviation Authority (CAA), HAL's regulator. HAL later determined that, with Heathrow operating at or near to capacity, Crossrail would bring no net benefit to the airport, but made a provisional allowance of £100 million in its final business plan. In summer 2013 the Department made a counterproposal of £137 million. In January 2014 the CAA determined that HAL should contribute £70 million.

- In another private sector funding agreement, the Department consistently declined to make up a funding shortfall. We believe this helped to secure the required funding without the need for a further call on central government resources. The agreement, to build a station at Woolwich, has taken almost six years to resolve. The original scope for Crossrail did not include a Woolwich station, which was added in 2007. The property developer Berkeley Homes agreed to fund preliminary work. In July 2013, Berkeley Homes, the Royal Borough of Greenwich and Transport for London agreed to pay the £54 million cost of completing the station.

- In addition to £250 million in guaranteed funding, the Department's agreement with the City of London Corporation included £100 million which the City, working with the Mayor of London and the government, planned to raise in voluntary contributions from businesses. The Department is not responsible for any shortfall in this contribution, but is currently discussing with the City how much of this funding can be raised.

Figure 9

Private sector funding negotiated by the Department

Funding organisation	Contribution type	Amount originally agreed (£m)	Potential minimum contribution (£m)
City of London Corporation	Fixed	250	250
Heathrow Airport Limited	Fixed	230	70
Total		**480**	**320**
Shortfall to be paid by the Department			**Up to 160**

Note

1 Although the City of London Corporation will provide £250 million for the Crossrail programme, this will be offset by the Department for Communities and Local Government allowing the City of London to retain around £10 million a year from its contribution to the national business rates pool (paragraph 2.17).

Source: National Audit Office

2.17 At the same time as the Department secured the guaranteed £250 million funding from the City of London Corporation, the Department for Communities and Local Government agreed to reinstate an arrangement whereby it allowed the City of London to retain around £10 million a year from its contribution to the national business rates pool. The reinstatement of this arrangement took into account the planned Crossrail contribution by the City. Over time this additional funding will offset the City's contribution to Crossrail.

Securing the Crossrail trains

2.18 The Department and Transport for London originally agreed that the trains and maintenance depot for Crossrail should be funded through a Private Finance Initiative (PFI) deal – a contract with private sector companies to finance the trains. In late 2012, Transport for London expressed concerns that this could delay the programme if trains were either not available or insufficiently tested by the opening date, citing recent transport PFI deals such as the Thameslink programme, which was delayed by over three years.

2.19 Transport for London proposed that it buy the trains and depot directly. The Department analysed the value for money of PFI and 100 per cent public procurement, concluding in favour of PFI. Transport for London's own analysis found in favour of public procurement, though the difference between each organisation's assessments was marginal. In February 2013, following discussions between Transport for London, HM Treasury and the Department, the sponsors agreed to abandon the PFI approach. The Department had been convinced by Transport for London that the risk of having no trains overrode its analysis supporting PFI, and was assured by Transport for London that a public procurement was affordable from within its budget. Transport for London will now buy the trains directly at an estimated cost of around £1 billion, funding the purchase mainly through borrowing. The Department has contributed £100 million from its central budget, in addition to the £5.2 billion it has set aside for Crossrail.

Other costs

2.20 The Department, and earlier the Strategic Rail Authority, met £175 million of the £316 million costs of early programme development by Cross London Rail Links and Crossrail Limited, between 2001 and 2008, with Transport for London paying for the remainder. There are other costs, most of which are funded by Transport for London or Network Rail, rather than the Department (**Figure 10**).

2.21 The fact that the Department holds responsibility for costs above the agreed infrastructure funding increases the importance of keeping costs within the agreed levels. The Department has agreed cost control mechanisms with Crossrail Limited and Network Rail (Part Three).

Figure 10
Other Crossrail costs not funded by the Department

Funding required	Description
Interest on borrowing	Incurred by Network Rail and Transport for London on borrowing taken out to fund their contribution to the programme.
Operating deficit at the start of railway operations	Staff and running costs, among other costs, will be incurred before significant ticket revenues are raised. These will be funded by Transport for London on behalf of the railway operator.
Maintenance of the trains which run on the railway	This will depend upon the final contract for trains but is likely to be funded by the railway operator or Transport for London.

Source: National Audit Office analysis of programme costs

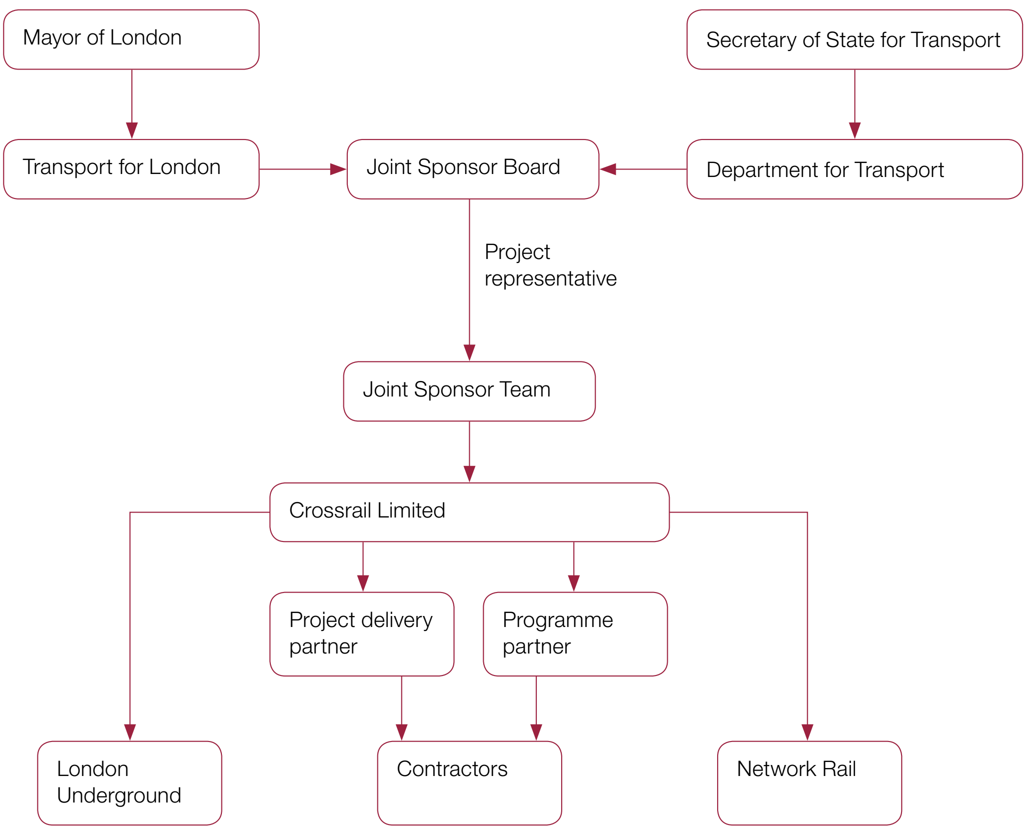
Part Three

Oversight of the programme

Governance

3.1 We found that the Department for Transport (the Department) and Transport for London have established governance (**Figure 11**) and oversight arrangements that provide a clear view of risks to their financial interest and to successful delivery of the programme. The governance arrangements are defined in the agreements discussed in Part One.

Figure 11
Governance arrangements



Source: Department for Transport

3.2 The Joint Sponsor Board is the top level oversight body for the programme. It is the forum where sponsors approve major project decisions and where they can question Crossrail Limited. The Department and Transport for London are each represented on the Joint Sponsor Board by two voting members. One of the Department's representatives is the Director General for Rail. The Department's own Board – through the board investment and commercial subcommittee – has considered some of the key issues on the programme's development, where these required its authorisation. For example, the subcommittee authorised passing 'Review Point 4' in March 2011, which committed the Department to the project.

3.3 Based on our review of papers submitted to the Joint Sponsor Board at key decision points, and the minutes of these meetings, we found that sponsors are given clear, good quality information. Members of the Joint Sponsor Board engaged in frank discussion of the issue at hand and reached timely decisions.

3.4 Transport for London's membership of the Joint Sponsor Board has been relatively consistent but the Department's representatives have changed frequently. This lack of continuity could have weakened the Department's understanding and potentially led to delays in decision-making, or uncertainty. However, we do not consider that this has happened on Crossrail, as:

- a small number of departmental staff have rotated on the Joint Sponsor Board, meaning that the Department's representatives understand the programme's background;
- there has been more continuity of Transport for London staff on the Joint Sponsor Board. Transport for London has brought experience of major transport projects to bear; and
- Crossrail Limited is led by a highly capable senior team with a track record of successful delivery in both the public and private sectors worldwide.

3.5 The Joint Sponsor Board is supported by a Joint Sponsor Team, led by a representative from Transport for London and staffed by the sponsors. The team provides management information and briefing to the Joint Sponsor Board and also acts as the primary, day-to-day link between sponsors and Crossrail Limited.

3.6 To carry out its role effectively, the Joint Sponsor Team needs good quality management information. Crossrail Limited's monthly and semi-annual reports are generally clear and contain information that is relevant and useful to sponsors, enabling them to monitor progress, risks and challenges. The quality and clarity of progress reports has improved significantly since the beginning of the programme, in part due to suggestions by the sponsors. We found some scope to improve them further: the semi-annual reports would benefit from more information on trends across the lifetime of the programme and a concise snapshot of performance, similar to the 'dashboard' of the main performance measures which is included in the monthly reports. Crossrail Limited receives detailed information on Network Rail's works, and includes a summary of this in its regular reports to sponsors. However, given that the Department is wholly responsible for any increase in the cost of the Network Rail programme beyond £2.3 billion, it has asked for more detail on the progress of the works being delivered by Network Rail, particularly as Network Rail increases its activity.

3.7 The Department receives additional assurance from the Crossrail Project Representative, a team of senior engineers with significant experience and expertise in major programme management. The Project Representative acts as an independent expert, reviewing progress across the programme and Crossrail Limited's management information, as well as carrying out detailed reviews of parts of the programme and reporting to the sponsors on these. We found the Project Representative's work to be detailed and thorough, containing recommendations that aim to improve Crossrail Limited's management of the programme. For example, the Project Representative has encouraged Crossrail Limited to process compensation claims from suppliers more quickly, to give a more complete picture of costs and reduce the risk of a large backlog of claims.

3.8 As an additional source of oversight, the Department and Transport for London can each nominate a non-executive director to sit on Crossrail Limited's main board, to help raise issues relevant to the sponsors. The Department's nominee has been in place since 2009, but Transport for London has held its equivalent position vacant for more than a year, appointing its latest nominee in August 2013.

3.9 Sponsors and Crossrail Limited point to the relatively small number of sponsor requests for changes to programme scope – ten in all, of which four were implemented – as a demonstration of the stability of the project's governance arrangements and its clear scope.

3.10 When the construction of the civil engineering elements of Crossrail is completed in 2016 and the programme moves into fitting out and testing the operating railway, the Department expects that its role will change, with Transport for London taking more of a lead role as it is directly responsible for the trains and the operation of the railway. Governance during this handover period is not described in the Crossrail programme agreements and the Department, Transport for London and Crossrail Limited are aware that they need to develop transition plans.

Skills and capabilities

3.11 The Department's staff are involved in Crossrail in a number of roles:

- Senior staff are members of the Joint Sponsor Board, as noted above.
- The Joint Sponsor Team is jointly staffed by the Department and Transport for London.
- The Department has its own Crossrail team within the Department, which manages government and political processes. For example, it liaises with rail franchises about the impact of Crossrail on their services. This team has also been responsible for negotiations with private funders who are contributing to the programme.

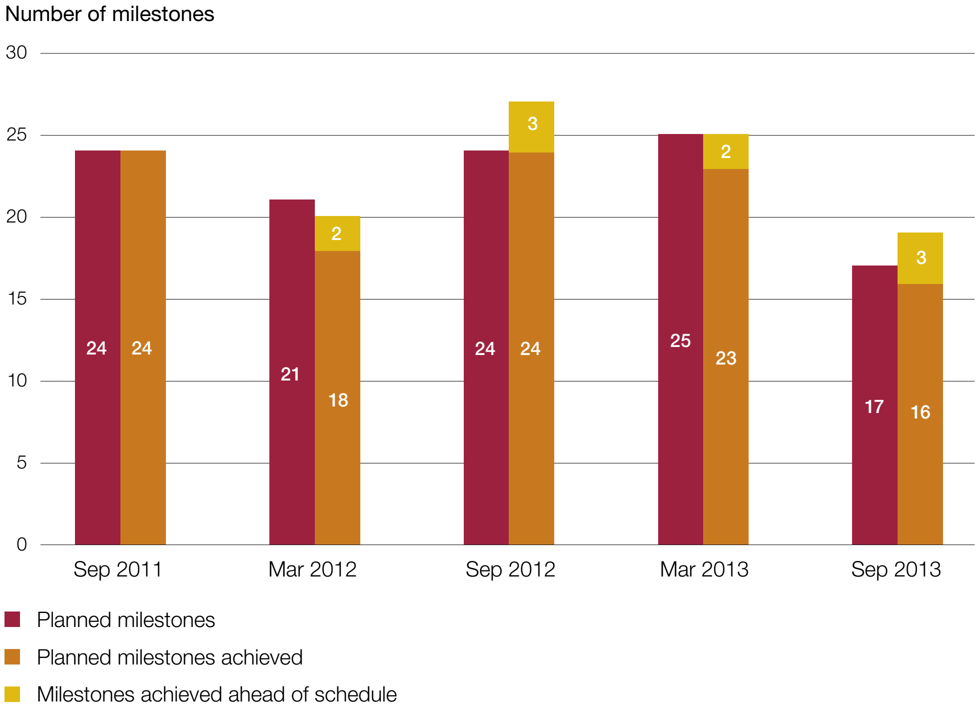
Monitoring progress against schedule

3.12 The Department uses Crossrail Limited's reports, along with the Project Representative's review of them, to monitor the programme's progress against schedule and budget, to identify where action needs to be taken. These reports include updates on progress against a range of measures, which, taken together, present a rich set of management information in line with good practice for major programmes. The most recent available measures show that the programme is slightly behind schedule but the schedule also includes some time contingency or 'float', and Crossrail Limited is confident that it will meet the planned delivery date:

- In the six-month period March 2013 to September 2013, Crossrail Limited missed one of 17 key programme milestones that it aimed to achieve in this period, although it achieved three other milestones earlier than planned. Milestones are important elements of the programme, for example the completion of the first underground tunnel, between Royal Oak in west London and Farringdon in east London, in October 2013. In general (**Figure 12** overleaf), Crossrail Limited has achieved most or all milestones set for each six-month period on time, and achieved some milestones that were set for the next period, early. When Crossrail Limited fails to achieve a milestone in the planned period, it monitors progress in the next reporting period.
- In September 2013, 43.7 per cent of the work required for the programme was complete, against a target of 45.2 per cent. The Schedule Performance Index or SPI, which provides a measure of work completed against work planned, would be reported at 1 if the programme was exactly on schedule and above 1 if it was ahead of schedule. It has been below 1 but gradually improving (**Figure 13** on page 33). It is important to note that the Schedule Performance Index measures progress against early completion dates in contractors' programmes, and does not take account of time contingency or 'float' that Crossrail Limited has allowed for in its overall programme.

Figure 12
Programme milestones planned compared to milestones completed

Crossrail Limited has achieved most or all milestones set for each six-month period on time

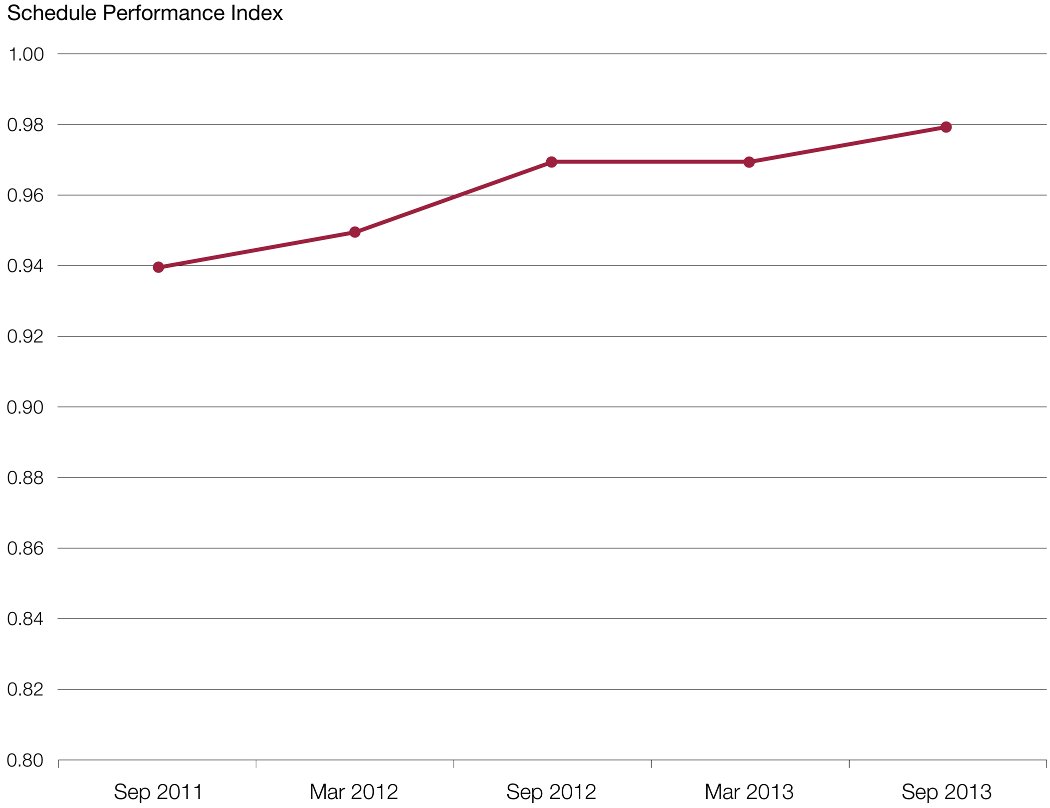


Source: National Audit Office analysis of Crossrail Limited semi-annual construction reports

3.13 To help it manage the programme, and test the schedule's adequacy, including float, Crossrail Limited uses a quantified risk analysis to estimate its confidence in delivering the programme on schedule. Crossrail Limited currently estimates that there is a 78 per cent probability of the central, tunnelled section of the railway opening on time, in December 2018 or before, indicating a high level of confidence. No equivalent figure is reported for the probability of opening the full railway on time in December 2019. In the latest six-monthly programme report, December 2019 is still expected to be the full opening date. At the time of writing, Network Rail's work on the surface sections of the railway is in its early stages, but on schedule with around 6 per cent complete.

Figure 13
Trend in progress to date against the programme schedule

Progress against early completion dates is just behind schedule, but is improving



	Sep 2011	Mar 2012	Sep 2012	Mar 2013	Sep 2013
Schedule Performance Index	0.94	0.95	0.97	0.97	0.98

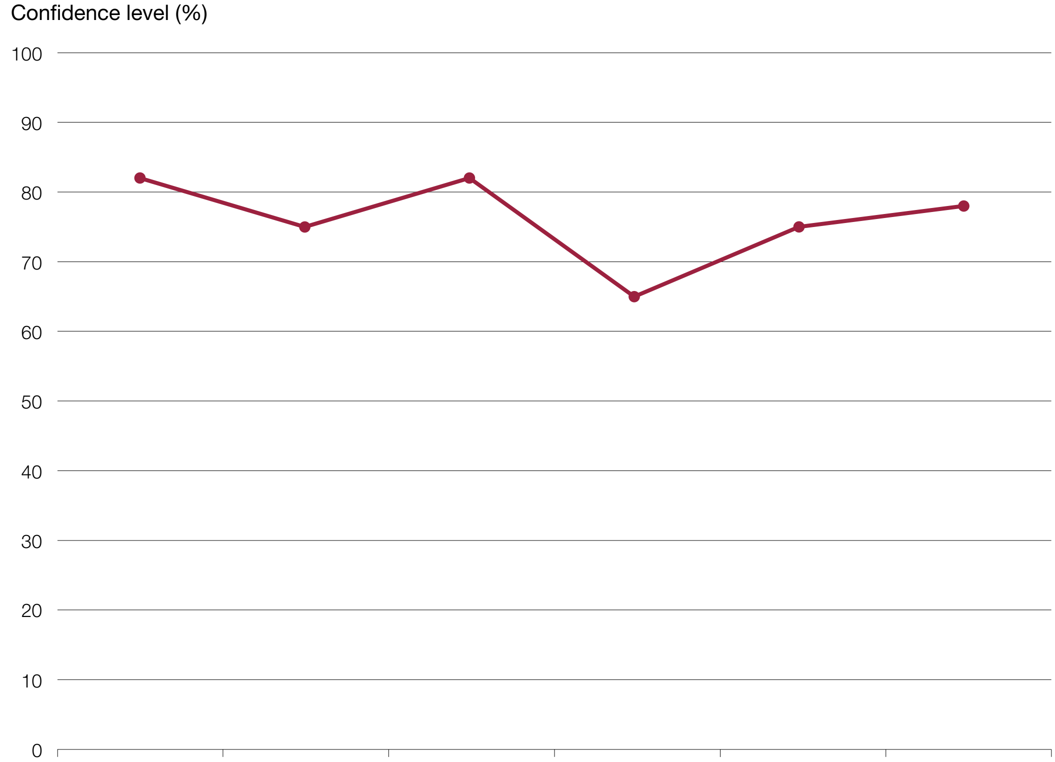
Source: National Audit Office analysis of Crossrail Limited semi-annual construction reports

3.14 In 2012, the probability of delivering the central section on time dipped to 65 per cent (**Figure 14**) because of issues including unexpected building foundations found at Liverpool Street station, and slower than expected tunnelling. The sponsors required Crossrail Limited to show how it would address this. Crossrail Limited produced plans to re-sequence some activities and renegotiate some contracts with suppliers.

Figure 14

Crossrail Limited's confidence in achieving the central section opening date of December 2018

Despite a dip in September 2012, confidence of completion on time has been high



	Mar 2011	Sep 2011	Mar 2012	Sep 2012	Mar 2013	Sep 2013
● Confidence level (%)	82	75	82	65	75	78

Source: National Audit Office analysis of Crossrail Limited semi-annual construction reports

Monitoring progress against budget

3.15 Crossrail Limited manages the overall costs of the infrastructure programme and reports on these to the Department and Transport for London. Its reports again use several different measures of costs, in line with good practice, and currently show that costs are under control, though close to key boundaries. The key measures are:

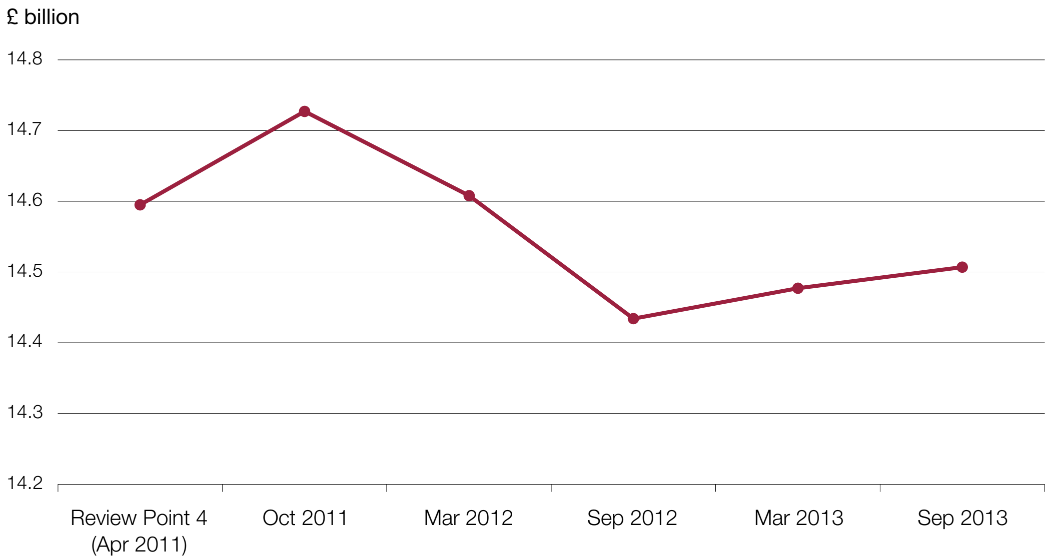
- the anticipated final cost of the whole infrastructure programme;
- the forecast costs of Crossrail Limited's direct works;
- the forecast costs of Network Rail's work on the existing surface network; and
- spend to date against the budgeted cost of the work delivered.

3.16 The anticipated final cost of the infrastructure programme is an important measure for the Department, which is liable for any costs above the £14.8 billion available funding. As at September 2013, Crossrail Limited calculated a 95 per cent probability that the final cost of the programme would be at or below £14.51 billion, £293 million below the £14.8 billion funding package. Overall, the estimate has reduced over the past two years, but since September 2012, anticipated costs have increased marginally (**Figure 15**). The actual final cost depends on the accuracy of cost estimates and the amount of risk which actually occurs.

Figure 15

Changes in the forecast final cost of the Crossrail infrastructure

Overall the anticipated final cost has reduced over the last two years, but anticipated costs have begun to increase since September 2012



	Review Point 4 (Apr 2011)	Oct 2011	Mar 2012	Sep 2012	Mar 2013	Sep 2013
● Anticipated final cost	14.60	14.73	14.61	14.43	14.48	14.51

Source: National Audit Office analysis of Crossrail Limited semi-annual construction reports

3.17 The Department and Transport for London have set 'intervention points' which encourage Crossrail Limited to keep its own direct costs well within the available funding, by defining the conditions under which the sponsors can intervene, if cost forecasts rise above certain levels (**Figure 16**). These are monitored as part of Crossrail Limited's progress reports.

Figure 16
Crossrail Limited's 'intervention points'

Intervention point	Level at which forecast costs of Crossrail Limited's direct work breach the intervention point, (£bn)[1]	Crossrail Limited and sponsors' actions if there is a breach
0	11.75	Crossrail Limited must give a remedial action plan to Transport for London. The Department can make suggestions on the action plan, but Transport for London is not bound by these.
1	11.99	Transport for London can specify what Crossrail Limited must do to reduce costs and improve management and governance of the programme. Transport for London must consult with the Department, but is not bound by its suggestions. Transport for London can also choose to provide extra funding to Crossrail Limited.
2	12.58	Either the Department or Transport for London can require that the Department takes ownership of Crossrail Limited. The Department can then choose to either: • discontinue the project and pay all winding-down costs, plus 75 per cent of Transport for London's borrowing for Crossrail and any additional funding provided at intervention point 1; or • continue with the project and pay all Transport for London's borrowing for Crossrail, plus any additional funding to deliver the programme. The Department can also decide either to replace Crossrail Limited, or to deliver the programme itself.

Note

1 The point at which the intervention points are set fluctuates slightly to reflect slight adjustments to the funding profile and changes in assumptions about interest rates. The table shows the intervention points as at September 2013.

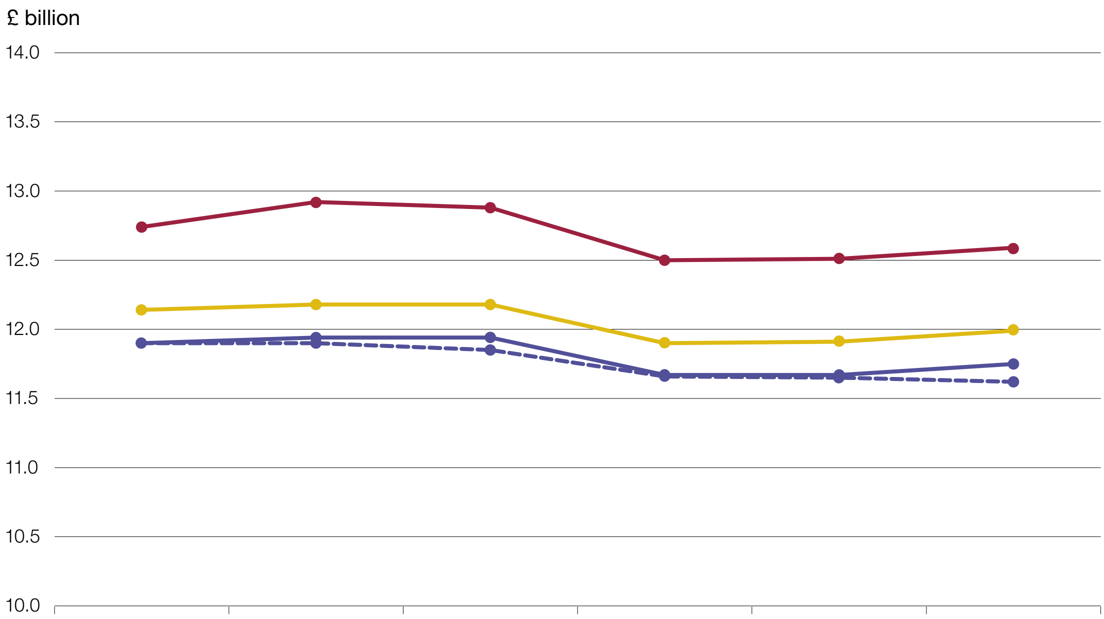
Source: Crossrail Project Development Agreement

3.18 Crossrail Limited's forecast direct costs, excluding Network Rail's work on the surface sections, have not so far breached any of the intervention points. However, in September 2012 and March 2013, they got close to the first of these, known as intervention point 0 (**Figure 17**). This is the point at which Transport for London could require Crossrail Limited to take action to control costs.

3.19 Network Rail is not subject to intervention points. However, under the protocol setting out Network Rail's involvement in the programme, it is required to inform the Department and Crossrail Limited if its costs are likely to exceed £2.3 billion. If this were to happen, Crossrail Limited and Network Rail would discuss how to bring costs under control. The Department has the option of stepping in if such talks fail and would then have to cover the extra cost itself, or require Network Rail to reduce or remove work from the programme. The protocol also sets out measures to incentivise Network Rail to reduce costs and deliver on schedule.

Figure 17

Changes to the value of the intervention points and the Crossrail Limited anticipated final costs since September 2010



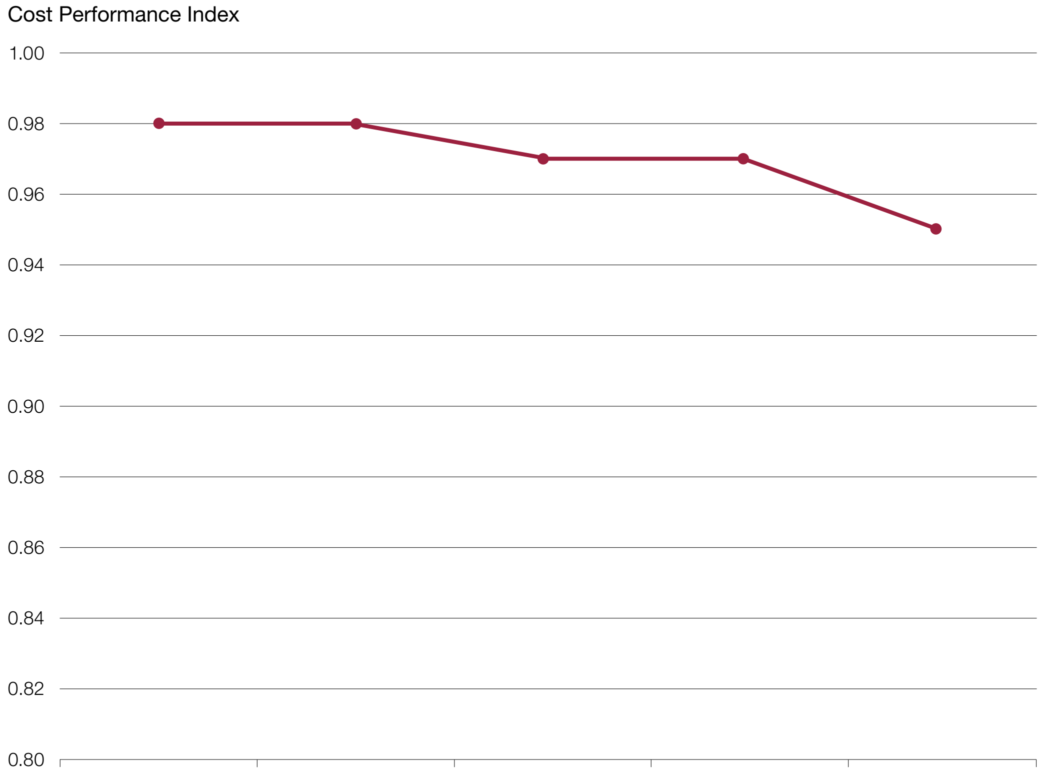
	Review Point 4 (Apr 2011)	Sep 2011	Mar 2012	Sep 2012	Mar 2013	Sep 2013
Intervention point 2	12.74	12.92	12.88	12.50	12.51	12.59
Intervention point 1	12.14	12.18	12.18	11.90	11.91	11.99
Intervention point 0	11.90	11.94	11.94	11.67	11.67	11.75
Forecast Crossrail Limited costs to a 50 per cent degree of confidence	11.90	11.90	11.85	11.66	11.65	11.62

Source: National Audit Office analysis of Crossrail Limited semi-annual construction reports

3.20 Crossrail Limited also analyses how much it has spent on work completed by contractors relative to how much it budgeted to spend. The Cost Performance Index (CPI) shows that the cost of work delivered has been higher than the budgeted cost of that work (**Figure 18**). Since this measure focuses on work done by contractors, and does not include, for example, Crossrail Limited's centrally held contingency and additional contingency funding held by Transport for London, it does not imply a risk to the overall funding package. However, in the latest six-monthly progress report, in response to a request from the Department and Transport for London, Crossrail Limited set out the measures it is taking to improve the CPI.

Figure 18
Trend in the actual cost of work against budgeted cost of work

The cost of work delivered has been higher than the budgeted cost of that work



	Sep 2011	Mar 2012	Sep 2012	Mar 2013	Sep 2013
● Cost Performance Index	0.98	0.98	0.97	0.97	0.95

Source: National Audit Office analysis of Crossrail Limited semi-annual construction reports

Future challenges

3.21 Crossrail will not be fully operational for another six years. Risks remain in a number of areas. For example:

- awarding the contract to manufacture the trains, by April 2014. Failure to do so could result in delays to services starting and a reduction in benefits. This process has suffered delays as a result of the decision to change the method of funding, but the sponsors are focused on achieving this date;
- operational planning is crucial to Crossrail's success. Crossrail Limited's plans for integrating the programme are well advanced relative to other rail projects we have recently reviewed, and there is a clear assurance process in place. A director of operations reporting to the chief executive was in place from 2006 to 2008 during the early development of Crossrail plans and operations staff have been in place throughout the programme. Crossrail Limited recruited the current operations director in early 2013, increasing the focus on this critical area in advance of the appointment of the operator; and
- aligning Crossrail with other rail services – including Great Western, Anglian and South Eastern services. This work is led by the Joint Sponsor Team, working closely with the Department's Crossrail and franchising teams.

Appendix One

Our audit approach

1 This study examined the Department for Transport's (the Department's) investment and role in the Crossrail programme and the likelihood that this will provide value for money for the taxpayer. Our key areas of review were:

- the development of the programme and whether the Department is confident that the programme is on track to deliver the expected benefits against a well-founded schedule and budget;
- funding the programme and whether the Department is managing its full financial exposure on the programme effectively; and
- progress to date, management and oversight and whether the Department is an effective sponsor of the programme.

2 We applied an analytical framework with evaluative criteria; this considered what would have been the optimal arrangements for the delivery of the Crossrail programme and the Department's role in this. Optimal arrangements would include a strong delivery agreement which clearly defines the roles and responsibilities of each of the parties involved. Within the agreement the sources of funding will be clearly stated; incentives will be in place to ensure that Crossrail Limited delivers the programme at the lowest possible cost; there will also be requirements for Crossrail Limited to produce regular and reliable reports on project progress and forecast; and it will include a suitable means for the Department to intervene if necessary.

3 During our work we established the basis of the business case used to support the decision to commence the programme; reviewed the Project Development Agreement and the Sponsors Agreement documentation which forms the basis for the governance and delivery of the programme; reviewed the project's recent progress and Crossrail Limited's reporting on this; and reviewed the sponsors' involvement in the programme's development.

4 We also identified the potential risks and challenges for future delivery of the programme and considered potential lessons that the government could apply to other large engineering projects.

5 Our audit approach is summarised in **Figure 19**. Our evidence base is described in Appendix Two.

Figure 19
Our audit approach

The government's objective

The Department's objectives for the Crossrail programme are to:

- relieve congestion to the existing transport network in and around London;
- accommodate future travel demand growth;
- improve connectivity and reduce journey times; and
- create wider economic impacts, including supporting economic growth.

How this will be achieved

The current programme began in 2008 and is due to complete in 2019. It consists of three main components:

- infrastructure work costing £14.8 billion;
- buying a fleet of new trains and a new maintenance depot; and
- a new concession for running passenger services on the Crossrail route.

Our study

Our study examines the Department for Transport's role in the development of the programme, funding the programme and management and oversight of the programme.

Our evaluative criteria

Whether the Department is managing its full financial exposure on the programme effectively.

Whether the Department is confident that the programme is on track to deliver the expected benefits against a well-founded schedule and budget.

Whether the Department is an effective programme sponsor.

Our evidence

(see Appendix Two for details)

We assessed the Department's management of its financial exposure by:

- reviewing departmental documents;
- interviewing key staff at the Department, Transport for London, Network Rail and Crossrail Limited;
- analysing the Crossrail business cases; and
- drawing on our previous work.

We assessed the Department's confidence over the programme schedule and budget by:

- reviewing and analysing the Crossrail Limited reporting made available to the Department;
- interviewing key staff at the Department, Transport for London, Network Rail and Crossrail Limited; and
- reviewing the results of internal and external challenge.

We assessed the Department's effectiveness as a sponsor by:

- reviewing departmental documents;
- interviewing key staff at the Department, Transport for London, Network Rail and Crossrail Limited;
- reviewing the results of internal and external challenge; and
- drawing on our previous work.

Our conclusion

On the whole and to date, the Department together with its co-sponsor Transport for London and its delivery body Crossrail Limited have done well to protect taxpayers' interests in the Crossrail programme. In the early years, they took effective action to stop costs escalating and to obtain more competitive rates from suppliers during the recession. During the construction phase, the governance arrangements and oversight of the project have ensured tight management of the programme so that delivery to both cost and schedule are well managed. The late decision to change funding of the rolling stock introduced a new delivery risk, but this is now being managed. The strategic need for Crossrail has become clearer over time as forecasts of population and employment growth in London have increased. The Department forecasts that Crossrail will bring £1.97 of transport benefits for every £1 of cost. Overall, if progress to date can be maintained, and risks managed, Crossrail is on track to achieve value for money.

Appendix Two

Our evidence base

1 We completed our independent review of the Crossrail programme after analysing evidence collected between August 2013 and November 2013.

2 We applied an analytical framework with evaluative criteria, which considered the optimal conditions for the development of the Crossrail programme. Our audit approach is outlined in Appendix One.

3 We assessed the Department's management of its financial exposure:

- We reviewed departmental documents to understand what financial commitments on the Crossrail programme the Department is liable for.
- We reviewed departmental documents on where the funding was being sourced from and up-to-date information on the likelihood that the Department would receive this funding.
- We carried out semi-structured interviews with key staff at the Department, Transport for London, Network Rail and Crossrail Limited to obtain further information about the Department's financial exposure on the programme.
- We assessed the analysis behind the Crossrail business case to understand how cost and benefit estimates had been produced and checked the Department's approach against HM Treasury guidance. We did not directly review or test the passenger demand models on which the economic case is based.
- We drew upon our past work on the Department's cost reductions undertaken as part of the 2010 Comprehensive Spending Review, for example our study on *Reducing costs in the Department for Transport*.

4 We assessed the Department's confidence over the programme schedule and budget:

- We reviewed the periodic management information provided to the Department which covers budgets, forecast outturn costs and current schedule against timetable.
- We assessed progress against target dates and budgets, and reviewed the timetable going forward.
- We reviewed meeting reports and minutes from key events in the programme to date, from the Department and the Joint Sponsor Board.
- We carried out semi-structured interviews with key staff at the Department, Transport for London, Network Rail and Crossrail Limited to obtain further information about the programme schedule and budgets and the reporting upon them.
- We reviewed the results of internal and external challenge to understand the implications for their findings and recommendations upon programme management and programme information.

5 We assessed the Department's effectiveness as a sponsor:

- We reviewed key programme documents which set out the governance and management frameworks for the Crossrail programme and the Department's role within this.
- We reviewed papers of the Joint Sponsor Board and submission to departmental ministers to understand the Department's approach to sponsorship.
- We assessed the capacity and capability of the Department's staff undertaking this programme and the rotation of staff within the team.
- We identified key risks to the successful delivery of the programme.
- We carried out semi-structured interviews with key staff at the Department, Transport for London, Network Rail and Crossrail Limited to obtain further information about the Department's performance as a joint sponsor of the programme.
- We reviewed the results of internal and external challenge to understand the views of other parties about the Department's previous and current effectiveness as a sponsor.
- We drew upon our past work looking at the Department's capability as a sponsor of large infrastructure projects.

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