National Audit Office

Report
by the Comptroller
and Auditor General

Department for Transport and High Speed Two Ltd

High Speed Two: A progress update

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Key facts

2036 to 2040

High Speed Two Limited's (HS2 Ltd's) current forecast opening date for the start of passenger services on the full High Speed Two network from London to Leeds and Manchester, via the West Midlands, although there is significant uncertainty regarding these dates

£65bn to £88bn

the Department for Transport's emerging estimate of the cost of the High Speed Two programme (in 2015 prices) as at December 2019. At the time of publishing this report, it is not possible to say with certainty what the final programme cost may be

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number of trains an hour that are planned to run to and from London on the new railway, compared with typically between two and six trains an hour on European high-speed railways

£27.1 billion	available funding for High Speed Two Phase One to the West Midlands (2015 prices), excluding VAT. Available funding for the whole programme is £55.7 billion (2015 prices), excluding VAT
£31 billion to £40 billion	the Department and HS2 Ltd's range estimate in November 2019 of the cost of Phase One (2015 prices). The Department proposes setting HS2 Ltd a target of delivering Phase One for £36 billion
March 2020	date by which construction must start on Phase One of the railway to avoid further delays to the start of passenger services
2029 to 2033	partial start of Phase One passenger services between Old Oak Common and Birmingham Curzon Street. Full Phase One services from Euston are forecast to start between 2031 and 2036
£6.3 billion	the Department and HS2 Ltd's spend on Phase One to 31 March 2019, excluding VAT. In total, they had spent £7.4 billion on the programme to 31 March 2019, excluding VAT

Summary

The High Speed Two programme

1 The High Speed Two programme (the programme) aims to construct a new high-speed, high-capacity railway between London, Leeds and Manchester, via the West Midlands. The new railway will join with the existing rail network to enable journeys to Liverpool, Newcastle, Edinburgh and Glasgow. It is the government's largest infrastructure programme by value and many of its component parts, such as works at Euston station, construction of the railway infrastructure and purchase of land and property for the route, are large and complex projects in their own right.

2 The Department for Transport (the Department) is the programme's sponsor, responsible for funding and overseeing delivery. High Speed Two (HS2) Limited (HS2 Ltd), an arm's-length body of the Department, is responsible for delivering an operational railway. Network Rail is undertaking work for HS2 Ltd to make changes to the existing railway to facilitate the construction of, and link to, the planned new high-speed service.

3 The Department has split the programme into three phases:

- Phase One (London to the West Midlands). The Department expects to take the final investment decision on whether to proceed with Phase One and to start main civil construction in early 2020.
- Phase 2a (West Midlands to Crewe). The Department expects Parliament to approve the Phase 2a enabling legislation (hybrid bill) in early 2020.
- Phase 2b (Crewe to Manchester and West Midlands to Leeds) is at a much earlier stage. The Department has been planning on introducing a hybrid bill to Parliament in June 2020.

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

- provide sufficient capacity to meet long-term rail demand and to improve resilience and reliability on the rail network;
- improve connectivity by making journeys faster and easier; and
- boost economic growth across the UK.

5 In March 2019, HS2 Ltd formally advised the Department that it would not be able to deliver Phase One of the programme on time or within available funding. Since then, HS2 Ltd has continued to develop cost and schedule estimates for the programme, which indicate that the programme will cost more than the available funding and be completed later than planned.

6 The total forecast cost for the programme is not yet clear. The Department's emerging estimate, as at December 2019, gives a potential cost of between £65 billion and £88 billion (2015 prices), between 17% and 58% more than the available funding of £55.7 billion (2015 prices) agreed with HM Treasury. However, Phase Two is at an early stage of development, and given the reasons for cost increases on Phase One, we do not think that it is possible, as yet, to estimate with certainty what the final cost could be. The Department and HS2 Ltd are continuing to develop the cost estimates.

7 The Department and HS2 Ltd expect partial Phase One services from Old Oak Common to Birmingham Curzon Street to start between 2029 and 2033, with full services from Euston starting between 2031 and 2036. It is not clear when services on the full High Speed Two network to Leeds and Manchester will commence; HS2 Ltd estimates these will open between 2036 and 2040.

8 In August 2019, the government announced an independent review of the programme to provide advice on whether, and if so, how to proceed with the programme.[1] The review is wide-ranging in scope and is due to report in early 2020.

9 We have reported three times on the programme.[2] Each of our previous reports highlighted significant cost and schedule pressures; the potential effect of any increases in these on the scope and benefits of the programme to passengers, communities, businesses and the economy; and areas of risk going forward.

Scope of the report

10 This report examines whether the Department and HS2 Ltd have protected value for money in their stewardship of the programme so far, and the risks to value for money going forward. We assess:

- the progress of the programme since we last reported in 2016;
- why the schedule is delayed and forecast costs have increased; and
- the risks that the Department and HS2 Ltd must manage.

1 The review is chaired by Douglas Oakervee, who was the previous chairperson of both HS2 Ltd and Crossrail Limited.

2 Comptroller and Auditor General, Department for Transport, *High Speed 2: A review of early programme preparation*, Session 2013-14, HC 124, National Audit Office, May 2013. Comptroller and Auditor General, Department for Transport and HS2 Ltd, *Progress with preparations for High Speed 2*, Session 2016-17, HC 235, National Audit Office, June 2016. Comptroller and Auditor General, Department for Transport and HS2 Ltd, *Investigation into land and property acquisition for Phase One (London – West Midlands) of the High Speed 2 programme*, Session 2017–2019, HC 1531, National Audit Office, September 2018.

11 Given it is still at an early stage, we do not seek to conclude on whether the programme is ultimately likely to be value for money. We focus our analysis on Phase One, because HS2 Ltd has made more progress on the cost and schedule estimate in advance of the Department's plan to take the final investment decision on that phase.

12 We conducted fieldwork between July and December 2019. At the time of publishing this report, the latest forecast cost and schedule estimates for the programme were not yet complete and subject to change. We plan to continue to look at the programme regularly, reporting on progress and the Department's actions to address recommendations for improvement.

Key findings

Progress since our 2016 report

13 Since we last reported, the Department and HS2 Ltd have focused on getting ready to start construction on Phase One. HS2 Ltd has focused on working with its main civil construction contractors to design how the civil construction elements will be built and agree the cost and schedule. HS2 Ltd has purchased 66% of the land required to build Phase One, let design contracts for new stations and started other procurements needed for an operational railway, including railway systems. It has also undertaken preparatory work, such as demolitions, moving utility pipes and cables, and archaeological programmes at 250 locations. Across the whole programme, the Department and HS2 Ltd have spent £7.4 billion to March 2019 (paragraphs 1.7, 1.8 and 1.12 to 1.16).[3]

Why the schedule is delayed and forecast costs have increased

14 The 2026 target opening date for Phase One was ambitious. The Department set a 2026 opening date with reference to other infrastructure programmes. It did not take into account sufficiently that High Speed Two was a significantly larger programme with many more interrelated elements than the comparators. In 2013, we reported that it would be difficult for HS2 Ltd to complete all activities in the time available. In 2016 we, and others, warned that the 2026 opening date was at risk. In April 2017, the Department agreed that HS2 Ltd should work towards a partial opening of Phase One passenger services from 2026, and full opening by the end of 2027. It also asked HS2 Ltd to look at ways of achieving a full opening in 2026. In October 2018, HS2 Ltd notified the Department that there were significant challenges to achieving the partial opening date of 2026. Since April 2019, HS2 Ltd has been planning on the basis of a more realistic schedule for the programme. The Department and HS2 Ltd now expect partial Phase One services to start between 2029 and 2033, with full services from Euston starting between 2031 and 2036, at least five years later than planned (paragraphs 2.4 to 2.6, 2.8 and 2.9).

3 Excluding £0.6 billion of VAT which HS2 Ltd has told us that HM Treasury has agreed to fund.

15 **The Department and HS2 Ltd underestimated the complexity of the programme, and Phase One is now forecast to cost between £31 billion and £40 billion, £3.9 billion to £12.9 billion (14% to 47%) more than its available funding.** High Speed Two is a highly ambitious programme intended to be world-leading in its specification, including features such as a service frequency of 18 trains an hour to and from London compared with between a typical two to six trains an hour on European high-speed railways. The programme is constructing a new railway through city centres where site logistics are more challenging, and the UK's high population density means a large number of roads, utility pipes and cables must be moved. The Department set the available funding in 2013 when the programme was at an early stage, based on a basic design, and uplifted this for inflation in the Spending Review 2015. Since then, forecast costs have increased on all elements of Phase One except the purchase of new trains (paragraphs 2.2, 2.10 to 2.12, and Figures 5, 7, 8, 11 and 12).

16 **HS2 Ltd did not account for the level of uncertainty and risk in the programme when previously estimating the costs of Phase One.** HS2 Ltd's previous cost estimate was agreed in April 2017, when Phase One was still at a relatively early stage of design maturity. At this stage, it was not possible to know what the specific requirements of the programme meant for the design or the costs of the railway. HS2 Ltd used existing international high-speed rail programmes as a basis for its costs, but these programmes have significant differences to High Speed Two. HS2 Ltd also had to make assumptions about elements such as ground conditions, as it did not yet have the legal powers to undertake detailed surveys. Despite these uncertainties, HS2 Ltd adopted a detailed method for calculating contingency appropriate for a programme at a much greater stage of development and certainty. This method resulted in £7 billion of contingency being set, 37% of forecast future Phase One costs. The amount of contingency was not enough to address the significant increases in cost that emerged as the design became more detailed, and issues such as poor ground conditions came to light (paragraphs 2.14 to 2.16, 2.19, 2.22, and Figures 11 to 13).

17 **The Department and HS2 Ltd underestimated the impact on costs of changes made to the design and construction of the railway by the hybrid bill.** To gain the legal powers to build the railway, in 2013 the Department and HS2 Ltd deposited a hybrid bill in Parliament. As part of this process, the Department and HS2 Ltd committed to meeting certain requirements during the construction and operation of the railway. Some of these commitments were requested by people affected by the programme and were added through additional provisions to the bill, or through commitments known as 'undertakings and assurances'. Some of these requirements made High Speed Two different from the international comparators on which HS2 Ltd based its April 2017 cost estimate, although it is difficult to isolate the impact of these commitments from other design choices and legal requirements. HS2 Ltd commissioned analysis which suggested that environmental and visual impact measures, such as lowering the railway beneath ground level, have made High Speed Two's main civil construction around £1 billion more expensive than international comparators. Although there is some overlap with the measures above, indicative analysis by HS2 Ltd also suggests that its previous estimate of £245 million for meeting undertakings and assurances may have also been underestimated, and that the impact on costs may be £1.2 billion. Not all commitments have an impact on cost, although some of the commitments made can restrict contractors' ability to avoid costs and create interdependencies that add to the challenge of delivering the programme (paragraphs 2.16 to 2.18).

18 **HS2 Ltd included ambitious savings targets in its forecast costs to get within the available funding on Phase One but did not change its approach in order to deliver them.** To make Phase One affordable, HS2 Ltd incorporated £4.9 billion of efficiency savings, changes to the design and scope of the programme and price estimate reductions within its April 2017 estimate. These were based on internal scrutiny of the estimate, the benchmarking approach it used to cost the programme and reviews by the Cabinet Secretary. For example, HS2 Ltd assumed it could make savings by encouraging UK industry to work closer together, as is common in European countries, to reduce administrative costs. When we last reported, HS2 Ltd had plans identifying where the savings might be found but did not develop these further into a programme of activity to achieve them. The elements that had the most assumed savings have seen significant cost increases. Had HS2 Ltd assumed no savings and applied a more appropriate amount of contingency, it would have forecast a cost comparable with the current estimate for Phase One (paragraphs 2.20 to 2.22, and Figure 13).

Actions taken by HS2 Ltd and the Department

19 HS2 Ltd and the Department tried to reduce forecast costs. In June 2018 HS2 Ltd's main civil construction contractors warned that early estimates for Phase One construction were indicating significant cost increases. HS2 Ltd undertook a number of actions to reduce costs, including further detailed technical design work on how features of the infrastructure could be built more efficiently. However, these actions did not bring forecast costs within the available funding, or achieve a schedule that enabled passenger services to start on time. The Department also explored changes to the scope of the programme to make it affordable. It assessed that significant changes were needed that would require the support of Parliament and wider government stakeholders. In July 2019, the Department concluded that the programme was not affordable within available funding (paragraphs 1.12 to 1.17 and Figure 6).

20 HS2 Ltd has undertaken a significant and unforeseen amount of work to agree a new cost and schedule for Phase One. HS2 Ltd and its contractors underestimated the amount of time they thought it would take to develop and assess a robust revised cost and schedule for Phase One. HS2 Ltd has repeatedly moved its internal targets for agreeing the estimate and then approving the start of main construction, and the unanticipated volumes of work have increased pressures on HS2 Ltd's staff. In order to maintain the schedule and protect future value for money of the programme while it agreed a new cost and schedule, the Department concluded that it should continue to spend money on the programme and authorised some spending on main civil construction activities in advance of taking the main investment decision on the programme. HS2 Ltd considers that the additional time taken to develop the 2019 cost estimate has helped to protect the scheme's overall value for money by giving it more time for scrutiny and applying lessons learned from contracting for main civil construction on Phase One to other areas, such as the design and build of new stations and Phase Two (paragraphs 2.28 and 2.29).

Risks that the Department and HS2 Ltd must manage going forward

21 Compared with 2016, HS2 Ltd now has greater confidence in its cost estimate for Phase One but it will need to manage risks that could cause costs to increase further as the programme progresses. The Department and HS2 Ltd have undertaken a substantial programme of activity to ensure the current Phase One cost estimate is robust, but there are risks that costs could change further. Unexpected site conditions and poor weather could increase construction costs; final cost estimates from contractors for nearly 50% of the cost of the current estimate could be more or less than assumed; and potential efficiencies may not be achieved, increasing costs. Euston station will need to be extended to accommodate high-speed services and there is uncertainty as to how this will be done and the likely cost. The Department and HS2 Ltd based the £31 billion to £40 billion (2015 prices) estimate for Phase One on a detailed assessment of programme risks and analysis of comparator schemes. The range includes £9.9 billion of contingency (2015 prices). The lower bound of the range assumes few risks materialise, whereas the upper end assumes the majority of modelled risks occur. Given the scale, complexity and early stage of the programme, the Department and HS2 Ltd will need to consider going forward how to monitor whether the level of contingency is sufficient for future risks materialising and when it is appropriate to narrow the range of estimated costs (paragraphs 3.5 to 3.6).

22 HS2 Ltd's revisions to its commercial approach for the Phase One main civil construction works are sensible but carry risks that it must manage. In July 2017, HS2 Ltd let seven multi-million pound contracts for Phase One main civil construction to four joint venture companies. HS2 Ltd intended that agreeing fewer, larger contracts would create economies of scale and reduce the risks from, and costs of, managing many different contractors. HS2 Ltd considers that once the cost of building the railway became clear, the terms of the contract combined with worsening conditions in the construction industry, resulted in designs which were less efficient and contractors increasing their forecast prices further. In order to ensure an affordable programme, HS2 Ltd is currently finalising revised terms with its contractors. Contractors will no longer be liable for cost increases above a fixed target price. Instead, HS2 Ltd has developed an estimated cost for the works with its contractors. HS2 Ltd will be responsible for funding increases above the estimated cost and contractors will lose a proportion of their fee for building the railway if they do not meet performance indicators on cost and schedule. HS2 Ltd will need to ensure that it has a detailed understanding of contractors' costs and that it incentivises contractors to deliver throughout the contract (paragraphs 2.23 to 2.27, 3.7 and Appendix Three).

23 **Delays to the start of construction beyond March 2020 will put the expected opening date of Phase One at risk.** The Department and HS2 Ltd currently expect a phased opening of Phase One of the railway between 2029 and 2033. If work does not begin by the end of March 2020, the schedule may be delayed or compressed further because some of the construction work can only be done at certain times of the year. Delays may also reduce the amount of time allocated for the latter stages of a programme, such as integrating the signalling and systems which control the railway, and testing the intended operation of the railway, which are complex and risky parts of delivering a project on time and budget (paragraphs 1.11 and 3.2).

24 **HS2 Ltd must develop its capability to manage the programme as it progresses.** The programme is a vast, interrelated set of projects all at different stages, which need to be managed concurrently over decades. HS2 Ltd will need to continue to develop its existing capabilities, as well as new ones, as the programme progresses into construction, and eventually into integrating the systems used to control the railway and operations. This includes effectively managing revised arrangements with its contractors and ensuring that it can assure itself that the programme is on track (paragraphs 1.4, 1.5, 3.8 and 3.9).

25 **On current plans Phase Two is forecast to cost more than its available funding and take longer than expected.** Phases 2a and 2b are at much earlier stages of development than Phase One and their scope, costs and schedule are less certain. HS2 Ltd's current forecast for when passenger services would run on Phase 2a is between 2030 and 2031, and for Phase 2b is between 2036 and 2040, three to seven years later than planned. The Department estimates the cost of Phase 2a could increase to £6.5 billion (87% higher than the available funding of £3.5 billion) and Phase 2b to £41 billion (63% higher than the available funding of £25.1 billion). However, both phases will require legislation to be agreed by Parliament, which may affect both the cost and schedule, and are at such an early stage of development that it is currently difficult to estimate the potential costs with certainty. The Department will need to carefully balance decisions on the scope and costs of Phase Two as changes will impact on the benefits of the overall scheme, given the majority of benefits are delivered by this phase (paragraphs 1.11, 3.11 to 3.18 and Figure 5).

Conclusion on value for money

26 High Speed Two is an ambitious national programme, the construction of which will take decades. The Department, HS2 Ltd and government more widely underestimated the task, leading to optimistic estimates being used to set budgets and delivery dates. In not fully and openly recognising the programme's risks from the outset, the Department and HS2 Ltd have not adequately managed the risks to value for money. If these risks had been recognised and managed earlier, then the significant activity in a pressured environment over the past year trying to understand and contain cost increases may not have been necessary. There are lessons to be learned from the experience of High Speed Two for other major infrastructure programmes.

27 We welcome the increased realism on the estimated cost and schedule for the programme. However, significant risks remain. While the estimated cost and schedule for Phase One are now on a stronger footing, the challenge of getting Phase One into construction, and of monitoring and managing the programme as it progresses, is considerable. Phase Two is at a far earlier stage of development with many important decisions to be made before HS2 Ltd and the Department can improve cost and schedule estimates. Completing High Speed Two will require sustained focus and support from the Department and across government to ensure the programme is re-established on a sound basis, balancing cost, time and benefits, and delivered in a way that achieves long-term value for money.

Recommendations

28 On the High Speed Two programme:

a the Department should periodically assure itself about the feasibility of completing the programme to agreed revised opening dates and the likely success of actions to improve delivery confidence, and whether any delays against schedule are reducing the time allocated for the critical stages of systems integration and testing of the railway;

b the Department and HS2 Ltd should develop a common set of management information, so that they can clearly and consistently track performance on the programme and identify when risks are emerging. The management information should use consistent terminology and definitions and include the rationale for any changes. It should also be clear about what the Department and HS2 Ltd are measuring the programme costs and schedule against, for example the difference between the forecast cost of the programme, the budget and the target cost;

c while we support the use of cost and schedule ranges in major programmes, the Department and HS2 Ltd should have a plan to narrow the range as the programme goes on. This plan should reflect the level of risk remaining in the programme;

d the Department should assure itself that HS2 Ltd has the capabilities it needs to deliver the programme, including the capability needed to manage the revised commercial approach for main civil construction. This assessment should recognise that HS2 Ltd will need a range of skills because the phases of the programme will be at different stages of maturity;

e following its review of sponsorship arrangements for major projects, the Department should ensure that it has appropriate arrangements to gain assurance on programme delivery, while also providing HS2 Ltd with sufficient freedom to deliver the programme; and

f HM Treasury, the Department and HS2 Ltd should take decisions on the scope and available funding for the programme, taking into account the trade-offs between cost and benefits. It should reflect a realistic assessment of the full cost of the programme and include appropriate contingency. It should also include the potential impact on cost, schedule and benefits of decisions made during parliamentary scrutiny of the Phase Two hybrid bills and provide this information to Parliament.

29 On programme management the government should:

a ensure that it takes appropriate account of the limitations of cost benchmarking information when using this approach to estimate costs. It should also use other available sources of information on costs;

b be realistic about the cost of complex and ambitious programmes and not assume arbitrary efficiency savings to make them affordable within available funding. Targets should be based on a realistic assessment of how robust cost control and different approaches to delivery can lower costs; and

c throughout the life of a programme, consider setting ranges for cost estimates and completion dates to reflect uncertainty, with a point estimate within this range set to help delivery bodies and programme sponsors closely manage performance.