

LONDON - WEST MIDLANDS PRECONSTRUCTION COMMENTARY

November 2009 submission to DfT

During November 2009, HS2 provided an estimate of preconstruction costs to DfT. This identified costs relating to design, surveys, HS2 project overheads, costs relating to the statutory process plus compensation / land costs. Up to 2017/18, this estimate totalled £1,854,672,505.

Preconstruction estimate to 2017/18	£1,854,672,505
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January 2010 recommendation

Preparation of HS2 report December 2009

Preparation of the cost estimate and project timeline for the HS2 report submitted at the end of December 2009 improved understanding of the activities required to deliver the project in line with a desired opening date at the end of 2025.

A cashflow was derived for the London - West Midlands capex costs. The roll up of this is shown in the HS2 main report. This shows annual costs to 2017/18 higher than those submitted in November 2009, costs comprised four elements as shown below:

a) The annual costs to 2017/18 for the preconstruction activities identified in the November 2009 submission are retained at very similar values to those estimated in November.	£1,850,411,274
b) More detailed understanding of the project's critical path identified a few activities which should commence before the main construction period in order to achieve the 2025 opening date	£642,525,299
c) Quantitative risk assessment enabled location-specific and programme-wide construction risk to be calculated and this was spread in the cashflow.	£167,339,946
d) Additional risk provision for external risks ("optimism bias") was spread in the cashflow in line with the overall project spend profile.	£741,584,308
<i>Total of all items</i>	<i>£3,401,860,827</i>

Further review of costs to 2017/18 January 2009 - recommended

The HS2 Programme Board reviewed the cashflow to 2017/18 and recommended the following:

a) Preconstruction activity costs to be retained as estimated for the HS2 Report.	£1,850,411,274
b) Of the "critical path" activities - some truly were critical (primarily those regarding the early commencement of enabling works at Euston, ordering of power connections from the National Grid and commencement of classic-compatible train procurement) and some were activities that could be undertaken promptly to de-risk delivery but did not directly impact on the project's critical path. The January 2010 recommendation therefore separates these two categories of activity out - it is strongly recommended that the few critical activities are budgeted for prior to the main construction period, the risk mitigation activities can be considered separately.	£231,801,494 (critical)
	£194,720,094 (risk mitigation)
c) Appropriate provision for construction risk through the design / mobilisation phase should be made, as risks will emerge during these activities causing re-work, revision to cost etc. This value is subsequently shown in the critical activities table.	£174,868,116
d) Additional provision for external risks would not be included in the projection to 2017/18.	£0
<i>Total of above excluding risk mitigation</i>	<i>£2,257,080,885</i>
<i>Total of above including risk mitigation</i>	<i>£2,451,800,979</i>

LONDON - WEST MIDLANDS

November 2009 submission to DfT

Item	Estimated spend to 2017/18 (£)
Design	766,450,340
Topographical / Ground Investigation surveys	31,000,000
HS2 overhead costs - staff profile related	299,022,165
Statutory Process & Consultation Charges	202,000,000
Compensation (Land sub-total)	556,200,000
Total	1,854,672,505

January 2010 recommendation

Activities included in Nov 09 estimate to DfT

Item	Estimated spend to 2017/18 (£)	Comment
Design	726,550,412	Split into three phases, covering design to obtain consents, outline engineering design and then detailed design. As design is an essential precursor to construction, all spend will be incurred before construction starts. Design cost is estimated as 8% of construction costs.
Topographical / Ground Investigation surveys	31,000,000	Essential precursor to delivering high quality early design work. Estimated at £150k per route km.
HS2 overhead costs - staff profile related	286,260,862	Total overhead cost estimated as 8% construction costs, costs spread in line with projected staff profile.
Statutory Process & Consultation Charges	200,000,000	Activities required to deliver consents prior to construction, estimated from Crossrail experience.
Compensation (Land sub-total)	606,600,000	Exceptional hardship scheme total cost £25m running until 2011/12; general blight scheme running from 2012/13 @ £5m per annum, then £10m in 2017/18. Land costs incurred from 2012/13 at 5% of the estimated land cost, increasing to 25% in 2016/17 and 2017/18 (significant land acquisition required prior to construction ready for enabling works etc.)
Total	1,850,411,274	

Additional critical items identified

Item	Estimated spend to 2017/18 (£)	Comment
Stations	50,000,000	33% of Euston allowance for utility diversions, service diversions, installation of crossovers and signalling modifications to enable staging (removes risk from the critical path).
Stations - operational railway related costs	6,000,000	Pro rata of isolation, possession and TOC compensation costs in 2017/18 to support station work, plus advance RIMINI safety planning in 2016/17.
Power supply	39,064,182	50% of power supply estimate payable 2015/16 to National Grid at time connection points "ordered" - regulatory requirement - no pay no connection with a 5-7 year lead time (if pushed back increased risk to critical path and availability of power for testing / commissioning phase).
Administration Costs		
- Preliminaries & General Items	29,389,850	2.5% allowance in 2016/17 and in 2017/18 allowance for mobilisation activities required to support critical path activities including station related work.
- Site Supervision	7,347,462	Pro rata of prelim costs in 2017/18 to cover site work (mainly station related).
Trains	100,000,000	Initial provision to enable specification, procurement and early design of classic compatible sets to commence in 2017/18 (estimated five year delivery, then testing, commissioning and shadow running prior to start of operations). Total provision for classic compatible inc. 40% risk = £2,362m.
Risk	174,868,116	Spread of risk calculated at 7.5% of estimated spend in year (including critical spend) 2011/12 - 2015/16 and 10% of spend in 2016/17 and 2017/18. Equates to 8% of total construction risk provision.
Total	406,669,611	

Risk mitigation activities for consideration

Item	Estimated spend to 2017/18 (£)	Comment
Tunnel	146,608,750	5% of tunnelling costs in 2016/17 and also in 2017/18 for procurement of TBMs, ordering tunnel rings, procurement of batching plants - if spend is pushed back then tunnelling likely to fall on to the critical path with 18 month gap between final approval and commencement of tunnelling on site.
Utilities	17,120,301	10% of utility costs allowed in 2017/18 to allow non-contentious utility diversions to be undertaken in advance, enables faster start of main construction activities and reduces uncertainty regarding what utilities are present where.
Administration Costs		
- Preliminaries & General Items	29,389,850	2.5% allowance in 2016/17 and in 2017/18 allowance for mobilisation activities to prime other construction critical path / key activities.
- Training	1,601,193	20% allowance of total training costs in 2017/18 - skills for construction (note Crossrail delivering their own tunnelling training prior to construction).
Total	194,720,094	

Summary

Item	Estimated spend to 2017/18 (£)	Comment
Total Nov 09 activities	1,850,411,274	(i.e. yellow line)
Total Nov 09 activities + additional critical	2,257,080,885	(i.e. yellow + green line)
Total Nov 09 + critical + risk mitigation	2,451,800,979	(i.e. yellow + green + blue line)

Note

Within the cashflow shown in the HS2 Report, additional risk provision ("optimism bias") has been included for consistency as shown below. This is not included above.

Item	To 2017/18 (£)	Comment
Additional provision for external risks	741,584,308	Spread in line with profile of project expenditure, equates to 18% of total additional provision on £4,218m.

LONDON - WEST MIDLANDS DETAIL

November 2009 submission to DfT

Item	Estimated spend to 2017/18 (£)	2010-2011	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018	Total
Design	766,450,340	2,365,152	15,329,007	136,428,161	152,457,816	183,948,082	183,948,082	91,974,041	-	766,450,340
Topographical / Ground Investigation surveys	31,000,000	3,100,000	6,200,000	13,950,000	7,750,000	-	-	-	-	31,000,000
HS2 overhead costs - staff profile related	299,022,165	9,833,778	18,200,668	28,312,150	30,334,446	40,445,928	50,557,410	60,668,892	60,668,892	299,022,165
Statutory Process & Consultation Charges	202,000,000	6,000,000	12,800,000	27,200,000	40,000,000	40,000,000	40,000,000	36,000,000	-	202,000,000
Compensation (Land sub-total)	556,200,000	5,400,000	21,600,000	40,500,000	40,500,000	40,500,000	40,500,000	180,900,000	186,300,000	556,200,000
Total	1,854,672,505	26,698,931	74,129,675	246,390,310	271,042,262	304,894,010	315,005,492	369,542,933	246,968,892	1,854,672,505

January 2010 recommendation

Activities included in Nov 09 estimate to DfT

Item	Estimated spend to 2017/18 (£)	2010-2011	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018	Total
Design	726,550,412	2,085,853	14,531,008	129,325,973	144,677,330	174,372,099	174,372,099	87,186,049	-	726,550,412
Topographical / Ground Investigation surveys	31,000,000	3,100,000	6,200,000	13,950,000	7,750,000	-	-	-	-	31,000,000
HS2 overhead costs - staff profile related	286,260,862	11,624,807	17,437,210	26,882,365	29,062,016	38,507,172	47,952,327	57,397,483	57,397,483	286,260,862
Statutory Process & Consultation Charges	200,000,000	6,000,000	12,800,000	27,200,000	40,000,000	40,000,000	40,000,000	34,000,000	-	200,000,000
Compensation (Land sub-total)	606,600,000	5,400,000	21,600,000	43,900,000	43,900,000	43,900,000	43,900,000	199,500,000	204,500,000	606,600,000
Total	1,850,411,274	28,210,659	72,568,218	241,258,339	265,389,347	296,779,271	306,224,426	378,083,532	261,897,483	1,850,411,274

Additional critical items identified

Item	Estimated spend to 2017/18 (£)	2010-2011	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018	Total
Stations	50,000,000	-	-	-	-	-	-	-	50,000,000	50,000,000
Stations - operational railway related costs	6,000,000	-	-	-	-	-	-	1,000,000	5,000,000	6,000,000
Power supply	39,064,182	-	-	-	-	-	39,064,182	-	-	39,064,182
<i>Administration Costs</i>										
- Preliminaries & General Items	29,389,850	-	-	-	-	-	-	14,694,925	14,694,925	29,389,850
- Site Supervision	7,347,462	-	-	-	-	-	-	-	7,347,462	7,347,462
Trains	100,000,000	-	-	-	-	-	-	-	100,000,000	100,000,000
Critical items sub-total							39,064,182	15,694,925	177,042,387	231,801,495
Risk	174,868,116	-	5,442,616	18,094,375	19,904,201	22,258,445	25,896,646	39,377,846	43,893,987	174,868,116
Total	406,669,611	-	5,442,616	18,094,375	19,904,201	22,258,445	64,960,828	55,072,771	220,936,374	406,669,611

Risk mitigation activities for consideration

Item	Estimated spend to 2017/18 (£)	2010-2011	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018	Total
Tunnel	146,608,750	-	-	-	-	-	-	73,304,375	73,304,375	146,608,750
Utilities	17,120,301	-	-	-	-	-	-	-	17,120,301	17,120,301
<i>Administration Costs</i>										
- Preliminaries & General Items	29,389,850	-	-	-	-	-	-	14,694,925	14,694,925	29,389,850
- Training	1,601,193	-	-	-	-	-	-	-	1,601,193	1,601,193
Total	194,720,094	-	-	-	-	-	-	87,999,300	106,720,794	194,720,094

Summary

Item	Estimated spend to 2017/18 (£)	2010-2011	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018	Total
Total Nov 09 activities	1,850,411,274	28,210,659	72,568,218	241,258,339	265,389,347	296,779,271	306,224,426	378,083,532	261,897,483	1,850,411,274
Total Nov 09 activities + additional critical	2,257,080,885	28,210,659	78,010,834	259,352,714	285,293,548	319,037,716	371,185,254	433,156,303	482,833,857	2,257,080,885
Total Nov 09 + critical + risk mitigation	2,451,800,979	28,210,659	78,010,834	259,352,714	285,293,548	319,037,716	371,185,254	521,155,603	589,554,651	2,451,800,979

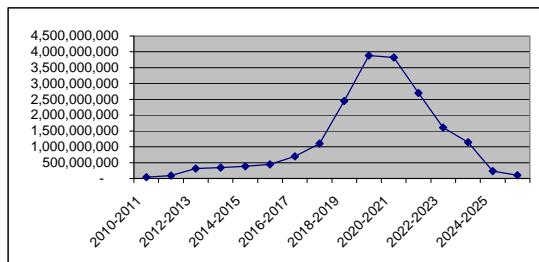
Note

Within the cashflow shown in the HS2 Report, additional risk provision ("optimism bias") has been included for consistency as shown below. This is not included above.

Item	To 2017/18 (£)	2010-2011	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018	Total
Recommended additional provision for external risks	741,584,308	7,844,329	20,243,430	67,267,230	73,972,866	82,745,019	97,463,679	151,066,594	240,981,161	741,584,308

CASHFLOW IN HS2 REPORT

Financial year	2010-2011	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019	2019-2020	2020-2021	2021-2022	2022-2023	2023-2024	2024-2025	2025-2026
£	36,054,988	92,811,648	308,525,569	339,362,213	379,524,290	447,056,924	693,069,415	1,105,455,781	2,448,468,884	3,883,671,504	3,825,251,349	2,703,543,849	1,604,920,360	1,145,412,417	236,660,143	97,663,821



This spread includes all infrastructure and rolling stock capital costs inclusive of construction risk and additional risk provision. As a result, 2010-11 spend will be shown as a value higher than the 2010-11 budget for HS2

EXTENSION TO MANCHESTER & LEEDS

Development Year 0

Development costs for Leeds - Manchester	7,500,000	Analogous to work undertaken during 2009 for London - West Mids
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Pre-construction activities Year 1 - Year 8

Assume east Manchester and Leeds legs = 336 km (compared with 206km London - West Mids)

Construction cost exc. land, project costs and any risk estimated at £7,477m

Land costs allowance £675m; section specific construction risk 17% of construction cost

Derived construction cost £9,423m

Other activities to pump prime delivery of the critical path for Leeds / Manchester are not sufficiently understood to identify at this stage.

Items	Estimated pre-construction	Comment
Design	753,840,000	Similar to London - West Midlands, all spend would be incurred pre-construction. Anticipate that this would again be estimated at 8% construction costs.
Topographical / Ground Investigation surveys	50,400,000	Similar to London - West Midlands, this would again be estimated at £150k / route-km.
HS2 overhead costs - staff profile related	171,756,517	Additional staff and overheads incremental to those already covered under London - West Midlands equivalent to 60%, so estimate is 60% of London - W. Mids spend to 2017/18.
Statutory Process & Consultation Charges	250,000,000	Scope is 1.63 x that of London - West Mids assume some efficiency for general process administration, so 1.25 x allowance.
Compensation (Land sub-total)	480,000,000	Would expect similar assumptions as London - West Mids so additional exceptional hardship scheme total cost £25m running until 2011/12; general blight scheme running from 2012/13 @ £5m per annum, then £10m in 2017/18. Land costs incurred from 2012/13 at 5% of the estimated land cost, increasing to 25% in 2016/17 and 2017/18.
Total	1,705,996,517	

Total Year 0 - Year 8	1,713,496,517
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