Appendix 1

Optimised Alternative to HS2 – The Scope for Growth on the Existing Network

Prepared by Christopher Stokes

1 OPTIMISED ALTERNATIVE TO HS2 – THE SCOPE FOR GROWTH ON THE EXISTING NETWORK

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1.1 This paper sets out a realistic "Optimised Alternative", providing additional capacity on the West Coast Main line route on an incremental, value for money basis, through reconfiguration of some first class capacity to standard class, operation of longer trains, and limited, specific infrastructure investment to ease a small number of "pinchpoints" on the route. The additional capacity provided is fully able to meet any foreseeable future increase in demand.

Introduction

1.2 Rigorous evaluation of proposals to construct a £32 billion rail project should properly include consideration of all alternative options, with the project itself evaluated against the best alternative, rather than an artificial "do minimum" case, as has been the case with HS2.

1.3 Taking the present position as a start point, there is currently limited crowding on the West Coast Main Line in standard class. This is concentrated on Friday evenings, particularly on departures immediately after 7 pm when cheaper "saver" are available. In contrast, first class load factors are low, at about 20%.

1.4 Provision of additional capacity is already planned through the committed project for lengthening 31 out of the existing 52 Pendolino units from 9 to 11 cars by adding two standard class cars, together with the procurement of four new 11 car trains. However, there is likely to be significant further demand growth, and it is certainly appropriate to identify options to meet this.

1.5 Options should be considered incrementally, starting with proposals which prime facie offer the best value for money. The options would include:

- Effective use of the capacity provided by Chiltern Railways as a result of the Evergreen 3 project, which will provide faster journey times between Birmingham and London from later this year.
- Rolling stock reconfiguration, particularly conversion of some first class vehicles to standard class.

- More effective demand management, including when appropriate use of obligatory reservations.
- Operation of longer trains, to the extent that this is possible without major infrastructure expenditure.
- Targeted infrastructure investment to clear selected bottlenecks to enable frequencies to be increased.
- Construction of new infrastructure (HS2).

1.6 It should be noted that the Department for Transport (DfT) and HS2 Ltd have given **no** consideration to rolling stock reconfiguration and improved demand management, and have not optimised their evaluation either of train lengthening, or of incremental infrastructure investment. In addition, the Evergreen 3 project was explicitly ignored.

1.7 This submission considers these options, focussing on the West Coast Main Line, and also includes brief summaries in relation to the East Coast and Midland Main Lines. The options for the West Coast Main Line have been evaluated to produce an “Optimised Alternative”, a low risk, incremental approach, with much lower costs than for HS2 and the ability to trigger incremental expenditure as and when it is required, rather than the “all or nothing” approach which is unavoidable with construction of a new route.

1.8 The Optimised Alternative is based on the incremental interventions in Table 1.1 and delivers a 215% increase in standard class seating over DfT’s 2008 “base”. This increase is over twice the high “background growth” figure of 102% forecast by DfT.

1.9 The derivation of the table is detailed in Annex 1; the additional capacity provided does not take into account the potential capacity upgrade on the Chiltern route, or assume any benefits from more effective demand management.

1.10 The proposed incremental changes are considered in more detail in this appendix.

TABLE 1.1 INCREMENTAL INTERVENTIONS FOR OPTIMISED ALTERNATIVE

Interventions	Daily Trains	Daily Standard Class Seats	% Increase above 2008 Base	Comments
Train Investment with no/little Infrastructure Investment				
HS2 2008 Base		59,298		Base used by DfT for evaluation of HS2. Predates full WCML upgrade timetable.
Current timetable	286	81,924	38%	Includes Voyager services (30 daily)
Evergreen 3	[64]	[35,200][1]	[100%]	Committed scheme – complete in 2011 Illustrative numbers – excluded from totals
Committed lengthening project	286	105,924	79%	Committed scheme – implemented from 2012
December 2013 additional services	306	113,769	92%	Additional hourly off-peak train each way
First class reconfiguration	306	134,379	127%	One car converted from first to standard
12 car sets (except Liverpool)	306	166,908	181%	Major physical constraints at Liverpool
Infrastructure Investment				
Additional services	336	186,648	215%	34 additional daily trains following investment to relieve pinchpoints

Evergreen 3

1.11 The current upgrade of the Chiltern Line Marylebone – Birmingham route ("Evergreen 3"), due for completion in September this year, will reduce fastest journey times on the route to 90 minutes, only marginally longer than the present times for the Euston route (84 minutes). In addition, the Chiltern route directly serves affluent areas to the South West of Birmingham (Solihull, Warwick, Leamington Spa) with high levels of rail use,

1.1 [1] Illustrative Evergreen 3 figures assume Chiltern trains currently 4 car class 168 units (275 seats), lengthened to 8 car class 168 (550 seats) so will provide a very attractive alternative to the use of current railheads at Birmingham International and Coventry.

1.12 The business case for the Evergreen 3 project is predicated on Chiltern gaining a significant share of the current West Midlands – Euston market, which will directly relieve any future crowding pressures on the Euston route. However, DfT's evaluation of HS2 takes no account of Evergreen 3.

1.13 At present, Chiltern generally operate short (3 or 4 car) trains, and capacity could be readily increased by operating longer trains without any additional infrastructure expenditure.

1.14 A combination of extra seats on the West Coast Main Line and Chiltern routes is fully able to meet high growth scenarios for the London – West Midlands corridor. Taken together, these initiatives deliver 1450 additional standard class seats in each direction every hour, giving a total of 2882 seats per hour, or 46,112 per day. This is more than ten times the total combined average daily demand from Birmingham New Street and Birmingham International of 4,268 each way in 2009/10[2]

Rolling Stock Configuration

1.15 First class load factors are much lower than standard class currently (c20% only, compared with c50% in standard class) and first class volumes have recently dropped, reflecting reductions in corporate and public sector expenses paid first class business travel as a result of the recession and public expenditure cuts. First class yields per passenger have also declined substantially, reflecting the shift to much cheaper, train specific advance purchase tickets.

1.16 If, conservatively, one out of the current four first class car in each unit is reconfigured as standard class, this would increase overall seating. For an 11 car unit, the new capacity would be 99 first/519 standard, compared with 145/444 at present. The reduction in crowding would be significantly greater, reflecting the much higher load factors in standard class; the units would have 75 additional standard class seats, giving an overall increase in standard class of 19%. It may be that detailed analysis would show that overall capacity would be optimised by reconfiguring two first class cars to standard class in each train. It is also possible that bidders for the new West Coast franchise will propose reconfiguration themselves.

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[2] Derived from flow data in the Network Rail draft WCML Rout utilisation Study (December 2010) page 38

1.17 This change could almost certainly be carried out without any reduction in revenue, as the limited number of trains on which a reduction of one first class vehicle might cause a shortage of first class capacity could be managed through yield management techniques.

Improved Demand Management

1.18 The majority of the existing overcrowding is on departures from Euston after 1900 on a Friday evening, as these trains are the first for which the regulated, non-train specific "saver" fares are available. Given the increases in open ticket prices since privatisation, the regulated "Saver" fares represent very good value, and are cheaper than advanced purchase prices in the evening peak period. But this is an artificial peak, directly caused by the fares structure, and could be reduced by changes to the structure for fares regulation.

1.19 In the medium term, the development of smarter IT will certainly enable better demand management, with flexible, fully reservable trains, enabling passengers to arrive at the last minute, and book a seat "on the run", using mobile devices, provided space is available. Given the pace of IT development, it is inconceivable that such systems will not be in place by 2026 when HS2 Phase 1 is due to open.

1.20 Effective demand management would enable load factors to rise on a sustainable way without increased overcrowding; both Eurostar and French TGV services already operate at load factors of about 70%. This would also significantly improve the poor financial performance of the rail industry, as set out in the National Audit Office's report "Increasing Rail Capacity"[3], which recommended:

"The Department should…[evaluate] further the costs and benefits of demand management as well as capacity enhancement approaches to tackling peak time overcrowding.."

Operation of Longer Trains

1.21 The current InterCity fleet comprises 52x9 car Pendolinos, each with 145 first class and 294 standard class seats, together with 21x5 car diesel "Voyager" units which are used on Euston – Chester/North Wales and Birmingham – Glasgow/Edinburgh services. The analysis of options for increasing train capacity only considers the Pendolino fleet, but it is equally

1.2 [3] Executive Summary:NAO rept (HC 33 2010-2011): Increasing passenger rail capacity [Exec summary] (pdf - 65KB - opens in new window) possible to lengthen or reconfigure the Voyager fleet to deliver equivalent proportional capacity increases.

1.22 The existing project to lengthen 31 of the Pendolino units to 11 cars and build 4 new 11 car units will increase total standard class capacity by 42%. Full use of the four new trains will be delivered through use of the extra path identified by DfT in the West Coast franchise consultation document[4].

1.23 DfT considered operation of 14 and 17 car trains in its review of alternatives, but both were rejected because of the major infrastructure work required, and there was no serious evaluation of full 11 or 12 car operation. However, the work carried out by Atkins for DfT did indicate that only modest infrastructure expenditure would be required to enable 12 car operation on all routes except Liverpool, where lengthening platforms would be prohibitively expensive.[5]

1.24 A further increase in train lengths to 12 cars is therefore deliverable cost effectively except on the Euston – Liverpool route. Conservatively, it would be necessary to retain 10x11 car sets to ensure that sufficient units were reliably available for the Liverpool services, which, as a self contained service, currently require 8 units each day.

Targeted Infrastructure Investment

1.25 **Short term**. There is already significant overcrowding on the fast commuter services to Milton Keynes and Northampton, and passenger volumes on this route are likely to grow rapidly in line with expected population growth. Urgent action is therefore required to enable the peak fast commuter frequency to be increased, as follows:

- Construction of a grade separated Junction at Ledburn, south of Leighton Buzzard, to enable commuter trains to transfer from the fast to the slow lines without conflicting with trains in the other direction. This work was identified in “Rail Package 2” (“RP2”), the best alternative evaluated by DfT, at an estimated cost of £243 million. The site of the junction is remote from housing and is unlikely to present insuperable difficulties in terms of obtaining Transport and Works Act consent.

1.3 [4] InterCity West Coast Consultation Document – January 2011 page 52 http://www.dft.gov.uk/consultations/closed/2011-01/

[5] “Rail Interventions Report of the High Speed 2 Strategic Alternatives” Appendix E http://webarchive.nationalarchives.gov.uk/+/http://www.dft.gov.uk/pgr/rail/pi/highspeedrail/alternativestudy/pdf/railintervention.pdf

- Procurement of new, high performance trains for operation of the fast commuter services to minimise the impact of capacity on the route south of Ledburn junction. DfT has already considered introducing new "IEP" trains for these services, and indeed has included equivalent units for the fast Kings Cross – Cambridge trains on the East Coast Main Line in its recently announced commitment to the IEP project. As would be the case on the West Coast Main Line, the new trains will run to the same timings as the long distance InterCity services on the route, hence maximising route capacity.

1.26 **Medium term.** As and when it becomes clear that the increased train capacity set out above will not meet realistic forecasts of demand, further work should be undertaken to mitigate pinchpoints north of Rugby:

1.27 **Construction of a fourth line between Attleborough and Brinklow.** This work would shorten the section of route north of Rugby which currently has only one northbound track which has to accommodate InterCity services together with up to three freight trains an hour. Completion of the current Felixstowe – Nuneaton route upgrade will potentially allow a significant reduction in the number of freight trains on the route south of Nuneaton, but this capacity may be taken up by new flows, for example from new port developments such as London Gateway.

1.28 Both the RP2 work and independent work for this evaluation validate that this section of the route will provide sufficient capacity to allow operation of an upgraded InterCity service. The estimated cost of this work is £187 million.

1.29 The **"Stafford bypass"**. There are significant capacity constraints south of Stafford and at Stafford itself:

- Colwich junction, where the route to Manchester via Stoke-on-Trent leaves the main line, is not grade separated.
- The main line from Colwich junction towards Stafford is only two track for c3 miles, with a flat junction where the four track section resumes.
- There is a flat junction with the Birmingham – Stafford route just south of Stafford.

1.30 Network Rail has been evaluating possible options for mitigating these constraints, including construction of a "Stafford bypass" which would also allow some reduction in journey times. Firm proposals have not yet been developed, but it is assumed in RP2 that these pinchpoints can be resolved at an estimated cost of £1.23 billion.

1.31 It should be noted that HS2's own analysis assumes that

"some infrastructure/ signalling works have taken place in the Stafford area to alleviate this known capacity constraint"[6],

so HS2 makes no allowance for the costs of this work. RP2 is therefore inconsistent with this, resulting in a significant bias towards HS2 in DfT's evaluation.

1.32 Other works proposed by DfT in its review of strategic alternatives[7] are not necessary, either because other schemes will provide the necessary capacity (for example the Manchester "Hub" scheme will free up capacity for additional InterCity trains at Manchester Piccadilly and its approaches, and is assumed to have been completed in DfT's evaluation of HS2 itself) or because the additional capacity is not required, as between Coventry and Birmingham.

1.33 The capital costs of the Optimised Alternative (£2.06 billion) are detailed in Table 1.2, which also gives a comparison with DfT's estimate of capital expenditure for RP2.

1.4 [6] Technical Appendices, Appendix 2, para 2.20 http://webarchive.nationalarchives.gov.uk/20110131042819/http://www.dft.gov.uk/pgr/rail/pi/highspeedrail/hs2ltd/technicalappendix/pdf/report.pdf

1.5 [7] HS2 Strategic Alternatives Study – Rail Interventions Report (March 2010) http://webarchive.nationalarchives.gov.uk/+/http://www.dft.gov.uk/pgr/rail/pi/highspeedrail/alternativestudy/pdf/railintervention.pdf

TABLE 1.2 CAPITAL EXPENDITURE: RP2 COMPARED WITH OPTIMISED ALTERNATIVE

Scheme	Scenario B (£bn)	Optimised Alternative (£bn)
Stafford area bypass	1.230	1.230
Ledburn grade separated junction	0.243	0.243
Euston station – 3 extra platforms	0.062	N/A
Manchester Piccadilly – 3 extra platforms	0.395	N/A
Attleborough to Brinklow – 4 tracking	0.187	0.187
Northampton Loop speed improvements	0.003	0.003
Beechwood/Stechford 4 tracking	0.903	N/A
Power supply + disruption + other items (+24%)	0.737	0.390
Total	**3.759**	**2.062**

1.34 Scenario B schemes are identical to those for RP2, and are shown in "Strategic Alternatives to the Proposed "Y" Network, page 41 (**http://highspeedrail.dft.gov.uk/sites/highspeedrail.dft.gov.uk/files/hsr-strategic-alternative.pdf**)

Peak capacity

1.35 HS2's supporters have argued that alternatives which deliver increased capacity on the existing network are flawed, as they do deliver capacity when it is most needed, in peak periods. HS2 Ltd have also consistently used this argument at consultation roadshows, but have been unable to provide evidence to support this when challenged.

1.36 No detailed loading data is currently publicly available. HS2AA have queried this with DfT and HS2, but neither have been able to provide any up to date information on peak loadings. This is remarkable, given that the current franchisee, Virgin Trains, certainly has detailed train-by-train loading information, and peak period loadings are clearly a critical issue in determining whether there is a case for HS2.

1.37 The most recent publicly available data on Virgin West Coast loadings is very limited information from Network Rail's West Coast Main Line Route Utilisation Strategy (RUS).8 This shows two services daily with standing passengers on weekdays, rising to ten services on Fridays, out of a total of 287 trains daily. The RUS also confirms that standing is in fact concentrated on the first departures from Euston after 1900 in the evening; this is largely

[8] West Coast Main Line Route Utilisation Strategy July 2011 page 48
http://www.networkrail.co.uk/browse%20documents/rus%20documents/route%20utilisation%20strategies/west%20coast%20main%20line/westcoastmainlinerus.pdf

an artificial peak, as these are the first trains on which the regulated “off peak” return (the previous “Saver”) is available. “Open” ticket prices have progressively been increased at a faster rate than inflation, so the regulated off peak price is very attractive, and off-peak loadings have increased much faster than peak loadings. In addition, Virgin Trains’ pricing policy has maintained a very sharp disparity in fares before and after 1900. In contrast, East Coast fares are managed to “smooth” this peak much more effectively.

1.38 This artificial peak is also evidenced by the posters displayed by Virgin at Euston which specifically refer to the likely overcrowding on trains departing at 1900 and immediately afterwards. This peak can be managed by rationalising the pricing structure and reforming price regulation.

1.39 DfT/HS2 should not be using the peak capacity argument for InterCity services without evidence to support it, and evaluating alternative ways of dealing with the 1900 artificial peak – the latter is certainly not justification for building a £32 billion new railway.

1.40 However, as already discussed, there is an immediate and more serious overcrowding problem on peak trains between Northampton, Milton Keynes and Euston. Capacity constraints on the route only currently allow operation of a half hourly service from London in the evening peak. All the trains already overcrowded, with passengers standing for at least 30 minutes as far as the first stop at Leighton Buzzard, and in some cases for even longer. These services currently operate at a maximum speed of 100 mph, and transfer to the “slow” lines at Ledburn Junction, south of Leighton Buzzard, with frequent albeit minor delays to following InterCity trains as the movement to the slow lines often conflicts with southbound InterCity services.

1.41 DfT offer no prospect of relief for these already overcrowded services until HS2 is completed, in 2026 at the earliest. In contrast, the Optimised Alternative includes construction of a grade separated junction at Ledburn and the introduction of new, higher performance rolling stock, enabling peak capacity on these services to be doubled in c5 years time.

1.42 A detailed evaluation has been carried out of the capacity provided by 51m’s “Optimised Alternative” (“OA”) both against the May 2008 timetable, used by DfT/HS2 as the “base” for the evaluation of HS2, and RP2. For completeness, capacity has also been compared with the current (May 2011) timetable.

1.43 This comparison has been made against a two hour period in the evening peak from Euston, for the period 16.30 to 18.29. This equates to the recognised peak period for northbound InterCity travel if the artificial “1900” peak is ignored; as discussed above, this can be readily managed through a more rational pricing policy.

1.44 Comparative frequencies are set out below:

May 2008: 19 InterCity and 4 fast commuter trains (Total 23)

May 2011: 23 InterCity and 4 fast commuter trains (Total 27)

RP2: 26 InterCity and 8 fast commuter trains (Total 34)

OA: 24 InterCity and 8 fast commuter trains (Total 32)

1.45 The Optimised Alternative provides increased capacity in each train, with an average of 680 seats compared with 439 today, with (mostly) 12 car trains with 9 standard class cars, in contrast to 4 first, 5 standard today. Total standard class capacity in the peak period is increased by 138% compared with the 2008 base, well above DfT’s forecast background growth of 102%, and also higher than the 101% capacity increase for RP2. The detailed calculations are set out in Annex 2.

1.46 As with RP2, the Optimised Alternative proposes an increase in peak frequency over the current level. This is achieved by remodelling Ledburn Junction, as described above. However, unlike RP2. the illustrative Optimised Alternative pattern retains some spare track capacity, significantly contributing to reliability.

1.47 Despite assuming operation of one less trains an hour than in RP2, the Optimised Alternative provides ***more*** standard class seats than RP2. This is as a result of using the full capacity of the route in terms of train lengths (12 car trains except for Liverpool services, where there are major physical constraints at Liverpool Lime street station) and reconfiguring one first class vehicle to standard class – given the current formation (4 first class vehicles) and the existing low first class load factors this is a conservative assumption.

Illustrative service pattern

1.48 The illustrative Optimised Alternative pattern also provides an attractive all day stopping pattern, with improved journey times and intermediate journey opportunities, as shown below:

- Doubling fast commuter capacity to Milton Keynes and Northampton – these are the services for which there is an overcrowding crisis ***now***.
- Additional capacity to Manchester and the North West

- Hourly "fast" Manchester – non-stop to Wilmslow
- Glasgow trains accelerated by omission of north west stops, and alternate trains running fast from Preston to Carlisle
- New through services to Blackpool/Windermere (alternate hours)
- Major improvement for Nuneaton, Tamworth and Lichfield.
- Improved Rugby service (almost half hourly interval)
- Watford gains a Crewe/Manchester service, giving a step change in access to the North West

1.49 This illustrative timetable has been "proved" through external expert analysis, and is robust. A schematic showing this service pattern is shown in Figure 1.1.

Relationship with the McNulty study

1.50 The Optimised Alternative is also consistent with key conclusions from "Realising the Potential of GB Rail"[9], Sir Roy McNulty's recent report into value for money in the rail industry. One of the key conclusions was that an important factor is the lower level of train utilisation in this country, with on average fewer passengers using each train.[10] The report therefore recommends that there should be much better use of existing capacity:

"There should be a move away from 'predict and provide' to 'predict, manage and provide', with a much greater focus on making better use of existing system capacity"[11]

and that (Recommendation 6.3.7):

"There needs to be at least as much focus on train utilisation (the number of passenger km per train km) as there is on track utilisation (the number of train km per main track km)."

1.51 The approach we advocate through the development of our "Optimised Alternative" is entirely consistent with Sir Roy McNulty's recommendations, identifying low risk, low cost approaches which increase capacity on the existing network on an incremental basis as and when it is clear that additional capacity is needed.

[9] http://www.dft.gov.uk/pgr/rail/strategyfinance/valueformoney/realising-the-potential-of-gb-rail/pdf/realising-the-potential-of-gb-rail-summary.pdf
[10] Executive Summary, paragraph 4; also section 2.3.4, figure 2.12
[11] Executive Summary, paragraph 23

West Coast Main Line - Summary

1.52 ***InterCity Services***

- Overall, InterCity standard class capacity can be increased by 181% by rolling stock reconfiguration and train lengthening.
- A further incremental capacity uplift (giving a total increase of 211%) can be achieved by carrying out a number of specific infrastructure improvements at an estimated cost of £2.06 billion, to allow an increase in all day frequency to 11 trains per hour (12 in peak periods).

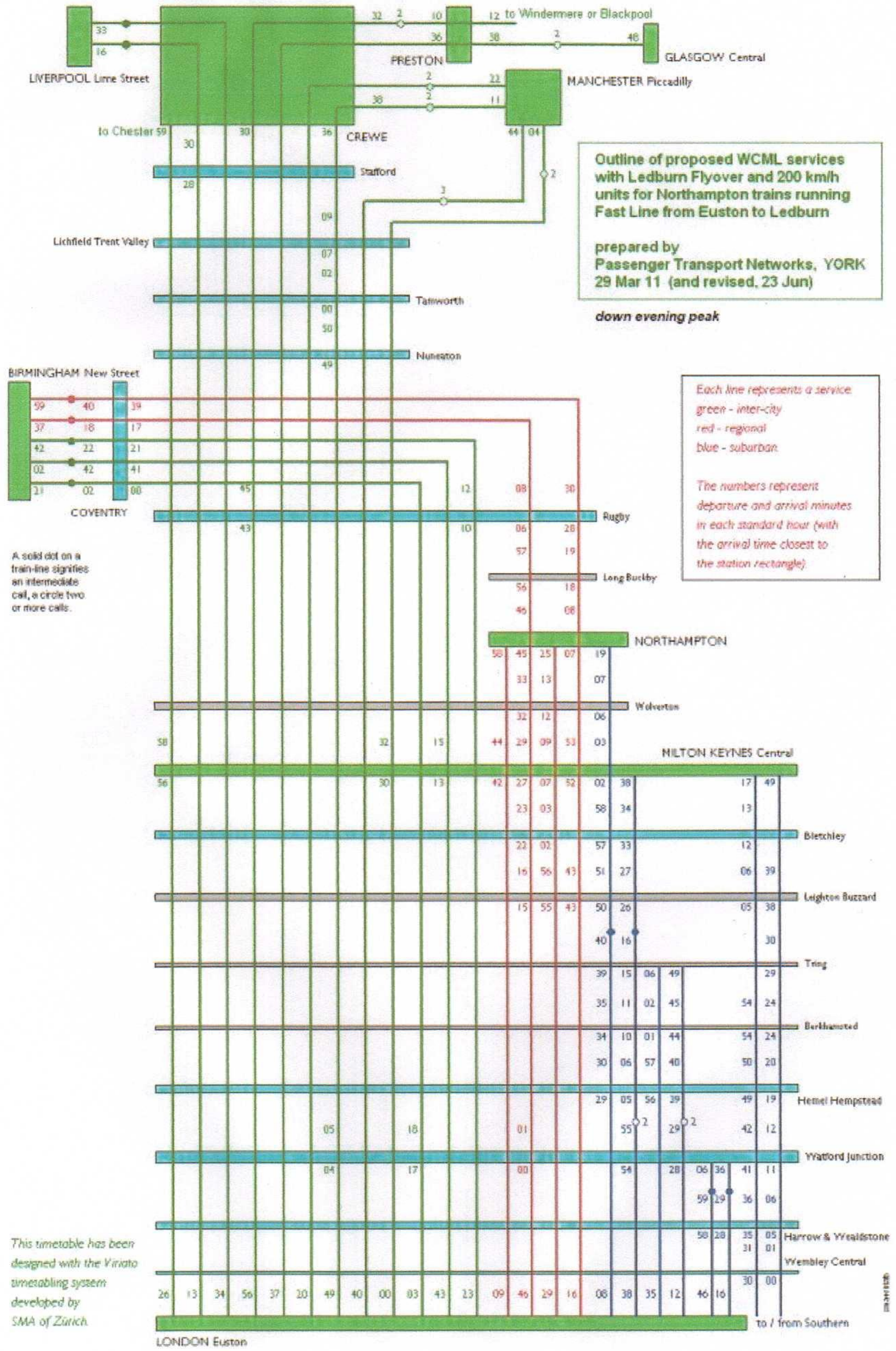
1.53 As discussed earlier, the key issue in relation to crowding is standard class capacity. However, we have also analysed the Optimised Alternative against HS2 and RP2 (see annex 2). This shows that the Optimised Alternative delivers a lower overall load factor than HS2 (52% compared with 58% for HS2), and provides broadly the same capacity as RP2 at little more than half the capital cost.

1.54 There is therefore no case for construction of HS2 to meet any need for increased capacity for the foreseeable future.

1.55 ***Fast commuter services*.** There is an immediate and more serious overcrowding problem on peak trains between Northampton, Milton Keynes and Euston. Capacity constraints on the route only currently allow operation of a half hourly service from London in the evening peak. All peak trains are already overcrowded, with passengers standing for at least 30 minutes.

1.56 Urgent action is needed to provide additional capacity on this route, and capacity could be doubled in five years by construction of the proposed grade separated junction at Ledburn at an estimated cost of £243million, and procurement of new, higher performance rolling stock. But construction of HS2 will delay this until 2026 at the earliest.

FIGURE 1.1 SERVICE SCHEMATIC FOR ILLUSTRATIVE SERVICE



1.57 **Freight.** Freight traffic uses the "slow" lines during the daytime, and would only be affected by increased InterCity services at pinchpoints which would be eased, as described above (1.24 – 1.32). In addition, the current upgrade of the Felixstowe – Nuneaton route will allow diversion of over half the existing freight trains south of Rugby, creating significant capacity for future growth.

1.58 Freight capacity issues are discussed in more detail in Appendix 7.

East Coast Main Line

1.59 Overall seating capacity can be increased by 87% by the committed frequency increase from May 2011, the introduction of planned higher capacity trains ("IEP"), the use of higher capacity trains on open access services, and a further timetable revision to allow an extra train per hour on the route, as envisaged in Network Rail's East Coast Main Line 2016 Capacity Review (December 2010).

1.60 In the longer term, further capacity increases can be delivered with infrastructure enhancements costed at £1.159 – 1.615 billion. With improved demand management, the 115% background growth forecast for 2043 in DfT's HS2 documentation can be readily absorbed without further major infrastructure enhancements. There is therefore no case for construction of HS2 to meet any need for increased capacity on the East Coast Main Line for the foreseeable future.

Midland Main Line

1.61 Almost half the trains arriving at St. Pancras during the morning peak period have standing passengers, but this is entirely due to relatively short distance commuting from Bedford, Luton and Luton Airport Parkway - the current average all day load factor south of Leicester is only 39%.

1.62 The Thameslink project, now under construction, will deliver a major increase in capacity south of Bedford, with train lengths extended from 8 to 12 cars. When this additional capacity is delivered, the Thameslink service will be a good alternative for passengers who currently use Midland Main Line trains. It is certainly not value for money to provide additional long distance capacity solely to provide short distance commuting capacity between Bedford and London.

1.63 DfT's future forecast demand growth of c100% can therefore be met without any significant further infrastructure investment. This can be delivered through a combination of lengthening InterCity trains and transfer of some short distance London commuter traffic to Thameslink services, once additional capacity is available as an output of the Thameslink project.

1.64 There is therefore no justification for the service levels or scope of infrastructure work proposed by DfT in the Alternatives Study[12].

Conclusion

1.65 The above analysis shows that there is no case for construction of HS2 on capacity grounds. Future foreseeable growth can be met by incremental cost effective measures, delivering earlier benefits when needed and avoiding the “all or nothing” approach which is inevitable with HS2.

1.6 [12] High Speed Rail Strategic Alternatives Study, February 2011 http://highspeedrail.dft.gov.uk/sites/highspeedrail.dft.gov.uk/files/hsr-strategic-alternative.pdf

Annex 1

Derivation of Optimised Alternative capacity

	Per unit First	Standard	Total	% of 2008 base Standard	Total	
Pendolino capacity						
Present						
9 car	145	294	439			
Lengthening project						
35x11 car	145	444	589			
21x9 car	145	294	439			
Total	8120	21714	29834			
Average per set	145	388	533			
First class reconfiguration						
35x11 car	99	519	618			
21x9 car	99	369	468			
Total	5544	25914	31458			
Average per set	99	463	562			
12 car sets (except Liverpool)						
10x11 car	99	519	618			
46x12 car	99	594	693			
Total	5544	32514	38058			
Average per set	99	581	680			
Voyager capacity	40	222	262			Note 1
Daily capacity						
2008 Base		59298	88544			Note 2
Current timetable (286 trains daily, 256 Pendolino, 30 Voyager)						
Pendolino 256 trains	37120	75264	112384			
Voyager 30 trains	1200	6660	7860			
Total	38320	81924	120244	138	136	
Committed lengthening project						
Pendolino 256 trains	37120	99264	136384			
Voyager 30 trains	1200	6660	7860			
Total	38320	105924	144244	179	163	
December 2013 additional services						
Pendolino 276 trains	40020	107019	147039			
Voyager 30 trains	1200	6660	7860			
Total	41220	113679	154899	192	175	
First class reconfiguration						
Pendolino 276 trains	27324	127719	155043			
Voyager 30 trains	1200	6660	7860			
Total	28524	134379	162903	227	184	
12 car sets (except Liverpool)						
Pendolino 276 trains	27324	160248	187572			
Voyager 30 trains	1200	6660	7860			
Total	28524	166908	195432	281	221	
Additional services following infrastructure upgrade						
Pendolino 310 trains	30690	179988	210678			
Voyager 30 trains	1200	6660	7860			
Total	31890	186648	218538	315	247	

Notes
1. First/standard split estimated - one car flexible. No lenghtening of Voyagers assumed, although this is quite feasible.
2. Total from HS2 Alternatives Study – Baseline Report page 21 (http://webarchive.nationalarchives.gov.uk/20110131042819/http://www.dft.gov.uk/pgr/rail/pi/highspeedrail/alternativestudy/pdf/baselinereport.pdf) Standard class figure derived from total using current Pendolino first/standard split.

Comparison of Optimised Alternative with HS2 and RP2

[HS2 figures refer to HS2 route only,excluding residual classic services]

	Actual	HS2	RP2	Optimised alternative	Notes	
2008 Base passenger numbers	50085				1	
2008 Base load factor	0.57				2	
2008 Base capacity	88544				3	
Current timetable	120244					Derived from above analysis
Optimised Alternative - incremental interventions						
Lengthening project				144244		
December 2013 timetable				154899		Optimised Alternative totals
First class reconfiguration				162903		derived from above analysis
12 car operation				195432		
Additional services				218538		
2043 position						
Forecast passenger numbers		136103	113041	113041	4,5	RP2 forecast used for optimised alternative
Total capacity		234660	221650	218538	6,7	
% increase on 2008 Base		165	150	147		
Load factor		0.58	0.51	0.52	8,9	
Capital expenditure		£16.75bn	£3.76bn	£2.06bn	(Infrastructure only)	Notes 10, 11

Notes

1. Strategic Alternatives to the Proposed Y Network, page 8, figure 2.1
http://highspeedrail.dft.gov.uk/sites/highspeedrail.dft.gov.uk/files/hsr-strategic-alternative.pdf
2. Strategic Alternatives to the Proposed Y Network, page 9, para 2.1.4.1
3. HS2 Alternatives Study – Baseline Report page 21
(http://webarchive.nationalarchives.gov.uk/20110131042819/http://www.dft.gov.uk/pgr/rail/pi/highspeedrail/alternativestudy/pdf/baselinereport.pdf)
4. HS2 numbers: Economic Case for HS2 page 20 http://highspeedrail.dft.gov.uk/sites/highspeedrail.dft.gov.uk/files/hs2-economic-case.pdf
5. RP2 number derived from capacity and forecast load factor
6. HS2 number derived form forecast passenger numbers and load factor
7. RP2 number: Strategic Alternatives to the Proposed Y Network, page 17, table 4.2: combined figure minus Chiltern base
8. HS2 from Economic Case for HS2 page 21
9. RP2 from Strategic Alternatives to the Proposed Y Network, page 17, table 4.2
10. HS2: Economic Case for HS2 page 37, table 7
11. RP2: Strategic Alternatives to the Proposed Y Network, page 41

Annex 2 - Peak Capacity

Fast Line Evening Peak capacity from Euston (1630 - 1829)

	Seats per train			Total seats			% increase on base		
	First	Standard	Total	First	Standard	Total	First	Standard	Total
All fast line trains									
HS2 Evaluation "Base" (May 2008 timetable)									
18x9 car Pendolinos	145	294	439	2610	5292	7902			
1x10 car Voyager	80	444	524	80	444	524			
4x12 car class 350*	72	672	744	288	2688	2976			
				2978	8424	11402			
May 2011 timetable									
21x9 car Pendolinos	145	294	439	3045	6174	9219			
2x10 car Voyager	80	444	524	160	888	1048			
4x12 car class 350*	72	672	744	288	2688	2976			
				3493	9750	13243	17.3%	15.7%	16.1%
"RP2"									
24x11 car Pendolinos	145	444	589	3480	10656	14136			
2x10 car Voyager	80	444	524	160	888	1048			
8x12 car class 350*	72	672	744	576	5376	5952			
				4216	16920	21136	41.6%	100.9%	85.4%
"Optimised Alternative"									
18x12 car Pendolinos	99	594	693	1782	10692	12474			
4x11 car Pendolinos	99	519	618	396	2076	2472			
2x10 car Voyager	80	444	524	160	888	1048			
8x12 car class 350*	72	672	744	576	5376	5952			
				2914	19032	21946	-2.1%	125.9%	92.5%

* Milton Keynes/Northampton fast commuter services

	Seats per train			Total seats			% increase on base		
	First	Standard	Total	First	Standard	Total	First	Standard	Total
"InterCity" trains only									
HS2 Evaluation "Base" (May 2008 timetable)									
18x9 car Pendolinos	145	294	439	2610	5292	7902			
1x10 car Voyager	80	444	524	80	444	524			
				2690	5736	8426			
May 2011 timetable									
21x9 car Pendolinos	145	294	439	3045	6174	9219			
2x10 car Voyager	80	444	524	160	888	1048			
				3205	7062	10267	19.1%	23.1%	21.8%
"RP2"									
24x11 car Pendolinos	145	444	589	3480	10656	14136			
2x10 car Voyager	80	444	524	160	888	1048			
				3640	11544	15184	35.3%	101.3%	80.2%
"Optimised Alternative"									
18x12 car Pendolinos	99	594	693	1782	10692	12474			
4x11 car Pendolinos	99	519	618	396	2076	2472			
2x10 car Voyager	80	444	524	160	888	1048			
				2338	13656	15994	-13.1%	138.1%	89.8%