The Midland Main Line and the influence of HS2

A short report for North West Leicestershire District Council

1. Introduction

Concerns have been raised recently about the relationship between the Midland Main Line (MML) and HS2, and whether the high-speed line is likely to have adverse effects on the existing network. At first sight, these concerns do not appear unreasonable in the context of recent Network Rail/Department for Transport decisions:

- There will be no electrification north of Kettering as this work has been halted in this and other locations. This raises a question about the viability of the Classic Connection with HS2 at Toton
- The new East Midlands contract will be 7+2, reducing the incentive for a new train operator to invest in new rolling stock;
- HSTs are scheduled to come out of service by 2019; possible replacements will not be able to attain the same speeds and this could adversely affect journey times.

These points together make depressing reading, and it is understandable why there is a feeling that the MML is being sacrificed in favour of HS2 to make it a more attractive prospect for this part of England.

The relationship between the MML and HS2 is an important one in the District, and currently it is finely balanced. The Council has been broadly supportive of the scheme because of the economic benefits that will follow on from the construction and operation of HS2, but there is a danger that this could change, particularly if continued opposition from residents and businesses alters the view of the elected members. However, the project is moving towards the deposition of the Hybrid Bill in 2019 and renewed opposition from the District will only divert valuable time and resources from the larger matters of obtaining the best possible value out of HS2. It is therefore vital that we use our energies profitably.

To assist with this and to help to rationalise some of the current thinking about the MML issues, this short report details how the two lines do (and don't) mesh together, and poses a number of questions to be raised with HS2 and the successful East Midlands franchisee.

2. Electrification

In the year 2000, the Great Western Line and the Midland Main Line were the last two major railway lines using diesel trains as the main source of locomotive power. The initial announcement to electrify the Great Western Line was made in 2009 and the claim was that the project would pay for itself over a 40-year period, but since then there have been two general elections. Following the 2010 election, the coalition government placed all major government capital expenditure on hold pending a return-on-investment review. The contract for the work was eventually awarded in 2012.

The Hendy Review examined Network Rail's CP5 period of works (2014-2019) and identified that the cost of the Great Western project had tripled. In November 2016, the government announced that electrification work on the branches from Oxford to Didcot Parkway, Bristol Parkway to Bristol Temple Meads, Thingley Junction to Bath Spa and Bristol Temple Meads, and lines in the Henley and Windsor

are had been indefinitely deferred (The Guardian, Wednesday 9th November 2016). In July 2017 it was announced that the Cardiff-Swansea electrification project had been cancelled and that bi-mode trains would be used on the route.

It is evident that the Department for Transport found the Great Western electrification project a sobering experience; costs spiralled and there were many overruns, leading to a major rethink on the feasibility of this and other large-scale electrification projects elsewhere.

In addition to this, there has been a policy shift towards the use of bi-mode (electric and diesel) trains. This is the brainchild of Chris Grayling and the use of these trains is going to be in the forefront of government thinking about rail at least as long as he is Transport Secretary. The thinking behind the use of bi-mode trains is that:

- There will be less disruption to passengers by changing rolling stock rather than the extensive infrastructure works that would result from electrification;
- There will still be a net gain from the use of bi-mode trains as they will only burn diesel for part of their journey and in any case, there is a planned shift away from diesel road vehicles;
- Bi-modes may be a transitional solution, as other technologies are being developed; these include the use of battery trains and hydrogen power;
- Infrastructure costs are reduced; therefore electrification can be reserved for lines where there are genuine* benefits to passengers.

*the assumption is that these would be calculated by BCR, although recently the government has started to state that these are "sensitive information", when previously they were not. The reasons for this are currently unclear. (Rail 832).

However, it is important to note that electrification has not been completely ruled out. Network Rail's Chief Executive, Mark Carne, stated on September 13th 2017 that, "I don't see a shift away from electrification, I see thought into where is the best to do it?". (Rail 836). In practice, this will mean that there will be more evaluation of the economic benefits of electrification against other methods of improving the rail service, a practice that Carne termed "economic rationality". He also announced that there will be three different methods for third party funding of projects, which are:

- Third party **delivery** of Government/Network Rail funded activity (NR will be able to decide to put the delivery of projects/activities out to market if it will offer better value for money);
- Third party **funded** projects (third party to take on responsibility for funding, design and build with NR advising on standards and ensuring compatibility);
- Third party **financed** schemes, using the considerable private sector appetite to invest in assets such as railways.

It is therefore also possible that a future electrification project on the Midland Main Line could fall into one of these categories.

3. The Classic Connection

Without electrification, the Classic Connection is not viable. However, this assertion needs to be taken in context with the following:

- The business case for it was apparently reasonably well-received by the Department for Transport, and it may be enough for some sort of passive provision of it to be included in the

Hybrid Bill (i.e. that there will be enough leeway in the infrastructure to enable it to be worked into the detailed design);

- The government has already stated that electrification will be considered when there is a "genuine benefit" to passengers, and it should be possible to produce a strong business case to link HS2 with the Midland Main Line;
- The section of the line between Clay Cross (approx.) and Meadowhall (approx.) will be electrified to accommodate HS2, therefore these costs are already accounted for, leaving more scope for cash to be available for electrification of the remaining sections which would link to HS2 at Toton.

Therefore, it seems best to consider the Classic Connection as in abeyance, rather than impossible, particularly when put in the context of recent government remarks about electrification being used when it is appropriate.

4. Rolling Stock and the New Franchise

Although it is already known that the length of the new contract will be 7+2 (and therefore not producing any useful overlap with HS2), the fact remains that the HSTs currently in use on the London-Sheffield route will have to be replaced by 1st January 2020, unless they are fitted with plug or side doors, controlled emission toilets, improved access and passenger information screens. The current owner of the HSTs has declined to state what the alternative fleet option would be, and it is unknown whether they will be the winner of the new franchise.

For the new operator, withdrawal of the HSTs means that some investment in rolling stock will be inevitable as there will simply not be enough trains to run the services once the HSTs are taken out of the equation.

The expectation is that the choice will be bi-mode trains as these are the government's "weapon of choice", although there are some issues which will need to be addressed by the new franchisee:

- How much investment to make, i.e. whether to replace only the HSTs, or to buy/lease additional units which will enable the still-serviceable Class 222 Meridians to be used elsewhere
- How to address issues with journey times, as the Class 800/802s are only capable of a top speed of 100mph on diesel traction. Chris Grayling has been asked for a meeting on this issue, but at the time of writing no reply has been received

The Class 802 has already been ordered by Transpennine and GWR (Photo: Rail Technology Magazine)

The preservation of the current 60-minute Leicester-London journey time has been presented as one of the major asks to the new franchisee, and remains an essential requirement going forward to the HS2 operational period.

The issue of the potential time loss from bi-modes cannot be answered with any precision as we do not yet know a precise specification for the trains. The uprated Class 802s that are being purchased for Great Western have a similar power/weight ratio to an HST. Two colleagues from SLC Rail have attempted to work out the possible effects upon train timings using two existing trains in the current working timetable as a comparison. Both have the same calling pattern and run non-stop between London and Leicester.

Station	**1F50 – Class 222 (1558 St Pancras to Sheffield)**	**1F70 - HST (19.55 St Pancras to Leeds)**	**Run Time difference**
St Pancras International	1558	1955	
Leicester arr.	1659½	2101	
Leicester dep.	1701½	21p03	HST -3½ mins

*p= advertised departure time is earlier

Moving further north, the HST continues to lose time and there is another 5-minute deficit on the journey times of both to Sheffield. This differential would worsen by about ½ minute per additional stop because of the poorer acceleration profile of the HST.

As bi-modes are limited to 100 mph, this could add a further 1 to 1½ minutes to the HST times between London and Leicester. However, there are two offsetting factors:

- Better acceleration under electric power between London and Kettering
- The impact of the works at Market Harborough (which we can't currently assess)

But – this analysis shows that there is a level of risk to journey times and this will need to be addressed with the DfT/new franchisee.

5. Opinion

The view of colleagues in the railway industry is that it is unlikely the government will do a u-turn on electrification any time soon. Chris Grayling is not known for changing his mind and bi-mode is the solution that he is championing for the reasons already stated above.

Bi-mode trains are therefore the current solution of choice, but there are a number of issues with their uptake on the MML:

- The sustainability argument is not as good as electrification; these trains will still use diesel power when they leave the electrified track. This may become a subject for lobbyists as it could be interpreted as the government stepping back from their commitment to reducing carbon footprint in the rail industry;
- There are shortcomings with the bi-mode trains most likely to be supplied (Class 800/802) as their maximum speed is 100mph;

- The Class 222 (Meridian) units are relatively young in rolling stock terms and will remain in service after HSTs are withdrawn. These are diesel powered and do have a maximum speed of 125 mph, but the same issues with carbon footprint apply.

Is there really a case for bi-mode trains using electric traction for less than half the journey between London and Sheffield? If there is, then is the Class 800/802, with all its known shortcomings, necessarily the best option? It may not be more logical to treat the Midland Main Line fleet renewal as a separate issue under the franchise renewal process rather than linking it to the electrification project.

Another point for consideration is the **nature** of the Midland Main Line without full electrification. The decision to terminate the wires at Corby has radically changed the scheme from a true main-line electrification scheme to an extension of the London Surburban network. Looking at bi-mode trains from this perspective makes the idea look slightly lacking, to say the least, as these trains will only use electric power for some 45% of their journeys from London to Sheffield.

But governments, ministers and policies are not permanent, and it is possible that this thinking could change before the arrival of HS2 in 2033. However, if electrification is revisited, the route with the most political capital would be re-extension to Bristol rather than Kettering – Sheffield (or even Kettering – Leicester).

To temper the above, Network Rail have stated that electrification is not completely off the table, but will depend more on the appropriateness of the scheme and whether there are better alternatives. A good argument could be constructed in favour of electrification from Corby northwards to enable the Midland Main Line to link with HS2, particularly in the context of a plan to "wire" Clay Cross to Mexborough.

On another positive note, the political landscape could be very different by the mid-2020s when HS2 is under construction. By that point, infill electrification from Kettering to Clay Cross, or wherever HS2 will join the Midland Main Line to get to Sheffield, might just make more economic sense. This may also come into play with the Classic Connection (see above).

It is unlikely that there is any plan to deliberately run down the MML to bolster the case for HS2, for the following reasons:

- Timescales – Network Rail are dealing with the more immediate future, and it would make no sense whatever to run down a line in anticipation of HS2 beginning operations in 2033 (or, as some of the naysayers would have it, not at all)
- Money - There is no financial overlap between NR and HS2; they are completely separate entities. It is far more likely that money from electrification has been hived off into other current NR projects, such as Crossrail 2.

What is more likely to happen to the MML is that its **character** will change, along with the other classic main lines that will overlap with the HS2 route. The MML and West Coast Main Lines could become more suburban in nature as the London commuter belt continues to move northwards, and train paths are freed up to serve the expanding market. In the longer term and as commuter demand grows, cities such as Leicester and Coventry may see rolling stock change to that of an outer-suburban line with catering trollies rather than restaurant cars. However, any reduction in perceived on-train quality would be offset by a reduction in journey times, and an increase in frequency.

6. Summary

- Although both HS2 and the MML are ultimately government entities, they are independent of each other financially;
- Both HS2 and the MML are run according to very different timescales, meaning that it is very unlikely that current decisions about the MML are made in the light of HS2;
- Electrification is off the table for the MML right now, but the government has left the door open for it to be revisited with appropriate economic/passenger benefits and funding. Future decisions about the viability of connecting HS2 and the classic network could feed into such a business case;
- The classic connection is not viable without electrification, but this could be part of the larger timescales allocated to the development of the HS2 project;
- There are other possible rolling stock solutions outside large-scale electrification, including bi-mode, battery trains and hydrogen power. Bi-mode may not be the permanent, or only solution, and could in fact be a medium-term interim measure until more sustainable technologies are developed;
- The new franchisee will have to invest in some new rolling stock because of the short shelf-life of the HSTs. The amount and type of this is unknown at the moment;
- It is essential to maintain good lines of communication with both HS2 Ltd, the DfT and the new franchisee to ensure the best outcomes for the District.

7. Questions for the DfT and HS2 Ltd

DfT:

1. Is there really a case for the use of bi-mode trains on the MML when they will use electric traction for only 45% of their journeys between London and Sheffield?
2. If there is, are the Class 800/802 necessarily the best option?
3. Is there another viable rolling stock solution which will have less adverse effects upon journey times?
4. How can the obvious sustainability issues with bi-mode trains be compensated for? The forward policy of phasing out petrol and diesel cars by 2040 may not be enough of a payoff for environmentalists
5. If the new franchisee makes only a modest investment in new rolling stock, how will this be addressed in the preparations for the next franchise period to ensure that the MML's rolling stock does not become run-down?
6. Are the economic effects of increased journey times to and from London fully understood?

HS2:

1. How much interface is there with MML at the moment, and planned for the future as HS2 goes into the construction phase?
2. When would be an appropriate time to revisit discussions about the Classic Connection and electrification works on the MML to enable this?
3. Is there another projected solution to the Classic Connection to enable a meaningful interface between the two rail networks that will bring economic benefits to the East Midlands and Thames Valley areas?

8. References

Electrification cost overruns: The Guardian, November 9th 2016
https://www.theguardian.com/business/2016/nov/08/great-western-electrification-branch-lines-oxford-bristol

A week of extremes (Richard Clinnick): Rail 832, August 2nd 2017, and Network Rail Funding Special from the same issue.

Carne doesn't rule out electrification in the future (Richard Clinnick): Rail 836, September 27th 2017, and Stock shortfall fears if HSTs miss disability deadline from the same issue.