Group Strategy - Capability Analysis

ECML 2020 Capacity - Timetable Assessment Report

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Ed Jeffery	Signature	Date
Project Manager –Capability Analysis (Document Owner)		

Matt Rice	Signature	Date
Operational Planning Manager		

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References				
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1	East Coast Main Line 2016 Capacity Review	N/A	12/10	Final
2	Principal Development Timetable for Thameslink Key Output 2 (2011 Iteration)	CA118385-1	15/06/12	1.1
3	ECML Line of Route GRIP 1 Study – Capacity Modelling and Infrastructure Options	CA128248	10/09/12	6.0
4	ECML Capacity Options Report to support Access Application Process	N/A	11/09/14	1.3

Abbreviations	
Acronym	**Meaning**
DfT	Department for Transport
DTT	Development Timetable
ECML	East Coast Main Line
FOC	Freight Operating Company
GRIP	Governance for Rail Investment Projects
IEP	Intercity Express Programme
IPG	Industry Plan Group
ITSS	Indicative Train Service Specification
L&NE	London and North Eastern
LDHS	Long Distance High Speed
NR	Network Rail
ORR	Office of Rail Regulation
RUS	Route Utilisation Strategy
TLP	Thameslink Programme
TOC	Train Operating Company
TPH	Trains Per Hour
TPR	Train Planning Rules
TSGN	Thameslink, Southern and Great Northern (franchise)
TSS	Train Service Specification
TT	Timetable

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1. Executive Summary

Network Rail has produced this report to present in more detail the capacity options presented in the "ECML Capacity Options Report."
In line with the project remit this report focuses on three LDHS service scenarios:

- 7 tph LDHS off-peak: choices around operating a 7 tph service pattern alongside revised TSGN service patterns
- 8 tph LDHS off-peak: choices around operating an 8 tph service pattern along the ECML route, and also the feasibility of operating 2 tph fast London – Edinburgh
- 8 tph LDHS peak: choices around operating an 8 tph service pattern alongside the suburban London peak service

These service scenarios have been overlaid onto the ECML 2020 ITSS to produce a high-level set of development timetables.

The key findings within this report can be summarised as follows:-

- An 8th LDHS path can be accommodated on the route, alongside the TSGN off-peak and peak suburban service.

- The full ECML ITSS cannot be accommodated in several locations, particularly between York and Edinburgh.

In addition to the headline findings, a number of choices have been highlighted throughout this report for further consideration

These include:-

- Two timetable options; one based around 20-minute service patterns to key destinations, the other with 30-minute patterns which offers better connectivity
- Options for potential service specification interventions where the ITSS cannot be met (particularly north of York)
- Two fast Edinburgh LDHS paths can be accommodated, noting the impact on the ITSS highlighted above; if these services are not flighted together, this results in LDHS services being overtaken at several locations along the route
- Significant changes to the existing LDHS service structure will trigger the requirement to rewrite the timetable in the Doncaster area
- Changes to the TSGN service structure compared to previous timetable development result in differing options in terms of impact on service structures and journey times

- A full list of choices is presented in section 7.1

The infrastructure interventions being developed through the ECML Connectivity programme have been assumed. This report finds that these interventions are required to deliver the majority of the outputs (see section 7.3 for more details).

A number of the choices will impact on performance along the route, such as the operation of 8 tph and the overtaking of LDHS services. For any option that is taken forward into timetable development, Network Rail will require further work to be carried out on service recovery principles and performance resilience (section 7.4). Further investigation is also required into safety, operability and traction power supply impacts (section 7.5).

2. Introduction

2.1. Background

Network Rail issued a report to the ORR on 11th September 2014 (reference 4) to inform capacity options on the ECML from 2020.

This report considered capacity options based around 7, 8 or 9 London LDHS paths per hour. Choices around these LDHS service levels along the route were highlighted. The aspired service levels were not always achievable without choices around other services on the route. The purpose of this report is to investigate these choices in more detail and provide further detail on what the impact of these choices might be.

This report updates previous ECML Connectivity analysis (7 tph) and also considers 8 tph LDHS services as the most likely short- and medium-term scenario (within the context of the industry-agreed ECML ITSS).

2.2. Report Structure

The structure of this report is as follows:

- Section 2 (this section): Background, assumptions and methodology used in this analysis
- Section 3: This section deals with LDHS service patterns. This analyses potential LDHS service structures and provides some choices around what may be deliverable.
- Section 4: This section overlays the LDHS service structures developed in section 3 over the entire route and highlights choices around the interaction of LDHS and non-LDHS services. This section is split into geographical sub-sections to focus on the choices for each route section.
- Section 5: This section examines some of the choices between passenger and freight capacity in more detail. The logic behind this is explained in section 2.5.
- Appendix A: Sample WTTs of the outputs discussed in sections 3 and 4. The content of these WTTs is discussed in more detail in section 2.5.
- Appendix B: Initial findings of this workstream were presented at an industry working group on 21st November 2014. This section documents the comments received at the working group.

2.3. Input Assumptions

This section highlights input parameters and assumptions for this study.

2.3.1. Service specifications

The service specification used in this study is the ECML 2020 ITSS v1.0 (8.APPENDIX B). Three scenarios based on London LDHS services have been developed to test the capacity on the route.

Service Level	London – based LDHS Specification	Test
7 tph off-peak (Scenario A)	2 x Leeds via Wakefield (IEP) 1 x Leeds via Wakefield or Hambleton (IEP) 2 x Edinburgh (IEP) 1 x Newcastle (IEP) 1 x Sunderland, Bradford or Hull (180/IEP)	To provide baseline
8 tph off-peak (Scenario B)	As 7 tph off-peak plus: 1 x Edinburgh (390)	Feasibility and choices in operating 8 tph pattern Feasibility and choices in operating 2 tph fast Edinburgh services
8 tph PM peak (Scenario C)	2 x Leeds via Wakefield (IEP) 1 x Leeds via Wakefield or Hambleton (IEP) 2 x Edinburgh (IEP) 1 x Edinburgh (390) 1 x Newcastle (IEP) 1 x Lincoln or Hull (IEP)	Feasibility and choices in operating 8 tph alongside London suburban peak services

Table 1: LDHS service scenarios to be tested

The service specification (including rolling stock assumptions) for all other services on the route is taken from the ECML 2020 ITSS v1.0.

In accordance with previous findings from the ECML Connectivity workstream, it is not possible to deliver the current quantum of LDHS services to Sunderland, Bradford and Hull within one standard off-peak path. The solution proposed therefore was to use contra-peak paths and one path in each peak in addition to an off-peak hourly path for these services to increase the daily quantum of available paths. This work considers a standard hour so this is not directly relevant, but this should be considered when making choices around the daily allocation of available paths.

The scope of this study does not include infrastructure or network trains on the route. These will need to be fully taken into account for future timetable development.

2.3.2. Source timetables

For LDHS services, no source timetable has been used. For other services, current timings at the entrance and exit points of the study area have been used where possible (where, for example, a service increases from 1 tph to 2 tph in the ITSS, a second path has been added as close to half-hourly from the existing path as possible). The exceptions to this are:

- Freight services. A quantum of freight paths has been tested based on the levels specified in the ITSS
- Trans-Pennine services. Timings from the Northern Hub development timetable have been taken at Leeds, and the services extrapolated onto the ECML at York as required.
- TSGN services. A draft timetable was supplied by Govia to give an indication of the likely Thameslink and London suburban service patterns.

2.3.3. Running times and planning rules

Current Timetable Planning Rules (TPR) 2015 version 4.1 have been used for this work.

For existing rolling stock, current Sectional Running Times (SRTs) have been used. Other SRTs used include:

- IEP and Thameslink (Class 700): SRTs taken from the ECML Connectivity workstream
- Class 390: SRTs developed by Network Rail's Capacity Analysis Team and reviewed by Alliance Rail. This assumes the ability for Class 390s to tilt on the route.
- Class 380: SRTs for Leeds – Edinburgh trans-Pennine services were supplied by Network Rail's Capacity Analysis Team.
- New infrastructure: Where new infrastructure has been assumed (section 2.3.4), SRTs and TPRs used in scheme development (e.g. ECML Connectivity workstream) have been used

2.3.4. Infrastructure assumptions

The committed end-CP5 infrastructure has been assumed, with the exception of the following ECML Connectivity schemes which have been endorsed for further development:

- Huntingdon – Woodwalton 4-tracking. Originally to be tested as part of this study, this scheme has now been endorsed by Programme Board
- Peterborough: Down Slow Fletton – Peterborough upgrade
- GN/GE Southern Access: Werrington Junction grade separation
- Doncaster: Platform 0 and east side bi-di

- York: York station North throat upgrade
- Northallerton – Newcastle: Freight loops provided at Cowton – Eryholme (both directions), south of Ferryhill (Down side) and extension of Up/Down Slow Line from Birtley Junction to Ouston.

2.3.5. Time of day

This analysis considers an off-peak standard hour and a peak standard hour only. Although the capacity challenges are different in morning and evening peaks (for example, available capacity between Huntingdon and Peterborough), there is normally a higher level of LDHS service in the evening peak. In the morning, the level of LDHS service is generally reduced (due to the length of some of the train runs from the north of England and Scotland meaning it is not possible to provide early arrivals) with additional suburban services included. In the evening peak, the full LDHS service operates alongside the suburban service. As the purpose of this work is to inform choices around the LDHS services, the evening peak was therefore considered.

2.4. Methodology

This work builds upon previous analysis conducted on the ECML (references 1-3). The 7 tph service specification described in section 2.3.1 is the same as that used for the ECML Connectivity workstream. The 8 tph off-peak specification builds upon this, adding one additional LDHS path. The 8 tph peak specification is a variant of the off-peak specification, with additional suburban TSGN services on the southern end of the route. The specifications are therefore designed to be iteratively developed rather than completely independent from each other.

The capacity and constraints on the southern end of the route are well-known from previous analysis. The first steps were therefore to compare the provided Govia TSGN timetable to that developed for ECML Connectivity. It is acknowledged that the timetable provided by Govia is in a draft format; further work is required to develop this into an operable timetable. The impact of changes to the TSGN timetable on the ECML Connectivity timetable provided the 7 tph baseline for this study.

The next step was to identify capacity over the Welwyn Viaduct alongside the TSGN paths in order to develop the 8 tph timetable structure (extrapolating to/from London King's Cross and Peterborough as needed). The resulting LDHS service structure was then analysed and the advantages and disadvantages considered. Where this LDHS structure was unsuitable (or sub-optimal), amendments to the TSGN service pattern were investigated and the choices between LDHS and Thameslink services considered.

As part of this study, the presentation times at the Thameslink core were kept fixed and any changes carried out on the ECML leg of the train; this was to ensure compatibility of the

LDHS service alongside the wider Thameslink area. However, it may be that as part of the continuous timetable development process, any changes to the Thameslink services may be iteratively removed by amendment to the core pattern to produce a compliant LDHS and TSGN timetable.

The process followed in this study can therefore be summarised as:

1. Analyse and comment on amendments to TSGN service pattern compared with previous work
2. Consider impact of 1. on ECML Connectivity LDHS paths to produce 7 tph baseline
3. Consider available capacity over Welwyn Viaduct and produce skeleton of LDHS paths
4. Investigate whether the paths identified in 3. are available in both the off-peak and peak and what amendments need to be made to take into account peak suburban services
5. Develop these paths into 'whole route' LDHS paths
6. Overlay other paths in the ECML ITSS onto the paths developed in step 5. Consider the choices in terms of service specification, connectivity and journey times etc. which are acknowledged as part of the development process
7. Consider the overall timetable structure and output and repeat steps 3 – 6 as required

2.5. Outputs

The main outputs provided here are the findings presented in this report and supporting Working Timetables (WTTs).

The WTTs provided (8.APPENDIX D) are for information purposes only, to inform further economic appraisal and illustrate some of the choices. They do not represent Network Rail's view of a viable timetable nor do they infer any assumptions about access rights.

The purpose of this study is to provide information around choices for potential LDHS service structures. The supplied WTTs therefore do not contain every train listed in the ITSS. Where there is limited or no capacity impact of the choices being developed here, or where findings have not changed based upon the previous analysis (such as the Connectivity workstream), some services have not been included in the output in order to focus on the LDHS choices. The findings of the previous analysis still stand and the ECML Connectivity reports (for example, reference 2 and 3) should be consulted for more detail.

In most sections of the route, there are detailed choices to be made around the balance of passenger and freight capacity. To highlight these in the WTTs would require the choice to be resolved in order to demonstrate one particular solution.

The supplied WTTs only contain passenger services. Detailed freight commentary on what paths are achievable has been provided, including:

- maximum trailing loads,
- journey times
- infrastructure and service specification choices

2.6. Communication

Network Rail has maintained regular dialogue with the ORR and wider Industry through all stages of the ECML 2020 work. The remit for this work has been informed by discussions with the ORR and has been shared with Industry stakeholders.

On 21st November 2014, a formal Industry session was held in York to discuss the key findings, choices and impacts that are contained in this report. The session was well attended and Network Rail are grateful for the Industry participation and input. The notes of this discussion are included as APPENDIX A.

3. Long Distance High Speed Service Patterns

This section considers how the service patterns to be tested can be developed into a LDHS service structure, how they are constrained on the southern end of the route and the resulting impact. Section 4 considers the choices around the development of the resulting service structure on the whole route, section-by-section.

3.1. Capacity over Welwyn Viaduct

As discussed in section 2.3.2, previous analysis (References 1-3) has highlighted that the LDHS service structure is constrained primarily over Welwyn Viaduct and the 2- and 3-track sections between Peterborough and Huntingdon. Since completion of the DTT 2011 for Thameslink Key Output 2 (Reference 2), the TSGN franchise award has taken place. This section will consider available capacity for LDHS services alongside the supplied timetable.

Table 2 shows a comparison between Down direction paths for the four core Thameslink paths for DTT 2011 and the TSGN franchise timetable.

	DTT 2011				TSGN Franchise Timetable			
Path	To	Finsbury Park	Woolmer Green	Holme Jn	To	Finsbury Park	Woolmer Green	Holme Jn
1	Cambridge	11.09 ½	11/23	-	Peterboro'	11.06	11/20	12/07 ½
2	Peterboro'	11.24 ½	11/38	12/23 ½	Cambridge	11.24	11/37 ½	-
3	Cambridge	11.39 ½	11/53	-	Peterboro'	11.36	11/50	12/37 ½
4	Peterboro'	11.54 ½	12/08	12/53 ½	Cambridge	11.54	12/07 ½	-

Table 2: Down Direction TSGN Paths

There are two key differences between DTT 2011 and the TSGN franchise timetable:

- Services are based on a 12/18 minute pattern in the TSGN franchise timetable rather than an even 15 minute interval in DTT 2011
- Cambridge and Peterborough paths are rotated by approximately 15 minutes

Table 3 shows the equivalent path comparison for the Up direction. Although the 15-minute interval is preserved, the paths from Cambridge and Peterborough have been swapped by 15 minutes.

	DTT 2011				TSGN Franchise Timetable			
Path	From	Peterboro'	Woolmer Green	Finsbury Park	From	Peterboro'	Woolmer Green	Finsbury Park
1	Cambridge	-	10/54 ½	11.08 ½	Peterboro'	10.01	10/53	11.07 ½
2	Peterboro'	10.17	11/08 ½	11.23	Cambridge	-	11/07 ½	11.22
3	Cambridge	-	11/24 ½	11.38 ½	Peterboro'	10.31	11/23	11.37 ½
4	Peterboro'	10.47	11/38 ½	11.53	Cambridge	-	11/37 ½	11.52

Table 3: Up Direction TSGN Paths

The impact of these changes is that the paths previously considered need to be revised due to the different TSGN timetable structure.

3.2. Option 1

3.2.1. Down direction

The 8 tph off-peak service (Scenario B) will be built up first, before any changes required for the peak service (Scenario C) and differences for the 7 tph service (Scenario A) will be considered.

Extrapolating available paths at Woolmer Green Junction towards King's Cross leads to the following off-peak timetable structure:

Path	King's Cross	Finsbury Park	Woolmer Green Jn
LDHS	11.00	11/03 ½	11/15
TSGN Horsham - Peterborough		11.06	11/20
LDHS	11.08	11/11 ½	11/23
LDHS	11.11	11/14 ½	11/26
TSGN King's Cross – Kings Lynn	11.14	11/17 ½	11/30 ½
LDHS	11.19	11/22 ½	11/34
TSGN Brighton - Cambridge		11.24	11/37 ½
TSGN Tatt. Corner - Cambridge		11.18 (SL)	11/42
LDHS	11.30	11/33 ½	11/45
TSGN Horsham - Peterborough		11.36	11/50
LDHS	11.38	11/41 ½	11/53
LDHS	11.41	11/44 ½	11/56
TSGN King's Cross – Kings Lynn	11.44	11/47 ½	12/00 ½
LDHS	11.49	11/52 ½	12/04
TSGN Brighton - Cambridge		11.54	12/07 ½
TSGN Tatt. Corner - Cambridge		11.48 (SL)	12/12

Table 4: Option 1 Down direction off-peak paths

This structure is fundamentally different to both the current timetable and DTT 2011. Currently, there is an xx.00 fast service flighted with an xx.03 stopping service to maximise capacity use. The 12/18 split on the core TSGN services prevents this, as the xx.03 LDHS service would conflict with the Peterborough TSGN service. Instead of flighting services, this leads to an LDHS timetable pattern with services more evenly spread throughout the hour.

The timetable pattern between London and Peterborough is shown in Figure 1.

Key for timetable graphs:

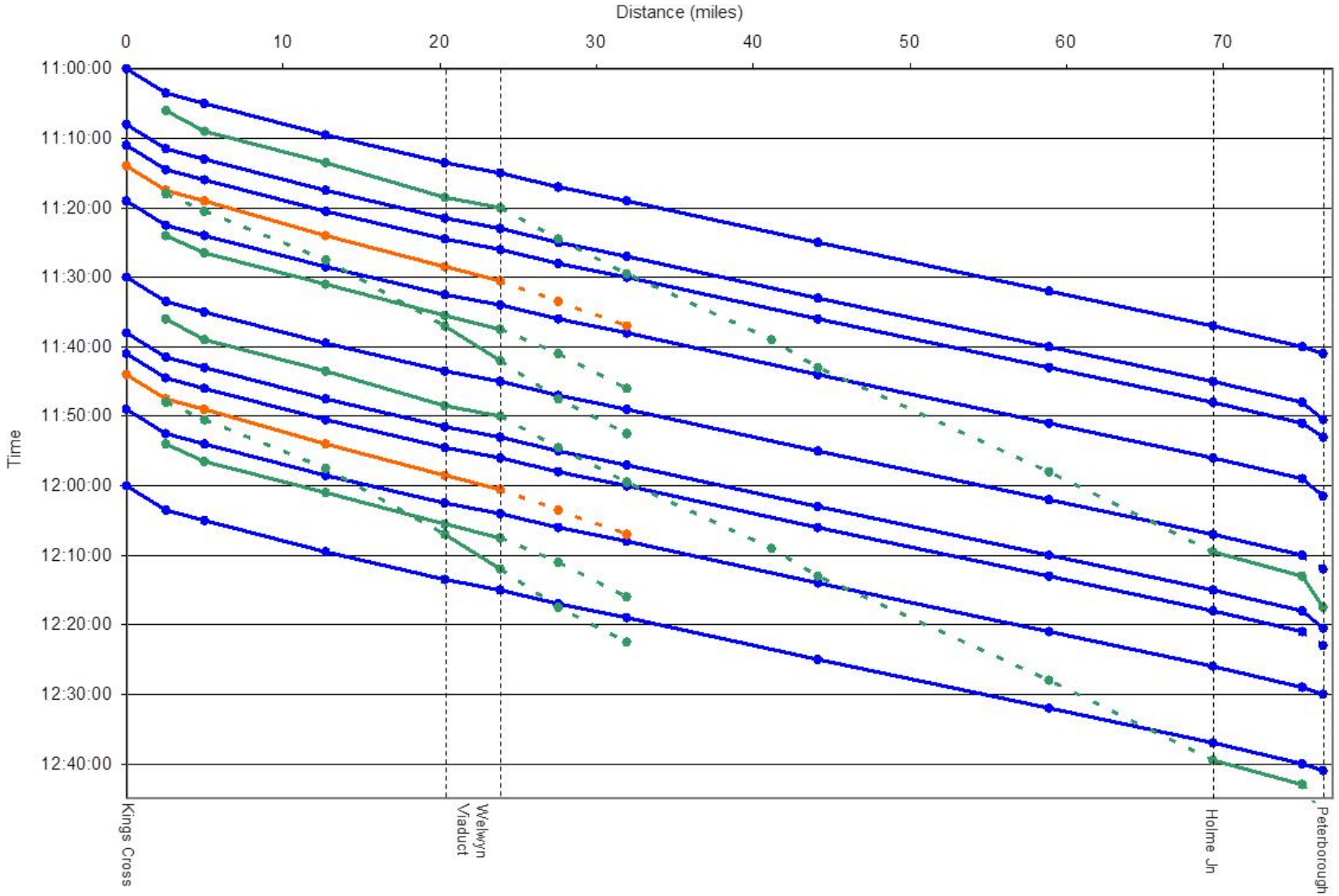

Figure 1: Down direction off-peak Option 1 standard hour

The advantage of this timetable structure is that an even interval 3 tph service could be introduced with the use of public/working timetable differentials. This would lead to departures to Scotland and the North East of xx.18, xx.38 and xx.58. To preserve an xx.00 Scotland departure, this would result in a loss of the exact 20-minute interval, leading to a pattern of xx.00, xx.19 and xx.38.

A pattern of Leeds departures could then use xx.11, xx.30 and xx.49 (or xx.09, xx.29 and xx.49 with public/working timetable differentials). The two 'spare' slots could then use xx.08 and xx.41 as required.

If the fast York, Newcastle & Edinburgh service departs at xx.00, the faster 390 tilting service must run in the xx.38 slot to avoid overtaking the xx.00 en route. The slower stopping service therefore runs at xx.19.

The Leeds services typically run 8-11 minutes in front of the next Scotland service. This leads to a constraint where they can typically only call at one or two intermediate stations south of Doncaster before being caught up by a Scotland train. There is an opportunity to be overtaken at Grantham (Down direction), Newark (Up direction) and Retford (both directions). However, this will lead to a journey time penalty of at least five minutes in the Leeds trains, which would not be conducive to achieving a desired sub 2-hour journey time, as well as posing a performance risk.

The alternative is a loss of connectivity along the Peterborough – Doncaster corridor, with trains unable to call at, for example, all of Peterborough, Grantham, Newark and Retford as today. This will make some journey opportunities much more difficult.

It should be noted that the timetable structure presented here does not have franchised services calling at Retford. To provide the call in franchised services would require swapping of intermediate calls, leading to loss of an even service interval for some stations and potential journey time extensions for following services (Retford calls use additional capacity due to the longer time taken to call because of the infrastructure layout).

Due to the restricted number of station calls which are achievable between London and Doncaster, it has not been possible to accommodate LDHS calls at Stevenage. This is discussed in more detail in section 3.4.4.

CHOICE: Within timetable Option 1, it is not possible to maintain current connectivity between Peterborough and Doncaster without overtaking other services, resulting in extended journey times to Leeds and a performance risk

Departure	Destination	Calling pattern
xx.00	Edinburgh	York, Newcastle
xx.08	Hull, Sunderland, Bradford etc.	Retford, Doncaster, York (as required)
xx.11	Leeds	Peterborough, Newark, Doncaster, Wakefield
xx.19	Edinburgh	Peterborough, Grantham, Doncaster, York, Northallerton, Darlington, Durham, Newcastle, Berwick
xx.30	Leeds	Peterborough, Wakefield
xx.38	Edinburgh	Newcastle
xx.41	York/Newcastle	Peterborough, Newark, Doncaster, York, TBC
xx.49	Leeds	Grantham, Doncaster, Leeds

Table 5: Option 1 Down direction service structure

This service structure (Table 5) provides a 20-minute service interval to Leeds and Edinburgh and a reasonable spread of calls at intermediate destinations. However, it is not possible to maintain current connectivity between all stations, particularly those between Peterborough and Doncaster.

3.2.2. Up direction

In the Up direction, the changes in timings to TSGN Peterborough trains in comparison to DTT 2011 make it more difficult to find paths that align on the Welwyn Viaduct and between Peterborough and Huntingdon. The optimal timetable pattern for LDHS cannot be used as this would be flighted together too much – meaning that the 20 minute pattern in the Down direction cannot be reproduced. Similar to the Down direction, the end result is paths which are moved to fit within the 20 minute cycle, giving three arrivals in the first half of the hour and five in the second half.

Origin	Arrival
York / Newcastle	11.08
Leeds	11.17
Edinburgh (slower service)	11.29
Leeds	11.36
Edinburgh	11.39
Sunderland, Hull, Bradford etc.	11.47
Edinburgh (tilting service)	11.50
Leeds	11.59

Table 6: Arrival times at King's Cross (Option 1 Up direction)

Note that although the Leeds services run in a 20 minute pattern, this is harder to achieve for the Edinburgh services due to the difference in speeds. In practice, the two fast trains are half-hourly at Edinburgh and (combined with other services) a 20 minute pattern is provided from York southwards.

Calling patterns and choices are identical to those shown for the Down direction (section 3.2.1).

Figure 2 shows the limited opportunities for aligning paths over Welwyn Viaduct and south of Peterborough.

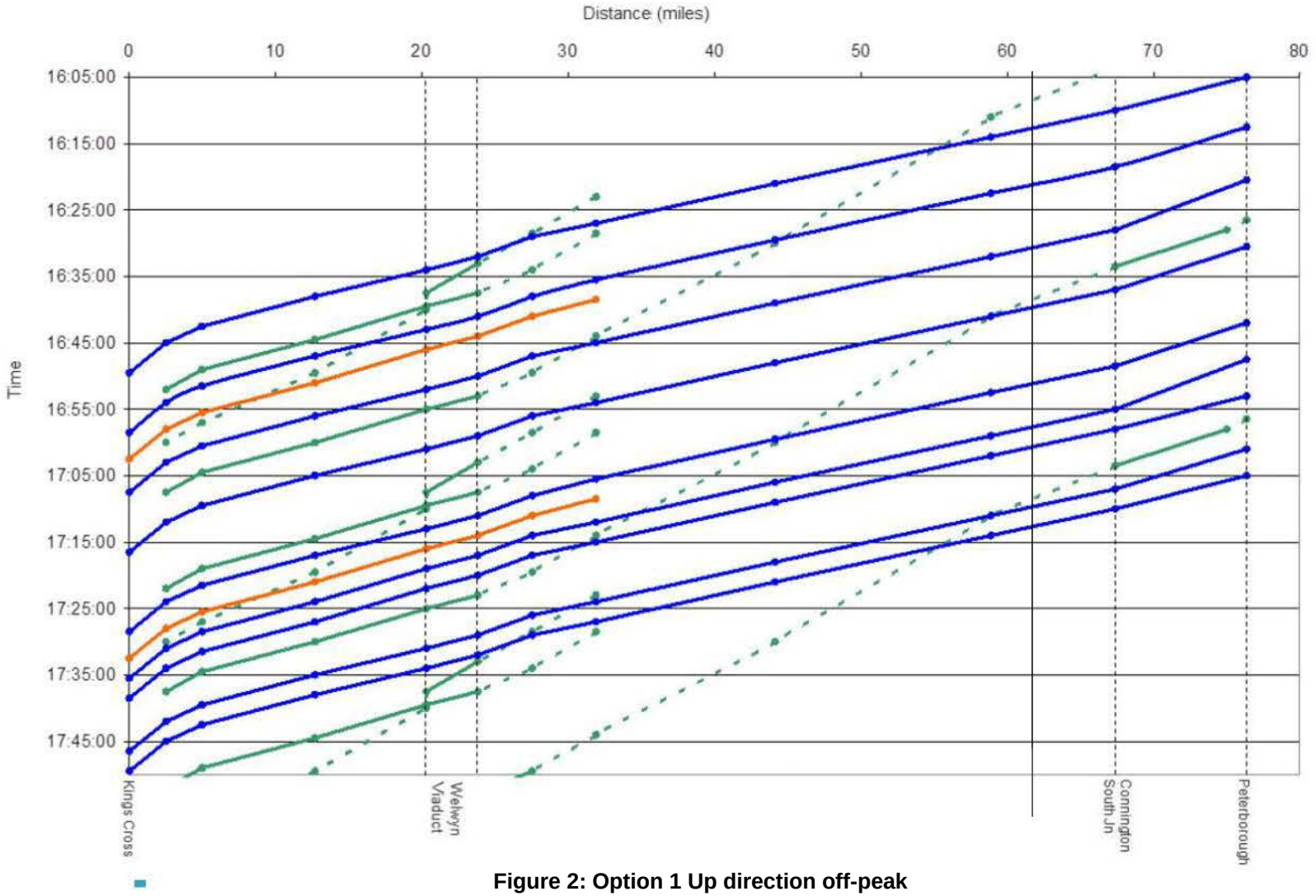

Figure 2: Option 1 Up direction off-peak

3.2.3. Peak timetable (Scenario C)

The key specification change for the peak is the addition of two TSGN King's Cross – Peterborough services. These services were not in a compliant path in the supplied TSGN timetable, so a new path has been found for these services close to the original timings.

Path	Off-peak departure	Peak departure
Edinburgh	xx.00	xx.00
Hull, Sunderland, Bradford etc.	xx.08	-
Leeds	xx.11	xx.07
Peterborough	-	xx.10
Kings Lynn	xx.14	xx.13
Lincoln / Hull	-	xx.17
Edinburgh	xx.19	xx.20
Leeds	xx.30	xx.30
Edinburgh	xx.38	xx.37
Peterborough	-	xx.40
York/Newcastle	xx.41	xx.47
Kings Lynn	xx.44	xx.43
Leeds	xx.49	xx.50

Table 7: Peak Option 1 changes

Table 7 shows the difference in departure times between the peak and off-peak service structures. The main change is a moving of LDHS paths to accommodate the TSGN peak Peterborough services. These additional services are constrained by the section between Huntingdon and Peterborough and the interactions between themselves and the TSGN Peterborough services from the Thameslink core.

The peak LDHS timings north of Doncaster are very similar to the off-peak and therefore the findings from the off-peak apply equally to the peak.

It should also be noted that, in the TSGN draft peak timetable, the Tattenham Corner – Cambridge service runs on the Fast Line between Finsbury Park and Welwyn Garden City. This is not possible and it must run on the Slow Line (per the off-peak and the DTT 2011 timetable) with pathing time or additional calls as appropriate. Otherwise, the level of Fast Line service is increased to 20 tph (as each train effectively uses two Fast Line paths), and significant journey time extensions and timetable restructuring is required to accommodate this. Running this service on the Fast Line would also present a performance risk due to trains slowing to cross for the call at Welwyn Garden City and being caught by a following

Fast Line train.

3.3. Option 2

As discussed in section 3.2, the Option 1 LDHS pattern contains compromises which results in a slightly sub-optimal service pattern in terms of connectivity. Option 2 attempts to find a solution to resolve the connectivity issue.

3.3.1. Down direction

Connectivity can be improved by adjusting the timetable to provide an xx.03 and xx.33 path, allowing better flighting of LDHS services.

This requires two minutes pathing time in the TSGN Peterborough trains (effectively putting them back onto an even 15-minute pattern) and an additional 3 minutes in the Huntingdon area (due to conflicts caused by the swapping of the Cambridge and Peterborough patterns). Table 8 shows the off-peak structure created by making these changes to the TSGN services.

Path	King's Cross	Finsbury Park	Woolmer Green Jn
LDHS	11.00	11/03 ½	11/15
LDHS	11.03	11/06 ½	11/18
TSGN Horsham - Peterborough		11.08	11/22
LDHS	11.10	11/13 ½	11/25
LDHS	11.13	11/16 ½	11/28
TSGN King's Cross – Kings Lynn	11.16	11/19 ½	11/32 ½
TSGN Brighton – Cambridge		11.24	11/37 ½
TSGN Tatt. Corner - Cambridge		11.18	11/42
LDHS	11.30	11/33 ½	11/45
LDHS	11.33	11/36 ½	11/48
TSGN Horsham - Peterborough		11.38	11/52
LDHS	11.40	11/43 ½	11/55
LDHS	11.43	11/46 ½	11/58
TSGN King's Cross – Kings Lynn	11.46	11/49 ½	12/02 ½
TSGN Brighton – Cambridge		11.54	12/07 ½
TSGN Tatt. Corner - Cambridge		11.48	12/12

Table 8: Option 2 Down direction off-peak paths

Comparison between Options 1 and 2 shows that the largest gap between consecutive LDHS services has increased from 11 minutes to 17 minutes. This will allow at least one additional call to be added in to the 11.13 and 11.43 paths to improve Peterborough –

Doncaster connectivity.

The starting point has been to make the xx.00 and xx.30 the fast Edinburgh services. Whilst there is no requirement for these to be half-hourly, these two paths have the largest gaps in front of them which will avoid them being slowed down following a stopping train or introducing additional overtaking moves.

The Leeds services have been added at xx.03 and xx.33 in order to provide a reasonably fast service to Leeds.

The disadvantage of this option is that although it provides 3 tph to Leeds and Newcastle/Edinburgh, it is not on an even interval. This is not such an issue for Edinburgh (as the purpose of the stopping train is to provide connectivity between intermediate stations and Newcastle/Scotland not for through London – Scotland journeys) and although less optimal for Leeds, the third path has been used to provide connectivity between Peterborough, Grantham and Newark, and between these stations and Leeds. A Retford call could be added to the xx.43 Leeds service to maximise connectivity, but this would require the train to be overtaken at Retford by the following Edinburgh train.

Calls at intermediate stations such as Newark are not as well spread as Option 1, but connectivity between stations is improved. Stevenage calls have not been accommodated as in Option 1; further information is given in section 3.4.4.

Departure	Destination	Calling pattern
xx.00	Edinburgh	York, Newcastle
xx.03	Leeds	Peterborough, Retford, Doncaster, Wakefield
xx.10	Hull, Sunderland, Bradford etc.	Grantham, Doncaster, York (as required)
xx.13	Edinburgh	Peterborough, Doncaster, York, Northallerton, Darlington, Durham, Newcastle, Berwick
xx.30	Edinburgh	Newcastle
xx.33	Leeds	Peterborough, Newark, Doncaster
xx.40	York/Newcastle	Peterborough, Doncaster, York, TBC
xx.43	Leeds	Peterborough, Grantham, Newark, Doncaster, Wakefield

Table 9: Option 2 Down direction off-peak service structure

3.3.2. Up direction

In the Up direction, pathing time for TSGN services is not required. Calling patterns for LDHS services are the same as the Down direction, and the arrival times at London are shown in Table 10.

Origin	Arrival
Leeds (slower service)	xx.03
Leeds	xx.06
Sunderland, Hull, Bradford etc.	xx.09
York / Newcastle	xx.16
Leeds	xx.33
Edinburgh (slower service)	xx.36
Edinburgh	xx.39
Edinburgh (tilting)	xx.46

Table 10: Arrival times at King's Cross (Option 2 Up direction)

The three Edinburgh services arrive at London quite close together. This is due to the speed differential meaning they are much more equally spaced at origin (depending on the precise stopping pattern implemented).

Figure 3 illustrates the difference in Up direction structure between Option 1 (Figure 2) and Option 2. As there is not a requirement for a 20-minute interval from key destinations, services are more flighted between Peterborough and London. This requires fewer amendments to TSGN services.

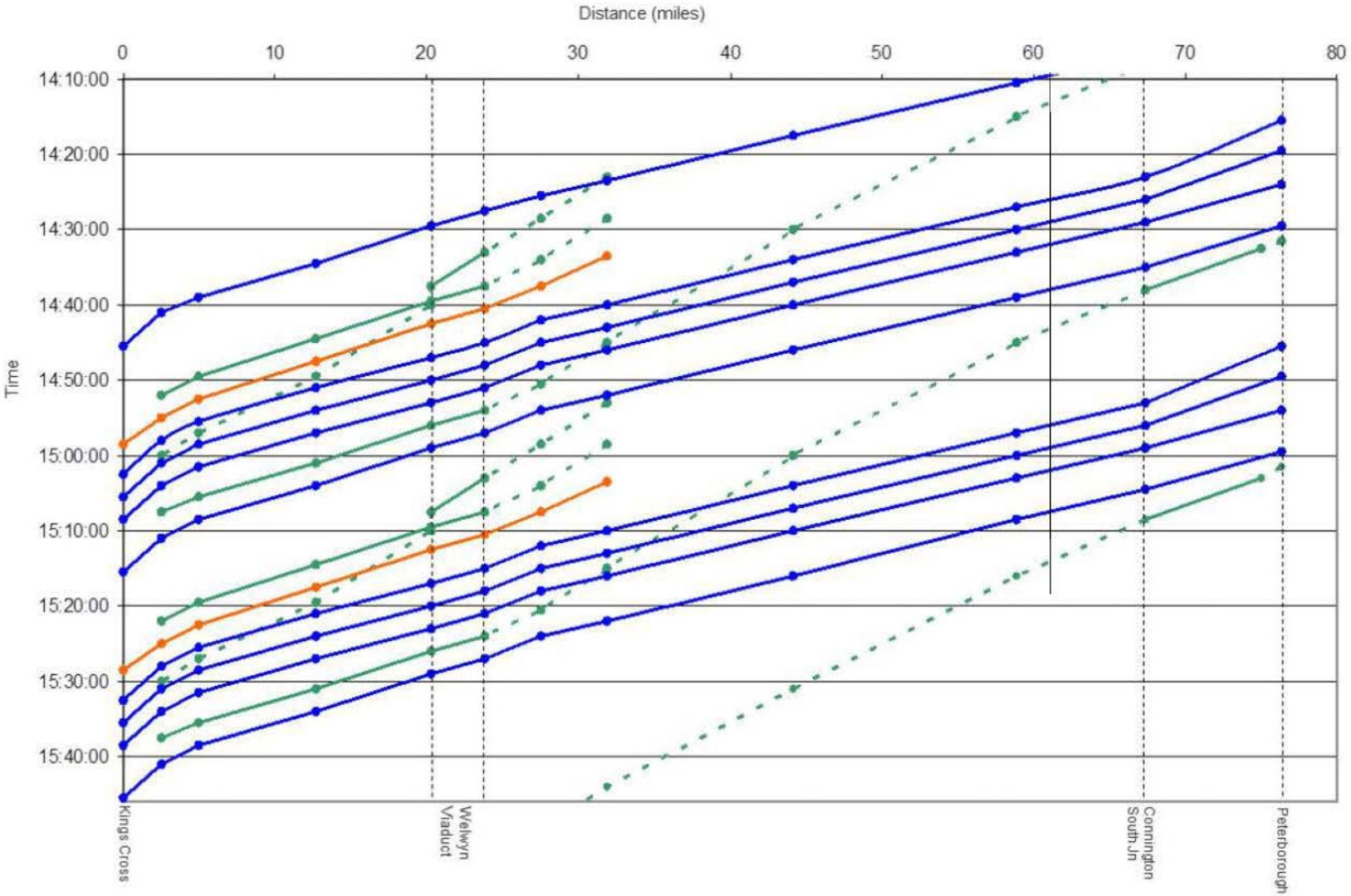

Figure 3: Option 2 Up direction off-peak

3.3.3. Peak timetable (Scenario C)

The peak timetable changes more compared to the off peak than in Option 1 (Table 11).

Path	Off-peak departure	Peak departure
Edinburgh	xx.00	xx.00
Leeds	xx.03	xx.03
Peterborough	-	xx.08
Sunderland / Bradford / Hull etc.	xx.10	-
Edinburgh	xx.13	xx.19
Lincoln / Hull	-	xx.16
Kings Lynn	xx.16	xx.11
Edinburgh	xx.30	xx.30
Leeds	xx.33	xx.33
Peterborough	-	xx.38
York/Newcastle	xx.40	xx.46
Leeds	xx.43	xx.49
Kings Lynn	xx.46	xx.41

Table 11: Peak Option 2 changes

These changes are primarily driven by the TSGN King's Cross – Peterborough service. The pattern for this train is that it runs non-stop from London before making its first call at Sandy or Biggleswade. It therefore must run fast enough for it to overtake the Thameslink Core – Peterborough train before calling on the Slow line and running ahead of the Thameslink train to Peterborough. A better calling pattern for LDHS in the peak would result if the King's Cross train ran later; this however would conflict with the Thameslink Core train and there would not be an available path over the 2-track section between Huntingdon and Peterborough.

The changes to stopping patterns required to accommodate this would mean that the exit times from the Doncaster 2-track section would be similar for the off-peak and the findings from the off-peak timetables also apply here.

The comments noted in section 3.2.3 for the Tattenham Corner – Cambridge service needing to be routed on the Slow Lines south of Welwyn Garden City also apply here.

3.4. LDHS Findings

This section summarises the key findings for LDHS service patterns. Section 4 explores the interactions of these service patterns with other services on the route in more detail.

3.4.1. Service structures

Two timetable structures have been found to be viable; a 20-minute service pattern to key destinations with poorer connectivity or a 30-minute service pattern with better connectivity.

CHOICE: The proposed 8 tph timetable structure can be implemented by providing either a 20-minute or 30-minute timetable service pattern.

3.4.2. 8 tph service pattern

This analysis has found that a viable 8 tph service pattern is possible on the south end of the route. The impact of this service pattern on other services and on performance is considered later in this report in sections 4 and 5. On the south end of the route, there is limited difference between a 7 tph and 8 tph service due to the symmetrical nature of the timetable south of Peterborough driven by the repeating Thameslink service pattern. The performance impact of 8 tph is considered in section 6.1.

3.4.3. Fast Edinburgh service

This analysis has found potential paths for a fast (i.e. tilting Class 390) Edinburgh path within the 8 tph timetable structure. The performance impact and impact on other services is considered later in this report in sections 5, 6 and 7.

In order to provide a better spread of services, the two faster services have been timed to be approximately 20-minutes or half hourly at origin (depending on option). The alternative would be to flight trains closer together, which may be less attractive to passengers and have implications for revenue.

Having two fast trains evenly spaced is a constraint on the timetable structure and must result in services being overtaken en route. Figure 4 shows this for Option 2, where the slower Edinburgh service is overtaken at York by the faster Edinburgh train.

CHOICE: With two fast Edinburgh services, they either need to be flighted closely together or it is necessary to overtake other LDHS services

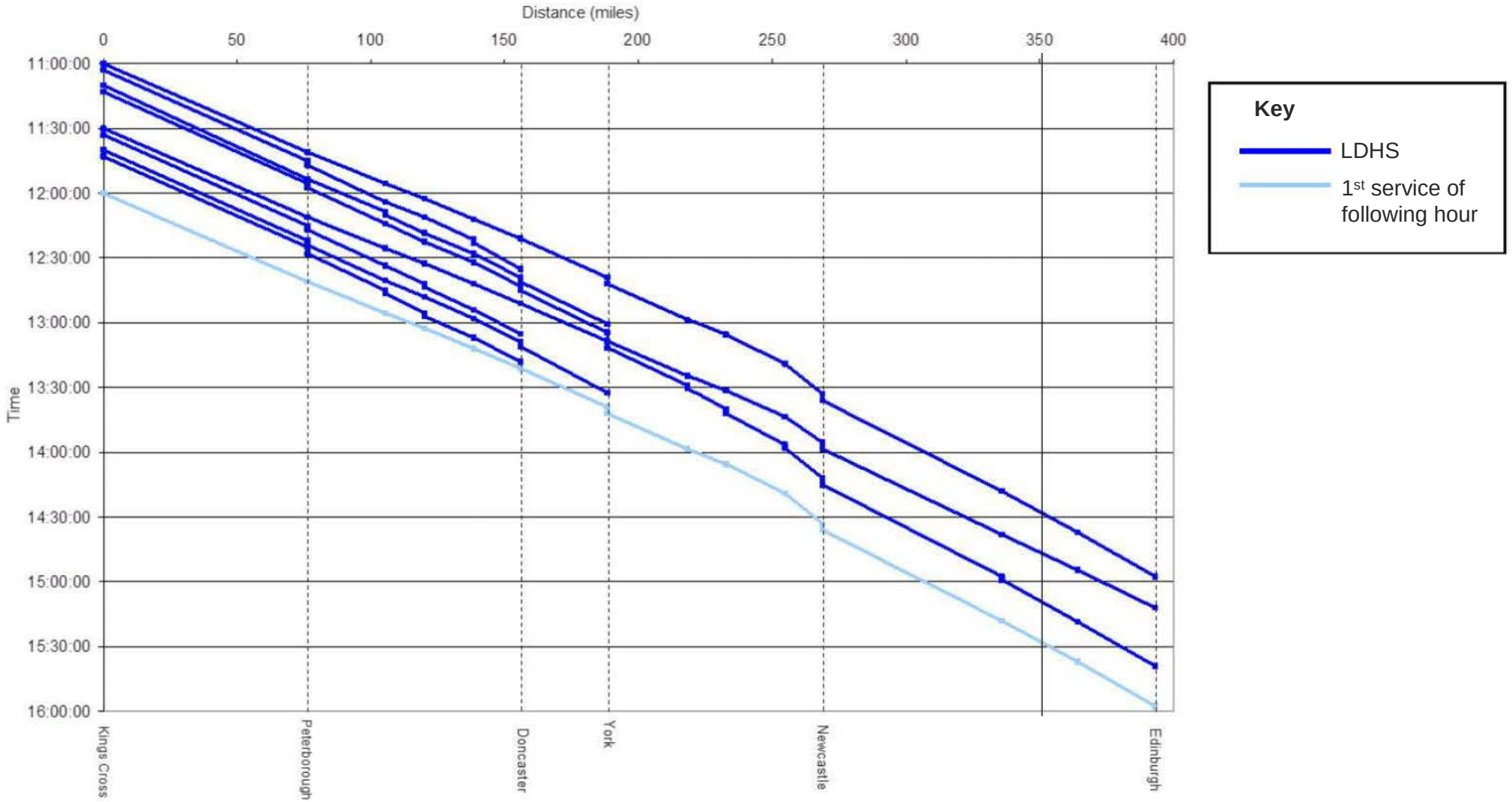

Figure 4: Option 2 timetable extended to Edinburgh

3.4.4. Stevenage

Due to the constrained nature of the timetable, it is difficult to accommodate LDHS Stevenage calls.

In Option 1, the call could be accommodated in several of the services such as the xx.11, xx.19, xx.41 or xx.49 (assuming it is not put in the faster Edinburgh services). However, the limited connectivity between Peterborough and Doncaster has been discussed previously, and the constrained nature of the timetable means that a Stevenage call would likely have to be at the expense of another call in this section (e.g. swapping Stevenage for Peterborough), further limiting connectivity.

In Option 2, the call could only be added into the trains at the end of the flight. It is not possible to add this to the xx.03 and xx.33 trains as this would need these trains to follow the Peterborough trains over the Huntingdon – Peterborough 2-track section; however, to avoid impact on the following flight of trains, this would need to be instead of the Peterborough call. This is not possible as the train would be caught behind the stopping Thameslink train at Peterborough. The call could be added to the xx.13 Edinburgh train, but this would extend journey times for this train and require it to be overtaken at Doncaster rather than York which would have an impact on platform capacity. The call could be added to the xx.43 service, but this would need to be instead of another call between Peterborough – Doncaster, reducing the connectivity which is the main benefit of Option 2.

There is opportunity to accommodate Stevenage calls within the 7 tph timetable structure (section 3.5) due to the better spacing of trains and the more uniform running times (as there are not two fast services half-hourly apart).

CHOICE: Either Stevenage calls are not provided in LDHS services or further changes to calling patterns between Peterborough and Doncaster are required, leading to reduced connectivity and extended journey time for some LDHS services.

3.4.5. Journey times

Table 12 shows approximate journey times for key destinations for Options 1 and 2 compared to today. A journey time reduction is shown for most destinations.

There are not any significant differences between Options 1 and 2. This is because the ‘headline’ services (e.g. fast Edinburgh trains) have similar-type paths in both. The connectivity in Option 2 is provided by the use of a mix of fast trains and slower trains ‘off-pattern’ picking up the stops. Therefore, connectivity is better in Option 2 but journey times

are maintained as the faster trains have fewer stops, per Option 1.

Sample Fastest JT	Typical Off-peak Today	Option 1 (20 minute)	Option 2 (30 minute)
Doncaster	Down: 1 hr 34 Up: 1 hr 37	Down: 1 hr 31 Up: 1 hr 31	Down: 1 hr 30 Up: 1 hr 31
York	Down: 1 hr 51 Up: 1 hr 52	Down: 1 hr 39 Up: 1 hr 44	Down: 1 hr 39 Up: 1 hr 42
Newcastle	Down: 2 hr 50 Up: 2 hr 51	Down: 2 hr 26 Up: 2 hr 28	Down: 2 hr 26 Up: 2 hr 28
Edinburgh	Down: 4 hr 22 Up: 4 hr 21	Down: 3 hr 44 Up: 3 hr 44	Down: 3 hr 44 Up: 3 hr 45
Leeds	Down: 2 hr 11 Up: 2 hr 12	Down: 1 hr 56 Up: 1 hr 59	Down: 2 hr 00 Up: 2 hr 01

Table 12: Indicative journey times. Option 1 and 2 times include pathing and engineering allowance, but not performance allowance. These numbers are approximations and exact numbers will depend on the final choices decided upon

3.5. LDHS 7 tph options (Scenario A)

Alongside the 8 tph LDHS options discussed in this section, a 7 tph LDHS option was also considered. This option is based on a hybrid of the paths identified for 8 tph Options 1 and 2. One of the key benefits of this option is greater capability to add additional stops to provide connectivity (using the capacity that would otherwise be used for the 8th path). This does require the use of the xx.03 and xx.33 paths to maximise connectivity by flighting of trains, therefore the choices around the TSGN service highlighted as part of Option 2 also apply here (section 3.3).

The service structure and calling patterns identified here are almost identical to those identified for the ECML Connectivity workstream which was developed around a 7 tph

service. For the Down direction, this is shown in Table 13.

Departure	Destination	Calling pattern
xx.00	Edinburgh	York, Newcastle, Berwick/Dunbar/Alnmouth
xx.03	Newcastle	Peterborough, Grantham, Newark, Doncaster, York, Northallerton, Darlington, Durham
xx.10	Hull, Sunderland, Bradford etc.	Grantham, Doncaster, York (as required)
xx.19	Leeds	Stevenage, Peterborough, Doncaster
xx.30	Edinburgh	Peterborough, Doncaster, York, Darlington, Durham, Newcastle, Berwick/Dunbar/Alnmouth
xx.33	Leeds	Peterborough, Grantham, Newark, Retford, Doncaster, Wakefield
xx.49	Leeds	Peterborough, Doncaster, Wakefield

Table 13: Sample 7 tph Down direction service structure

As well as the additional connectivity, the 7 tph service level is also likely to have a positive performance impact (section 7.4). However, the disadvantages include the loss of a fast service to Edinburgh and increased journey times to Edinburgh and Newcastle (assuming the 8th path is the fast Edinburgh service tested here).

South of Peterborough, the choices discussed in section 3.1 will be similar for 7 tph and 8 tph. This is because of the symmetrical nature of the timetable on the route meaning that the 7 tph service is equivalent to 8 tph service structure with one path removed.

The better spacing of services and the reduced speed differential (as the xx.30 path is a stopping service rather than a fast non-stop train) means it is possible to accommodate a station call at Stevenage, something it was not possible to do within the 8 tph timetable structure without reducing the level of calls elsewhere.

North of York, the level of London LDHS is likely to be similar between 7 tph and 8 tph options (depending on the exact level of service to Newcastle and Edinburgh in the 8 tph option) meaning that the choices are also likely to be similar. The main difference will therefore be between Peterborough and York in terms of performance and impact on other services.

CHOICE: A 7 tph service pattern can offer better connectivity (and potentially more performance resilience), but means slower journey times and less frequent fast services to Newcastle and Edinburgh

4. Section by section

This section will consider, section by section, the choices around the implementation of the LDHS service structure as discussed in Section 3 and the interaction with the other services using the route.

4.1. King's Cross – Peterborough

Table 14 shows a breakdown of the ITSS for the section of the ECML between King's Cross and Peterborough. Only services that affect the Fast Lines are shown.

	From	To	Timing Load	Trains per hour
LDHS	King's Cross	North	IEP, 390	8 tph
London Suburban	Horsham (via Thameslink Core)	Peterborough	700	2 tph
	Tattenham Corner (via Thameslink Core)	Cambridge	700	2 tph
	Brighton (via Thameslink Core)	Cambridge	700	2 tph
	King's Cross	Kings Lynn	365	2 tph
	King's Cross	Peterborough	365	2 tph (peak only)
Freight	London	Doncaster/ Wakefield/ Selby	Class 4, 1800t	1 tph (off peak only)
	London	Doncaster	Class 6, 1800t (electric) or 2600t (diesel)	2 hourly (off peak only)

Table 14: ITSS for the section of the route King's Cross – Peterborough (services affecting fast lines only)

4.1.1. LDHS service structure

Both LDHS timetable options, as discussed in sections 3.2 and 3.3 are developed around the available paths over Welwyn viaduct and extrapolated back to give departure times from King's Cross, and forward to determine the timetable structure north of Peterborough.

Option 1 – The departure times of the 8 LDHS paths are relatively evenly spread out, with limited flighting. This leads to a potential 20 minute departure to Leeds and Edinburgh.

In the Down direction the xx.08 LDHS departure requires 1½ minutes of pathing time before Peterborough in order to achieve the minimum headway behind a Thameslink service terminating at Peterborough.

In the Up direction the LDHS services in this option don't have an even half hourly pattern.

In order to achieve an approximately 20 minute pattern the LDHS paths have been split such that three arrive in the first half of the hour and five in the second. This makes it easier to accommodate the stopping patterns and service intervals required. Some services have up to 1 minute of pathing time to path trains amongst TSGN Main Line services south of Hitchin.

Option 2 – In this option there is more flighting with the LDHS paths, in both the Up and Down directions. In the Down direction there are four flights of trains (xx.00/xx.03, xx.10/xx.13, xx.30/xx.33 and xx.40/xx.43). In the Up direction the 8 LDHS paths are flighted in two groups of four between Peterborough and King's Cross.

In the Up direction two of the paths have an additional 1 minute of added time south of Welwyn Garden City. This is in order to maintain the headway with the slower Peterborough – Horsham service running in front of them.

In both timetable options, peak and off-peak, no LDHS stop is included at Stevenage. This is discussed in further detail in section 3.4.4.

Peak

As discussed in sections 3.2.3 and 3.3.3 the peak departure times in both options are slightly different from the off peak times.

In both timetable options the LDHS paths in the peak require more pathing time than in the off-peak. Due to the additional King's Cross – Peterborough services in the peak it is necessary to path the LDHS paths between King's Cross and Woolmer Green Jn to ensure that they run the same speed as the Thameslink trains to maintain the headway and achieve the maximum number of paths.

In Option 1 the xx.17 and xx.20 departures and in Option 2 the xx.16 and xx.19 departures also require 1½ minutes of pathing time on approach to Hitchin. This is to provide a sufficient junction margin with the peak King's Cross – Peterborough train which crosses to the Slow Line at Biggleswade ahead of these LDHS services.

4.1.2. Impact of LDHS service structure

It is possible to achieve the full service specification on this section of the route as outlined in the ITSS (Table 14). However, in the peak hours Welwyn Viaduct is at full capacity, when 10 Thameslink services and 8 LDHS services run. In the off-peak with 8 Thameslink and 8 LDHS the viaduct is at high capacity. The performance implications are discussed further in section 6.1.

The level of service south of Peterborough must also be considered in the context of the

ETCS implementation within the same timescales. Any capacity issues and opportunities arising from ETCS should factor in the proposed levels of service highlighted here.

In order to achieve the two different LDHS timetable options some alterations have been made to the Thameslink services.

Option 1 – In the Down direction 2 minutes of additional time is required in the Horsham – Peterborough services in order to achieve a compliant path between LDHS services on the 2-track section between Holme Junction and Fletton Junction. The additional time is added as extended dwell at Huntingdon as opposed to pathing time.

In the Up direction the Peterborough – Horsham service requires 4 minutes of additional time in order to achieve a path on the two track section between Fletton Junction and Connington South Junction. This assumes the 4-tracking between Woodwalton Junction and Huntingdon, without the 4-tracking further additional time (approximately 3 minutes) would be required in the Peterborough – Horsham train.

Option 2 – In order to achieve two LDHS paths flighted together from King's Cross at xx.00 and xx:03 and xx:30 and xx:33, the Horsham – Peterborough services have an extended dwell time at Finsbury Park of 3 minutes to run after the second LDHS path. This option also requires 3 minutes of additional time on approach to Holme Junction in order to avoid conflict on the 2 track section due to the changed timings of the Peterborough trains.

In comparison to Option 1, the Up Peterborough – Horsham services do not require any additional time.

CHOICE: The revised TSGN service structures provided do not align exactly with optimal LDHS paths. Pathing time (and therefore extended journey times) or amendment to the structure of either service group is required.

In both of the timetable options it has been found that the upgrade of the Down Slow line between Fletton Junction and Peterborough is required. This is in order to allow for a LDHS service following a Thameslink train terminating at Peterborough to run behind it on the Down slow line and undertake it.

CHOICE: The Peterborough Down Slow upgrade is required to avoid pathing time in LDHS services and also reduces performance risk in the Peterborough area

In order to turnback at Peterborough the Thameslink services slow on the Down Fast line before crossing over the Up fast line to use Platform 1 or 2. On approach to Peterborough the terminating services also require 2 minutes of engineering time. Upgrading the Down Slow line would allow a following LDHS service to turn off the Fast Line at Fletton Junction and call at Platform 4 via the Slow Line at Peterborough, without the need for additional

time to keep the LDHS behind the terminating Thameslink train. This leads to a pattern of a LDHS service calling at Peterborough following behind terminating Thameslink train.

In one case this pattern is not applied and some pathing time is added into a LDHS service on approach to Peterborough, as mentioned previously in 4.1.1.

Similarly, in the Up direction it has been necessary for some LDHS services calling at Peterborough to use Platform 1 and to run on the Up Slow line to Fletton Junction to avoid conflicts with Thameslink trains using Platform 2 for turnround to London (thereby providing a parallel move).

Two freight paths can be accommodated in this section of the route, joining the ECML at Langley Junction from the Hertford Loop. In order to deliver the second (heavy Class 6) freight path is has been found that 4-tracking between Woodwalton Junction and Huntingdon is necessary.

4.2. Peterborough – Doncaster

	From	To	Timing Load	Trains per hour
LDHS	London	North	IEP, 390	8 tph
Interurban	Norwich (ECML between Peterborough and Grantham)	Liverpool	158	1 tph
Local	Peterborough	Spalding/ Lincoln	156	1 tph
	Leicester	Lincoln (over Newark Flat Crossing)	156	1 tph
	Nottingham	Lincoln (over Newark Flat Crossing)	156	1 tph
Freight	London	Doncaster/ Selby/ Wakefield/ Stourton (via GN/GE Joint Line)	Class 4, 1800t	1 tph
	London	Doncaster	Either Class 6, 1800t (electric via Grantham) Or Class 6, 2600t (diesel via GN/GE Joint Line)	2 hourly
	West Midlands	Immingham	Class 6, 2200t (Eastbound) Class 6, 3000t (Westbound)	1 tph

Table 15: ITSS Peterborough - Doncaster

4.2.1. LDHS service structure

The stopping patterns of the LDHS services in this section of the route are dictated by the LDHS service structure, as discussed in section 3.

Figure 5 illustrates this for Option 1. In this option, the lack of flighting of LDHS services can be seen, which necessitates flighting of stops in consecutive services (e.g. first service calls at Retford, second at Newark and third at Grantham) limiting connectivity. The lack of spare capacity for pathing freight services with this stopping pattern can be seen.

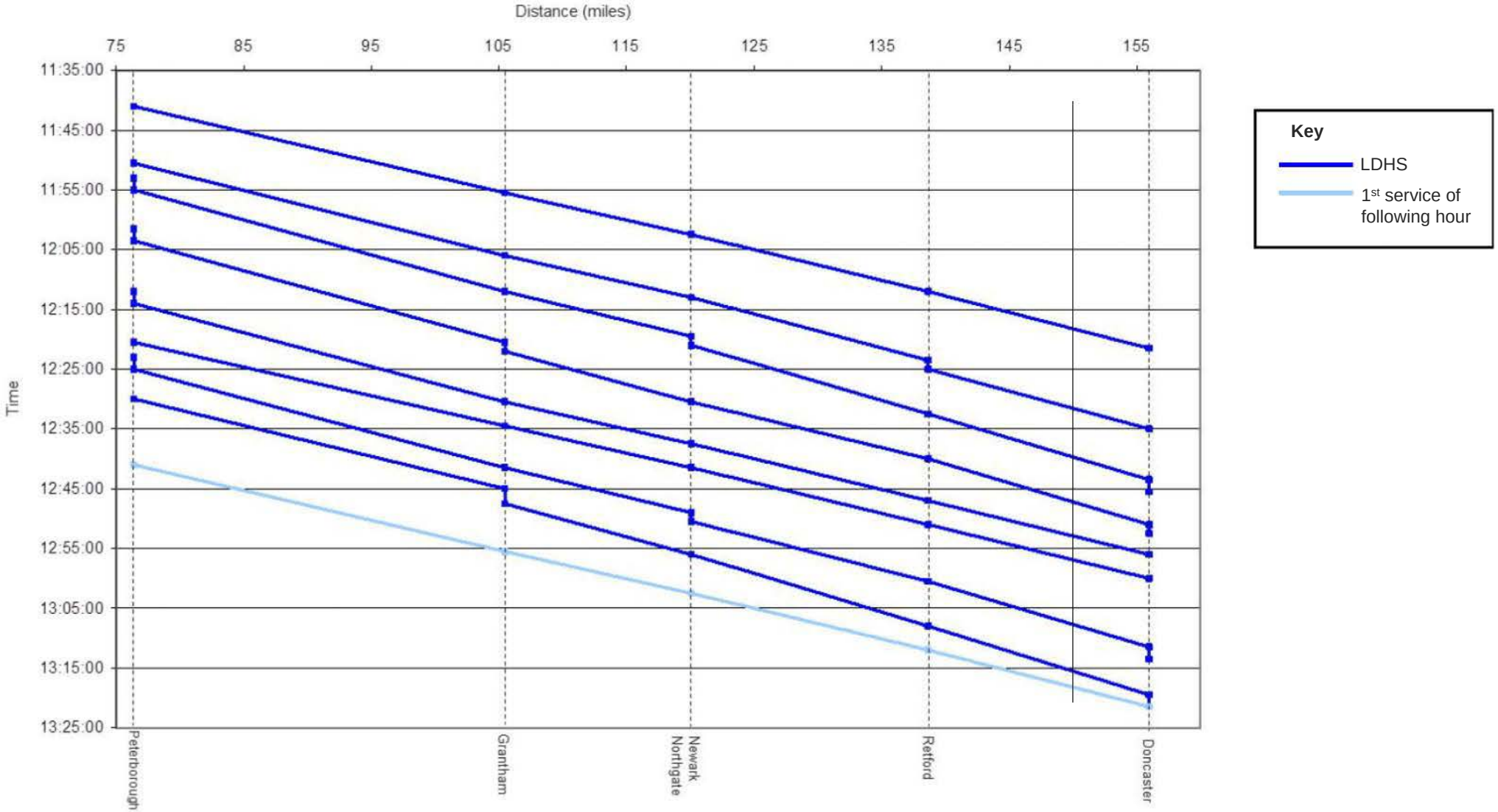

Figure 5: Peterborough - Doncaster stopping patterns (Option 1 shown)

4.2.2. Impact of LDHS

It is possible to accommodate two freight paths from Peterborough to Werrington Junction, where they join the GN/GE Joint Line. It is not possible to accommodate the electric class 6 freight path *via* Grantham on the main line alongside the 8 LDHS paths. Reduction to 7 LDHS paths over this section would provide additional capacity which may enable this service, as would altering calling patterns to maximise potential freight capacity (which would negatively impact connectivity and potentially journey times). Class 4 paths run via the Main Line today, however they typically utilise additional capacity offered when a LDHS terminates at Newark.

The Norwich – Liverpool interurban service runs on the ECML between Grantham and Peterborough between the LDHS paths. Altering the LDHS paths has resulted in conflicts between the LDHS and this service; the Up direction is particularly difficult as this service makes crossing moves at both Grantham and Peterborough. For both timetable options paths have been found between Peterborough and Grantham in both directions, but these are at slightly differing timings to current paths to take into account the changed LDHS patterns. These are as follows.

Option 1 – The Down train departs Peterborough at approximately the same time as current, but requires 2½ minutes pathing time on the Slow Line approaching Stoke Junction in order to achieve its path to Grantham. The departure time of the Up direction train from Grantham depends on the time of the Down train at Grantham due to the single lead to Nottingham Branch Junction. The later arrival time of the Down train therefore causes the Up train to depart later, at xx.14 ½. The arrival time of the Up train at Peterborough is then also approximately 4 minutes later than current. The margin in this timetable at Peterborough is ½ minute short of the compliant margin between the two Up LDHS services arriving at Peterborough as this path arrives in the middle of a flight of LDHS services.

Option 2 – In the Down direction the path is approximately the same as current. In the Up direction 6½ minutes of pathing time is required between Grantham and Peterborough to achieve the necessary junction margins and capacity over Stoke summit.

Altering the timings of this service further and/ or using a higher-performing rolling stock for this service could achieve a better path on the ECML. 100mph or 110mph rolling stock with a better ability to maintain speed up the gradients around Stoke Summit would provide a benefit.

A possible option to improve the path is for the Down Norwich – Liverpool service to depart Norwich later. The timetable at Ely North Junction is required to be altered due to F2N and

TSGN service changes, and this train has a large dwell time at Nottingham above that required for splitting/joining as well as additional pathing time. Therefore, moving the train later could absorb some of this excess time and provide a better path on the ECML (and better journey times). Similarly it may be possible for the Up direction train to depart earlier from Nottingham, reducing the dwell there and removing pathing, and achieving an earlier path on the ECML. This would change the single lead junction conflict to the other way around – the Down train following the Up train. Initial analysis on the Options here suggests that there are gaps large enough between the LDHS services at these times to achieve this.

CHOICE: Changes are required to the Liverpool – Norwich service if the LDHS paths are changed. This may take the form of changing the timings of these trains between Norwich and Nottingham, or providing higher performing rolling stock.

At Newark flat crossing there is capacity for 3 Nottingham – Lincoln paths per hour. In both LDHS timetable options, one path is broadly the same as current, another approximately 30 minutes from the current and the third in between the two. This would deliver the ITSS specification of two passenger and one freight service over the flat crossing. In most cases, the crossing moves are on minimum margins; the performance risk of increasing services on both routes over the flat crossing are discussed in section 6.1.

In Option 1 these paths are achieved with minimal alterations to the LDHS paths, but in Option 2 one of the Up Leeds trains requires 4 minutes of pathing time south of Newark to accommodate the third path at Newark flat crossing.

CHOICE: In timetable Option 2 a 3rd path across Newark Flat Crossing is achievable if pathing time (and hence extended journey time) is added to one of the Up Leeds trains.

4.3. Doncaster – York

	From	To	Timing Load	Trains per hour
LDHS	London	North	IEP, 390	5 tph
	Reading	Newcastle	221	1 tph
Local	Sheffield	Hull	319	1 tph
Freight	London	Selby	Class 4, 1800t	1 tph
	London	Millerhill	Class 4, 1800t	1tph

Table 16: ITSS Doncaster - York

4.3.1. LDHS

North of Doncaster, the peak timetables produced for both options have similar timings and service structures to the off-peak timetables. Therefore all findings north of Doncaster are based on the off-peak timetables but the findings are applicable to both peak and off-peak service structures. Services have not been tested alongside 'local' peaks where these do not overlap with the London peak (e.g. at Doncaster or Newcastle).

4.3.2. Impact on other services

In both timetable options the timings of the new LDHS paths do not align with the timings of the other services at Doncaster station. These services, particularly those crossing the ECML at Doncaster, are timed around the LDHS paths. As the timings of LDHS paths fundamentally change, this will present an opportunity to rewrite the Doncaster area timetable (including taking advantage of ECML Connectivity infrastructure). For example, the path of the Reading – Newcastle cross-country service could be significantly improved by the removal of pathing time approaching Doncaster.

CHOICE: Significant changes to the LDHS service structure will require a timetable rewrite for local and interurban services in the Doncaster area.

It should also be noted that Doncaster represents a crucial node for infrastructure and network trains. These requirements (alongside those with the proposed new IEP depot at Doncaster) should be fully captured in any timetable rewrite.

Not all of the other services outlined in the ITSS for the Doncaster area are included in the timetable attached in the appendix, however previous studies (references 1-3) have shown that there is sufficient capacity alongside the 8 LDHS paths to accommodate all the services.

It is possible to achieve the required passenger and freight specification in the section of the route between Doncaster and York without any other significant issue. The capacity constraint is in the speed differential between passenger and freight paths (which have been achieved per the ITSS); the remaining freight and passenger services running part of the route can be accommodated alongside these core paths.

The Reading – Newcastle cross-country service joining the ECML at Doncaster can be accommodated without addition of extra time. This path has been included in its current position (with removal of pathing time where possible); however, the ECML 2020 timetable may prove a catalyst to find a better path alongside planned changes elsewhere on its route (such as Birmingham, Derby and Sheffield).

Option 1 – In the Down direction the Reading – Newcastle service arrives at Doncaster in the same timings as current. Its dwell time at Doncaster has been extended by 5 minutes to depart at xx:24 ½ behind the xx.00 LDHS departure from King's Cross. This means that it arrives later at York, however there is currently an extended dwell at York that can absorb the late arrival and hence the timings north of York do not need to be changed.

In the Up direction the Newcastle – Reading service runs in the same path as currently.

Option 2 – In the Down direction the Reading – Newcastle service is able to arrive and depart Doncaster 3 minutes earlier than in the current timetable. This is possible by removing some of the pathing time before arrival at Doncaster in the current timetable. This train then runs to York in between the xx.40 and xx.00 LDHS services. At York this service is required to be overtaken, therefore the extended dwell time in the current timetable is still necessary.

In the Up direction it is necessary for the Newcastle – Reading service to depart Newcastle, and arrive at Doncaster earlier to avoid conflict with the Leeds – King's Cross service arriving Doncaster at xx.55. This gives a longer journey time by approximately 3 minutes.

4.4. York – Newcastle

	From	To	Timing Load	Trains per hour
LDHS	London	Newcastle	IEP	1 tph
	London	Edinburgh	IEP, 390	3 tph
	Plymouth	Glasgow	221	1 tph
	Reading	Newcastle	221	1 tph
Interurban	Liverpool	Edinburgh/ Glasgow	380	1 tph
	Liverpool	Newcastle	380	1 tph
	York	Middlesbrough	158	1 tph
Freight	Doncaster	Millerhill	Class 4, 1800t	1 tph
	Drax/ Eggborough	Tyne Dock/ Carlisle	Class 4, 800t (Down) Class 6, 2600t (Up)	1 tph
	Doncaster/ Teesside (via Tursdale Jn)	Scotland	Class 6, 2600t	1 tph

Table 17: ITSS York - Newcastle

4.4.1. LDHS

In both timetable options the slow Edinburgh path is required to be overtaken by the fast Edinburgh (Class 390) service at York due to the speed differential. This requires an extended dwell for the overtaken train at York and causes a possible performance risk (section 6.1).

4.4.2. Impact

There is a very high level of passenger service in the ITSS, as shown in Table 18.

Service Group	Today	Connectivity Workstream	ITSS
London LDHS	2	3	4
Cross-country LDHS	2	2	2
Interurban passenger	1	1	2
Class 4 Freight	Varies, but typically 1-3 paths per hour	0 – 1	0 - 1
Class 6 Freight		1	1 (north of Tursdale)

Table 18: Current and specified services between Northallerton and Newcastle

It has been found that there is insufficient capacity to run the level of both passenger and freight, as given in the ITSS.

There are a number of ways the specification may be reduced to that which is more achievable. One potential way to deliver this is:

- London LDHS. The ITSS shows three trains to/from Edinburgh (two fast, one stopping) and a stopping train to Newcastle. It is proposed the Newcastle train should only run as far as York (the slower Edinburgh and Newcastle trains have similar stopping patterns York – Newcastle so there is no impact on connectivity). In practice, this train could be extended to other destinations beyond York which do not run beyond Northallerton (such as Harrogate, Scarborough or Middlesbrough) depending on rolling stock.
- Interurban and cross-country passenger. The specification shows one train *via* Doncaster and three trains *via* Leeds (one from the South West and two from Liverpool / Manchester). It is proposed that only three of these services be included. This is in line with the ITSS, where there are options for either a Liverpool train or the South West cross-country train to terminate at Leeds. This gives six passenger trains in total, the same as examined for the Connectivity workstream.
- Freight. Current bulk freight traffic tends to run northbound via Darlington as empty Class 4 and loaded Class 6 southbound via the Durham Coast or via the Stillington

branch. Both options have capacity for a Class 4 intermodal train in both directions. Further choices around freight are outlined below.

CHOICE: It is not possible to run the full volume of passenger and freight services indicated in the ITSS. There needs to be a decision between London LDHS, interurban / cross-country and freight services.

For analysis purposes the timetable options highlighted below and attached in the appendix include both of the interurban services from Liverpool to Newcastle and Scotland, and uses the option in the ITSS of terminating the South West – Scotland cross-country service at Leeds. This choice of services has been investigated as the Liverpool services are slower in terms of rolling stock and calling pattern and hence use the most capacity.

Figure 6 illustrates the difference in journey times between non-stop LDHS services (blue) and stopping interurban services (green). The capacity constraints can be seen, as can the potential necessity to overtake services on route; this is with the reduced passenger service quantum discussed above. The difficulty in pathing freight without choices around passenger services can be seen.

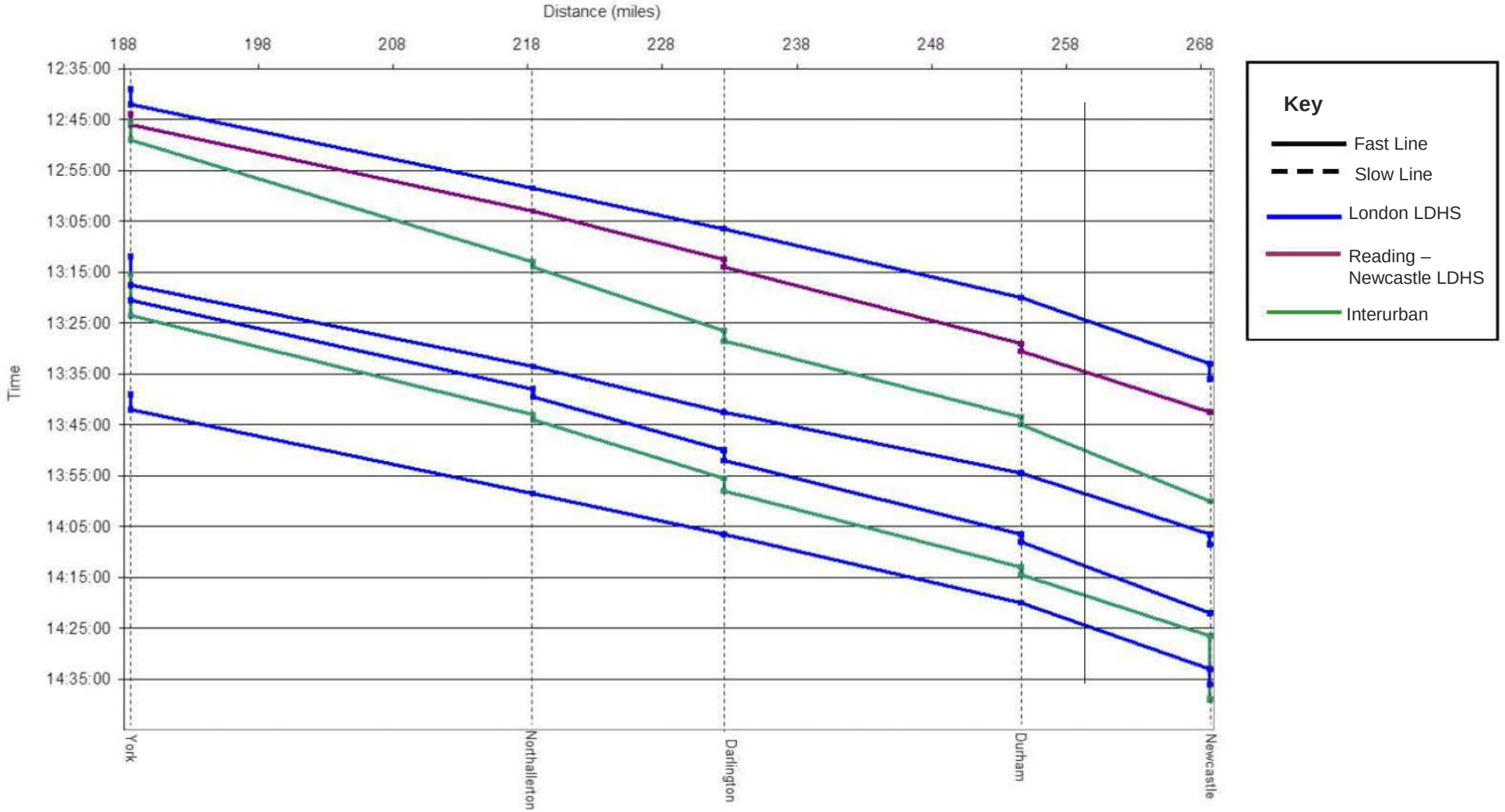

Figure 6: Passenger services York - Newcastle (Option 1 shown)

Option 1 – The Reading – Newcastle service runs in its current path north of York. The Liverpool – Newcastle train is extended from Leeds using the paths indicated in the Northern Hub development timetable. The Liverpool – Glasgow service requires an 8 minute dwell time at York in order to run behind the slow Edinburgh LDHS that has been overtaken at York. The Liverpool – Glasgow train therefore arrives at Newcastle just ahead of the fast Edinburgh IEP train, and as a result must be overtaken at Newcastle giving it another extended dwell time.

In the Up direction the Newcastle – Reading train runs in approximately the same path as currently. The Glasgow – Liverpool service has 3 minutes of pathing time on approach to Skelton Junction, where it waits on the Slow Line to be overtaken by the Edinburgh fast service.

It is necessary for the Newcastle – Liverpool service to be overtaken between Newcastle and York by the Edinburgh 390 service. In this timetable the overtaking move is planned at Darlington, giving this service an extended dwell here.

Option 2 – In the Down direction the Reading – Newcastle service is overtaken at York by the fast Edinburgh train. This service has an extended dwell time at York in the current timetable, therefore this does not cause an increased journey time. However in this option it can depart York 3 minutes earlier than currently, due to the removal of some pathing time before Doncaster, therefore it arrives Newcastle 3 minutes earlier than currently. Both of the Liverpool services fit in between the other LDHS services without any overtaking or extended dwells being necessary. The Liverpool – Glasgow service, however, is caught by the Edinburgh 390 at Newcastle and requires an extended dwell here to be overtaken.

In the Up direction the Reading train departs Newcastle earlier than currently to achieve its path at Doncaster, as discussed in section 4.3. In this option neither of the Liverpool services need to be overtaken in this section of the route. The Glasgow – Liverpool service, however, does require an extended dwell of 7 minutes at York in order to achieve a path in front of the fast Edinburgh IEP train.

The ECML Connectivity scheme at York was found to be important in reducing journey times and providing a performance improvement. In both service options, an interurban service arriving at York from the north is caught by a faster LDHS service and the alterations to Platforms 9-11 will help the train to be platformed more easily and at less of a performance risk.

A potential constraint in this section of the route is achieving crossing moves for Up services calling at Darlington. It has been found that the necessary junction margins are achievable but some alterations are necessary to avoid conflicts, for example addition of

some pathing time and/ or extended dwell times at Darlington. This constraint also presents a potential performance risk as the crossing moves are often achieved on minimum headways and junction margins. Proposals for an Up platform on the Up side of the line would avoid these conflicts.

As mentioned previously, one Class 4 intermodal freight path has been added in each direction. The additional freight infrastructure identified from the ECML Connectivity work is used in order to achieve this path in both of the timetable options. In the Down direction the new loop south of Ferryhill Junction is used and in the Up the additional track between Birtley Junction and Ouston Junction and the loop at East Cowton is necessary.

Northbound, addition of a lighter Class 4 path would be possible with alterations to passenger services, such as holding trains at York to provide better flighting or removing intermediate calls to spread services better. However, addition of the third path (a Class 6 2600t via Stillington) would not be possible alongside the second Class 4 path and without more substantial amendments to passenger services. The alternative is to run two freight paths (one via Darlington and one via Stillington) per the Connectivity workstream, with any other paths routed via the Durham Coast which provides a balance between passenger and freight requirements.

Southbound, it is possible to add a Class 6 2600t via Stillington with some amendments to passenger services as above. It is not possible to add a Class 6 2600t via Darlington without substantial changes to passenger services. As with the northbound direction, this service would require routeing via the Durham Coast (with some infrastructure enabling works if required).

CHOICE: It is not possible to fit the full freight and passenger services alongside each other. Should more substantial changes to passenger services not be the preferred option, the routeing of freight trains should be considered in more detail. This may include infrastructure enabling works, such as those on the Durham Coast route.

4.5. Newcastle – Edinburgh

	From	To	Timing Load	Trains per hour
LDHS	London	Edinburgh	IEP, 390	3 tph
	Plymouth	Glasgow	221	1 tph
Interurban	Liverpool	Edinburgh/ Glasgow	380	1 tph
Local passenger	Metrocentre	Morpeth	14x/15x	1 tph
	Newcastle	Woodhorn	14x/15x	1 tph
	Berwick	Edinburgh	380	2 hourly
	North Berwick	Edinburgh	380	1 tph
Freight	Doncaster	Millerhill	Class 4, 1800t	1 tph
	Doncaster/ Teesside	Scotland	Class 6, 2600t	1 tph

Table 19: ITSS Newcastle - Scotland

4.5.1. LDHS

There is a high level of service compared to today, as shown in Table 20.

Service Group	Today	Connectivity Workstream	ITSS
London LDHS	1 (2 in some hours)	2	3
Cross-country LDHS	1	1	1
Interurban passenger	0 *	0 *	1 **
Class 4 Freight	Varies, but typically only 1 path per hour	0	1
Class 6 Freight		1	1

Table 20: Current and specified services between Newcastle and Drem. * - Plus one 2-hourly service Edinburgh - Dunbar. ** - Plus one 2-hourly service Edinburgh - Berwick

There is not capacity to run all of the specified services due to the speed mix of services, with tilting LDHS, LDHS, stopping interurban and freight services. One potential way of using available capacity is:

- London LDHS. Two services per hour would allow an increase over today's service at a level similar to that tested in the Connectivity workstream. Intermediate calls may need to be added to the remaining services to provide connectivity to London. The third path could potentially be terminated at Newcastle.
- Cross-country and interurban. Per the section between York and Newcastle, there is

capacity for one path. Should this be the Liverpool service, the ability to run at 110mph would be beneficial between York and Edinburgh (for example if a Class 350 110mph EMU is used rather than the Class 380 100mph EMU assumed here). The Edinburgh – Berwick service is included but the local services between Newcastle and Morpeth should be considered in light of the calling pattern of the Liverpool train.

- Freight. It was agreed at the industry workshop that only one path is required over the whole route, ideally suitable for either a Class 4 or Class 6 train. One additional path is required on the southern end of the route, in order to access the Blyth & Tyne.

A hybrid solution may also be considered; as the Edinburgh – Berwick service is planned to run two-hourly, in the opposite hours additional calls could be provided in London or interurban services for connectivity purposes. It should be noted that due to available gaps between other services, the Edinburgh – Berwick must run close to the interurban service (potentially with duplicated calling patterns) which may also be resolved within a two-hourly solution.

If London LDHS services are to be terminated at Newcastle, it is recommended that further investigation takes place into platform capacity at Newcastle, particularly with additional dwell time in some services for overtaking.

Option 1 – Edinburgh fast and 390 LDHS services are approximately half an hour apart in the Down direction. The 390 service is approximately 10 minutes quicker between Newcastle and Edinburgh. In the Up direction the fast Edinburgh services depart Edinburgh approximately 30 minutes apart, and arrive approximately 20 minutes apart at Newcastle. The third LDHS departs Newcastle flighted with the fast service, providing interchange for intermediate stations.

Option 2 – The two fast LDHS services are approximately 20 minutes apart at Newcastle in the Down direction. The Up services depart Edinburgh approximately 20 minutes apart, although this may be increased to half-hourly if additional calls are added to one service.

4.5.2. Impact

Similarly to the previous section of the route, there are a high number of passenger services in the ITSS. It is not possible to achieve the full level of passenger and freight services together. One potential service level found to be achievable is 4 passenger (2 LDHS, 2 semi-fast including 1 Berwick – Edinburgh) and 1 freight path.

CHOICE: The full specification of passenger and freight services cannot run between Newcastle and Edinburgh. The level of service needs to be reduced.

As discussed in section 4.4, the findings presented here assume the South West - Scotland service terminates at Leeds. The number of services has been further reduced by assuming that the third Edinburgh service terminates at Newcastle. This gives 2 London – Edinburgh services and 1 Leeds – Edinburgh, alongside the local Berwick – Edinburgh service.

As a standard hour timetable is produced a path for the Berwick – Edinburgh service is given. This service is only 2-hourly, however, therefore one option is to produce a 2-hourly timetable pattern, incorporating this local service in one hour and additional calls or services in the opposite hour. The local service includes calls at two potential new stations on the ECML (East Linton and Reston). These calls do not significantly add to the capacity constraints on this section, but may have a potential performance impact under perturbation.

A review of service levels and calling patterns is therefore recommended, including local services around Edinburgh and Newcastle (such as the Newcastle – Morpeth stopping services).

CHOICE: Consideration should be given to connectivity requirements and calling patterns between Newcastle and Edinburgh, with a view to considering a 2-hourly standard pattern.

One full-length freight path has been included. As a Class 4 path, the freight is looped several times between Newcastle and Edinburgh, although the total journey time is at the same level as today. Class 6 journey time would be extended even further, however this could be offset by any spare capacity unlocked by operating a two-hourly timetable pattern.

4.6. Doncaster – Leeds

	From	To	Timing Load	Trains per hour
LDHS	London	Leeds	IEP	3 tph
	Plymouth	Glasgow Central	221	1 tph
Local	Doncaster	Leeds	380	1 tph
	Sheffield	Leeds	158	1 tph
	Sheffield	Adwick	319	1 tph
	Huddersfield	Wakefield	142	1 tph
Freight	London	Wakefield/ Stourton	Class 4, 1800t	1 tph
	West Midlands	West Yorkshire	Class 6, 2200t	1 tph

Table 21: ITSS Doncaster – Leeds

4.6.1. LDHS

In Option 1, services in the Down direction are roughly spaced around a 20-minute interval, but with differences due to stopping patterns. In the Up direction, the pattern is more similar to an even 20 minutes.

In Option 2, the two faster Leeds services are approximately half-hourly apart in both directions. The additional Leeds service is inserted in one of the 30-minute gaps.

In both options, at least one service skipping Wakefield Westgate has been considered. This would maintain the current 2 tph at Wakefield whilst providing a faster London – Leeds journey time.

4.6.2. Impact

It is possible to achieve the specification outlined in the ITSS. It is necessary to significantly alter the timings of the Doncaster – Leeds services in order to flight them with the changed LDHS paths.

In Option 1, this is more difficult due to the 20-minute service interval. It is possible to achieve this by taking advantage of the differences in calling pattern leading to a not quite 20-minute interval.

In Option 2, there is capacity to run the Doncaster – Leeds service in the opposite half-hour to the third London path. Note that the third LDHS path being routed via Wakefield will preclude running a second Doncaster – Leeds stopping service without infrastructure intervention.

It has been necessary to slightly alter the path of the Leeds – Sheffield service to fit alongside the LDHS paths. However, it is likely that these services may be altered anyway as part of the increase in Leeds – Sheffield service.

4.7. Leeds – York

	From	To	Timing Load	Trains per hour
LDHS	Plymouth	Glasgow	221	1 tph
Interurban	Liverpool	Edinburgh/ Glasgow	380	1 tph
	Liverpool	Newcastle	380	1 tph
	Manchester Airport	York	380	2 tph
	Blackpool	Scarborough	170	1 tph
	Manchester	Hull	380	2 tph
Local	Leeds	York	319	1 tph
	Leeds	Selby	319	1 tph

Table 22: ITSS Leeds - York

The timetable and infrastructure between Leeds and York (via Micklefield) is being considered in detail as part of a separate workstream.

The timings of the Northern Hub trans-Pennine paths have been projected back and forward to York. A broadly 15-minute pattern between Leeds and York has been achieved, although some trains have been adjusted by a few minutes. The key constraint to achieving this is the difference in speed between non-stop trans-Pennine, local stopping and semi-fast (e.g. Blackpool North – Scarborough) trains. This has been achieved but with additional journey time and some changes to the interval of trains. The potential alterations to the cross-country or trans-Pennine paths (discussed in sections 4.4 and 4.5) reduce the level of service over this section.

These constraints are being considered in more detail as part of the separate workstream.

4.8. Platforming and turnrounds

As part of this analysis, no detailed platforming and turnround exercise at major stations has taken place. This section considers high-level capacity at key stations based upon the service structures presented here. More detailed consideration should be given once a preferred timetable option is developed.

4.8.1. London King's Cross

Within the timescales being considered here, as a result of planned signal renewals and introduction of ETCS, an opportunity has arisen to redesign the approach to King's Cross station. A number of options have been developed and although the design is not yet finalised, all options involve providing additional flexibility through reopening the disused

bore of Gasworks Tunnel and making it easier to access higher numbered platforms. This is particularly useful since, after the introduction of Thameslink, a number of suburban services are diverted away from the mainline station freeing up platform capacity. To use this spare capacity effectively, better access to higher numbered platforms from the Fast Lines is required.

Turnround times associated with IEP trains have not yet been finalised and as such a detailed turnround exercise has not been carried out; however, matching inbound and outbound services for options 1 and 2, a feasible plan can be developed. Assuming the length of turnrounds are similar to today's minimum values, eight platforms are required for LDHS off-peak services (one service per platform per hour) plus one additional platform for the Kings Lynn services.

The options being developed do provide nine useable platforms for Fast Line services and the ability to run 8 tph has been proven as part of the King's Cross Remodelling workstream. There are several potential throat conflicts in both options but this should be within the capability of the infrastructure being designed to accommodate this number:

- Option 1: xx.08 arrival and xx.08 departure, xx.39 arrival and xx.38 departure and xx.50 arrival and xx.49 departure
- Option 2: xx.03 arrival and xx.03 departure and xx.33 arrival and xx.33 departure

4.8.2. Edinburgh Waverley

The impact of platform capacity is dependent on the number of trains to Scotland and extensions beyond Edinburgh (to Inverness and Aberdeen). If three trains per hour terminate (per the ITSS) this is likely to cause a shortage of platforms compared to today. If two trains per hour terminate (section 4.5) this is similar to the maximum platform usage today. Turnrounds from London are feasibly between 40 and 50 minutes depending on the option. Should the trans-Pennine service operate (and terminate at Edinburgh rather than Glasgow) an additional platform is required; turnrounds vary between 30-50 minutes.

A more detailed capacity exercise of the Edinburgh area is recommended to be carried out as part of the Scotland Route Study.

4.8.3. Newcastle

Platform capacity at Newcastle is a potential constraint dependent on the number of terminating trains and overtaking manoeuvres carried out there (section 4.4.2). Once more detail on preferred timetable options and choices are known, a more detailed study should be carried out.

5. Freight and passenger capacity choices

As identified in section 4, it is not possible to accommodate both passenger and freight services specified in the ITSS on several sections of the route. In these sections, a reduction in proposed service levels for either/both passenger and freight, or additional infrastructure is likely to be required. These choices have been highlighted throughout section 4, but have not been resolved within this report or the outputs presented in Appendix D.

The purpose of this section is, as described in section 2.5, identification of specific choices around passenger and freight capacity.

Freight services which operate for a large part of the ECML are taken from the ECML IPG ITSS and are described in the following tables. Services which run short distances on the route, or in an area not constrained by capacity, are not considered, such as:

- Doncaster – Shaftholme Jn. Sections 3 and 4 have identified the need to fundamentally rewrite the timetable at Doncaster station. These freight paths will form a key part of this rewrite, but there is expected to be sufficient capacity (as identified in references 2 and 3)
- York – Northallerton. The section between York and Northallerton is 4-track so does not pose a significant capacity constraint in itself. The key constraint is crossing moves at Skelton Bridge Jn, and the quantum of passenger services presented in section 4 is not significantly increased from ECML Connectivity; the Connectivity workstream findings still stand

The tables are split by route section, and comment on findings such as:

- Freight path / timing load: Taken from ECML IPG ITSS
- Achievable without intervention. Is there capacity for this service as part of the ECML ITSS without the need for further intervention?
- Specification choices. What potential changes to the ITSS are needed to deliver this level of service?
- Infrastructure choices. What potential infrastructure change is required to deliver this level of service, as identified in the remit?
- Typical path. High level indicative journey times between key locations, including locations to be looped (if known). Detailed journey times will depend on infrastructure and specification choices, and the times presented here are for use as an approximate guide only.

5.1. London – Doncaster

5.1.1. Down direction

	Freight path	Timing Load	Achievable without intervention	Specification choices	Infrastructure choices	Typical path
1	**London – Doncaster Yards (via Hertford Loop and GN/GE joint line)**	Class 4. Class 66, 1800t	Yes			Approximate journey time Langley Jn – Werrington Jn between 55 and 65 minutes
2	**London – Doncaster Yards (via Hertford Loop and GN/GE joint line)**	Class 6. Class 66, 2600t	Yes			Approximate journey time Langley Jn – Werrington Jn between 55 and 65 minutes
3	**London – Doncaster Yards (via Hertford Loop then ECML via Grantham)** **An alternative option to 2**	Class 6. Class 92, 1800t	No	Removal of 2 passenger services and some alteration to stopping pattern to improve flighting		Estimated journey time Langley Jn – Loversall Carr Jn 2 hr 45 – 3 hr 00 minutes. Looped between Grantham and Loversall Carr Jn and waiting time needed at Stoke Jn.
4	**West Midlands – Immingham via Newark Flat Crossing (Eastbound)**	Class 6. Class 66, 2200t	Yes			Path over Newark flat crossing identified in timetable attached in 8.APPENDIX D

5.1.2. Up direction

	Freight path	Timing Load	Achievable without intervention	Specification choices	Infrastructure choices	Typical path
1	**Doncaster Yards – London (via GN/GE joint line and Hertford Loop)**	Class 4. Class 66, 1800t	Yes			Approximate journey time Werrington Jn – Langley Jn between 1 hr 5 minutes and 1 hr 15 minutes
2	**Doncaster Yards – London (via GN/GE joint line and Hertford Loop)**	Class 6. Class 66, 2600t	No		4-tracking necessary between Huntingdon and Woodwalton Jn	Approximate journey time Werrington Jn – Langley Jn between 1 hr 15 minutes and 1 hr 20 minutes
3	**Doncaster Yards – London (via Grantham then Hertford Loop)** **An alternative option to 2**	Class 6. Class 92, 1800t	No	Removal of 2 passenger services and alteration of stopping pattern/ addition of extra time to improve flighting	4-tracking necessary between Huntingdon and Woodwalton Jn	Estimated journey time Loversall Carr Jn – Langley Jn 2hrs 45 minutes. Looped several times between Loversall Carr Jn and Peterborough.
4	**Immingham – West Midlands via Newark Flat Crossing (Westbound)**	Class 6. Class 66, 3000t	Yes			Path over Newark flat crossing identified in timetable attached in 8.APPENDIX D

5.2. Doncaster – York

5.2.1. Down direction

	Freight path	Timing Load	Achievable without intervention	Specification choices	Infrastructure choices	Typical path
1	London - Selby	Class 4. Class 66, 1800t	Yes			
2	Doncaster - Teesside	Class 4. Class 66, 1800t	Yes			Approximate journey time Doncaster – York 35 minutes.

5.2.2. Up direction

	Freight path	Timing Load	Achievable without intervention	Specification choices	Infrastructure choices	Typical path
1	Selby - London	Class 4. Class 66, 1800t	Yes			
2	Teesside - Doncaster	Class 4. Class 66, 1800t	Yes			Approximate journey time York – Doncaster 40 minutes.

5.3. York – Newcastle

5.3.1. Down direction

	Freight path	Timing Load	Achievable without intervention	Specification choices	Infrastructure choices	Typical path
1	Doncaster - Millerhill	Class 4, class 66, 1800t	No	Removal of 2 passenger services (as discussed in section 4.4) and infrastructure	Connectivity freight loops required along with specification choices	Approximate journey time Longlands Jn – Ouston Jn between 55 minutes and 60 minutes. Looped at new Ferryhill Loop and Ouston infrastructure used.
2	Drax / Eggborough – Tyne Dock / Carlisle	Class 4, class 66, 800t	No	Can replace path 1. If both paths required, in addition to choices above: Alteration of stopping pattern/ extended dwell times to passenger services to improve flighting	Connectivity infrastructure required as above.	Approximate journey time Longlands Jn – Ouston Jn of between 40 minutes and 1 hr. Looped at new loop south of Ferryhill depending on timetable structure.
3	Doncaster - Scotland	Class 6. Class 66, 2600t. (from Tursdale)	No	Removal of a further passenger service	Connectivity infrastructure required as above.	Approximate journey time (Tursdale Jn – Ouston Jn) 20-25 minutes

5.3.2. Up direction

	Freight path	Timing Load	Achievable without intervention	Specification choices	Infrastructure choices	Typical path
1	Millerhill - Doncaster	Class 4. Class 66, 1800t	No	Removal of 2 passenger services (as discussed in section 4.4) and alteration of stopping pattern to improve flighting	Additional connectivity infrastructure required	Approximate journey time Ouston Jn – Longlands Jn 2hrs 15 minutes – 2 hrs 30 minutes. Looping required at new loop south of Ferryhill and East Cowton. Ouston infrastructure needed.
2	Tyne Dock / Carlisle – Drax / Eggborough	Class 6. Class 66, 2600t	No	In addition to above removal of at least one further passenger service necessary	Additional connectivity infrastructure required	Looping required at new loop south of Ferryhill and East Cowton. Ouston infrastructure needed.
3	Scotland - Doncaster	Class 6. Class 66, 2600t (to Tursdale)	No	Removal of additional passenger service	Additional connectivity infrastructure required	Ouston infrastructure needed.

5.4. Newcastle – Edinburgh

As stated in section 4.5, two freight paths are specified in the ITSS but it is acknowledged by the industry that only one path over the whole route would reasonably be required, subject to being suitable for Class 4 or Class 6 traffic. An additional path would still be required between Newcastle and the Blyth and Tyne area.

5.4.1. Down direction

	Freight path	Timing Load	Achievable without intervention	Specification choices	Infrastructure choices	Typical path
1	**Doncaster - Millerhill**	Class 4. Class 66, 1800t	No	Removal of 2 passenger services (as outlined in section 4.5)	Loop lengthening or additional loops may be required	Approximate journey time 3 hrs 40 minutes. Looped at several loops (such as Morpeth, Crag Mill, Berwick, Grantshouse and Drem).
2	**Doncaster - Scotland**	Class 6. Class 66, 2600t	No	Removal of 2 passenger services (as outlined in section 4.5)	Loop lengthening or additional loops may be required	Advantage could be taken of potential 2-hourly cycle north of Newcastle to run heavier freight path

5.4.2. Up direction

	Freight path	Timing Load	Achievable without intervention	Specification choices	Infrastructure choices	Typical path
1	Millerhill - Doncaster	Class 4. Class 66, 1800t	No	Removal of 2 passenger services (as outlined in section 4.5)	Loop lengthening or additional loops may be required	Approximate journey time 3 hrs 40 minutes. Looped at several locations such as Dunbar, Grantshouse, Cragmill, Chevington
2	Scotland - Doncaster	Class 6. Class 66, 2600t	No	Removal of 2 passenger services (as outlined in section 4.5)	Loop lengthening or additional loops may be required	Advantage could be taken of potential 2-hourly cycle north of Newcastle to run heavier freight path

5.5. Doncaster – Leeds

5.5.1. Down Direction

	Freight path	Timing Load	Achievable without intervention	Specification choices	Infrastructure choices	Typical path
1	London – Wakefield/ Stourton	Class 4. Class 66, 1800t	Yes			Approximate journey time 25 minutes Doncaster – Hare Park Junction
2	West Midlands – West Yorkshire	Class 6. Class 66, 2200t	Yes			Approximate journey time South Kirkby Junction – Hare Park Junction 10 minutes.

5.5.2. Up Direction

	Freight path	Timing Load	Achievable without intervention	Specification choices	Infrastructure choices	Typical path
1	Wakefield/ Stourton – London	Class 4. Class 66, 1800t	Yes			Approximate journey time 25 minutes Hare Park Junction – Doncaster.
2	West Yorkshire – West Midlands	Class 6. Class 66, 2200t	Yes			Approximate journey time South Kirkby Junction – Hare Park Junction 15 minutes.

6. Other Impacts

6.1. Performance

6.1.1. Performance Summary

As the options in this report are developed into timetables, Network Rail intends to assess these against structural themes which might aid resilient performance of the timetable and also undertake modelling of the timetable options as appropriate. The modelling options identified so far are listed below under areas for further development & assessment.

For any option taken forward into full timetable development, Network Rail will require detailed discussions on service recovery principles to be held and agreed upon prior to commencement along with agreeing a 93% target for right time departures at origin.

6.1.2. Performance Impact

As stated in the initial report (reference 4), based on high level analysis and without modelling of the actual timetable or diagrams to be implemented, Network Rail believes that increasing the quantum of LDHS services will result in a worsenment of the performance figures of services on the route, potentially in the order of 1.8 - 2% PPM, depending on the mitigations that can be put into place.

A key feature of the development timetables is that all options (with two non-flighted fast Edinburgh services) require overtaking moves; this is driven by the requirement for an even spread of services at the south end of the ECML and imports a risk to performance where right time operation is required throughout a schedule to avoid reactionary delay. Furthermore, the planned operation of 18 tph over Welwyn Viaduct is a key limitation to performance as this structure leads to a high level of interaction between services and an increased likelihood of the transfer of delay between service groups.

6.1.3. Areas for further development and assessment

a. King's Cross Platforms; in particular interactions between arrivals and departures of LDHS
b. Welwyn Viaduct; impact of small minutes perturbation into timetable at 18tph
c. Modelling of planned overtaking moves; what is the threshold of late running for the fast services without impacting on the other services
d. Comparison of the choice between flighted fast Edinburgh services and regular pattern with overtaking moves
e. Operation of Newark Flat Crossing; what is the impact of marginal late running on

the ECML on opportunities for east-west traffic
f. Understand the impact and opportunities of ETCS implementation
g. Recast of timetable at Doncaster; detail of changes to be worked through

6.2. Power Supply

A programme of power supply upgrades has been put in place to provide sufficient traction power for the services that will use the ECML in CP5 and CP6.

To support the IEP and Thameslink programmes, the East Coast Power Supply Upgrade project is delivering power enhancements between London and Doncaster within CP5.

To account for future growth in CP6, a further scheme - LNE Routes Traction Power Supply Upgrade - is being developed as part of the committed CP5 Enhancements Delivery Plan. This is a broader, strategic project that will span control periods. Its aim is to model the predicted demand levels for CP6, and put in place the upgrades necessary to support electric services for the longer term. The main focus of this project will be the portion of the East Coast route north of Doncaster not treated by the initial upgrade programme.

The 2020 timetable development specified in this document will be used to model future power demand scenarios for the LNE Routes Traction PSU project. It is anticipated that this modelling will begin early in 2015.

6.3. Safety and Operability

Safety and operability impacts are normally assessed in line with Network Rail's existing timetable risk assessment processes. Examples of areas covered include Level Crossing risk, SPAD risk and Signaller workload. At this stage, these impacts have not been assessed.

7. Conclusions

7.1. Key Findings

This report has been produced to build upon the "ECML Capacity Options Report" and provide more information regarding the choices for services on the route post-2020.

The central finding is that, in accordance with the previous report, any of these service scenarios could operate alongside the potential TSGN service structure (including 8 LDHS and 10 TSGN in the evening peak), but there a number of choices to be made regarding performance, connectivity, service structure and impact on other services.

On a number of route sections (particularly north of York), the ECML IPG ITSS cannot be accommodated in full on the 2020 infrastructure. It is likely that many of the choices will need to be made regardless of the level of London LDHS service operated as the ITSS sees an increase in almost every type of service on the route.

7.2. Choices

Three LDHS service scenarios and capacity options have been developed:

- 7 tph LDHS off-peak: choices around operating a 7 tph service pattern alongside revised TSGN service patterns
- 8 tph LDHS off-peak: choices around operating an 8 tph service pattern along the ECML route, and also the feasibility of operating 2 tph fast London – Edinburgh
- 8 tph LDHS peak: choices around operating an 8 tph service pattern alongside the suburban London peak service

For most of the service scenarios, it was possible to produce two sub-options, one with a 20-minute service to key destinations ("Option 1") and one with a 30-minute service ("Option 2").

These service scenarios have then been overlaid onto the services specified in the ECML 2020 ITSS to produce a high-level standard hour development timetable.

A number of choices result, around the interaction of LDHS services with other services on the route, potential service structures, connectivity, journey time and performance.

These choices are highlighted within this report and are summarised in Table 23.

Section / type	Choice
LDHS Service Structure	Within timetable Option 1, it is not possible to maintain current connectivity between Peterborough and Doncaster without overtaking other services, resulting in extended journey times to Leeds and a performance risk
	The proposed 8 tph timetable structure can be implemented by providing either a 20-minute or 30-minute timetable service pattern.
	With two fast Edinburgh services, they either need to be flighted closely together or it is necessary to overtake other LDHS services.
	Either Stevenage calls are not provided in LDHS services or further changes to calling patterns between Peterborough and Doncaster are required, leading to reduced connectivity and extended journey time for some LDHS services.
	A 7 tph service pattern can offer better connectivity (and potentially more performance resilience), but means slower journey times and less frequent fast services to Newcastle and Edinburgh.
London - Peterborough	The revised TSGN service structures provided do not align exactly with optimal LDHS paths. Pathing time (and therefore extended journey times) or amendment to the structure of either service group is required.
	The Peterborough Down Slow upgrade is required to avoid pathing time in LDHS services and it also reduces performance risk in the Peterborough area
Peterborough - Doncaster	Changes are required to the Liverpool – Norwich service if the LDHS paths are changed. This may take the form of changing the timings of these trains between Norwich and Nottingham, or providing higher performing rolling stock.
	In timetable Option 2 a 3rd path across Newark Flat Crossing is achievable if pathing time (and hence extended journey time) is added to one of the Up Leeds train.
Doncaster - York	Significant changes to the LDHS service structure will require a timetable rewrite for local and interurban services (Doncaster area).
York - Newcastle	It is not possible to run the full volume of passenger and freight services between York and Newcastle as indicated in the ITSS. There needs to be a decision between London LDHS, interurban / cross-country and freight services.

Section / type	Choice
	It is not possible to fit the full freight and passenger services alongside each other. Should more substantial changes to passenger services not be the preferred option, the routeing of freight trains should be considered in more detail. This may include infrastructure enabling works, such as those on the Durham Coast.
Newcastle - Edinburgh	The full specification of passenger and freight services cannot run between Newcastle and Edinburgh. The level of service needs to be reduced.
	Consideration should be given to connectivity requirements and calling patterns between Newcastle and Edinburgh and also a potential 2-hourly standard pattern.

Table 23: Summary of choices

Operation of a 7 tph London LDHS service level reproduces the findings of the ECML Connectivity work (references 2 and 3), with the TSGN service choices highlighted above. The 7 tph LDHS specification offers the same quantum of service north of York as the proposed solution to run 1 tph to Newcastle and 2 tph to Edinburgh. Therefore the findings north of York are likely to be unaffected by the LDHS service levels.

7.3. Infrastructure

In order to operate the proposed level of service, the following ECML Connectivity schemes are required:

- Huntingdon – Woodwalton 4-tracking (to avoid pathing time, provide a performance benefit and enable operation of a second freight path south of Peterborough)
- Peterborough Down Slow Upgrade (to avoid pathing time and provide a performance improvement for both LDHS and Thameslink services)
- Werrington Junction Grade Separation (to enable access to the GN/GE Joint Line for freight)
- York Station North Throat (to provide a performance and journey time benefit)
- Freight Improvements North of York (Cowton, Ferryhill and Ouston loops to enable operation of the specified level of freight and passenger service)

The following schemes have not been explicitly considered here but are likely to be required for the level of service specified:

- Doncaster Platform 0 and East Side Bi-di (to provide opportunity to unlock capacity

for a potential Doncaster timetable rewrite)
- Freight Loops North of Newcastle (to enable operation of longer freight services)

7.4. Performance and other impacts

Detailed performance assessments have not been carried out at this stage, but a worsenment of 1.8% - 2.0% PPM is expected with 8 tph LDHS, depending on mitigations put in place.

A number of choices highlighted have a potential performance impact, such as the requirement (depending on service structure) of overtaking LDHS services or the operation of 18 tph over Welwyn Viaduct in the peak. Further detailed assessments are required for key risk areas (section 6.1.3) and work on service recovery principles and performance targets is required for any option taken forward into full timetable development.

Power supply has not been considered in detail by this report, however the findings of this report will provide an input into the LNE Routes Traction Power Supply Upgrade project commencing in 2015.

Safety and operability has not been considered in detail by this report. Safety and operability impacts are normally assessed in line with Network Rail's existing timetable risk assessment processes. Examples of areas covered include Level Crossing risk, SPAD risk and Signaller workload.

7.5. Next Steps

Once in final copy this report will be issued to the ORR and industry stakeholders. It is anticipated that this work will be an input into any future decisions regarding access rights on the ECML.

In any future consideration for the sale of access rights and where appropriate Network Rail will undertake further detailed timetable development.

In line with any further timetable work Network Rail in partnership will carry out performance assessment work as outlined under section 6.1.

Likewise, the power supply upgrade programme and any modelling will be informed by this timetable work.

A safety and operability assessment will take place at the appropriate stage of development.

8. APPENDIX

APPENDIX A. ECML 2020 Workshop 21st November 2014 – Meeting Notes

A workshop was held on 21/11/2014 to present initial findings to the industry and seek feedback. This Appendix documents the meeting notes and comments received during the workshop. The workshop was held in two parts: a presentation on initial findings from Network Rail and a facilitated workshop which presented more detailed findings on posters split into route sections.

A.I. Meeting Notes

ECML 2020 workshop, 21st November 2014, 10:00 – 15:00

George Stephenson House, York, Room 4.1/4.2

Attendees:	
Alliance:	Chris Hanks
Cross Country:	Matt Pocock
DB Schenker:	Nick Gibbons
East Coast:	Shaun Fisher
East Midlands Trains:	Andy Prior
Freightliner:	Jason Bird
GBRf:	Ian Kapur
GTR:	Jon Hills
Hull Trains:	Louise Mendham
Network Rail:	Graham Botham (Chair) Amy Bradford Ken Farms Ed Jeffery Russ Smallwood Katie Vollbracht Tim Wright
Northern:	Mark Beck
TPE:	David Langton
Transport Scotland:	David Prescott
Apologies:	
Network Rail:	Matt Rice

A.II. Introductions

Nothing noted

A.III. Presentation of findings

1. EJ ran through the background and invited comment/ queries as the presentation progressed
2. EJ stressed that this was not a detailed timetabling session

3. IK queried whether this session would become the ESG
   a. GB stated no, this piece of work is being undertaken in order to answer a question from the ORR
   b. CH stated that the ESG should build on the decisions the ORR makes based upon this piece of work
   c. GB stated that the DfT were planning to share what they wish to buy at a programme board meeting taking place on 24/11/14
4. IK & CH queried whether King's Cross remodelling is taken into account by this piece of work
   a. EJ confirmed that in terms of the level of service it will support, yes but detailed platforming work has not been included
5. CH asked that the assumption of LDHS stopping on the FL at Stevenage be noted as this is not necessarily going to be the case giving another opportunity for overtaking
6. IK asked how much additional time is required in the GTR services without the four-tracking
   a. EJ stated this would be an additional 2-3 mins on top of the 4-5 mins that is needed anyway
   b. DP stated that for resilient performance into the core, extra time in the GTR services might not be a bad thing
   c. JH stated that any additional time should be built into station dwells rather than as a pathing allowance
7. JH pointed out that the indicative arrival times for LDHS at King's Cross were very similar to the departure times. A group discussion ensued with the conclusion reached that King's Cross platforming would need examining in detail
8. CH asked that the distance note be changed to "miles" rather than "km" on the graphs
9. JH raised the interaction of fast and stopping Cambridge services and how these might look after they have left the ECML
   a. EJ confirmed that this has not been examined as it is outwith the geographical scope
10. DL queried the traction type examined for proposed TPE services to Scotland
    a. EJ confirmed that this was assumed to be a class 380 at 100mph
11. JH queried whether, given that the main issues seemed to be arising from creating connectivity, a WCML style VHF TT with limited connectivity between intermediate stations could be an option

A.IV. Issues noted from review of detail posters and comments received

1. Poster 1; King's Cross – Peterborough
   a. Can this be clarified to show which are peak and off peak services
   b. Clarification on whether Class 4 freight services run in the peak as well
   c. Headways south of Hitchin need to be examined to see whether they need to be reduced or increased, as appropriate

d. Group discussion on ETCS; need to raise any capacity issues/opportunities with scheme designers so that benefits can be maximised. What is the impact on planning headways and performance?
e. Could LDHS calls be on the SL at Stevenage
f. Discussion on standardising SRTs for all timing loads; not supported overall
g. Note that the ITSS does not include freight services via Royston, which run today
h. If the Down Slow Upgrade at Fletton is required, is the 2-track section at high capacity utilisation and is 4-tracking (e.g. Yaxley – Fletton) necessary to deliver desired performance?
i. Class 700 and IEP SRTs south of Peterborough need to be investigated further as they look challenging

2. Poster 2; Peterborough – Doncaster
   a. Norwich – Liverpool services; what rolling stock is used for these? Would paths be easier to find if they were higher performing DMUs (e.g. Class 185)
   b. What level of change is required for Norwich – Liverpool services? Is this compatible with paths from Nottingham?
   c. What is the structure of paths across Newark Flat Crossing? Are the paths available in both directions and do they need to coincide to be deliverable? What is the risk of transferring delay between ECML and east-west services (and vice versa)?
   d. If Newark Flat Crossing were to be removed, would this unlock additional connectivity opportunities for LDHS?
   e. What might be possible if freight paths are planned to be electrically hauled? What about accommodating electric Class 4 freights (and Royal Mail services)?
   f. Could all class 6 freights be routed via GNGE for capacity and performance benefits?
   g. What are the overtaking opportunities using the SL where it exists? At least 1 tph could be overtaken Peterborough – Doncaster.
   h. General note that the existing rights of Open Access operators to 16 paths per day is not catered for in any of the options presented

3. Poster 3; Doncaster – York
   a. Class 6 paths should be added in this section between Doncaster and Shaftholme and Joan Croft to Hambleton.
   b. No LDHS paths turning off at Shaftholme Jn
   c. London service to Hull (via Temple Hirst) should be considered, as should a Sheffield – Doncaster – Hull EMU service via Selby
   d. Cross Country would like the proposed recast of Doncaster to realise some journey time improvements for them

   i. More detail needed on what does not fit, flighting of LDHS trains and level of difficulty to input into recast
e. Changes to Northern services through electrification might change the service structure and relieve some of the pressure on the station
f. Splitting through services (e.g. Scunthorpe-Sheffield) at Doncaster fits with Sheffield – Doncaster electrification and Platform 0 at Doncaster. This would also improve ability for ECML services to overtake stopping services.
g. York – Selby via ECML trains should be taken into account

4. Poster 4; York – Newcastle
   a. Even with the connectivity schemes there is little room for freight
      i. If NR are spending all of this money on the connectivity schemes then why would you put yourselves in the situation where it cannot be used? i.e. through extra LDHS removing overall capacity for freight
   b. Reducing the freight ITSS is not an option. Northallerton – Eaglescliffe is already at capacity so no scope for diversion
      i. Could all Class 6 be routed via Stillington post-resignalling?
   c. Connectivity at Darlington between ECML and Bishop Auckland/Middlesbrough services
   d. Would there be more capacity if the interurban services were retimed to be 110mph or even 125mph?
   e. Is there any plan to look into the redoubling of Darlington South Jn?
   f. Would there be benefit to removing clashes between Down non-stop and Up stopping services at Darlington?
   g. Possibility of overtaking at Darlington should be considered (note aspiration for Up side platform). Could one interurban service terminate at Darlington?
   h. Note the aspiration for 2 tph Harrogate – York alongside a journey time improvement

5. Poster 5; Newcastle – Edinburgh
   a. Freight operators confirm only one freight path per hour is required through this section (suitable for Class 4 or Class 6) but that there is an additional 1 path per hour required between Newcastle and the Blyth & Tyne lines
   b. Should this section be examined as a two-hourly plan rather than hourly based on two-hourly Edinburgh – Berwick services?
   c. What are the options for local services i.e. Morpeth – Metrocentre if the additional Edinburgh – Berwick service and the trans-Pennine service picks up the stops on the ECML
   d. There is a need to provide intermediate bigger stations with connectivity to London and between each other (1 through train per 2 hours minimum)

e. The prospect of Newcastle running out of platform space with terminating services was raised, overtaking moves and through trains all needing to be accommodated
f. It was questioned whether the work would highlight a performance or journey time benefit of building a down platform at Dunbar
g. What capacity benefits could be provided by cross-country services running at 140mph or tilting?

6. Poster 6; Doncaster – Leeds
   a. 2 x Cross Country services via Leeds per hour should be tested
   b. Class 4 and 6 path needed between Doncaster and Hare Park Jn (and vice versa)
   c. How are Grand Central trains between Doncaster & Hare Park Jn to be accommodated? (part of Class 4 quantum?)
   d. Should be 4 local services per hour Leeds – South Kirkby (2x Leeds – Doncaster and 2x Leeds – Sheffield via Moorthorpe), ideally equally spaced
   e. West Yorkshire Combined Authority aspiration for additional Wakefield Westgate – Leeds local (linked with current Knottingley – Wakefield Kirkgate service)

A.V. AOB

1. JB asked for confirmation that all tonnages could be accommodated
2. JH queried whether Leeds – York section would also be examined as this is shown as part of the geographical scope

APPENDIX B. ECML IPG 2020 ITSS

East Coast Main Line

	ID	Option / Scenarios		From	To	Service group	Peak/off-peak variations	Typical stock / trailing load	Service Pattern	Suggested calling pattern (portion affecting ECML)	Notes
Passenger	EC1		Long Distance High Speed	London King's Cross	Leeds (via Wakefield Westgate)	ECML LDHS	All day	9 car IEP	60 min interval	tbc - to be informed by the outputs of modelling	Cross-reference with Leeds ITSS (D1). May extend to locations west / north of Leeds.
	EC2			London King's Cross	Leeds (via Wakefield Westgate)	ECML LDHS	All day	9 car IEP	60 min interval	tbc - to be informed by the outputs of modelling	Cross-reference with Leeds ITSS (D2). May extend to locations west / north of Leeds.
	EC3a	Option		London King's Cross	Leeds (via Hambleton)	ECML LDHS	All day	5 car IEP (10 car in peak)	60 min interval	tbc - to be informed by the outputs of modelling	Cross-reference with East of Leeds ITSS (KX1). May extend to locations west / north of Leeds. Either EC3a or EC3b in ITSS
	EC3b	Option		London King's Cross	Leeds (via Wakefield)	ECML LDHS	All day	5 car IEP (10 car in peak)	60 min interval	tbc - to be informed by the outputs of modelling	Cross-reference with East of Leeds ITSS (KX1). May extend to locations west / north of Leeds. Either EC3a or EC3b in ITSS
	EC4			London King's Cross	Edinburgh	ECML LDHS	All day	9 car IEP	60 min interval	tbc - to be informed by the outputs of modelling	May extend to Aberdeen / Inverness.
	EC5			London King's Cross	Edinburgh	ECML LDHS	All day	9 car IEP	60 min interval	tbc - to be informed by the outputs of modelling	May extend to Aberdeen / Inverness.
	EC6			London King's Cross	Newcastle	ECML LDHS	All day	5 car IEP (10 car in peak)	60 min interval	tbc - to be informed by the outputs of modelling	
	EC7			London King's Cross	Hull	ECML LDHS	High peak hour only	9 car IEP	n/a	tbc - to be informed by the outputs of modelling	
	EC8			London King's Cross	Lincoln	ECML LDHS	Late shoulder peak hour only	9 car IEP	n/a	tbc - to be informed by the outputs of modelling	
	EC9			London King's Cross	Bradford Interchange (via Mirfield)	ECML LDHS	Off-peak	5/10 car Class 180	2-hourly. EC9/10/11 equate to 3 trains every 2 hours	King's Cross, Doncaster, Pontefract Monkhill…	Cross-reference with Leeds ITSS (N13)
	EC10			London King's Cross	Sunderland	ECML LDHS	Off-peak	5/10 car Class 180	2-hourly. EC9/10/11 equate to 3 trains every 2 hours	King's Cross, York, Thirsk, Northallerton, Eaglescliffe…	
	EC11			London King's Cross	Hull	ECML LDHS	Off-peak	5 car Class 180 or Class 38x	2-hourly. EC9/10/11 equate to 3 trains every 2 hours	King's Cross, Grantham, Retford, Doncaster, Selby…	
	EC12			London King's Cross	Edinburgh	ECML LDHS	All day	9 car Class 390	60 min interval	King's Cross, Newcastle, Edinburgh	Aspiration for a 3hrs 45mins journey time between Edinburgh and London.
	XC1a	Option		Plymouth	Leeds	Cross- Country LDHS	All day	4/5/8/9/10 car Class 220/1	60 min interval	…Sheffield, Wakefield Westgate, Leeds	Cross-reference with Leeds / East of Leeds ITSS (XC1) and MML ITSS (X2). Either XC1a or XC1b in ITSS
	XC1b	Option		Plymouth	Edinburgh / Glasgow (via Leeds)	Cross- Country LDHS	All day	4/5/8/9/10 car Class 220/1	60 min interval	…Sheffield, Wakefield Westgate, Leeds, York, Darlington, Durham, Newcastle, (Alnmouth), (Berwick), (Dunbar), Edinburgh	Cross-reference with Leeds / East of Leeds ITSS (XC1) and MML ITSS (X2). Either XC1a or XC1b in ITSS. Only one of NTP1b and XC1b to run to Glasgow
	XC2			Reading	Newcastle (via Doncaster)	Cross- Country LDHS	All day	4/5/8/9/10 car Class 220/1	60 min interval	…Sheffield, Doncaster, York, Darlington, Durham, Newcastle	Cross-reference with MML ITSS (X1)
	XC3			Birmingham or Nottingham	Leeds	Cross-Country LDHS	All day	4/5/8/9/10 car Class 220/1	60 min interval	…Sheffield, Wakefield Westgate, Leeds	Cross-reference with Sheffield ITSS (SHSP / XC3P)
	NTP1a	Option		Liverpool	Edinburgh	Trans-Pennine interurban	All day	4/8 car Class 38x	60 min interval. N1/2/3/4 to be as close to 15 min apart as possible. N1/2 to be as close to 30 min apart as possible	…Leeds, York, Northallerton, Darlington, Durham, Newcastle, Cramlington, Morpeth, Alnmouth, Berwick, Dunbar, Edinburgh	Cross-reference with Leeds / East of Leeds ITSS (N1). 110mph service. Either NTP1a or NTP1b in ITSS
	NTP1b	Option		Liverpool	Glasgow	Trans-Pennine interurban	All day	4/8 car Class 38x	60 min interval. N1/2/3/4 to be as close to 15 min apart as possible. N1/2 to be as close to 30 min apart as possible	…Leeds, York, Northallerton, Darlington, Durham, Newcastle, Cramlington, Morpeth, Alnmouth, Berwick, Dunbar, Edinburgh, Motherwell, Glasgow	Cross-reference with Leeds / East of Leeds ITSS (N1). 110mph service. Either NTP1a or NTP1b in ITSS. Only one of NTP1b and XC1b to run to Glasgow
	NTP2			Liverpool	Newcastle	Trans-Pennine interurban	All day	4/8 car Class 38x	60 min interval. N1/2/3/4 to be as close to 15 min apart as possible. N1/2 to be as close to 30 min apart as possible	…Leeds, York, Thirsk, Northallerton, Darlington, Durham, Chester-le-Street, Newcastle	Cross-reference with Leeds / East of Leeds ITSS (N2). 110mph service.
	NTP3			Manchester Airport	York	Trans-Pennine interurban	All day	4/8 car Class 38x	60 min interval. N1/2/3/4 to be as close to 15 min apart as possible. N3/4 to be as close to 30 min apart as possible	…Leeds, (Cross Gates), (Garforth), (Church Fenton), York	Cross-reference with Leeds / East of Leeds ITSS (N3)
	NTP4			Manchester Airport	York	Trans-Pennine interurban	All day	4/8 car Class 38x	60 min interval. N1/2/3/4 to be as close to 15 min apart as possible. N3/4 to be as close to 30 min apart as possible	…Leeds, (Cross Gates), (Garforth), (Church Fenton), York	Cross-reference with Leeds / East of Leeds ITSS (N4)
	NTP5			Blackpool North	Scarborough	Trans-Pennine interurban	All day	2/5 car Class 158	60 min interval	…Garforth, York, Malton…	Cross-reference with East of Leeds ITSS (N17)
	NTP6			York	Middlesbrough	Trans-Pennine interurban	All day	2/5 car Class 158	60 min interval	York, Thirsk, Northallerton, Yarm…	
	STP6			Manchester Airport	Cleethorpes	Trans-Pennine interurban	All day	3/6 car Class 185	60 min interval	…Meadowhall, Doncaster, Scunthorpe	Cross-reference with Sheffield ITSS (N7B). Possibly 6 car to Doncaster then 3 car to Cleethorpes
	P1			Norwich	Liverpool	East Midlands interurban	All day	4/6 car Class 158	60 min interval	…March, Peterborough, Grantham, Nottingham…	Cross-reference with MML ITSS (X3) and Sheffield ITSS (N50)
	P2			Stansted Airport	Birmingham New St	Cross-Country interurban	All day	3 car Class 170	60 min interval	…March, Peterborough, Stamford…	Cross-reference with MML ITSS (X5)
	P3			Cambridge	Birmingham New St	Cross-Country interurban	All day	3 car Class 170	60 min interval	…March, Peterborough, Stamford…	Cross-reference with MML ITSS (L5). Extension of half-hourly Leicester to Birmingham local service
	MS1		London suburban	Moorgate	Stevenage (via Hertford North)	Moorgate Suburban	All day	6 car Class 313	30 min interval		
	MS2			Moorgate	Stevenage (via Hertford North)	Moorgate Suburban	All day	6 car Class 313			
	MS3			Moorgate	Hertford North	Moorgate Suburban	All day	6 car Class 313			
	MS4			Moorgate	Hertford North	Moorgate Suburban	All day	6 car Class 313			
	MS5			Moorgate	Hertford North	Moorgate Suburban	Peak hours	6 car Class 313	30 min interval		
	MS6			Moorgate	Hertford North	Moorgate Suburban	Peak hours	6 car Class 313			
	MS7			Moorgate	Gordon Hill	Moorgate Suburban	Peak hours	6 car Class 313			
	MS8			Moorgate	Gordon Hill	Moorgate Suburban	Peak hours	6 car Class 313	30 min interval		
	MS9			Moorgate	Gordon Hill	Moorgate Suburban	High peak hour only	6 car Class 313			
	MS10			Moorgate	Gordon Hill	Moorgate Suburban	High peak hour only	6 car Class 313			
	MS11			Moorgate	Welwyn Garden City	Moorgate Suburban	All day	6 car Class 313	30 min interval		
	MS12			Moorgate	Welwyn Garden City	Moorgate Suburban	All day	6 car Class 313			
	MS13			Moorgate	Welwyn Garden City	Moorgate Suburban	All day	6 car Class 313	30 min interval		
	MS14			Moorgate	Welwyn Garden City	Moorgate Suburban	All day	6 car Class 313			
	KXS1			London King's Cross	Ely or Kings Lynn	King's Cross Suburban	All day	12 car Class 365 / 377	30 min interval	King's Cross, (Letchworth), (Royston), Cambridge,…	
	KXS2			London King's Cross	Ely or Kings Lynn	King's Cross Suburban	All day	12 car Class 365 / 377		King's Cross, (Letchworth), (Royston), Cambridge,…	
	KXS3			London King's Cross	Royston	King's Cross Suburban	Peak hours	8 car Class 365 / 377	30 min interval	King's Cross, Welwyn GC, Welwyn North, Knebworth, Stevenage, Hitchin, Letchworth, Baldock, Ashwell	
	KXS4			London King's Cross	Royston	King's Cross Suburban	Peak hours	8 car Class 365 / 377		King's Cross, Welwyn GC, Welwyn North, Knebworth, Stevenage, Hitchin, Letchworth, Baldock, Ashwell	
	KXS5			London King's Cross	Peterborough	King's Cross Suburban	Peak hours	12 car Class 365 / 377	30 min interval		Assume 100mph at this stage but may be 110mph
	KXS6			London King's Cross	Peterborough	King's Cross Suburban	Peak hours	12 car Class 365 / 377			Assume 100mph at this stage but may be 110mph
	KXS7			London King's Cross	Cambridge	King's Cross Suburban	Morning peak hour only	12 car Class 365 / 377	30 min interval		Assume 100mph at this stage but may be 110mph. Morning peak only from Cambridge, with no equivalent evening peak return service
	KXS8			London King's Cross	Cambridge	King's Cross Suburban	Morning peak hour only	12 car Class 365 / 377			Assume 100mph at this stage but may be 110mph. Morning peak only from Cambridge, with no equivalent evening peak return service
	TLC1			Thameslink Core	Peterborough	Thameslink Core Suburban	All day	8/12 car Class 700	30 min interval	Finsbury Park, Stevenage, Hitchin, Arlesey, Biggleswade, Sandy, St Neots, Huntingdon	
	TLC2			Thameslink Core	Peterborough	Thameslink Core Suburban	All day	8/12 car Class 700		Finsbury Park, Stevenage, Hitchin, Arlesey, Biggleswade, Sandy, St Neots, Huntingdon	
	TLC3			Thameslink Core	Cambridge	Thameslink Core Suburban	All day	8/12 car Class 700	30 min interval	Finsbury Park, Stevenage, Hitchin, Letchworth	
	TLC4			Thameslink Core	Cambridge	Thameslink Core Suburban	All day	8/12 car Class 700		Finsbury Park, Stevenage, Hitchin, Letchworth	
	TLC5			Thameslink Core	Letchworth or Cambridge	Thameslink Core Suburban	Off-peak	8 car Class 700	30 min interval	Potters Bar, Hatfield, Welwyn Garden City, Welwyn North, Knebworth, Stevenage, Hitchin, Letchworth	
	TLC6			Thameslink Core	Letchworth or Cambridge	Thameslink Core Suburban	Off-peak	8 car Class 700		Potters Bar, Hatfield, Welwyn Garden City, Welwyn North, Knebworth, Stevenage, Hitchin, Letchworth	
	TLC7			Thameslink Core	Welwyn Garden City	Thameslink Core Suburban	Peak hours	8 car Class 700	30 min interval		
	TLC8			Thameslink Core	Welwyn Garden City	Thameslink Core Suburban	Peak hours	8 car Class 700			
	TLC9			Thameslink Core	Welwyn Garden City	Thameslink Core Suburban	Peak hours	8 car Class 700	30 min interval		
	TLC10			Thameslink Core	Welwyn Garden City	Thameslink Core Suburban	Peak hours	8 car Class 700			
	EM1		Local	Leicester	Lincoln	East Midlands local	All day	2 car Class 156	60 min interval	…Newark Castle, Collingham…	Cross-reference with MML ITSS (L4). Crosses ECML at Newark
	EM6			Nottingham	Lincoln	East Midlands local	All day	2 car Class 156	60 min interval	…Newark Castle, Lincoln	Crosses ECML at Newark
	EM2			Nottingham	Skegness	East Midlands local	All day	2 car Class 156	60 min interval	…Bottesford, Grantham, Sleaford…	Cross-reference with MML ITSS (L9)
	EM3			Peterborough	Spalding or Lincoln	East Midlands local	All day	2 car Class 156	60 min interval	Peterborough, Spalding…	
	EM4			Newark Northgate	Lincoln or Grimsby	East Midlands local	All day	2 car Class 156	60 min interval	Newark Northgate, (Collingham)…	
	EM5			Lincoln	Doncaster (via Finningley)	East Midlands local	All day	1/2 car Class 15x	60 min interval	…Gainsborough Lea Road, Doncaster	Need to consider new station proposal at Robin Hood airport
	GA1			Ipswich	Peterborough	East Anglia local	All day	2 car Class 156	60 min interval	…Whittlesea, Peterborough	
	Y1			Leeds	York (via Micklefield)	Yorkshire local	All day	4 car Class 319	60 min interval	…(Ulleskelf), York	Cross-reference with East of Leeds ITSS (Y1)
	Y2			Leeds	York (via Micklefield)	Yorkshire local	Afternoon high peak hour only	4 car Class 319	n/a	…(Ulleskelf), York	Cross-reference with East of Leeds ITSS (Y2). One direction only. No equivalent service from York by this route in the morning peak
	V3			Huddersfield	Wakefield Westgate	Yorkshire local	All day	2 car Class 144/15x	60 min interval	…Wakefield Kirkgate, Wakefield Westgate	Cross-reference with Leeds ITSS (H1)
	V4			Doncaster	Leeds (via Wakefield Westgate)	Yorkshire local	All day	4 car Class 3xx	60 min interval	Doncaster, Bentley, Adwick, South Elmsall, Fitzwilliam, Sandal and Agbrigg, Wakefield Westgate, Outwood, Leeds	Cross-reference with Leeds ITSS (D3)
	V5			Doncaster	Leeds (via Wakefield Westgate)	Yorkshire local	High peak hour only	4 car Class 3xx	n/a	Doncaster, Bentley, Adwick, South Elmsall, Fitzwilliam, Sandal and Agbrigg, Wakefield Westgate, Outwood, Leeds	Cross-reference with Leeds ITSS (D4P)
	V6			Doncaster	Leeds (via Wakefield Westgate)	Yorkshire local	High peak hour only	4 car Class 3xx	n/a	Doncaster, Bentley, Adwick, South Elmsall, Fitzwilliam, Sandal and Agbrigg, Wakefield Westgate, Outwood, Leeds	Cross-reference with Leeds ITSS (D5P)
	V7			Sheffield	Leeds (via Wakefield Westgate)	Yorkshire local	All day	2/4 car Class 158	30 min interval	…Moorthorpe, Fitzwilliam, Sandal and Agbrigg, Wakefield Westgate, Outwood, Leeds	Cross-reference with Sheffield North ITSS (SH1)
	Y17			Sheffield	Leeds (via Wakefield Westgate)	Yorkshire local	All day	2/4 car Class 158		…Moorthorpe, Fitzwilliam, Sandal and Agbrigg, Wakefield Westgate, Outwood, Leeds	Cross-reference with Sheffield North ITSS (SH6)
	Y8a	Option		Sheffield	Hull	Yorkshire local	All day	2/4 car Class 158	60 min interval	…Meadowhall, Doncaster, Goole…	Cross-reference with Sheffield ITSS (HUL1). Either Y8a or Y8b in ITSS
	Y8b	Option		Sheffield	Hull	Yorkshire local	All day	4 car Class 319	60 min interval	…Meadowhall, Doncaster, Selby…	Cross-reference with Sheffield ITSS (HUL1). Either Y8a or Y8b in ITSS
	V9			Sheffield	Scunthorpe	Yorkshire local	All day	2/4 car Class 158	60 min interval	…Conisbrough, Doncaster, Kirk Sandall…	Cross-reference with Sheffield ITSS (SC1)
	Y10a	Option		Lincoln	Adwick (via Sheffield)	Yorkshire local	All day	3 car Class 15x	60 min interval	…Conisbrough, Doncaster, Bentley, Adwick	Cross-reference with Sheffield ITSS (AD1). One of Y10a, Y10b or Y10c in ITSS
	Y10b	Option		Sheffield	Adwick	Yorkshire local	All day	4 car Class 319	60 min interval	…Conisbrough, Doncaster, Bentley, Adwick	Cross-reference with Sheffield ITSS (AD1). One of Y10a, Y10b or Y10c in ITSS
	Y10c	Option		Sheffield	Leeds (via Doncaster)	Yorkshire local	All day	4 car Class 319	60 min interval	…Conisbrough, Doncaster, Bentley, Adwick, South Elmsall, Fitzwilliam, Sandal and Agbrigg, Wakefield Westgate, Outwood, Leeds	Cross-reference with Sheffield ITSS (AD1). One of Y10a, Y10b or Y10c in ITSS
	V11			Doncaster	Hull	Yorkshire local	All day	2/4 car Class 158	60 min interval	Doncaster, Kirk Sandall…	
	Y12	Option		Doncaster	Goole	Yorkshire local	All day	2/4 car Class 158	60 min interval	Doncaster, Kirk Sandall…	Only required if Y8b in ITSS. Not required if Y8a in ITSS
	Y13a	Option		Sheffield	York (via Rotherham Central and Pontefract)	Yorkshire local	Off-peak	2 car Class 14x/15x	2 trains per day	…(Ulleskelf), York	Cross-reference with Sheffield North ITSS (Y1). Either Y13a or Y13b in ITSS. This option fits with option XC1b LDHS service above
	Y13b	Option		Sheffield	York (via Rotherham Central and Pontefract)	Yorkshire local	All day	2 car Class 14x/15x	60 min interval	…(Ulleskelf), York	Cross-reference with Sheffield North ITSS (Y2). Either Y13a or Y13b in ITSS. This option fits with option XC1a LDHS service above
	Y14a	Option		Hull	York (via Sherburn)	Yorkshire local	All day	2 car Class 158 or 4 car Class 319	60 min interval	…(Ulleskelf), York	Route generally used inbound to York in morning and outbound from York in afternoon / evening. Either Y14a or Y14b in ITSS
	Y14b	Option		Hull	York (via Hambleton North)	Yorkshire local	All day	2 car Class 158 or 4 car Class 319	60 min interval	…Selby, York	Route generally used outbound from York in morning and inbound to York in afternoon / evening. Either Y14a or Y14b in ITSS
	V15			York	Harrogate (and Leeds)	Yorkshire local	All day	2/3/4 car Class 14x/15x or 4 car Class 319	30 min interval	York, Poppleton…	
	Y16			York	Harrogate (and Leeds)	Yorkshire local	All day	2/3/4 car Class 14x/15x or 4 car Class 319		York, Poppleton…	
	NE1			Saltburn	Bishop Auckland	North East local	All day	2 car Class 14x/15x	60 min interval. NE1/2/3 to provide as close as possible 20min frequency between Darlington and Saltburn	…Dinsdale, Darlington, North Road…	
	NE2			Saltburn	Darlington	North East local	All day	2 car Class 14x/15x	60 min interval. NE1/2/3 to provide as close as possible 20min frequency between Darlington and Saltburn	…Dinsdale, Darlington	
	NE3			Saltburn	Darlington	North East local	All day	2 car Class 14x/15x	60 min interval. NE1/2/3 to provide as close as possible 20min frequency between Darlington and Saltburn	…Dinsdale, Darlington	
	NE4			Saltburn or Middlesbrough	Newcastle (via Darlington)	North East local	Morning peak hours only	2 car Class 14x/15x	60 min interval (3 trains per day)	…Dinsdale, Darlington, Durham, (Chester-le-Street), Newcastle	One direction only. No equivalent service from Newcastle by this route in the evening peak
	NE5			Hexham	Middlesbrough	North East local	All day	2 car Class 14x/15x	60 min interval. NE4/6/7/8 to be as close to 15mins apart as possible	…(Dunston), Newcastle, (Hexworth)…	
	NE6			Newcastle	Middlesbrough	North East local	High peak hour only	2 car Class 14x/15x	n/a	Newcastle, (Hexworth)…	
	NE7			Carlisle	Newcastle	North East local	All day	2 car Class 156	60 min interval. NE4/6/7/8 to be as close to 15mins apart as possible	…Metrocentre, Newcastle	
	NE8			Metrocentre	Newcastle	North East local	All day	2 car Class 14x/15x	60 min interval. NE4/6/7/8 to be as close to 15mins apart as possible	Metrocentre, Newcastle	
	NE9			Metrocentre	Morpeth or Chathill	North East local	All day	2 car Class 14x/15x	60 min interval. NE4/6/7/8 to be as close to 15mins apart as possible	Metrocentre, Newcastle, (Manors), Cramlington, Morpeth, (Pegswood), (Widdrington), (Acklington), (Alnmouth), (Chathill)	Extended to Chathill in the high peak hour only. Could also be extended to run to and from a proposed new station at Belford
	NE10			Newcastle	Woodmorn	North East local	All day	2 car Class 14x/15x	60 min interval	Newcastle, (Manors), Northumberland Park…	
	NE11			Newcastle	Woodmorn	North East local	Peak hours	2 car Class 14x/15x	60 min interval. NE11 to be as close to 30mins apart from NE10 as possible	Newcastle, (Manors), Northumberland Park…	
	SC1a	Option		Dunbar	Edinburgh	Scotland local	All day	4 car Class 380	2-hourly	Dunbar, Musselburgh, Edinburgh	One of SC1a, SC1b or SC1c in ITSS. Could also call at proposed new station at East Linton
	SC1b	Option		Berwick	Edinburgh	Scotland local	All day	4 car Class 380	2-hourly	Berwick, Dunbar, Musselburgh, Edinburgh	One of SC1a, SC1b or SC1c in ITSS. Could also call at proposed new stations at Reston and East Linton
	SC1c	Option		Newcastle	Edinburgh	Scotland local	All day	4 car Class 380	2-hourly	Newcastle, Cramlington, Morpeth, Alnmouth, Berwick, Dunbar, Musselburgh, Edinburgh	One of SC1a, SC1b or SC1c in ITSS. Could also call at proposed new stations at Belford, Reston and East Linton
	SC2			North Berwick	Edinburgh	Scotland local	All day	4 car Class 380	60 min interval	North Berwick, Drem, Longniddry, Prestonpans, Wallyford, Musselburgh, Edinburgh	
	SC3			North Berwick	Edinburgh	Scotland local	Peak hours	4 car Class 380	60 min interval. SC3 to be as close to 30mins apart from SC2 as possible	North Berwick, Drem, Longniddry, Prestonpans, Wallyford, Musselburgh, Edinburgh	
	SC4			Tweedbank	Edinburgh	Scotland local	All day	2/4 car Class 158	30 min interval	…Brunstane, Edinburgh	
	SC5			Tweedbank	Edinburgh	Scotland local	All day	2/4 car Class 158		…Brunstane, Edinburgh	
	SC6			Newcraighall	Edinburgh	Scotland local	High peak hour only	2/4 car Class 158	30 min interval. SC4/5/6 to be as close to 15mins apart as possible	…Brunstane, Edinburgh	
Freight	F1	Min	Class 4	Felixstowe	Nuneaton	Freight	All day	75mph, 1800t trailing, Class 66	2 per hour	Routed via March, Peterborough and Stamford	Cross-reference with MML ITSS (F1).
	F2	Max		Felixstowe	Nuneaton	Freight	All day	75mph, 1800t trailing, Class 66	3 per hour	Routed via March, Peterborough and Stamford	Cross-reference with MML ITSS (F2).
	F1	Min		Nuneaton	Felixstowe	Freight	All day	75mph, 1800t trailing, Class 66	2 per hour	Routed via Stamford, Peterborough and March	Cross-reference with MML ITSS (F1).
	F2	Max		Nuneaton	Felixstowe	Freight	All day	75mph, 1800t trailing, Class 66	3 per hour	Routed via Stamford, Peterborough and March	Cross-reference with MML ITSS (F2).
	F3			London	Doncaster Europort / Wakefield / Selby / Stourton	Freight	Off-peak (London to Peterborough)	75mph, 1800t trailing, Class 66	1 per hour	Routed from Finsbury Park via Hertford Loop, then ECML to Peterborough, then GN/GE Joint Line, then from Doncaster to destination	
	F4			Doncaster Europort / Wakefield / Selby / Stourton	London	Freight	Off-peak (London to Peterborough)	75mph, 1800t trailing, Class 66	1 per hour	Routed from origin to Doncaster, then GN/GE Joint Line, then ECML to Stevenage, then via Hertford Loop to Finsbury Park	
	F5			Doncaster Yards	Teesside	Freight	All day	75mph, 1800t trailing, Class 66	1 per hour	Routed on the ECML between Doncaster Yards and Longlands Jn	
	F6			Teesside	Doncaster Yards	Freight	All day	75mph, 1800t trailing, Class 66	1 per hour	Routed on the ECML between Longlands Jn and Doncaster Yards	
	F7			Doncaster Europort	Millerhill	Freight	All day	75mph, 1800t trailing, Class 66	1 per hour	Routed on the ECML between Doncaster Yards and Monktonhall Jn	
	F8			Millerhill	Doncaster Europort	Freight	All day	75mph, 1800t trailing, Class 66	1 per hour	Routed on the ECML between Monktonhall Jn and Doncaster Yards	
	F9			Drax or Eggborough	Tyne Dock or Carlisle (via Darlington)	Freight	All day	75mph, 800t trailing, Class 66	1 per hour	Routed on the ECML between Colton Jn and King Edward Bridge South Jn	
	F10			Drax or Eggborough	Tyne Dock or Teesside (via Eaglescliffe)	Freight	All day	75mph, 800t trailing, Class 66	2 per hour	Routed on the ECML between Colton Jn and Longlands Jn	
	F11			East Anglia	East Midlands	Freight	All day	60mph, 2600t trailing, Class 66	1 per hour	Routed via March, Peterborough and Stamford	Cross-reference with MML ITSS (F3)
	F12			East Midlands	East Anglia	Freight	All day	60mph, 2600t trailing, Class 66	1 per hour	Routed via Stamford, Peterborough and March	Cross-reference with MML ITSS (F3)
	F13	Option		London	Doncaster Yards	Freight	Off-peak (London to Peterborough)	60mph, 1800t trailing, Class 92	2-hourly	Routed via Hertford Loop and then ECML via Grantham	One of F13 or F15 in ITSS
	F14	Option		Doncaster Yards	London	Freight	Off-peak (London to Peterborough)	60mph, 1800t trailing, Class 92	2-hourly	Routed on the ECML via Grantham then via Hertford Loop	One of F14 or F16 in ITSS
	F15	Option		London	Doncaster Yards	Freight	Off-peak (London to Peterborough)	60mph, 2600t trailing, Class 66	2-hourly	Routed from Finsbury Park via Welwyn GC, then ECML to Peterborough, then GN/GE Joint Line	One of F13 or F15 in ITSS
	F16	Option		Doncaster Yards	London	Freight	Off-peak (London to Peterborough)	60mph, 2600t trailing, Class 66	2-hourly	Routed via GN/GE Joint Line to Peterborough, then ECML via Welwyn GC to Finsbury Park	One of F14 or F16 in ITSS
	F17		Class 6	West Midlands	Immingham	Freight	All day	60mph, 2250t trailing, Class 66	1 per hour	Routed across Newark flat crossing	
	F18			Immingham	West Midlands	Freight	All day	60mph, 3000t trailing, Class 66	1 per hour	Routed across Newark flat crossing	
	F19			Scotland	Teesside or Doncaster Yards	Freight	All day	60mph, 2600t trailing, Class 66	1 per hour	Routed on the ECML between Monktonhall Jn and Tyndale Jn or Colton Jn	Also traffic to / from North Blyth
	F20			Teesside or Doncaster Yards	Scotland	Freight	All day	60mph, 2600t trailing, Class 66	1 per hour	Routed on the ECML between Colton Jn or Tursdale Jn and Monktonhall Jn	Also traffic to / from North Blyth
	F21			Tyne Dock or Carlisle	Drax or Eggborough (via Darlington)	Freight	All day	60mph, 2600t trailing, Class 66	1 per hour	Routed on the ECML between King Edward Bridge South Jn and Colton Jn	
	F22			Tyne Dock or Teesside	Drax or Eggborough (via Eaglescliffe)	Freight	All day	60mph, 1800t trailing, Class 66	2 per hour	Routed on the ECML between Longlands Jn and Colton Jn	
	F23			Teesside	West Midlands / Wales	Freight	All day	60mph, 2400t trailing, Class 66	1 per hour	Routed on the ECML between Colton Jn and Longlands Jn	
	F24			West Midlands / Wales	Teesside	Freight	All day	60mph, 2400t trailing, Class 66	1 per hour	Routed on the ECML between Colton Jn and Longlands Jn	
	F25			Doncaster Yards	Immingham (via Skellow Jn)	Freight	All day	60mph, 2200t trailing, Class 66	1 per hour	Routed on the ECML between Doncaster Yards and Adwick Jn	
	F26			Immingham (via Skellow Jn)	Doncaster Yards	Freight	All day	60mph, 2200t trailing, Class 66	1 per hour	Routed on the ECML between Adwick Jn and Doncaster Yards	
	F27			West Midlands	West Yorkshire	Freight	All day	60mph, 2200t trailing, Class 66	1 per hour	Routed on the ECML between South Kirkby Jn and Hare Park Jn	
	F28			West Yorkshire	West Midlands	Freight	All day	60mph, 2200t trailing, Class 66	1 per hour	Routed on the ECML between Hare Park Jn and South Kirkby Jn	
	F29			Doncaster Yards	Drax or Eggborough	Freight	All day	60mph, 2600t trailing, Class 66	1 per hour	Routed on the ECML between Doncaster Yards and Shaftholme Jn	
	F30			Drax or Eggborough	Doncaster Yards	Freight	All day	60mph, 1800t trailing, Class 66	1 per hour	Routed on the ECML between Shaftholme Jn and Doncaster Yards	
	F31			Peterborough Yards	Whitemoor	Freight	All day	60mph, 2400t trailing, Class 66	1 per hour	Routed via Whittlesea	
	F32			Whitemoor	Peterborough Yards	Freight	All day	60mph, 2400t trailing, Class 66	1 per hour	Routed via Whittlesea	
	F33			Peterborough Yards	Toton	Freight	All day	60mph, 2400t trailing, Class 66	2-hourly	Routed via Stamford	
	F34			Toton	Peterborough Yards	Freight	All day	60mph, 2400t trailing, Class 66	2-hourly	Routed via Stamford	
	F35		Rail	Willesden PRDC	Low Fell RMT	Freight	All day	12 car Class 325	2 trains per day	Routed along ECML via Grantham	
	F36			Low Fell RMT	Willesden PRDC	Freight	All day	12 car Class 325	2 trains per day	Routed along ECML via Grantham	

APPENDIX C. Remit Specification

East Coast Mainline December 2020 Capacity Timetable Assessment Remit Specification

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Author:	Matt Rice
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1. PROJECT CONTENT

1.1 Background

Network Rail has recently completed and published a report that outlines the capacity choices available on the ECML from 2020 onwards. The capacity options identified in that report can be summarised as follows:

- 7 LDHS paths can be combined with 10 TSGN Fast line services. This option also allows for 1 Class 4 TPH in each direction and potential for a Class 6 in the down direction. This option has the benefit of unused capacity in the standard hour, with the potential of absorbing time lost in running from any paths.
- 8 LDHS allows for 10 TSGN paths but in the off-peak hour offers limited capacity for class 4 freight on restricted tonnages on the south end of the route.
- 9 LDHS paths maximises the available opportunities for LDHS paths. Capacity for freight is restricted to a limited tonnage class 4 northbound path and the 10 TPH TSGN requirement cannot be fulfilled.

1.2 Aim

The aim is to provide Standard-hour high-level development timetables to inform capacity allocation and access rights decisions for services that will operate on the East Coast Main line (ECML) from 2020.

1.3 Objective

Based on the assumed infrastructure at the end of CP5 and the identified train service specification for 2020, the objective is to develop Standard-hour high-level development timetables based on the scenarios in section 1.4.

The parameters and assumptions for this work are detailed in the sections that follow. The outputs are defined in section 5.

1.4 Scenarios to be Tested

The scenarios below are based upon the ECML 2020 ITSS v1.0. All other services not specified are taken from the ITSS.

Stopping patterns for LDHS services are to be evolved as part of the timetable development process, but will broadly provide (as a minimum):

- Stevenage 1 tph
- Peterborough 3 tph
- Grantham & Newark 2 tph
- Retford 1 tph
- Doncaster 4 tph
- Wakefield Westgate 1-2 tph (depending on routeing)
- York 3 tph
- Northallerton 1 tph
- Darlington & Durham 1 tph
- Newcastle 3 tph
- Berwick & Dunbar 1 tph

1.4.1 Scenario 1

Off-peak 7 tph standard hour	
Purpose	To provide base case scenario, based upon previous ECML Connectivity work
LDHS	Kings Cross – Leeds via Wakefield (9-car IEP) Kings Cross – Leeds via Wakefield (9-car IEP) Kings Cross – Leeds via Wakefield or Hambleton (5-car IEP) Kings Cross – Edinburgh (9-car IEP) Kings Cross – Edinburgh (9-car IEP) Kings Cross – Newcastle (5-car IEP) Kings Cross – Sunderland, Bradford Interchange or Hull (5-car 180)
TSGN	8 paths
Freight	1-2 paths per hour as defined in the ECML ITSS

1.4.2 Scenario 2

Off-peak 8 tph standard hour	
Purpose	To test 8 tph over southern end of ECML To test 3 tph between Newcastle and Edinburgh To test timetable viability of Class 390
LDHS	Kings Cross – Leeds via Wakefield (9-car IEP) Kings Cross – Leeds via Wakefield (9-car IEP) Kings Cross – Leeds via Wakefield or Hambleton (5-car IEP) Kings Cross – Edinburgh (9-car IEP) Kings Cross – Edinburgh (9-car IEP) Kings Cross – Newcastle (5-car IEP) Kings Cross – Sunderland, Bradford Interchange or Hull (5-car 180) Kings Cross – Edinburgh (9-car 390)
TSGN	8 paths
Freight	1-2 paths per hour as defined in the ECML ITSS

1.4.3 Scenario 3

Evening peak 8 tph standard hour	
Purpose	To test 8 tph LDHS alongside enhanced TSGN suburban services
LDHS	Kings Cross – Leeds via Wakefield (9-car IEP) Kings Cross – Leeds via Wakefield (9-car IEP) Kings Cross – Leeds via Wakefield or Hambleton (10-car IEP) Kings Cross – Edinburgh (9-car IEP) Kings Cross – Edinburgh (9-car IEP) Kings Cross – Newcastle (10-car IEP) Kings Cross – Lincoln or Hull (9-car IEP) Kings Cross – Edinburgh (9-car 390)
TSGN	10 paths
Freight	0 paths per hour as defined in the ECML ITSS

For each scenario, commentary will be provided as to whether the Woodwalton 4-tracking scheme is required to deliver the output and the trade-offs possible if it is not provided.

2. PARAMETERS

2.1 Time of Day

The timetables will be based on a standard SX hour as defined in section 1.4

2.2 Geographical Scope

The geographical scope for the analysis includes the ECML between London Kings Cross and Edinburgh, plus Doncaster – Leeds – Colton Junction. This has been split into the following sections:

- Kings Cross to Stevenage (to include Kings Cross platforms & Hertford Loop)
- Stevenage to Peterborough
- Peterborough to Doncaster
- Doncaster to Colton Jn
- Doncaster to Colton Jn (via Leeds)
- Colton Jn to Northallerton
- Northallerton to Newcastle
- Newcastle to Drem
- Drem to Edinburgh

For Edinburgh platforming there will be a high-level commentary only. This will need to be investigated fully as part of any follow-up work.

The Moorgate branch remains out of scope for this work.

2.3 LDHS Pattern

The LDHS pattern is specified under 1.4.

2.4 Freight Service Parameters

Freight services are as defined in the ECML 2020 ITSS in terms of quantum, weight and traction characteristics. The ITSS aligns with the Freight Market Study (FMS).

2.5 TSGN Service Parameters

The TSGN service specification and parameters are based on information that has been supplied by Govia based on the ITT and TSGN Franchise Agreement.

2.5.1 Background to 2020 TSGN timetable

A December 2015 re-cast of the Brighton Main Line (BML) is planned and will form the basis for the 2018 timetable on the ECML. Key to operation of the Thameslink

KO2 timetable from 2018 onwards is the interaction and integration of proposed slots across all the lines of route that Thameslink will operate on; Sussex, Kent, Midland Mainline and East Coast Main Line. These slots will be connected through the 'central' core.

2.5.2 TSGN Service Specification

The quantums below are based on the Train Service Requirement (TSR) that is included in the Franchise Agreement.

The tests identified in 1.4 are based on off-peak and PM peak scenarios.

2.5.2.1 PM peak (1600-1859) departing London

- 2 tph Brighton to Cambridge
- 2 tph Tattenham Corner to Cambridge (run Fast Line Finsbury Park to Welwyn Garden City only)
- 2 tph Horsham to Peterborough
- 2 tph Kings Cross to Kings Lynn
- 2 tph* Kings Cross to Peterborough (departures at 1612, 1712, 1742, 1812, 1842)

*1612 terminates at Huntingdon and no departure at 1642.

2.5.2.2 Off-peak in both directions

Between the peaks (1000-1559) and post evening peak and weekends, the following train service shall apply in both directions:

- 2 tph Brighton to Cambridge
- 2 tph Tattenham Corner to Cambridge
- 2 tph Horsham to Peterborough
- 2 tph London Kings Cross to Kings Lynn via Cambridge

2.6 North of England Regional Service Parameters

These will be in line with the North of England specification as factored into the ECML 2020 ITSS.

2.7 ScotRail Edinburgh Service Parameters

Services will be based on those in the ECML 2020 ITSS, which contains a 2-hourly service between Edinburgh and one of Newcastle, Berwick or Dunbar (including calls at the proposed new stations at East Linton and Reston).

3. ASSUMPTIONS

3.1 Station Working

Version 4 2015 Timetable Planning Rules will be used as the base.

For Doncaster Platform 0 which comes into use from the December 2015 timetable, the current expectation is that terminating services from Thorne Jn will use that platform. Further information on the 2020 platform workings at Doncaster will be incorporated as required.

3.2 Rules of the Plan

The base TPR information for this work will be the latest industry issue i.e. version 4 Rules for the 2015 timetable year.

An LNE TPR review is currently progressing but not enough information is known at this time to factor this into the base assumptions for this work.

3.3 Maintenance of the Network

For the purpose of this work, it has been assumed that there will be no changes to the maintenance of the ECML network.

3.4 Infrastructure interventions

The infrastructure assumptions for 2020 are based on the interventions that are expected to take place by the end of CP5. This are set out in Appendix A, with more detail on the East Coast Connectivity programme and schemes in Appendix B.

For the Huntingdon to Woodwalton 4-tracking project, it is to be noted that this has such a significant potential timetabling benefit that the work needs to consider the timetable both with and without this scheme.

3.5 Train Services

The base assumptions for the train service specification are based on the following:

- LDHS specification scenarios as per section 1.4
- Govia specification for TSGN services using the ECML as per section 2.5
- Freight specification based on ECML 2020 ITSS
- CrossCountry and East Midlands specification based on ECML 2020 ITSS
- Northern and TPE specification based on ECML 2020 ITSS

3.6 Passenger Rolling Stock

Unless changes are explicitly stated below, it is assumed that all other traffic on the ECML in the period until December 2020 will operate as per the ECML 2020 ITSS in terms of train type and length.

3.6.1 Rolling stock changes

The rolling stock changes assumed at the time of this analysis are:

- Alliance – proposed new services assumed to be operated using Class 390s
- ICEC franchise – introduction of IEP Class 800/801 trains from December 2018.
- TSGN franchise – Class 700 trains introduced from 2018, Class 377 trains introduced for GN Kings Lynn services from 2017, new Metro fleet for GN Moorgate services from 2018
- TPE franchise – EMUs for Leeds to Newcastle from December 2018
- Northern franchise – EMUs for Leeds to York services from December 2018
- Grand Central – all Sunderland services use Class 180s from December 2016

3.7 Sectional Running Times

Based on the infrastructure and rolling stock assumptions for 2020, relevant SRT values will be calculated. An SRT table will be produced to underpin this work.

For modelling purposes, the SRTs for future Northern and TPE EMU stock are based on Class 350 and Class 380, respectively. In addition, the following will apply:

- Class 700 – values as provided to the DFT for TSGN re-franchising
- Class 800/801 – values as provided to the DFT for East Coast re-franchising
- Class 390 – values as created for the ECML Capacity Options report

3.8 Other ECML Timetable Paths in 2020

The scope of this work does not at this stage include the timetabling of Sleeper services or infrastructure / network trains. However, these would need to be factored into the future timetable development for 2020.

4. METHODOLOGY

4.1 Timetable development

Standard-hour high-level development timetables will be developed based on the parameters and assumptions set out in this remit. A number of timetable structures and calling patterns will be tested until an optimal solution is reached.

The final timetable structures will be discussed with industry stakeholders as part of the process.

4.2 Performance assessment and modelling

Following development of the indicative timetables, industry dialogue is planned to take place and will inform an initial high level performance assessment.

Detailed performance modelling will not take place during STAGE 1 of this work (see section 5).

5. OUTPUTS

The initial focus will be on completing the STAGE 1 work as identified below. The potential requirement for work beyond STAGE 1 is sign-posted as STAGE 2.

STAGE 1 (November 2014)

The primary output will be standard-hour high-level development timetables based on the parameters, assumptions and methodology set out in this remit.

The intention is to hold an industry session to provide a high-level assessment on performance impacts. Detailed performance modelling will not take place at this stage.

A draft report will be produced and will provide relevant commentary for the outputs summarised in 5.1 and 5.1 below. This will include the specific tests that have been carried out and any constraints identified.

5.1 Timetables

Standard-hour high-level development timetables for December 2020 will be built based on the scenarios outlined in section 1.4.

5.2 Initial Performance Assessment

Given the requirement to provide a draft report to ORR, the initial priority will be to provide a high-level assessment. In broad terms, Network Rail proposes to convene an Industry session to:

- Discuss the standard-hour development timetables
- Form a professional judgement / consensus on the performance impacts
- Potentially identify areas for detailed performance modelling and assessment

STAGE 2 (Requirement and Dates TBC)

The requirement for further work and timelines will be defined as necessary upon completion of STAGE 1.

5.3 Detailed Performance Modelling

Detailed performance modelling will be targeted on as required basis to allow a deeper understanding of areas of concern. This could inform decisions around further timetable development.

In addition, this could support development of a draft regulation statement and service recovery strategy detailing the industry response to disruption on the route.

In general terms, any next steps may involve a series of industry sessions to:

- Consider ability to recover PPM and right time
- Informed the next stages of timetable development
- Agree areas where a disruption management and / or service recovery strategy will be required

5.4 Safety and Operability

Safety and operability impacts are normally assessed in line with Network Rail's existing timetable risk assessment processes. Examples of areas covered include Level Crossing risk, SPAD risk and Signaller workload.

5.5 Power Supply

There is no theoretical maximum capacity for 2020. North of Newcastle, the traction power infrastructure is reaching its limits, and the impact of any additional services would need to be modelled by Network Rail's Asset Management function to determine if sufficient power exists.

In addition to the numbers of trains, the frequency and proximity of services drives power consumption. Therefore, the theoretical timetables will form a valuable modelling specification to understand if any additional interventions are needed.

6. ROLES & RESPONSIBILITIES

6.1 Client

The Office of Rail Regulation is the leading Client for this work.

6.2 Sponsor

The Sponsor for this work is Matthew Rice, he will:

- Be the person to whom the Project Manager is accountable.
- Act as the key point of contact for all stakeholders.
- Have overall accountability for the outputs.

6.3 Project Manager

The Project Manager for this work is Ed Jeffery. He is accountable for the successful delivery of the work in accordance with this remit.

The Project Manager shall:

- Identify and manage the resources required to deliver this study
- Inform the Sponsor of any significant changes to timescales
- Give timely response to the Sponsor regarding any change requests
- Ensure the delivery of this project to the agreed timescales and budget
- Ensure that the work undertaken focuses on the objectives and delivers in line with the expectations of the Sponsor and Client
- Retain and catalogue all workings throughout the analysis to provide background to any conclusions.

APPENDIX A. INFRASTRUCTURE AND TIMETABLE PLANNING RULE ASSUMPTIONS

The following table details the infrastructure that is assumed to be in place at the end of CP5 and will be used as the basis for this study.

Programme	Enhancement	Assumption & TPR Implications	Scheme note
CP4 scheme	North Doncaster chord	Included as per TPR	Introduced from Dec-14 timetable
Thameslink	Belle Isle connection between ECML and Thameslink	Included as per DTT2011 assumptions for TPR	Due for completion 2015
CP4 scheme	GN/GE Joint Line upgrade	Included and assumed freight can be routed via this route	Due for completion in 2014
Track renewals	Shaftholme Jn upgrade	Assumed but no impact on capacity	Due to complete 2016
InterCity Express (IEP)	IEP depot at Doncaster Carr	Included but no impact on standard hour timetable	Due to complete 2017
EC Connectivity	Doncaster: new east side platform (platform 0)	Included as per GRIP 2 scheme sketch	Due to complete 2016
EC Connectivity	Doncaster: east side new tracks and bi-directional working	Included as per GRIP 2 scheme sketch	Due to complete 2016
Resignalling	North Lincolnshire resignalling	Increased freight capacity between Wrawby Jn and Scunthorpe. SFN is funding extra signals between Appleby & Elseham to reduce headways on this section.	Due to complete in CP5
InterCity Express (IEP)	Edinburgh station – additional platform(s)	Included but multiple options still under consideration therefore no detailed work undertaken	Extend platform 5 & 6 for IEP
EGIP	Portobello Junction doubling	Not assumed	Under development but not assumed
EC Connectivity	York: north throat additional track	Included as per GRIP 2 scheme sketch	Due to complete 2018
Track renewals	Belford Loops entry and exit speeds	Assumed but no impact on capacity	Not progressing, low priority for Connectivity Fund
InterCity Express (IEP)	ECML gauge clearance for Super Express Train	Assumed there is no gauge restriction on aspired services	Due for completion 2017
EC Connectivity	Woodwalton Jn to Huntingdon: reinstate Up Slow line	Assumed	High priority for CP5 and endorsed by Programme Board
--	Works necessary to provide EPS for Class 390	Included as per information provided by Alliance Rail	
--	East Leeds Parkway station	Not assumed	
Thameslink	ATO through Thameslink Core	Included as per TPR values assumed for DTT2011	Infrastructure ready Jan 2018
Thameslink	New EMU depot, Hornsey	Included but no impact on standard hour timetable	Due to complete July 2016

Thameslink	New EMU depot, Eastfield (Peterborough)	Included but no impact on standard hour timetable	Infrastructure ready May 2015
EC Connectivity	Fletton to Peterborough Down Slow upgrade	Included as per GRIP 2 scheme sketch	Due for completion 2017
North of England	East of Leeds corridor (re-signalling and headway improvements)	Not assumed as insufficient information available to include a single option in timetable development.	Due to complete 2018
EC Connectivity	Additional freight loops between Northallerton and Newcastle	Included as per GRIP 2 scheme sketch	Due to complete 2018
HLOS capacity	Stevenage turnback (new platform)	Included and assumed there is a bay platform to the west of Platform 4	Due to complete 2018
North of England	Leeds station – additional through platform / other alterations	Not assumed as insufficient information available to include a single option in timetable development	Due to complete 2018
Electrification in the North	Electrification Neville Hill to Colton Jn and Selby	Assumed	Due to complete 2018
ERTMS	ETCS implementation Kings Cross to Alexandra Palace and Hertford North	Assumed to be implemented but no change in existing headways or margins has been assumed. Therefore the basic assumption is that ETCS will at least deliver current signalling capability.	Planned for 2018
Track renewals	Kings Cross area S&C renewals	Included with Option 9 layout assumed	Planned for Dec 2018
Level Crossing Upgrade	Upgrade St Germains LC (near Drem)	Included but no impact on TPRs assumed	Progressing option for closure with local authority
EC Connectivity	GN/GE southern access	Included and assumes a dive under at Werrington as per GRIP 2 option	Planned for 2018
EC Connectivity	Peterborough station remodelling	Based on current fund priorities, this scheme is not assumed.	Not progressing, low priority for Connectivity Fund
ERTMS	ETCS implementation Alexandra Palace to Peterborough	Assumed to be implemented but no change in existing headways or margins has been assumed. Therefore the basic assumption is that ETCS will at least deliver current signalling capability.	Planned for Dec 2020
ERTMS	ETCS implementation Peterborough to Bawtry	Assumed to be implemented but no change in existing headways or margins has been assumed. Therefore the basic assumption is that ETCS will at least deliver current signalling capability.	Planned for Dec 2020
Dunbar Station	Additional platform at Dunbar Station	Under development but not assumed	Item added since ECML Capacity Options report
New stations at Reston and East Linton	New stations (with local stopping service) included as a priced option in the new ScotRail franchise	Not assumed	Item added since ECML Capacity Options report

APPENDIX B. EAST COAST CONNECTIVITY SCHEMES

A more detailed view of the East Coast Connectivity Fund works proposed for draw down by the East Coast Programme Board follows.

The Programme Board will continue to prioritise schemes for efficient delivery of Connectivity Fund.

GN/GE Southern Access

Scope: Grade separation, exploring options for flyover or dive under

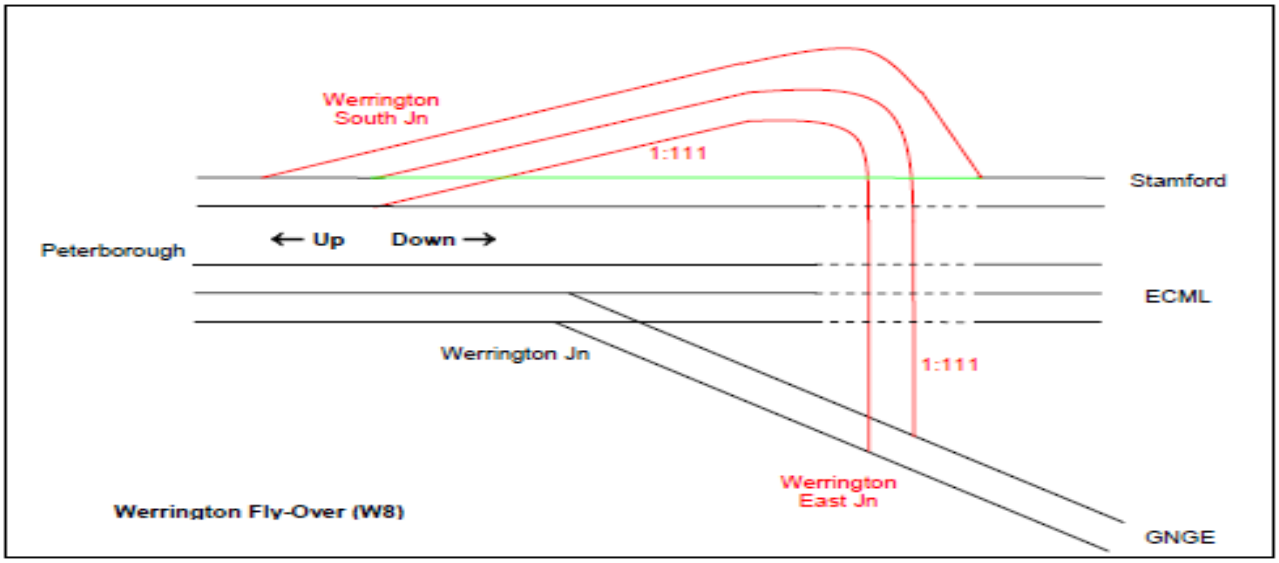

Figure 1 GN/GE Southern Access project

Doncaster Station Area

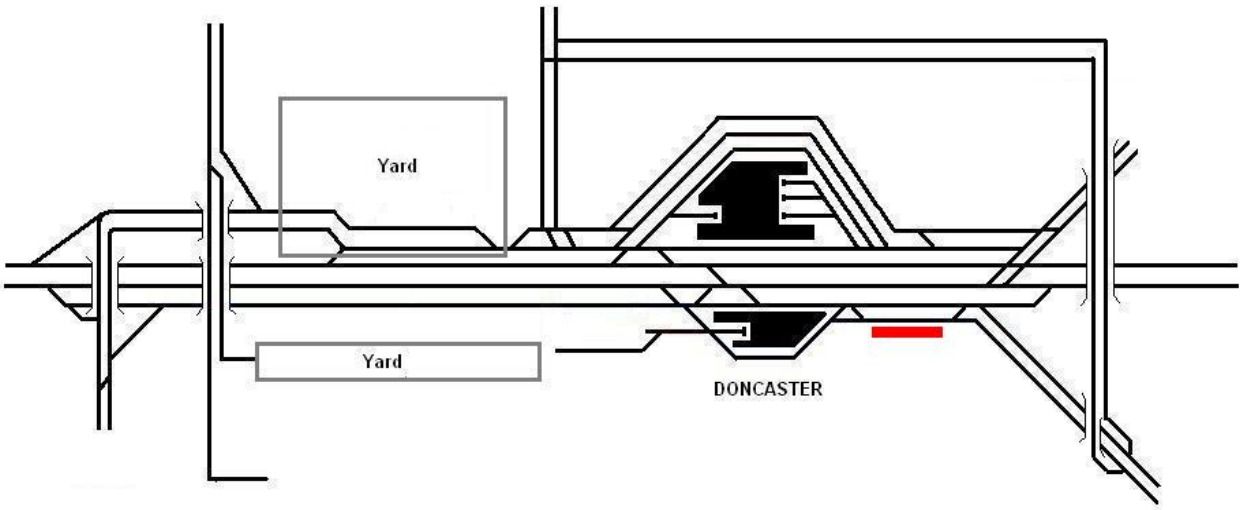

Figure 2 Doncaster Station Area project

Scope:

- Construction of 100m long bay Platform with half length canopy with a covered footbridge and two new lifts, adjacent to Frenchgate centre for trains to/from Hull/Scunthorpe
- Associated lighting, telecoms, CCTV.
- Additional canopy on Platform 1 & 4 to cover the area to the new footbridge.
- 2 new turnouts, 2 friction buffer stops. Modification to existing track, signalling and OLE equipment, although the Platform line will not be electrified.
- Bi-directional signalling to the Doncaster East Side (25mph) from Black Carr Junction to Balby bridge
- A new 25mph crossover on the Thorne lines
- Modification of the carriage sidings including electrifying the new route through the sidings
- A new crossover between the existing shunt neck and Low Ellers Curve
- A new driver walkway at St Catherine's Junction.

<u>Shaftholme Jn speed increase</u>

Increase turnout speed from 20mph to 40mph and increase the down main line speed from 100mph to 125mph.

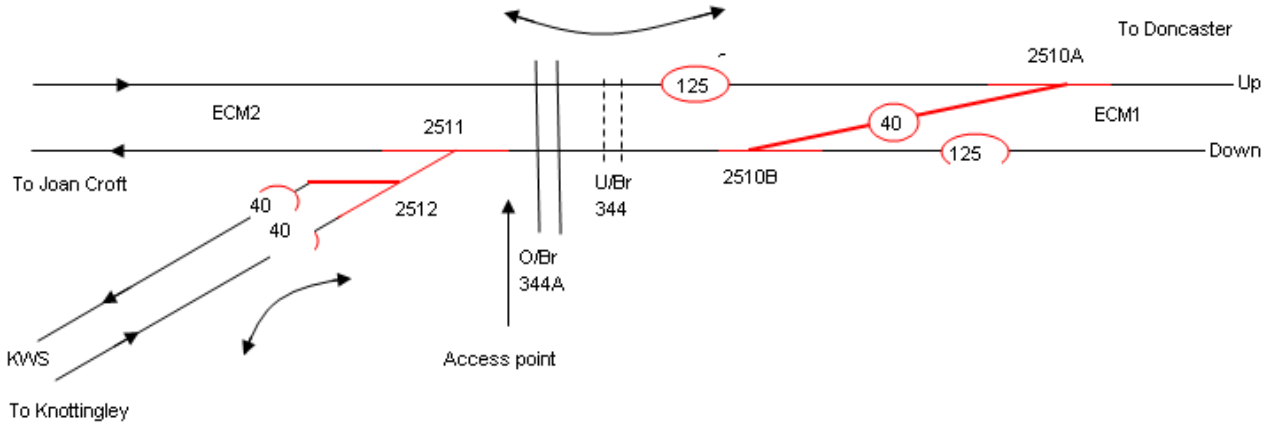

Figure 3 Shaftholme Jn speed increase project

York Station North Throat

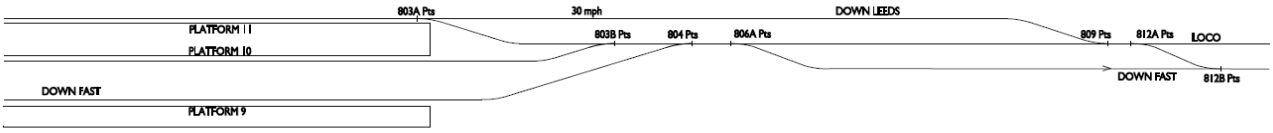

Figure 4 York Station North Throat project

- New line from Platform 11 to the loco line to allow parallel moves into/out of platforms 9/10 and platform 11.
- Construction of 300m of plain line
- Installation of 2 no. switches and crossings (S&C) units
- Modifications to the existing signalling infrastructure
- Installation of new OLE equipment.

Northalleron – Newcastle: Freight Loops

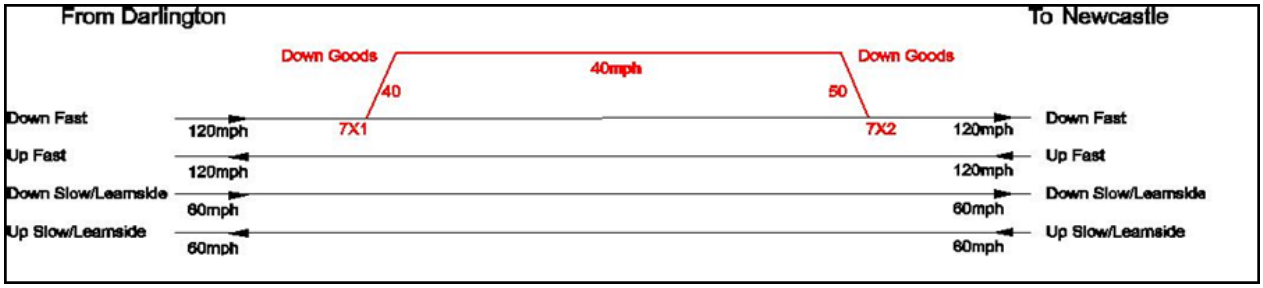

Figure 5 Northallerton to Newcastle Freight Loops project (Ferryhill)

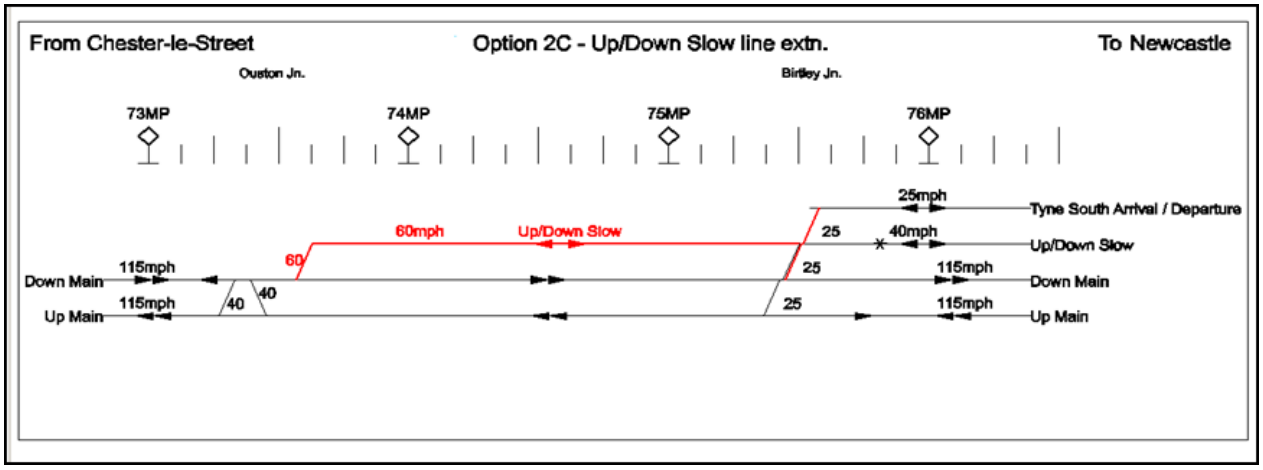

Figure 6 Northallerton to Newcastle Freight Loops project (Ouston – Birtley)

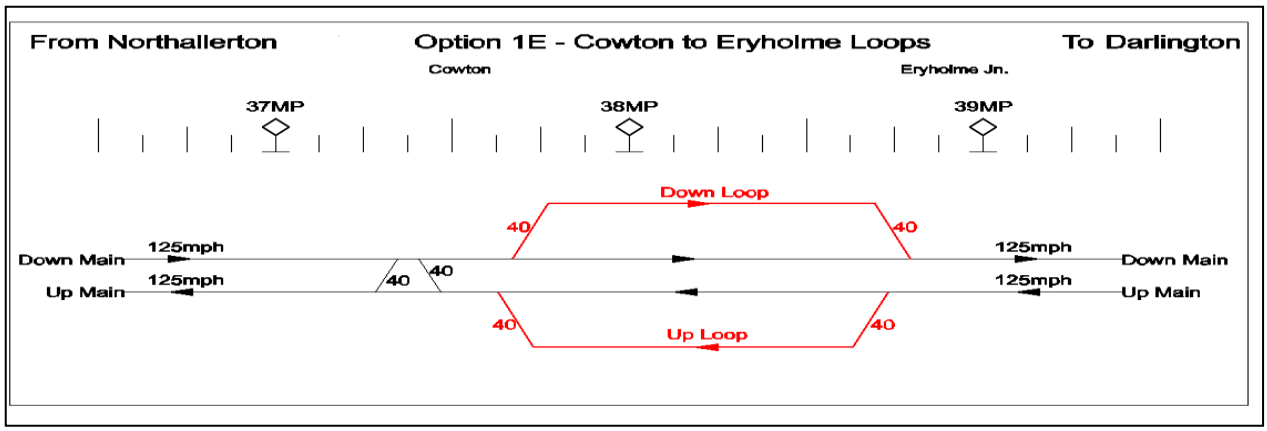

Figure 7 Northallerton to Newcastle Freight Loops project (Cowton – Eryholme)

Huntingdon to Woodwalton

Scope:

(1) Re-instate the Up Slow line (4th line) between Huntingdon and Woodwalton with 100mph linespeed

(2) Connection to Up Fast at Connington to include options to retain existing 70mph turnout and to increase turnout speed to 100mph.

(3) New Up Fast to Up Slow crossover near Woodwalton.

(3) New Up Fast to Up Slow crossover near Huntingdon at end of new 4 tracking section.

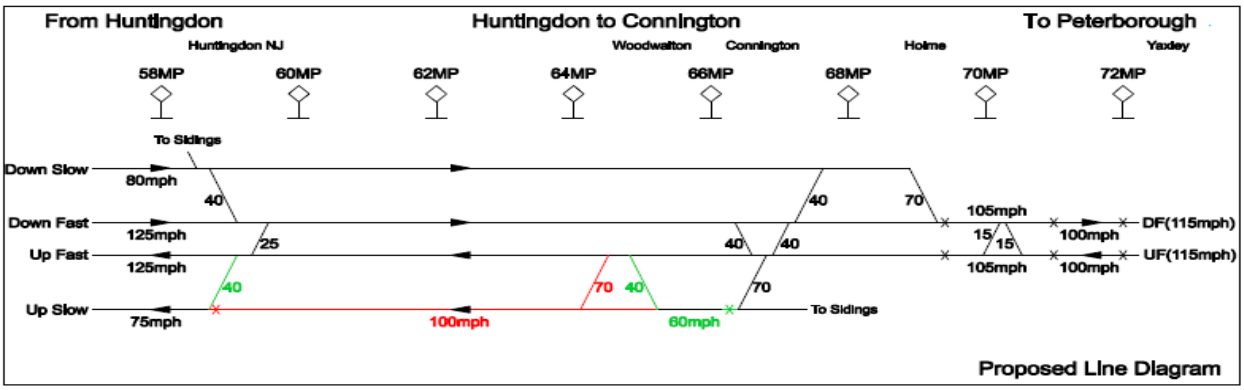

Figure 8 Huntingdon to Woodwalton 4-tracking project

APPENDIX C. CONTACT DETAILS

Sponsor

Matthew Rice

Matthew.rice@networkrail.co.uk

Project Manager

Edward Jeffery

Edward.jeffery@networkrail.co.uk

LNE Route Lead

Tim Wright

Tim.wright@networkrail.co.uk

Strategic Planning Lead

Graham Botham

Graham.botham@networkrail.co.uk

APPENDIX D. ABBREVIATIONS

Acronym	Meaning
ALCRM	All Level Crossing Risk Model
ATO	Automatic Train Operation
BML	Brighton Main Line
CP4	Control Period 4
CP5	Control Period 5
DfT	Department for Transport
DRS	Direct Rail Services
DTT	Development Timetable
EC	East Coast
ECML	East Coast Main Line
EGIP	Edinburgh to Glasgow Improvement Programme
EMU	Electric Multiple Unit
EPS	Enhanced Permissible Speed
ERTMS	European Rail Traffic Management System
ESI	Electricity Supply Industry
ETCS	European Train Control System
FMS	Freight Market Study
GE	Great Eastern
GN	Great Northern
GRIP	Guide to Railway Investment Projects
GTR	Govia Thameslink Railway
HS2	High Speed 2
ICEC	Inter City East Coast
IEP	InterCity Express Programme
ITSS	Indicative Train Service Specification
LDHS	Long Distance High Speed
LNE & EM	London North Eastern & East Midlands (Network Rail Route)
NMT	New Measurement Train
OLE	Overhead Line Equipment
ORR	Office of Rail Regulation
PLPR	Plain Line Pattern Recognition
PPM	Public Performance Measure
PPRP	Performance Planning Reform Programme
S&C	Switches and Crossings
SPA	Signalling Performance Assessment
SRT	Sectional Running Time
SX	Monday to Friday (applies to timetable)

Acronym	Meaning
Thameslink KO2	Thameslink Key Output 2
TSGN	Thameslink, Southern and Great Northern
TPE	Trans Pennine Express
TPD	Trains per Day
tph	Trains per Hour
TPR	Timetable Planning Rules
WCML	West Coast Main Line
WTT	Working Timetable

APPENDIX D. Working Timetables

KINGS X to PETERBOROUGH (OPTION 1 OFF-PEAK 8 TPH)

Original Location		Kings Cross	Horsham	Horsham	Kings Cross	Kings Cross	Kings Cross	Kings Cross	Brighton	Tattenham Corner	Kings Cross	Horsham	Horsham	Kings Cross	Kings Cross
Destination Location		Edinburgh	Peterborough	Peterborough	Sunderland, Bradford, Hull	Leeds	Kings Lynn	Edinburgh	Cambridge	Cambridge	Leeds	Peterborough	Peterborough	Edinburgh	York
Timing Load		800	700	700	180	800	365	800	700	700	800	700	700	390	800
Kings Cross	**dep**	**11.00**			**11.08**	**11.11**	**11.14**	**11.19**			**11.30**			**11.38**	**11.41**
Belle Isle	**dep**	*11/01 ½*		*11/02*	*11/09 ½*	*11/12 ½*	*11/15 ½*	*11/20 ½*	*11/18*		*11/31 ½*		*11/32*	*11/39 ½*	*11/42 ½*
				SL			**FL**		**SL**				**SL**		
Finsbury Park	**arr**			**11.05**					**11.23**				**11.35**		
	dep	*11/03 ½*		**11.06**	*11/11 ½*	*11/14 ½*	*11/17 ½*	*11/22 ½*	**11.24**		*11/33 ½*		**11.36**	*11/41 ½*	*11/44 ½*
		FL		**FL**	**FL**	**FL**	**FL**	**FL**	**FL**		**FL**		**FL**	**FL**	**FL**
Alexandra Palace	**dep**	*11/05*		*11/09*	*11/13*	*11/16*	*11/19*	*11/24*	*11/26 ½*		*11/35*		*11/39*	*11/43*	*11/46*
Potters Bar	**dep**	*11/09 ½*		*11/13 ½*	*11/17 ½*	*11/20 ½*	*11/24*	*11/28 ½*	*11/31*		*11/39 ½*		*11/43 ½*	*11/47 ½*	*11/50 ½*
Welwyn GC	**arr**									**11.36 ½**					
	dep	*11/13 ½*		*11/18 ½*	*11/21 ½*	*11/24 ½*	*11/28 ½*	*11/32 ½*	*11/35 ½*	**11.37**	*11/43 ½*		*11/48 ½*	*11/51 ½*	*11/54 ½*
Digswell	**dep**									*11/38 ½*					
Woolmer Green Jn	**dep**	*11/15*		*11/20*	*11/23*	*11/26*	*11/30 ½*	*11/34*	*11/37 ½*	*11/42*	*11/45*		*11/50*	*11/53*	*11/56*
		FL		**SL**	**FL**	**FL**	**SL**	**FL**	**SL**	**SL**	**FL**		**SL**	**FL**	**FL**
Stevenage	**arr**			**11.23 ½**					**11.40**	**11.46 ½**			**11.53** ½		
	dep	*11/17*		**11.24 ½**	*11/25*	*11/28*	*11/33 ½*	*11/36*	**11.41**	**11.47 ½**	*11/47*		**11.54 ½**	*11/54 ½*	*11/58*
Hitchin	**dep**	*11/19*		**11.29 ½**	*11/27*	*11/30*	*11/37*	*11/38*	**11.46**	**11.52 ½**	*11/49*		**11.59 ½**	*11/57*	*12/00*
				SL			**DCF**		**DCF**	**DCF**			**SL**		
Biggleswade	**dep**			**11.39**									**12.09**		
Sandy	**dep**	*11/25*		**11.43**	*11/33*	*11/36*		*11/44*			*11/55*		**12.13**	*12/02 ½*	*12/06*
Huntingdon	**arr**			**11.57**									**12.27**		
	dep	*11/32*		**12.00**	*11/40*	*11/43*		*11/51*			*12/02*		**12.30**	*12/09 ½*	*12/13*
			←									←			
Holme Jn	**dep**	*11/37*	*11/39 ½*	*12/09 ½*	*11/45*	*11/48*		*11/56*			*12/07*	*12/09 ½*	*12/39 ½*	*12/14 ½*	*12/18*
			FL	**FL**								**FL**	**FL**		
Fletton Jn	**pass**	*11/40*	*11/43*	→	*11/48*	*11/51*		*11/59*			*12/10*	*12/13*	→		*12/21*
			FL		**FL**	**SL**		**SL**			**SL**	**FL**		**FL**	**SL**
			[2]		(1.5)			(½)				[2]			
Peterborough	**arr**		**11.47 ½**			**11.53**		**12.01 ½**			**12.12**	**12.17 ½**		(2)	**12:23**
		DF	**2**		**DF**	**4**		**4**			**4**	**2**		**DF**	**4**
	dep	*11/41*			*11/50 ½*	**11.55**		**12.03 ½**			**12.14**			*12/20 ½*	**12:25**

Original Location		Kings Cross	Kings Cross	Brighton	Tattenham Corner	LDHS
Destination Location		Kings Lynn	Leeds	Cambridge	Cambridge	Edinb.
Timing Load		365	800	700	700	800
Kings Cross	dep	**11.44**	**11.49**			**12.00**
Belle Isle	dep	*11/45 ½*	*11/50 ½*	*11/48*		*12/01 ½*
				SL		
Finsbury Park	arr			**11.53**		
	dep	*11/47 ½*	*11/52 ½*	**11.54**		*12/03 ½*
		FL	**FL**	**FL**		**FL**
Alexandra Palace	dep	*11/49*	*11/54*	*11/56 ½*		*12/05*
Potters Bar	dep	*11/54*	*11/58 ½*	*12/01*		*12/09 ½*
Welwyn GC	arr				**12.06 ½**	
	dep	*11/58 ½*	*12/02 ½*	*12/05 ½*	**12.07**	*12/13 ½*
Digswell	dep				*12/08 ½*	
Woolmer Green Jn	dep	*12/00 ½*	*12/04*	*12/07 ½*	*12/12*	*12/15*
		SL	**FL**	**SL**	**SL**	**FL**
Stevenage	arr			**12.10**	**12.16 ½**	
	dep	*12/03 ½*	*12/06*	**12.11**	**12.17 ½**	*12/17*
Hitchin	dep	*12/07*	*12/08*	**12.16**	**12.22 ½**	*12/19*
		DCF		**DCF**	**DCF**	
Biggleswade	dep					
Sandy	dep		*12/14*			*12/25*
Huntingdon	arr					
	dep		*12/21*			*12/32*
Holme Jn	dep		*12/26*			*12/37*
Fletton Jn	pass		*12/29*			*12/40*
			FL			
Peterborough	arr					
			DF			**DF**
	dep		*12/30*			*12/41*

PETERBOROUGH TO DONCASTER (OPTION 1 OFF-PEAK 8 TPH)

Original Location		**Kings Cross**	**Norwich**	**Kings Cross Sunderland, Bradford,**	**Kings Cross**	**Nottingham**	**Kings Cross**	**Kings Cross**	**Kings Cross**	**Kings Cross**	**Norwich**	**Leicester**	**Kings Cross**	**Kings Cross**
Destination Location		**Edinburgh**	**Liverpool Lime Street**	**Hull**	**Leeds**	**Lincoln**	**Edinburgh**	**Leeds**	**Edinburgh**	**York**	**Liverpool Lime Street**	**Lincoln**	**Leeds**	**Edinburgh**
Timing Load		**800**	**158**	**180**	**800**	**150**	**800**	**800**	**390**	**800**	**158**	**150**	**800**	**800**
Peterborough	**arr**				**11.53**		**12.01 ½**	**12.12**	*(2)*	**12:23**	**12.27 ½**			
		DF		**DF**	**4**		**4**	**4**	**DF**	**4**	**7**		**DF**	**DF**
	dep	*11/41*		*11/50 ½*	**11.55**		**12.03 ½**	**12.14**	*12/20 ½*	**12:25**	**12.29 ½**		*12/30*	*12/41*
											SL		*(1)*	
Helpston Jn	pass										*12/35 ½*			
Tallington Jn	pass	*11/45 ½*	←	*11/55*	*12/01 ½*		*12/10*	*12/20 ½*	*12/24 ½*	*12/31 ½*	*12/39 ½*		*12/35 ½*	*12/45 ½*
			←								[2] (2 ½)			
Stoke Jn	pass	*11/52 ½*	*11/55 ½*	*12/02*	*12/08 ½*		*12/17*	*12/27 ½*	*12/32*	*12/38 ½*	*12/55 ½*		*12/42 ½*	*12/52 ½*
			FL	*(1)*	*(½)*						FL			
Grantham	**a**		**12.02**				**12.20 ½**				→		**12.46**	
	d	*11/55 ½*	**12.04**	*12/06*	*12/12*		**12.22**	*12/30 ½*	*12/34 ½*	*12/41 ½*			**12.47 ½**	*12/55 ½*
			DNL											
Nottingham Branch Jn	pass		*12/06*											
Newark NG	**a**				**12.19 ½**					**12.49**				
	d	*12/02 ½*		*12/13*	**12.21**		*12/30 ½*	*12/37 ½*	*12/41 ½*	**12.50 ½**			*12/56*	*13/02 ½*
													(2 ½)	
Newark Flat Crossing	pass	*12/03*		*12/13 ½*	*12/22*	*12/26*	*12/31*	*12/38*	*12/42*	*12/51 ½*		*12/54 ½*	*12/59*	*13/03*
									(½)					
Retford	**a**			**12.23 ½**										
	d	*12/12*		**12.25**	*12/32 ½*		*12/40*	*12/47*	*12/51*	*13/01 ½*			*13/08*	*13/12*
														(½)
Loversall Carr Jn	pass	*12/19*		*12/33*	*12/39 ½*		*12/47*	*12/54*	*12/57 ½*	*13/08 ½*			*13/15*	*13/19 ½*
													SL	
Doncaster	**a**	*(½)*			**12.43 ½**		**12.51**		(½)	**13.12 ½**			**13.20**	
	pl	**DF**		**DF**	**4**		**4**	**DF**	**DF**	**4**			**4**	**DF**
	d	*12/21½*		*12/35*	**12.45 ½**		**12.52 ½**	*12/56*	*13/00*	**13.14 ½**			**13.22**	*13/21 ½*

DONCASTER to YORK (OPTION 1 OFF-PEAK 8 TPH)

Original Location		Kings Cross	Reading	Kings Cross	Kings Cross	Kings Cross	Kings Cross	LDHS
Destination Location				Sunderland,				
Timing Load		Edinburgh 800	Newcastle 221	Hull 180	Edinburgh 800	Edinburgh 390	York 800	Edinburgh 800
Doncaster	**arr**	(½)	**12.17 ½**		**12.51**	(½)	**13.12 ½**	(½)
	pl	**DF**	**8**	**DF**	**4**	**DF**	**4**	**DF**
	dep	*12/21½*	**12.24 ½**	*12/35*	**12.52 ½**	*13/00*	**13.14 ½**	*13/21 ½*
Shaftholme Jn	pass	*12/23 ½*	*12/28*	*12/37*	*12/56*	*13/02*	*13/18*	*13/23 ½*
Temple Hirst Jn	pass	*12/28 ½*	*12/32 ½*	*12/42*	*13/01 ½*	*13/07*	*13/23 ½*	*13/28 ½*
Hambleton Nth Jn	pass	*12/31*	*12/35 ½*	*12/44 ½*	*13/04*	*13/09 ½*	*13/26* [2]	*13/31*
York	**arr**	**12.39**	**12.44**	**12.52 ½**	**13.12**		**13.36**	**13.39**
	pl							
	dep	**12.42**	**12.46**		**13.20 ½**	*13/17 ½*		**13.42**

YORK to NEWCASTLE (OPTION 1 OFF-PEAK 8 TPH)

Original Location		Kings Cross	Reading	Liverpool	LDHS	LDHS	Liverpool	LDHS
Destination Location		Edinburgh	Newcastle	Newcastle	Edinburgh	Newcastle	Glasgow	Edinb.
Timing Load		800	221	380	390	800	380	800
York	**arr**	**12.39**	**12.44**	**12.45 ½**		**13.12**	**13.15 ½**	**13.39**
	pl						**10**	
	dep	**12.42**	**12.46**	**12.49**	*13/17 ½*	**13.20 ½**	**13.23 ½**	**13.42**
Thirsk	arr			**13.05 ½**				
	dep			**13.06 ½**				
Northallerton	**a**			**13.13**		**13.38**	**13.43**	
	d	*12/58 ½*	*13/03* *(½)*	**13.14**	*13/33 ½*	**13.39 ½**	**13.44**	*13/58 ½*
Darlington	**a**		**13.12 ½**	**13.26 ½**		**13.50**	**13.55 ½**	
		(1)	**1**	**1**	*(2)*	**4**	**1**	*(1)*
	d	*13/06 ½*	**13.14**	**13.28 ½**	*13/42 ½*	**13.52**	**13.58**	*14/06 ½*
Ferryhill New Loop	arr							
	dep							
Ferryhill Sth Jn	pass	*13/14*	13/21 ½	13/36 ½	*13/49*		*14/06*	*14/14*
Tursdale Jn	pass	*13/12 ½*	13/24	13/38 ½	*13/50*		*14/08*	*14/15 ½*
Durham	**a**		**13.29**	**13.43 ½**		**14.06 ½**	**14.13**	
	d	*13/20*	**13.30 ½**	**13.45**	*13/54 ½*	**14.08**	**14.14 ½**	*14/20*
Chester-le-Street	arr			**13.50**				
	dep			**13.51**				
		[3]	[1]	[1]	[3]	[3]	[1]	[3]
Birtley Jn	pass	*13/28*	*13/37 ½*	13/55	*14/02*	*14/17*	*14/22*	*14/28*
King Edward Bridge Sth Jn	pass	*13/31*	*13/40 ½*	13/58	*14/04 ½*	*14/20*	*14/25*	*14/31*
Newcastle	**a**	**13.33**	**13.42 ½**	**14.00**	**14.06 ½**	**14.22**	**14.26 ½**	**14.33**
	d	**13.36**			**14.08 ½**		**14.39**	**14.36**

NEWCASTLE TO EDINBURGH (OPTION 1 OFF-PEAK 8 TPH)

Original Location		Kings Cross	Liverpool Lime Street	Kings Cross	Berwick	North Berwick	Kings Cross
Destination Location		Edinburgh	Glasgow	Edinburgh	Edinburgh	Edinburgh	Edinburgh
Timing Load		800	380	390	380	380	800
Newcastle	**arr**	**13.33**	**13.26 ½**	**14.06 ½**			**14.33**
	dep	**13.36**	**13.39**	**14.08 ½**			**14.36**
Heaton Sth Jn	pass	*13/38 ½*	*13/41*	*14/11*			*14/38 ½*
Cramlington	arr		**13.47**				
	dep		**13.48**				
Morpeth	arr		**13.53 ½**				
	dep	*13/47 ½*	**13.54 ½**	*14/19 ½*			*14/47 ½*
Alnmouth	arr		**14.07**				
	dep	*13/59*	**14.08**	*14/29 ½*			*14/59*
Belford	pass	*14/08*	*14/18 ½*	*14/38*			*15/08*
		[2]	[1]	[2]			[2]
Berwick	**arr**		**14.29 ½**				
	dep	*14/18*	**14.31**	*14/48*	**14.53**		*15/18*
Reston Signal EG403	pass	*14/20 ½*	*14/34*	*14/50*	*14/55 ½*		*15/20 ½*
Reston	pass	*14/25*	*14/39*	*14/54 ½*	*15/02*		*15/25*
Granthouse	dep	*14/29*	*14/42 ½*	*14/57*	*15/06*		*15/29*
Oxwellmains	pass	*14/36*	*14/49 ½*	*15/06*	*15/13*		*15/36*
Dunbar	**arr**		**14.51 ½**		**15.15**		
	dep	*14/37*	**14.53**	*15/04 ½*	**15.16 ½**		*15/37*
Drem	arr						
	dep	*14/43 ½*	*15/01*	*15/09 ½*	*15/24*	**15.28**	*15/43 ½*
Prestonpans	pass	*14/48 ½*	*15/06 ½*	*15/14*	*15/39 ½*		*15/48 ½*
		[2]	[3]	[2]	[3]	[3]	[2]
Monktonhall Jn	pass	*14/52*	*15/13 ½*	*15/17 ½*	*15/41 ½*	*14/44 ½*	*15/52*
Edinburgh	**arr**	**14.57 ½**	**15.18 ½**	**15.22**	**15.46 ½**	**14.52 ½**	**15.57 ½**

DONCASTER TO LEEDS (OPTION 1 OFF-PEAK 8 TPH)

Original Location		**Kings Cross**	**Plymouth**	**Doncaster**	**Kings Cross**	**Kings Cross**	**Sheffield**	**Kings Cross**
Destination Location		**Leeds**	**Glasgow**	**Leeds**	**Leeds**	**Leeds**	**Leeds**	**Leeds**
TID								
Timing Load		**800**	**221**	**321C**	**800**	**800**	**142**	**800**
Doncaster	arr	**12.20**			**12.43 ½**			**13.20**
	plat	**4**		**6**	**4**	**DF**		**4**
	dep	**12.22**		**12.26**	**12.45 ½**	*12/56*		**13.22**
Adwick	arr			**12.32 ½**				
	dep	*12/25 ½*		**12.33 ½**	*12/49*	*13/00*		*13/25 ½*
Adwick Jn	pass	*12/26*		*12/34 ½*	*12/49 ½*	*13/00 ½*		*13/26*
		(3)						(3)
South Kirkby Jn	pass	*12/32*	*12/37 ½*	*12/41*	*12/52 ½*	*13/03 ½*	*13/07 ½*	*13/32*
Hare Park Jn	pass	*12/35 ½*	*12/42*	*12/48*	*12/56*	*13/07*	*13/16 ½*	*13/35 ½*
		[1]			[1]	[1]		[1]
Wakefield Westgate	arr		**12.45 ½**	**12.54**	**13.01**	**13.12**	**13.22 ½**	
	dep	*12/40*	**12.47**	**12.55**	**13.02 ½**	**13.13 ½**	**13.23 ½**	*13/40*
		[1]	[1]<1>	[2]	[1] (½)	[1]	[2]<1>	[1]
Holbeck Jn	pass	*12/49*	*12/58 ½*		*13/12 ½*	*13/23*	*13/39*	*13/49*
Whitehall Jn	pass	*12/49 ½*	*12/59*	*13/09*	*13/13*	*13/23 ½*	*13/39 ½*	*13/49 ½*
Leeds West Jn	pass	*12/50*	*12/59 ½*	*13/09 ½*	*13/13 ½*	*13/24*	*13/40*	*13/50*
Leeds	arr	**12.51 ½**	**13.01**	**13.11**	**13.15**	**13.25 ½**	**13.43 ½**	**13.51½**

EDINBURGH TO NEWCASTLE (OPTION 1 OFF-PEAK 8 TPH)

Original Location		Edinburgh	Edinburgh	Edinburgh	Edinburgh	Edinburgh	Edinburgh
Destination Location		Kings Cross	Liverpool Lime Street	Kings Cross	Berwick	North Berwick	Kings Cross
Timing Load		390	380	800	380	380	390
Edinburgh	**dep**	**13.05**	**13.08**	**13.37 ½**	**13.41 ½**	**13.45 ½**	**14.05**
		(½)					(½)
Monktonhall Jn	pass	*13/10*	*13/13*	*13/43*	*13/49 ½*	13/53 ½	*14/10*
Prestonpans	arr					**13.59**	
	dep	*13/12*	*13/16*	*13/45*	*13/52 ½*	**14.00**	*14/12*
Drem	arr					**14.10 ½**	
	dep	*13/15 ½*	*13/20 ½*	*13/49 ½*	*13/58*	**14.11 ½**	*14/15 ½*
Dunbar	**arr**		**13.28**		**14.07 ½**		
	dep	*13/22*	**13.30 ½**	*13/56*	**14.09**		*14/22*
Oxwellmains	pass	*13/23*	*13/32 ½*		*14/11*		
Grantshouse	arr						
	dep	*13/29 ½*	*13/39 ½*	*14/04*	*14/18*		
Reston	pass	*13/32 ½*	*13/43*	*14/08 ½*	*14/21 ½*		
		[2]	[2]	[2]	[3]		[2]
Reston Signal EG402	pass	*13/39*	*13/50 ½*	*14/15*	*14/32 ½*		
Berwick	**arr**		**13.53**		**14.35**		*14/40 ½*
	dep	*13/40 ½*	**13.54 ½**	*14/17 ½*			
Cragmill Loop	arr						
	dep						
Belford	pass	*13/48 ½*	*14/05*	*14/26*			*14/48 ½*
Alnmouth	arr		**14.15 ½**				
	dep	*13/57*	**14.16 ½**	*14/34 ½*			*14/57*
Morpeth	arr		**14.29**				
	dep	*14/07 ½*	**14.30**				*15/07 ½*
Cramlington	arr		**14.35 ½**				
	dep		**14.36 ½**				
		[2]	[2]	[2]			[2]
Heaton Sth Jn	pass		*14/44*				*15/17 ½*
Newcastle	**arr**	**14.20**	**14.47**	**14.59 ½**			**15.20**
	plat						
	dep	**14.22**	**14.49**	**15.02 ½**			**15.22**

NEWCASTLE TO YORK (OPTION 1 OFF-PEAK 8 TPH)

Original Location		Edinburgh	Newcastle Liverpool	Newcastle	Newcastle	Edinburgh Liverpool	Edinburgh	Newcastle Liverpool	Edinburgh
Destination Location		Kings Cross	Lime Street	Kings Cross	Reading	Lime Street	Kings Cross	Lime Street	Kings Cross
Timing Load		390	380	800	221	380	800	380	390
Newcastle	**arr**	**14.20**				**14.47**	**14.59 ½**		**15.20**
	plat								
	dep	**14.22**		**14.26 ½**	**14.33 ½**	**14.49**	**15.02 ½**	**15.07**	**15.22**
King Edward Bridge Sth Jn	pass	*14/23 ½*		*14/28 ½*	*14/35*	*14/50 ½*	*15/04 ½*	*15/08 ½*	*15/23 ½*
Birtley Jn	pass	*14/26 ½*		*14/31 ½*	*14/38 ½*	*14/53 ½*	*15/07 ½*	*15/11 ½*	*15/26 ½*
Chester-le-Street	arr							**15.14 ½**	
	dep							**15.15 ½**	
Durham	**arr**			**14.37 ½**	**14.45**	**15.00**		**15.20 ½**	
	dep	*14/31 ½*		**14.39**	**14.47**	**15.01**	*15/13*	**15.22**	*15/31 ½*
Tursdale Jn	pass	*14/35 ½*		*14/44 ½*		*15/06 ½*	*15/18*	*15/27 ½*	
Ferryhill Sth Jn	pass	*14/36 ½*		*14/45 ½*		*15/08*	*15/19*	*15/29*	
		[1]	←	[1] (1) {1}	[1]	{1}	[1]		[1]
Darlington	**arr**		**14.39**	**14.56**	**15.02**	**15.16 ½**		**15.37 ½**	
	dep	*14/43 ½*	**14.48**	**14.58**	**15.07 ½**	**15.18 ½**	*15/27*	**15.48**	*15/44*
Northallerton	**arr**		**14.58**	**15.07**		**15.28 ½**		→	
	dep	*14/51*	**14.59**	**15.08 ½**	*15/16 ½*	**15.29 ½**	*15/34*		*15/51*
			SL			**SL**			
Thirsk	arr		**15.05**						
	dep		**15.06**			*15/34 ½*	*15/38*		
Tollerton	pass		*16/14 ½*			*15/42 ½*	*15/44*		
		[1]	[2]	[1]	[1]	[2](3)	[1]		[1]
York	**arr**		**16.23**	**15.27**	**15.33**	**15.54 ½**	**15.51 ½**		
	dep	*15/08*	**16.27 ½**	**15.30**	**15.35**	**15.57 ½**	**15.54 ½**		*16/08*

YORK TO DONCASTER (OPTION 1 OFF-PEAK 8 TPH)

Original Location		Edinburgh	York	Newcastle	Newcastle	Edinburgh	Sunderland, Hull	Edinburgh
Destination Location		Kings Cross	Kings Cross	Kings Cross	Reading	Kings Cross	Kings Cross	Kings Cross
TID								
Timing Load		390	800	800	221	800	180	390
York	**arr**			**15.27**	**15.33**	**15.51 ½**		
	dep	*15/08*	**15.11**	**15.30**	**15.35**	**15.54 ½**	**15.59**	*16/08*
Doncaster	**arr**		**15.29 ½**	**15.51 ½**	**15.56 ½**			
	plat	UF						
	dep	*15/25 ½*	**15.31 ½**	**15.53 ½**	**15.58 ½**	*16/12*	*16/16 ½*	*16/25 ½*

DONCASTER TO PETERBOROUGH (OPTION 1 OFF-PEAK 8 TPH)

Original Location		Edinburgh Kings Cross	Leeds Kings Cross	York Kings Cross	Lincoln Leicester	Leeds Kings Cross	Liverpool Lime Street Norwich	Newcastle Kings Cross	Liverpool Lime Street Norwich	Leeds Kings Cross	Lincoln Nottingham	Edinburgh Kings Cross	Sunderland, Hull, Bradford Kings Cross	Edinburgh Kings Cross
Destination Location		Edinburgh Kings Cross	Leeds Kings Cross	York Kings Cross	Lincoln Leicester	Leeds Kings Cross	Liverpool Lime Street Norwich	Newcastle Kings Cross	Liverpool Lime Street Norwich	Leeds Kings Cross	Lincoln Nottingham	Edinburgh Kings Cross	Sunderland, Hull, Bradford Kings Cross	Edinburgh Kings Cross
Timing Load		390	800	800	158	800	158	800	158	800	150	800	180	390
Doncaster	**arr**		**15.17 ½**	**15.29 ½**		**15.40**		**15.51 ½**						
	plat	UF	UF											
	dep	*15/25 ½*	**15.27 ½**	**15.31 ½**		**15.42**		**15.53 ½**		*16/04*		*16/12*	*16/16 ½*	*16/25 ½*
			SL									(1)		
Retford	**arr**												**16.26 ½**	
	dep	*15/34*	*15/38*	*15/42*		*15/52 ½*		*16/04*		*16/13*		*16/22*	**16.28**	*16/34*
Newark Flat Crossing	pass	*15/42 ½*	*15/46 ½*	*15/50 ½*	*15/54 ½*	*16/01*		*16/12 ½*		*16/21 ½*	*16/25 ½*	*16/30 ½*	*16/38 ½*	*16/42 ½*
Newark	**arr**			**15.51 ½**		**16.02**								
	dep	*15/43*	*15/47*	**15.53 ½**		**16.03 ½**		*16/13*		*16/22*		*16/31*	*16/39*	*16/43*
Nottingham Branch Jn	dep						*16/09*							
Grantham	**arr**		**15.55**				**16.11**	**16.21**						
	plat		**1**				**4**	**1**						
	dep	*15/50 ½*	**15.56 ½**	*16/02 ½*		*16/12 ½*	**16.14 ½**	**16.22 ½**		*16/29 ½*		*16/38 ½*	*16/46 ½*	*16/50 ½*
		(½)					FL		←					(½)
Stoke Jn	pass		*16/01*	*16/05 ½*		*16/15 ½*	*16/21 ½*	*16/27*	*16/21 ½*					
							SL		*SL*					
							→							
Tallington Jn	pass		*16/08*	*16/12 ½*		*16/22 ½*		*16/34*	*16/33*					
Werrington Jn	pass													
									[2]					
Peterborough	**arr**			**16.18 ½**		**16.28 ½**		**16.40**	**16.43**	**16.45 ½**				
	plat	**3**	**3**	**1**		**3**		**3**	**6**	**1**				
	dep	*16/05 ½*	*16/12 ½*	**16.20 ½**		**16.30 ½**		**16.42**	**16.45**	**16.47 ½**		*16/53*	*17/01*	*17/05 ½*

PETERBOROUGH TO KINGS CROSS (OPTION 1 OFF-PEAK 8 TPH)

Original Location		Edinburgh	Cambridge Tattenham	Cambridge	Leeds	Kings Lynn	York	Peterborough	Peterborough	Leeds	Cambridge Tattenham	Cambridge	Newcastle	Kings Lynn	Leeds
Destination Location		Kings Cross	Corner	Brighton	Kings Cross	Kings Cross	Kings Cross	Horsham	Horsham	Kings Cross	Corner	Brighton	Kings Cross	Kings Cross	Kings Cross
Timing Load		390	700	700	800	365	800	700	700	800	700	700	800	365	800
Peterborough	**arr**						**16.18 ½**			**16.28 ½**			**16.40**		**16.45 ½**
	plat				**3**		**1**		**2**	**3**			**3**		**1**
	dep	*16/05 ½*			*16/12 ½*		**16.20 ½**		**16.27**	**16.30 ½**			**16.42**		**16.47 ½**
					(1)		SL		SL						SL
Fletton Jn	**dep**								*16/30 ½*						
							FL	←	ML						FL
Connington SJ	**dep**	*16/10*			*16/18 ½*		*16/28*	*16/04*	*16/34*	*16/37*			*16/48 ½*		*16/55*
					FL		FL	SL	SL						
Huntingdon	**arr**							**16.10**							
	dep	*16/14*			*16/22 ½*		*16/32*	**16.15**	→	*16/41*			*16/52 ½*		*16/59*
St Neots	dep														
Sandy	**dep**	*16/21*			*16/29 ½*		*16/39*	**16.30**		*16/48*			*16/59 ½*		*17/06*
Hitchin	**dep**	*16/27*	**16.23**	**16.28 ½**	*16/35 ½*	*16/38 ½*	*16/45*	**16.44**		*16/54*	**16.53**	**16.58 ½**	*17/05 ½*	*17/08 ½*	*17/12*
			SL	SL	(½)	FL					SL	SL	(½)	FL	
Stevenage	**arr**		**16.27 ½**	**16.33**				**16.48 ½**			**16.57 ½**	**17.03**			
	dep	*16/29*	**16.28 ½**	**16.34**	*16/38*	*16/41*	*16/47*	**16.49 ½**		*16/56*	**16.58 ½**	**17.04**	*17/08*	*17/11*	*17/14*
						FL									
Langley Jn	dep	[1]			[1]	[1]	[1]			[1]			[1]	[1]	[1]
Woolmer GJ	**dep**	*16/32*	*16/33*	*16/37 ½*	*16/41*	*16/44*	*16/50*	*16/53*		*16/59*	*17/03*	*17/07 ½*	*17/11*	*17/14*	*17/17*
Digswell Jn.	**dep**		*16/36*								*17/06*				
			SL								SL				
Welwyn GC	**arr**		**16.37 ½**								**17.07 ½**				
	dep	*16/34*	**16.40**	*16/39 ½*	*16/43*	*16/46*	*16/52*	*16/55*		*17/01*	**17.10**	*17/09 ½*	*17/13*	*17/16*	*17/19*
								FL						FL	(1)
Potters Bar	**dep**	*16/38*		*16/44 ½*	*16/47*	*16/51*	*16/56*	*17/00*		*17/03*		*17/14 ½*	*17/17*	*17/21*	*17/24*
Alexandra P	**dep**	*16/42 ½*		*16/49*	*16/51 ½*	*16/55 ½*	*17/00 ½*	*17/04 ½*		*17/09 ½*		*17/19*	*17/21 ½*	*17/25 ½*	*17/28 ½*
		[1]			[1]	[1]	[1]			[1]			[1]	[1]	[1]
Finsbury P	**arr**			**16.52**				**17.07 ½**				**17.22**			
	dep	*16/45*		**16.53**	*16/54*	*16/58*	*17/03*	**17.08 ½**		*17/12*		**17.23**	*17/24*	*17/28*	*17/31*
				SL				SL				SL			
Belle Isle	**dep**					*17/00 ½*								*17/30 ½*	
		(1)													
Kings X	**arr**	**16.49 ½**			**16.58 ½**	**17.02 ½**	**17.07 ½**			**17.16 ½**			**17.28 ½**	**17.32 ½**	**17.35 ½**

Original Location		Edinburgh	Horsham	Horsham	Sunderland, Hull, Bradford	Edinburgh
Destination Location		Kings Cross	Peterborough	Peterborough	Kings Cross	Kings Cross
Timing Load		800	700	700	180	390
Peterborough	**arr**					
	plat			**2**		
	dep	*16/53*		**16.57**	*17/01*	*17/05 ½*
				SL	(1)	
Fletton Jn	**dep**			*17/00 ½*		
			←	ML		
Connington SJ	**dep**	*16/58*	*16/34*	*16/04*	*17/07*	*17/10*
			SL	SL		
Huntingdon	**arr**		**16.40**			
	dep	*17/02*	**16.45**	→	*17/11*	*17/14*
St Neots	dep					
Sandy	**dep**	*17/09*	**17.00**		*17/18*	*17/21*
Hitchin	**dep**	*17/15*	**17.14**		*17/24*	*17/27*
Stevenage	**arr**		**17.18 ½**			
	dep	*17/17*	**17.19 ½**		*17/26*	*17/29*
Langley Jn	dep	[1]			[1]	[1]
Woolmer GJ	**dep**	*17/20*	*17/23*		*17/29*	*17/32*
Digswell Jn.	**dep**					
Welwyn GC	**arr**					
	dep	*17/22*	*17/25*		*17/31*	*17/34*
		(1)	FL			
Potters Bar	**dep**	*17/27*	*17/30*		*17/35*	*17/38*
Alexandra P	**dep**	*17/31 ½*	*17/34 ½*		*17/39 ½*	*17/42 ½*
		[1]			[1]	[1]
Finsbury P	**arr**		**17.37 ½**			
	dep	*17/34*	**17.38 ½**		*17/42*	*17/45*
			SL			
Belle Isle	**dep**					
						(1)
Kings X	**arr**	**17.38 ½**			**17.46 ½**	**17.49 ½**

LEEDS TO DONCASTER (OPTION 1 OFF-PEAK 8 TPH)

Original Location		Leeds	Leeds	Glasgow	Leeds	Leeds	Leeds	Leeds	Leeds
Destination Location		Kings Cross	Sheffield	Plymouth	Kings Cross	Doncaster	Kings Cross	Kings Cross	Sheffield
Timing Load		800	142	221	800	321C	800	800	142
Leeds	**dep**	**14.49**	**14.53**	**15.06 ½**	**15.11**	**15.15**	**15.37**	**15.49**	**15.53**
					(2)				
Wakefield Westgate	arr	**14.59**	**15.08**	**15.17**	**15.23**	**15.27 ½**	**15.47**	**15.59**	**16.08**
	dep	**15.00 ½**	**15.09**	**15.18 ½**	**15.24 ½**	**15.28 ½**	**15.48 ½**	**16.00 ½**	**16.09**
Hare Park Jn	pass	*15/06*	*15/15 ½*	*15/23 ½*	*15/28 ½*	*15/34*	*15/52 ½*	*16/06*	*16/15 ½*
South Kirkby Jn	pass	*15/09 ½*	*15/24*	*15/28*	*15/32*	*15/41*	*15/56*	*16/09 ½*	*16/24*
Doncaster	**arr**	**15.17 ½**			**15.40**	**16.00**		**16.17 ½**	
	plat								
	dep	**15.27 ½**			**15.42**		*16/04*	**16.27 ½**	

KINGS X to PETERBOROUGH (OPTION 1 PEAK 8 TPH)

Original Location		Kings Cross	Horsham	Horsham	Kings Cross	Kings Cross	Kings Cross	Kings Cross	Kings Cross	Brighton	Tattenham Corner	Kings Cross	Kings Cross	Horsham
Destination Location		Edinburgh	Peterborough	Peterborough	Leeds	Peterborough	Kings Lynn	Lincoln/ Hull	Newcastle	Cambridge	Cambridge	Peterborough	Leeds	Peterborough
Timing Load		800	700	700	800	365	365	800	800	700	700	365	800	700
Kings Cross	dep	**17.01**			**17.07**	**17.10**	**17.13**	**17.17**	**17.20**				**17.31**	
Belle Isle	dep			*17/02*						*17/18*				
				SL						**SL**				
Finsbury Park	arr			**17.05**						**17.23**				
	dep	*17/04 ½*		**17.06**	*17/10 ½*	*17/13 ½*	*17/16 ½*	*17/20 ½*	*17/23 ½*	**17.25**			*17/34 ½*	
				FL						**FL**			**FL**	
Alexandra Palace	dep	*17/06*		*17/09*	*17/12* (½)	*17/15*	*17/18*	*17/22*	*17/25*	*17/28*			*17/36*	
Potters Bar	dep	*17/10 ½*		*17/13 ½*	*17/17*	*17/20*	*17/23*	*17/26 ½* (½)	*17/29 ½* (½)	*17/32 ½*			*17/40 ½*	
Welwyn GC	arr										**17.37**			
	dep	*17/14 ½*		*17/18*	*17/21* (½)	*17/24 ½*	*17/28*	*17/31* (½)	*17/34* (½)	*17/37*	**17.38**		*17/44 ½*	
Digswell	dep										*17/39 ½*			
Woolmer Green Jn	dep	*17/16*		*17/20*	*17/23*	*17/26 ½*	*17/29 ½*	*17/33*	*17/36*	*17/39*	*17/43*		*17/46*	
				SL						**SL**	**SL**		**FL**	
Stevenage	arr			**17.23 ½**						**17.41 ½**	**17.47 ½**			
	dep	*17/18*		**17.24 ½**	*17/25*	*17/28 ½*	*17/31 ½*	*17/35* (1 ½)	*17/38* (1 ½)	**17.42 ½**	**17.48 ½**		*17/48*	
Hitchin	arr			**17.28 ½**										
	dep	*17/20*		**17.32 ½**	*17/27*	*17/31* {1}	*17/34*	*17/38 ½*	*17/41 ½*	**17.47 ½**	**17.53 ½**		*17/50*	
			←											←
Biggleswade	dep		**17.12**	**17.42**		*17/38 ½*								**17.42**
				→		**SL**						←		
Sandy	dep	*17/26*	**17.16**		*17/33*	*17/41 ½*		*17/44 ½*	*17/47 ½*			*17/41 ½*	*17/56*	**17.46**
						→								
Huntingdon	dep	*17/33*	**17.32**		*17/40*			*17/51 ½*	*17/54 ½*			**17.56**	*18/03*	**18.02**
Holme Jn	dep	*17/38*	*17/41 ½*		*17/45*			*17/56 ½*	*17/59 ½*			*18/05*	*18/08*	*18/11 ½*
		FL	**FL**		**FL**							FL	FL	FL
Fletton Jn	pass	*17/41*	*17/45*		*17/48*			*17/59 ½*	*18/02 ½*			*18/08 ½*	*18/11*	*18/15*
		FL	**FL**		**SL**			**FL**	**FL**			**FL**	**SL**	**FL**
			[2]									[2]		[2]
Peterborough	arr		**17.49 ½**		**17.50**			**18.01 ½**	**18.04 ½**			**18.13**	**18.13**	**18.19 ½**
			2		**4**			**4**	**5**				**4**	**2**
	dep	*17/42*			**17.52**			**18.03 ½**	**18.06 ½**				**18.15**	

Original Location		Horsham	Kings Cross	Kings Cross	Kings Cross	Kings Cross	Kings Cross	Brighton	Tattenham Corner	Kings Cross	Kings Cross
Destination Location		Peterborough	Edinburgh	Peterborough	Kings Lynn	York	Leeds	Cambridge	Cambridge	Peterborough	Edinburgh
Timing Load		700	390	365	365	800	800	700	700	365	800
Kings Cross	**dep**		**17.37**	**17.40**	**17.43**	**17.47**	**17.50**				**18.01**
Belle Isle	**dep**	*17/30*						*17/48*	*17/44*		
		SL						**SL**	**SL**		
Finsbury Park	**arr**	**17.33**						*17.53*	*17.47*		
	dep	**17.36**	*17/40 ½*	*17/43 ½*	*17/46 ½*	*17/50 ½*	*17/53 ½*	*17.55*	*17.49*		*18/04 ½*
		FL						**FL**	**SL**		**FL**
Alexandra Palace	**dep**	*17/39*	*17/42*	*17/45*	*17/48*	*17/52*	*17/55*	*17/58*	*17/52 ½*		*18/06*
			(½)								
Potters Bar	**dep**	*17/43 ½*	*17/47*	*17/50*	*17/53*	*17/56 ½*	*17/59 ½*	*18/02 ½*	*17/59 ½*		*18/40 ½*
						(½)	(½)				
Welwyn GC	**arr**								*18.07*		
	dep	*17/48*	*17/51*	*17/54 ½*	*17/57 ½*	*18/01*	*18/04*	*18/07*	*18.08*		*18/14 ½*
			(½)			(½)	(½)				
Digswell	**dep**								*18/09 ½*		
Woolmer Green Jn	**dep**	*17/50*	*17/53*	*17/56 ½*	*17/59 ½*	*18/03*	*18/06*	*18/09*	*18/13*		*18/16*
		SL						**SL**	**SL**		
Stevenage	**arr**							*18.11 ½*	*18.17 ½*		
	dep	*17.54 ½*	*17/55*	*17/58 ½*	*18/01 ½*	*18/05*	*18/08*	*18.12 ½*	*18.18 ½*		*18/18*
						(1 ½)	(1 ½)				
Hitchin	**arr**	**17.58 ½**									
	dep	**18.02 ½**	*17/57*	*18/01*	*18/04*	*18/08 ½*	*18/11 ½*	*18.17 ½*	*18.23 ½*		*18/20*
				{1}							
Biggleswade	**dep**	**18.12**		*18/08 ½*							
		→		**SL**						←	
Sandy	**dep**		*18/03*	*18/11 ½*		*18/14 ½*	*18/17 ½*			*18/11 ½*	*18/26*
				→							
Huntingdon	**dep**		*18/10*			*18/21 ½*	*18/24 ½*			*18.26*	*18/33*
Holme Jn	**dep**		*18/15*			*18/26 ½*	*18/29 ½*			*18/35*	*18/38*
			FL			**FL**	**FL**			**FL**	**FL**
Fletton Jn	**pass**		*18/18*			*18/29 ½*	*18/32 ½*			*18/38 ½*	*18/41*
			FL			**FL**	**FL**			**SL**	**FL**
										[2]	
Peterborough	**arr**									**18.43**	
	dep		*18/19*			*18/30 ½*	*18/33 ½*				*18/42*
			(2)								

PETERBOROUGH - DONCASTER (OPTION 1 PEAK 8 TPH)

Original Location		Kings Cros	Kings Cross	Kings Cross	Kings Cross	Kings Cross	Kings Cross	Kings Cross	Kings Cross	Kings Cross
Destination Location		Edinburgh	Leeds	Lincoln/ Hull	Newcastle	Leeds	Edinburgh	York	Leeds	Edinburgh
TID										
Timing Load		800	800	180 TBC	800	800	390	800	800	800
Peterborough	arr		17.50	18.01 ½	18.04 ½	18.13				
			4	4	5	4				
	dep	*17/42*	17.52	18.03 ½	18.06 ½	18.15	*18/19*	*18/30 ½*	*18/33 ½*	*18/42*
							(2)			
Grantham	arr				18.23 ½				18.48 ½	
	dep	*17/56 ½*	*18/08 ½*	*18/20*	18.25	*18/31 ½*	*18/35 ½*	*18/45*	18.50	*18/56 ½*
Newark North Gate	arr			18.27 ½				18.52 ½		
	dep	*18/03 ½*	*18/15 ½*	18.29	*18/33 ½*	*18/38 ½*	*18/42 ½*	18.54	*18/58 ½*	*19/03 ½*
Retford	arr		18.26							
	dep	*18/13*	18.27 ½	*18/39*	*18/43*	*18/48*	*18/52*	*19/04*	*19/08*	*19/13*
Loversall Carr	dep									
Decoy North Jn	dep									
	line									
Doncaster	arr		18.39 ½	18.50	18.54				19.19	
	plat									
	dep	*18/22*	18.41 ½	18.52	18.56	*18/57*	*19/01*	*19/13*	19.21	*19/22*

KINGS X to PETERBOROUGH (OPTION 2 OFF-PEAK 8 TPH)

Original Location		Kings Cross	Kings Cross	Horsham	Horsham	Kings Cross Sunderland, Hull, Bradford	Kings Cross	Kings Cross	Brighton	Tattenham Corner	Kings Cross	Kings Cross	Horsham	Horsham	Kings Cross	Kings Cross	Kings Cross
Destination Location		Edinburgh	Leeds	P'boro	P'boro		Edinburgh	Kings Lynn	Cambridge	Cambridge	Edinburgh	Leeds	P'boro	P'boro	York	Leeds	Kings Lynn
Timing Load		800	800	700	700	180	800	365	700	700	390	800	700	700	800	800	365
Kings Cross	dep	**11.00**	**11.03**			**11.10**	**11.13**	**11.16**			**11.30**	**11.33**			**11.40**	**11.43**	**11.46**
Belle Isle	dep	*11/01 ½*	*11/04 ½*		*11/02*	*11/11 ½*	*11/14 ½*	*11/17 ½*	*11/18*		*11/31 ½*	*11/34 ½*		*11/32*	*11/41 ½*	*11/44 ½*	*11/47 ½*
					SL			**FL**	**SL**					**SL**			
Finsbury Park	arr				**11.05**				**11.23**					**11.35**			
	dep	*11/03 ½*	*11/06 ½*		**11.08**	*11/13 ½*	*11/16 ½*	*11/19 ½*	**11.24**		*11/33 ½*	*11/36 ½*		**11.38**	*11/43 ½*	*11/46 ½*	*11/49 ½*
		FL	**FL**		**FL**	**FL**	**FL**	**FL**	**FL**		**FL**	**FL**		**FL**	**FL**	**FL**	**FL**
Alexandra Palace	dep	*11/05*	*11/08*		*11/11*	*11/15*	*11/18*	*11/21*	*11/26 ½*		*11/35*	*11/38*		*11/41*	*11/45*	*11/48*	*11/51*
Potters Bar	dep	*11/09 ½*	*11/12 ½*		*11/15 ½*	*11/19 ½*	*11/22 ½*	*11/26*	*11/31*		*11/39 ½*	*11/42 ½*		*11/45 ½*	*11/49 ½*	*11/52 ½*	*11/56*
Welwyn GC	arr									**11.36 ½**							
	plat																
	dep	*11/13 ½*	*11/16 ½*		*11/20 ½*	*11/23 ½*	*11/26 ½*	*11/30 ½*	*11/35 ½*	**11.37**	*11/43 ½*	*11/46 ½*		*11/50 ½*	*11/53 ½*	*11/56 ½*	*12/00 ½*
Digswell	dep									*11/38 ½*							
Woolmer Green Jn	dep	*11/15*	*11/18*		*11/22*	*11/25*	*11/28*	*11/32 ½*	*11/37 ½*	*11/42*	*11/45*	*11/48*		*11/52*	*11/55*	*11/58*	*12/02 ½*
		FL	**FL**		**SL**	**FL**	**FL**	**FL**	**SL**	**SL**	**FL**	**FL**		**SL**	**FL**	**FL**	**FL**
Stevenage	arr				**11.25 ½**				**11.40**	**11.46 ½**				**11.55 ½**			
	dep	*11/17*	*11/20*		**11.26 ½**	*11/27*	*11/30*	*11/34 ½*	**11.41**	**11.47 ½**	*11/47*	*11/50*		**11.56 ½**	*11/57*	*12/00*	*12/04 ½*
								{1}									[1]
Hitchin	dep	*11/19*	*11/22*		**11.31 ½**	*11/29*	*11/32*	*11/38*	**11.46**	**11.52 ½**	*11/49*	*11/52*		**12.01 ½**	*11/59*	*12/02*	*12/08*
					SL			**DCF**	**DCF**	**DCF**				**SL**			**DCF**
Biggleswade	dep				**11.41**									**12.11**			
Sandy	dep	*11/25*	*11/28*		**11.45**	*11/35*	*11/38*				*11/55*	*11/58*		**12.15**	*12/05*	*12/08*	
				←									←				
Huntingdon	arr			**12.29**	**11.59**								**11.59**	**11.59**			
	dep	*11/32*	*11/35*	**12.33**	**12.03**	*11/42*	*11/45*				*12/02*	*12/05*	**12.03**	**12.33**	*12/12*	*12/15*	
					→									→			
Holme Jn	dep	*11/37*	*11/40*	*11/42 ½*		*11/47*	*11/50*				*12/07*	*12/10*	*12/12 ½*		*12/17*	*12/20*	
				FL									**FL**				
Fletton Jn	pass	*11/40*	*11/43*	*11/46*		*11/50*	*11/53*				*12/10*	*12/13*	*12/16*		*12/20*	*12/23*	
			SL	**FL**		**FL**	**SL**					**SL**	**FL**		**SL**	**SL**	
						(2.5)											
Peterborough	arr		**11.45**	**11.49**			**11.55**					**12.15**	**12.19**		**12.22**	**12.25**	
			4	**2**			**4**					**4**	**2**		**4**	**5**	
	dep	*11/41*	**11.47**			*11/53 ½*	**11.57 ½**				*12/11*	**12.17**			**12.24**	**12.28**	

Original Location		Brighton	Tattenham Corner	Kings Cross
Destination Location		Cambridge	Cambridge	Edinburgh
Timing Load		700	700	800
Kings Cross	**dep**			**12.00**
Belle Isle	**dep**	*11/48*		*12/01 ½*
		SL		
Finsbury Park	**arr**	**11.53**		
	dep	**11.54**		*12/03 ½*
		FL		**FL**
Alexandra Palace	**dep**	*11/56 ½*		*12/05*
Potters Bar	**dep**	*12/01*		*12/09 ½*
Welwyn GC	**arr**		**12.06 ½**	
	plat			
	dep	*12/05 ½*	**12.07**	*12/13 ½*
Digswell	**dep**		*12/08 ½*	
Woolmer Green Jn	**dep**	*12/07 ½*	*12/12*	*12/15*
		SL	**SL**	**FL**
Stevenage	**arr**	**12.10**	**12.16 ½**	
	dep	**12.11**	**12.17 ½**	*12/17*
Hitchin	**dep**	**12.16**	**12.22 ½**	*12/19*
		DCF	**DCF**	
Biggleswade	**dep**			
Sandy	**dep**			*12/25*
Huntingdon	**arr**			
	dep			*12/32*
Holme Jn	**dep**			*12/37*
Fletton Jn	**pass**			*12/40*
Peterborough	**arr**			
	dep			*12/41*

PETERBOROUGH TO DONCASTER (OPTION 2 OFF-PEAK 8 TPH)

Original Location		Kings Cross	Norwich	Kings Cross	Kings Cross Sunderland,	Kings Cross	Nottingham	Kings Cross	Kings Cross	Kings Cross	Leicester	Kings Cross	Kings Cross
Destination Location		Edinburgh	Liverpool	Leeds	Bradford, Hull	Newcastle	Lincoln	Edinburgh	Leeds	York	Lincoln	Leeds	Edinburgh
Timing Load		800	158	800	800	800	15x	390	800	800	15x	800	800
Peterborough	**arr**		**11.25**	**11.45**		**11.55**			**12.15**	**12.22**		**12.25**	
			6	**4**		**4**			**4**	**4**		**5**	
	dep	*11/41*	**11.27**	**11.47**	*11/53 ½*	**11.57 ½**		*12/11*	**12.17**	**12.24**		**12.28**	*12/41*
Stoke Jn	pass	*11/52 ½*	**11b54**	*12/00 ½*	*12/05*	*12/11*		*12/22 ½*	*12/30 ½*	*12/37 ½*		*12/41 ½*	*12/52 ½*
Grantham	**arr**		**12.01**	(½)	**12.08 ½**							**12.45**	
	dep	*11/55 ½*	**12.03**	*12/04*	**12.10**	*12/14*		*12/25 ½*	*12/33 ½*	*12/40 ½*		**12.46 ½**	*12/55 ½*
						(1 ½)							
Newark NG	**arr**								**12.42**	(½)		**12.55 ½**	
	dep	*12/02 ½*		*12/11*	*12/18 ½*	*12/22 ½*		*12/32 ½*	**12.43 ½**	*12/48*		**12.57**	*13/02 ½*
Newark Flat Crossing	pass	*12/03*		*12/11½*	*12/19*	*12/23*	*12/26 ½*	*12/33*	*12/44 ½*	*12/48 ½*	*12/54 ½*	*12/58*	*13/03*
Retford	**arr**			**12.21 ½**						(½)			
	dep	*12/12*		**12.23**	*12/28*	*12/32*		*12/42*	*12/54*	*12/58*		*13/07 ½*	*13/12*
Doncaster	**arr**			**12.35**	**12.39**	**12.43**			**13.05**	**13.09**		**13.18 ½**	
	plat	**TL**		**8**	**4**	**8**		**TL**	**8**	**4**		**8**	**TL**
	dep	*12/21*		**12.37**	**12.41**	**12.45**		*12/51*	**13.07**	**13.11**		**13.20 ½**	*13/21*

DONCASTER to YORK (OPTION 2 OFF-PEAK 8 TPH)

Original Location		**Kings Cross**	**LDHS Sunderland,**	**Kings Cross**	**Kings Cross**	**Kings Cross**	**Reading**	**Kings Cross**
Destination Location		**Edinburgh**	**Hull**	**Newcastle**	**Edinburgh**	**York**	**Newcastle**	**Edinburgh**
Timing Load		**800**		**800**	**390**	**800**	**221**	**800**
Doncaster	**a**			**12.43**		**13.09**	**13.14**	
	d	*12/21*	*12/39*	**12.45**	*12/51*	**13.11**	**13.16**	*13/21*
Temple Hirst Jn	pass	*12/28*	*12/46*	*12/54*	*12/58*	*13/20*	*13/24*	*13/28*
		(½)						(½)
Hambleton Sth Jn	pass	*12/31*	*12/48 ½*	*12/56 ½*	*13/00 ½*	*13/22 ½*	*13/27*	*13/31*
			[2]			[2]	<1>	
York	**a**	**12.39**	**12.58 ½**	**13.04 ½**		**13.32 ½**	**13.35 ½**	**13.39**
	pl							
	d	**12.42**	**13.00 ½**	**13.11 ½**	*13/08 ½*		**13.45**	**13.42**

YORK to NEWCASTLE (OPTION 2 OFF-PEAK 8 TPH)

Original Location		Kings Cross	Reading	Liverpool	Kings Cross	Kings Cross	Liverpool	Kings Cross
Destination Location		Edinburgh	Newcastle	Glasgow	Edinburgh	Newcastle	Newcastle	Edinburgh
Timing Load		800	221	380	390	800	380	800
						←		
York	**arr**	**12.39**	**12.35 ½**	**12:45 ½**		**13.04 ½**	**13.15 ½**	**13.39**
	plat							
	dep	**12.42**	**12.45**	**12:48**	*13/08 ½*	**13.11 ½**	**13.17 ½**	**13.42**
Thirsk	arr						**13.32 ½**	
	dep						**13.33 ½**	
Northallerton	**arr**			**13.07 ½**		**13.29**	**13.40**	
	dep	*12/58 ½*		**13.08 ½**	*13/24 ½*	**13.30 ½**	**13.41**	*13/58 ½*
Darlington	**arr**		**13.10**	**13.20**		**13.40**	**13.51**	
	dep	*13/05 ½*	**13.11 ½**	**13.22**	*13/31 ½*	**13.41 ½**	**13.53**	*14/05 ½*
Ferryhill	**pass**	*13/13*	*13/19 ½*	*13/30*	*13/38*	*13/49 ½*	*14/01*	*14/13*
Durham	**arr**		**13.26 ½**	**13.37**		**13.56**	**14.08**	
	dep	*13/19*	**13.28**	**13.38 ½**	*13/43 ½*	**13.57 ½**	**14.10**	*14/19*
		[3]	[1]	[1](2)	[3]	[3]		[3]
Chester-le-Street	**arr**						**14.15 ½**	
	dep						**14.16 ½**	
							[1]	
Newcastle	**arr**	**13.33**	**13.40**	**13.52 ½**	**13.55 ½**	**14.11 ½**	**14.26 ½**	**14.33**
	dep	**13.36**		**14.00 ½**	**13.58 ½**			**14.36**

NEWCASTLE TO EDINBURGH (OPTION 2 OFF-PEAK 8 TPH)

Original Location		Kings Cross	Berwick	Kings Cross	Liverpool	North Berwick	Kings Cross
Destination Location		Edinburgh	Edinburgh	Edinburgh	Glasgow	Edinburgh	Edinburgh
Timing Load		800	380	390	380	380	800
Newcastle	**arr**	**13.33**		**13.55 ½**	**13.52 ½**		**14.33**
	dep	**13.36**		**13.58 ½**	**14.01 ½**		**14.36**
Cramlington	arr				**14.09**		
	dep				**14.10**		
Morpeth	arr				**14.15 ½**		
	dep	*13/47 ½*		*14/09 ½*	**14.16 ½**		*14/47 ½*
Alnmouth	arr	*13/59*		*14/19 ½*	**14.29**		*14/59*
	dep				**14.30**		
Belford	pass	*14/08*		*14/28*	*14/41 ½*		*15/08*
		[2]		[2]	[2]		[2]
Berwick	**arr**				**14.53 ½**		
	dep	*14/18*	**14.22**	*14/38*	**14.54 ½**		*15/18*
Grantshouse	pass	*14/29*	*14/35*	*14/47*	*15/06*		*15/29*
Dunbar	**arr**		**14.43 ½**		**15.15**		
	dep	*14/37*	**14.44 ½**	*14/54 ½*	**15.16**		*15/37*
Drem Jn	pass	*14/43 ½*	*14/54*	*14/59 ½*	*15/24*	*15/29 ½*	*15/43 ½*
		[2]	[2]	[2]	[2]		[2]
Monktonhall Jn	pass	*14/52*	*15/03 ½*	*15/07 ½*		*15/46*	*15/52*
				(1)		[2]	
Portobello Jn	pass	*14/53 ½*	*15/07*	*15/10*	*15/35 ½*	*15/49 ½*	*15/53 ½*
Edinburgh	**arr**	**14.57 ½**	**15.10 ½**	**15.13½**	**15.39**	**15.54**	**15.57 ½**

DONCASTER TO LEEDS (OPTION 2 OFF-PEAK 8 TPH)

Original Location		Kings Cross	Plymouth	Kings X	Sheffield	Doncaster	Kings X	Kings X
Destination Location		Leeds	Glasgow	Leeds	Leeds	Leeds	Leeds	Leeds
Timing Load		800	221	800	142	321C	800	800
Doncaster	**arr**	**12.18 ½**		**12.35**			**13.05**	**13.18 ½**
	plat	**4**		**4**		**6**	**DF**	**4**
	dep	**12.20 ½**		**12.37**		**12.43**	**13.07**	**13.20 ½**
Adwick	arr					**12.49 ½**		
	dep	*12/24*		*12/40 ½*		**12.50 ½**	*13/10 ½*	*13/24*
Adwick Jn	pass	*12/24 ½*		*12/41*		*12/51 ½*	*13/11*	*13/24 ½*
South Kirkby Jn	pass	*12/27 ½*	*12/37 ½*	*12/44*	*12/48*	*12/58*	*13/14*	*13/27 ½*
Hare Park Jn	pass	*12/31*	*12/42*	*12/47 ½*	*12/57*	*13/05*	*13/17 ½*	*13/31*
		[1]		[1]			[1]	[1]
Wakefield Westgate	**arr**		**12.45 ½**	**12.52 ½**	**13.03**	**13.11**	**13.22 ½**	
	dep	*12/35 ½*	**12.47**	**12.54**	**13.04**	**13.12**	**13.24**	*13/35 ½*
		[1]	[1]<1>	[1] (½)	[2]<1>	[2]	[1](½)	[1]
Leeds	**arr**	**12.47**	**13.01**	**13.06 ½**	**13.24**	**13.28**	**13.36 ½**	**13.47**

EDINBURGH TO NEWCASTLE (OPTION 2 OFF-PEAK 8 TPH)

Original Location		Edinburgh	Glasgow	Edinburgh	Edinburgh	Edinburgh	Edinburgh
Destination Location		Kings Cross	Liverpool	Berwick	Kings Cross	North Berwick	Kings Cross
Timing Load		390	380	380	800	380	390
Edinburgh	**dep**	**11.00 ½**	**11:09**	**11:16**	**11.39 ½**	**11.43**	**12.00 ½**
Monktonhall	pass	*11/05 ½*	*11/14*	*11/24*	*11/45*	*11/51*	*12/05 ½*
Drem	pass	*11/11*	*11/21 ½*	*11/32 ½*	*11/51 ½*	**12.07**	*12/11*
Dunbar	**arr**		**11.29**	**11.42**			
	dep	*11/16 ½*	**11.30**	**11.43**	*11/58*		*12/16 ½*
Grantshouse	pass	*11/23 ½*	*11/39*	*11/52*	*12/06*		*12/23 ½*
			[2]	[3]	[2]		
Berwick	**arr**	[2]	**11.52 ½**	**12.09**			[2]
	dep	*11/35*	**11.53 ½**		*12/19 ½*		*12/35*
Alnmouth	arr		**12.14 ½**				
	dep	*11/51 ½*	**12.15 ½**		*12/36 ½*		*12/51 ½*
Morpeth	arr	*12/01 ½*	**12.28**		*12/48*		*13/01 ½*
	dep		**12.29**				
Cramlington	arr		**12.34 ½**				
	dep		**12.35 ½**				
		[2]	[2]		[2]		[2]
Newcastle	**arr**	**12.14 ½**	**12.45 ½**		**13.01 ½**		**13.14 ½**
	dep	**12.17 ½**	**12.47 ½**		**13.04 ½**		**13.17 ½**

NEWCASTLE TO YORK (OPTION 2 OFF-PEAK 8 TPH)

Original Location		Edinburgh	Newcastle	Newcastle	Newcastle	Glasgow	Edinburgh	Edinburgh
Destination Location		Kings Cross	Liverpool	Reading	Kings Cross	Liverpool	Kings Cross	Kings Cross
Timing Load		390	380	221	800	380	800	390
Newcastle	**arr**	**12.14 ½**				**12.45 ½**	**13.01 ½**	**13.14 ½**
	dep	**12.17 ½**	**12.20 ½**	**12.32**	**12.42 ½**	**12.47 ½**	**13.04 ½**	**13.17 ½**
Ouston Jn	pass	*12/23*	*12/27*	*12/39*	*12/49*	*12/53 ½*	*13/11*	*13/23*
Chester-le-Street	arr		**12.28**					
	dep		**12.29**					
Durham	**arr**		**12.34**	**12.43 ½**	**12.53 ½**	**12.59**		
	dep	*12/27 ½*	**12.35**	**12.45 ½**	**12.55**	**13.00**	*13/15*	*13/27 ½*
Tursdale Jn	pass			*12/51 ½*			*13/20*	
Ferryhill Sth	pass	*12/35*	*12/42*	*12/53 ½*	*13/02*	*13/07*	*13/22*	*13/35*
Darlington	**arr**	[1]	**12.50 ½**		**13.09**	**13.15**	[1]	[1]
	dep	*12/40*	**12.52 ½**	*13/05*	**13.11**	**13.17**	*13/29*	*13/40*
Northallerton	**arr**		**13.02 ½**		**13.20**	**13.27**		
	dep	*12/47*	**13.03 ½**	*13/14*	**13.21 ½**	**13.28**	*13/36*	*13/47*
Thirsk	arr		**13.09 ½**					
	dep		**13.10 ½**					
		[1]	[1]	[1]	[1]	[2]	[1]	[1]
York	**arr**		**13.27**	**13.30 ½**	**13.40**	**13.50 ½**	**13.53 ½**	
	dep	*13/03 ½*	**13.29**	**13.35**	**13.43**	**13.57 ½**	**13.56 ½**	*14/03 ½*

YORK TO DONCASTER (OPTION 2 OFF-PEAK 8 TPH)

Original Location Destination Location		Edinburgh Kings Cross	Sunderland, Hull Kings Cross	York Kings Cross	Newcastle Reading	Newcastle Kings Cross	Edinburgh Kings Cross	Edinburgh Kings Cross
Timing Load		390	180	800	221	800	800	390
York	**arr**				**15.33**	**13.40**	**13.53 ½**	
	dep	*13/03 ½*	**13.17 ½**	**13.22**	**15.35**	**13.43**	**13.56 ½**	*14/03 ½*
Doncaster	**arr**		**13.37**	**13.41 ½**	**15.56 ½**	**14.02 ½**		
	dep	*13/21*	**13.39**	**13.43 ½**	**15.58 ½**	**14.04 ½**	*14/14*	*14/21*

DONCASTER TO PETERBOROUGH (OPTION 2 OFF-PEAK 8 TPH)

Original Location		Edinburgh	Leeds	Leeds	Sunderland, Bradford, Hull	Lincoln	York	Liverpool	Leeds	Newcastle	Lincoln	Edinburgh	Edinburgh
Destination Location		Kings Cross	Kings Cross	Kings Cross	Kings Cross	Nottingham	Kings Cross	Norwich	Kings Cross	Kings Cross	Nottingham	Kings Cross	Kings Cross
Timing Load		390	800	800	180	15x	800	158	800	800	15x	800	390
Doncaster	**arr**		**13.15**	**13.25**	**13.37**		**13.41 ½**		**13.55**	**14.02 ½**			
	dep	*13/21*	**13.22**	**13.27**	**13.39**		**13.43 ½**		**13.57**	**14.04 ½**		*14/14*	*14/21*
			SL										
Retford	**arr**			**13.38**									
	dep	*13/29 ½*	*13/34*	**13.39 ½**	*13/49 ½*		*13/54*		*14/07 ½*	*14/15*		*14/23*	*14/29 ½*
Newark FC	**pass**					*13/53*			*14/16*	*14/23*	*14/26*	*14/31*	
			(1)										
Newark NG	**arr**		**13.44 ½**						**14.17**				
	dep	*13/38 ½*	**13.45**	*13/50*	*13/58 ½*		*14/03*		**14.18 ½**	*14/23 ½*		*14/32*	*14/38 ½*
Grantham	**arr**	(½)	**13.54 ½**	(2)	**14.06 ½**								(½)
	dep	*13/46*	**13.56**	*13/59 ½*	**14.08**		*14/10 ½*	**14.12 ½**	*14/27 ½*	*14/31 ½*		*14/39 ½*	*14/46*
Stoke Jn	**pass**			(2)				*14/25*	*14/30 ½*				
								[2](4)					
Peterborough	**arr**		**14.13 ½**	**14.17 ½**			**14.26 ½**	**14.50 ½**	**14.43 ½**	**14.47 ½**			
	dep	*13/59 ½*	**14.15 ½**	**14.19 ½**	*14/24*		**14.28 ½**		**14.45 ½**	**14.49 ½**		*14/54*	*14/59 ½*

PETERBOROUGH TO KINGS CROSS (OPTION 2 OFF-PEAK 8 TPH)

Original Location		Edinburgh	Cambridge Tattenham Corner	Cambridge	Kings Lynn	Horsham	Leeds	Leeds	Sunderland, Bradford, Hull	Horsham	York	Cambridge Tattenham Corner	Cambridge	Kings Lynn	Horsham	Leeds	Newcastle
Destination Location		Kings Cross		Brighton	Kings Cross	Peterborough	Kings Cross	Kings Cross	Kings Cross	Peterborough	Kings Cross		Brighton	Kings Cross	Peterborough	Kings Cross	Kings Cross
Timing Load		390	700	700	365	700	800	800	180	700	800	700	700	365	700	800	800
Peterborough	arr						**14.13 ½**	**14.17 ½**			**14.26 ½**					**14.43 ½**	**14.47 ½**
							3	**1**			**3**					**3**	**1**
	dep	*13/59 ½*				**14.01 ½**	**14.15 ½**	**14.19 ½**	*14/24*		**14.28 ½**				**14.31 ½**	**14.45 ½**	**14.49 ½**
						SL	**SL**								SL	SL	
Connington SJ	dep	*14/04 ½*				14/08	*14/23*	*14/26*	*14/29*		*14/35*				*14/38*	*14/53*	*14/56*
						SL				←							
Huntingdon	dep	*14/08 ½*				**14.15**	*14/27*	*14/30*	*14/33*	**14.15**	*14/39*				**14.45**	*14/57*	*15/00*
						SL				**SL**					SL		
St Neots	dep	(½)				→									→		
Sandy	dep	*14/16*					*14/34*	*14/37*	*14/40*	**14.30**	*14/46*					*15/04*	*15/07*
Hitchin	dep	*14/22*	**14.23**	**14.28 ½**	*14/33 ½*		*14/40*	*14/43*	*14/46*	**14.45**	*14/52*	**14.53**	**14.58 ½**	*15/03 ½*		*15/10*	*15/13*
			SL	SL	FL							SL	SL	FL			
Stevenage	arr		**14.27 ½**	**14.33**						**14.49 ½**		**14.57 ½**	**15.03**				
	dep	*14/24*	**14.28 ½**	**14.34**	*14/37 ½*		*14/42*	*14/45*	*14/48*	**14.50 ½**	*14/54*	**14.58 ½**	**15.04**	*15/07 ½*		*15/12*	*15/15*
		[1]			[1]		[1]	[1]	[1]		[1]			[1]		[1]	[1]
Woolmer GJ	dep	*14/27*	14/33	*14/37 ½*	*14/40 ½*		*14/45*	*14/48*	*14/51*	*14/54*	*14/57*	*15/03*	*15/07 ½*	*15/10 ½*		*15/15*	*15/18*
Digswell Jn.	dep		14/36									*15/06*					
			SL									SL					
Welwyn GC	arr		**14.37 ½**									**15.07 ½**					
	dep	*14/29*	**14.40**	*14/39 ½*	*14/42 ½*		*14/47*	*14/50*	*14/53*	*14/56*	*14/59*	**15.10**	*15/09 ½*	*15/12 ½*		*15/17*	*15/20*
		(1)									(1)						
Potters Bar	dep	*14/34*		*14/44 ½*	*14/47 ½*		*14/51*	*14/54*	*14/57*	*15/01*	*15/04*		*15/14 ½*	*15/17 ½*		*15/21*	*15/24*
Alexandra P	dep	14/38 ½		*14/49 ½*	*14/52 ½*		*14/55 ½*	*14/58 ½*	*15/01 ½*	*15/05 ½*	*15/08 ½*		*15/19 ½*	*15/22 ½*		*15/25 ½*	*15/28 ½*
		[1]			[1]		[1]	[1]	[1]		[1]			[1]		[1]	[1]
Finsbury P	arr			**14.52**						**15.07 ½**			**15.22**				
	dep	*14/41*		**14.53**	*14/55*		*14/58*	*15/01*	*15/04*	**15.08 ½**	*15/11*		**15.23**	*15/25*		*15/28*	*15/31*
				SL						SL			SL				
Belle Isle	dep	*14/43*			14/56 ½		*15/00*	*15/03*	*15/06*		*15/13*			*15/26 ½*		*15/30*	*15/33*
Kings X	arr	**14.45 ½**			**14.58 ½**		**15.02 ½**	**15.05 ½**	15.08 ½		**15.15 ½**			**15.28 ½**		**15.32 ½**	**15.35 ½**

Original Location		Edinburgh	Horsham	Edinburgh
Destination Location		Kings Cross	Peterborough	Kings Cross
Timing Load		800	700	390
Peterborough	**arr**			
	dep	*14/54*		*14/59 ½*
Connington SJ	**dep**	*14/59*		*15/04 ½*
			←	
Huntingdon	**dep**	*15/03*	**14.45**	*15/08 ½*
			SL	
St Neots	**dep**			(½)
Sandy	**dep**	*15/10*	15.00	*15/16*
Hitchin	**dep**	*15/16*	15.15	*15/22*
Stevenage	**arr**		15.19 ½	
	dep	*15/18*	15.20 ½	*15/24*
		[1]		[1]
Woolmer GJ	**dep**	*15/21*	*15/24*	*15/27*
Digswell Jn.	**dep**			
Welwyn GC	**arr**			
	dep	*15/23*	*15/26*	*15/29*
				(1)
Potters Bar	**dep**	*15/27*	*15/31*	*15/34*
Alexandra P	**dep**	*15/31 ½*	*15/35 ½*	*15/38 ½*
		[1]		[1]
Finsbury P	**arr**		**15.37 ½**	
	dep	*15/34*	**15.38 ½**	*15/41*
			SL	
Belle Isle	**dep**	*15/36*		*15/43*
Kings X	**arr**	**15.38 ½**		**15.45 ½**

LEEDS TO DONCASTER (OPTION 1 OFF-PEAK 8 TPH)

Original Location		**Leeds**	**Leeds**	**Glasgow**	**Leeds**	**Leeds**	**Leeds**	**Leeds**
Destination Location		**Kings Cross**	**Doncaster**	**Plymouth**	**Kings Cross**	**Sheffield**	**Kings Cross**	**Kings Cross**
Timing Load		**800**	**321C**	**221**	**800**	*142*	**800**	**800**
Leeds	**dep**	**12.58**	**13.02**	**13.11**	**13.28** (3 ½)	**13.32**	**13.48**	**13.58**
Wakefield Westgate	**arr**	**13.08**	**13.14 ½**	**13.21 ½**		**13.47**	**13.58**	**14.08**
	dep	**13.09 ½**	**13.15 ½**	**13.23**	*13/39 ½*	**13.48**	**13.59 ½**	**14.09 ½**
Hare Park Jn	pass	*13/13 ½*	*13/21*	*13/28*	*13/43 ½*	*13/54 ½*	*14/03 ½*	*14/13 ½*
South Kirkby Jn	pass	*13/17*	*13/28* [2]	*13/32 ½*	*13/47*	*14/03*	*14/07*	*14/17*
Doncaster	**arr**	**13.25**	**13.47**		**13.55**		**14.15**	**14.25**
	plat							
	dep	**13.27**			**13.57**		**14.22**	**14.27**

KINGS CROSS to PETERBOROUGH (OPTION 2 PEAK 8 TPH)

Original Location		Kings Cross	Kings Cross	Horsham	Horsham	Kings Cross	Kings Cross	Kings Cross	Kings Cross	Brighton	Tattenham Corner	Kings Cross	Kings Cross	Kings Cross
Destination Location		Edinburgh	Leeds	Peterborough	Peterborough	Peterborough	Kings Lynn	Sunderland, Hull, Bradford	Newcastle	Cambridge	Cambridge	Peterborough	Edinburgh	Leeds
Timing Load		800	800	700	700	365	365	180	800	700	700	365	390	800
Kings Cross	**dep**	**17.00**	**17.03**			**17.08 ½**	**17.11 ½**	**17.16**	**17.19**				**17.30**	**17.33**
Belle Isle	**dep**				*17/02*					*17/18*				
					SL					SL				
Finsbury Park	**arr**				**17.05**					**17.23**				
	dep	*17/03 ½*	*17/06 ½*		**17.08**	*17/42*	*17/45*	*17/09 ½*	*17/12 ½*	**17.24**			*17/33 ½*	*17/36 ½*
					FL					FL				
						(½)	(½)							
Alexandra Palace	**dep**	*17/05*	*17/08*		*17/11*	*17/14*	*17/17*	*17/21*	*17/24*	*17/27*			*17/35*	*17/38*
Potters Bar	**dep**	*17/09 ½*	*17/12 ½*		*17/15 ½*	*17/19 ½*	*17/22 ½*	*17/25 ½*	*17/28 ½*	*17/31 ½*			*17/39 ½*	*17/42 ½*
Welwyn GC	**arr**										**17.36**			
	plat													
	dep	*17/13 ½*	*17/15 ½*		*17/20*	*17/23 ½*	*17/26 ½*	*17/29 ½*	*17/32 ½*	*17/36*	**17.37**		*17/43 ½*	*17/46 ½*
								(½)	(½)					
Digswell	**dep**										*17/38 ½*			
Woolmer Green Jn	**dep**	*17/15*	*17/18*		*17/22*	*17/25 ½*	*17/28 ½*	*17/31 ½*	*17/34 ½*	*17/38*	*17/42*		*17/45*	*17/48*
					SL					SL	SL			
Stevenage	**arr**				**17.25 ½**					**17.40 ½**	**17.46 ½**			
	dep	*17/17*	*17/20*		**17.26 ½**	*17/27 ½*	*17/30 ½*	*17/33 ½*	*17/36 ½*	**17.41 ½**	**17.47 ½**		*17/47*	*17/50*
								(1 ½)	(1 ½)					
Hitchin	**dep**	*17/19*	*17/22*		**17.31 ½**	*17/30*	*17/33*	*17/37*	*17/40*	**17.46 ½**	**17.52 ½**		*17/49*	*17/52*
				←										
Biggleswade	**dep**			**17.11**	**17.41**	*17/37 ½*								
					→	SL						←		
Sandy	**dep**	*17/25*	*17/28*	**17.15**		*17/40 ½*		*17/43*	*17/46*			*17/40 ½*	*17/55*	*17/58*
						→								
Huntingdon	**arr**			**17.30**										
	dep	*17/32*	*17/35*	**17.34**				*17/50*	*17/53*			*17/55*	*18/02*	*18/05*
Holme Jn	**dep**	*17/37*	*17/40*	*17/42 ½*				*17/55*	*17/58*			*18/04*	*18/07*	*18/10*
		FL	**FL**	**FL**								FL	FL	FL
Fletton Jn	**pass**	*17/39*	*17/42*	*17/46*								*18/07 ½*		
		FL	**FL**	**FL**								**SL**		
				[2]								[2]		
Peterborough	**arr**		**17.45**	**17.50 ½**					**18.03**			**18.12**		**18.15**
				2										
	dep	*17/41*	**17.47**					*17/59*	**18.05**				*18/11*	**18.17**

Original Location Destination Location		Horsham Peterborough	Kings Cross Peterborough	Kings Cross Kings Lynn	Kings Cross York	Kings Cross Leeds	Brighton Cambridge	Tattenham Corner Cambridge	Kings Cross Peterborough	Kings Cross Edinburgh
Timing Load		700	365	365	800	800	700	700	365	800
Kings Cross	**dep**		**17.38 ½**	**17.41 ½**	**17.46**	**17.49**				**18.00**
Belle Isle	**dep**	*17/30* SL					*17/48*			
Finsbury Park	**arr**	**17.33**					**17.53**			
	dep	**17.38** FL	*17/42* (½)	*17/45* (½)	*17/49 ½*	*17/52 ½*	**17.54**			*18/03 ½*
Alexandra Palace	**dep**	*17/41*	*17/44*	*17/47*	*17/51*	*17/54*	*17/57*			*18/05*
Potters Bar	**dep**	*17/45 ½*	*17/49 ½*	*17/52 ½*	*17/55 ½*	*17/58 ½*	*18/01 ½*			*18/09 ½*
Welwyn GC	**arr**							**18.06**		
	plat									
	dep	*17/50*	*17/53 ½*	*17/56 ½*	*17/59 ½* (½)	*18/02 ½* (½)	*18/06*	**18.07**		*18/13 ½*
Digswell	**dep**							*18/08 ½*		
Woolmer Green Jn	**dep**	*17/52* SL	*17/55 ½*	*17/58 ½*	*18/01 ½*	*18/04 ½*	*18/08* SL	*18/12* SL		*18/15*
Stevenage	**arr**						**18.10 ½**	**18.16 ½**		
	dep	**17.56 ½**	*17/57 ½*	*18/00 ½*	*18/03 ½* (1 ½)	*18/06 ½* (1 ½)	**18.11 ½**	**18.17 ½**		*18/17*
Hitchin	**dep**	**18.01 ½**	*18/00*	*18/03*	*18/07*	*18/10*	**18.16 ½**	**18.22 ½**	←	*18/19*
Biggleswade	**dep**	**18.11** →	*18/07 ½* SL						**17.41**	
Sandy	**dep**		*18/10 ½* →		*18/13*	*18/16*			**17.45**	*18/25*
Huntingdon	**arr**								**18.00**	
	dep				*18/20*	*18/23*			**18.04**	*18/32*
Holme Jn	**dep**				*18/25*	*18/28*			*18/12 ½* FL	*18/37* **FL**
Fletton Jn	**pass**								*18/16* **FL** [2]	*18/39* **FL**
Peterborough	**arr**					**18.33**			**18.20 ½** **2**	
	dep				*18/29*	**18.35**				*18/41*

PETERBOROUGH to DONCASTER (OPTION 2 PEAK 8 TPH)

Original Location		Kings Cross	Kings Cross	Kings Cross	Kings Cross	Kings Cross	Kings Cross	Kings Cross	Kings Cross	Kings Cross
Destination Location		Edinburgh	Leeds	Sunderland, Bradford, Hull	Newcastle	Edinburgh	Leeds	York	Leeds	Edinburgh
Timing Load		800	800	180	800	390	800	800	800	800
Peterborough	**arr**		**17.45**		**18.03**		**18.15**		**18.33**	
	dep	*17/41*	**17.47**	*17/59*	**18.05**	*18/11*	**18.17**	*18/29*	**18.35**	*18/41*
Grantham	**arr**	*17/55 ½*	*18/03 ½*	**18.14**			**18.34**			*18/55 ½*
	dep			**18.15 ½**	*18/21 ½*	*18/25 ½*	**18.35 ½**	*18/43 ½*	*18/51 ½*	
Newark North Gate	**arr**	*18/02 ½*	*18/10 ½*				**18.44 ½**	**18.51**		*19/02 ½*
	dep			*18/24*	*18/28 ½*	*18/32 ½*	**18.46**	**18.52 ½**	*18/58 ½*	
Retford	**arr**		**18.21**							
	dep	*18/12*	**18.22 ½**	*18/33 ½*	*18/38*	*18/42*	*18/56*	*19/02 ½*	*19/08*	*19/12*
									SL	
Doncaster	**arr**		**18.34 ½**		**18.49**			**19.13 ½**	**19.19**	
	dep	*18/21*		*18/42 ½*	**18.55**	*18/51*	**19.07**	**19.15 ½**		*19/21*

KINGS X to PETERBOROUGH (7 TPH)

Original Location		Kings Cross	Kings Cross	Horsham	Horsham	Kings Cross Sunderland, Hull, Bradford	Kings Cross	Kings Cross	Brighton	Tattenham Corner	Kings Cross	Kings Cross	Horsham	Horsham	Kings Cross	Kings Cross	Brighton	Tattenham Corner	Kings Cross
Destination Location		Edinburgh	Newcastle	P'boro	P'boro		Kings Lynn	Leeds	Cambridge	Cambridge	Edinburgh	Leeds	P'boro	P'boro	Kings Lynn	Leeds	Cambridge	Cambridge	Edinburgh
Timing Load		800	800	700	700	180	365	800	700	700	800	800	700	700	365	800	700	700	800
Kings Cross	dep	**11.00**	**11.03**			**11.10**	**11.13**	**11.19**			**11.30**	**11.33**			**11.43**	**11.49**			**12.00**
Belle Isle	dep	*11/01 ½*	*11/04 ½*		*11/02*	*11/11 ½*	*11/14 ½*	*11/20 ½*	*11/18*		*11/31 ½*	*11/34 ½*		*11/32*	*11/44 ½*	*11/50 ½*	*11/48*		*12/01 ½*
					SL		**FL**		**SL**					**SL**			**SL**		
Finsbury Park	arr				**11.05**				**11.23**					**11.35**			**11.53**		
	dep	*11/03 ½*	*11/06 ½*		**11.08**	*11/13 ½*	*11/16 ½*	*11/22 ½*	**11.24**		*11/33 ½*	*11/36 ½*		**11.38**	*11/46 ½*	*11/52 ½*	**11.54**		*12/03 ½*
		FL	**FL**		**FL**	**FL**	**FL**	**FL**	**FL**		**FL**	**FL**		**FL**	**FL**	**FL**	**FL**		**FL**
Alexandra Palace	dep	*11/05*	*11/08*		*11/11*	*11/15*	*11/18*	*11/24*	*11/26 ½*		*11/35*	*11/38*		*11/41*	*11/48*	*11/54*	*11/56 ½*		*12/05*
Potters Bar	dep	*11/09 ½*	*11/12 ½*		*11/15 ½*	*11/19 ½*	*11/23*	*11/28 ½*	*11/31*		*11/39 ½*	*11/42 ½*		*11/45 ½*	*11/53*	*11/58 ½*	*12/01*		*12/09 ½*
Welwyn GC	arr									**11.36 ½**								**12.06 ½**	
	plat																		
	dep	*11/13 ½*	*11/16 ½*		*11/20 ½*	*11/23 ½*	*11/27 ½*	*11/32 ½*	*11/35 ½*	**11.37**	*11/43 ½*	*11/46 ½*		*11/50 ½*	*11/57 ½*	*12/02 ½*	*12/05 ½*	**12.07**	*12/13 ½*
Digswell	dep									*11/38 ½*								*12/08 ½*	
Woolmer Green Jn	dep	*11/15*	*11/18*		*11/22*	*11/25*	*11/29 ½*	*11/34*	*11/37 ½*	*11/42*	*11/45*	*11/48*		*11/52*	*11/59 ½*	*12/04*	*12/07 ½*	*12/12*	*12/15*
		FL	**FL**		**SL**	**FL**	**FL**	**FL**	**SL**	**SL**	**FL**	**FL**		**SL**	**FL**	**FL**	**SL**	**SL**	**FL**
Stevenage	arr				**11.25 ½**				**11.40**	**11.46 ½**				**11.55 ½**			**12.10**	**12.16 ½**	
	dep	*11/17*	*11/20*		**11.26 ½**	*11/27*	*11/31 ½*	*11/36*	**11.41**	**11.47 ½**	*11/47*	*11/50*		**11.56 ½**	*12/01 ½*	*12/06*	**12.11**	**12.17 ½**	*12/17*
							{1}								[1]				
Hitchin	dep	*11/19*	*11/22*		**11.31 ½**	*11/29*	*11/35*	*11/41*	**11.46**	**11.52 ½**	*11/49*	*11/52*		**12.01 ½**	*12/05*	*12/08*	**12.16**	**12.22 ½**	*12/19*
					SL		**DCF**		**DCF**	**DCF**				**SL**	**DCF**		**DCF**	**DCF**	
Biggleswade	dep				**11.41**									**12.11**					
Sandy	dep	*11/25*	*11/28*		**11.45**	*11/35*		*11/44*			*11/55*	*11/58*		**12.15**		*12/16*			*12/25*
				←									←						
Huntingdon	arr			**12.29**	**11.59**								**11.59**	**11.59**					
	dep	*11/32*	*11/35*	**12.33**	**12.03**	*11/42*		*11/51*			*12/02*	*12/05*	**12.03**	**12.33**		*12/21*			*12/32*
					→									→					
Holme Jn	dep	*11/37*	*11/40*	*11/42 ½*		*11/47*		*11/56*			*12/07*	*12/10*	*12/12 ½*			*12/26*			*12/37*
				FL									**FL**						
Fletton Jn	pass	*11/40*	*11/43*	*11/46*		*11/50*		*11/59*			*12/10*	*12/13*	*12/16*			*12/29*			*12/40*
			SL	**FL**		**FL**		**SL**				**SL**	**FL**			**SL**			
Peterborough	arr		**11.45**	**11.49**		**11.52**		**12.01**			**12.12**	**12.15**	**12.19**			**12.31**			
			4	**2**				**4**				**4**	**2**			**5**			
	dep	*11/41*	**11.47**			**11.54**		**12.05**			**12.14**	**12.18**				**12.34**			*12/41*

Peterborough - Doncaster (7 LDHS TRAINS PER HOUR)

Original Location		Kings Cross	Kings Cros	Kings Cross	Kings Cross	Kings Cross	Kings Cross	Kings Cross	Kings Cross
Destination Location		Edinburgh	Newcastle	Sunderland, Hull, Bradford	Leeds	Edinburgh	Leeds	Leeds	Edinburgh
Timing Load		800	800	180	800	800	800	800	800
Peterborough	**arr**		**11.45**	**11.52**	**12.01**	**12.12**	**12.15**	**12.31**	
			4		**4**		**4**	**5**	
	dep	*11/41*	**11.47**	**11.54**	**12.05**	**12.14**	**12.18**	**12.34**	*12/41*
Grantham	**arr**		**12.04**	**12.11**			**12.35**		
	dep	*11/55 ½*	**12.05½**	**12.12 ½**	*12/21 ½*	*12/30 ½*	**12.36 ½**	*12/50 ½*	*12/55 ½*
Newark North Gate	**arr**		**12.14½**				**12.45½**		
	dep	*12/02 ½*	**12.16**	*12/21*	*12/28 ½*	*12/37 ½*	**12.47**	*12/57 ½*	*13/02 ½*
Retford	**arr**			**12.31 ½**			**12.58**		
	dep	*12/12*	*12/26*	**12.33**	*12/38*	*12/47*	**12.59½**	13/07	*13/12*
Doncaster	**arr**		**12.37**	**12.45**	**12.49**	**12.58**	**13.11½**	**13.18**	

Peterborough - Kings Cross (7 TPH LDHS)

Original Location		Edinburgh	Cambridge	Cambridge	Kings Lynn	Horsham	Leeds	Sunderland, Bradford, Hull	Horsham	Leeds	Cambridge	Cambridge	Kings Lynn	Horsham	Newcastle	Edinburgh
Destination Location		Kings Cross	ttenham Corr	Brighton	Kings Cross	Peterborough	Kings Cross	Kings Cross	Peterborough	Kings Cross	ttenham Corr	Brighton	Kings Cross	Peterborough	Kings Cross	Kings Cross
Timing Load		800	700	700	365	700	800	180	700	800	700	700	365	700	800	800
Peterborough	**arr**						**14.17 ½**			**14.25 ½**					**14.43 ½**	**14.47 ½**
							1			**3**					**3**	**1**
	dep	*13/59*				**14.01 ½**	**14.19 ½**	*14/21 ½*		**14.27 ½**				**14.31 ½**	**14.45 ½**	**14.49 ½**
								(2 ½)						SL	SL	
Fletton Jn	**dep**													*14/32*		
														ML		
Connington SJ	**dep**	*14/04*				14/08	*14/26*	*14/29*		*14/34*				*14/38*	*14/53*	*14/56*
						SL			←							
Huntingdon	**dep**	*14/08 ½*				**14.15**	*14/30*	*14/33*	**14.15**	*14/39*				**14.45**	*14/57*	*15/00*
						SL			SL					SL		
St Neots	**dep**	(½)				→								→		
Sandy	**dep**	*14/16*					*14/37*	*14/40*	**14.30**	*14/46*					*15/04*	*15/07*
Hitchin	**dep**	*14/22*	**14.23**	**14.28 ½**	*14/33 ½*		*14/43*	*14/46*	**14.45**	*14/52*	**14.53**	**14.58 ½**	*15/03 ½*		*15/10*	*15/13*
			SL	SL	FL						SL	SL	FL			
Stevenage	**arr**		**14.27 ½**	**14.33**					**14.49 ½**		**14.57 ½**	**15.03**				
	dep	*14/24*	**14.28 ½**	**14.34**	*14/37 ½*		*14/45*	*14/48*	**14.50 ½**	*14/54*	**14.58 ½**	**15.04**	*15/07 ½*		*15/12*	*15/15*
		[1]			[1]		[1]	[1]		[1]			[1]		[1]	[1]
Woolmer GJ	**dep**	*14/27*	*14/33*	*14/37 ½*	*14/40 ½*		*14/48*	*14/51*	*14/54*	*14/57*	*15/03*	*15/07 ½*	*15/10 ½*		*15/15*	*15/18*
Digswell Jn.	**dep**		*14/36*								*15/06*					
			SL								SL					
Welwyn GC	**arr**		**14.37 ½**								**15.07 ½**					
	dep	*14/29*	**14.40**	*14/39 ½*	*14/42 ½*		*14/50*	*14/53*	*14/56*	*14/59*	**15.10**	*15/09 ½*	*15/12 ½*		*15/17*	*15/20*
		(1)								(1)						
Potters Bar	**dep**	*14/34*		*14/44 ½*	*14/47 ½*		*14/54*	*14/57*	*15/01*	*15/04*		*15/14 ½*	*15/17 ½*		*15/21*	*15/24*
Alexandra P	**dep**	14/38 ½		*14/49 ½*	*14/52 ½*		*14/58 ½*	*15/01 ½*	*15/05 ½*	*15/08 ½*		*15/19 ½*	*15/22 ½*		*15/25 ½*	*15/28 ½*
		[1]			[1]		[1]	[1]		[1]			[1]		[1]	[1]
Finsbury P	**arr**			**14.52**					**15.07 ½**			**15.22**				
	dep	*14/41*		**14.53**	*14/55*		*15/01*	*15/04*	**15.08 ½**	*15/11*		**15.23**	*15/25*		*15/28*	*15/31*
				SL					SL			SL				
Belle Isle	**dep**	*14/43*			14/56 ½		*15/03*	*15/06*		*15/13*			*15/26 ½*		*15/30*	*15/33*
Kings X	**arr**	**14.45 ½**			**14.58 ½**		**15.05 ½**	15.08 ½		**15.15 ½**			**15.28 ½**		**15.32 ½**	**15.35 ½**

Original Location Destination Location Timing Load		**Leeds Kigs Cross** **800**	**Horsham Peterborough** **700**	**Edinburgh Kings Cross** **800**
Peterborough	**arr**			
	dep	*14/54*		*14/59*
Fletton Jn	**dep**			
Connington SJ	**dep**	*14/59*		*15/04*
			←	
Huntingdon	**dep**	*15/03*	**14.45** SL	*15/08 ½*
St Neots	**dep**			(½)
Sandy	**dep**	*15/10*	15.00	*15/16*
Hitchin	**dep**	*15/16*	15.15	*15/22*
Stevenage	**arr**		15.19 ½	
	dep	*15/18* [1]	15.20 ½	*15/24* [1]
Woolmer GJ	**dep**	*15/21*	*15/24*	*15/27*
Digswell Jn.	**dep**			
Welwyn GC	**arr**			
	dep	*15/23*	*15/26*	*15/29* (1)
Potters Bar	**dep**	*15/27*	*15/31*	*15/34*
Alexandra P	**dep**	*15/31 ½* [1]	*15/35 ½*	15/38 ½ [1]
Finsbury P	**arr**		**15.37 ½**	
	dep	*15/34*	**15.38 ½** SL	*15/41*
Belle Isle	**dep**	*15/36*		*15/43*
Kings X	**arr**	**15.38 ½**		**15.45 ½**

Doncaster - Peterborough (7 TPH LDHS)

Original Location Destination Location		Edinburgh Kings X	Leeds King X	Sunderland, Hull, Bradford Kings Cross	Leeds Kings Cross	Newcastle Kings Cross	Edinburgh Kings Cross	Leeds Kings Cross	Edinburgh Kings Cross
Timing Load		800	800	180	800	800	800	800	800
Doncaster	**dep**	*13/19*	**13.23**	**13.32**	**13.42 ½**	**13.52 ½**	**14.03 ½**	**14.07 ½**	*14/19*
Retford	**arr**		**13.34 ½**	**13.43 ½**					
	dep	*13/28*	**13.36**	**13.45**	*13/53*	*14/03*	*14/14*	*14/18*	*14/28*
Newark NG	**arr**		**13.47 ½**			**14.12 ½**			
	dep	*13/37*	**13.49**	*13/56*	*14/02*	**14.14**	*14/23*	*14/27*	*14/37*
Grantham	**arr**		**13.58 ½**	**14.04**		**14.23 ½**			
	dep	*13/44 ½*	**14.00**	**14.05 ½**	*14/09 ½*	**14.25**	*14/30 ½*	*14/34 ½*	*14/44 ½*
Peterborough	**arr**		**14.17 ½**		**14.25 ½**	**14.42 ½**	**14.46 ½**	**14.50 ½**	
	plat		**1**		**3**	**3**	**1**		
	dep	*13/59*	**14.19 ½**	*14/21 ½*	**14.27 ½**	**14.45 ½**	**14.49 ½**	**14.52 ½**	*14/59*