



System Operator

East Coast Mainline Congested Infrastructure – Regulation 27: Capacity Analysis

- Huntingdon North Jn to New England North Jn
- Northallerton Longlands Jn to King Edward Bridge South Jn
- Doncaster Marshgate Jn to Copley Hill West Jn



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References

Ref.	Document Name	Document Ref. No.	Date	Rev
1.	Church Fenton to Newcastle Strategic Advice	N/A	April 2020	
2.	IRP CA Technical Note for N2N 7 th path	N/A	December 2022	P01
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14.	Freight Route Utilisation Strategy	N/A	March 2007	n/a
15.	Shaftholme Jn – Linespeed Improvement (2025)	N/A	20/06/2025	1.0

Abbreviations

Acronym	Meaning
ATT	Advanced Timetable Team
CP	Capacity Planning
DfT	Department for Transport
ECML	East Coast Main Line
ECS	Empty Coaching Stock
EMR	East Midlands Railway
ESG	Event Steering Group
GTR	Govia Thameslink Railway



HAW	Heavy Axle Weight
ITPR	Indicative Timetable Planning Rules
ITSS	Indicative Train Service Specification
LDHS	Long Distance High Speed
LNER	London North Eastern Railway
N2N	Northallerton to Newcastle
NR	Network Rail
SRT	Sectional Running Time
TPE	TransPennine Express
TPRs	Timetable Planning Rules
TYR	Tyne Yard Reversible
WTT	Working Timetable

Assumptions	
Geographic Scope	East Coast Mainline, areas defined in Congested Infrastructure declaration • Huntingdon North Jn to New England North Jn • Northallerton Longlands Jn to King Edward Bridge South Jn • Doncaster Marshgate Jn to Copley Hill West Jn
Timetable	December 2025 Working Timetable (during production D-30)
Timetable Planning Rules	2026 Version 4.0



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Part A: Executive Summary

This report provides a detailed analysis of capacity constraints across three key sections of the East Coast Main Line (ECML), carried out by Network Rail's Advanced Timetable Team. The analysis was initiated in response to anticipated congestion in the December 2025 Working Timetable and aims to identify the causes of congestion and explore potential mitigation strategies as set out in Regulation 27 of the Railways (Access, Management and Licensing of Railway Undertakings) Regulations 2016 (the **Railway Regulations**).

The study focussed on three specific corridors: from Huntingdon North Junction to New England North Junction (Peterborough); from Northallerton Longlands Junction to King Edward Bridge South Junction (Newcastle) and from Doncaster Marshgate Junction to Copley Hill West Junction (Leeds).

A.01 Huntingdon North Jn to New England North Jn

- Options for diverting services from the area to relieve congestion are limited either by gauge or limited capacity on alternative routes.
- A consequence of the implementation of the W10 Strategic Freight Network is to concentrate gauge constrained services into the Peterborough area.
- The development of the Freight facilities on the up side at Peterborough in recent years creates a requirement for capacity use that was not part of the assumption set when the additional access rights were approved in 2016; paths to access the yards were contained in the original specification for the ESG that developed the Dec-25 timetable structure.
- The structure of the Dec-25 ECML passenger service does not naturally contain capacity for services using the two ladder junctions at Peterborough, options for adjusting the passenger service are very limited.
- Whilst four tracking south of Peterborough creates additional capacity it does not directly alleviate the congested infrastructure as this capacity can only be released as part of a wider recast over a much larger geographical area.
- The application of multiple timetable planning rules sets in the Peterborough area minimises congestion but only as a trade off against timetable performance.
- Infrastructure interventions to deconflict movements on the core ECML from movements crossing the ECML at Peterborough are unlikely to be feasible

A.02 Northallerton Longlands Jn to King Edward Bridge South Jn

- The mix of services and stopping patterns on this section, complicated by the directionally inconsistent nature of the timetable and passenger service intervals (resulting from the service specification), leads to inefficient capacity usage.



- The configuration and location of loops (including entry and exit speeds) is not compatible with the requirements of longer and higher speed freight services
- A proposition exists to create a gauge cleared alternative route between Northallerton and Ferryhill (including enhancements in the Newcastle area) however this is not funded; it is also unclear as to whether this option would be commercially effective for freight operators.
- A re-opened Leamside line offers the possibility of decongesting the route north of Tursdale Junction, however capacity and operational considerations between Pelaw and Newcastle East Jn reduce its feasibility.
- Electrically hauled freight offers capacity benefits taken either as improved journey time or greater trailing load, additional paths can be found. The implication on Traction Power would need to be considered.
- There is potential that a revision to the passenger service specification on this section of line could alleviate congestion.

A.03 Doncaster Marshgate Jn to Copley Hill West Jn

- This is a heavily used mixed traffic section of line, trains operate with a very wide range of service speeds on the two routes (which converge half way along its length); this reduces the effective capacity of the section.
- The route has been provided with W10 gauge clearance as part of the Strategic Freight Network, there are no gauge cleared alternative routes to the terminals served.
- Some potential options exist for interventions to allow W10 freight services to be diverted from this route
- The grade separation of South Kirkby Jn could alleviate some congestion on this route by removing the conflict between southbound services towards Sheffield and Northbound services towards Wakefield
- Whilst the operation of electrically hauled freight trains (subject to sufficient traction power) is beneficial in terms of running time, the structure of the Dec-25 timetable does not easily allow these benefits to be converted into additional paths.
- There is potential that a revision to the passenger service specification on this section of line would alleviate congestion.

A.04 Limitations:

- Scope of analysis: The study focuses on three corridors and does not assess network-wide impacts or downstream effects.
- Data assumptions: Capacity modelling is based on current planning rules (except where stated otherwise) and known service patterns, which may evolve.
- Infrastructure feasibility: Some proposed interventions (e.g. Leamside Line reinstatement) require further feasibility and cost-benefit analysis.



Part B: Introduction

B.01 ECML Context

The ECML is the principal main line from London to Yorkshire, the Northeast and Scotland. It was extensively upgraded and optimised in the 1980's when electrified to cater for a long-distance high speed (LDHS) service only half as dense as that operated today. Since then, the ECML has been subject to targeted infrastructure and service upgrades to incrementally increase capacity to meet growing demand; it has also seen the arrival of three open access operators targeting new or under-provided for markets and flows, the implementation of the Thameslink service and a radical change in the nature of its use by freight operators moving from slow speed bulk haul traffic to higher speed and long distance intermodal traffic. Additionally, the ECML is used by numerous services entering and exiting from adjoining routes, especially north of Doncaster, which do not easily integrate with ECML services to/from London.

The physical configuration of the ECML places constraints on the effective allocation of capacity due to numerous bottleneck sections and flat junctions and whilst some of the worst of these have been resolved in recent years (King's Cross approaches, Stevenage turnback, Cambridge Jn (Hitchin), Werrington Jn, Joint Line upgrade, Barkston Jn, Joan Croft Jn), those that remain (such as Welwyn Viaduct and Peterborough to Huntingdon) have a fundamental influence on the structure and scale of the timetable and the allocation of capacity.

In December 2025 (Dec-25) a new ECML timetable will be implemented, this will be the culmination of over 5 years work to develop a timetable that meets the requirements of the industry agreed specification (formalised via the Event Steering Group) and satisfies most of the firm rights that were approved for new services in 2016. This timetable will increase passenger services on the ECML catering for growing demand for rail travel; it will also contain several other service uplifts not originally envisaged in the specification, but which have become desirable due to passenger and freight growth occurring during the development period. The Dec-25 timetable will also realise the benefits of the multi-billion-pound investment made in infrastructure and fleet by UK government, although not all the investment anticipated at the time that rights were approved in 2016 has been implemented.

This timetable change will be the largest undertaken on the ECML since May 2011. It will deliver considerable user benefits creating more seating capacity and journey opportunities and generate revenue that will help the industry move towards its goals of financial sustainability.



B.02 Declaration of Congested Infrastructure

A consequence of the development process for the Dec-25 timetable, which has sought to allocate capacity as effectively as possible to meet the high volume of rights and the specification of the users of the ECML, is that 3 sections of the route will become congested upon the commencement of the timetable with a fourth section subject to an 'early-notice of congestion' warning.

The Event Steering Group (ESG), a cross-industry group implemented to lead the development of the new timetable, ran a number of workstreams to assess the various foreseeable capacity allocation challenges including (a) how existing freight requirements could be integrated with the new passenger service specification, and (b) how best to create a standard repeating pattern timetable that met the specification, the rights held and achieved acceptable levels of performance. While progress was made through these workstreams, a full resolution to all the challenges was not achieved resulting in the deferral of the timetable launch and an agreement to decrement the specification.

Network Rail's Timetable Production team subsequently completed two phases of additional development work which resolved many of the conflicts in the proposed timetable and which contributed to a clearer understanding of the timetable risks to support Industry decision making regarding timetable launch.

As some of these risks include capacity challenges at specific locations, Network Rail issued an Early Indicator of Likely Congested Infrastructure in accordance with the Network Rail Management of Congested Infrastructure Code of Practice in July 2024. Following completion of the second phase of advanced work in October 2024, the Industry ECML Task Force recommended to funders and stakeholders to proceed with the ECML timetable recast in December 2025.

Further assessment was undertaken by Network Rail to understand whether a formal declaration of Congested Infrastructure in specific areas should be progressed. It was decided that three of the four locations were likely to become congested, and formal declaration was made in March 2025.

It is worth noting that the following factors have also affected the development of the December-25 timetable and contributed to the conditions that have given rise to this declaration of Congested Infrastructure.

- The structure of the ESG timetable is based upon rights approved in 2016 under a different infrastructure assumption set (which assumed infrastructure interventions which were not subsequently funded for delivery) and application of decision criteria to address conflicts that arose has resulted in inconsistencies in the pattern of capacity allocation.
- Since the start of the ESG process the requirements for the use of capacity for freight services in the Peterborough area, where significant investment has been made in facilities



on the up-side of the ECML, have changed from the assumptions that underpinned the original TSS and the anticipated availability of capacity.

B.03 Aims and Objectives

The Railways Regulations require that, where railway infrastructure has been declared to be congested in accordance with Regulations 26(1) or 26(2), Network Rail must undertake a capacity analysis of the congested infrastructure, as described in Regulation 27 (Regulation 26(4)).

In accordance with Regulation 27 of the Railways Regulations, this analysis considers the characteristics of the congested infrastructure, together with the operating procedures used on it, and the characteristics of the different rail services which have been allocated capacity to operate on it.

In seeking to determine measures to alleviate congestion, we have considered measures including the re-routing of services, re-timing of services, alterations to line speeds and the introduction of railway infrastructure improvements.

B.04 Scope

The geographic scope of this analysis is primarily limited to the sections of the ECML which have been declared congested and each is considered in turn

- Between Huntingdon North Jn and New England North Jn (Peterborough)
- Between Northallerton Longlands Jn and Newcastle King Edward Bridge South via the ECML
- Between Doncaster Marshgate Jn and Leeds Copley Hill West Jn

Additionally, the report will present a summary of interventions currently envisaged to be required to address the removal of the additional London to Leeds service which was removed from the specification but for which firm rights were held but not exercised.



Part C: Huntingdon North Jn to New England North Jn

Key Points

- Options for diverting services from the area to relieve congestion are limited either by gauge or limited capacity on alternative routes.
- A consequence of the implementation of the W10 Strategic Freight Network is to concentrate gauge constrained services into the Peterborough area.
- The development of the Freight facilities on the up-side at Peterborough in recent years creates a requirement for capacity use that was not part of the assumption set when the additional access rights were approved in 2016; paths to access the yards were contained in the original specification for the ESG that developed the Dec-25 timetable structure.
- The structure of the Dec-25 ECML passenger service does not naturally contain capacity for services using the two ladder junctions at Peterborough, options for adjusting the passenger service are very limited.
- Whilst four tracking south of Peterborough creates additional capacity it does not directly alleviate the congested infrastructure as this capacity can only be released as part of a wider recast over a much larger geographical area.
- The application of differing timetable planning rules sets in the Peterborough area minimises congestion but only as a trade off against timetable performance.
- Infrastructure interventions to deconflict movements on the core ECML from movements crossing the ECML at Peterborough are unlikely to be feasible

C.01 Reasons for congestion

The East Coast Mainline between Huntingdon and New England North Jn has been declared congested due to freight paths (exhibiting certain common characteristics) being unable to be accommodated, during passenger service operating hours of 06:00 - 21:00, within the structure of the Dec-25 timetable. The significant constraints being:

- No further paths are available into the Peterborough yards for traffic from Fletton Jn
- The only slot available for class 6 traffic between Connington and Huntingdon cannot be heavier than 1600 tonnes.

This part will explore reasons for congestion in this section and discuss some measures to alleviate it.



C.01.01 Characteristics of the infrastructure

From South to North, a four-track formation (paired by direction) reduces to three tracks at Huntingdon North Jn, losing the up slow line with the exception of a two-signal section stretch retained as a loop between Woodwalton Jn (65m43c) and Connington South Jn (67m38c). This reduces further to two-tracks between Holme Jn (69m11c) and Fletton Jn (74m69c).

This route is gauge cleared for W10 services and forms a part of the core W10 freight network connecting ports in the Thames Estuary and on the Suffolk Coast with inland terminals in the Midlands, North-West and Yorkshire. Gauge clearance to W10 through Peterborough from Felixstowe and via the East Coast Mainline was completed as part of the Strategic Freight Network (SFN) to divert intermodal traffic away from London and the south end of the West Coast Mainline.

To the south Peterborough there are no alternative gauge cleared routes and as a result W10 freight traffic must be planned on these routes in a fashion which mitigates against the impact of periodic blockages for maintenance, this is especially the case for services accessing the Thameside ports. The consequence is that freight traffic which could operate overnight in the area operates instead during the day increasing the demand for capacity in the busiest periods.

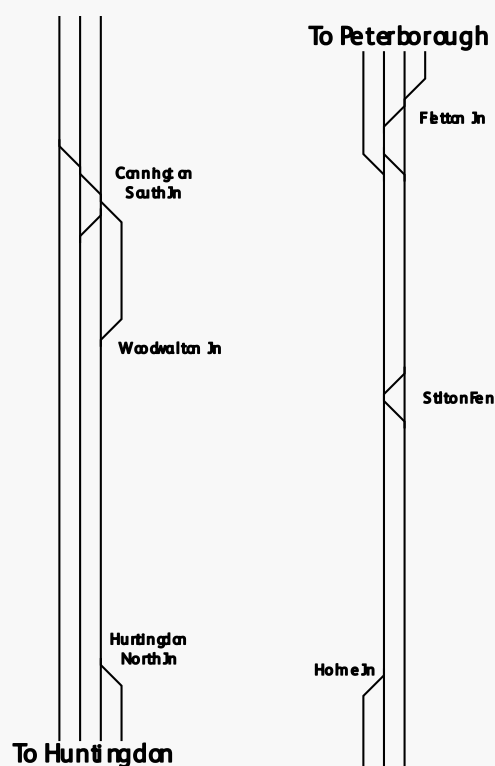


Figure 1: Simplified diagram showing the railway between Huntingdon North Jn and Fletton Jn.



At Fletton Jn, the track goes back to four-tracks. The lead to the Down Slow from Down Fast is rated at 70mph whereas the lead from the Up Slow to the Up Fast is 25mph. Movements to the down slow may receive flashing aspects approaching Fletton Jn although the conditions required to receive this aspect sequence are quite restrictive¹, leading to large junction margins between movements across Spital Jn and arrivals in platforms 4 or 5 from Fletton Jn with the least restrictive approach. In the up direction, the low 25mph speed of the turnout from the Up Slow line to the Up Fast line contrasts poorly with a linespeed of 105mph on the up fast. This means that a large gap (7½ to 13½ minutes) needs to be present in spacing of London bound trains to allow a freight to emerge onto the Up Fast and clear at Connington South Jn before the next train passes through.

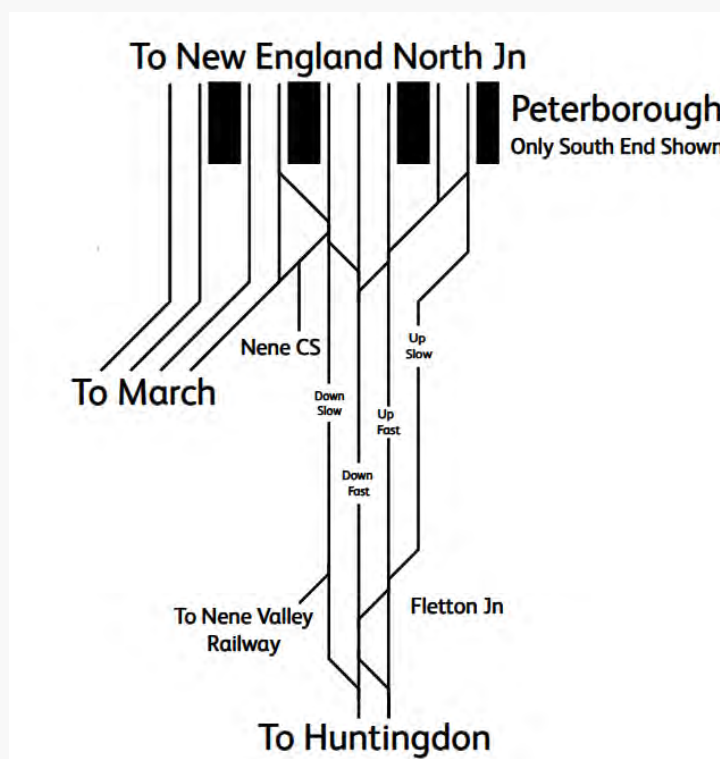


Figure 2: Simplified diagram showing the railway between Fletton Jn and Peterborough (South End)

There are several flat junctions in the Peterborough station area which contribute to congestion. These are Crescent Jn, for movements between the down fast and platforms 1 and 2 at

¹ For a down train to receive flashing aspects approaching P417 (junction signal for Fletton Jn), the signal immediately beyond Fletton Jn (P421) must already be off which requires the full overlap being available on platform 4 or 5 which prevents any simultaneous conflicting move across Spital Jn



Peterborough and Spital Jn, linking the up side yards with the March lines and New England North Jn which connects the Stamford lines with Peterborough North Yard and the North arrival/departure lines at Eastfield. Access to the Peterborough yards requires conflicting movements at Spital Jn (access to/from the south) and New England North junction (access to/from the north). Both Spital Jn and New England North Jn are characterised by low permissible speed and are single track ladders, 15-25mph Spital Jn; 15mph New England North Jn.

The proximity of Spital Junction to Peterborough station means that trains traversing the whole ladder occupy the overlaps for signals at the north end of Platforms 4 and 5 (accessed from the Down Slow). This has an impact on the ability to plan trains arriving into Peterborough in the northbound direction whilst the ladder is occupied and also has a performance implication at Fletton Junction as occupation of the overlap affects the speed that trains can access the Down Slow line there.

The current use of the yards at Peterborough has increased over recent years and the extent of use was not part of the assumptions sets when the additional passenger rights were approved in 2016. When the ESG train service specification was initially set a wider range of services requiring to access the yards was included to reflect the investment in the site. Crossing moves from the Stamford/March lines create a direct conflict with services operating north/south on the core ECML.

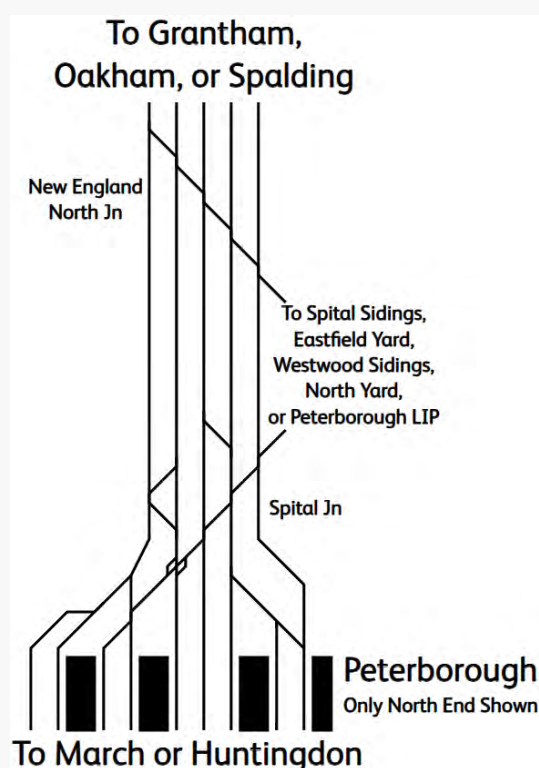


Figure 3: Simplified Diagram showing the railway between Peterborough and New England North Jn. Detail of the many Peterborough Yards has not been included.



C.01.02 Operating procedures

Trains moving through the section are controlled by York ROC (Huntingdon W/S and Peterborough W/S) and Eastfield signal box. All running lines are worked under Track Circuit Block regulations with the exception of the Goods lines controlled by Eastfield signal box which are worked according to No Block Regulations laid out in the Signal Box Special Instructions for Eastfield.

A review of Local instructions and signal box special instructions did not find any contribution to congestion due to operating procedures.

The Huntingdon and Peterborough workstations are fitted with an automatic route setting product known as Dynamic Route Setting (DRS). This system has been unable to signal certain combinations of moves, particularly those requiring the restricted overlap at the north end of platform 4 which has prompted a review of the planning rules (discussed further in C.02.05).

C.01.03 Characteristics of the train services

There is a varied mix of passenger and freight traffic on the East Coast Main Line through Peterborough. This includes:

Passenger Services;

- Fast services between London and Lincoln / Yorkshire / the North of England / Scotland
- Regional express train services between Liverpool and Norwich (using the ECML/March line) and Birmingham and Cambridge/Stamsted Airport (Stamford/March line).
- Terminating stopping passenger services between Peterborough and Horsham, Lincoln/Doncaster and Ipswich

Freight Services:

- Gauge critical container trains operating from East Anglia (via March) to the West Midlands (via Stamford) and Yorkshire (via the GNGE Joint Line or ECML)
- Gauge critical container trains operating from Thameside ports (via Hitchin) to Yorkshire (via the GNGE Joint Line or ECML)
- Bulk construction materials and Infrastructure Services trains (class 6) on all routes
- Bulk materials to/from an unloading facility at Peterborough Yard
- Use of Peterborough North yard facilities for the stabling and remarshalling of trains plus locomotive swaps for maintenance and fuelling

There is considerable demand for capacity for freight paths in the Peterborough area. It is anticipated that demand for additional services to/from the Thames ports via the south end of the ECML will increase due to changes in the global shipping market.

The December 2025 timetable contains approximately 125 SX freight paths between 06:00 and 22:00. Of those paths, 25 continue south of Peterborough on the ECML via Fletton Junction:



- 1 Class 0
- 12 Class 4
- 12 Class 6

Of the ~83 freight movements via Peterborough, all trains accessing the yards do so as part of a through schedule. Only one train in each direction has Peterborough West Yard (via New England North Junction) as an origination or termination point over the 24-hour period:

- 6H69 to Biggleswade Plasmor at 05:13
- 6H86 from Heck Plasmor PS at 23:43

There are strategic paths for another ten services over the time period.

At Spital Jn there are 18 non-passenger movements during the 24-hour period which cross the whole ladder, with half of these between 0700 and 2100. The majority (15) are Class 4 freight trains, with two Class 6s and one ECS (Class 5) movement. Of this traffic, more than half (ten) were going to Felixstowe, with London Gateway (three) the next most common destination.

Additionally, there is also an hourly passenger movement across Spital Jn, the eastbound Liverpool to Norwich service, currently operated by EMR, there are also GTR ECS moves between Platform 2 and the Thameslink sidings which use the east side of the ladder.

C.02 Measures to alleviate congestion

C.02.01 Re-routeing of services

Re-routing freight was attempted with no success. There was no alternative route found for trains between the Peterborough Yards (North Yard, West Yard, Eastfield) and East Anglia destinations (e.g.: March, Whitemoor) and terminals towards Leicester (e.g.: Mountsorrel, Old Dalby, Ketton Ward) that did not involve crossing the ECML at grade. No alternative route for southbound arrivals from the ECML into the Peterborough Yards without crossing the ECML is available.

C.02.01.01 Bulk traffic via Nottingham and Grantham or Sleaford

A potential alternative route for Class 6 services running between Peterborough and Tunstead was identified and considered without success. From Toton, this would route services via Nottingham, Bingham, and either Grantham and the ECML or via Sleaford and Spalding to Peterborough. This would avoid the need to cross the ECML at grade at New England North Jn. This would limit services to 2400 tonnes trailing. Paths were not found due to the high volume of services between Attenborough Jn and Netherfield Jn (through Nottingham station), Absolute Block headways between Bingham and Grantham, crossing the ECML at grade at Grantham, and long headways between Allington and Werrington Junctions via Sleaford).



C.02.01.02 Intermodal via West Anglia Mainline

An alternative route for both Class 4 and Class 6 services running between Peterborough Yards and various East of London terminals (e.g. London Gateway, Ripple Lane) was considered without success. From Peterborough, this would route services via March, Ely, Cambridge, Bishop's Stortford, Seven Sisters, and South Tottenham to join the Gospel Oak to Barking line.

This would remove some freight from the two- or three-track section between Fletton Junction and Huntingdon. It would also limit intermodal services to W8 gauge clearance. Paths were not found due to the number of services between Peterborough and Ely, a lack of paths over Ely North Jn, constraints on the capacity between Cambridge and Shepreth Branch Jn and between Stanstead North Jn and Cheshunt. Loop lengths throughout the route are too short for intermodal services to use.

C.02.01.03 Midland Mainline

Diverting some services between West Midlands intermodal terminals and London Gateway away from Peterborough onto the Midland Main Line was considered. However, parts of that route are not gauge cleared above W7, so no attempt was made to find paths.

C.02.02 Re-timing of services

C.02.02.01 Overall

Overall, there are low numbers of containable flexes possible to accommodate a Class 4 path in some hours, but these prove much harder to achieve (impossible in some hours) particularly during and surrounding the morning and evening peaks where extra passenger services run; for class 6 freight services the consequential flexing required would be more impactful on the timetable. GTR's minimum TPR-compliant turnarounds are already below the 15-minute preferred minimum value at Peterborough in some instances (10-minute absolute minimum with consultation) on their Horsham services which cannot be rectified without a subsequent complete change to the southbound passenger timetable structure as well.

C.02.02.02 Huntingdon North Jn to Fletton Jn

On the two/three-track section between Huntingdon North Jn and Fletton Jn, there is little scope to re-time services within the existing timetable structure. Re-timings of between 30 seconds and 2 minutes were achieved, but these are not enough to make a meaningful difference.

More major re-timing would result in re-flighting of the full ECML. Whilst this may resolve the congestion issue in this section, it will likely lead to issues accommodating the required capacity at other locations (for example Welwyn viaduct, Doncaster).

C.02.02.03 New England North and Spital Junctions

An attempt was made to find a standard hour slot at New England North and Spital Junctions for freight crossing to/from the Peterborough Yards. However, although the Dec-25 timetable structure was initially developed with a standard hour pattern, this has been significantly eroded



and altered as a consequence of accommodating services that run at less than hourly frequency into the standard hour.

The figure below illustrates hour to hour variation throughout the day at New England North Junction Up and Down Fast lines. Passenger services are shown in dark blue. White spaces indicate periods when the lines are not occupied; however, these do not necessarily reflect available capacity, as the graphs do not account for existing crossing traffic to/from Peterborough sidings. A freight crossing from the up-side to the March Independent requires a 6-minute gap in traffic between up-direction passenger movements and a 6-9 minute between down direction passenger movements

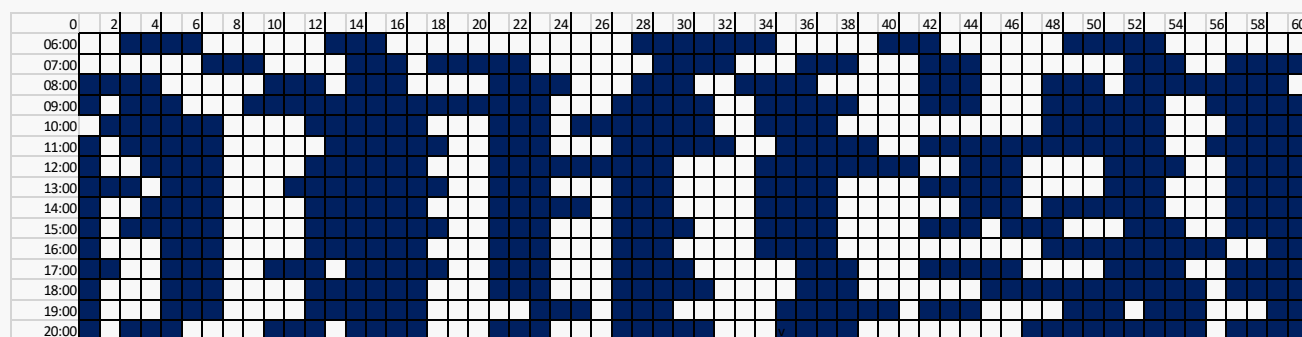


Figure 4. Pattern analysis of Fast Up and Down Lines at New England North Junction Dec25.

Although both directions are shown in figure 4, the deviations from the standard pattern are not consistent and differ by direction. This leads to a situation where there are several gaps in each direction large enough to accommodate trains crossing at New England North or Spital Junctions, however those gaps do not align to provide the space for a crossing move to occur.

Long Distance High Speed (LDHS) services already incur significant pathing to create gaps for crossing moves, and that pathing is now not enough to be compliant with the margins required by the updated TPRs in the area (see section C.02.05). It is theoretically possible that shifting an entire direction of ECML traffic by 10-minutes (later for northbound, or earlier for southbound) could allow the gaps in service in each direction to match up around Peterborough, however that would require, at least, a re-assessment of every single flat junction on the ECML and platforming at many stations. A similar gap in service would also need to exist on the Stamford lines, with retiming of services on the Stamford lines potentially impacting Ely and the Midland Mainline. Further, due to the aforementioned non-standard hour nature of LDHS services due to open access paths, such a shift would not create suitable and usable capacity in every hour.

C.02.02.04 Re-ordering of services

If the four-tracking between Woodwalton and Huntingdon were in place it would be possible to revise the order of Up long-distance services. The IRP Phase 1 report highlighted potential train path swaps in the Up direction through the Peterborough to Huntingdon area that would result in



overall lower pathing allowances, with some journey time reductions for services being possible. This would not have a big impact on platforming at King's Cross, with two exceptions:

- 1Y10LN (ex-Newcastle) and 1A65LX (ex-Leeds fast) swap outbound workings. Both services are currently on five-car electric diagrams, so this would be possible
- A free platform could not be found for the Lumo service 1E83LL (arriving 12:48) forming 1S97GL (departing 14:15) and an ECS (empty coaching stock) train movement to Ferme Park or Bounds Green would be required, which may trigger a need to consider alternative train crew strategies.

However, it would still not be possible to accommodate a two-hourly Class 6 freight path crossing New England North Jn and Spital Ladder to access the Peterborough North Yard / Eastfield Yard site.

The irregular pattern of long-distance trains, particularly on the Up Fast and Down Fast Line that are effectively fixed around other services, and the junction margins that need to be met mean that the opportunity for these movements is limited.

C.02.03 Infrastructure improvements

C.02.03.01 Huntingdon – Woodwalton 4-tracking

Timetabling between Huntingdon North Junction and Fletton Junction, South of Peterborough, is impacted by the two-track section between Fletton Junction and Holme, plus the Up Slow Line converging back into the Up Fast at Woodwalton Junction. This means there is only one running line for Up services between there and Huntingdon North Junction.

The IRP Phase 1 analysis suggests that if four-tracking were in place between Woodwalton Junction and Huntingdon then this would reduce the amount of pathing time needed in passenger services, plus cut freight journey times by eliminating the need for looping. The intervention is shown in the figure below.

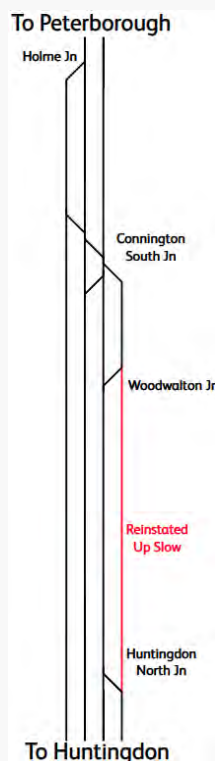


Figure 5: Four-tracking between Woodwalton Jn and Huntingdon North Jn

Any time a freight train is looped at Connington it requires a second path on departure to continue south. The four-tracking means that at least one path is gained every time a freight is looped (approx. 14 across the day). This does not mean an additional service can run: the majority of extra paths could not be accommodated at Peterborough.

With this timetable structure there is still a need to regulate freight to align their paths north of Peterborough to their paths south of Hitchin. This analysis suggests holding services north of Huntingdon on the new Up Slow. When freight is being regulated in this manner, Thameslink services have to run on the Up Fast all the way to Huntingdon. Otherwise, they can run on the new Up Slow from Connington South.

The effect of this intervention on LDHS services running on the Fast Lines is minimal when the remainder of the ECML south to London Kings Cross is considered. Between 7am and 10pm, 21 services save a total of 38½ minutes of pathing time between Peterborough and Huntingdon as a result of the four-tracking and re-routing of freight and Thameslink services onto the new Up Slow line. However, half of those services would have all that pathing re-added by Woolmer Green Junction, and all but 5 arrive into London Kings Cross at the same time as before. Of those 5 which arrive earlier, 4 have journey time saving of between 1 and 2 minutes, and the remaining service saves 7 minutes.



This intervention would have no impact on the congested nature of the infrastructure north of Fletton Jn without a revision to the whole ECML train service structure.

C.02.03.02 Fletton Jn Up Slow – Up Main permissible speed

RailSys analysis was conducted with Fletton Jn turnout speed improved to 40mph and 50mph. At 40mph, the journey time saving for freight services varied between 0 and 1½ minutes, with journey time savings increasing in proportion to trailing load. There would also be a saving of ½ a minute between Peterborough and Fletton Jn on the Slow Lines for all freight services. At 50mph, the journey time saving for freight services varies between ½ minute and 2½ minutes, again with journey time savings increasing in proportion to trailing load. There would also be a saving of ½ a minute between Peterborough and Fletton Jn on the Slow Lines for all freight services.

On its own, no additional capacity was created through this intervention within the current timetable structure. At best, existing non-compliances within the base would be solved. (The time period of 07:00 to 22:00 SX was analysed.) Even though up to 2½ minutes can be saved, this is only at the heaviest trailing load (2400tonnes at 60mph), and there are no services that run at this trailing load during those hours. Most freight services that run during the day are 600 tonnes maximum, where there is no benefit at 40mph, and only ½ a minute at 50mph. Therefore, the scope to increase the trailing load during the time period is non-existent at 40mph and minimal (i.e.: 200 tonnes extra maximum) at 50mph.

There are six intermodal services running at 1600 tonnes trailing load within this time period, saving 1 minute with Fletton Jn at 40mph or 2 minutes at 50mph. However, these services are the ones that tend to have inadequate adjustment allowances in the base timetable, so there would be no improvement to those services. As with Huntingdon – Woodwalton 4-tracking, this would have no impact on the congested nature of the infrastructure north of Fletton Jn.

C.02.03.03 Grade separation of Spital Jn / New England North Jn

To address the constraints, either both junctions would need to be grade separated, or non-stop [at Peterborough] LDHS traffic would need to be grade-separated through the whole Peterborough area (south of the station to New England North Jn).

Neither grade separation option was analysed in detail due to the likely cost and space constraints rendering such an intervention highly unlikely to ever be carried out. There is little space between New England North Jn and Marholm Jn (to access the Werrington dive-under), and between Spital Junction and Peterborough station, to accommodate a rising/falling gradient to pass under/over the East Coast Main and Stamford lines. There are also four road bridges which would be affected should there be a flyover grade-separation, and bridges over the River Nene directly to the south. Consequently, an intervention such as this (were it ever to be deemed necessary) would require such extensive remodelling in the Peterborough area that it would be more sensibly achieved by way of a Peterborough by-pass line.



C.02.03.04 Doubling of New England North Jn

Doubling New England North Junction would allow parallel arrivals and departures from the Peterborough Yards. The existing base non-compliances when applying the revised TPRs (see C.02.05) made analysing this more difficult. The approach taken was to use existing slots and to see if any new conflicts were added.

Most existing slots where a service crosses to or from the Peterborough Yards could not be used by a service in the opposite direction. This is due to headway issues on the Stamford Lines, or junction margin conflicts at Helpston Junction. There were three opportunities across the day (07:00 to 22:00 SX) where existing arrivals and departures could be combined with success. Otherwise, the benefits would be very limited. Again, these findings are ignoring the existing base non-compliances due to the TPR change; further analysis would need to be conducted with new TPR compliant slots to get a full picture of what benefit (if any) doubling would bring.

Therefore, to properly exploit any capacity benefits brought by doubling the junction, either the Syston to Peterborough and Peterborough to Ely lines would require a timetable restructure, or the ECML would need one (and quite possibly both). Even if a new timetable structure could be found that would allow parallel arrival/departure slots from the Peterborough Yards over New England North Jn, it would still not address the fundamental cause of congestion: the contradiction of freight crossing to/from the Peterborough Yards and all other rail traffic in the area.

C.02.04 Alterations to the speed of trains within existing infrastructure capabilities

In attempting to remove pathing time, it was found that times at Doncaster and London King's Cross were fixed, and pathing time at Connington South Jn could only be redistributed rather than eliminated. This is because the ordering of trains between Doncaster and London King's Cross was not optimised for speed differentials but around the need to slot in between Govia Thameslink paths over Welwyn Viaduct which are considered fixed due to the potential network wide implications of a Thameslink timetable change.

C.02.05 Planning rule accuracy and completeness

During 2024 a working group was set up to review the Timetable Planning Rules between Huntingdon and Peterborough. This was in response to concerns being raised about the achievability of the existing rules resulting from the new signalling system and the availability of paths to/from Peterborough North Yard.

Analysis for the ECML Task Force assessed the impact of applying the optimal TPRs for Peterborough as found by the working group. Most required changes could be accommodated within the structure of the ESG timetable, with the exception to TPR changes for New England North and Spital Jns, identified during additional TPR working groups held in June 2024.



Between 0600 to 2100 hrs (SX) there are a limited number of gaps of sufficient size between the flighting of trains in the Peterborough area to accommodate the optimal TPRs for these moves. Application of the optimal TPRs for Peterborough following the signalling re-control review of TPRs has identified:

- 16 crossing moves at Spital Jn that are non-compliant
- 27 crossing moves at New England Jn that are non-compliant

Using the current TPRs for Peterborough the situation of TPR compliance looks different and it has been identified that:

- 15 crossing moves at Spital Jn that are non-compliant and will require clarification in the application of the current Rules to support TPR compliance which details the north end Peterborough platform margins not apply to crossing moves
- All crossing moves at New England Jn can be made within the constraints of the TPRs

Aligned to the discussions of the Task Force (in respect of the new TPR's required as a result of Peterborough recontrol) it was recommended that to accommodate the recast of the ECML timetable the optimal TPR values for New England North and Spital Jns were not established due to their material impact on the structure of the ESG timetable. The Task Force endorsed this approach, with the industry transparently trading performance for capacity. Taking this approach enabled the current levels of freight traffic on the ECML to be accommodated.

The Peterborough Timetable Planning Rules final report (23 September 2024) details the process of validating the ESG timetable for Peterborough against proposed TPRs to establish if all services could be accommodated or to highlight any risks with implementing the new rules.

While the changes which would have no material impact on the timetable were accommodated into the May 2025 TPRs, no changes were established for Holme Junction, Fletton Junction, Spital Ladder or New England Junction.

The difficulty at Spital Ladder and New England Junction is where trains have to cross all five lines of the East Coast Main Line. Where there are gaps in the flighting of the Up and Down trains which should be able to accommodate crossing moves, these do not match up with each other to create the needed gaps across the whole of the ECML.

The report highlighted various risks:

- Major increase in the number of conflicts that would be shown at New England North Jn
- Fewer compliant paths available in the WTT due to the limiting factors of the new margins at New England North Jn and Spital Jn



- Harder to use TPRs for this area which may also decrease planning quality in this area especially for STP
- Fewer available paths (freight and passenger) in this area on an STP basis if wanting to add more services in around the WTT. Especially if there are blocks on to the south of Peterborough meaning more freight would need to cross the ECML when heading for Anglia
- How accurate the current generic platform end margins are at Peterborough and how effective it is having these values split across the two halves of the station
- Non compliances of 1.5 minutes and greater would increase from 21 incidences to 49 incidences in the time window looked at.

Other restrictive TPRs in the Peterborough area include:

- Four or five-minute headways departing Peterborough if not following through service or on Slow Lines



C.02.06 Operational changes

C.02.06.01 Usage of Peterborough North Yard

It is acknowledged that the use of Peterborough Yards as a maintenance and operational location is a permanent feature of the ECML and critical to commercial freight operations.

There are several services throughout the day that cross the ECML at grade twice due to an intermediate stop at the Peterborough Yards. Other services avoid the grade separated Werrington dive-under because of an intermediate stop at the Peterborough Yards, meaning they only have to cross the ECML at grade once. During the day the only reason freight services access the yards is for operational reasons.

Removing or reducing those intermediate stops would be beneficial to capacity in the area. However, this would mean freight paths north or south of the Peterborough area would need to be recast to avoid extensive pathing time requirement on the network or other regulation locations would need to be found.

C.02.06.02 Electric haulage of freight

One of the main reasons for intermediate stops for freight services at Peterborough Yard is to swap diesel locomotives for maintenance and/or to refuel them. Deploying electric locomotives or bi-mode electric locomotives, which have higher reliability, lower frequency maintenance requirements and less or no requirement for fuel, onto freight services passing through the area would reduce the need for crossing moves at Spittal and New England Junctions. This would alleviate congestion to a degree, keeping freight services on the mainline or Stamford lines.

C.02.06.03 Improvements facilitated by improved gauge clearance

For freight services traversing the Peterborough area running to or from the Thameside ports the lack of a gauge cleared diversionary route south of Peterborough, and especially between Stevenage and Alexandra Palace (which means that when the Hertford Loop is closed for maintenance such services cannot run) concentrates these services into daytime paths. Were there to be improved provision of gauge cleared routes for these services it could be possible to re-schedule some freight services into more convenient overnight paths alleviating congestion during the day.

C.02.07 Reduction or combination of services

A viable alternative to infrastructure or capacity-allocation based interventions is to consider the train service specification for the congested line of route to determine if there are any options for amending the specification to reduce congestion.



The marginal paths analysis² looked at the implications of timetabling freight on this stretch. It concluded that this section of route requires a Y-path for an 1,800-tonne Class 4 intermodal and a 2,400HAW- tonne Class 6, sharing the same path.

Within the context of the analysis undertaken in the study several options for service reduction were reviewed, table 1 below sets out only the options that could potentially ease congestion within this section of the ECML and facilitate capacity for freight services to use Spittal and/or New England junctions to access Peterborough Yards. Options to obtain capacity requiring the removal of more than one service group have been discounted.

Table 1: Potential options for service reduction/alteration

Service	Freq.	Option	High level Impact Assessment
London to Leeds/West Yorkshire	2tph	Reduction to 1tph by removing the PBO/GRA variant of the service (these pass in the Werrington Jn area) would facilitate an additional opportunity in every hour at both Spittal and New England Junctions.	- Significant loss of capacity and connectivity on this critical and growing service group - Significant revenue impact for the industry putting further pressure on industry finances - Significant negative stakeholder and passenger reaction. - An inappropriate trade-off of productive capacity for capacity for growth
Peterborough to Lincoln	~1tph	Diversion of all terminating and originating services to use the Werrington dive-under to access the high number platforms at Peterborough	- This would reduce use of the bi-directional up slow between Peterborough and Werrington - Subject to capacity availability in platforms 6 and 7 would maintain existing journey opportunities
Liverpool to Norwich	1tph	Diversion of service to the Nottingham – Oakham – Stamford route would remove the southbound service from Spittal Junction creating 1 additional opportunity per hour to get to or from Peterborough yards	- Extend journey time on the service between Norwich/Peterborough and Nottingham. - Loss of connectivity to/from Grantham, whilst increasing range of destinations from Oakham, Stamford and Melton - Require additional operational resources due to extended journey times.

² This was work undertaken during 2024 to establish the trade-offs that would allow introduction of additional freight paths onto the ECML with the December 2025 timetable.



Service	Freq.	Option	High level Impact Assessment
			- Put further (unsustainable) pressure on capacity on the Peterborough to Leicester route.
Liverpool to Norwich	1tph	Facilitate a crossing move for the southbound train north of Peterborough. This could be achieved through the creation of a Bi-Directional line from Tallington Jn to Helpston Junction over the Down Slow line.	- Would require additional signalling facilities to be installed (replacing the temporary arrangement) - Would retain the existing routing and therefore minimise disbenefits of the above option - Could remove one train movement per hour using Spittal Jn. - May require a recast in this service group as it is unclear that capacity exists for this option³

The evidence of this analysis of capacity utilisation at Spittal and New England Junctions is that there is no simple or obvious option to ease congestion based upon reduction of combination of services within the Dec-25 timetable structure; those that have been identified are not ones which can be recommended for further investigation in isolation.

It is reasonable to conclude that the only service specification-based option which could facilitate more efficient capacity utilisation and ease congestion in this section is one which seeks to restructure the pattern of LDHS services. Such an approach would need to specifically target the creation of standard opportunities to cross the ECML at Spittal and New England Junctions whilst also (a) respecting the constraints imposed on the standard pattern at other locations such as Welwyn Viaduct and (b) seeking to at least match the economic outputs of the Dec-25; this is not an impossible task but is one which may not be easily achievable within the current capacity allocation framework of the industry.

³ This option will be considered in more detail in the Capacity Enhancement Plan



Part D: Northallerton Longlands Jn to King Edward Bridge South Jn (via ECML)

Key Points

- The mix of services and stopping patterns on this section, complicated by the directionally inconsistent nature of the timetable and passenger service intervals (resulting from the service specification), leads to inefficient capacity usage.
- The configuration and location of loops (including entry and exit speeds) is not compatible with the requirements of longer and higher speed freight services
- A proposition exists to create a gauge cleared alternative route between Northallerton and Ferryhill (including enhancements in the Newcastle area) however this is not funded; it is also unclear as to whether this option would be commercially effective for freight operators.
- A re-opened Leamside line offers the possibility of decongesting the route north of Tursdale Junction, however capacity and operational considerations between Pelaw and Newcastle East Jn reduce its feasibility.
- Electrically hauled freight offers capacity benefits taken either as improved journey time or greater trailing load, additional paths can be found. The implication on Traction Power would need to be considered.
- There is potential that a revision to the passenger service specification on this section of line could alleviate congestion.

D.01 Reasons for congestion

The East Coast Mainline between Longlands Jn and King Edward Bridge South Jn has been declared congested due to freight paths (exhibiting certain common characteristics) being unable to be accommodated, during passenger service operating hours of 06:00 - 21:00, within the structure of the Dec-25 timetable. The significant constraints being:

- There is limited additional capacity for new freight paths from Longlands Jn to Birtley Jn via Darlington
- In the up direction, there is limited additional capacity available for freight, one of the areas in particular being Darlington and accommodating additional paths over 1400 tonnes between Darlington and Northallerton

This part will explore reasons for congestion in this section and discuss some measures to alleviate it.



D.01.01 Characteristics of the infrastructure

Between Northallerton and Newcastle there are long stretches of two-track railway with only limited opportunities to loop services at Darlington, Ferryhill, Durham and Low Fell Junction. The loop lengths are shown in the table below.

Table 2: Source - Timetable Planning Rules (London North Eastern) 2026 Version 4.0

LOCATION	DIRECTION	USABLE LENGTH (SLU/METRES)
Darlington Down Loop	Down	105 / 672
Darlington Down Bypass	Down	19 / 128
Darlington Up Loop	Up	89 / 570
Ferryhill Up Goods Loop	Up	70 / 448
Durham Up Loop	Up	88 / 563
Durham Down Slow	Down	80 / 512
Tyne Yard Reversible Goods	Down/Up	35/ 224

The maximum permissible speed over the section is 125mph south of Darlington. North of Darlington, the 125mph maximum speed reduces to around 100mph (several sections have higher speeds) with lows of 75mph as the route becomes more severely curved around Durham.

There are branches leading off the East Coast Main Line at:

- Northallerton: LN626 / LN627 via Yarm and Eaglescliffe with trains continuing to the Durham Coast or Middlesbrough
- Darlington South Junction: LN631 leading to Eaglescliffe via Teeside Airport
- Darlington North Junction: LN678 leading to Bishop Auckland
- Ferryhill South Junction: LN646 leading to Norton-on-Tees
- Trains also dive under the ECML between Low Fell Junction and King Edward Bridge South Junction to / from Norwood Junction before continuing to Carlisle

There are multiple flat junctions characterised by slow permissible speeds. This increases junction occupation for crossing trains and increases running time for trains emerging from a slow line due to them needing to accelerate from a low speed. This affects freight trains far more significantly than passenger trains due to their higher trailing load.

The full geography of this congested area is shown in figure 7:

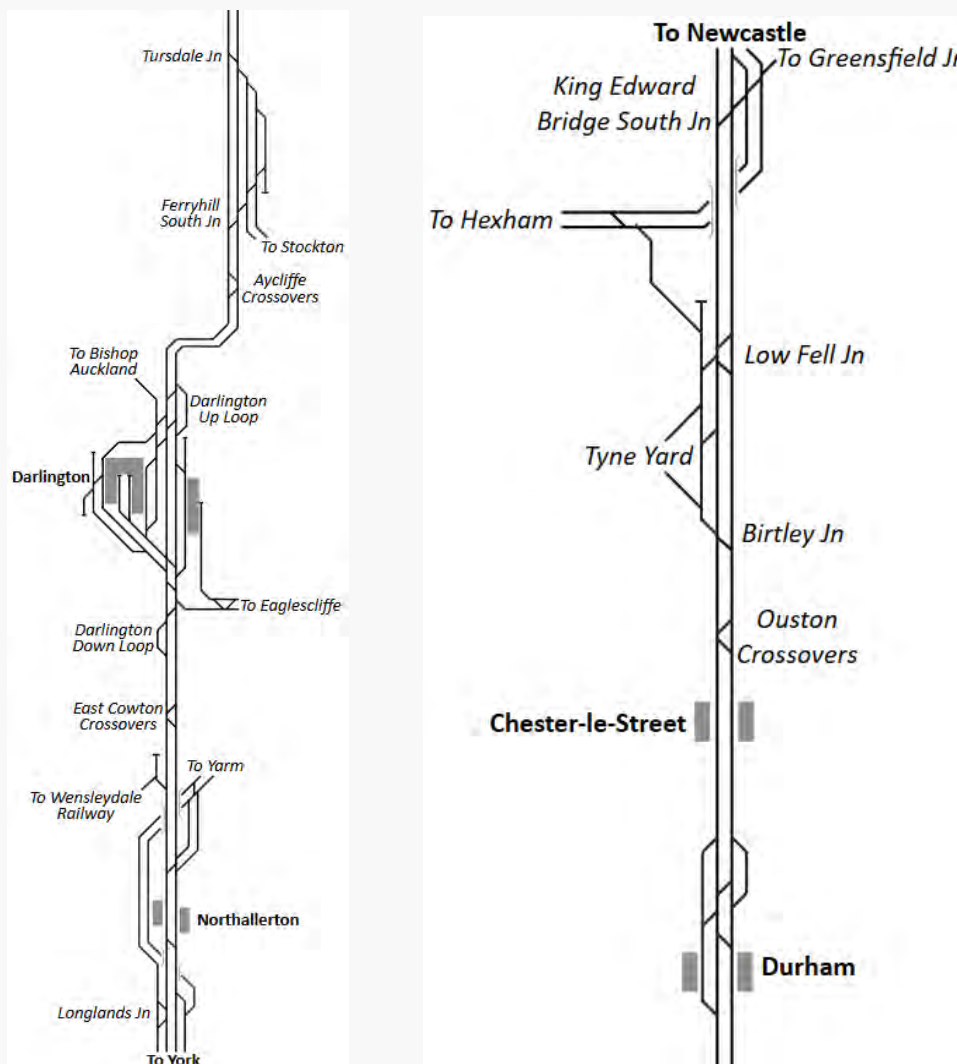


Figure 6: Simplified diagram showing the railway between Longlands Jn and King Edward Bridge South Jn.

D.01.01.01 Northallerton

At Northallerton, the platforms are located on the Up and Down Main lines, requiring passenger services towards Eaglescliffe calling at Northallerton to cross the ECML on the flat north of the station at Northallerton High Jn. This requires a gap in traffic of 5½ minutes on the Up Main. The Longlands Loop lines, providing grade separation of northbound services to Teesside from the ECML, do not have platforms.



D.01.01.02 Darlington

At Darlington, there is limited opportunity to loop long intermodal trains, the down loop south of the station being 672m long and the up loop only 570m. Darlington South Jn is a single lead junction, meaning that only one train in each direction can pass to or from Eaglescliffe.

D.01.01.03 Ferryhill South Jn – Tursdale Jn

Both Ferryhill South and Tursdale junctions are characterised by a low permissible speed (30mph). Furthermore, for down traffic requiring to be overtaken, the overtaken train must cross the Up Main to access the Down Slow at Ferryhill Jn (requiring 7 – 7½ minute gap in traffic on the Up Main) and then cross the Up Main again at Tursdale to return to the Down Main (requiring a 5-7 minute gap in Up Main traffic). Therefore, a single train requiring to cross to the Down Slow and back could utilise almost 25 % of the capacity of the Up Main in a given hour.

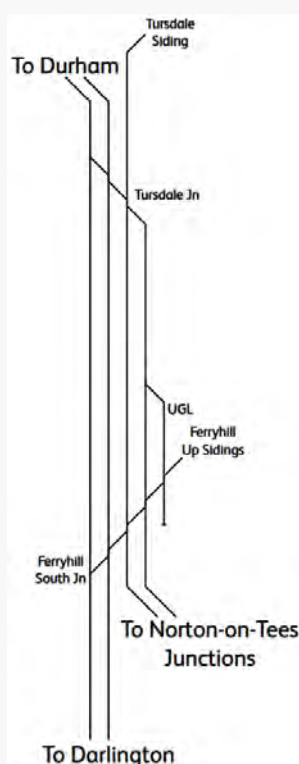


Figure 7: Simplified diagram showing the railway between Ferryhill South Jn – Tursdale Jn

D.01.01.04 Tursdale Jn – Birtley Jn

The loops/Down Slow at Durham are both around 500 metres which are not long enough to accommodate current or future aspirations for lengths for intermodal traffic (a 1400t train being approximately 660m long⁴). This is a fairly steeply graded section of line, particularly in the up

⁴ Source: Table 18 (5.4), Defining the case for optimising sectional running times for freight T1301 - Phase 1, March 2025, Rail Safety and Standards Board



direction which affects the performance of freight, meaning a larger gap is required between services.

D.01.01.05 Birtley Jn – Low Fell Jn

Birtley Jn is a single lead junction with a low permissible speed of 25mph. An up train emerging from the Tyne Yard Reversible onto the Up Main requires a gap of 7–7½ minutes between trains on the Down Main. Up trains requiring to be looped on the Tyne Yard Reversible need to cross the Down Main at Low Fell Jn. This is another low-speed junction (30mph) which requires a gap of 6⁵ minutes between trains at King Edward Bridge South Jn.

D.01.02 Operating procedures

York ROC (York North workstation) hands over responsibility for the East Coast Main Line to Tyneside ROC around two-thirds of a mile north of Northallerton. At Tyneside ROC, the affected route is controlled by the Darlington and Gateshead workstations. Track Circuit Block regulations apply throughout. A review of Local instructions and signal box special instructions did not find any contribution to congestion due to operating procedures.

D.01.03 Characteristics of the train services

There is mixed traffic on the corridor, with seven or eight passenger trains in each direction passing through or stopping at Northallerton each hour. This includes passenger services to Newcastle and Scotland from London, Liverpool, Reading and the South West.

While the Manchester Airport to Redcar Central services depart the ECML at Northallerton, other passenger services join the network at Darlington, including terminating and through trains from Saltburn (to and from Bishop Auckland).

The Atkins Réalis Marginal Freight Path Introductions analysis looked at opportunities for freight growth on the corridor. It focused on a Y-path for an 1,800-tonne Class 4 intermodal and a 2,400HAW-tonne Class 6 between Doncaster Yards and Tyne Yard in either direction.

It concluded that there was *“a high number of highly impactful flexes to accommodate the Class 4 path in most hours of the day. These flexes would either significantly increase journey times, cause a lot of re-platforming and/or further amount of unknown flexing to a host of services south of Doncaster, which would very likely not be workable within the current timetable structure”*.

While the Class 6 would result in fewer highly impactful flexes, *“these flexes would either significantly increase journey times, cause a lot of re-platforming and/or further amount of unknown flexing at stations like Edinburgh which would likely not be workable within the current timetable structure”*.

⁵ Required gap based on class 80x (electric) as traffic on the Down Main. Margin will vary according to the SRT between Birtley Jn and Low Fell Jn.



In the down direction, the passenger services between York and Newcastle are quite closely contained within a 35-minute period, providing an opportunity for a freight path between the flights of passenger trains. This “bunching” of the services occurs in part due to:

- The Cross Country service routed via Leeds taking longer than the service via Doncaster, reducing from an almost half-hourly interval at Sheffield to running 5 minutes apart north of York
- The half-hourly King’s Cross- Edinburgh departures having differing calling patterns, with the fast service catching up with the semi-fast service such that they are 10 minutes apart north of Darlington

There is limited capacity for any future freight or use of heavier timing loads within the structure of the timetable:

- In the Down direction, there is limited additional capacity for new freight paths from Longlands Jn to Birtley Jn via Darlington

In the Up direction, there is limited additional capacity available for freight particularly through the Darlington and York areas, particularly for Class 4 and Class 6 freight over 1,400 tonnes between Darlington and Northallerton.

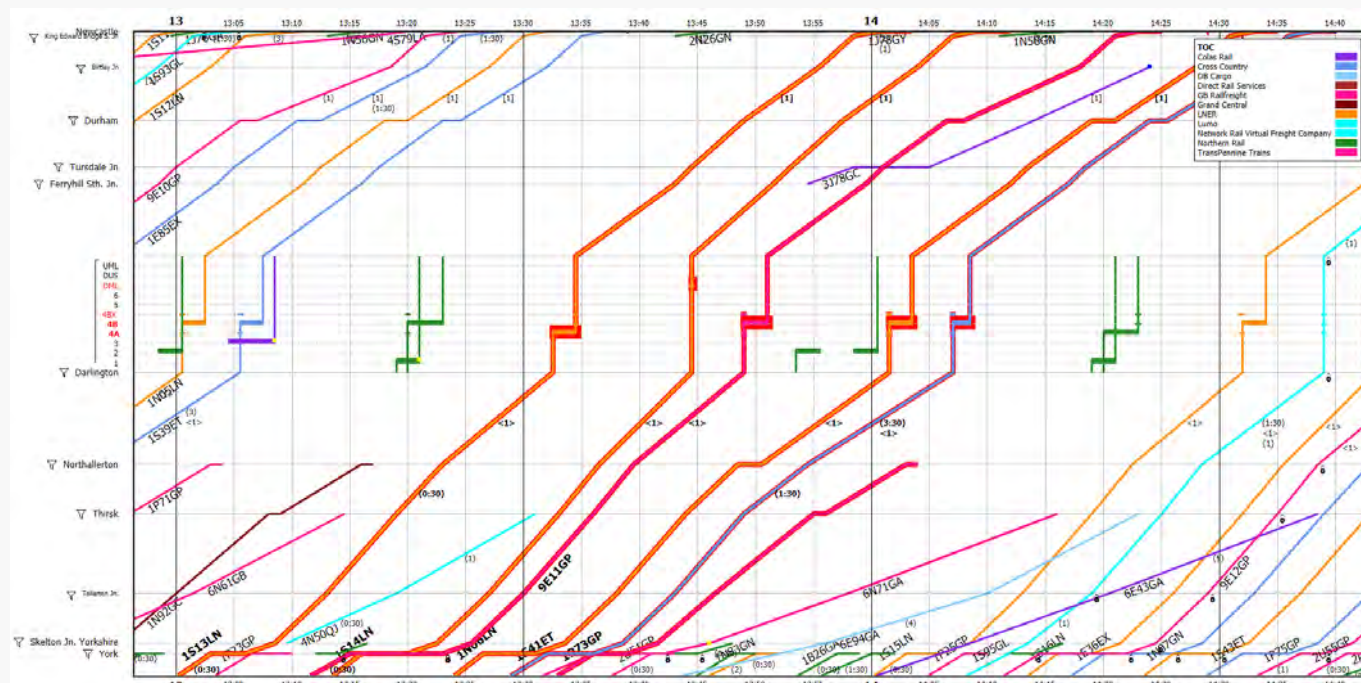


Figure 8: Graph showing down direction pattern of service in Dec '25 timetable

In the up direction, the spacing of passenger services is far more spread out, reducing the available windows for freight.

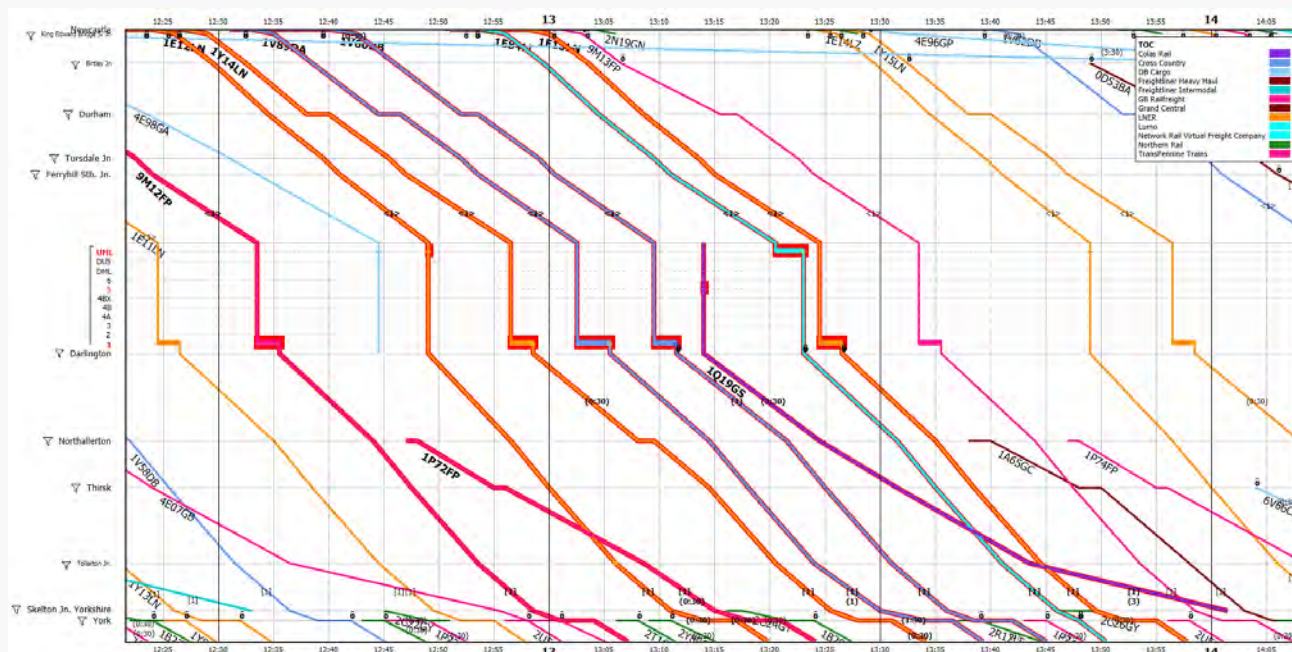


Figure 9: Graph showing up direction pattern of service in Dec '25 timetable

At Darlington, the hourly through Bishop Auckland – Saltburn service crosses the East Coast Mainline at Darlington South Jn. To fit between passing trains on the Up and Down Mains, a departure to Dinsdale requires a margin of 4-5 minutes on the Down Main and 5-6 minutes on the Up Main. An arrival from Dinsdale requires a margin of 7-8 minutes on the Down Main and 5-6 minutes on the Up Main.

The figures below illustrate hour to hour variation throughout the day at Northallerton Station, Platforms 1 and 2. Passenger services are shown in dark blue; freight services are shown in green. White spaces indicate periods when the line is not occupied; however, these do not necessarily reflect available capacity, as the graphs do not account for crossing traffic towards Yarm.

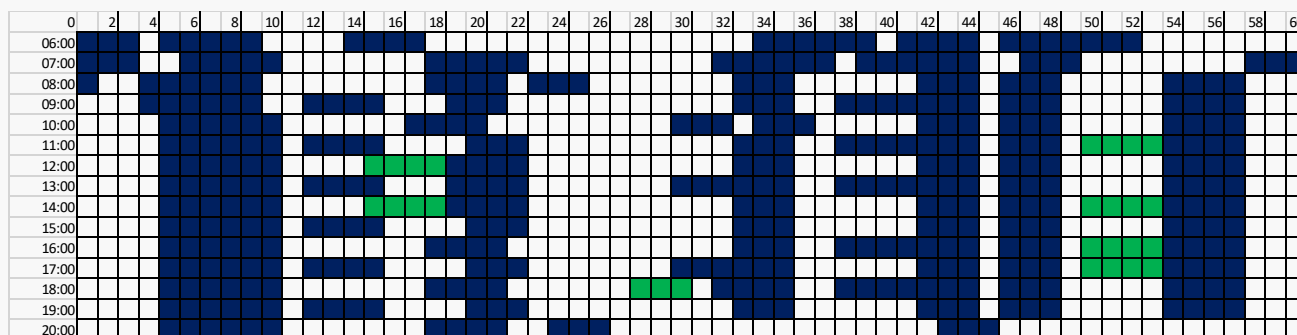


Figure 10. Pattern analysis at Northallerton Platform 1.

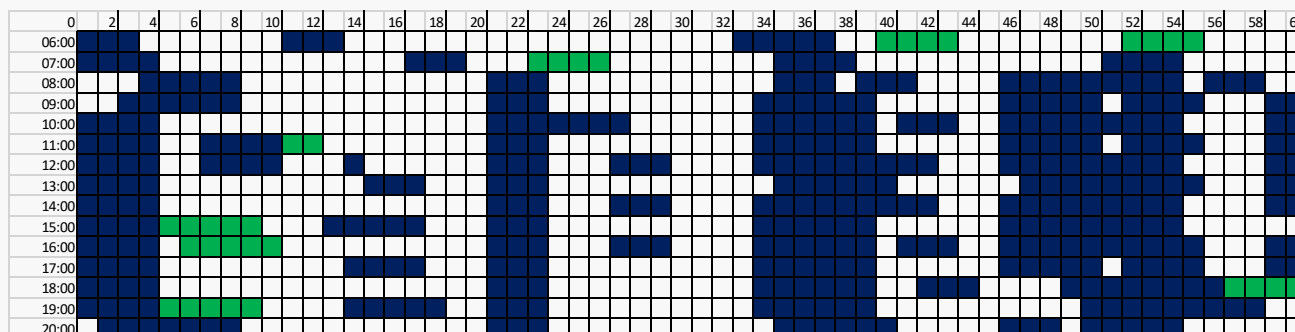


Figure 11. Pattern analysis at Northallerton Platform 2.

D.02 Measures to alleviate congestion

D.02.01 Re-routeing of services

There are two existing opportunities to divert traffic away from the congested area from Northallerton:

- Via Eaglescliffe and Stillington
- Via Eaglescliffe and Sunderland (Durham Coast)

Diversions via Stillington only remove services from part of the congested infrastructure, the traffic rejoining the ECML at Tursdale Jn. Neither of these diversionary routes are gauge cleared above W7 throughout making these unsuitable for intermodal traffic unless gauge clearance works are undertaken.

D.02.01.01 Diversion via Stillington

The Stillington route is not currently gauge-cleared for W10 and W12 freight meaning, as previously mentioned, that services with these gauge characteristics must run via the ECML. The maximum trailing load permitted in the down direction via Stillington is limited to 2405 tonnes for a class 60 hauled train due to the gradient between Norton South Jn and Norton West Jn precluding the heaviest traffic from using this diversionary route.

Analysis for the TransPennine Route Upgrade Concept Timetable 3⁶ work showed that diverting intermodal freight via the Stillington route would add 27 minutes to the journey time between York and Newcastle compared to the June 2024 timetable.

⁶TransPennine Route Upgrade Concept Timetable 3 is a concept end-state timetable for the infrastructure configuration state following completion of the TransPennine Route Upgrade programme (circa 2035).



D.02.01.02 Diversion via Sunderland (Durham Coast)

The railway between Sunderland and Pelaw Metro Jn is very constrained. Advanced work to examine the impact of introducing a 6 trains per hour frequency for the Tyne & Wear Metro services shows that only a single freight path is available per hour. There are existing traffic demands to/from Tyne Dock and the available capacity would not provide enough room to accommodate existing traffic and diversion of ECML freight. Due to the expected lack of spare capacity, further analysis to examine the feasibility of finding paths via this route was not conducted.

D.02.02 Re-timing of services

Analysis has identified that highly impactful flexes would be needed to accommodate both Class 4 and Class 6 paths in most hours of the day. While the number of flexes is relatively low, these would either significantly increase journey times, causing considerable re-platforming and/or further amount of unknown flexing at stations like Edinburgh which would likely not be workable within the current timetable structure.

Existing freight trains were retimed to use different combinations of loops and timings to fit between passenger services. Some freight services were diverted via Eaglescliffe, joining the ECML at Northallerton rather than running through Darlington. Gauge clearance and level crossing risks would need to be considered and checked around this rerouting. Teesside W10 services must run via Darlington and run round there due to a lack of gauge clearance on other routes.

While there are limited opportunities to retime passenger trains, flexes of between 30 seconds and two minutes would not create sufficient capacity to accommodate an additional service.

Previous work has also been undertaken to develop a timetable based on a revised TPE pattern. This saw the London King's Cross – Middlesbrough and Manchester Airport – Saltburn paths optimised with freight services timed around them, and the Bishop Auckland – Saltburn service retimed to accommodate the overall pattern. It was found there were significant opportunities to reduce pathing times in the London King's Cross – Middlesbrough and Manchester – Saltburn services.

D.02.03 Alterations to the speed of trains within existing infrastructure capabilities

Analysis has looked at whether flexing or even removing passenger services would make it possible to accommodate additional freight paths on this stretch. The results show it is possible but is highly impactful. For example:

The Southbound Class 6 can be looped at Ferryhill, like the Class 4. However, it arrives later due to the difference in speed and tonnage and departs at a different time. As a result:

- LNER's Edinburgh – London King's Cross train has six minutes of pathing added between Tursdale Junction and Tollerton Junction, none of which is recoverable by the time it reaches London.



- The LNER Newcastle – London King’s Cross service following this one has 1½ minutes’ pathing added before Tursdale Junction to maintain headway compliance. While this time is recoverable by Doncaster, the late arrival into Darlington causes knock-on delay to nine other services. This includes the Scotland – South West CrossCountry arriving at Leeds 5½ minutes later and the Sheffield – York via Pontefract Baghill service needing to be completely retimed.

D.02.04 Infrastructure improvements

The 2019 Continuous Modular Strategic Planning document, “What is required to make the rail network between Church Fenton and Newcastle ready for the 2030s and beyond” suggested numerous infrastructure interventions to accommodate the full passenger specification north of York that the East Coast ESG originally aimed to deliver. These interventions are shown in the diagram below:

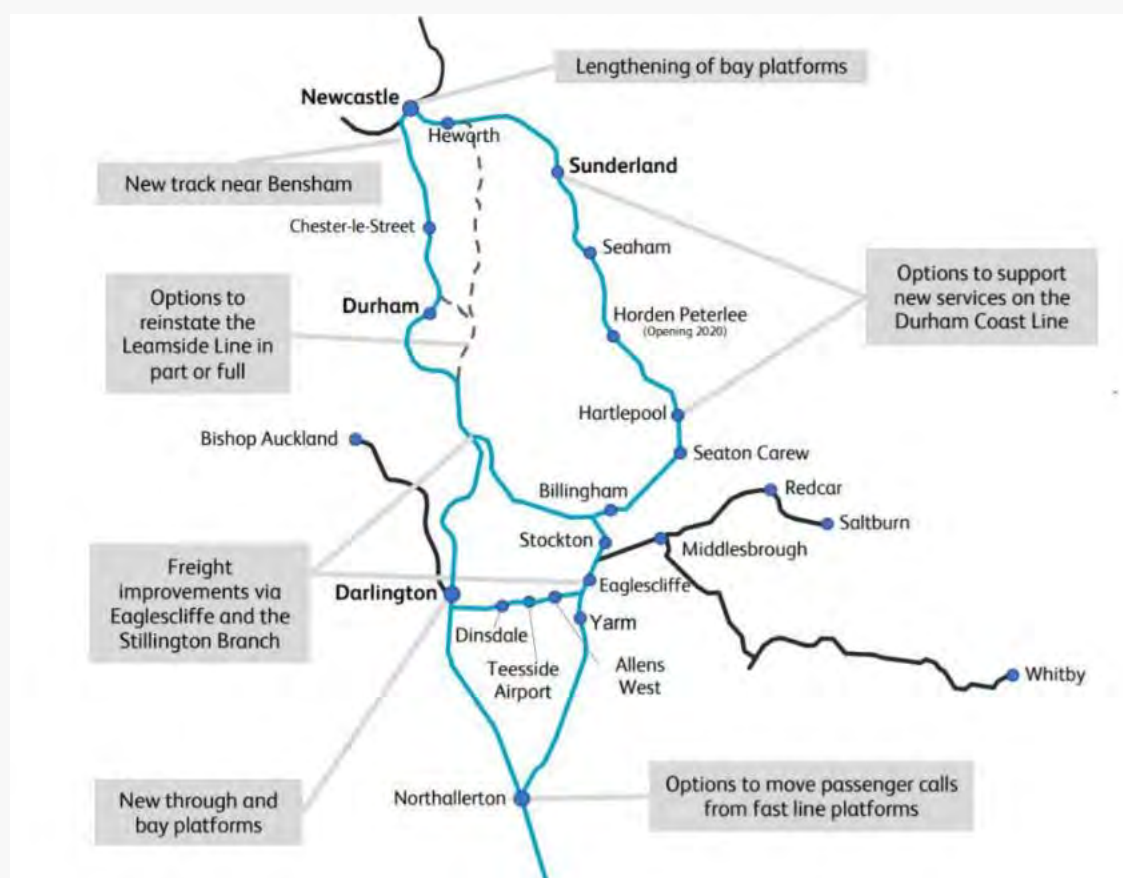


Figure 12: Diagram showing numerous infrastructure interventions suggested by The 2019 Continuous Modular Strategic Planning document.



This was backed up by the 2022 study, “IRP CA study for N2N 7th path”, looking at the interventions needed to fit a seventh hourly passenger service between Northallerton and Newcastle. It was concluded that all services could only be compliantly timetabled with:

- Two additional platforms at Darlington
- Freight routed off the ECML between Northallerton and Tursdale Junction, instead taking the Stillington route

It also found performance benefits arising from two further interventions:

- Moving the platforms to the Slow Lines at Northallerton, to allow through services to pass stoppers at the station
- Reinstating the Bensham Curve

The latter was also recommended in the 2024 IRP Forth Banks Line Optioneering Study as it would allow more optimal paths in and out of Tyne Yard for freight, allowing services to move between Newcastle and Tyne Yard via the Slow Lines, avoiding having to cross the flat junction at Low Fell Junction or disrupt traffic on the Fast Lines. This would benefit the timetabling of passenger services, with the study highlighting the difficulties of compliantly fitting in services on the long two-track sections south of Newcastle. It has been highlighted during development work on the Bensham Curve option that limitations on trailing loads imposed by the curvature and gradient could make this option commercially unviable for freight operators.

D.02.04.01 Extending Tyne Yard Reversible between Birtley Junction and Ouston Crossovers

Another potential intervention would be to extend the bidirectional Slow Line from Birtley Junction to Ouston Crossovers (see Figure). This would allow freight to be routed on and off the Main Lines further south of Newcastle, reducing occupancy of the Up or Down Main lines, potentially facilitating more or heavier paths.

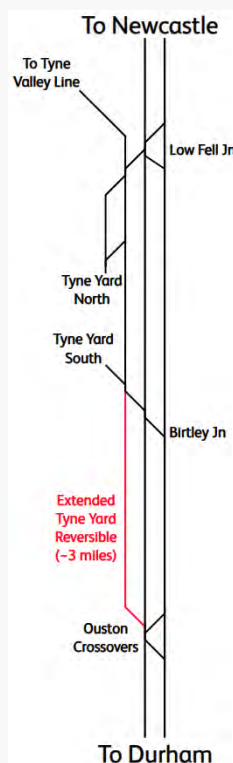


Figure 13: Extension of the Tyne Yard Reversible line to Ouston in the context of the Tyne Yard area.

This intervention does not improve capacity south of Ferryhill and would still require up trains to cross the Down Main, therefore further enhancements would be required to achieve an improvement to capacity for freight, such as diversion of traffic via Stillington.



D.02.04.02 Re-opening the Leamside route

Another option for taking freight off the Main Lines between Tursdale Junction and Newcastle would be to reinstate the Leamside Line. This route connected Tursdale Jn on the ECML with Pelaw Jn on the Durham coast route.



Figure 14: Leamside route highlighted in red

Assuming current junction margins at Pelaw Jn for freight to join / depart the Leamside Line, the above would create plenty of capacity for additional or rerouted freight. However, with freight routed south of Newcastle, these services would also have to use the single leads at Park Lane Jn and King Edward Bridge East Jn. Junction margins at the former are up to five minutes, with a blanket three-minute margin at King Edward Bridge East Junction.

Due to the low traffic level between Pelaw Jn and Park Lane Jn, there is likely sufficient capacity for additional freight traffic. However, there are a series of challenges in a re-opened Leamside route being a viable alternative to the ECML:

- Junction capacity Gateshead area is very limited with single lead junctions at Park Lane Jn and King Edward Bridge East/North Jns.
- Route clearance tables in NESA show that the line from Park Lane Junction to King Edward Bridge South Junction is not gauge cleared for W10a and W12 freight.
- The cost of re-instatement is likely to be very high
- Journey time penalty (refer to IRP studies)



- There is a stakeholder aspiration to use part of the Leamside line for metro services to Washington. This scheme is being developed mindful of the potential requirement to reopen the line for freight services diverted from the ECML, however the capacity that could be provided is currently unknown.
- Due to the orientation of the junctions, there is limited benefit to traffic to/from Tyne Dock/Jarrow, requiring run-rounds at Pelaw, Gateshead or Tyne Yard.

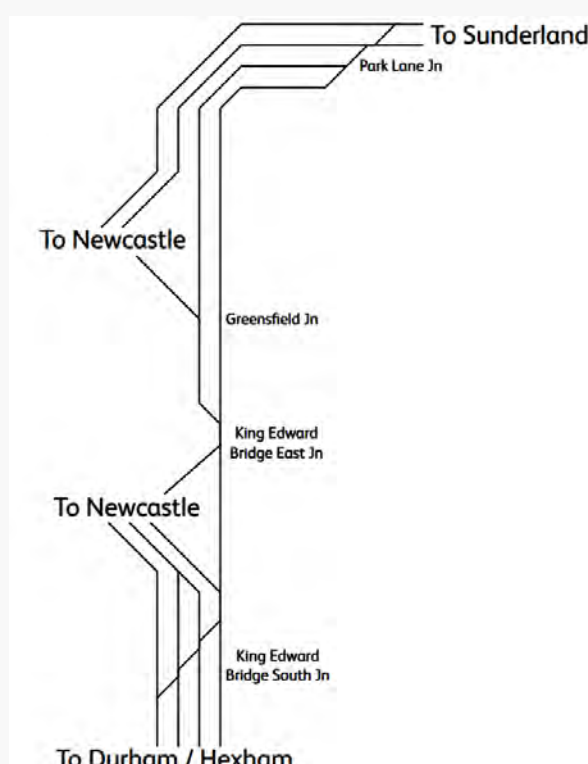


Figure 15: Simplified diagram of the Park Lane Junction and King Edward Bridge East Junction

D.02.04.03 Improvements to permitted speed at Tursdale Jn and Birtley Jn

Another potential intervention to improve timetabling would be to increase turnout speeds at Tursdale Junction. The Concept Timetable 3 (North of England) Technical Note (November 2024) recommended a faster turnout at Tursdale Junction, to help reduce junction margins there from four minutes to three minutes. It also concluded that extension of the Tyne Yard Reversible south to Ouston along with provision of high-speed crossovers could further increase capacity to allow the ITSS to be fully accommodated.



A RailSys model was constructed to test a linespeed improvement to the crossovers that increased speeds to the speed on the diverging line i.e. 60mph at Tursdale Jn and 40mph at Birtley Jn with flashing yellows. The journey time savings are summarised below.

Table 3: Summary of timing improvements from increasing speed at Tursdale/Birtley Jn

	Journey time improvement					
	Tursdale Jn only		Birtley Jn only		Tursdale and Birtley Jns	
	Up	Down	Up	Down	Up	Down
60-66S24	0.5	0	0	0.5	0.5	0.5
75C66S18	0.5	0.5	0	0.5	0.5	1.0

As can be seen from the table above, the journey time savings are not significant so are unable to unlock an additional freight path although may permit existing freight capacity to be maintained with an increase in passenger service quantum as indicated by the CTT3 report or allow an increase in tonnage for existing paths.

D.02.04.01 Northallerton to Newcastle Enhancement

Early-stage development work has been undertaken on this option which combines many of the interventions explored above. This has not yet come to a conclusive understanding of the acceptability of the trade-offs in benefits and dis-benefits between operators. Following the comprehensive spending review of 2025, development work on this project has ceased.

D.02.05 Planning rule accuracy and completeness

During development of the East Coast ESG (Dec '25) timetable, some rules around Northallerton were reviewed and found possible to be lowered. This indicated that some of the other rules around Northallerton could also be reduced.

A simulation looking at the most common junction margins for Northallerton showed that some may be a bit high if the first train is departing to Eaglescliffe but also indicated some potential deficiencies for movements to/from Eaglescliffe following a movement on the Up Main from Darlington. The table below shows the movements, existing junction margin in minutes and the rounded time generated by RailSys simulation:

Table 4: Comparison of Northallerton junction margins.

First movement	Second movement	Margin	RailSys
Depart to Eaglescliffe	Pass Down Main	4½	3½
Depart to Eaglescliffe	Pass Up Main	4½	4
Depart to Eaglescliffe	Arrive Up Main	4	4
Arrive / pass Up Main	Depart to Eaglescliffe	1	1
Arrive / pass Up Main	Pass to Eaglescliffe	3	3½



Pass Up Main	Pass / arrive from Eaglescliffe	3	3½
Depart Up Main	Arrive from Eaglescliffe	4	4

The Timetable Planning Rules around Darlington have already been reviewed recently (December 2025 TPR) in connection with the enhancement works so have not been reviewed as part of this study. Headways were reviewed during development of the East Coast Mainline timetable (December 2025) where the 4-minute standard headway was reduced to 3 for following non-stopping long distance services, the 4-minute headway remaining following a stopping passenger or freight train.

D.02.06 Operational changes

D.02.06.01 Electric freight

Previous work by Network Rail's Advanced Timetable Team looked at electric freight timings between Northallerton and Newcastle via Tyne Yard. This was using existing infrastructure, with the timings based on Class 99s with different training loads. There is the potential for stabling of electrically hauled freight services in Tyne Yard which could be used for traction changeover.

Table 5: Summary of journey time improvements for electric vs diesel traction (down direction)

Train class	Traction type	power	Trailing load/tonnes	Journey time (Northallerton to King Edward Bridge South Jn)/ minutes
4	Diesel		1600	50.5
4	Electric		1600	40.0
6	Diesel		2200	60.5
6	Electric		2200	50.0

Table 6: Summary of journey time improvements for electric vs diesel traction (Up direction)

Train class	Traction type	power	Trailing load/tonnes	Journey time (King Edward Bridge South Jn to Northallerton)/ minutes
4	Diesel		1600	54.5
4	Electric		1600	41.5
6	Diesel		2200	61.5
6	Electric		2200	50.0

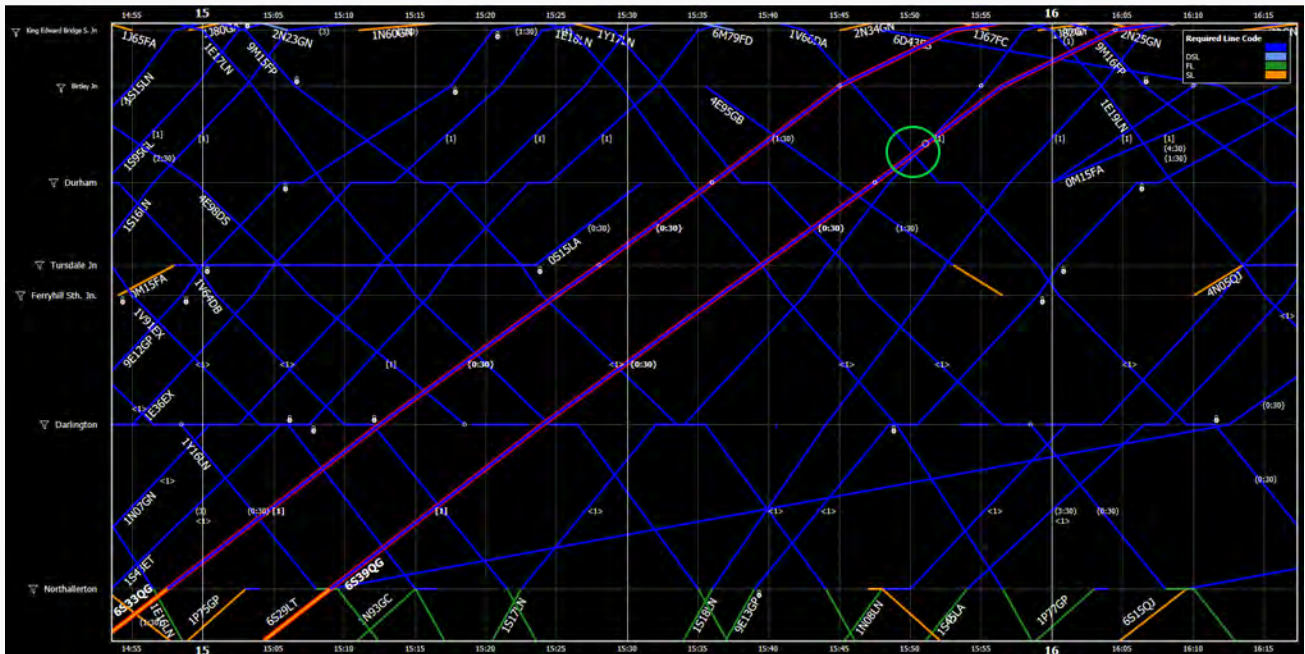


Figure 17: Graph showing class 6 electric freight paths in down direction

An alternative approach was tested, combining a freight path from Northallerton to Kings Edward Bridge South Junction with another entering the section at Ferryhill South Junction towards Tyne Yard. However, this configuration also failed, as it resulted in multiple headway violations between the two freight paths and the following 1S17LN service.

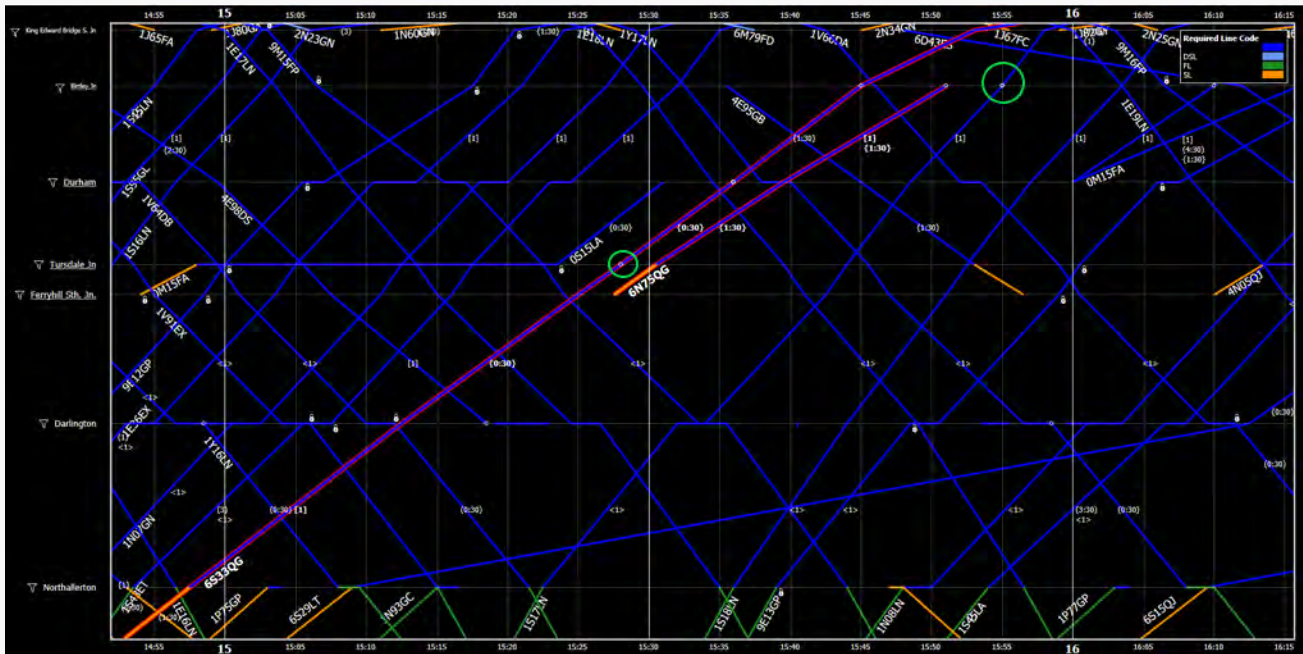


Figure 18: Graph showing class 6 electric freight paths in down direction (alternative approach)

Two completed tests in the Down direction confirmed that electric traction can support the addition of one Class 6 freight path from Northallerton, with a tonnage of up to 2200 tonnes.



In the Up direction, two to three class 4 electric hauled paths are available timed at 1600 tonnes, making use of the space available between passenger services. With diesel traction only a single path is available and with a lower tonnage.

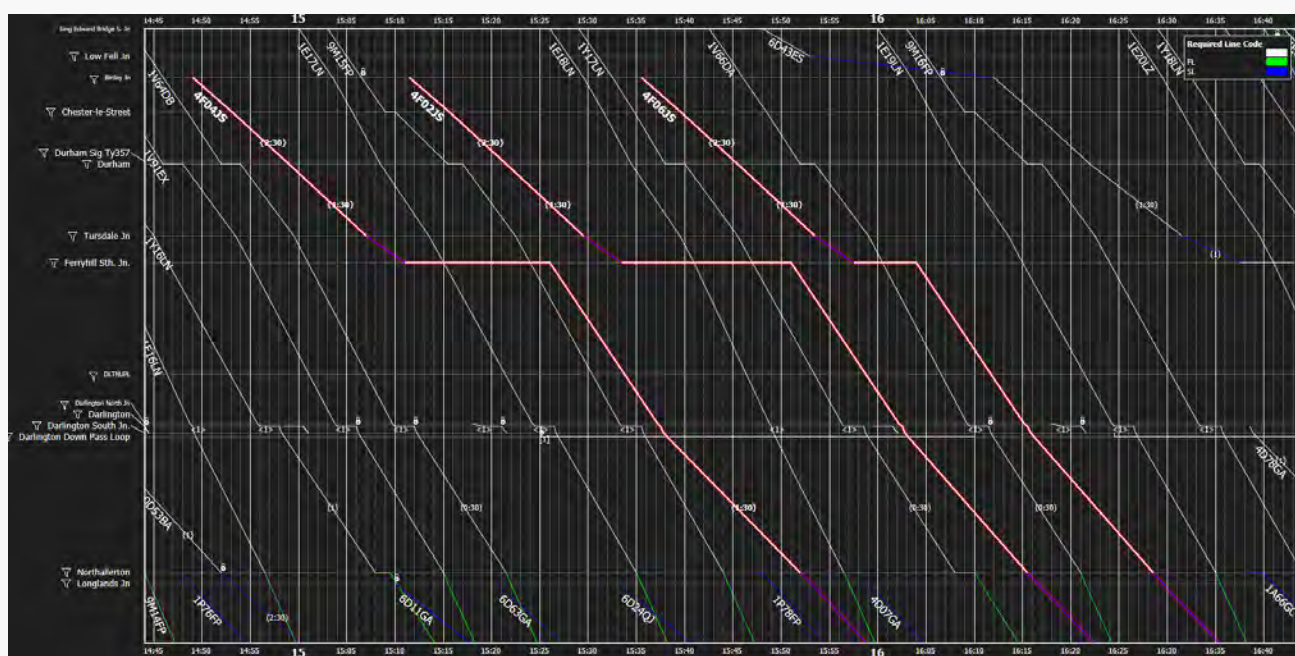


Figure 19: Class 4 electric freight paths in up direction

In the Up direction, the same gaps were tested to assess whether they could accommodate a Class 6 service of any tonnage. Due to a conflict with service 2D44 at Darlington, freight cannot pass through earlier than 16:05:30. However, this timing does not allow sufficient margin for a clear path to Northallerton, resulting in a violation with the following 1V66 service.

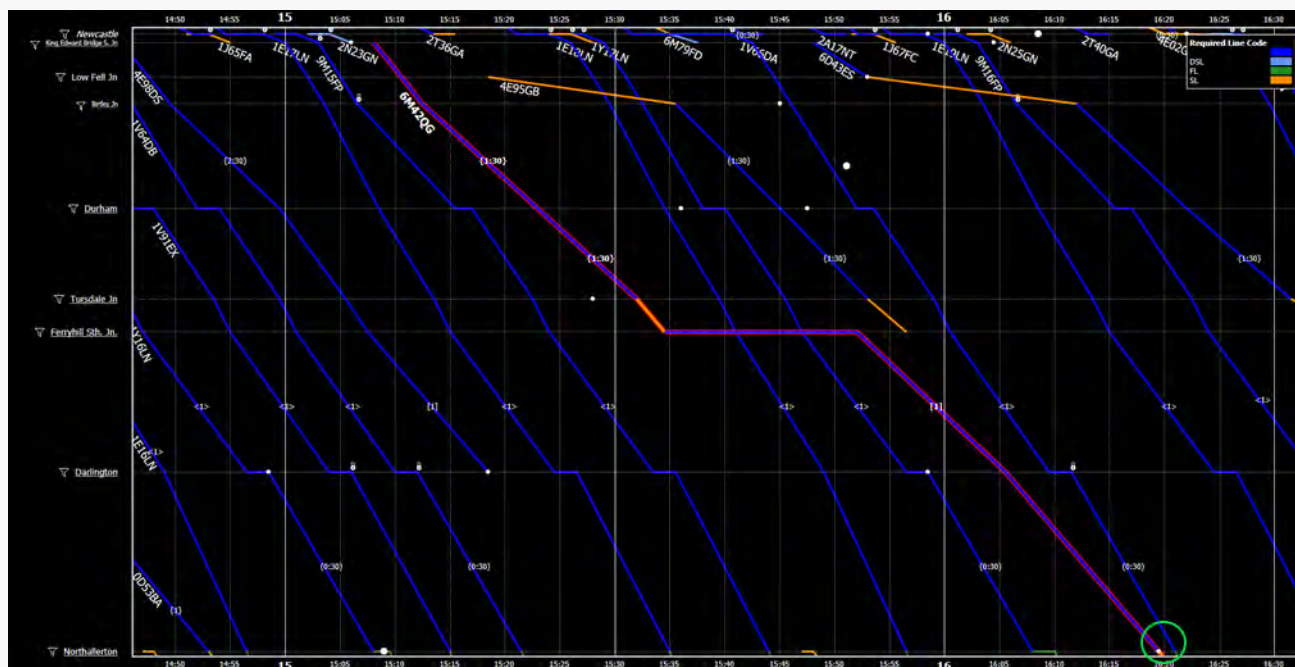


Figure 20: Electric freight class 6 paths in up direction

A longer dwell at Ferryhill was tested to see if it could resolve the issue, but passing through Darlington remained problematic. An earlier path, as shown in the graph below, was also tested but faced similar constraints—specifically, junction margins at Darlington and headway violations approaching Northallerton.

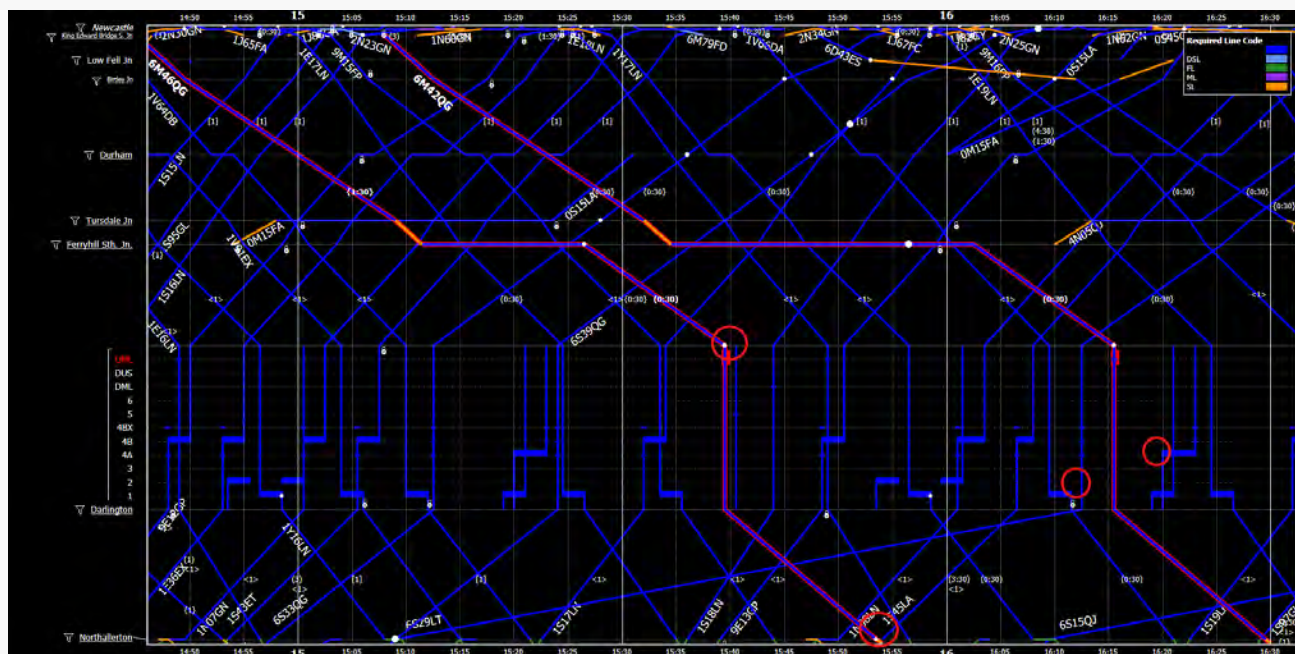


Figure 21: Electric freight class 6 up direction paths (alternative approach)

Overall, the benefits of introducing electric Class 6 services in the Up direction are less clear when considered within a fixed timetable structure. This is primarily due to the longer run times of Class 6 services, which do not vary significantly with tonnage, and constraints at Darlington.

If regular electrically hauled freight is to operate on the ECML, the available power capacity would need to be assessed, and it is likely that traction power supply upgrades would be required.

D.02.07 Reduction or combination of services

A viable alternative to infrastructure or capacity-allocation based interventions is to consider the train service specification for the congested line of route to determine if there are any options for amending the specification to reduce congestion.

It is acknowledged that the specification of the Dec-25 timetable differs from the strategic objective pursued previously, and temporarily enacted in the May-18 timetable, of implementing a 2tph service between Manchester and Newcastle via the TransPennine Route. Capacity required for this option on the section of line between York and Newcastle has been used by the ESG to support an enhanced London to Newcastle service as per the agreed industry specification.

North of York, many of the LDHS services provide a very similar offering between York and Newcastle with only slight differences in calling pattern. In the northbound direction this is exacerbated by the fact that most of these services run in a compressed period in each hour and



thus whilst in some cases 2tph are provided the reality is that the trains are closely spaced negating the benefits of a half hourly interval.

The options presented below look at each of the service groups on the route in isolation, this is due to the significant geographical extent of the congested section meaning that it is less easy to align the removal of a service group with addressing a specific element of the congestion. There is also the complication that due to the asymmetric nature of the timetable north of York the optimum option for removing or amending a service group in one direction is not necessarily the optimum option for the other.

Table 7: Comparison of options for service reduction.

Service	Freq.	Alternative	High level Impact Assessment
London King's Cross – Edinburgh/ (Aberdeen/ Inverness)	1tph	Removal of service from timetable	- Increased journey times and crowding on other services - Loss of direct London to Scottish Highlands connectivity - Significant impact on industry revenues and financial sustainability - Significant negative stakeholder and passenger reaction
London King's Cross – Edinburgh	1tph	Removal of service from timetable	- Significant impact on industry revenues and financial sustainability - Reduction of service quantum will increase crowding on other services. - Significant negative stakeholder and passenger reaction
London King's Cross – Newcastle	1tph	Terminate at York	- Calls could be redistributed into other services, increasing journey times and crowding. - Significant impact on industry revenues and financial sustainability - Significant negative stakeholder and passenger reaction - Impact on platform capacity at York.
London King's Cross – Newcastle/ Edinburgh/ Glasgow	6tpd	Removal of service from timetable	- Increased crowding on other trains - Loss of rail custom attracted by low fares - Negative stakeholder and passenger reaction
Liverpool – Newcastle	1tph	Terminate at Leeds or York	- Would remove connectivity between Newcastle and Northwest undermining a foundational element of the



			improvements to connectivity across the North. - Significant negative stakeholder and passenger reaction - Impact on platform capacity at York or Leeds
Plymouth – Edinburgh	1tph	Terminate at Leeds or York.	- Reduction in capacity and connectivity between Northeast and Midlands/South West - Significant negative stakeholder and passenger reaction - Impact on platform capacity at York or Leeds
Reading – Newcastle	1tph	Terminate at York	- Reduction in capacity and direct connectivity between Northeast and Midlands/South of England (avoiding London) - Significant negative stakeholder and passenger reaction - Impact on platform capacity at York.
Bishop Auckland – Saltburn	1tph	Split service at Darlington, removing conflicting moves at Darlington South Jn	- Loss of direct connectivity between Bishop Auckland and Middlesbrough - Negative stakeholder and passenger reaction

This is a portion of the ECML that is subject to ongoing competitive application for capacity and will play a key role in improving connectivity across the north, firstly as an output of the TRU programme and subsequently the NPR programme.

Taken in isolation none of the above options would represent an appropriate trade-off between current use of capacity and the provision of future capacity, however further options for easing congestion could potentially be found by way of a holistic review of the service specification. This could consider changes such as trading train length for frequency to maintain connectivity and reduce capacity utilisation or more efficiently use capacity. It is possible that an option which concentrates connectivity between Birmingham and Northeast/Scotland with into a single longer train per hour via Doncaster could allow for a second Manchester to Newcastle service to operate maintaining the Leeds to Northeast (and Edinburgh) connectivity. This is a long-held aspiration of stakeholders that has not been achievable to date and is assumed to require substantial infrastructure enhancement to implement within the current timetable structure and specification.

Using existing strategic planning forums, the industry and funders could work jointly to investigate the potential for mutually acceptable service specification change to alleviate congestion on this



System Operator



section of the ECML. In the absence of a funded intervention to alleviate congestion such an investigation would need to consider how to maximise the passenger service with a 6tph service.



Part E: Doncaster Marshgate Jn to Copley Hill West Jn

Key Points

- This is a heavily used mixed traffic section of line, trains operate with a very wide range of service speeds on the two routes (which converge half way along its length); this reduces the effective capacity of the section.
- The route has been provided with W10 gauge clearance as part of the Strategic Freight Network, there are no gauge cleared alternative routes to the terminals served.
- Some potential options exist for interventions to allow W10 freight services to be diverted from this route
- The grade separation of South Kirkby Jn could alleviate some congestion on this route by removing the conflict between southbound services towards Sheffield and Northbound services towards Wakefield
- Whilst the operation of electrically hauled freight trains (subject to sufficient traction power) is beneficial in terms of running time, the structure of the Dec-25 timetable does not easily allow these benefits to be converted into additional paths.
- There is potential that a revision to the passenger service specification on this section of line would alleviate congestion.

E.01 Reasons for congestion

The East Coast Mainline between Doncaster Marshgate Jn and Copley Hill West Jn has been declared congested due to freight paths (exhibiting certain common characteristics) being unable to be accommodated, during passenger service operating hours of 06:00 - 21:00, within the structure of the Dec-25 timetable. The significant constraints being:

- In the down direction there are no new freight paths available between Doncaster, Hare Park Jn and Calder Bridge Jn between 06:00 and 19:30 as all potential slots are taken by existing WTT freight service
- In the up direction there is limited additional capacity available for freight between 06:00 and 21:00 SX. This is due to there only being two freight slots per hour available and most of these are already occupied by freight services. The structure of the Dec-25 timetable does not support there being more than two of these paths.

It should be noted that development work for Dec-25 timetables initially sought to integrate two new services specified for this section of the line, these being the LNER 0.5tph London to Leeds service and the Northern 1tph Sheffield to Leeds fast service. Whilst the former was withdrawn from the specification (see section F) and is therefore not a cause of congestion, the latter was



able to be included within the timetable. The Dec-25 timetable therefore introduces an additional hourly service.

The following sections consider the factors which combine to cause the congestion in turn.

E.01.01 Characteristics of the infrastructure

- This section is electrified at 25kV AC.
- It is a two-track railway, with loops provided at Hemsworth between South Kirkby Jn and Hare Park Jn; the Down Loop is 845m and the Up Loop is 615m.
- There is one principal station on the route (Wakefield Westgate) at which all trains call, all other stations provide local connectivity and are served by stopping services
- All stations on the section of line have platforms on the main running lines meaning that there is no opportunity for trains of differing speeds/calling pattern to overtake one another (Wakefield Westgate has a bypass line in the down direction only negating its usefulness)
- Line speeds range from a maximum of 100 mph from Bentley to Sandal and Agbrigg, after which it varies between 35 mph and 90 mph until Copley Hill West Junction, with the lowest speed of 35 mph through Wakefield Westgate station.
- The section of line has numerous flat junctions with reduced operating speeds such as Carcroft Junction at 25 mph, Hare Park Junction at 20 mph and Wakefield South Jn at 15mph. South Kirkby Junction, the principal junction on the route has a line speed of 50 mph.
- The line has multiple-aspect signalling, with four-aspect signals on the main lines.
- The route between Doncaster and Hare Park Jn is gauge cleared at W10, however there is no alternative gauge cleared route allowing W10 trains to access the container terminals in the Leeds and Wakefield areas from either the ECML or the Sheffield route.

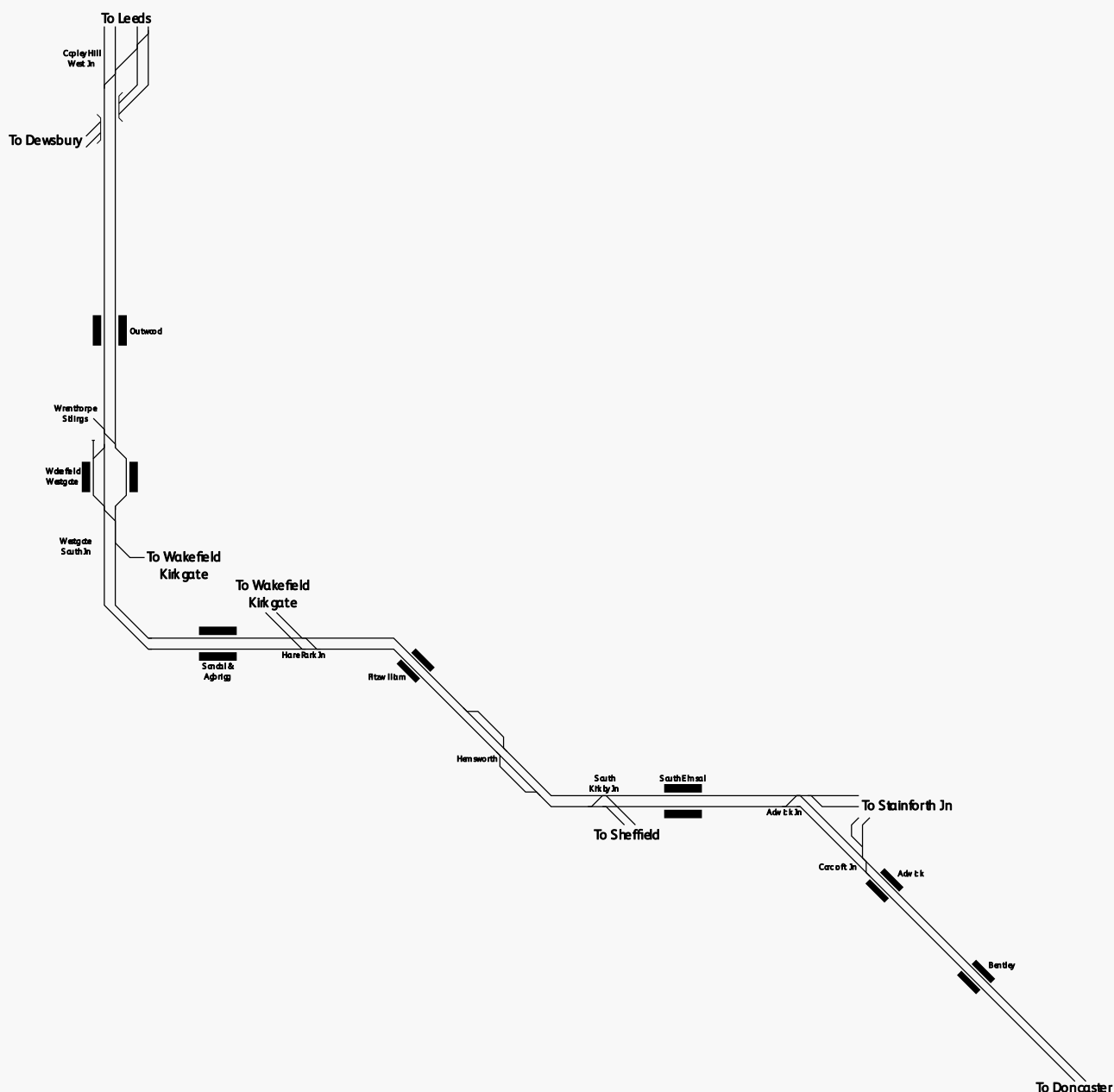


Figure 22: Track layout diagram showing the railway between Doncaster Marshgate Jn and Copley Hill West Jn.

E.01.02 Operating procedures

Trains moving through the section are controlled by York ROC (Ardsley workstation) and Doncaster PSB Panel 4. Track Circuit Block regulations apply throughout. The Special Instructions to the signallers at Doncaster PSB and York ROC have been reviewed and nothing notable was identified that could have an impact on capacity in the area of concern.



E.01.03 Characteristics of the train services

The train services operating on this route are a mix of passenger and freight. The route contains a significant convergence at South Kirby Jn where passenger services from the midlands and Sheffield towards Leeds join and must integrate with services operating from London and Doncaster to Leeds. A less busy convergence occurs at Wakefield Westgate where services from Wakefield Kirkgate to Leeds enter the route. Freight services operate on these two arteries but only as far as Hare Park Jn where they join and leave the route to access the main terminals at Wakefield Europort, Leeds Stourton and to head west towards Huddersfield.

The busiest portion of this route is therefore the ~6 miles between South Kirkby Junction and Hare Park Junction and at both ends of this section trains leaving the route must cross the opposite running line in a conflicting move to access the junctions.

Passenger services at a standard hour include:

On the Doncaster to Leeds axis;

- 2 tph LNER London Kings Cross to Leeds with extensions to Bradford and Harrogate
- 1 tph Northern Doncaster – Leeds stopping service.
- 1 tph Northern Sheffield – Adwick with an hourly ECS move to/from Skellow Jn
- 1 tph Northern Knottingley – Leeds entering the section from Wakefield.

On the Sheffield to Leeds axis;

- 1 tph Cross Country service from the South-West to Newcastle/Scotland
- 1 tph Northern Sheffield – Leeds stopping service
- 1 tph Northern Sheffield – Leeds fast service

The Northern operated Leeds to Sheffield service shown above is a new addition to the route within the Dec-25 timetable.

Freight services and passenger empty stock moves operating through the section traverse Hare Park Jn to use the route to Crofton. Several freight paths operate through or from Doncaster, with the rest joining the section from South Kirkby Jn. The freight services consist of a mix of Class 6 and Class 4 Intermodal, with varying tonnage up to 2200t for Class 6 and up to 1800t for Class 4.

E.02 Measures to alleviate congestion

E.02.01 Re-routing of services

An assessment was conducted to determine the feasibility of re-routing services to/from Doncaster and Humberside to Wakefield via Knottingley using the route through Stainforth and the Shaftholme Flyover. As indicated in the route clearance tables, this route is not W10 cleared,



therefore, Class 4 intermodal containers were excluded from this test. For Class 6 freight, it was possible to re-route services entering from Adwick Junction (originating from Scunthorpe) in both directions. New train paths were validated, and the available capacity on the Knottingley line was proved to be sufficient to accommodate at least 1tph.

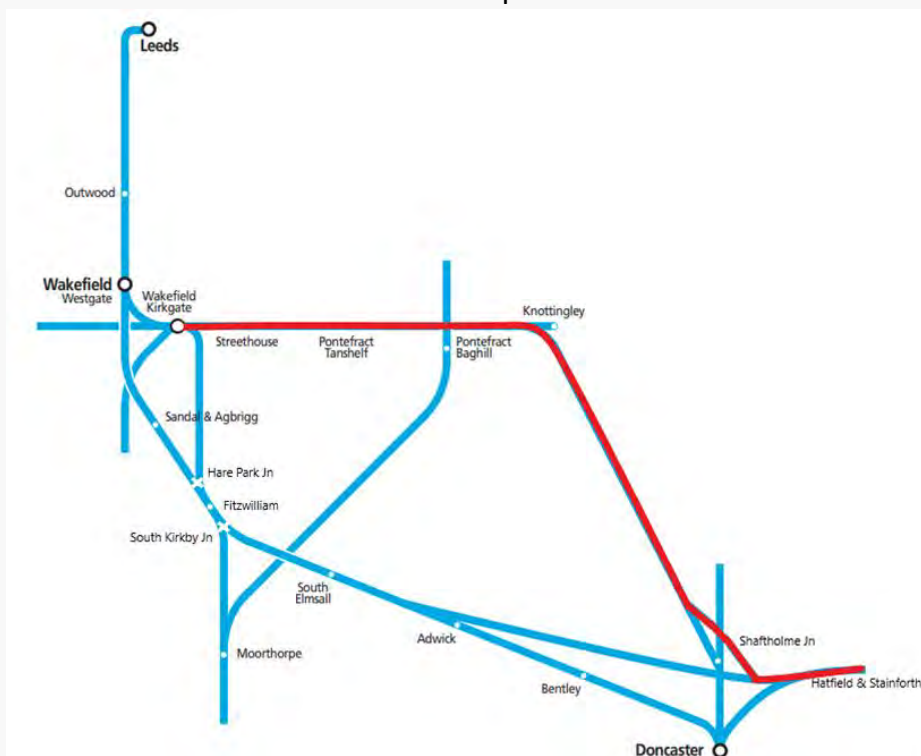


Figure 23: Simplified diagram showing the re-routing opportunity via Knottingley.

The re-routing did not result in increased journey times, and the timings at the boundary points aligned with those of the original paths. This option was tested using one freight service in each direction. High level assessment was done to understand capacity level via Knottingley and number of freight services using the Adwick Jn to Hare Park Jn route. There are 6 freight services a day currently using the route and there is sufficient capacity via Knottingley to accommodate them.. Being non-intermodal traffic, no gauge clearance works would be required to enable this diversion.

E.02.02 Re-timing of services

A greater number of Class 6 services enter the congested section from Doncaster via Marshgate Junction. To enable similar re-routing, these services would need to operate via the Doncaster–Shaftholme Junction corridor. Due to the crossing moves required for this diversion, the proposal has been considered in conjunction with retiming. It is anticipated that some level of path flexing will be necessary to accommodate the diversion.



The existing structure of services between Leeds and Doncaster already facilitates efficient flighting of passenger services. As altering the order of these services is not expected to unlock additional capacity for freight, retiming alone has not been considered a viable measure.



Figure 24: Simplified diagram showing the re-routing opportunity via Shaftholme Junction and Knottingley

The test involved re-routing freight service 6M59 (600 tonnes). To deconflict the new path, it was necessary to swap it with the slower 6D40 service. However, these changes did not introduce any new conflicts or increase journey times for either service. Based on a high-level review, the alternative route appears to have the capacity to accommodate at least two additional paths per hour in Down direction; paths of a heavier trailing load may necessitate further flexibility in scheduling. It was also possible to accommodate a Class 6, 600-tonne service via the alternative route connecting through Shaftholme Junction in the Up direction.

It is important to note that the route north of Shaftholme Jn is currently cleared only to W7 gauge. As traffic from Doncaster includes a mix of gauge characteristics, gauge clearance to W10 or W12 would be required if container traffic were to be diverted.

The TPRs for Shaftholme Junction have been reviewed, and some current values have proven insufficient. This must be taken into account if additional freight traffic is to be planned through



this junction. For the completed tests, more restrictive TPR values were applied, and the resulting paths were compliant.

E.02.03 Alterations to the speed of trains within existing infrastructure capabilities

This measure can explore alteration to the speed of the trains by changing lines, adjusting dwell times, or revising pathing allowances. Given that the route is predominantly double-track—except for the Hemsworth loops—there is limited opportunity for trains to be passed.

Passenger services do not have excessive pathing allowances that could be removed to release capacity. Freight services, on the other hand, often include extended stops at Hemsworth loop. While removing these stops could theoretically reduce journey times and release capacity, this is not feasible without infrastructure enhancements. The stops are strategically planned around passenger services to ensure compliant paths over South Kirkby or Hare Park Junctions. Removing station calls from passenger services, as a means of increasing a services average speed, may be considered but must be weighed against the potential negative impact on connectivity. For instance, in the Up direction, there is an opportunity to introduce an additional freight path between Hare Park Junction and Doncaster by removing the Fitzwilliam stop from the Leeds–Doncaster 2BXX service (this would have a consequential impact on connectivity between Fitzwilliam and Doncaster which would need to be assessed). Eliminating this call brings the Leeds–Doncaster service earlier by a few minutes, creating sufficient space to accommodate a freight path ahead of the LNER Leeds–London Kings Cross service. There is a consideration of potential service alterations in section E.02.07 that may release capacity on this section.

E.02.04 Infrastructure improvements

E.02.04.01 Chord between Pontefract Baghill and Pontefract Monkhill to divert freight from Moorthorpe

This proposal explores rerouting of freight traffic from Moorthorpe via Pontefract Baghill and towards Crofton East Junction; this would require a new single-line connection between Pontefract Baghill and Pontefract Monkhill broadly on the alignment of the previously closed curve.

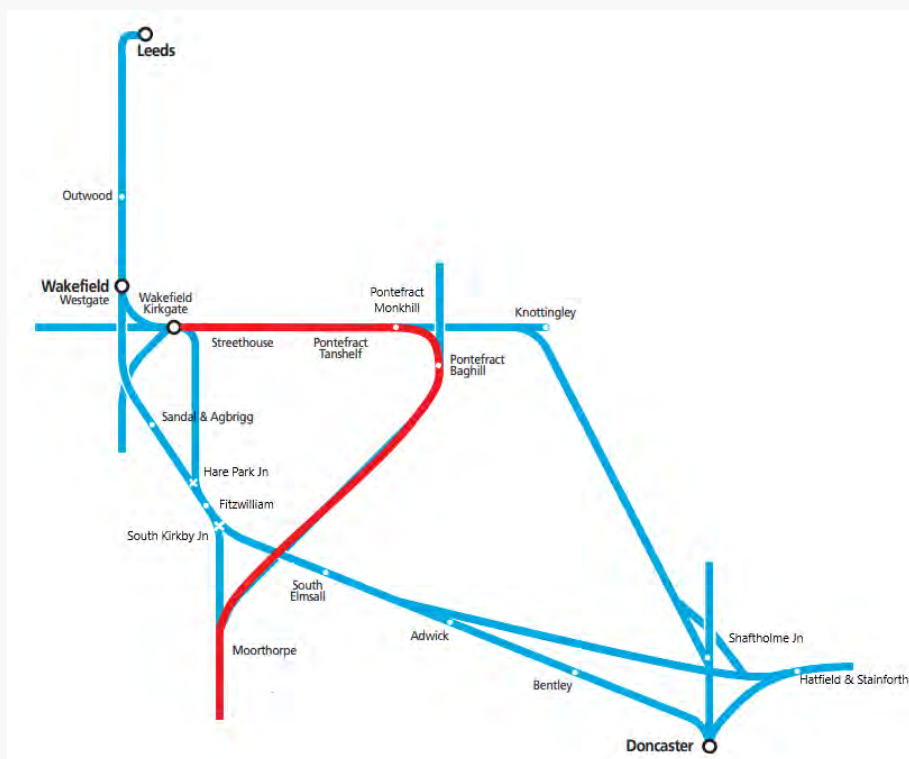


Figure 25: Simplified diagram showing the re-routing opportunity via reinstated chord between Pontefract Baghill and Pontefract Monkhill.

A successful test was conducted for freight service 6E29DA (Bradwell – Dewsbury, 2200 tonne HAW) which demonstrated a journey time saving of over an hour by avoiding a scheduled stop at the Hemsworth loop. A similar test in the opposite direction for freight service 4099CA (Leeds – Southampton, 1800 tonne CON) was also successful, confirming the feasibility of this route in both directions.

The SRTs for the diversion were estimated using distance and speed calculations. While these estimates provide a useful initial indication, they would need to be validated through RailSys modelling to confirm their accuracy and operational viability.

The feasibility of this diversion is subject to several key considerations:

- The route relies on the provision of a connecting line between Pontefract Monkhill and Baghill; whilst this curve can be created in concept, no work has been done to understand it's feasibility in respect of curvature, gradient, trailing loads and gauge.
- Gauge clearance works would be required on the existing network if the route were to be used for container traffic as it is not currently cleared for such movements.
- From a timetabling perspective, achieving a compliant path via Pontefract may be challenging for services without existing pathing allowance, as the diversion is longer than using the direct route between Moorthorpe and Hare Park Jn. However, in the tested cases,



pathing allowances were present, and by reducing or eliminating them, services were able to return to their current or even earlier timings from Crofton.

A high-level capacity assessment was also undertaken to evaluate the potential of the Pontefract route to absorb existing freight traffic. Currently, an average of one freight train per hour uses the route from Moorthorpe to Hare Park Junction. If the necessary infrastructure enhancements were to be delivered, it is reasonable to assume that all existing freight traffic on this corridor could be diverted via Pontefract.

E.02.04.02 Grade separating South Kirkby Jn

The benefit of this intervention is to remove the crossing conflict between southbound trains routed towards Sheffield via Moorthorpe and northbound services running from Doncaster towards Hare Park Jn. This has benefit both for the provision of capacity for freight services on this section and creating additional freedom for the spacing of passenger services between Leeds and Sheffield which may well assist capacity allocation at both locations.

Grade separating South Kirkby Jn in the tested hour enables an additional Down direction freight path from Doncaster and two Up direction paths to Moorthorpe. The benefit for passenger services within the Dec-25 timetable structure from grade separation is limited, however the additional capacity and flexibility that this would provide would be of considerable use for future service improvements anticipated on the Sheffield to Leeds corridor.

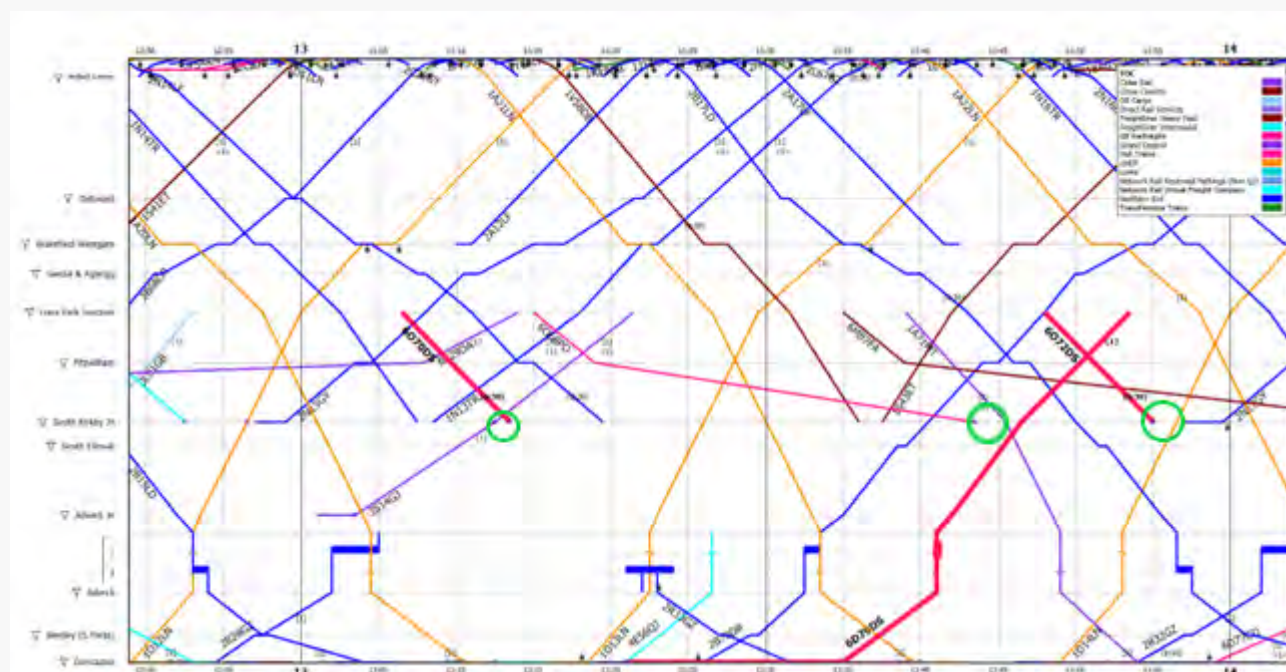


Figure 26: Graph illustrating additional freight services enabled by grade-separating South Kirkby Junction.



E.02.04.03 Grade separating Hare Park Jn

The benefit of this option is to remove the crossing conflict between northbound trains heading towards Crofton and southbound services between Wakefield and Sheffield or Doncaster. With only limited passenger services using this routing the primary improvements will be to the provision of capacity for freight services towards Crofton.

Grade separating Hare Park Jn enables one additional Down freight path from Doncaster and one from Moorthorpe.

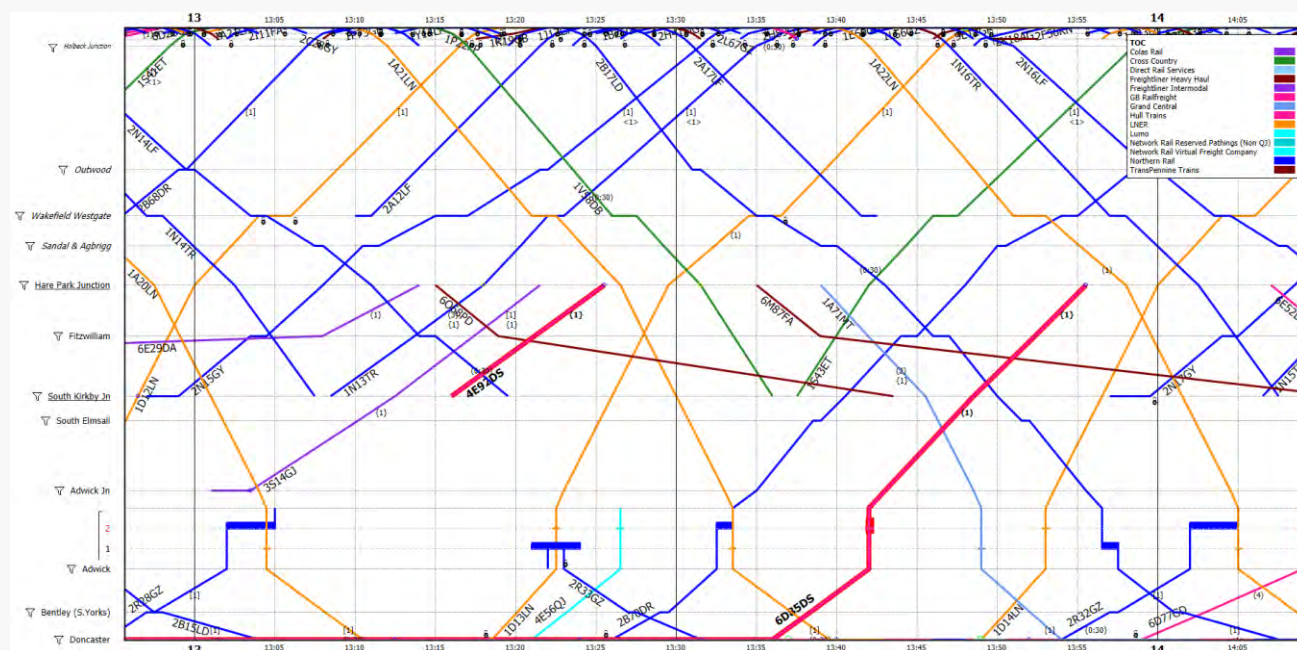


Figure 27: Graph illustrating additional freight services enabled by grade-separating Hare Park Junction.

E.02.05 Planning rule accuracy and completeness

This line of route has a standard headway of 4 minutes. Several rolling stocks have been modelled to establish accuracy of TPRs. In comparison to the existing headway, it been found that technical values vary across different sections of the line and among modelled rolling stocks. In an attempt to summarize the findings the below table was produced with rounded values split by sections and rolling stock.

Table 8: Calculated passenger headway values compared to TPRs.

LN836 DONCASTER MARSHGATE JUNCTION TO NEVILLE HILL EAST JUNCTION				
TIMING LOAD	TIMING POINT	DOWN	TIMING POINT	UP



	Standard Headway TPR 2026 v3.	4	Standard Headway TPR 2026 v3.	4
800 - E	Doncaster Marshgate Jn to Hare Park Jn (inclusive)	3	Hare Park Jn (inclusive) to Doncaster Marshgate Jn	2½
	Hare Park Jn to Wakefield Westgate (S - inclusive)	4	Outwood (inclusive) to Hare Park Jn	4½
	Wakefield Westgate (S) - Copley Hill West Jn	3	Holbeck Jn to Outwood	3
stopper 333	Doncaster Marshgate Jn to Adwick Jn	5½ ⁷	Adwick Jn to Doncaster Marshgate Jn	4½
	Adwick Jn to Outwood	4	Holbeck Jn to Adwick Jn	4
	Outwood to Copley Hill West Jn	3		
Moorthorpe 195	South Kirkby Jn to Outwood	4	Holbeck Jn to South Kirkby Jn	4½
	Outwood to Copley Hill West Jn	3		
Moorthorpe 221	South Kirkby Jn to Hare Park Jn	3	Outwood (inclusive) to South Kirkby Jn	4
	Hare Park Jn to Wakefield Westgate (S - inclusive)	4	Holbeck Jn to Outwood	3
	Wakefield Westgate (S) - Copley Hill West Jn	3		

As can be seen from the table above some sections of the line have headways lower than 4 minutes, while others do not. Although the indicative TPRs suggest there may be opportunities to reduce headways, implementing a 3-minute headway in selected sections is unlikely to increase capacity. This is because more restrictive margins elsewhere on the line limit the overall benefit.

Analysis has been undertaken to confirm validity of current freight headway margins too, summary of results can be seen in the table below.

Table 9: Calculated freight headway values compared to TPRs.

LN836 DONCASTER MARSHGATE JUNCTION TO NEVILLE HILL EAST JUNCTION				
TIMING LOAD	TIMING POINT	DOWN	TIMING POINT	UP
	Standard Headway TPR 2026 v3.	4	Standard Headway TPR 2026 v3.	4
	Doncaster Marshgate Jn to South Kirkby Jn	5	Hare Park Jn to South Kirkby Jn	6

⁷ The headway value of 5½ minutes between Marshgate Jn and Adwick can be attributed to the proximity of both Bentley and Adwick stations and signalling layout.



Class 4 1800 t from Doncaster	South Kirkby Jn to Hare Park Jn	5½	South Kirkby Jn to Doncaster Marshgate Jn	3½
Class 6 2400 t from Doncaster	Doncaster Marshgate Jn to South Kirkby Jn	5	Hare Park Jn to South Kirkby Jn	6
	South Kirkby Jn to Hare Park Jn	5½	South Kirkby Jn to Doncaster Marshgate Jn	3½
Class 4 1800 t from Moorthorpe	South Kirkby Jn to Hare Park Jn	6½	Hare Park Jn to South Kirkby Jn	7½
Class 6 2400 t from Moorthorpe	South Kirkby Jn to Hare Park Jn	6½	Hare Park Jn to South Kirkby Jn	7½

Margins are consistent between Class 4 and 6 and overall exceed the current TPR values. The largest discrepancies are observed at the section between South Kirkby Jn and Hare Park Jn, which is also highest in Capacity Utilisation on the line. Heavy loads were used in the modelling to estimate worst-case margins. However, in practice, the current timetable includes a mix of freight loads ranging from 600 to 2400 tonnes. In some cases, the calculated margins are nearly double the TPR values. This raises the question of whether freight paths planned using minimum margins are contributing to performance issues and it warrants further investigation. (example 4L09 16:17 Leeds F.L.T. to Felixstowe – passing Hare Park Jn at 17:07 and 4E39 12:42 Tilbury to Wakefield Europort – passing South Kirkby Jn at 19:05) At this stage, the calculated values are provided for information and to highlight potential risks, but they have not been applied in other parts of the Congested Infrastructure analysis.

E.02.06 Operational changes

While looking at local signalling instructions nothing has been identified that could be optimised for the purposes of this analysis.

E.02.06.01 Electric haulage of freight services

This element of the analysis was undertaken to consider whether benefits could be attained from an improvement in the capability of traction provided for freight services by using electric traction. It is acknowledged that neither of the routes towards Moorthorpe from South Kirkby Jn and towards Crofton from Hare Park Jn are electrified; no assessment of the traction power implications of this option has been undertaken and would be required were this to be pursued.

Analysis completed by Network Rail's Advanced Timetable Team looking at electric freight timings on the ECML has been replicated to consider implications on the Leeds – Doncaster line of route.



Table 10: Electric freight journey time in the Down direction

Train class	Traction power type	Trailing load/tonnes	Journey time (Doncaster to Hare Park Jn)/ minutes
4	Diesel	1800	19.0
4	Electric	1800	12.5
6	Diesel	2400	23.0
6	Electric	2400	15.5

Over the section of line from Marshgate Jn to Hare Park Jn running times calculated for electric class 4 with 1800 tonne trailing load are 6.5 minutes faster than the diesel SRT. The analysis demonstrates an even bigger journey time reduction when comparing 2400t trailing load – a total of 7.5 minutes over the same stretch.

Table 11: Electric freight journey time in the Up direction

Train class	Traction power type	Trailing load/tonnes	Journey time (Hare Park Jn - Doncaster)/ minutes
4	Diesel	1800	18.5
4	Electric	1800	12.5
6	Diesel	2400	20
6	Electric	2400	15.5

In the southbound direction journey time savings are 6 minutes for class 4 1800t and 4.5 for class 6 2400 t.

When freight moves to/from Moorthorpe and Crofton West Junction the run times take longer as can be seen in the tables below. South Kirkby Jn – Hare Park Jn moves are electric while connecting IRTs are modelled on Diesel.

Table 12: Electric freight IRTs from Moorthorpe.

From	To	class 4 1800t	SRT	class 6 2400 t	SRT
Moorthorpe	South Kirkby Jn	2.5	-	2.0	-
South Kirkby Jn	Hare Park Junction	6.5	8	7	10.5
Hare Park Junction	Crofton West Junction	3	-	2.5	-

Table 13: Electric freight IRTs to Moorthorpe.

From	To	class 4 1800t	SRT	class 6 2400 t	SRT
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Crofton West Junction	Hare Park Junction	4.0	-	4.0	-
Hare Park Junction	South Kirkby Jn	8	7.5	8.5	9.5
South Kirkby Jn	Moorthorpe	1	-	1	-

Headway values have also been calculated when modelling electric freight. Headway margins are improved when compared with values calculated for TPR review but are still higher than standard headway on the line. These values are provided for information only and are not applied at subsequent analysis.

Table 14: Electric freight headway values.

LN836 DONCASTER MARSHGATE JUNCTION TO NEVILLE HILL EAST JUNCTION				
TIMING LOAD	TIMING POINT	DOWN	TIMING POINT	UP
	Standard Headway TPR 2026 v3.	4	Standard Headway TPR 2026 v3.	4
Class 4 1800 t from Doncaster	Doncaster Marshgate Jn to Hare Park Jn	3½	Hare Park Jn to Doncaster Marshgate Jn	3½
Class 6 2400 t from Doncaster	Doncaster Marshgate Jn to Hare Park Jn	4	Hare Park Jn to South Kirkby Jn	4
			South Kirkby Jn to Doncaster Marshgate Jn	3½
Class 4 1800 t from Moorthorpe	South Kirkby Jn to Hare Park Jn	6	Hare Park Jn to South Kirkby Jn	6½
Class 6 2400 t from Moorthorpe	South Kirkby Jn to Hare Park Jn	5½	Hare Park Jn to South Kirkby Jn	6

Two potential capacity gaps in the Down direction were evaluated to accommodate electric freight services with a trailing load of 1800 tonnes. However, both options were unsuccessful due to insufficient junction margins at Hare Park Junction.

In the Up direction an alternative path for service 4D03DS was found to be compliant due to improved electric journey times, as illustrated in the graph below.



		approach Leeds from the east	- Evidence of insufficient capacity between Micklefield Jn and Leeds
Doncaster – Leeds	1tph	Remove and re-distribute calls at local stations between other services north of South Kirkby Jn.	- Impact on connectivity/ frequency at certain stations - Journey time implications for services with additional stops
Sheffield – Adwick (via DON)	1tph	Terminate at Doncaster instead of Adwick	- Reduction in calls at Adwick - Impact on platform capacity at Doncaster due to turnaround - Of only marginal benefit in addressing the issues north of South Kirkby Jn
Cross Country	1 tph	Reroute via Knottingley to Church Fenton or via Doncaster	- Loss of a call at Leeds removing Birmingham and Edinburgh connectivity
Sheffield – Leeds	1 tph (fast)	Reroute via Barnsley with a stop at Wakefield Kirkgate	- Reduction in calls at Wakefield Westgate - Undermines the purpose of the new service.
Sheffield – Leeds	1 tph (slow)	Reroute service to/from Pontefract to create an hourly Sheffield to Pontefract service (incorporating the 3 x SHF-YRK services)	- Reduction of one call per hour at stations north of South Kirkby Jn - Potential impact on connectivity to Leeds and Sheffield from intermediate stations. - Creates new journey opportunities.

It is acknowledged that any of these alterations would require further in-depth analysis to fully understand and articulate the benefits and drawbacks, and that any change would need to pass a high threshold to be acceptable. However, based on this analysis there could be merit in exploring the option to amend the Sheffield to Leeds stopping service to serve Pontefract instead and release hourly paths north of South Kirkby Jn. This option does not leave any stations without stops, although it does reduce frequency at stations between Fitzwilliam and Outwood and impacts connectivity for local journeys that would pass through Moorthorpe. Downstream benefits of this could include (a) creating new journey opportunities to/from Pontefract, (b) potentially releasing rolling stock which could be redeployed elsewhere and (c) reducing demand for capacity in the peaks at Sheffield station.



Part F: Additional 2-hourly Leeds service

Key Points

- This section has been added to recognise that LNER have rights for trains not exercised due to NR stating insufficient capacity/unsustainable performance impact.
- The rationale for separating this section from Doncaster Marshgate Jn – Copley Hill West Jn analysis is that the 0.5tph doesn't contribute to the CI declaration on this section as it becomes congested without those trains in the timetable.

F.01 Overview

Whilst developing the ECML ESG timetable, initially proposed for introduction in May 2022, it was found to not be possible to maintain existing passenger service intervals and meet the requirements of the Freight Operating Companies on the Doncaster to Leeds corridor whilst also inserting the additional LNER 0.5 tph London King's Cross – Leeds/Harrogate service (which had been provided with Firm Rights in 2016). It was found that attempting to meet all these requirements would have an unacceptable impact on train performance due to the volume of conflicts and would also have a significant impact on the ECML ESG programme that was targeting the May 2022 timetable change.

The specification for the LNER service to/from London King's Cross was therefore reduced from 6.5 tph to 6 tph, with agreement from the DfT. This reduction retained the 0.5 tph London King's Cross – Middlesbrough service, albeit only as far as York, with the 0.5 tph London King's Cross – Leeds service being descoped entirely. The ECML Programme Board on 21st March 2021 noted the recommendation from EC Route to defer the 0.5 tph London King's Cross – Leeds service, including the conditional outcome of journey time reduction between London Kings Cross and Leeds, to a post-ECML ESG future timetable change.

A consequence of the decision to decrement was that early-stage development work was undertaken by Network Rail to consider the interventions required to be able to include these services in the timetable. As part of this process a third-party consultant was asked to look at the feasibility of including the additional two-hourly LNER London King's Cross to Leeds services into the ESG timetable and utilising that timetable structure⁸.

⁸ This analysis was carried out by AtkinsRéalis who were requested to make recommendations on the infrastructure upgrades required to accommodate those additional services.



The purpose of this section of the report is to set out the findings of this analysis and helps to explain the extent of intervention required to place these services (which are supported by conditional firm rights held by LNER) into the timetable.

The analysis identified and number of planning changes and four infrastructure interventions being required:

- Four-tracking from Huntingdon to Woodwalton
- Four-tracking from South Kirkby Junction to Hare Park
- New connection between Platform 2 and the Up Slow Line at Peterborough station
- New connection from Potteric Carr Junction and Low Ellers Curve Junction on the ESL Slow

F.02 Summary of issues and changes

The analysis identified that it was possible to find paths in both directions using a combination of infrastructure interventions, flexing of other services and regulating the London King's Cross <> Leeds trains with pathing. The flexes, as well as the impact of different departure times on overall journey times, are summarised in the below tables:

Table 16: Up direction issues and changes

Step 1 Target Journey Time	2h01m	Step 2 Target Journey Time	1h58/ 1h59
Findings	Findings	Saving	
- LDS depart xx:35; KGX arrive xx:36 - Total pathing time 6 minutes due to: - Needing to depart Leeds ahead of standard 1AxxLN LDS-KGX service and arrive at King's Cross after 1TxxGR service. - Overtaking 1YxxYK MBR-KGX service at Peterborough	- LDS depart xx:30; KGX arrive xx:28 (or xx:29) - Total pathing time 3-4 minutes due to: - Woodwalton-Huntingdon Up Slow line allows for optimising Up direction structure, - Northern timetable structure amended where 2Nxx and 2Bxx are swapped. This also requires South Kirkby – Hare Park four-tracking or W12 clearance to allow freight to access Wakefield/Leeds via Shaftholme Jn and Knottingley West Jn, - Better path alignment between Leeds and London King's Cross - XC 10xx Newcastle-Reading/Southampton and NT 2Rxx Adwick-Sheffield permissive working at DON required	2-3 minutes	



- **Needing to let freight exit Connington Loop**

- Requires retiming of Northern 2AxxLF Knottingley circuits KGX arrival sensitive to platform end and Belle Isle Jn conflicts



Table 17: Down direction issues and changes

Step 1		Step 2	
Target Journey Time		Target Journey Time	
2h07m		2h02m	
Findings		Findings	Saving
- Total pathing time 12 minutes due to - Waiting at South Kirkby Jn to run behind 1SxxXC Cross Country - Additionally, conflict with Northern 2BxxDR services		- Total pathing time 7 minutes - Pathed to run ahead of 1SxxXC into Leeds - Northern timetable structure amended where 2Nxx and 2Bxx are swapped. This also requires South Kirkby – Hare Park four-tracking. This also requires South Kirkby – Hare Park four-tracking or W12 clearance to allow freight to access Wakefield/Leeds via Shaftholme Jn and Knottingley West Jn,	5 minutes

F.03 Re-routing of trains

As alluded to in the table above, to accommodate the additional Leeds – London King’s Cross service, the Newcastle – Reading CrossCountry would need to be re-routed into Platform 4 at Doncaster. This would allow 1AxxLX to pass Doncaster on the Up Fast Line.

This change requires permissive working on Platform 4 between the CrossCountry service, which arrives first, and the following Adwick – Sheffield train. The report comments that “this method of operation would introduce a performance risk whereby if trains are out of timetable sequence there could be ‘knock-on’ delay to other services, and it is unlikely to be supported by train operators”.

F.04 Infrastructure interventions

The IRP Phase 1 analysis identified that it was only possible to accommodate the additional London King’s Cross - Leeds services (within the Dec-25 Timetable structure) if the following nine interventions took place. These, and their benefits, are detailed in the table below:

Table 18: Interventions required to accommodate the additional London King’s Cross – Leeds service

Location	Intervention	Benefit
Hitchin to Peterborough	Hitchin to Holme Junction: Slow Lines line speed increase and Heavy Axle Weight restrictions removed	Flexibility in timetable development; improved freight capability



	Huntingdon to Woodwalton four-tracking	Segregation of outer-suburban, freight and LDHS paths; LDHS journey time; flexibility in timetable development; improved freight capability
	Peterborough to Fletton Jn (inclusive) Up Slow line speed increase	LDHS journey time; flexibility in timetable development; improved freight capability; enhanced CP7 renewal opportunity
	Peterborough Platform 2 to Up Slow new switches and crossings	LDHS journey time; flexibility in timetable development
Peterborough to Grantham	Werrington Junction to Stoke Junction: Slow Lines line speed increase	Flexibility in timetable development
Doncaster to Leeds	Potteric Carr: Up East Slow to Low Ellers Curve new S&C	Removal of at-grade crossing at Doncaster for freight from the North into Doncaster Iport
	Hare Park Junction line speed increase	Enhanced capacity to ease congestion
	Doncaster to Leeds capacity relief: Four-track Hare Park Junction to South Kirkby Junction; or, W12 Crofton West Junction to Shaftholme Junction via Knottingley and Askern	Enhanced capacity to ease congestion

F.05 Freight paths

The study also identified several consequential amendments required to freight paths in order that capacity could be found for the additional Leeds to London services within the Dec-25 timetable structure, these would be required in addition to implementation of the stated infrastructure interventions

- It would not be possible to accommodate a two-hourly Class 6 freight path crossing New England North Jn and Spital Ladder due to the irregular pattern of the LDHS services,
- Class 6 services between Doncaster and York would require amendment to run via Knottingley in both directions along with pathing time to meet the standard slots north of York;
 - Northbound services would require to be held at Haywood Jn or Knottingley South Jn for ~35 minutes
 - Southbound services would require to be held at Shaftholme Jn for ~10 minutes.



- It would not be possible to plan a fully TPR compliant train path for the Class 4 services between Doncaster and York due to the reliance on being able to pass from the Down ECML to Down Leeds line at Colton North Jn at the appropriate time.
- Southbound class 4 services to Doncaster iPort would require to use the new connection from the Up East Slow to Low Ellers curve as the opportunity to cross from the Up Main to the Downside at Doncaster station (via Marshgate Jn or Sheffield Ladder) would be precluded by the new passenger service.
- In the hours that the Sunderland to Kings Cross passenger service operates it is not possible to provide a path for a south bound class 4 service between York and Doncaster