



Continuous Modular Strategic Planning

How can forecast growth and partners' aspirations be accommodated in the Trent Junctions Area?

Strategic Question

April 2019

A. Foreword

As part of the railway industry's Continuous Modular Strategic Planning (CMSP) approach adopted for the Long Term Planning Process (LTPP) we are pleased to present the response to the Trent Junctions area Strategic Question.

By 2043, there will have been significant investment in the railway in the East Midlands, firstly through the Midlands Rail Hub scheme which will deliver new services between the key cities of the East Midlands, and the High Speed 2 East Midlands Hub station between Derby and Nottingham. As these new services are introduced, they need to be integrated into the wider rail network, providing a punctual, reliable and valuable service to passengers.

One of the major challenges to the introduction of new services around the East Midlands is the Trent Junctions area. Partners from across the rail industry and government identified this as a priority for a CMSP Strategic Question because of the large number of capacity and feasibility studies which have looked at this area. Each of these studies has worked with varied train service and infrastructure assumptions. This study takes an holistic view of these studies, combining them to identify specific locations which will be capacity constraints in the future.

Since the Midland Railway Company built Trent Junctions in the mid-nineteenth century, the layout of this area has evolved to deliver different services as the different flows across the junctions have changed. It is our hope that this report and its recommendations will be used as a guide to deliver the new services and changes of the next 15 years, enabling this vital piece of infrastructure to support the traffic flows of the twenty-first century onwards.

B. Executive Summary

The Trent Junctions Strategic Question was agreed by its Working Group members to be a study of existing analysis for the Trent Junctions area. The purpose of this report is to assess what those studies have found, which questions remain to be answered, and to set out what the issues around Trent Junctions are and will be. This Strategic Question answers where the key capacity constraints are in different circumstances, and sets out what steps should be taken to understand what capacity challenges need to be solved in the future. This document sets out strategic outcomes (what a good development of Trent Junctions should consider) and several next steps for the industry to consider.

B.01 Strategic Outcomes

From a strategic perspective, the following outcomes should be considered as key to any future analysis of Trent Junctions:

1. Supporting a better service for the East Midlands, both in terms of serving the East Midlands Hub from Derby, Nottingham, and Leicester, but also improving direct rail connectivity between key cities and towns (for example Leicester and Nottingham).
2. Timescales. Different schemes will have separate delivery dates meaning that elements of a whole solution will need to be phased, such as East Midlands Hub in 2033.
3. Affordability. Any infrastructure proposals for Trent Junctions should be cost-effective and small scale. Most train services in this area require subsidy, and additional services will need a strong business case to justify the use of scarce capacity. Therefore, if larger infrastructure alterations are required, the impact of reducing the Train Service Specification to reduce the need for them should be considered.
4. Options should consider the impact of level crossing barrier down time, and actively follow the opportunity to limit or reduce barrier down time on level crossings as a priority.

B.02 Next Steps

The review of existing analysis found that the various service specifications used for different pieces of work had heavily influenced the results of the analysis. This information is valuable as it shows that the Train Service Specification will drive an infrastructure solution and therefore a specific timetable. This leads onto the first recommendation:

1. That the industry, led by Network Rail, develops an integrated Train Service Specification for the Trent Junctions area with at most two options to be explored. This should capture all the base case outputs of Midlands Connect, High Speed 2, and freight, noting that by the time this piece of work is complete, there should be a better understanding of to where the High Output Operations Base will be moved.

- a. Noting outcome 1 above – that connectivity between the East Midlands Hub and Midlands towns and cities is vital, but so is local connectivity and journey times.

Because of the links between the Train Service Specification, infrastructure, and timetable, the second recommendation is that:

2. Once an integrated Train Service Specification has been developed as per recommendation 1, a full timetable study to assess the requirements of that TSS should be commissioned, along with appropriate development resource to develop solutions where they are required.
 - a. Before a timetable study is developed, the Timetable Planning Rules for Trent Junctions should be re-assessed. Signalling throughout the area was commissioned in 2009; there may be opportunities for limited alterations to the signalling to enable higher capacity (e.g. 3 minute headways between Nottingham and Trent East Junction).

Because of the location of Trent Junctions, which is constrained by the river Trent to the south and housing to the north, it is likely that larger interventions will be challenging to deliver. There needs to be a feedback loop to allow editing of the TSS to enable the correct balance between passenger needs and required interventions, along with a business case leading towards a Strategic Outline Business Case.

[Section G.01](#) sets out specific questions which we recommend are answered as part of a timetable study.

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C. Introduction

The Trent Junctions Strategic Question was agreed by its Working Group members to be a study of existing analysis for the Trent Junctions area. The purpose of this report is to assess what those studies have found, which questions remain to be answered, and to set out what the issues around Trent Junctions are and will be.

The agreed scope is quoted below:

The purpose of the Trent Junction strategic question is not to develop solutions for capacity constraints in the Trent Junctions area. The purpose of this study is to understand the wide variety of analysis which has already been produced and to provide an assessment of this to potential funders and the wider industry.

The report will incorporate an understanding of the issues around capacity and connectivity across Trent Junctions, specifically:

- *Strategic overview of the future uses of the junction,*
- *A timeline of events through to 2033 and beyond,*
- *It will highlight those elements which are common to all studies as well as incorporating analysis of what would need to be considered next.*

This Strategic Question answers where the key capacity constraints found in previous studies are in different circumstances, and sets out what steps should be taken to understand what capacity challenges need to be solved in the future. This document sets out strategic outcomes (what a good development of Trent Junctions should consider) and several next steps for the industry to consider.

D. Trent Junctions

The Trent Junctions area is a complex piece of railway infrastructure which supports the majority of east-west and north-south flows in the East Midlands. It consists of several different junctions linking various parts of the Midlands. This is shown in [Figure 1](#) below.

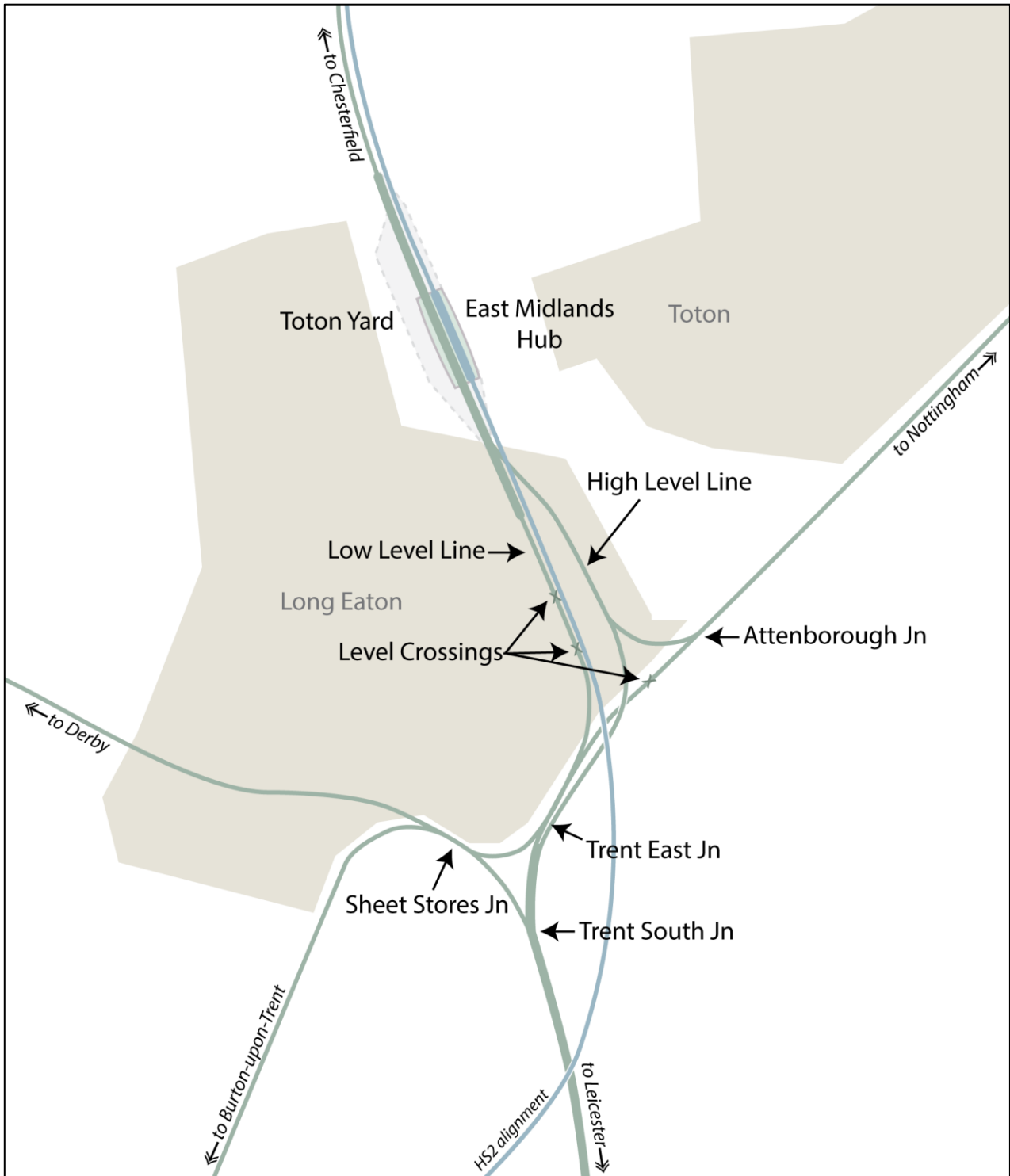


Figure 1: Map of the Trent Junctions area showing the future HS2 East Midlands Hub

Most passenger trains to and from Nottingham use Trent Junctions to access routes to Derby, the West Midlands, Leicester, London and Sheffield, and beyond. As well as passenger flows across the junction, freight constitutes a major part of the local railway geography. Network Rail's High Output Operations Base (HOOB) and Local Distribution Centre (LDC) is based at Toton Yard. This provides maintenance and renewals services for a significant part of the Midlands and east England. This in turn requires a large (but irregular) number of freight moves as machinery and material is moved to the relevant worksite. There is also a freight yard currently operated by DB Cargo, which produces additional freight traffic.

There are limited options for any flows, passenger or freight, to be re-routed and release capacity across the junctions. There are few other routes available, and where they do exist they are already capacity constrained. As such the area is a key piece of rail infrastructure, and one which is vital for supporting the future growth of rail, not just in the Midlands, but more widely.

There are two key stakeholders who are specifying new services which would use Trent Junctions, alongside other parties with an interest in improving connectivity around the Midlands.

- High Speed 2 (HS2) plans to construct an East Midlands Hub^a station in Toton, just north of Trent Junctions. The requirements for connectivity to enable access between Midlands towns and the HS2 Hub will add further traffic and change the flows across the junction.
- Midlands Connect's proposed Midlands Rail Hub^b scheme includes aspirations to improve journey times and connectivity across the Midlands, enabling a large increase in capacity and journeys across the Midlands.

These stakeholder aspirations are shown in [Figure 2](#).

^a <https://www.hs2.org.uk/stations/east-midlands-hub/>

^b <https://www.midlandsconnect.uk/key-projects/midlands-rail-hub/>

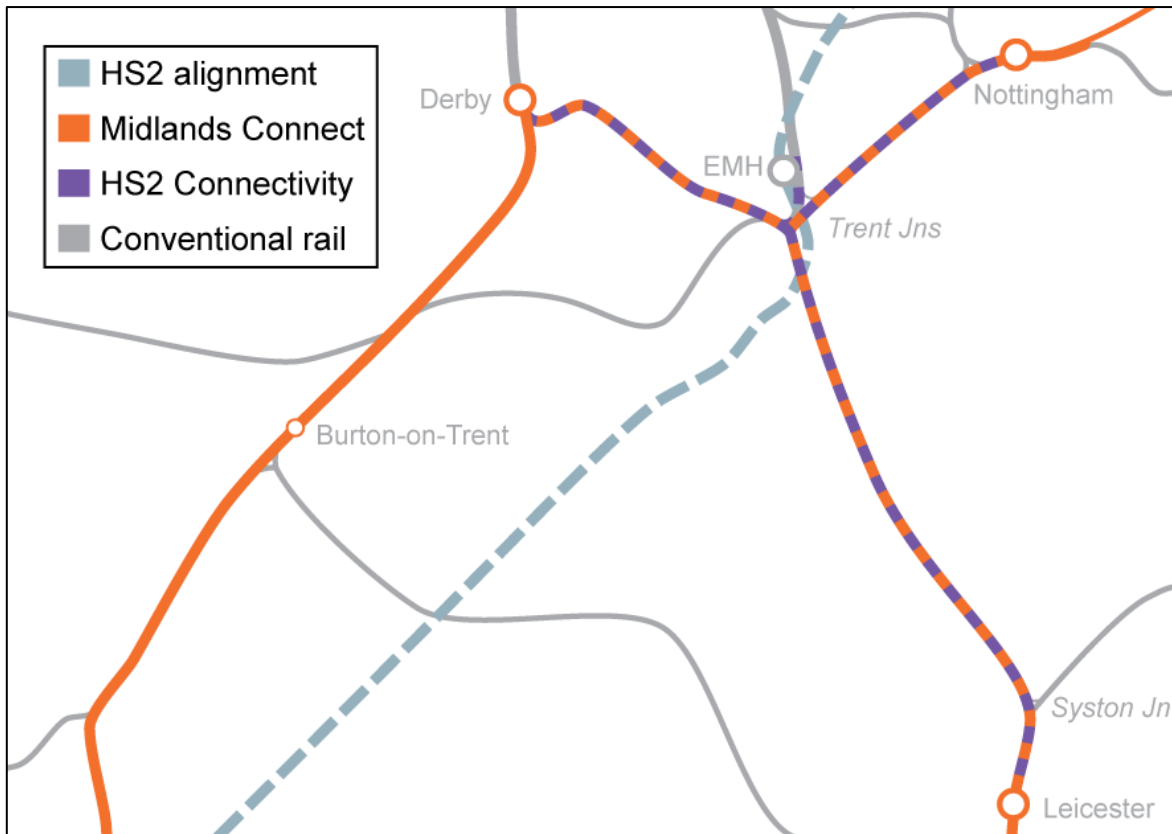


Figure 2: Stakeholder aspirations around the Trent Junctions area

D.01 Current train services

D.01.01 Freight

An assessment of freight services on an average Wednesday found that there were c.40 freight trains per day which were booked (and ran) across Trent East Junction. These were predominantly between 07:00 and 10:00 and 20:00 and 00:00 (midnight).

Because of the uncertainty around the location of the HOOB/LDC and DB Cargo depot at Toton when HS2 is being constructed, it is difficult to assess the impact of freight into the future. However, the Midland Main Line is likely to remain a key route for heavy freight into the future. There are also potential new flows, (e.g. HS2 construction traffic and the East Midlands Gateway rail freight terminal^c) that need to be considered as part of any future analysis.

D.01.02 Passenger

The Trent Junctions are currently at the centre of a complex flow of traffic travelling in different directions. The following diagram contextualises the flows across the junction in

^c <https://www.slp-emg.com/c/masterplan.php>

the current timetable. This does not show freight flows such as for the High Output Ballast depot at Toton.

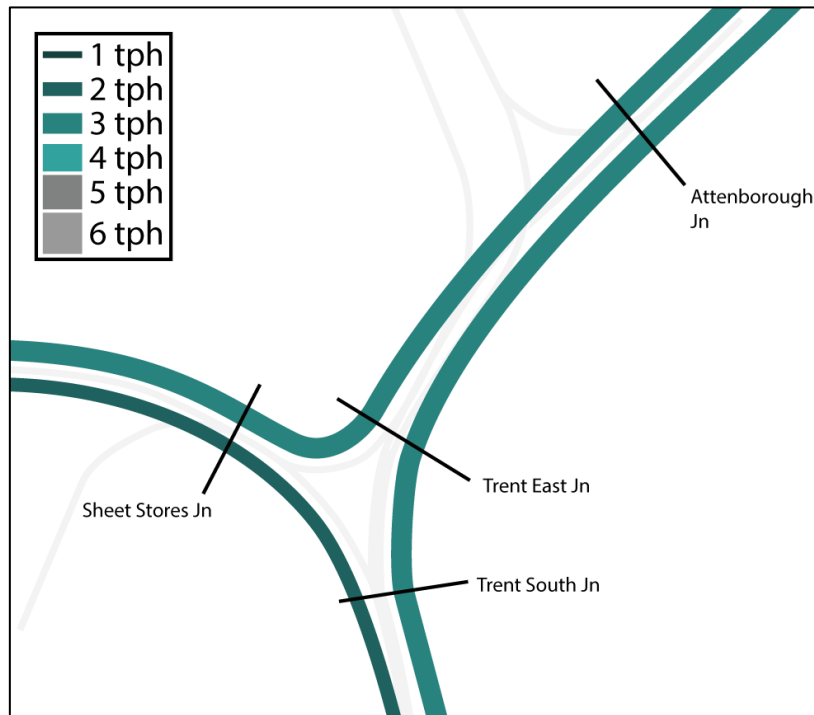


Figure 3: Current passenger service numbers across Trent Junctions.

Note: For simplicity, the numbers in these train service diagrams reference one direction only. Therefore, the total number of passenger train movements is **double the stated number**. (e.g. the total number of moves across Sheet Stores Junction is ten; five (2 Derby-London + 3 Derby-Nottingham) in each direction.)

Freight is not included in these diagrams because they do not fit into a standard hour, as described in [D.01.01](#).

D.02 Current infrastructure

D.02.01 Signalling

The signalling covering the Trent area was commissioned in 2009. Generally, the lifespan for signalling is about 30 years meaning that there is no requirement to do any significant further work to it for another 20 years. LNE & EM Route has a Digital Railway roll-out strategy covering the entire route. The existing signalling assets will be due for renewal in the late 2030s, and it is likely that this renewal would include Digital Railway elements.

There will remain a requirement to do minor renewals works to maintain reliability of signalling infrastructure, as would be expected with any asset, but no large-scale resignalling is planned within the timeframe considered by this Strategic Question.

However, it is worth considering that signalling assets will be ageing by the 2030s and reliability is therefore likely to drop at the same time as an increased number of services will put additional capacity pressure on the infrastructure.

D.02.02 Track / Switches & Crossings

Track and crossovers will continue to come up for renewal over an extended timeframe, as the current infrastructure has been there for varying lengths of time.

The current CP6 renewals plan includes renewals at Loughborough North Junction and Trent South Junction and any scheme to improve these junctions as proposed in this study should consider aligning the opportunity to deliver enhancements at the same time as these renewals.

D.02.03 Level Crossings

There are three level crossings within the area of this study. These are shown on Figure 1; there are two level crossings on the Low Level corridor, and one crossing on the Main Line towards Nottingham between Trent East Junction and Attenborough Junction. Any increase in services, particularly in the higher traffic scenarios outlined in Section [E.01](#), will increase barrier down time on the crossings and also increase the risk attached to those crossings remaining in use; the cost of providing alternatives to these level crossings needs to be considered in any development.

D.02.04 Line Speeds

Trent Junctions is designed to prioritise traffic between Derby and London and Nottingham and London, with line speeds remaining at 70-80mph through the junction on those routes. For services from the south to Toton and from east to west, the line speeds limit capacity and journey times, with 30mph crossovers across most points. Sheet Stores Junction has the lowest speed crossover at 10mph. The High Level Line to Toton has a relatively low line speed of 40mph. This is shown in [Figure 4](#) overleaf.

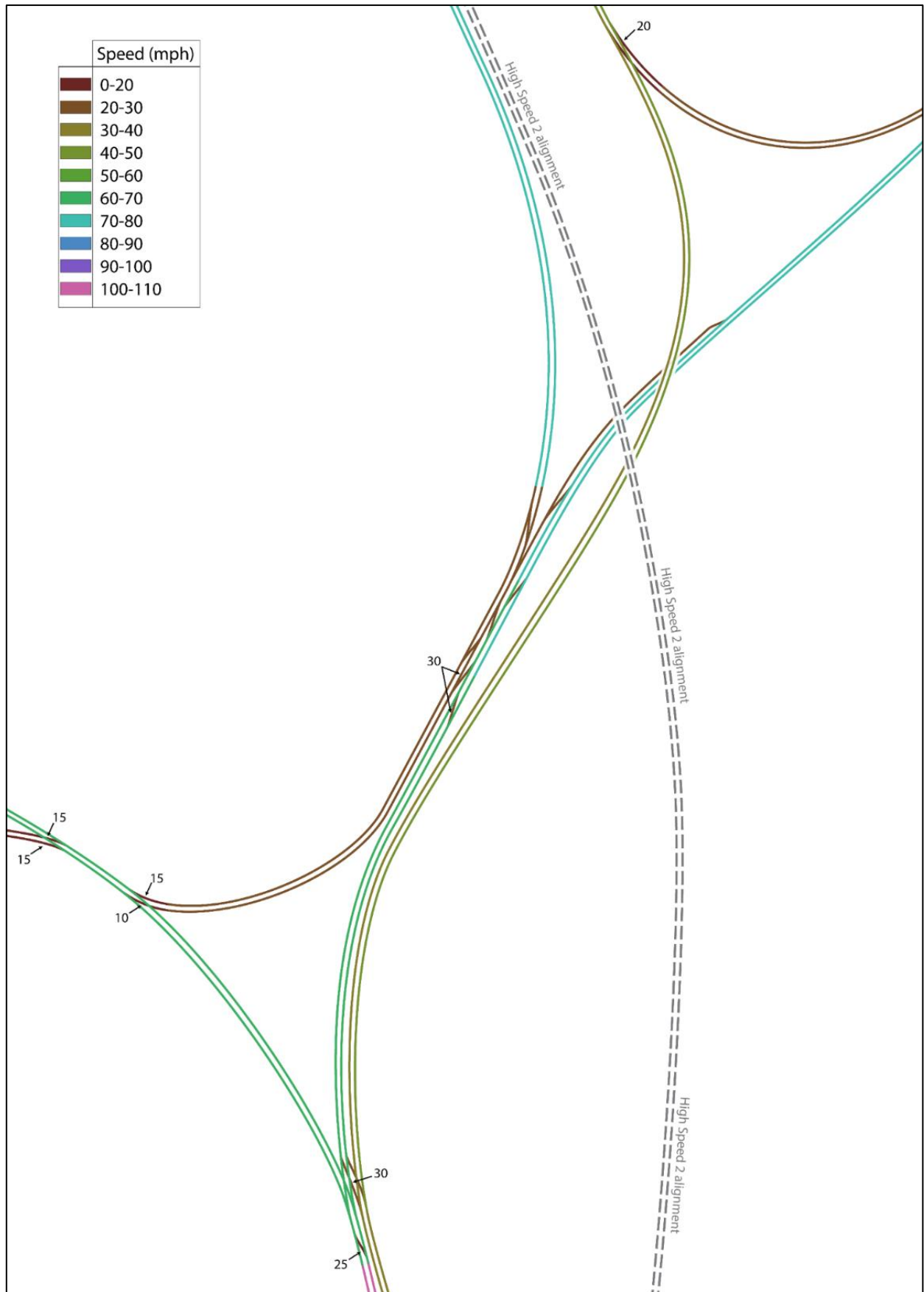


Figure 4: Line speeds across the different Trent Junctions

E. Findings

Currently the Junctions area serves east-west and north-south passenger and freight flows. However, no passenger services use the Junction to travel directly north. Trains to Sheffield must travel west towards Derby before travelling further north. Once East Midlands Hub has been constructed, the junction will gain a new flow, with services from the east, west, and south all serving a new destination to the north of the junction.

This is an opportunity to develop a junction layout which is fit for the future and which can carry the amount of traffic across the different flows which is projected for it into the post-HS2 future.

E.01 Train Service Aspirations

E.01.01 East Midlands Route Study

Network Rail published the East Midlands Route Study (EMRS) in 2015. This document outlines the industry’s expectations for future growth and models the services that could be delivered as part of this growth. The Indicative Train Service Specification (ITSS) used by the Route Study for Trent Junctions is shown in [Figure 5](#).

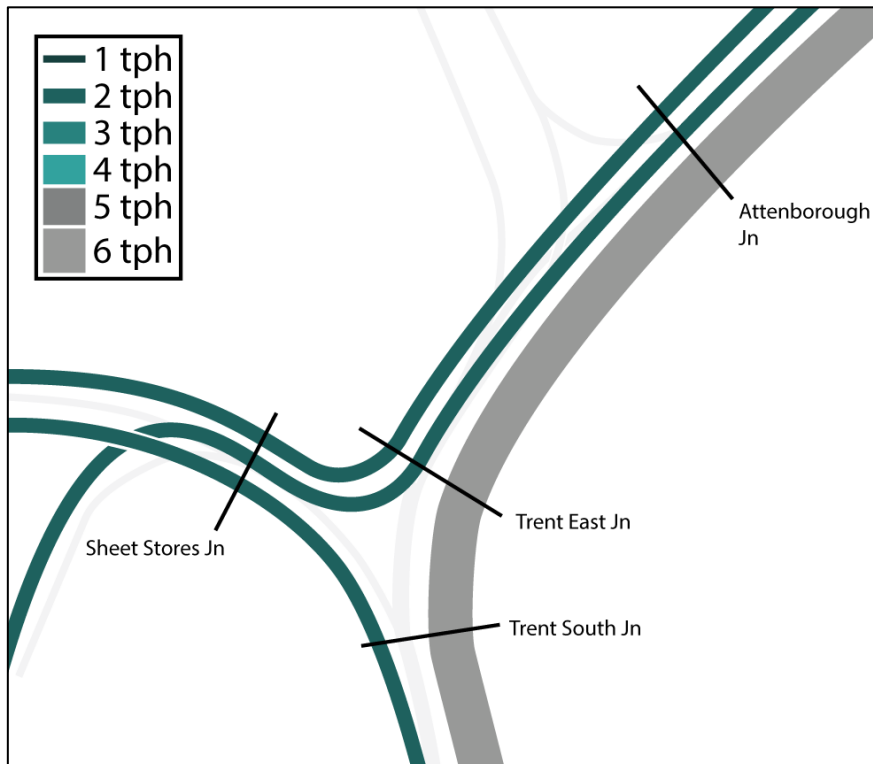


Figure 5: East Midlands Route Study ITSS extract for Trent Junctions

The amount of growth modelled in the Route Study required the delivery of significant infrastructure to enable all services to run, which would represent a major investment for the area.

The East Midlands Route Study found that the increased traffic across the Trent Junctions area would require a grade-separation of Sheet Stores Junction to allow traffic to cross conflict-free. Because of constructability issues at Trent Junctions it is unlikely that the existing site can be effectively grade-separated, so the EMRS suggested moving the location of Sheet Stores to the south of the River Trent, with a grade separation on to the Midland Main Line, as shown in [Figure 6](#).

When the Route Study was published, there was less information about the location of the HS2 Hub station and the Midlands Connect strategy had not been developed. The ITSS used for the Route Study does not reflect these aspirations; it is worth considering whether this remains the strategic intervention most suited to delivering additional flows across Trent Junctions.

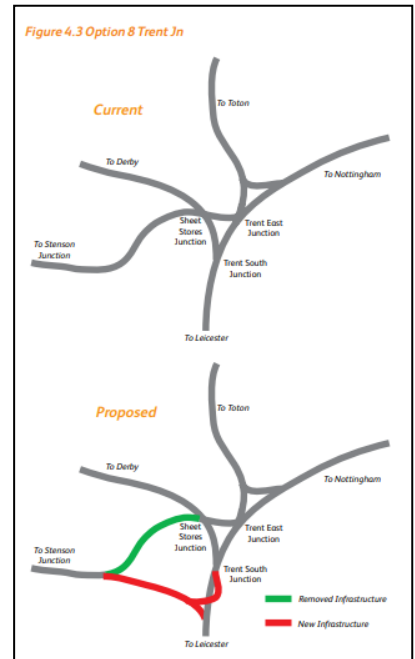


Figure 6: option for moving Sheet Stores Junction taken from the EMRS

E.01.02 Midlands Connect Aspirations

Midlands Connect represents the Midlands region from a transport perspective.

The Midlands Connect Strategy, published in March 2017, outlines the following aspirations to deliver additional rail services around the Midlands:

- **Midlands Rail Hub.** The Midlands Rail Hub is a scheme designed to deliver additional trains from around the Midlands into central Birmingham. This would provide an increased service frequency to Nottingham and Derby, across Trent Junctions. This scheme is currently under active development, with a Strategic Outline Business Case expected to be delivered in 2019.

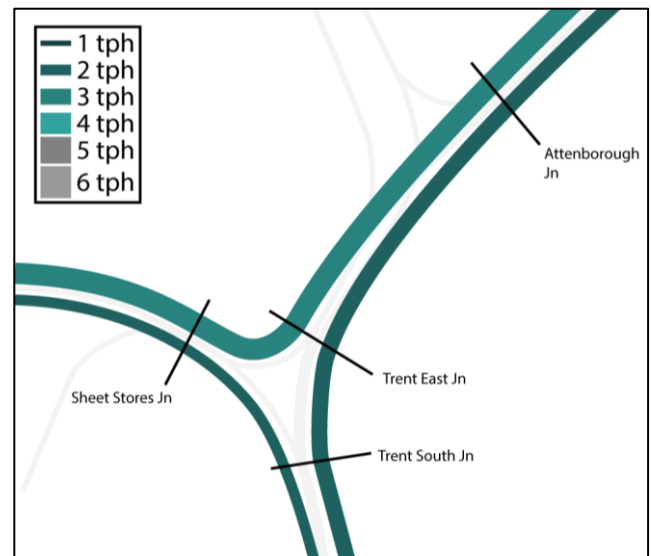


Figure 7: Midlands Connect services in addition to existing.

- **Birmingham-Nottingham corridor.** Beyond the connectivity delivered by the Midlands Rail Hub, Midlands Connect has additional aspirations to provide more services between Birmingham and Nottingham.

[Figure 7](#) demonstrates the uplift in passenger trains that Midlands Connect would provide across the Trent Junctions area into the 2030s.

E.01.03 High Speed 2

High Speed 2 plans to deliver a Hub station between Nottingham and Derby, on an existing railway site at Toton. This site is currently the location of the HOOB and LDC for Network Rail, which will be moved as part of the development of the Hub station and surrounding redevelopment area, which could change the freight flows around the Hub station.

The HS2 Phase 2B base case includes services providing connectivity between the Hub and Nottingham, Derby, and Leicester. These can be delivered through two mechanisms: diversion of existing services, or through new shuttle services. These two scenarios and their implications are considered separately as they may require different options to be considered to accommodate them.

Scenario 1: HS2 Diversion of existing services

In this scenario, existing services which currently travel between Leicester and Nottingham and Derby and Nottingham would be diverted to the Hub station north of Trent Junctions. The flows are shown in [Figure 8](#).

This would increase the amount of traffic using both Toton Low Level and High Level Lines and Attenborough Junction. Trains between Nottingham and Derby would turn across the Main Line at Attenborough Junction, run to the Hub on the High Level Line, then turn back and use the Low Level Line and Sheet Stores Junction towards Derby. This would move the existing crossing move from Trent East Junction to Attenborough Junction. Trains from Leicester to Nottingham are assumed to use the High Level Line instead of staying on the Main Lines. This would introduce a conflicting move at Attenborough Junction as they return from the Hub towards Nottingham.

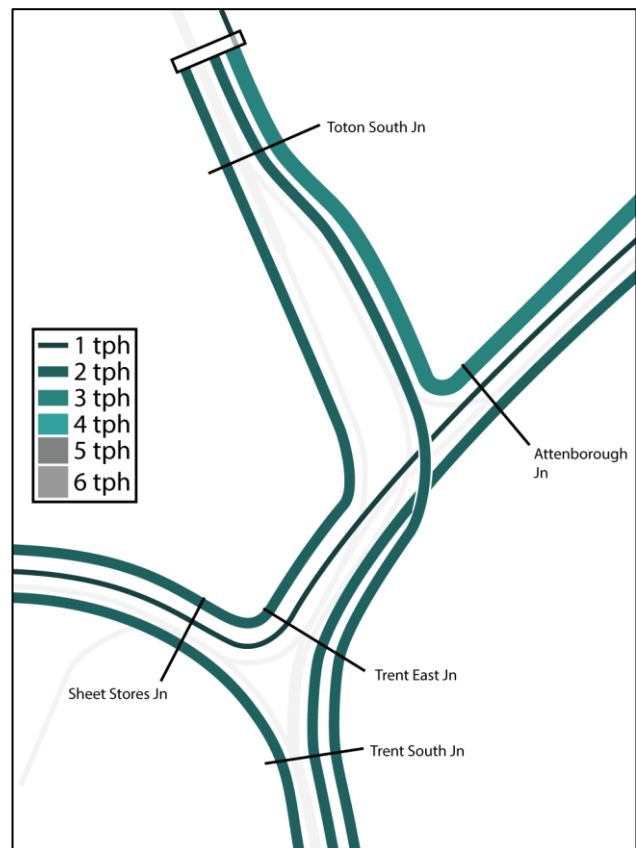


Figure 8: Diversion of existing services to the East Midlands Hub

Scenario 1 moves conflicting moves from Trent East Junction to Attenborough Junction, but does not use any more capacity than the existing service level. However, it has a significant disadvantage in that it also reduces direct connectivity between the three major cities in the East Midlands. This would increase journey times by at least 15 minutes, given the

additional time required to run to and from the Hub and allow for some turn round time. The journey time between Derby and Nottingham is currently about 30 minutes. The impact of this increase in journey time on passengers and ticket revenue needs to be carefully considered.

Scenario 2: Shuttles to the East Midlands Hub

In this scenario, shuttles are provided between Leicester, Nottingham and Derby to serve the East Midlands Hub station. This would allow existing services to retain their current connectivity while enabling good connectivity to the Hub.

It would significantly increase the number of services across Trent Junctions as it would add another 2 trains per hour on each of the three axes. Network Rail analysis has shown that these services could not be accommodated on the current layout without additional infrastructure. The Connectivity at East Midlands Hub^d report suggests that the service level would drive 4-tracking between Attenborough Junction and Nottingham, as well as an additional track at Sheet Stores Junction. However, the connectivity benefit provides a much better outcome for passengers from Derby, Nottingham and Leicester, without significantly increasing the existing journey times between the three cities and intermediate towns.

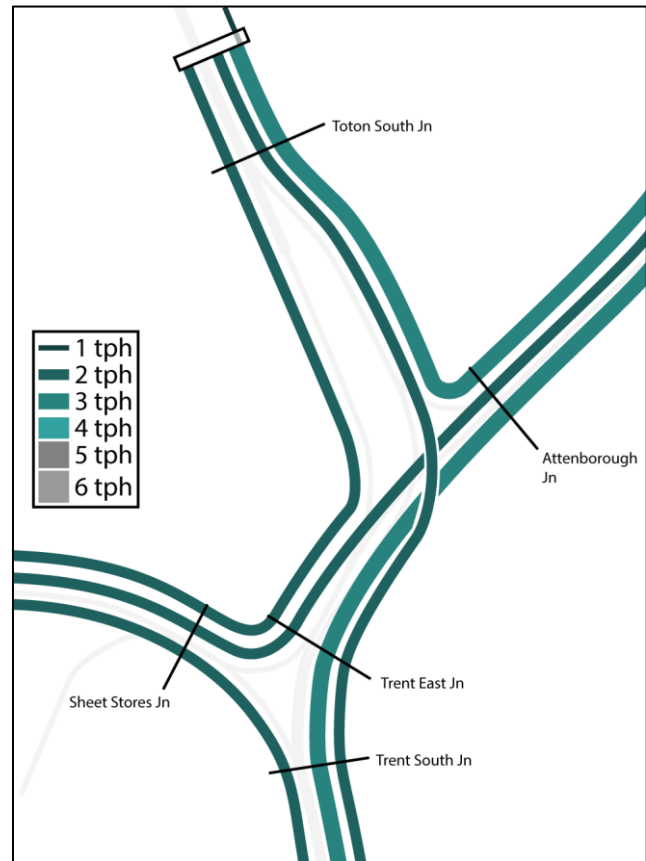


Figure 9: Impact of shuttles in addition to existing services across Trent Junctions.

^d Heavy Rail Connectivity to East Midlands HS2 Hub Report, Network Rail, February 2016.

E.01.04 Additional services

In addition to the High Speed 2 service specification, Midlands Connect and Transport for the East Midlands are proposing ‘conventional compatible’ services (which transition between high speed and conventional tracks) running between Leicester and Leeds. These would use the conventional network between Leicester and the East Midlands Hub and then transition to using the High Speed lines to Leeds. HS2 is providing for the transition point within its designs.

For the purposes of this study, it is worth considering these services as replacements for the Leicester shuttles required for the Hub, although it is likely that one service would be kept to provide connectivity to the Hub from places like Loughborough.

The capacity implications of these services are primarily not within the Trent Junctions area, as they could use the High Level Line from south of Trent South Junction. The main limitation is a lack of crossovers between the Fast and Slow lines between Trent South and Loughborough. It is likely that providing for these services would need a platform on the up slow at Loughborough, a higher speed double junction along with other interventions for freight in the Leicester area. These will be covered in more detail as part of the Leicester Strategic Question.

E.02 Capacity Constraints

The low line speeds on east – west flows are particularly relevant as the journey times of diverted services via Toton will be increased because of the lower line speeds across the junctions. Additionally, as the area becomes busier, with more services crossing, the low line speeds will become a limit on capacity as services could end up queueing to cross Sheet Stores and Trent East Junctions.

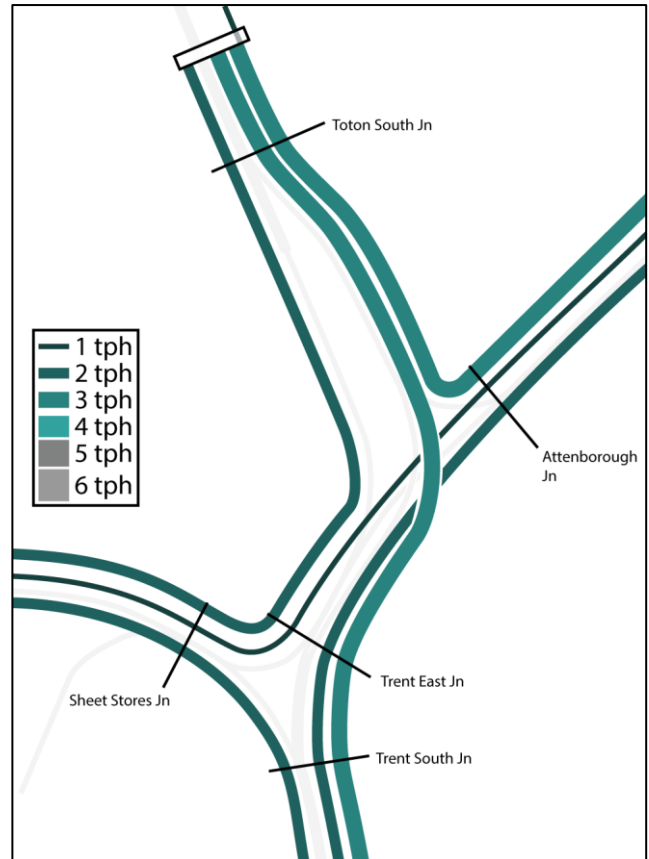


Figure 10: scenario including HS2 ‘conventional compatible’ services from Leicester to Leeds

Figure 11 shows the number of services which must cross Trent Junctions. This indicates that with both Midlands Connect and HS2 aspirations the dominant flows are from the East Midlands Hub to Nottingham and from Derby towards Nottingham. This means that the junctions with the most traffic are Sheet Stores Junction and Attenborough Junction.

E.02.01 Sheet Stores Junction

With the addition of Midlands Connect services across Trent Junctions, the east-west flows will increase, putting more pressure on the Sheet Stores low speed junction. Analysis shows that these services would require partial grade separation of the Sheet Stores junction because of the junction margins and conflicts crossing the layout. However, it is worth noting that Midlands Connect aspirations to speed up services to Birmingham include services using the Sheet Stores – Stenson line, which requires crossing the whole layout rather than just crossing in one direction. Services routed via Derby do not increase the capacity utilisation as much and may not require as much of an infrastructure solution to manage.

The pinch point for capacity at Sheet Stores Junction will be the 10 mph crossover shown in **Figure 4**, which has a total of 7 moves over it. Given the low speeds and conflicting moves across the junction, it is likely that 7 moves will be challenging to accommodate without making infrastructure alterations. The Network Rail East West Connectivity^e report suggests that reducing the junction margin (from 5 to 3 minutes) across Sheet Stores Junction would provide enough additional capacity to allow services, but it is worth noting that this assumed the Route Study ITSS and did not include additional services for the East Midlands Hub.

Network Rail analysis of the combined HS2 and Midlands Connect TSS demonstrates that Sheet Stores Junction would be over capacity with the full ITSS. This suggests that the option of maintaining existing services in their current paths and adding shuttles would put significant additional pressure on the junction and require an intervention to manage. The proposed intervention from Network Rail analysis includes 4-tracking through Sheet Stores Junction which would limit the number of conflicting moves but not eliminate them entirely.

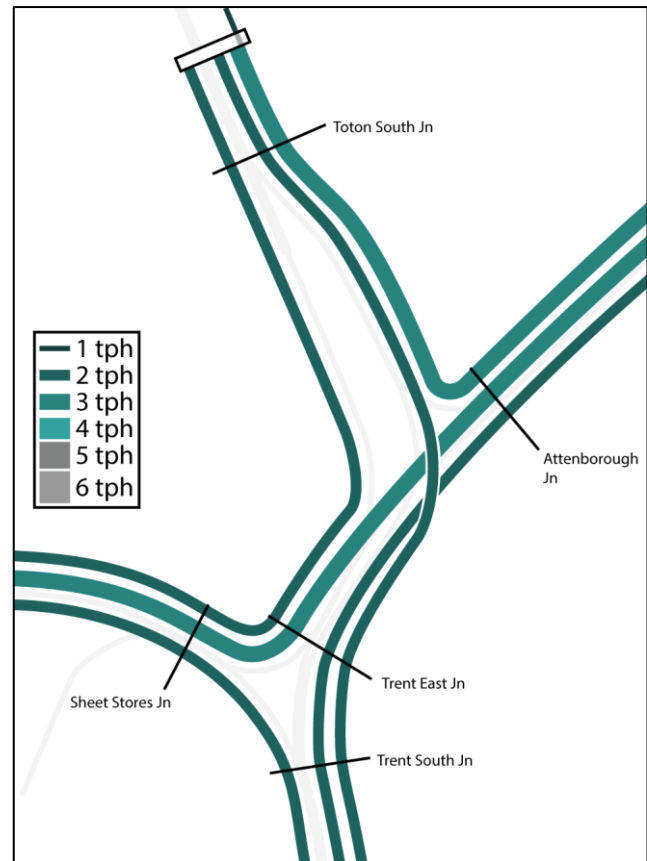


Figure 11: The total number of moves required with both HS2 and Midlands Connect services.

^e East Midlands – West Midlands Connectivity Report, Network Rail, July 2016

E.02.02 Attenborough Junction to Nottingham

Because of the large increase in service levels introduced by the full service aspirations, a number of different reports have shown that it will be challenging to accommodate all services without infrastructure interventions. These fall into two categories:

- Four tracking: This would be a major intervention and would probably require quite significant land-take to be possible.
- 3-minute headways (currently 4 minutes): Given that the signalling is relatively new, and that signal spacing drives headway considerations, it is recommended that an assessment of the signalling headways is done to determine if the current planning headway could be changed without significant alterations to the infrastructure.
- Alternatively, there is also an option of re-routeing traffic from the south side of the Hub by constructing a chord at Trowell Junction to the north of the Hub. This would release capacity from the Attenborough Junction to Nottingham corridor by enabling services to run to Nottingham via Mansfield Junction. This may reduce or remove the need to provide the interventions described above on the Attenborough to Nottingham corridor.

E.02.03 Toton Low Level Line

In either of the EMH connectivity scenarios, there will be an increase in the amount of traffic using the Toton Low Level line between Trent Junctions and the Hub station. Because of the two level crossings on the Low Level line, increasing the service level along the corridor will adversely affect road users of these level crossings.

There are stakeholder aspirations to either close the route to rail traffic, or to limit traffic as much as possible, as an increase in traffic over the level crossings would increase barrier-down time. Midlands Connect / Erewash Borough Council analysis indicates that there could be a positive Benefit Cost Ratio for a chord between Trent East Junction and the High Level Line.^f This would allow services from the Derby direction to travel to the Hub without using the Low Level Line. In line with Network Rail's policies on level crossings, we support any opportunity to improve safety on the railway by closing level crossings; but this needs to be balanced against the operational needs of the railway and ensuring access for freight and passenger trains across the rail network.^g

A further assessment of this option should consider the capacity implications on the High Level Line and whether freight could be accommodated as well. It is unlikely that the Low Level line could be closed altogether, although traffic could be limited by an additional chord.

^f *Midlands Rail Hub – Long Eaton Low Level Line Study*, Midlands Connect/Erewash Borough Council, November 2018

^g <https://www.networkrail.co.uk/running-the-railway/looking-after-the-railway/level-crossings/>

E.02.04 Toton High Level Line

With a significant number of additional services proposed to run over the High Level Line, an assessment of the capacity on this route needs to be made, particularly given the aspirations to transfer traffic from the Low Level line described in Section [E.02.02](#) above.

Additionally, accessing the High Level Line from the Leicester direction is currently constrained. A single crossover at Loughborough North Junction is the only means of moving from the Midland Main Line Fast Lines to the Slow Lines (and therefore to the High Level Line). This is likely to be a significant constraint for both shuttle services and conventional compatible services. Provision of a high speed double junction should be considered (dependent on the outputs of the Leicester CMSP Strategic Question).

E.03 Summary

The findings presented above show that in most scenarios the key capacity constraints will be Sheet Stores Junction and the Trent Junctions to Nottingham corridor. These capacity constraints can be managed through the TSS, but in delivering better connectivity to the East Midlands Hub, these areas will always remain a capacity constraint and will need interventions in the future to enable growth in the number of services which serve the Hub.

With the full Service Specification including both Midlands Connect and HS2 aspirations and projecting the use of shuttles to provide direct connectivity to the Hub station, it is likely that there would need to be quite significant interventions to enable all these services to run. However, these services would also enable good connectivity and a better overall service to the East Midlands.

F. Conclusions

This report is slightly unorthodox in that it advances no solution to the capacity constraints which have been identified by the various previous studies which have looked at Trent Junctions. This is because until now there has been no clear ‘problem’ which can be tested.

Over the next 15 years, there will be a significant investment in additional services across the Midlands; through the Midlands Rail Hub and HS2’s East Midlands Hub station. It is important to recognise that these projects have an impact on each other even though they will not be delivered at the same time. The HS2 East Midlands Hub provides an opportunity for improved services around the East Midlands and better north-south connectivity. However, making the most of the opportunity requires current journey times and connectivity to be maintained or improved, while also providing new services to the Hub station. **This should be the highest priority to be considered as part of future development of rail options around Trent Junctions.**

The findings show that, in general, the TSS for a scenario drives a different timetable and therefore infrastructure solutions. While this is unsurprising, it means that unless there is a single or limited number of TSS’ to be tested, there will not be a consensus on what is required to support those TSS’. The industry and other stakeholders, led by Network Rail, needs to develop a limited set of TSS’ to enable a full timetable study to be undertaken. It is recommended that this be limited to 2 scenarios; a high service level and a lower service level, as agreed by the industry. These TSS’ can then be tested to understand the benefit-cost ratio of the options. As part of this, the analysis should include understanding the capability of any infrastructure proposed in the low scenario. This would enable a better informed investment decision.

Although generally infrastructure requirements are linked to specific TSS’, the Findings section demonstrates that under most scenarios there are two key capacity constraints; Sheet Stores Junction and the Attenborough Junction to Nottingham corridor. It is therefore imperative to find solutions for these areas, especially as the evidence points to lower junction margins and headways being key to increasing capacity through these areas. Relatively small interventions could potentially address these; the signalling should be assessed to see if a small scale intervention could potentially increase capacity through these two key capacity constraints.

Finally, where possible, in line with Network Rail’s policies on level crossings and stakeholders’ aspirations to limit or reduce barrier down times, any opportunities to reduce traffic over level crossings should be considered, although this has to be balanced against the railway’s need to serve passenger and freight users with access to the network.

These conclusions can be summarised as the following 'strategic outcomes' which we believe are key criteria to consider in developing the Trent Junctions area into the future:

1. Supporting a good service for the East Midlands, both in terms of serving the East Midlands Hub from Derby, Nottingham, and Leicester, but also improving direct rail connectivity between key cities and towns, for example Leicester and Nottingham.
2. Timescales. Different schemes will have separate delivery dates meaning that elements of a whole solution will need to be phased, such as East Midlands Hub in 2033.
3. Affordability. Any infrastructure proposals for Trent Junctions should be cost-effective and small scale. If larger infrastructure alterations are required, the impact of reducing the Train Service Specification to reduce the need for them should be considered.
4. Options should consider the opportunity to limit or reduce barrier-down time on level crossings.

F.01 Next Steps

We propose the following next steps:

1. Network Rail System Operator will set up and lead a working group, including the key industry and other stakeholders, to develop a single Train Service Specification. This should at most contain two scenarios – a high and low scenario which can then be tested. This should also include economic analysis to better understand the benefits and disadvantages of the two different scenarios.
2. Once a TSS is agreed as proposed in point 1, the industry should commission a timetable study to assess the impacts of the TSS. This should include modelling the signalling to assess whether it would be possible to reduce headways and / or junction margins without significant infrastructure interventions and a study into the feasibility of altering Sheet Stores Junction to prioritise the large number of Derby-Nottingham corridor traffic if possible.
3. A timetable study should include the stations at Nottingham, Derby and Leicester (and the East Midlands Hub) to ensure that any timetable is fully workable on the projected infrastructure.
4. Using this timetable study, any necessary infrastructure interventions can be developed and then tested to ensure they deliver the required TSS, noting the results of the Leicester CMSP Question when they are available.

Once these steps are completed, the industry can then make a proposal to funders with a full understanding of what will be required to deliver the recommended TSS.

G. Appendix

G.01 Questions

There are several questions which have come out of the analysis which has been conducted in the past, and gap analysis of what has not been considered so far. These include:

- Can junction margins at Sheet Stores Junction be reduced for services travelling from Trent towards Derby?
- Can the infrastructure be re-aligned to achieve higher speeds on the turnouts for the Trent East-Sheet Stores chord?
- Would it be possible to provide a chord to the Toton High Level line to enable the Low Level line to be closed?
- Would the High Level line have the necessary capacity to support all Toton Low Level traffic being transferred to it?
- Which services should be prioritised in the future? (e.g. could Derby-London services be slowed down on the basis that a better connection to EMH and more capacity at Sheet Stores is a better whole system outcome?)
- Routeing via Trowell – what would this do?
- What elements of the TSS provide for future growth?
- Should any further study include considering connection times at Toton?