Midland Main Line

Congested Infrastructure

Capacity Enhancement Plan

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Peter Northfield Signature Date

Programme Manager

24 September 2015

Rob Fairy Signature Date

Lead Strategic Planner, LNE & EM

24 September 2015

Joanne Kaye Signature Date

Strategy & Planning Director, North

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Executive Summary

The Railways Infrastructure (Access & Management) Regulations require that, when Network Rail is unable to adequately satisfy requests for access to the infrastructure, it must declare the relevant part of the infrastructure to be congested. Following such a declaration, Network Rail must complete first a capacity analysis for the affected infrastructure and then a capacity enhancement plan for consideration by funders. A section of the Midland Main Line between Cricklewood and Leicester via both Market Harborough and Corby was declared to be congested infrastructure on 24 September 2014. The capacity analysis was published on 24 March 2015 and this document is the capacity enhancement plan.

The congestion on this route is caused by a combination of factors. Limited capacity could be found on each section of the infrastructure, but given the current use and limitations of the infrastructure, these different elements of capacity could not be joined up in a way that would produce a path that adequately satisfied the original request for access.

The capacity analysis published in March considered a variety of potential solutions to create additional capacity on the current infrastructure, but each of these involved disadvantaging some of the current users of the route. If services are diverted onto other routes then journey times will be increased. If the line-speed is reduced then journey times will be increased. If services are re-timed then operators will face additional costs and passengers will see a less regular service pattern, increasing their generalised journey time.

Only infrastructure improvements could provide capacity for additional services without adversely impacting demand in one or more of the markets currently served by this route. The infrastructure constraints identified as priorities for investment in the capacity analysis are already being addressed, with the Kettering – Corby redoubling due for completion in 2017.

Investment on the route is subject to a review following the decision to pause the Midland Main Line electrification programme. This plan cites the work carried out in the draft East Midlands route study, which was the subject of a public consultation between January and April 2015. It identifies actions that could be taken to enhance the capacity of the congested infrastructure, in line with the priorities for investment in the capacity analysis report, and indicative timescales by which they could be completed. However, because of the ongoing investment review, the final route study, when published, should be regarded as the definitive input to funders' decisions concerning investment in this part of the network.

In accordance with the Railways Infrastructure (Access & Management) Regulations, this capacity enhancement plan has been submitted in draft for the prior approval of the Secretary of State. This plan has not been approved by the Secretary of State. It is normal for GB rail industry investment plans such as Route Studies not to receive Government approval.

Introduction

1.1 Reasons for the enhancement plan

1.1.1 The Railways Infrastructure (Access & Management) Regulations require that, when Network Rail is unable adequately to satisfy requests for access to the infrastructure, it must declare the relevant part of the infrastructure to be congested. This should be done after "co-ordination" of requests for access, which Network Rail interprets to mean consideration within the bi-annual timetable planning cycle. Following such a declaration, Network Rail must complete a capacity analysis to identify the reasons for the congestion and potential short- or medium-term measures to address the congestion, followed by a capacity enhancement plan.

1.1.2 In May 2014, freight operator GB Railfreight submitted a train operator variation request to operate a train 6C99 on Mondays to Fridays from Leicester Humberstone Road to Cricklewood North End siding, departing between 0200 and 1800 with a journey time of up to approximately 6 hours. Network Rail was unable to accommodate this request, or to offer an acceptable alternative. After consideration of the likely result of the next timetable planning cycle (for May 2015), but without waiting for completion of that cycle, Network Rail decided to declare the infrastructure as congested, under Regulation 23(2) of the Railways Infrastructure (Access & Management) Regulations, where it considers the infrastructure is likely to become congested during the next working timetable period. This declaration was made on 24 September 2014, and applies to infrastructure between Cricklewood and Leicester inclusive, via both Market Harborough and Corby.

1.1.3 Consequently, Network Rail was required to complete a capacity analysis of the congested infrastructure within 6 months; the capacity analysis report was published at http://www.networkrail.co.uk/Guide/operational-rules/Congested-infrastructure/ on 24 March 2015. A capacity enhancement plan was required within a further 6 months, i.e. by 24 September 2015. This document is that plan.

1.2 Scope and structure of the plan

1.2.1 Regulation 25 of the Railways Infrastructure (Access & Management) Regulations sets out the requirements for the capacity enhancement plan.

1.2.2 The plan must describe the reasons for the congestion, the likely future development of traffic and any constraints on infrastructure development. It must then identify options for and costs of enhancing the capacity. Sections 2 to 5 of the plan contain this information.

1.2.3 Section 6 of the plan explains the consultation already undertaken on the options, and section 7 presents the action that could be taken to relieve the capacity, and a potential timetable for this action.

1.2.4 The content of this plan should not be read in isolation. The parts of the infrastructure that were declared congested are in the East Midlands, so they form a central part of Britain's rail network. Many of the train services using the congested infrastructure, or potentially using it in future years, also use significant amounts of infrastructure on either side of the congested elements, and interact with many other services that do not run near the geography of this plan.

1.2.5 To address this complexity of inter-related services, the industry has developed a comprehensive long term planning process, bringing together industry parties and stakeholders, to develop choices for funders around the uses of and investment in the network. A key part of the process is to explain the relationship between these choices: many investments may be necessary to deliver a single change in output, but equally a single investment scheme may contribute to many different outputs. This is critically important when Britain's railway is enjoying a period of unparalleled continuous growth.

1.2.6 This capacity enhancement plan quotes extensively from the capacity analysis report, but also from the documents of the long term planning process, and it should be read only with reference to that process. In particular, the forthcoming East Midlands Route Study (which was published in draft for public consultation in January 2015) will cover, *inter alia*, all the infrastructure within the scope of this capacity enhancement plan. The final route study, rather than this plan, should be regarded as the definitive input to funders' decisions concerning investment in this part of the network.

2 Reasons for the congestion

2.1 Source of the analysis

2.1.1 The reasons for the congestion were set out in the capacity analysis report published by Network Rail in March 2015. The conclusions of the analysis are repeated below. For the full supporting analysis please refer to the report at the web location referred to in section 1.1.

2.2 Conclusions of the analysis

2.2.1 The congestion on this route is caused by a combination of factors. Limited capacity can be found on each section of the infrastructure, but given the current use and limitations of the infrastructure, these different elements of capacity cannot be joined up in a way that would produce a path that adequately satisfies the original request for access.

2.2.2 One theme to emerge from this analysis is the difficulty of accommodating significant speed differentials on this mixed traffic main line. Although there are fewer sections of this route available for operation at over 100 mph than on the West Coast or East Coast main lines, and there are fewer fast passenger services each hour than on those routes, this must be set against a majority of freight trains conveying heavier, slower Class 6 aggregates traffic rather than lighter, faster Class 4 intermodal traffic.

2.2.3 As a consequence, there are limited opportunities to use the Fast lines for freight services, whether between Sharnbrook Jn and Kettering or between Kettering and Leicester.

2.2.4 A second theme is the significant capacity taken by the use of the reversible Up & Down Slow line between Bedford and Kettering for traffic in both directions. There is broad, though not exclusive, use of the Up & Down Slow line between Sharnbrook and Kettering for Up trains in the morning and Down trains in the afternoon, which improves overall utilisation but means that it is nearly impossible to find an additional path against the prevailing flow. Similarly, the relatively short Kettering – Corby single line loses almost half its capacity to the hourly out-and-back passenger service.

2.2.5 These constraints on Slow line capacity mean that the short double-track section at Kettering station is used for passing services 22 times a day (not to a regular pattern), so there are occasions when a path can be found on the Up & Down Slow line south of Kettering but it cannot be extended through Kettering station.

3 Likely future development of traffic

3.1 Sources of the analysis

3.1.1 For the reasons set out in section 1.2 it would be inappropriate to consider demand only for the elements of the infrastructure that were declared congested. The long term planning process has considered future demand for the whole rail system, by market sector, out to a 30-year horizon. The relevant publications, each of which was developed with extensive stakeholder involvement and subject to a full public consultation, are:

- Long Distance market study
- London and South East market study
- Regional Urban market study
- Freight market study

3.1.2 Each of these studies may be found at: http://www.networkrail.co.uk/improvements/planning-policies-and-plans/long-term-planning-process/market-studies/

3.1.3 Each market study analysed demand and presented conclusions in the form of conditional outputs, i.e. outputs that may be desirable subject to analysis of the associated costs and consequent value for money. This analysis is being undertaken through a number of national and regional route studies.

3.1.4 The East Midlands route study, published in draft for public consultation in January 2015, set out the various conditional outputs which are relevant to its geography. The geography of the route study includes all the infrastructure that is the subject of this capacity enhancement plan, and significantly more. The full draft route study may be found at: http://www.networkrail.co.uk/long-term-planning-process/east-midlands-route-study/

3.2 Conditional outputs for the Midland Main Line

3.2.1 The conditional outputs considered in the draft route study fall into the following categories:

- passenger capacity and connectivity in each market sector
- freight capacity
- passenger circulation capacity at stations
- access to international gateways
- access to further and higher educational establishments and social infrastructure

- capacity and connectivity for passenger leisure markets in the evenings and at weekends
- local access to the rail network
- passenger satisfaction

3.2.2 The detailed description of each of these is contained in section 3 of the draft route study.

4 Constraints on infrastructure development

4.1 Supply-side considerations

4.1.1 The congested section of the Midland Main Line ranges from inner-city urban to sparsely-populated rural areas. The level of development close to the railway is not an absolute constraint but it does of course affect costs: for example, increasing the number of lines from 4 to 6 between Silkstream and Radlett junctions would be expensive.

4.1.2 Selection of options to increase capacity in the route studies is initially based on 'gap analysis': the conditional outputs are loaded onto the existing infrastructure and the gaps between supply and potential demand are addressed. The gaps can be addressed by reducing services or by increasing infrastructure supply, or combinations of both. The options which seem to provide best socio-economic value at various cost levels are presented by the route study as choices for funders.

4.1.3 Hence, the physical difficulty of infrastructure enhancement in a particular location should be a consideration in this process, not an absolute constraint.

4.2 Demand-side considerations

4.2.1 There are similar considerations (rather than constraints) on the demand side. On this section of the Midland Main Line there is demand for faster long-distance services (to improve connectivity between cities of the East Midlands and London) but there is also substantial peak demand into London and Leicester from smaller stations, requiring slower trains. There is significant freight demand, with trains confined to relatively low speeds particularly in the southbound direction. And at Leicester there are significant east-west flows of inter-regional passenger and long-distance freight traffic which must cross the north-south flows of the main line.

4.2.2 These considerations were discussed in the capacity analysis report, in the context of changes to services on the current infrastructure, but they are equally powerful in influencing options for infrastructure enhancements.

4.3 Funding constraints

4.3.1 One genuine constraint is money. Investment will only be forthcoming if it can be shown to be value for money according to conventional socio-economic appraisal criteria. A further constraint is affordability. There are limits to the availability of public funds, so public sector funders must consider railway investment alongside other possible spending, for instance on healthcare or education. Even the best economic case will not lead to investment if the money is not available.

4.3.2 The solutions set out in the draft route study and quoted in this plan will remain only choices, about which funders will make decisions.

5 Options for and costs of enhancing the capacity

5.1 Hierarchy of constraints

5.1.1 The capacity analysis report published in March 2015 identified that some sections of the infrastructure should be prioritised for enhancement because they are the most significant constraints. The text below (5.1.2 to 5.1.4) is taken from section 3.5 of that report.

5.1.2 The single most obvious constraint is the long section of reversible Up & Down Slow line between Sharnbrook Jn and Kettering South Jn. This should be the top priority for any investment to relieve the congestion.

5.1.3 The routes north of Kettering are a secondary constraint. The capacity of one route or the other could be enhanced – both would probably not be required.

5.1.4 At a tertiary level in the hierarchy of capacity constraints are:

- Leicester area (from Kilby Bridge to Syston)
- Bedford – London

If the primary and secondary constraints are relieved by investment, and demand continues to grow, then these areas will become the next bottlenecks on this infrastructure. One particular area to note, although outside the infrastructure presently declared as congested, is Hampstead tunnels and Carlton Road Jn. Here freight services between the MML and the London orbital routes conflict with passenger services to/from St Pancras and the Thameslink core.

5.2 Current investment programme

5.2.1 The first priority investment – alleviating the long section of single Slow line between Sharnbrook and Kettering South junctions – was included in the CP5 investment programme for the East Midlands route. It is currently under review, along with the Midland Main Line electrification programme, to see which investments should be delivered in which order because of rising costs and affordability constraints. It may not be necessary to deliver the whole redoubling of the Slow line as envisaged in the CP5 enhancements plan, but the northern section through Wellingborough station towards Sharnbrook tunnel should be regarded as the priority.

5.2.2 Of the two potential secondary enhancements, one (redoubling Kettering – Corby) was included in the Control Period 5 enhancement plan and is now in mid-delivery. Although the final configuration of this project is subject to the review, it is still expected to complete in 2017.

5.2.3 The draft East Midlands route study assumed these two enhancements as within its (2019) plan base. It then looked at a range of further options to

meet the conditional outputs to 2043.

5.3 Future options

5.3.1 The tables below summarise 6 of the 14 infrastructure enhancement options identified in the draft East Midlands route study. These 6 are the options affecting the infrastructure that has been declared congested. More detail on each option is provided in section 4 of the draft route study.

Option 1 South of Bedford area	
Intervention details	This option consists of grade separation for services travelling south in the Leagrave Junction area, and grade separation for services travelling north in the Harpenden Junction area.
Indicative cost	£75 million - £175 million (grade separation near Leagrave Junction); £75 million - £175 million (grade separation near Harpenden Junction)

Option 2 Bedford area	
Intervention details	This option consists of the provision of a new platform on the west side of Bedford station, for the use of long distance high speed services calling at Bedford. This option also includes the provision of an additional terminating platform to the south of Bedford station. Leagrave station has been identified as a possible location for this facility, utilising the existing sidings on the east side of the station. Alternative locations are also under consideration.
Indicative cost	£5 million - £15 million (new platform on west side of station), less than £10 million (new crossover to platform 3), £5 million - £15 million (turnback at Leagrave station)

Option 3 Kettering – Wigston North Junction	
Intervention details	This option proposes to increase the existing two track railway to four tracks between Kettering North Junction and Kilby Bridge Junction, with a high speed flat junction at Kilby Bridge Junction to facilitate the crossing of services from the Leicester and Hitchin Line to the South Leicestershire Line and vice versa.
Indicative cost	£875 million - £1,875 million

Option 4 Wigston North Junction – Syston East Junction	
Intervention details	This option proposes the provision of two additional tracks of approximately 8.5 miles in length between Wigston North Junction and Syston East Junction as well as the introduction of a flyover at Wigston North Junction.
Indicative cost	£250 million - £400 million

Option 5 Leicester station	
Intervention details	This option consists of the creation of a new bay Platform 5 and a new through Platform (6), both of which would be used to accommodate traffic from the north, including reversing and stopping services. The bay platform could accommodate shuttle services between Leicester station and the proposed HS2 station.
Indicative cost	£5 million - £15 million (through platform), less than £10 million (bay platform)

Option 7 Syston East Junction – Manton Junction – Peterborough area	
Intervention details	This option includes signalling and track enhancements. The provision of third and fourth tracks of approximately 12 miles in length are proposed between the existing Goods Lines between Oakham station and Langham Junction, and between the River Eye bridge near Stapleford, and Melton Mowbray station. These new sections of track would have the same linespeed as existing infrastructure and would be suitable for utilisation by both passenger and freight services. This option also includes the installation of a new chord at Manton Junction to enable freight services from Peterborough to access Corby and Kettering (and vice versa). The need for this chord is subject to the development of new freight terminals. The signalling elements of the scheme enhancements to increase the number of trains able to use the section of route each hour.
Indicative cost	Signalling incremental enhancement: between £10 million and £50 million; third and fourth tracks £100 million - £250 million; chord £20 million - £50 million.

6 Consultation

6.1 Process

6.1.1 The draft East Midlands route study was the subject of a public consultation between January and April 2015.

6.2 Responses

6.2.1 Consultation responses may be found at: http://www.networkrail.co.uk/long-term-planning-process/east-midlands-route-study/

6.2.2 The responses have been considered in preparation of this capacity enhancement plan, and a commentary on the main themes will appear in the final route study.

7 Action to be taken and timetable

7.1 Choices for funders

7.1.1 The draft East Midlands route study presents funders with a variety of choices concerning prioritised schemes to meet forecast demand and other outputs during Control Period 6, i.e. to 2023.

7.1.2 Section 5 of the draft route study states that

"These interventions can take two forms:

- Those enhancements that can be put in place on the existing infrastructure: these are typically train lengthening schemes, or adaptations to service schedules that add additional trains, or manage demand by varying stopping patterns. Each of these proposals has been considered in terms of its value for money through an outline business case
- Infrastructure enhancements: changes to the physical network to enable conditional outputs to be accommodated. These schemes have been presented with a high level cost estimate."

7.1.3 The former are not within the scope of this capacity enhancement plan as set out in the Railways Infrastructure (Access & Management) Regulations. The latter are within the scope, but should be seen in the context of the longer term choices about railway infrastructure to 2043, as set out in section 5 of this plan. Business cases (socio-economic appraisal) have not been individually created for these interventions, because as explained in section 1.2, each infrastructure proposal can affect many different outputs.

7.2 Complexity of appraisal

7.2.1 For example, the package of schemes described as 'option 4' in section 5 of this plan contributes to increased capacity on the north-south Midland Main Line and on the east-west Felixstowe – Nuneaton route. Its costs should therefore be shared between the potential benefits on each of these routes. However, to recognise capacity and connectivity benefits on each route, groups of other enhancements are also required. A programme of interventions to increase freight capacity on the east-west axis might include investments between Felixstowe and Ipswich, at several locations in East Anglia, some or all of the Syston – Manton – Peterborough package described as 'option 5' in section 5 of this plan, and other works between Wigston and Nuneaton and maybe even further into the West Midlands and North West. Each of these other local investments might contribute to other local benefits as well as the long distance freight capacity between Felixstowe and the Midlands. It can be seen that producing a single benefit/cost ratio is more an exercise in definition than calculation.

7.2.2 This complexity and degree of interdependence is being worked through in the current review of Network Rail's investment programme. The review will decide which investments should be delivered in which order, given the recent decision to 'pause' the Midland Main Line electrification programme. These decisions will be reflected in the final East Midlands route study.

7.2.3 This capacity enhancement plan cannot anticipate that process. It is a requirement of the Railways Infrastructure (Access & Management) Regulations that an indicative action plan is produced, so this is given below. This plan will be subject to the decisions of the investment programme review, and following that review the final East Midlands route study should be regarded as the definitive input to funders' decisions, rather than this plan.

7.2.4 In accordance with the Railways Infrastructure (Access & Management) Regulations, this capacity enhancement plan has been submitted in draft for the prior approval of the Secretary of State. This plan has not been approved by the Secretary of State. It is normal for GB rail industry investment plans such as Route Studies not to receive Government approval.

7.3 Potentially deliverable by 2019

7.3.1 Additional line between Kettering and Corby.

7.3.2 Additional Slow line for part or all of the route between Sharnbrook and Kettering South junctions.

7.4 Potentially deliverable by 2023

7.4.1 Additional platforms at Bedford and potentially Leagrave.

7.4.2 Two additional lines between Wigston North and Syston East junctions and flyover at Wigston North junction.

7.4.3 Additional platforms at Leicester.

7.4.4 Enhanced signalling to reduce headways between Syston East and Manton junctions (and Peterborough).

7.5 Potentially deliverable after 2023

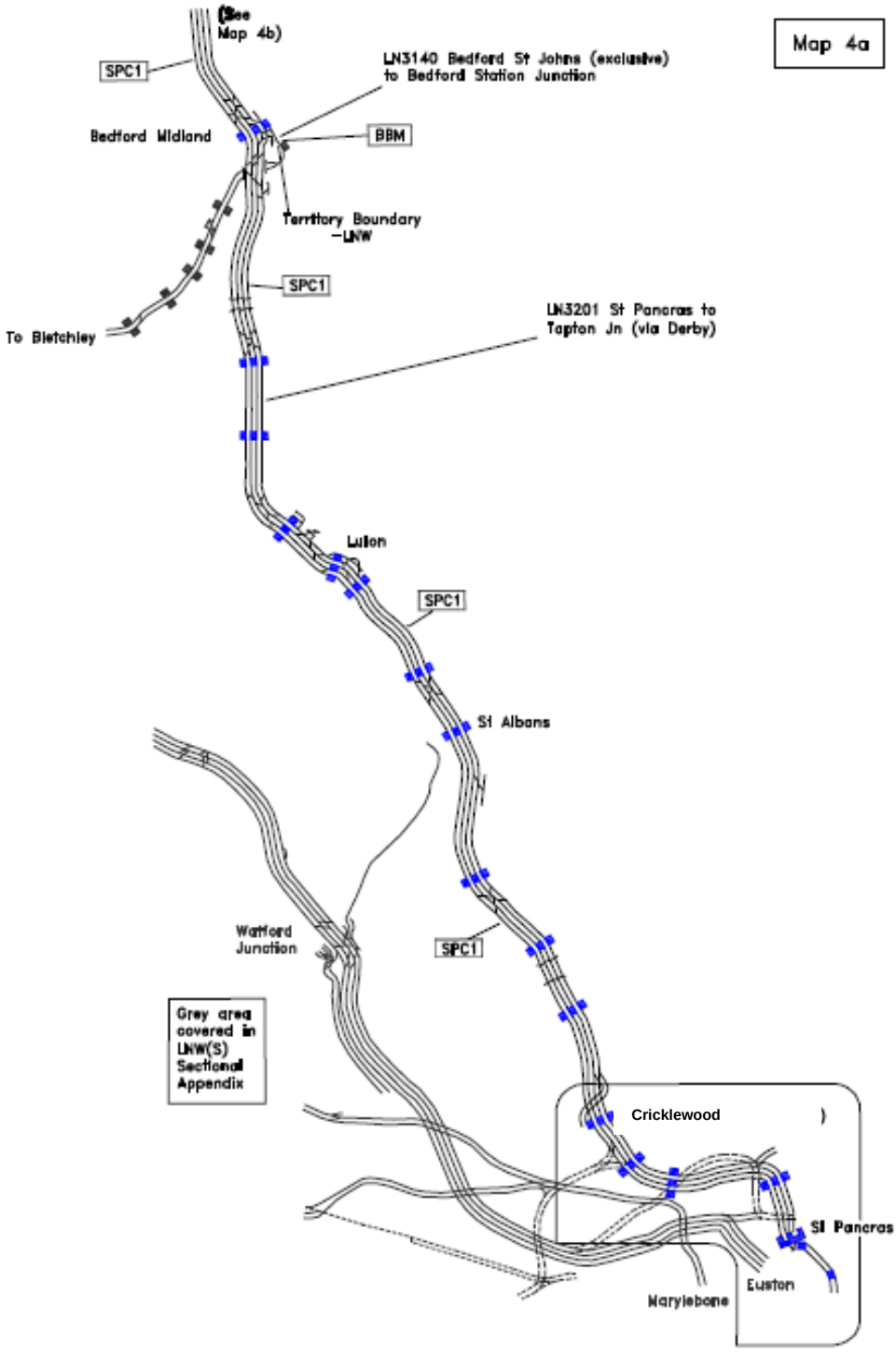
7.5.1 Grade separation near Leagrave and Harpenden junctions**.**

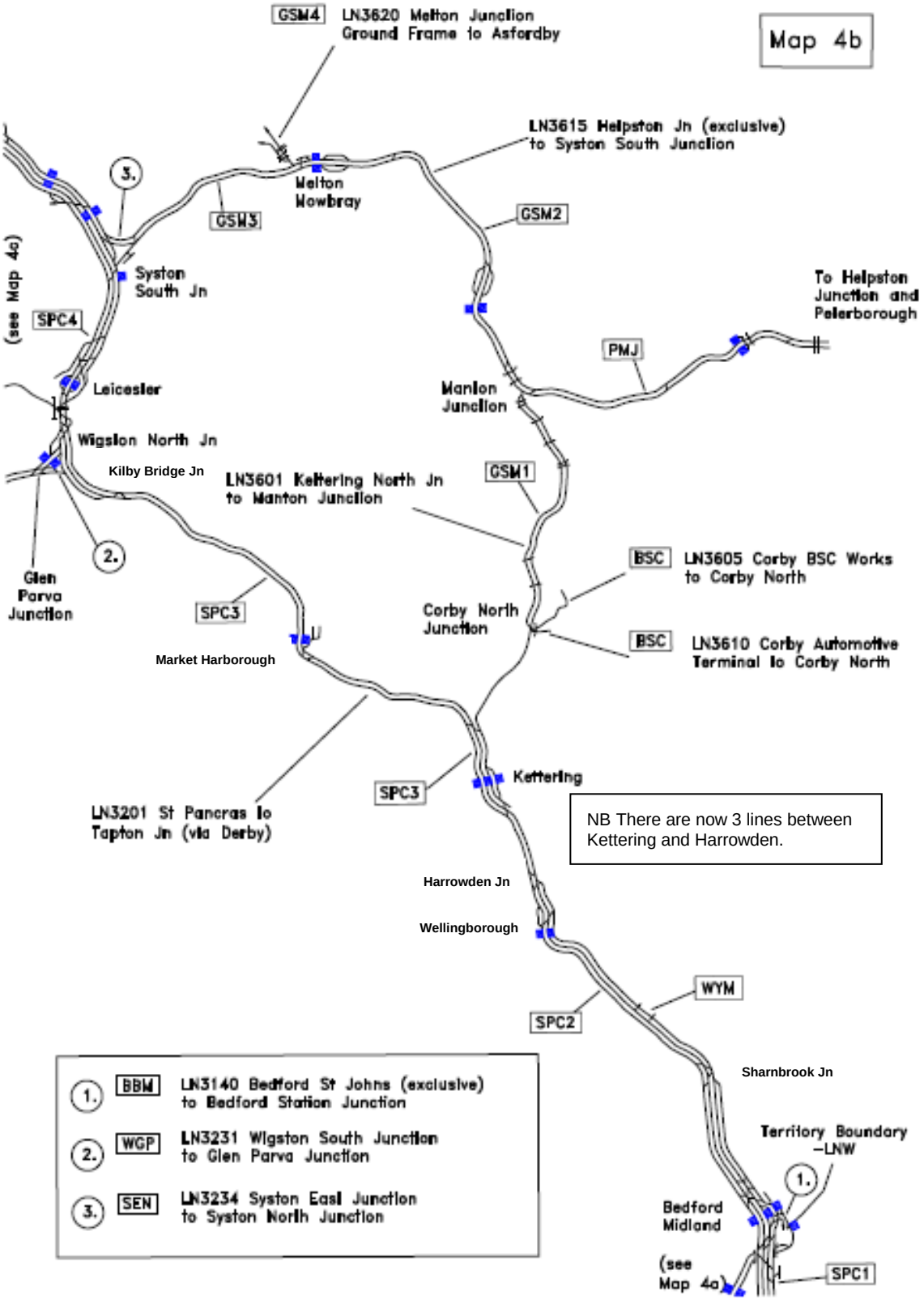
7.5.2 Two additional lines for part of the route between Syston East and Manton junctions.

APPENDIX A

Route diagrams

Adapted from diagrams in the National Electronic Sectional Appendix.




Map 4b
GSM4
LN3620 Melton Junction Ground Frame to Asfordby
LN3615 Helpston Jn (exclusive) to Syston South Junction
Melton Mowbray
GSM3
GSM2
3.
Syston South Jn
(see Map 4c)
SPC4
To Helpston Junction and Peterborough
PMJ
Leicester
Manton Junction
Wigston North Jn
Kilby Bridge Jn
LN3601 Kettering North Jn to Manton Junction
GSM1
2.
Glen Parva Junction
SPC3
BSC
LN3605 Corby BSC Works to Corby North
Corby North Junction
BSC
LN3610 Corby Automotive Terminal to Corby North
Market Harborough
LN3201 St Pancras to Tapton Jn (via Derby)
SPC3
Kettering
NB There are now 3 lines between Kettering and Harrowden.
Harrowden Jn
Wellingborough
WYM
SPC2
Sharnbrook Jn
Territory Boundary –LNW
1.
Bedford Midland
(see Map 4a)
SPC1
1. BBM LN3140 Bedford St Johns (exclusive) to Bedford Station Junction
2. WGP LN3231 Wigston South Junction to Glen Parva Junction
3. SEN LN3234 Syston East Junction to Syston North Junction