SOLENT TO THE MIDLANDS MULTIMODAL FREIGHT STRATEGY – PHASE 1

JUNE 2021

NetworkRail

highways england

TABLE OF CONTENTS

Version	Date	Purpose
V1.1	05.02.21	Internal Draft for Consultation
V1.2	16.02.21	External Draft for Consultation
V3.0	21.05.21	Final Copy for external distribution
V3.1	27.07.21	Alt text updated and electrification map updated.

FOREWORD

Highways England and Network Rail are pleased to publish this first phase of the Solent to the Midlands Multimodal Freight Strategy. The Strategy is the culmination of a year's work between our two organisations and represents a further step forward in the collaboration between Highways England and Network Rail in multimodal strategic planning.

This closer approach to planning and increased involvement of stakeholders is vital to delivering the best results for our customers and funders.

The Solent to the Midlands route is one of the most important freight corridors in the UK. It links the major port of Southampton with the numerous distribution centres and economic hubs of the Midlands, North and Scotland. The Solent Ports, particularly Southampton, are in favourable locations for connections to the global freight and logistics market due to their proximity to the main shipping lanes. The Midlands is home to a high concentration of large distribution centres and warehouses – the so-called 'Golden Triangle' of freight distribution.

The A34, managed by Highways England, links the Solent Ports and the Midlands and is closely mirrored by the equivalent rail route, owned and operated by Network Rail. The parallel nature of the road and rail routes means that it is an ideal candidate for cross-modal analysis.

Both our organisations have a shared goal of keeping Britain moving, as well as contributing to achieving the government's target of net-zero carbon emissions by 2050. This study contributes to these goals by demonstrating how both networks could be used more efficiently in terms of their overall capacity and their carbon footprint.

Taking a holistic approach, this study uses data in exciting and innovative ways to identify where there may be freight flows that currently use road but could be better served by rail. It also outlines the significant benefits that modal shift to rail offers both to freight end-users but also to the wider road and rail networks.

Phase 1 of this freight strategy outlines the potential for change and the scale of the benefits that could be achieved. We must now move forward with focus, determination and collective will to manage increasingly constrained network capacity as well as meet the pressing challenge of reducing the greenhouse gas emissions of the transport sector.

Paul McMahon
Managing Director, System Operator
Network Rail

Elliot Shaw
Executive Director, Strategy and Planning
Highways England

EXECUTIVE SUMMARY

In July 2020, Network Rail and Highways England agreed to work together to take forward a joint multimodal strategic study which would investigate growth on the key road and rail freight corridor between the Solent and the Midlands. This study forms part of Network Rail's Long-Term Planning Process and Highways England's Route Strategy and Pioneer Projects work, both of which are designed to identify investment priorities for the future.

The purpose of this study is to develop a long-term strategy for the movement of freight along the Solent to the Midlands corridor. Both organisations have a shared goal of keeping Britain moving, as well as obligations to meet the Government's commitment of net-zero carbon emissions by 2050. This Solent to the Midlands Multimodal Freight Study contributes to these goals by demonstrating how both networks could be used more efficiently in terms of their overall capacity and their carbon footprint.

The impact of the Covid-19 pandemic has been considered for this corridor and the wider road and rail networks. Rail freight has been resilient against the uncertainties surrounding Covid-19 whereas passenger rail demand has been severely impacted. The road network has proved resilient under Covid-19 and some freight movements have even seen an increase in comparison to 2019. This could be partly attributed to an increase in online shopping and a backlog of deliveries. It is unclear what the long-term effects will be on the SRN, but it shows that the movement of freight will remain an important part of the road and rail networks.

Network Rail and Highways England agreed a wide-ranging set of strategic questions to complement the main strategic question:

'What is the strategy for freight on the Solent to the Midlands route up to 2050?'

The study has been split into several 'phases' to ensure that all of the questions can be sufficiently and comprehensively addressed. The first phase is primarily focused on understanding the current state of the market as well as assessing what demand for freight on this route might look like in the future. Several recommendations have been identified that seek to progress the outputs of this study into the next phase and answer the remaining strategic questions.

The timing of this study aligns well with the development of wider policy related to the freight, transport, and logistics industry. These policies show that there is a strong appetite for modal shift to rail as an important part of the method for the decarbonisation of the road and rail networks. Network Rail and Highways England are ideally placed to work together on decarbonisation and congestion relief across both transport networks by finding the optimal balance for rail freight transportation.

The Solent to the Midlands has been chosen for this study as the route is one of the most important corridors in the UK for freight across both rail and road. It links the major port of Southampton with the numerous distribution centres and economic hubs of the Midlands and the North. The Solent Ports, particularly Southampton, are in favourable locations for connections to the global freight and logistics market due to their proximity to the main shipping lanes between North East Europe and the Far East.

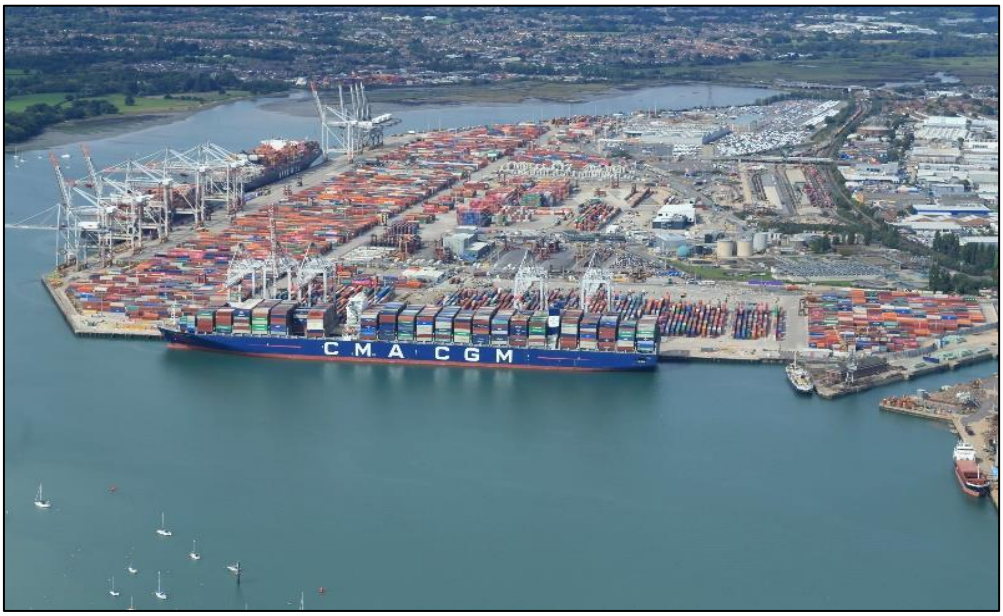


Figure 1 - Port of Southampton (Source: Network Rail)

The Midlands is home to a high concentration of large distribution centres and warehouses – the so-called 'Golden Triangle' of freight distribution. This high concentration is due to the proximity of this area to key arterial motorways and rail networks which link the area to areas all over the UK. Improving the

The A34, managed by Highways England, links the Solent Ports and the Midlands, and is closely mirrored by the equivalent rail route, which is owned and operated by Network Rail. The A34 serves a geographical route between Winchester and Oxford whilst also providing connections to other major routes such as the M3, M4, A303 and M40. It supports regional tourism, leisure and work including providing access to areas such as the M4's 'Silicon Valley', Newbury Racecourse and Areas of Outstanding Natural Beauty such as North Wessex Downs. It is the busiest non-motorway HGV trunk road in the UK and the rail route passes through some of the busiest passenger rail networks. The analogous nature of the route means that it is an ideal candidate for cross-modal analysis to understand how both networks can be used most efficiently and effectively for freight transportation.

Rail freight in the Solent area is focused almost exclusively at the Port of Southampton with over 32 trains per day on average arriving or departing. The route to the Midlands passes through Basingstoke, Reading, Didcot, Oxford to Birmingham sharing lines that are used for both a considerable passenger service and a growing freight service. The Southampton to the Midlands rail route is dominated by the intermodal sector but is also a key corridor for automotive rail freight; with 10.4% of trains carrying that commodity. Just under half of all automotive rail services in Great Britain go to/from Southampton. Construction materials (aggregates) make up 6% of rail freight services on this corridor compared to 29.1% of rail freight services in Great Britain overall.

The A34 is a strategic route for several road-reliant sectors where freight and goods for an industry can only or mostly travel on road – this covers large industries such as automotive where over 1000 vehicles are transported by road to Southampton port daily as well as automotive supply chain movements. Road-reliance is also key for more regional industries such as equestrian – the A34's proximity to Newbury Racecourse means it provides a key strategic role for these goods and livestock.

Building upon this baseline understanding of the road and rail corridors and what freight is moved on them, an investigation of potential growth was undertaken. In all scenarios identified for rail freight growth there is expected to be an increase in the number of trains needed per day to meet demand from the commodities already carried by the rail network; of between 5 and 20 trains per day to 2050. Further work will be required to fully understand the potential for growth in road freight on this corridor is required as Highways England take forward the findings of this study.

In addition to this predicted growth, the cross-modal analysis suggests that some further investigation into key end customers, main hauliers and the exact nature of the items being carried via road freight on the key routes is required to fully understand whether there are any potential markets for modal shift to rail. However, from the analysis so far undertaken the following conclusions around new markets and enhanced markets can be made:

1. Food and drink is a key commodity to many areas along the corridor. Network Rail and Highways England should look to understand the key organisations involved in these movements and engage with them to understand any barriers to model shift

2. Chemical and chemical products are also moved in high quantities on this corridor. Network Rail and Highways England should look to understand the key organisations involved in these movements and engage with them to understand the nature of this market

3. Secondary materials and waste (recycled materials) is a significant commodity on this route. Rail could provide a more carbon and financially efficient way of transporting this waste for export whilst in the long-term, rail should be considered for transporting secondary goods to UK based recycling facilities. Network Rail and Highways England should engage with ongoing workstreams around recycled materials taking place across the industry and make the case for rail as a mode for transporting these goods

4. Aggregate traffic is already a well-established market on rail. Network Rail and Highways England should work with the industry partners to assess how this existing established market can be expanded further

5. Whilst not in the top ten movements, the mail and parcels sector is significant on certain routes and offers opportunities for modal shift and can be faster and more flexible than traditional rail freight. Network Rail and Highways England will continue to investigate this market in future phases and will engage with the existing ongoing rail express parcel workstreams across the industry to ascertain the options for the Solent to the West Midlands route

One of the main outputs of this study has been to understand in more detail how the road and rail markets can support each other to provide a balanced freight transportation approach such that specific commodities to specific locations are transported by the most efficient and effective mode. Both road and rail are important parts of the overall transport provision; for instance, even where a commodity is transported by rail it is likely that road transport is required for the first/ last mile of the journey. This study has identified several conclusions that should be considered when seeking a balance between the two modes:

- Rail is considered more cost effective than road over long distances and for high loads[1]. Road is more effective for shorter-distances, such as the last mile from a rail freight interchange or local/ regional movements

[1] The value of freight – Vivid Economics on behalf of the National Infrastructure Commission https://nic.org.uk/app/uploads/Future-of-Freight_The-Value-of-Freight_Vivid-Economics.pdf p.37

- Rail has a similar reliability in terms of journey times than road. Average delay for trains to/from the Solent was less than 3 minutes in 19/20 compared to a peak-time delay of 5-14 minutes on road. Furthermore, rail reliability has been steadily improving over time[2].

- Rail is currently more efficient in terms of greenhouse gas emissions, even if the load is hauled by a diesel locomotive. Rail has a clear decarbonisation route whereas HGV decarbonisation is not yet at the same point of development, although this is an ongoing workstream for the road transport industry

- Modal shift to rail also provides a unique and exciting opportunity to help the road sector meet the capacity and carbon challenges on the Solent to the Midlands corridor, especially for those journeys that are >50 miles and > 100 miles[3] for bulk and consumer goods respectively

- It is acknowledged that modal shift to rail will not be the only solution to decarbonisation of the HGV network, particularly for shorter journeys where rail is not the appropriate mode

- To expand and increase rail freight, opportunities must be taken to expand the capability of the network as well as build awareness of the benefits that modal shift to rail can bring

As previously stated, this study is only the first phase of understanding this important freight corridor. Several recommendations and next steps have been identified that will build on the success of this study.

One of the main successes of this study has been the way in which Network Rail and Highways England have worked together, along with wider stakeholders including the freight, transport and logistics industry and Sub-national Transport Bodies. All parties need to continue to work together to apply relevant data sources to further develop the strategy for this important corridor; allowing a holistic approach to identifying the solutions and interventions required to balance road and rail freight traffic whilst adhering to wider policy initiatives and targets.

To build upon this successful collaborative approach, Network Rail and Highways England will work with the wider industry and other stakeholders to develop the exact scope, programme, and governance structure for future phases of the Solent to the Midlands Multimodal Freight Strategy.

The recommendations from this study fall within four categories which are then split into sub-recommendations beneath them; below are the key recommendation groupings:

1. Continued Joint Working – a series recommendations to take forward joint workstreams and specific analysis to delve deeper into how the two modes and networks can achieve the optimal balance and efficiency in freight movements

2. Removal of barriers to rail freight growth – a series of recommendations that seek to understand what barriers need to be removed and what opportunities there are for rail to grow its share of those commodities and journeys that are most appropriate for rail transportation

[2] The value of freight – Vivid Economics on behalf of the National Infrastructure Commission https://nic.org.uk/app/uploads/Future-of-Freight_The-Value-of-Freight_Vivid-Economics.pdf p.20

[3] Harris, N. G. and McIntosh, D. (2003). The Economics of Rail Freight.

3. Unlocking new markets – a series of recommendations that analysis in more detail the potential for rail to unlock new markets where commodities are not currently transported by rail but where it may be efficient and economical to do so

4. Decarbonisation – a series of recommendations addressing the ongoing workstreams in both the road and rail sectors to understand what is required to ensure that both networks contribute to the zero-carbon commitment

1. INTRODUCTION TO THE STUDY

1.1 INTRODUCTION

Network Rail and Highways England commissioned the Solent to the Midlands Multimodal Freight Study in July 2020. This study forms part of Network Rail's Long-Term Planning Process and Highways England's Route Strategy and Pioneer Projects work, both of which are designed to identify investment priorities for the future.

The purpose of this study is to develop a long-term strategy for the movement of freight along the Solent to the Midlands corridor. A key part in this is determining the optimum balance of freight traffic between road and rail to relieve congestion on the road system and contribute towards the GB decarbonisation agenda.

1.2 STRATEGIC QUESTIONS

To provide structure to the study, a main strategic question and several supporting sub-questions were agreed with the working group and senior stakeholder group. The main question this study has considered is:

'What is the strategy for freight on the Solent to the Midlands corridor up to 2050?'

To complete this, the following secondary questions were considered:

1. What is the totality of current and projected freight movements along and within the identified corridor? In particular, what are the longer-distance, 'strategic' and economically significant movements?

2. What are the constraints to rail freight growth throughout the corridor, across multiple NR Regions?

3. What are the current aspirations and strategy of the Solent Ports, in particular Southampton, and their development plans and associated requirements of customers along the corridor? This secondary question, in part, should seek to understand wider economic benefits from improvements within the corridor.

4. What are the end-to-end journey needs? i.e. "last mile" movements and, where applicable, wider Major Road Network impacts and integration opportunities.

5. What are the emerging priorities of the Sub National Transport bodies, such as Transport for the South East, Midlands Connect and England's Economic Heartland, with spatial focus in this corridor?

6. What the optimum balance of mode share between rail and road in moving freight on the corridor?

7. If freight is identified as being suitable for moving from road to rail or vice-versa, what are the potential infrastructure intervention locations to investigate in order to operate an increased freight service?

8. If freight is suitable for being moved on rail rather than road, what benefits would this bring to the SRN (e.g. capacity / location), freight customers and the rail industry, including how it would contribute to the overall decarbonisation of freight in the UK?

9. How can the Solent to the Midlands Freight Study contribute to the UK government's target of net-zero carbon emissions by 2050?

1.3 STUDY APPROACH

During development of the early stages it emerged that the size and scope of this study meant that it was not possible to comprehensively and effectively cover all the strategic questions before March 2021. Therefore, the study has been split into several 'phases'.

This first phase will focus on sub-questions 1-5 which are primarily focused on understanding the current state of the market as well as assessing what demand for freight on this route might look like in the future. The second phase will begin in Summer 2021 and focuses on strategic questions 6-9; this is further discussed in the 'Recommendations' section of this document.

1.4 GOVERNANCE STRUCTURE

The study has been jointly led by the Network Rail Southern Region Planning and Franchising Team and Highways England's Economic Development and Spatial Planning Team. A Senior Stakeholder meeting was established to set direction and oversee the programme. This was formed of Network Rail, Highways England, Department for Transport (DfT), Sub-National Transport Bodies and other key freight stakeholders. All key decisions regarding the study were approved through this group.

A Working Group was set up to oversee the programme and provide guidance and feedback. This was formed of Network Rail, Highways England and the DfT. An Economic sub-group was established to provide technical input and specialist guidance to the study. This was formed of economic analysts from Network Rail, Highways England and the DfT. Highways England set up an internal working group formed of transport planners, regional route managers, Major Projects and network strategists to shape the road network sections of this study. Key findings and outcomes of the study were reported to the respective Network Rail Route Strategic Planning Group (RSPG), Route Investment Review Group (RIRG) and the DfT chaired Programme Boards as appropriate by the relevant Network Rail strategic planning team.

KEY POINTS

- Network Rail and Highways England agreed a wide-ranging set of strategic questions to complement the main strategic question: 'What is the strategy for freight on the Solent to the Midlands route up to 2050?
- The study has been split into several 'phases' to ensure that all of the questions can be sufficiently and comprehensively addressed.
- The first phase is primarily focused on understanding the current state of the market as well as assessing what demand for freight on this route might look like in the future.
- The study has been guided by an economic analysis sub-group, a Working Group and a Senior Stakeholder Group

2. STRATEGIC AND POLICY CONTEXT

2.1 INTRODUCTION

This section will describe the current strategic and policy context regarding freight and logistics in the UK. The section will focus on national policies and strategies as well as taking account of the local policies of SNTBs on the Solent to the Midlands corridor. Links to the relevant strategies have been provided where available.

2.2 NATIONAL FREIGHT POLICIES AND STRATEGIES

There has been a substantial body of work completed looking at freight and logistics in the UK. The key documents are summarised below:

Rail Freight Strategy (2016) – Department for Transport[4]

The Rail Freight Strategy was published in 2016 and outlines the current structure of the rail freight industry, its challenges and what the future looks like. The study outlines what the priorities should be within the industry for rail freight to realise its potential. Specifically, the areas are:

- **Innovation and skills**
  - The strategy noted that rail freight is an *"industry based on high fixed costs over long timescales, responding flexibly to changing markets presents a particular challenge. The rail freight sector has traditionally been underpinned by a high-volume, high-tonnage model, and the industry will need to focus on growing new 'core' volume markets following the decline of coal. The ports intermodal and construction markets may provide an opportunity for the industry to develop such new markets"*[5]. Demand for coal declined dramatically in 2015 and has continued to decline since[6] meaning that rail's market share of inland freight movement has dropped significantly due to the loss of this market. The

[4] Rail Freight Strategy (2016), Department for Transport - https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/552492/rail-freight-strategy.pdf

[5] Rail Freight Strategy (2016), Department for Transport *p.7*

[6] Freight rail usage and performance (2020), Office of Rail and Road: *https://dataportal.orr.gov.uk/statistics/usage/freight-rail-usage-and-performance/*

2016 strategy notes that this provides an opportunity for the industry to explore new markets such as parcels and domestic intermodal in order to diversify the offering of rail freight.

- **Network Capacity**
  - One of the key areas the strategy focusses on is the balance between passenger and freight trains on the network. The study notes that: *"Rail freight services operate in response to customer and supply chain demands, making it more challenging to plan for freight services than passenger services, which tend to run to a regular timetable and route.*[7]*"* The changing levels of demand for freight mean that rail freight is often at a disadvantage over road freight's flexibility. The strategy notes that ensuring that flexible capacity is available is key in growing the rail freight market share.
- **Track Access Charging**
  - Any organisation which wants to use the railway must pay a track access charge to the incumbent network manager, which currently is Network Rail. The DfT notes that: *"Track access charges represent a significant cost for the rail freight industry, with the industry as a whole projected to pay £87 million per year in track access charges by the end of CP5. […] The level and future trajectory of track access charges has an impact on rail freight operators' ability to offer competitive prices to their customers and therefore is an important factor in realising the future growth of rail freight"*.[8] The lack of competitive pricing in rail freight could mean that potential freight customers are drawn to road freight. The DfT note that the benefits of using rail over road are not currently reflected in the track access charging regime[9]; it is not known whether any action has been taken to address this to date. However, it should be noted that there is a Mode Shift Revenue Scheme aimed at encouraging modal switch to rail for some traffic and this in turn brings wider environmental benefits.
- **Telling the story of Rail Freight**
  - The strategy explains how the Rail Freight industry can be hard to access for outsiders not familiar with it and that the potential benefits of using rail freight are not well explained by the rail industry. The competitive nature of rail freight means that there is sometimes a lack of collective working. The DfT noted in this strategy that there are several workstreams ongoing to improve this.

This Rail Freight Strategy provides a useful overview of the priorities for policymakers and sets out a number of actions to address the challenges facing rail freight. It is the 'live' strategy for rail freight in the UK.

[7] *Rail Freight Strategy (2016), Department for Transport p.8*

[8] *Rail Freight Strategy (2016), Department for Transport p.9*

[9] *Rail Freight Strategy (2016), Department for Transport p.10*

Freight Network Study (2017) – Network Rail[10]

Following on from DfT's Rail Freight Strategy (2016), in 2017 Network Rail published the Freight Network Study, as part of the Long-Term Planning Process (LTTP). This Network Strategy considered the future development of rail freight across the rail network in Great Britain.

The study outlines the markets for freight, the drivers for change, the constraints to change and potential options for funders. The demand forecasts included have since been updated in 2018 and 2019 - and were published again on a slightly revised basis (with the routeings report) in August 2020. These forecasts are detailed later in this study.

The Freight Network Study identifies several corridors and the potential options for funders that would need to be delivered to facilitate the growth that the study predicts. The Solent to the Midlands corridor is 'Corridor 4' in the study and the following capacity and gauge options are identified:

1. Improving existing passing loops between Eastleigh and Basingstoke
2. Grade separation at Basingstoke
3. Assuming OLE electrification of Southampton to Basingstoke, provision of electrified diversionary route via Andover [note that this was identified in the previous 'Electric Spine' study aspirations]
4. Capacity enhancements between Southcote Junction (Jn) and Oxford Road Jn in Reading
5. Grade separation at Didcot East Jn and Oxford North Jn
6. Capacity improvements Didcot – Oxford and Oxford station
7. Banbury Loops
8. Leamington Spa station remodelling
9. Water Orton area interventions
10. Sutton Park Line electrification
11. Gauge clearance of W10 of diversionary route via Westbury and Melksham
12. Gauge clearance to W8 of Bradford Jn to Bathampton Jn
13. Electrification of key freight terminals in the West Midlands

The study also describes the importance of infrastructure capability to improve restrictive line speeds for freight (particularly where heavier, Route Availability (RA10), operating permissions are in use); enable longer freight trains; enable the operation of electrified freight; introduce the concept of 'Nodal Yards'; and provide improved gauge capability.

This Freight Network Study is the 'live' strategy for freight on the rail network from a Network Rail perspective. Freight forecasts have been refreshed since this study, but the overview of markets provides a good baseline picture

[10] Freight Network Study (2017) – Network Rail https://www.networkrail.co.uk/wp-content/uploads/2017/04/Freight-Network-Study-April-2017.pdf

of how they may have changed since the publication of the study in 2017. The list of options for funders provides a high-level view of the potential schemes required to facilitate a change in the proportion of freight that is transported via rail; the list will be revisited and refreshed through this and subsequent phases of the Solent to Midlands Freight Strategic Study.

Industrial Strategy (2017) – HM Government[11]

Investment Strategy (2017) – Department for Transport[12]

The UK government published its industrial strategy in 2017 which set out the government's priorities for supporting growth in the UK economy. The strategy outlined five foundations of productivity that would shape the government's investment priorities, specifically:

- Innovation – the world's most innovative economy
- People – good jobs and greater earning power for all
- Infrastructure – a major upgrade to the UK's infrastructure
- Business environment – the best place to start and grow a new business
- Places – prosperous economies across the UK

The **Transport Investment Strategy** builds upon the priorities in the *Industrial Strategy (2017)* and outlines the UK government priorities for transport investment in the long term and outlines some of the challenges facing the national transport network into the future. The document reiterates the government's priority for a greater modal shift for freight from road to rail[13], noting the benefits both in terms of carbon emissions and safety.

Freight Carbon Review (2017) – Department for Transport[14]

The Freight Carbon Review was designed to help the road freight sector reduce its emissions in a cost-effective way that drives efficiency and innovation. The plan helps to help meet this challenge, the government will work collaboratively with the freight and logistics industry, to build on existing good practice.

The Freight Carbon Review has considered options for making more effective use of current capacity on the rail, water and road networks through increased use of rail freight, deployment of longer semi-trailers, and improved logistical efficiency through more widespread industry collaboration. The Rail Freight Strategy, published in September 2016, highlights the greenhouse gas (GHG) emissions reduction potential from modal shift from road to rail and identifies a range of issues that would need to be addressed to realise this potential. The Strategy was supported by an assessment from Arup/AECOM of the likely scale of GHG emission savings out to 2030 from shifting freight from road to rail, which suggests that savings could be significant. Further work will be needed to understand in more detail the likely costs and feasibility of these measures, particularly considering the significant infrastructure investment that

[11] Industrial Strategy (2017) – HM Government - https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/664563/industrial-strategy-white-paper-web-ready-version.pdf

[12] Investment Strategy (2017) – Department for Transport - https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/918490/Transport_investment_strategy.pdf

[13] *Transport Investment Strategy (2017), Department for Transport p.33*

[14] Freight Carbon Review (2017) – Department for Transport https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/590922/freight-carbon-review-2017.pdf

would be required. In addition to opportunities to make better use of the rail network, further efficiencies can be achieved through more effective use of the road network.

Better Delivery – The Challenge for Freight (2019) – National Infrastructure Commission[15]

The National Infrastructure Commission's (NIC) central finding is that through the adoption of new technologies and the recognition of freight's needs in the planning system, it is possible to decarbonise road and rail freight by 2050 and manage its contribution to congestion. Achieving this requires government to outline clear, firm objectives, and begin working with the energy sector, freight industry and local areas to ensure that the infrastructure required for alternative fuels and land for efficient freight operations is available when and where it is needed.

Delivering the UK's climate targets will require decarbonisation of transport. It is therefore a question of how to decarbonise the railway for both freight and passengers, rather than whether it should be done. Road and rail freight should have a common, single target to decarbonise fully by 2050.

National Infrastructure Strategy (2020) – HM Treasury[16]

The ongoing Covid-19 pandemic has bought major disruption to the UK economy during 2020. In response to this and to coincide with the November 2020 Comprehensive Spending Review, the government has published the National Infrastructure Strategy. Building on the work that was undertaken as part of the Industrial Strategy (2017), this strategy outlines the importance of infrastructure in underpinning economic growth and helping the UK to recover from the impact of Covid-19. The strategy describes how, through investment in infrastructure, the government will:

- Boost growth and productivity across the whole of the UK
- Put the UK on the path to meeting its net-zero emissions target by 2050
- Support private investment
- Accelerate and improve delivery

The government used this strategy to announce a full response to the NIC's *Better Delivery: The Challenge for Freight* recommendations as part of a comprehensive cross-modal freight strategy due for release in 2021. It will be important for any recommendations from this study to be aligned with this cross-modal freight strategy.

Decarbonising Transport: Setting the Challenge (2020) – Department for Transport[17]

Decarbonising Transport: Setting the Challenge sets out the scope of the development of the Transport Decarbonisation Plan, due for publishing in 2021. The Transport Decarbonisation Plan "will set out in detail what

[15]Better Delivery – The Challenge for Freight (2019) – National Infrastructure Commission - https://nic.org.uk/app/uploads/Better-Delivery-April-2019.pdf

[16]National Infrastructure Strategy (2020) – HM Treasury - https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/938539/NIS_Report_Web_Accessible.pdf

[17] Decarbonising Transport: Setting the Challenge (2020) – Department for Transport - https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/932122/decarbonising-transport-setting-the-challenge.pdf

government, business and society will need to do to deliver the significant emissions reduction needed across all modes of transport, putting us on a pathway to achieving carbon budgets and net-zero emissions across every single mode of transport by 2050"[18] It will be important for any recommendations from this study to be aligned with the Transport Decarbonisation Plan.

The Ten Point Plan for a Green Industrial Revolution (2020) – HM Government[19]

Also, in response to the Covid-19 pandemic, the Government published *The Ten Point Plan for a Green Industrial Revolution* which outlines how the government proposes that the UK's "recovery from coronavirus will be green, generate jobs and bolster the economy, whilst continuing to drive down emissions both now and in the future"[20]. Of particular interest to this study is the government's commitment to electrify more rail routes[21] which will be key in the overall decarbonisation of rail freight on this route. The government will publish its Transport Decarbonisation Plan to set out how the UK transport system will be decarbonised, using a cross-modal approach. This and subsequent phases of the *Solent to the Midlands Multimodal Freight Study* will feed into this overall plan by looking at how decarbonisation can be achieved on this particular freight route using a multimodal approach.

Modal Shift Revenue Support - Department for Transport[22]

Modal Shift Revenue Support (MSRS) is a government scheme aimed at assisting companies with the additional costs of running rail or inland water freight instead of travelling on road. The scheme aims to facilitate and support modal shift, generating environmental benefits and fewer lorry journeys on the roads. The scheme can be used for both automotive and intermodal rail freight.

2.3 INFRASTRUCTURE MANAGER STRATEGIES

The Wessex Route Study (2015) – Network Rail[23]

The Wessex Route Study was published in 2015 as part of Network Rail's Long-term Planning Process. The study looked to address a series of conditional outputs relating to passenger and freight capacity, journey time and connectivity. The Wessex Route Study freight forecasts were based on the Freight Market Study growth forecasts that were also used for the Network Rail Freight Network Study, described above. The Wessex Route Study is currently being refreshed by Network Rail through a programme of Strategic Studies.

---

[18] Department for Transport - Decarbonising Transport Setting the Challenge p5

[19]The Ten Point Plan for a Green Industrial Revolution – HM Government
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/936567/10_POINT_PLAN_BOOKLET.pdf

[20] The Ten Point Plan for a Green Industrial Revolution – HM Government p. 30

[21] The Ten Point Plan for a Green Industrial Revolution – HM Government p. 17

[22] Modal Shift Revenue Support - Department for Transport
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/966209/msrs-guide.pdf

[23] The Wessex Route Study (2015) https://www.networkrail.co.uk/wp-content/uploads/2016/11/Wessex-Route-Study-Final-210815-1-1.pdf

The Route Study highlighted the expected strong growth in intermodal traffic from Southampton Docks, as well as bulk aggregates and noted the strong growth being shown for automotive freight.

To accommodate freight growth on the Wessex network, in the period to 2043, the study identified the following options for funders:

- Capacity through Southampton Central
- Passing Loop between Eastleigh and Basingstoke
- Grade separation at Basingstoke
- Potential AC electrification in line with the 'Electric Spine' concept

This list of options for funders provides a high-level view of the potential schemes required to facilitate a change in the proportion of freight that is transported via rail; the list will be revisited and refreshed through this and subsequent phases of the Solent to Midlands Freight Strategic Study.

Solent Connectivity Continuous Modular Strategic Planning (2019) – Network Rail[24]

The Solent has a reasonably substantial rail network, with 39 stations and about 70 miles of passenger route on several lines (with a further 10 miles of lines currently only used for freight). At present, the dominant function of rail in the Solent area is for passenger transport to London (along the South West Main Line, SWML), and for freight transport from Southampton to the Midlands/ the North. The percentage of public transport use in the area is low and this results in heavy use of the M27 - a strategic road - for local journeys. 28% of all traffic on the M27 is travelling 5km or less contributing to congestion and impeding more economically critical uses of the strategic road network, especially freight movement to the ports.

The study recommended potential improvements would also substantially improve connectivity between Portsmouth and Southampton as a result of increased train frequency and opportunities for better timetabling of services and to encourage modal shift from road on to rail thereby reducing congestion on key links.

Oxford Rail Corridor Study (2019) – Network Rail

The Oxford Rail Corridor Study completed by Network Rail identified opportunities for rail stations, services and routes along the Oxfordshire corridor including Oxford Station and the rail corridor that runs through it (Didcot – Oxford – Aynho). The study explored the drivers and potential for rail growth along the Oxfordshire corridor that can directly enable and support economic and housing growth, noting those that set out a high-level strategy for potential rail interventions over a thirty-year time frame, as well as identifying phased requirements for the short, medium and longer term. The study recommended a portfolio of interventions that would help the railway meet the demand requirements up to 2043.

A key output of this study is that it highlights the need to provide additional freight paths from the Oxford corridor to East West Rail. This will provide a new route between the Solent, the Midland Main Line and East Coast Main Line. This may open up potential new markets that currently do not exist.

[24] Solent Connectivity Continuous Modular Strategic Planning https://www.networkrail.co.uk/wp-content/uploads/2020/07/Solent-Connectivity-Continuous-Modular-Strategic-Planning.pdf

Birmingham to Bristol & Bristol to Exeter Strategic Studies (2020) – Network Rail

There are two neighbouring strategic studies currently being undertaken by colleagues in the Western Strategic Planning team of Network Rail. These are Birmingham to Bristol and Bristol to Exeter. As part of the process a freight workshop took place with key stakeholders from Freight Operating Companies, local authorities, the West of England Combined Authority and professional institutes. It aimed to identify the key opportunities for rail freight and the ways in which this could be encouraged.

Key conclusions included the potential for new intermodal movements via the Birmingham – Bristol corridor to Exeter and beyond to South West England; scope for developing high speed express freight and logistics traffic in the same corridor; and the need for improved gauge clearances and appropriate diversionary capability. Locations of interest for new freight facilities were discussed and Avonmouth emerged as the key opportunity for a large-scale freight terminal/interchange serving the sub-region.

Based on the results of this workshop and similar discussions on potential passenger train service development, colleagues in the Network Rail Capacity Analysis team at Milton Keynes are currently undertaking a timetable study examining the potential for a wide range of freight and passenger train service specifications between Exeter, Bristol and Birmingham to enhance connectivity and meet stakeholder aspirations.

The freight elements being tested north of Bristol include an uplift from one to two freight paths each way per hour, on both the South Wales and Bristol routes north towards Birmingham. Equal allowance is made for both class four (freight that can run up to 75mph) and class six (freight that can run up to 60mph) paths under these assessments. Infrastructure and capacity constraints north of Abbotswood Junction have been highlighted by stakeholders, affecting all the freight route options to Birmingham and beyond. However, it has been agreed that addressing these would be beyond the scope of the Bristol to Birmingham strategic study.

The freight elements being tested south of Bristol are greater in scope and complexity, reflecting the aspirations of stakeholders to substantially grow freight capacity from its existing low base. Hourly class four freight paths would be retained to/from Portbury in all the scenarios being tested, while two paths per hour each way would ultimately be provided on the main corridor, one each for class six and class one, between Bristol and Exeter. The class one paths are designed to provide for high-speed express freight and logistics traffic, where performance is similar to passenger units.

The freight evidence base for the Birmingham and Exeter studies has built on information provided by Highways England for the Solent to Midlands Multimodal Freight Strategy, which included data for container movements between the Solent ports and Bristol/South Wales/South West England.

London Rail Freight Strategy (2021) – Network Rai[25]

The London Rail Freight Strategy sets out the strategy and future investment options in order to support future freight demand across the London orbital routes. The study also identifies the route between Clapham Junction and Willesden/Wembley via Kew (one possible diversionary route of trains between the South and the West Coast Main

[25] London Rail Freight Strategy – Summary Report (2021) – Network Rail - https://www.networkrail.co.uk/wp-content/uploads/2021/05/London-Rail-Freight-Strategy-Summary-Report.pdf

Line as a key gauge gap). This study is going to be followed by a Portfolio Strategic Outline Business Case (SOBC) for investment in 2021.

Solent to the Midlands Route Strategy (2017) – Highways England[26]

Highways England have a licence with the Department for Transport to carry out Route Strategies on a regular basis. A Route Strategy report provides an assessment of the current performance of the route in question and identifies pressures on the route to aid future planning investments under a collection of strategic themes. The Solent to Midlands Route Strategy in 2017 reported on tourism and employment in the route area, the volume of vehicles and what the key issues affecting the route were, namely congestion and capacity due to the high volume of freight vehicles and local traffic that utilize the A34 daily.

Connecting the Country (2017)– Highways England[27]

Connecting the Country highlights how future investment in the SRN should be shaped. This includes listening to customer and stakeholder needs, better understanding of our assets and performance, shareholder priorities and planning for the long term. By setting out long term planning, Connecting the Country gives a view of not only how the SRN might evolve but what this means for road network users and the UK economy. Using widespread research, trends have been identified for the most likely scenario for our network (this document was written pre-Covid) and used this information to shape how the SRN needs to adapt to support this long-term vision.

Road to Growth (2017) – Highways England[28]

The success of the UK's economy is underpinned by a safe, effective and efficient strategic road network (SRN). The SRN is the largest part of the integrated transport system that businesses rely on every day to operate successfully. The SRN is vital to the performance of some of the country's leading sectors – such as logistics and freight, retail and wholesale, construction and manufacturing. These sectors fundamentally rely on the road network to move materials and goods around the country. The development of new employment spaces and homes cannot happen without the right road connections and capacity. Road to Growth is Highways England's economic growth plan which sets out the long-term vision for supporting the economy and boosting economic growth. Road to Growth sets out four roles that the SRN plays in supporting the economy – these are:

- Supporting business productivity and competitiveness and enabling the performance of SRN-reliant sectors
- Providing efficient routes to global markets through international gateways
- Stimulating and supporting the sustainable development of homes and employment spaces
- Providing employment, skills and business opportunities within our sector

[26] Solent to the Midlands Route Strategy (2017) – Highways England - https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/600330/Solent_to_Midlands_Final.pdf

[27] Connecting the Country (2017)– Highways England - https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/666876/Connecting_the_country_Planning_for_the_long_term.pdf

[28] Road to Growth (2017) – Highways England - https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/600275/m160503_the_road_to_growth_Our_strategic_economic_growth_plan.pdf

Work is currently ongoing to publish the second Road to Growth but the four roles above remain the same vision on how the SRN supports the economy.

Southern Region Rail Freight Modular Study (2020) – Network Rail

The Southern Region Rail Freight Modular Study sets out the strategy for freight across the Network Rail Southern Region with the overall aim of answering the strategic question: "how can capacity, capability and reliability be improved for current and future freight end users in the Southern Region study area, whilst also balancing these needs with a dense passenger market?" The study includes all flows across the Southern Region except those covered by this Solent to the Midlands strategy. Both strategies together form the overall freight strategy for the Network Rail Southern Region. Module 1 of this study is primarily a baseline report. The report focuses on current freight flows and freight terminals across the region, (including Channel Tunnel traffic), the routing of these commodities and key capacity constraints. Also included in this document is the importance of Route Services located at strategic locations across the region and operations of special charter services which utilise London terminals including Victoria and Waterloo. The Module 2 Report of this study is based on the outcomes of the Freight End User Workshop, held in November 2019, when freight end users from the region were present for a workshop, focused on rail freight in the region. The attendees shared their current concerns regarding freight on the region as well what is required in order to meet the future freight forecasts. The outcome of the workshop was a set of emerging themes which were established through the interactive sessions at the workshop. The eight themes which emerged from the workshop impacting the Southern Region, included: how to decarbonise rail freight, capacity of the network, infrastructure constraints, nodal strategy, potential for high speed logistics, Strategic Routing Opportunities and Route Knowledge. Module 3 of this study is currently underway and is looking to answer the strategic question: What are the future requirements for the longer-term freight market (up to 2043)? The scope of this module 3 study includes identifying at future growth on the North Kent and Brighton Mainline corridors, how freight can be decarbonised on the Southern Region, potential new markets and potential constraints to growth.

2.4 STAKEHOLDER STRATEGIES

Network Rail and Highways England work closely with their stakeholders to align goals and objectives. This enables all parties to have a common understanding of the issues, constraints and funding priorities for the rail and highway networks. Some stakeholder strategies are summarised here as examples of this alignment of purpose.

Transport for the South East (TfSE)

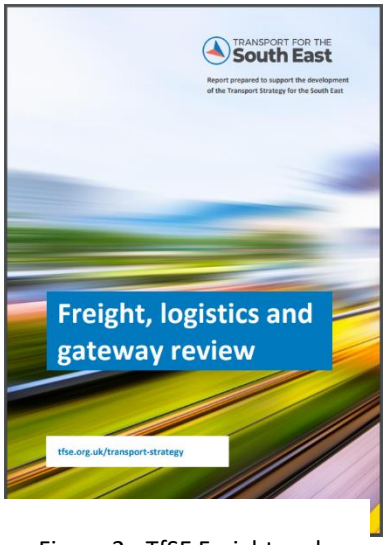


Figure 2 - TfSE Freight and Logistics Gateway Review

The key strategy related to freight produced by Transport for the South East (TfSE) is the 'Freight, logistics and gateway review', which forms part of the draft transport

strategy and was published in 2019.[29] The study provides a consistent view of current and future patterns of freight activity, freight logistics and gateways across the TfSE area for inclusion in the TfSE Transport Strategy.

The study recognises that road transport dominates inland freight movements, quoting that road transport carries two-thirds of goods moved. It is noted that the M27 and A34 are two of the most important and busiest routes for HGV and car traffic in the TfSE area.

From a rail perspective it highlights the significance of the Southampton to Basingstoke/ Reading corridor for freight movements; noting that it carries considerably more freight movements than any other corridor or route within the TfSE area.

The main conclusions stated for the study's analysis of freight movements are that:

- Road freight is dominated by short distance movements, which is typical for the whole country
- The TfSE area's roads carry important volumes of goods traffic to or from other countries via important gateways such as Southampton and Portsmouth docks
- There are important volumes of goods being moved through the TfSE area to and from London, East Anglia, and the Midlands
- Rail freight movements are dominated by imports of aggregates from other regions (and from Grain and Cliffe within TfSE), and by over 20 trains per day of containers and cars to and from Southampton

In its final recommendations and conclusions, the study identifies a series of objectives as a means to drive improvements to freight transport planning, these include: improving network efficiency to reduce the impact of freight movements on congested networks; increased network capacity; and encouraging modal shift from road to other modes including rail.

In addition, TfSE are developing a series of 'Area Studies' based around the most important economic corridors in the TfSE region and broader 'Thematic Studies'. The corridors that have been identified for the 'Area Studies' are those that connect some of the biggest towns and cities and international gateways across the TfSE region with the aim of identifying opportunities for sustainable economic growth. The 'Area Studies' and 'Thematic Studies' most aligned to the geography of this Strategic Study are:

- The Outer Orbital Area Study - encompasses the strategic corridors that follow the coastline from the New Forest in Hampshire towards East Kent
- The South West Radial Study – encompasses the strategic corridors that radiate out of London into Surrey and Hampshire and the southern parts of Berkshire
- The Freight, Logistics and International Gateway Strategy – building upon the published review described above

These workstreams provide an opportunity for continued working between TfSE, other SNTBs, Highways England and Network Rail.

[29] Freight, logistics and gateway review' – Transport for the South East (2019) https://transportforthesoutheast.org.uk/app/uploads/2020/11/Freight-logistics-and-gateway-review.pdf

England's Economic Heartland

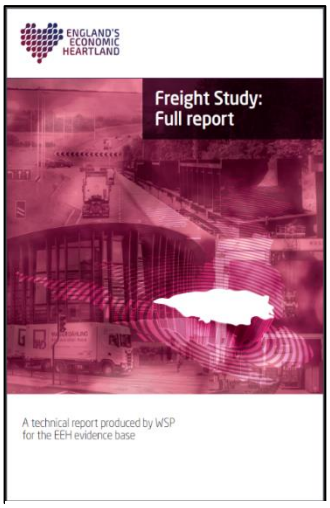


Figure 3 - England's Economic Heartland Freight Study

The key strategy related to freight produced by England's Economic Heartland (EEH) is the 'Freight Study: Full Report', which forms part of the evidence base for the development of the EEH Transport Strategy and was published in 2019.[30]

The study aims to support EEH in planning for the most efficient way of providing access to goods, that unlocks economic potential, protects the environment and communities, and future-proofs networks to accommodate growth and improve efficiency.

The study highlights that there has been a long trend towards centralisation of supply chains which has resulted in a strong concentration of large national distribution centres (NDCs) in the "Golden Triangle" of logistics centred around Lutterworth.

The environmental impact of HGVs is noted, stating that although HGVs only constitute 5% of the total vehicle mileage in the UK, they contributed 16% of the UK's greenhouse gases that resulted from transport in 2014. In addition, it is noted that poor air quality is considerably impacted by HGV traffic, particularly in urban areas.

In this study, EEH recognise the importance of the rail corridor from Southampton to the Midlands with a high number of freight movements, with the majority being related to the intermodal services.

It is noted that East West Rail proposals to connect Oxford and Cambridge could offer opportunities for improved rail freight connectivity. Particularly, the potential for improved access to terminals in Northamptonshire from Southampton is highlighted.

The study identifies a series of issues that impact potential road and rail freight opportunities, including:

- Road congestion
- Road reliability and resilience, including diversionary routes
- Low HGV payloads and empty running (making more efficient use of vehicles)
- Emissions from HGVs
- The impact of construction material movements by road (transfer more to rail)
- A lack of rail capacity
- The ability to operate longer freight trains
- The lack of rail connected intermodal terminals
- The lack of east/ west rail connectivity

There are also several planned connectivity studies by England's Economic Heartland which includes reference to the A34 – the studies in question which utilise the A34 are Oxford-Milton Keynes, Peterborough-Northampton-Oxford, Oxford-Didcot-Swindon.

[30] Freight Study: Full Report' – England's Economic Heartland (2019) https://eeh-prod-media.s3.amazonaws.com/documents/Freight_Study.pdf

Midlands Connect Strategy: Powering the Midlands Engine (2017)[31]

The Midlands is one of the largest economic areas outside of London and is therefore a key location for freight, both coming into and leaving the area. The Midlands Connect Strategy identifies a series of intensive growth corridors of which the route to/from the Solent area is included.

The strategy recognises that transport connectivity can support economic growth in different sectors and locations across the Midlands and also how the transport network, both road and rail, can act as a barrier to growth, both of which are key elements of the Solent to Midlands Freight Strategic Study

The strategy also highlights the importance of exports from the Midlands, some of which would leave via the Solent ports, as well as the need for a resilient rail and road freight network.

2.5 DECARBONISATION

In response to the international Paris Climate Agreement in 2015, which saw global commitment to limit average temperature rise to below 2°C with aspirations to limit the rise to below 1.5°C, the UK government has legislated that the UK economy must achieve net-zero greenhouse gas emissions by 2050. This requires all sectors of the economy to act immediately along the "road to zero". Supplementary to this, then Rail Minister, Jo Johnson in 2018, identified an aspiration to remove all diesel only trains from the network by 2040. In response to this the rail industry convened the Decarbonisation Taskforce which concluded that this aspiration was possible for passenger services through deployment of trains powered by battery, electric or hydrogen but for freight, removal of diesel only trains required significant further deployment of overhead line electrification. A brief timeline of these events is summarised in Figure 4.

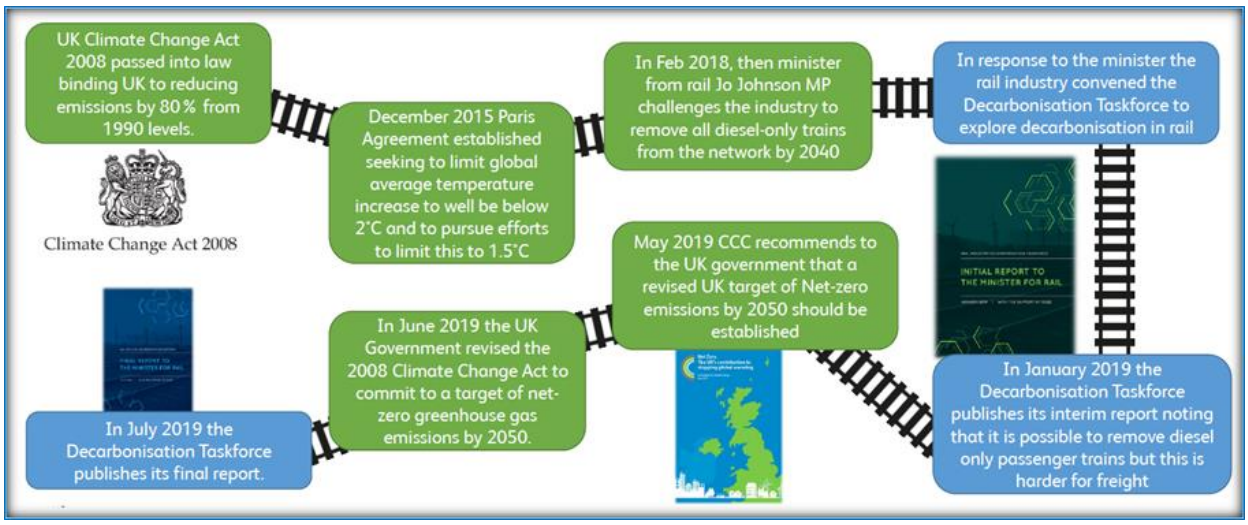


Figure 4 - Summary of rail industry's response to the decarbonisation agenda (Source: Network Rail)

Network Rail, building on the work of the decarbonisation taskforce, has completed the Traction Decarbonisation Network Strategy (TDNS). This work has determined the extent to which further electrification, battery technology and hydrogen technology could be deployed across the UK rail network to achieve zero emissions from rail traction.

[31] Midlands Connect Strategy: Powering the Midlands Engine (2017) https://www.midlandsconnect.uk/media/1224/midlands-connect-strategy-march-2017.pdf

Overall, rail contributes around 3 MtCO2e per year (Mega tonnes of Carbon Dioxide equivalents per year). This represents a very small amount of the total UK emissions (less than 1%) with rail one of the lowest emitting transport modes in the UK (from a total transport emissions perspective).

The TDNS sets out a series of strategic benefits that form the basis for the strategic case to make the move towards a decarbonised fleet across both passenger and freight sectors. The key benefits shown in figure 5, below, are:

- Emissions reduction
- Surface transport decarbonisation
- Passenger and freight end user benefits
- Direct rail benefits
- Environmental benefits
- Wider economic benefits

A move from road to rail, for certain freight commodities, will see direct realisation of these benefits. Figure 5, below, notes that there are benefits from a movement from road to rail even if the railway has not been completely decarbonised; this is an important point to note when considering freight, where full decarbonisation is likely to take some time to deliver across the whole network. The TDNS also highlights the need for improved resilience to give confidence in rail as an alternative to road; another important consideration for rail freight customers.

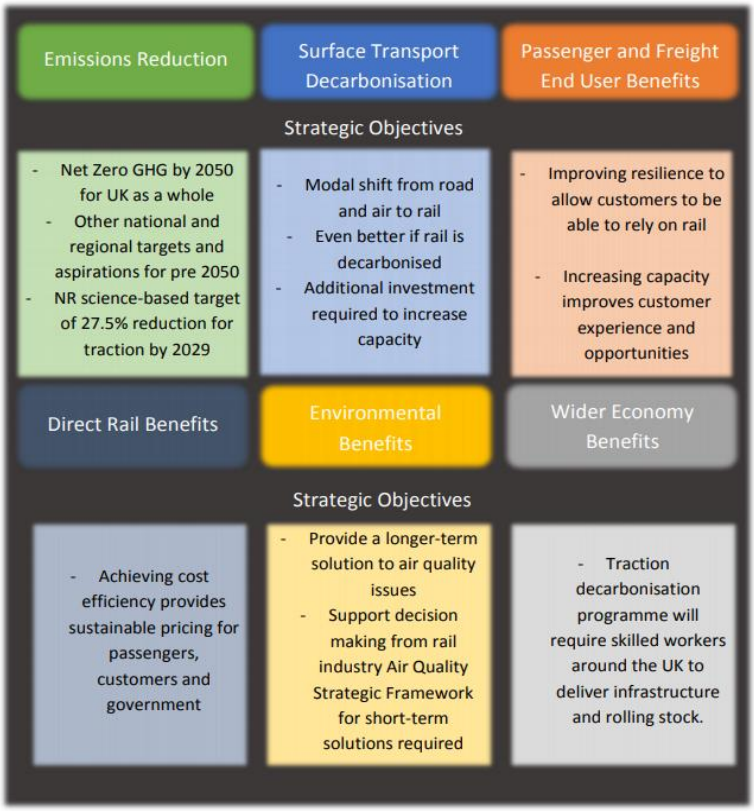


Figure 5 - TDNS Strategic Objectives (Source: Network Rail)

The TDNS has broken down a series of decarbonisation recommendations by Network Rail Region, some of which are described below:

- **Southern Region**:

  The route from Southampton to Basingstoke is heavily used by both freight and passenger services. The current freight fleet in this area operates using diesel services due to their operation beyond the electrified network and the limited number of locomotives capable of using third rail traction as well as several operational limitations. Whilst regional passenger services use the third rail system, long-distance high-speed services from CrossCountry also use diesel traction. Careful consideration will be required in assessing this corridor and the solution provided.

  The current freight and long-distance high-speed services (CrossCountry) diversionary route via Romsey and Andover should also be considered when understanding the electrification solution for freight traffic from Southampton. Potential new diversionary routes via Salisbury and Westbury will also need to be considered.

- **Western Region:**

  Electrification has been identified as the most likely and appropriate decarbonisation solution for much of the infrastructure that falls within the scope of the Solent to Midlands Freight Strategic Study on the Western Route. This is important for freight and passenger service decarbonisation as lines through the Western Region are key for both service groups.

  Potential diversionary routes from Southern Region via the Western Region have been identified through previous studies and workstreams. These routes include the diversion of Solent freight via Salisbury and Westbury. From Westbury services could be diverted via Newbury, Melksham or Bath/ Bristol. All these routes have been identified for future electrification.

- **North West and Central Region**

  Electrification has also been identified for the Chiltern Main Line. The significant freight flows from Southampton via Didcot and Oxford join this route at Banbury. The freight traffic either continues to Birmingham or diverges at Leamington Spa destined for Nuneaton or the WCML. In both cases, electrification has been identified as the ideal decarbonisation strategy. Beyond Birmingham other routes used by freight are also identified as requiring future electrification.

These TDNS recommendations highlight the importance of overhead electrification for the future decarbonisation of the rail network. Owing to the third rail infrastructure already in place in the Southern Region it can be seen that any future freight rolling stock decarbonisation solution will need to have both overhead and third rail capability.

Road

A specific decarbonisation policy for Highways England is currently being written and will be published within the next 12 months as set out in the Highways England Strategic Business Plan. Highways England recognises every aspect of our business has a part to play in improving environmental performance whilst ensuring statutory obligations are met. Environmental considerations and decarbonisation measures are embedded in all HE activities ranging from infrastructure design to scheme delivery, supported by our environment and wellbeing fund.

It is Highways England's understanding that logistics and freight operators in the UK are in the process of researching electric or hydrogen-powered HGVs but these are still in the early stages and details are as of yet unknown. Research is ongoing within the industry to find solutions to potential zero carbon barriers such as network infrastructure to support hydrogen refuelling or electric as well as the capacity of these vehicles to travel long distance. The Government currently have a Rapid Charging Fund announced in the March 2020 budget which support the transport network in its transition to electric vehicles – this fund aims to deliver 6 high powered charge points at service stations across England by 2023 and by 2035, up to 6000 charge points across the UK.[32] Primarily, these charge points will be for electric cars but more is expected to be announced by the government on electric HGVs when the Transport Decarbonisation plan is published. Highways England will continue support the government and freight operators' stakeholders in delivering the important wider environmental strategies of achieving net zero carbon.

Figure 6 below uses DfT's Continuing Survey of Roads Goods Transport (CSRGT) data to provide an estimate of empty vehicles travelling on the network. Empty vehicles can be measured in terms of vehicle kilometres travelled – the % of empty vehicles has been determined by journeys that reported no goods transported. The table shows the total number of kilometres travelled between regions and the Solent to Midlands corridor and the percentage of these kilometres which are empty vehicles. Highways England will work with freight partners to ensure the number of empty vehicles travelling is reduced to contribute to a carbon-free network.

Row Labels	Average % of empty vehicles (2019)
Inbound (Yorkshire and North East)	16%
Outbound (Yorkshire and North East)	24%
Inbound (North West)	13%
Outbound (North West)	3%
Inbound (East Midlands)	31%
Outbound (East Midlands)	38%
Inbound (West Midlands)	27%
Outbound (West Midlands)	28%
Inbound (Berkshire, Buckinghamshire and Oxfordshire)	36%
Outbound (Berkshire, Buckinghamshire and Oxfordshire)	25%
Inbound (Gloucestershire, Bristol/Bath and South Wales)	42%
Outbound (Gloucestershire, Bristol/Bath and South Wales)	29%

[32] **Government vision for the rapid chargepoint network in England** https://www.gov.uk/government/publications/government-vision-for-the-rapid-chargepoint-network-in-england/government-vision-for-the-rapid-chargepoint-network-in-england

Inbound (Cornwall, Isles of Scilly, Devon and Somerset)	44%
Outbound (Cornwall, Isles of Scilly, Devon and Somerset)	37%
Inbound (Dorset, Bournemouth, Christchurch and Poole)	24%
Outbound (Dorset, Bournemouth, Christchurch and Poole)	29%
Inbound (Wiltshire)	54%
Outbound (Wiltshire)	42%
Inbound total	**31%**
Outbound total	**28%**
Grand Total	**29%**

Figure 6- Estimate of empty vehicles travelling on the network. (Source: Highways England)

Approximately 29% of all vehicle kilometres travelled in the Solent to Midlands corridor on the SRN are from empty trucks and trailers. Assuming the majority of these longer distance empty freight movements are on 44 tonne articulated vehicles and a typical lorry uses 30 litres of fuel for every 100 kilometres travelled, this uses 991,527 litres of diesel. For every litre of diesel burnt this creates 2.64kg of CO2 into the atmosphere. The litres burnt by these empty vehicles represent 2,618 tonnes of CO2 annually with no productive payload. Highways England is committed to working with freight handlers to ensure this number is brought down and this will be reviewed further in Phase 2 of this study. As can be seen there are many empty movements in both directions and this information must offer potential for rationalisation and improvement. To note that the A34, the key road route in the Solent to Midlands corridor, has several Air Quality Management Areas along the route and the area around Oxford is a key area for Air Quality management for Highways England. Highways England implements multiple actions such as dynamic travel management and air quality barriers are put in place to manage air quality across our network.[33] In terms of how Highways England will reach decarbonisation targets on this corridor in the future will be investigated further in Phase 2 of the study.

Key Points

- Policies across the freight transport and logistics industry show that there is a strong appetite for modal shift to rail as a method of decarbonisation of the road and rail networks. Network Rail and Highways England can work together to optimise decarbonisation and ease congestion across both networks.

[33] https://highwaysengland.co.uk/our-work/air-quality/air-quality-our-programme-of-activity/

3. THE IMPORTANCE OF THE SOLENT TO THE MIDLANDS ROUTE

3.1 OVERVIEW

The Solent to the Midlands corridor has been chosen for this study as the route is one of the most important corridors in the UK for freight across both rail and road. It links the major port of Southampton with the numerous distribution centres and economic hubs of the Midlands and the North. The Solent Ports, particularly Southampton, are in favourable locations for connections to the global freight and logistics market due to their proximity to the main shipping lanes between North East Europe and the Far East[34]. The Midlands is home to a high concentration of large distribution centres and warehouses – the so-called 'Golden Triangle' of freight distribution. This high concentration is due to the proximity of this area to key arterial motorways and rail networks which link the area to areas all over the UK.

The A34, managed by Highways England, links the Solent Ports and the Midlands and is closely mirrored by the equivalent rail route, owned and operated by Network Rail. The A34 is the busiest non-motorway HGV trunk road in the UK and the rail route passes through some of the busiest passenger rail networks. The analogous nature of the route means that it is an ideal candidate for cross-modal analysis to understand how both networks can be used most efficiently.

3.2 ROAD AND RAIL CONNECTIONS

As outlined in figure 7 below, freight travelling by road between the Solent and the Midlands uses the A34 (part of the Strategic Road Network) to connect with the M40 to access destinations throughout the Midlands and beyond while the rail route follows the road route closely but taking a slightly longer route via Reading and Didcot. The road and rail routes are described in more detail later in this study.

[34] https://www.dpworldsouthampton.com/about/about-us

Figure 7 - The road and rail route between the Solent and the Midlands (Contains public sector information licensed under the Open Government Licence v3.0.)

3.3 THE SOLENT PORTS

The Solent area is characterised by its two ports: Port of Southampton and Portsmouth International Port. The ports at Southampton and Portsmouth are situated just 20 nautical miles from international shipping lanes and less than 100 nautical miles from the mass markets of mainland Europe, providing a strategic hub and gateway to global markets across southern and central England. Both ports have a strong impact on both the economy of the region and the UK. In 'Transport Infrastructure for our global future', published in 2017, DfT state the economic importance of the UK's 81 ports, see figure 8:

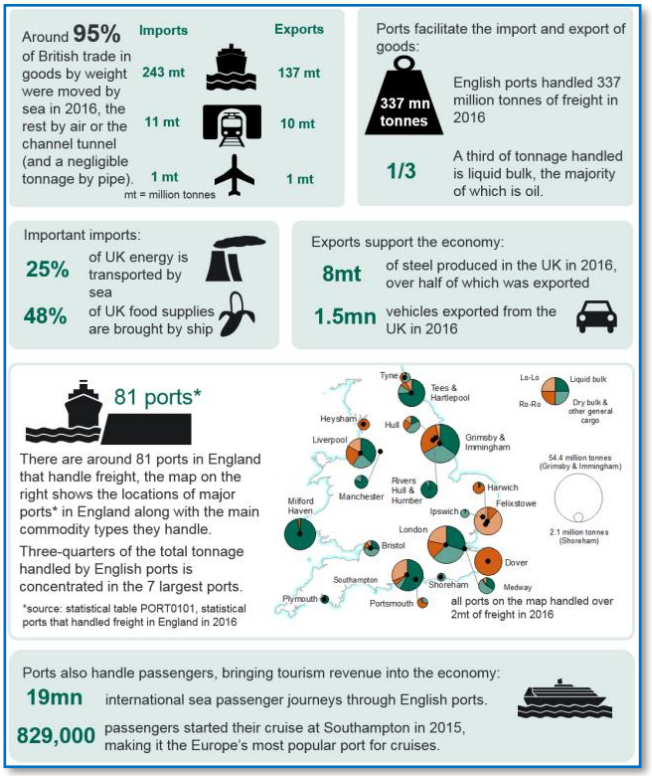


Figure 8 - Economic benefits of UK Ports (Source: DfT)

The Solent Local Enterprise Partnership (LEP) state that the Solent's marine and maritime sector is one of the area's largest and most productive sectors, accounting for 20.5% of Solent's GVA, providing 40,000 jobs locally, and supporting more than 3,000 businesses[35]. Also located to the west of Portsmouth and Southampton is the smaller Port of Poole which handles predominantly ro-ro traffic to and from destinations such as France, Spain and the Channel Islands.

In March 2021, the government announced that the Solent has recently been shortlisted to be the location of a freeport. This is due to come into operation in late 2021[36].

[35] https://solentlep.org.uk/the-solent/marine-and-maritime-economy/

[36] https://www.solentfreeport.com/

Port of Southampton

The Port of Southampton is one of the UK's major vehicle handling ports, one of Europe's leading turnaround cruise ports and one of the UK's busiest container port. The Port handles around 36 million tonnes of cargo each year; supports 15,000 jobs regionally and contributes around £2.5 billion to the UK economy on a site of approximately 726 acres. Over £71 billion of goods is handled through the Port every year (14% of UK throughput by value) of which £40 billion accounts for UK export goods to the global marketplace.[37]The Port is well connected to both the road and rail networks, being less than two miles from the M27 and with direct rail links to the main railway network for both freight and passenger trains.

Southampton is a critical stopping point on the world's busiest trade route from Shanghai to Rotterdam and able to handle the largest container vessels afloat (>22,000 TEU). The Port handles more than 2.0 million twenty-foot equivalent unit containers (TEUs) through its container terminal operated by DP World (the second largest in the UK) with the proportion of containers handled by rail approaching 40%. In 2020, the Department for Transport announced funding of £17 million so that freight trains running to the Port can be increased in length from 520m to 775m.

The Port is a gateway to global markets for the automotive industry. Southampton handles around 850,000 vehicles each year; handling all sizes of vessel and Roll On-Roll Off (Ro-Ro) cargoes of which around two thirds are export vehicles. Around 20% of export vehicles arrive at the Port via rail. Southampton is also the largest turnaround cruise port in Europe welcoming over 2.1 million passengers on 500 cruise ships in 2019. The Port has recently announced a £55 million investment into a new fifth cruise terminal which will include the largest commercial shore power installed in the UK enabling zero emissions from vessels during their stay. The Port also includes a multi-user bulk terminal, situated in the Port's Western Docks, which handles cargoes and minerals including animal feed, fertiliser, scrap, aggregates, salt, and biomass products. In addition, an export grain-silo terminal is located in the Eastern Docks.[38]

Portsmouth International Port

Portsmouth International Port, formerly known as the commercial or continental ferry port, has only been in operation since 1976. It is owned and operated by Portsmouth City Council and has grown extensively over the intervening decades. Initially it offered just one route to France from a small section of reclaimed harbour front. It is connected to more destinations than any other UK Port. The Port's location on the M275, with fast road connections to London, mean that it is an important location for both passengers and Roll On-Roll Off (Ro-Ro) freight. Portsmouth International Port is one of the country's leading Ro-Ro traffic destinations, with crossings to France, Spain and the Channel Islands. The Port is a key destination for fresh fruit and vegetables from all over the world. 70% of all the bananas eaten in the UK arrive at Portsmouth International Port before heading to supermarket shelves across the country.

Owing to the location of the Port in relation to the railway there is no direct link and therefore no freight is currently moved via rail. However, Portsmouth International Port funded the renovation of a freight siding at nearby Fratton in 2007 calling it "Portsmouth Intermodal Goods Yard". Unfortunately, this has not seen much freight traffic as the

[37] https://www.abports.co.uk/media/s5cfqmyy/abp-economic-impact-study.pdf

[38] https://www.abports.co.uk/about-abp/economic-impact/

market hasn't been there to make it financially viable. In addition, The Port benefits from a direct motorway link from its gate, whereas a short road journey is required to reach the rail terminal at Fratton from the Port.

Port of Poole

On the edge of the Solent region is the smaller Port of Poole. The Department for Transport notes that "Poole's key market is Ro-Ro, moving freight and passengers to France, Spain and the Channel Islands, followed by dry bulks (e.g. grain, fertiliser and timber). The port also handles cruise ships and marine leisure (yacht exports)."[39] The vast majority of freight is moved from Poole via the road network, however the Port of Poole itself is not accessible by the SRN. The closest SRN route to the rest of the country is the A31 and the A338. A strategic study is underway at Highways England to assess access for the Port of Poole and how the SRN could be improved in this area to facilitate better transportation links. The Hamworthy Branch rail line connects Poole Docks with the South West Main Line for onward journeys towards the north but currently sees no rail traffic. The final section of the line towards the docks themselves is currently designated out of use. Network Rail are working closely with the Port to realise new rail freight opportunities.

3.4 THE MIDLANDS & THE NORTH

At the end of the road/ rail corridor from the Solent is Birmingham and the West Midlands. In Midland Connect's 'Midlands Connect Strategy: Powering the Midlands Engine', published in 2017, it is stated that the Midlands is important to the UK's economy, accounting for one in six jobs, and being home to many world-leading companies.

It also states that the Midland's manufacturing sector accounts for a quarter of all UK manufacturing jobs and production. This includes companies such as Jaguar Land Rover, JCB, Toyota, Rolls Royce and Bombardier; all of which require road and/or rail at some point in their manufacturing process.

In their 'Freight Narrative Report'[40], published in 2017, the Midland Connect SNTB note that the Midlands region contributes a large proportion of the UK's exports. In the period between 2010 and 2013, exports from the Midlands increased by 37% compared to the UK average of 15% (Regional Trade Statistics 1996-2015). In 2013, the value of these exports was over £50bn. This shows the significance of the Midlands as a region and why the efficient operation of the corridor linking to the Solent, both in terms of road and rail, is so important.

But freight from the Solent area is not all destined for the Midlands: some continues to the North of England and Scotland. In their Strategic Transport Plan, Transport for the North SNTB (TfN) include "supporting businesses to move freight and goods efficiently and across modes" as one of the key aims. The TfN transport plan highlights the need to improve both road and rail networks to better connect locations across the North, such as Liverpool, Manchester, Leeds, Sheffield and Newcastle to other locations beyond the TfN area.

Improving the reliability and resilience of the Solent to Midlands corridor, be that through road or rail interventions, has the potential to unlock far reaching economic benefits to large parts of the UK beyond the scope of this study through onward connections to the North and Scotland.

---

[39] England's Port Connectivity – The Current Picture https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/701352/england-port-connectivity-the-current-picture.pdf

[40] https://www.midlandsconnect.uk/publications/freight-narrative-report/

3.4 OTHER CONNECTIONS

In addition to connections to the North, it should also be noted that the route between the Solent and the Midlands also provides important connections from the Solent Ports to Bristol, Wales and other locations in the West via the A34 and M4 as well as the rail links from the South West Main Line and the Great Western Main Line.

3.5 DISTRIBUTION CENTRES AND STRATEGIC WAREHOUSING

The flow of manufactured and retail goods from the Solent Ports is managed through the use of distributions centres located at points along or connected to the road and rail corridor that this strategic study is concerned with. The map below, taken from the Foresight report 'Understanding the UK Freight Transport System', published in 2019, details the spread of these Distribution Centres (DCs) across England and Wales.

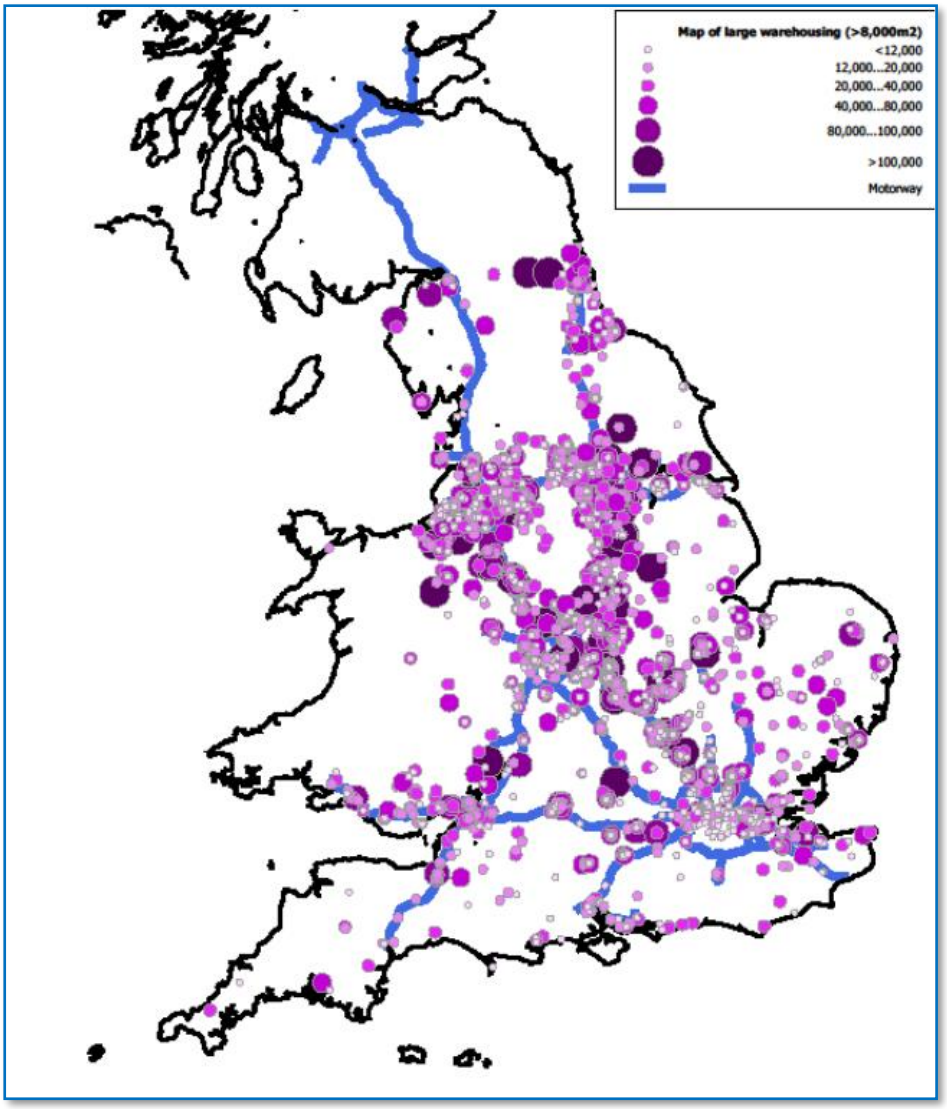


Figure 9 - The location of distribution space over 8,000 square metres in England and Wales in 2017
(Source: DfT/Foresight)

It is clear there are several distribution centres around the Solent area with a large proliferation in the Midlands. In their 'Logistics and Gateway Review' of 2019, Transport for the South East (TfSE) note that a common pattern for National Distribution Centres (NDCs) is to locate them in the Midlands, the "Golden Triangle" of logistics, from where goods from the Solent Ports might be sent before being distributed across the country, including back into the TfSE region.

England's Economic Heartland's (EEH) 'Freight Study', published in 2019, describes the "Golden Triangle" as an area centred on Lutterworth with one of the main benefits being that a single lorry driver shift (out and back) is all that is required to transfer goods from the ports to the NDCs.

The location of the DCs and NDCs are not necessarily connected directly to the rail network and therefore the use of HGVs and the road network is necessary, even if this is in combination with a rail journey to a nearby Strategic Rail Freight Interchange.

Key Points

- The Solent to the Midlands has been chosen for this study as the route is one of the most important corridors in the UK for freight across both rail and road.
- It links the major port of Southampton with the numerous distribution centres and economic hubs of the Midlands and the North.
- The Solent Ports, particularly Southampton, are in favourable locations for connections to the global freight and logistics market due to their proximity to the main shipping lanes between North East Europe and the Far East[41].
- The Midlands is home to a high concentration of large distribution centres and warehouses – the so-called 'Golden Triangle' of freight distribution. This high concentration is due to the proximity of this area to key arterial motorways and rail networks which link the area to areas all over the UK.
- The A34, managed by Highways England, links the Solent Ports and the Midlands and is closely mirrored by the equivalent rail route, owned and operated by Network Rail.
- The A34 is the busiest non-motorway HGV trunk road in the UK and the rail route passes through some of the busiest passenger rail networks.
- The analogous nature of the route means that it is an ideal candidate for cross-modal analysis to understand how both networks can be used most efficiently.

[41] https://www.dpworldsouthampton.com/about/about-us

4. THE ROAD ROUTE

4.1 OVERVIEW

The Solent to Midlands corridor covers a wide geographical area with multiple SRN routes. Figure 10 below details the roads covered in this area as well as the locations of the Solent Ports (Southampton, Poole and Portsmouth). This corridor is a key link for international economic gateways and major urban centres. The focus of this study is the A34, a dual carriageway that runs between junction 9 of the M40 and junction 9 of the M3, roughly Winchester to Oxford geographically. Access to the A34 is from the Solent is either A31 or M27.

The A34 has several key junctions namely, the A303 for destinations in the South West such as Cornwall and the M4 for destinations in Bristol or South Wales. Travelling northbound, the A34 reaches the M40 for destinations beyond Oxford such as Birmingham, Northampton and Nottingham. The corridor also bypasses airports such as Southampton International and is a route for several employment hubs such as the M4 'Silicon Valley' corridor where multiple international businesses have their headquarters.

The A34 supports strategic regional retail, tourism and leisure industries and local freight journeys such as agriculture. It is a main route for visitor destinations such as Newbury racecourse and Silverstone Racing Circuit); and is important in accessing key military and defence locations. The A34 is also a key route for Southampton Airport, a primarily passenger airport with a catchment area of 3 million people within an hour's drive.[42] The South West Main Line rail route passes close to the airport with a passenger station at Southampton Airport Parkway but there are no current rail freight

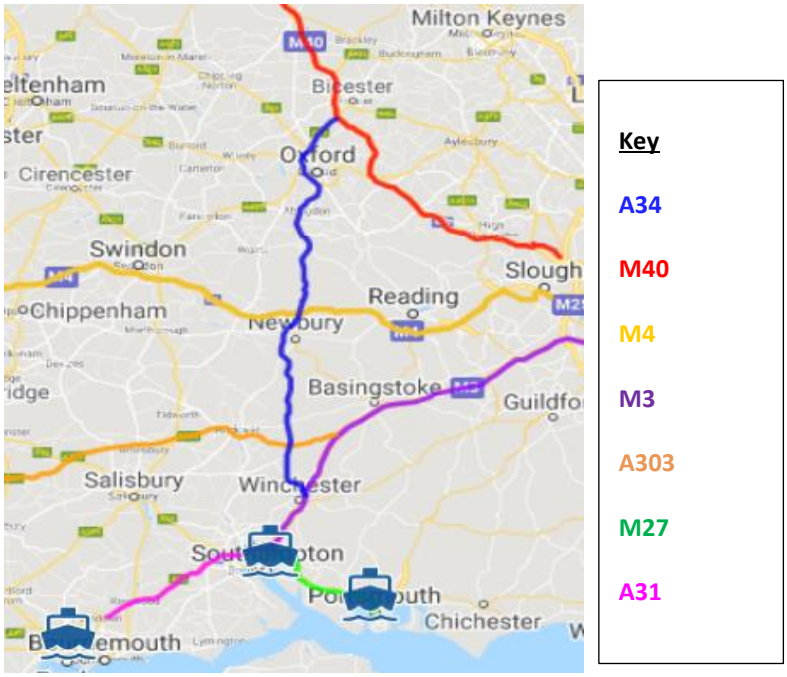


Figure 10 - Map of Solent to Midlands Road Corridor (Source: Highways England)

[42] https://www.southamptonairport.com/media/b5whqqn1/surface-access-strategy.pdf

movements associated with the airport. The route provides access to several important environmental areas including: North Wessex Downs Area of Outstanding Natural Beauty (AONB); South Downs National Park; and New Forest National Park.

The A34 is a key route for all traffic coming to and from the Solent area and is the main SRN route focused on in this study. As detailed in the Solent to Midlands Route Strategy, in 2016 the route had 3.2 billion vehicle miles travelled.[43] The A34 is at high capacity with high numbers of commercial and local traffic including agricultural traffic daily – this combined means the A34 is often congested and journey times can be unreliable. For both north and southbound traffic, congestion is situated mostly at the M3 junction near Winchester and the M40 junction close to Oxford.

Current and future enhancements within the A34 corridor planned by Highways England are:

- A303 Stonehenge Tunnel – This major project has just been given the go-ahead by Department for Transport, this project will likely mean that the A34 is busier during construction but ultimately will provide congestion relief benefits to the surrounding areas.[44]
- A34 Improvements North and South of Oxford – This project is of the most significance to the A34. The project is currently in the options identification phase. These improvements will aim to ease congestion in and around the A34 and make accessing Oxford a smoother journey.[45]
- A34 Safety Package – This project is a package of safety improvements on the A34. This project is currently on-going.
- M3 J10-14 Improved Slip roads – Currently under construction.
- M3 J9-14 Smart Motorway – This project is currently in development.[46]
- M3 J9 Improvement – This junction provides access to the A34 from the M3 and currently has multiple congestion issues. This project aims to create a free-flowing link direct to the A34 to reduce congestion. Project is currently in development.[47]
- A404/M40 Junction improvement – This project is committed for RIS3 and aims to create a free-flowing junction.
- M4 Junction 3-12 Smart Motorway – This project is currently under construction and due to be completed in 2022.[48]

[43] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/600330/Solent_to_Midlands_Final.pdf

[44] https://highwaysengland.co.uk/our-work/a303-stonehenge/

[45] https://highwaysengland.co.uk/our-work/a34-improvements-north-and-south-of-oxford/

[46] https://highwaysengland.co.uk/our-work/south-east/m3-junctions-9-to-14-smart-motorway/

[47] https://highwaysengland.co.uk/our-work/south-east/m3-junction-9-improvements/

[48] https://highwaysengland.co.uk/our-work/south-east/m4-junctions-3-12-smart-motorway/

Figure 11 - Sections of the A34 (Source: Highways England)

4.2 LOCAL AUTHORITIES

The Economic Assessment Tool (EAT) used by Highways England is an internal tool that builds on the four economic roles the SRN provides as set out in Road to Growth.[49] These roles are linked to publicly available datasets at local authority level to provide a proxy to a location's economic road-reliance. Ten local authorities that the A34 passes through – the residents and businesses in these LA areas utilise the A34 on a frequent basis – were put through the assessment tool. The local authorities were Cherwell, Vale of White House, South Oxfordshire, West Berkshire, Basingstoke and Deane, Winchester, Southampton, Eastleigh, Fareham and Portsmouth.

The EAT provides a quantitative score between 1-5 with 1 being of low significance and reliance on the SRN and 5 being of high significance and reliance on the SRN. The above local authorities all scored higher than 4 across each economic role demonstrating that they have a high significance to the SRN, a heavy reliance on the SRN and that each local authority is a part of providing an efficient strategic route to international gateways e.g. Southampton Port.

As is to be expected, individually Southampton, Portsmouth and Fareham all had very high significance in efficient routes to international gateways and high reliance on the strategic road network. Other important individual factors included South Oxfordshire and West Berkshire having a very high reliance on stimulating sustainable development - this can be assumed to be because of a higher population and various distributions hubs in and around these areas.

4.3 LORRY PARKING

The provision of sufficient safe and accessible rest facilities for lorry drivers is an important component of a safe road network. In addition to physical network safety, a lack of lorry parking provision can also lead to litter and pollution, resulting in further maintenance costs and negative impacts on the local community. Nationally there are many corridors where demand is not met by supply, or where the offer of the market does not meet lorry driver needs. By UK and EU law, drivers legally must have at least a 45-minute break after driving 4.5 hours. This journey time can roughly take a driver to the Midlands and potentially further north if driving conditions were optimal. . Alternatively, the 45-minute break can be interspersed among two shorter driving sessions

[49] The Road to Growth: Our Strategic Economic Growth Plan – Highways England https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/600275/m160503_the_road_to_growth_Our_strategic_economic_growth_plan.pdf

Dependent on their origin/destination, their need for lorry parking would depend on how drivers would want to spend their break time. The below tables are from Highways England and Department for Transport's joint lorry parking study showing the regional overviews for the South East and South West.[50] These figures show that in both regions capacity for vehicles is critical with both having high numbers of lay-by and industrial estate parking in addition to the lorry parks themselves.

South East Regional Overview				
	On-site	Laybys	Industrial Estates	Total
Total Number of Vehicles Parked	2,423	1,065	235	3,723
Foreign vehicles (%)	42%	38%	42%	41%
Number of Sites	58	554	128	740
Utilisation	84%			
Lorry Park Capacity	2,871			
Excess vehicles	(Total Number of vehicles parked - Capacity)			852

South West Regional Overview				
	On-site	Laybys	Industrial Estates	Total
Total Number of Vehicles Parked	783	359	130	1,272
Foreign vehicles (%)	16%	18%	5.38%	13%
Number of Sites	37	523	67	627
Utilisation	72%			
Lorry Park Capacity	1,084			
Excess vehicles	(Total Number of vehicles parked - Capacity)			188

Figure 12 - Highways England and Department for Transport's joint lorry parking study showing the regional overviews for the South East and South West

It should be noted that the results of the above assessment covered the whole South East and West regions, not just the area within the Solent to Midlands corridor. However, the study also showed that the A34 between Southampton and Oxford is the longest stretch of road within the South East that does not have a lorry park with suitable capacity – drivers potentially could have to drive 60 miles to access suitable parking. Dependent on their route, a driver could potentially have nowhere safe to park when travelling towards the Solent ports due to the lack of provision and high volume of freight traffic in general.

[50] National Survey of Lorry Parking – Department for Transport (2017)
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/723349/national-survey-of-lorry-parking-report.pdf

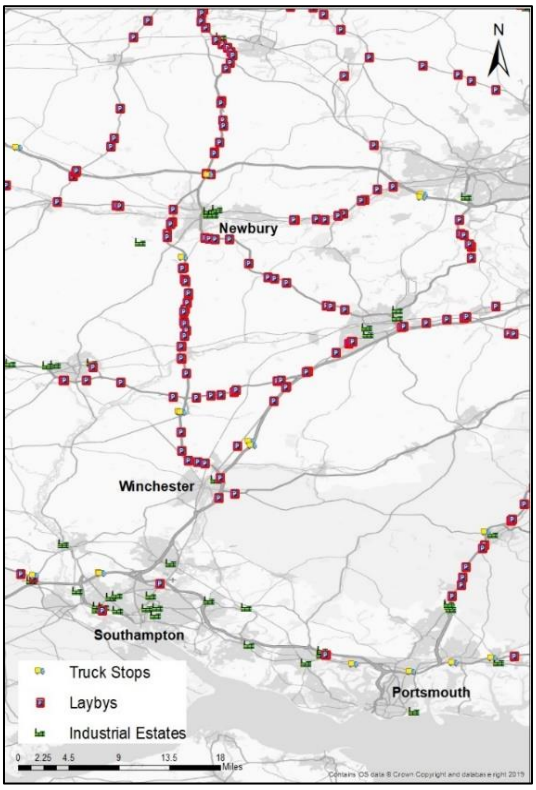


Figure 13 - Current lorry parking facilities in the Solent to Midlands corridor (Source: Highways England)

Figure 13 above shows the current lorry parking facilities in the Solent to Midlands corridor. The majority of parking within the Solent to Midlands corridor are lay-bys, with data showing the majority were in use at all times with only 2 purpose-built truck stops on the A34 itself. This would suggest that specifically on the A34 corridor, lorry parking capacity is at a critical level. There are potentially up to 6000 lorries a day travelling both north and southbound on the A34, most of which will initially be one-way journeys and less than 10% of the capacity available in the South East is close to the A34, meaning that drivers could potentially have to go several miles off route to find a safe place to rest.

The provision of safe, secure lorry parking across the SRN is a priority for Highways England. It is recommended that working with freight and local stakeholders, Highways England should undertake a deep dive on lorry parking demand and supply within the corridor and immediately adjacent to it and develop an approach to address this issue.

Key Points

- The A34 serves a geographical route between Winchester and Oxford whilst also providing connections to other major routes such as the M3, M4, A303 and M40.
- The A34 supports regional tourism, leisure and work including providing access to areas such as the M4's 'Silicon Valley', Newbury Racecourse and Areas of Outstanding Natural Beauty such as North Wessex Downs.
- There are a number of key projects in and around the A34 to ensure the SRN is safe and provides free-flowing access to all, including a major scheme to improve access to the Oxford junctions from the A34.
- The local authorities that the A34 passes through have a significant reliance on the A34.
- Lorry Parking on the A34 is at a critical capacity level.

5. THE RAIL ROUTE

5.1 OVERVIEW

The rail route from Solent to the Midlands is one of the most critical freight routes in the UK. Rail freight in the Solent area is focused almost exclusively at the Port of Southampton with over 32 trains per day[51] on average arriving or departing. The route to the Midlands passes through Basingstoke, Reading, Didcot, Oxford to Birmingham sharing lines that are already busy with passenger services. The below section will describe the route and any key constraints in the area.

5.2 SOUTHAMPTON AREA

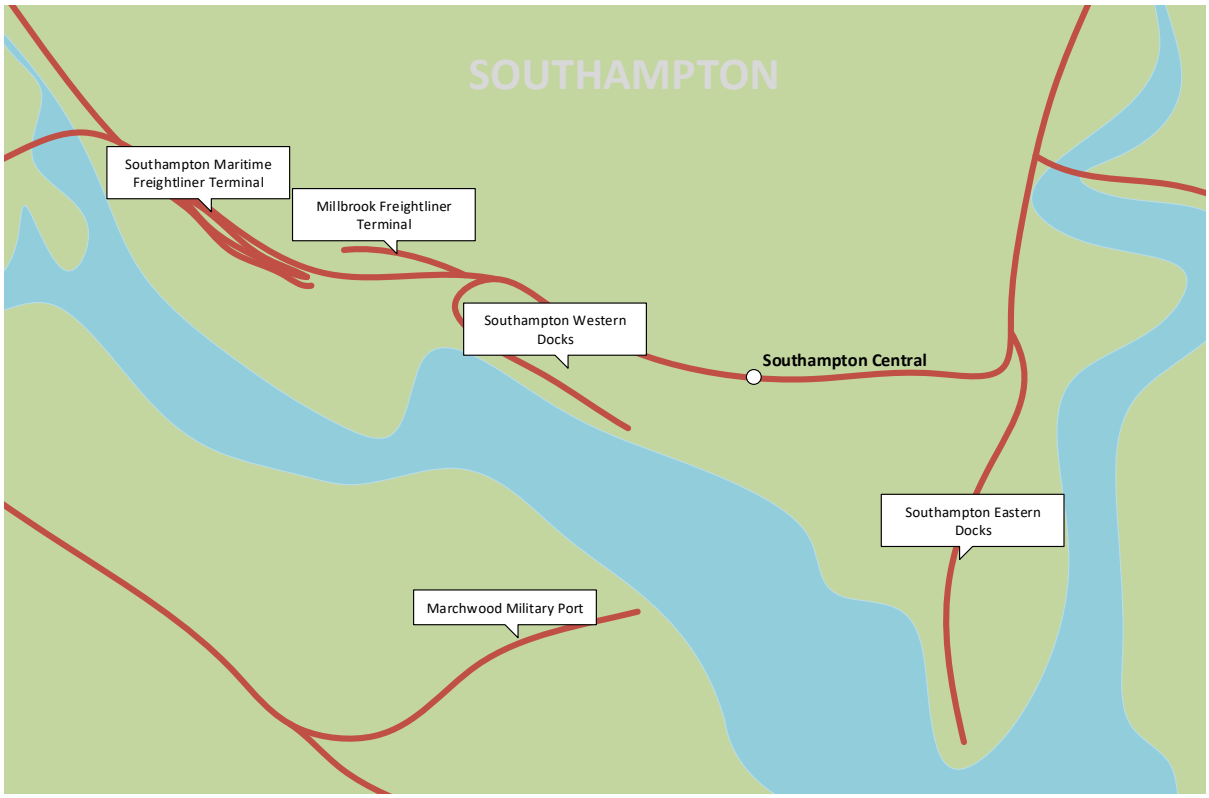


Figure 14 - Freight facilities around Southampton (Source: Network Rail)

The core freight route follows the South West Main Line from Southampton Port. There are multiple freight terminals in the Southampton area that freight trains arrive/depart from.

[51] Average freight train count per day to/from the Port of Southampton (including Marchwood) in railway period 4 in 19/20 from the Train Running System [TOPS] (TRUST).

Southampton Eastern Docks

Southampton Eastern Docks mostly accommodates automotive rail freight. Freight travelling to Southampton Eastern Docks diverges from the South West Main Line at Northam Junction. Part of the way towards the port, the ownership of the line transfers from Network Rail to Associated British Ports. The route also has several level crossings on the line, some of which are Public Highway Automatic Open Crossings (AOCL). The Northam Train Care Depot can also be accessed from this branch. The Eastern Docks can accommodate freight trains up to 685m in length.

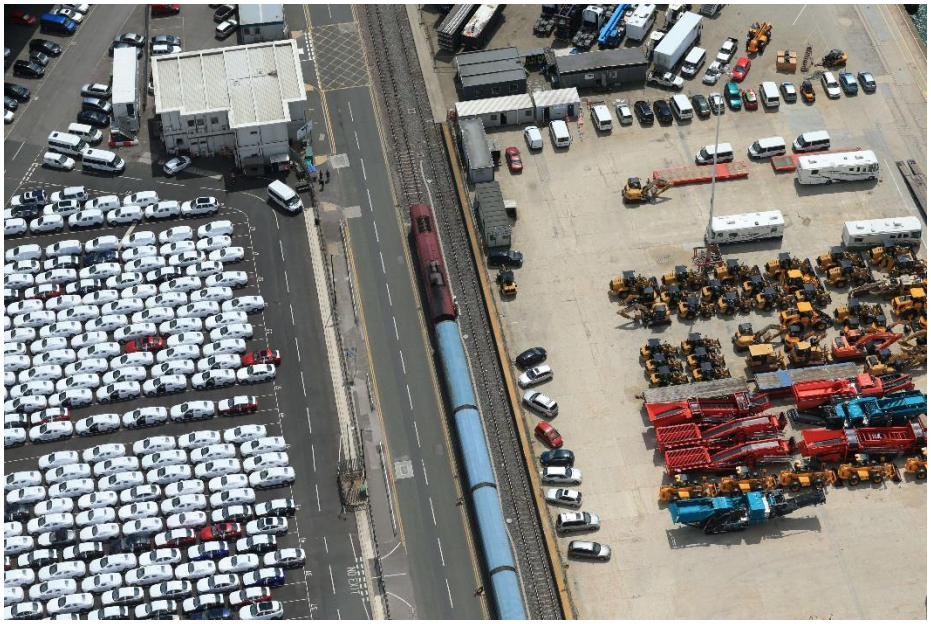


Figure 15 - Automotive freight train at Southampton Eastern Docks (Source: Network Rail)

Southampton Western Docks

Access to the Western Docks at Southampton is at Millbrook with infrastructure changing over to Associated British Ports responsibility soon after leaving the SWML. The Western Docks handle mostly intermodal freight. The Western Docks can currently use a special operating instruction to admit trains over 600m. Once the Southampton Freight Train Lengthening Scheme is complete the Western Docks branch will be capable of 700m, with special operating instructions.

Southampton Maritime Freightliner Terminal

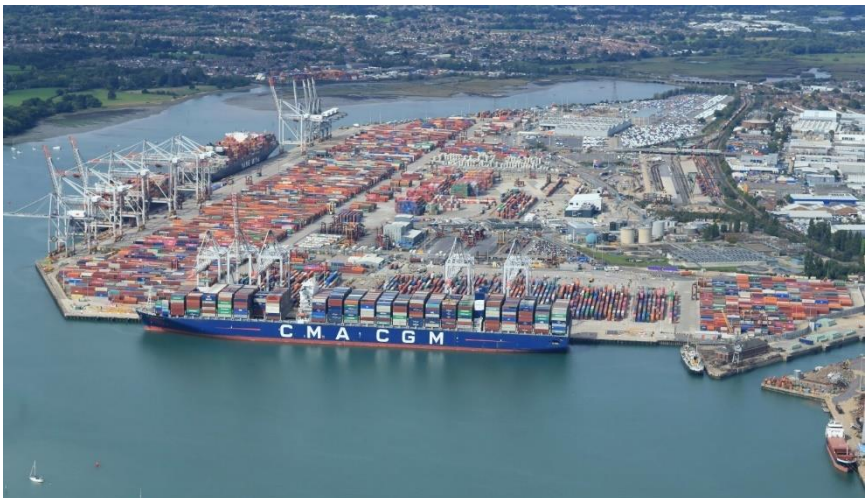


Figure 16 - Southampton Maritime Freightliner Terminal and the Port of Southampton (Source: Network Rail)

Southampton Maritime Freightliner Terminal is a major dock for the unloading and loading of freight and is managed by multinational logistics organisation, DP World. The terminal processes intermodal freight and can be accessed from the South Western Mainline. Longer trains wanting to travel to the West Midlands must shunt in Redbridge sidings to change direction. Redbridge sidings are due to be upgraded to accommodate 775m trains as part of the Southampton Freight Train Lengthening Project in 2021.

Millbrook Freightliner Terminal

Millbrook Freightliner terminal (FLT) is located close to Millbrook station and can be accessed at two points from the South West Main Line. Millbrook FLT is a small site that mostly handles wagon maintenance.

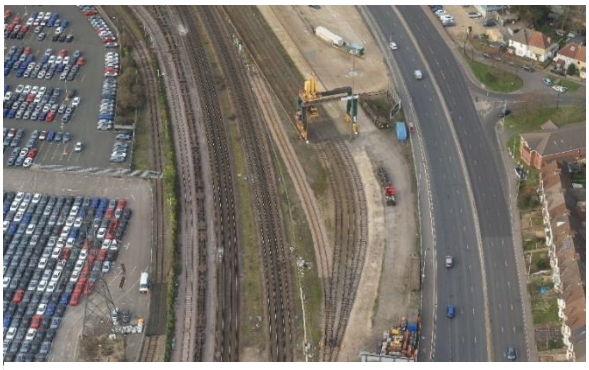


Figure 17 - Millbrook Freightliner Terminal (Source: Network Rail)

Marchwood Military Port / Fawley Branch Line

Marchwood Military Port is located on the west side of Southampton Water on the Fawley Branch Line which joins the South West Main Line at Totton. Irregular military rail services operate from this port in line with military demand. The Southampton Port operator, Associated British Ports, has aspirations for a new dock site at Dibden, close to Marchwood Military Port. Network Rail investigated potential timetable solutions to identify the train paths between Marchwood and Basingstoke to enable up to 10 trains a day, in each direction, to operate.

The Fawley Branch Line itself historically had regular oil freight services to and from Fawley Refinery. These services ceased in 2016 leaving a vast array of rail infrastructure within the refinery itself derelict. There is also a proposal to reopen the Fawley Branch Line to passenger traffic as part of the Government's 'Restoring Your Railway' initiative.

Totton Strategic Freight Site

There is also a Strategic Freight Site (SFS) at Totton. Network Rail maintains a reserve of strategic freight sites, in order to preserve potentially valuable locations for future rail freight use.

5.3 THE SOUTH WEST MAIN LINE

Figure 19 - Map of Southampton to the Basingstoke rail route (Source: Network Rail)

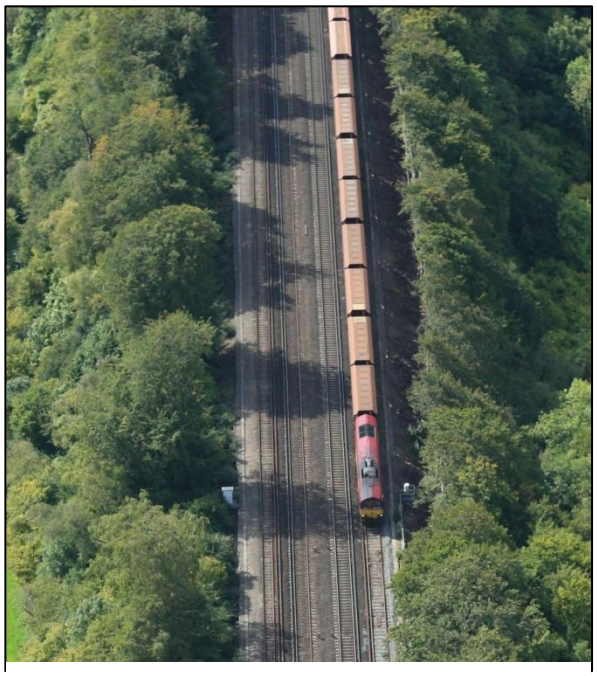


Figure 18 - Freight service on the South West Main Line (Source: Network Rail)

Overview

The South Western Mainline (SWML) between the Southampton area and Basingstoke is a heavily used railway. The line is mostly two-track with some four-track sections. The Wallers Ash Loop allows freight trains to diverge from the mainline and permit faster passenger trains to overtake. There is also a four-track section through Eastleigh which allows similar moves.

Bevois Park sidings (also known as Southampton Up Yard) close to St Denys accommodates aggregates traffic. Micheldever Down Sidings (formally Micheldever Oil Terminal) are currently disused but there have been various proposals for development of the sidings.

Eastleigh is a key area for both commercial freight movements and Network Rail engineering/supply chain operations. Eastleigh is home to a large Network Rail Route Services yard operated by GB Railfreight (East Yard) which supports infrastructure engineering projects across the Wessex Route. Eastleigh Chicknell sidings is used for commercial aggregates traffic. Arlington Fleet Services, a rail vehicle maintenance services company, is also based at Eastleigh.

Analysis completed as part of the Solent Connectivity CMSP[52] noted that the platform capacity at Eastleigh was a key constraint for increasing passenger services via Botley and reversing at Eastleigh. The study recommended that platform 1 be converted to a bi-directional platform.

[52] Solent Connectivity – Continuous Modular Strategic Planning - https://www.networkrail.co.uk/wp-content/uploads/2020/07/Solent-Connectivity-Continuous-Modular-Strategic-Planning.pdf

Key facts

Strategic Route Section SRS C.03	
Engineer Line Ref Full Name	Bournemouth Main Line
Section Start/ End	Worting Junction (Basingstoke) to Southampton
Operators' Ref	SW105
Engineers' Ref	BML1 47m60ch : 77m69ch Northam Jn (change of mileage) BML2 78m00ch Northam Jn : 79m20ch
Length	31.4 miles
Linespeed Max	100 mph
Route Availability	RA8
Freight Gauge	W10
Electrification	✓Third Rail 750V DC

5.4 LAVERSTOCK SWML ALTERNATIVE ROUTE

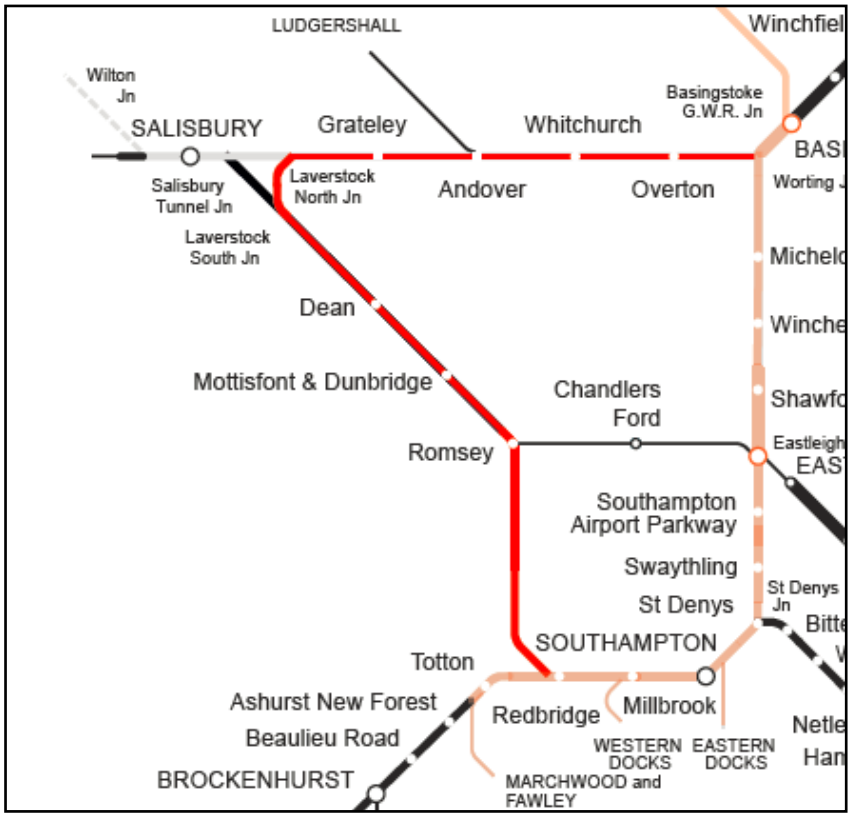


Figure 20 - Map of diversionary rail freight route via Laverstock (Source: Network Rail)

The key diversionary route for freight to between Southampton and Basingstoke is to use the line via Romsey to Laverstock Junctions continuing on the West of England line to Basingstoke, joining back onto the mainline at Worting Junction. This route is cleared for W10 and W12 trains meaning that intermodal trains can use this as a diversionary route if the route via Winchester is not available. The Ludgershall branch accommodates occasional Ministry of Defence traffic and joins the West of England line close to Andover.

Strategic Route Section SRS C.16	
Engineer Line Ref Full Name	Test Valley Line
Section Start/ End	Redbridge Junction and Eastleigh to Salisbury Tunnel Junction
Operators' Ref	SW130 | SW150
Engineers' Ref	ECR 73m20ch to 80m33ch RTJ1 23m31ch to 18m33ch RTJ2 80m33ch to 95m60ch
Length	19,7 miles
Linespeed Max	85mph
Route Availability	RA8
Freight Gauge	W12
Electrification	✖ Not electrified

Strategic Route Section SRS C.14	
Engineer Line Ref Full Name	West of England Line
Section Start/ End	Worting Junction, Basingstoke to Wilton Junction, Salisbury
Operators' Ref	SW155
Engineers' Ref	BAE1 50m 28ch to 83m 72ch
Length	33.5miles
Linespeed Max	90mph
Route Availability	RA8
Freight Gauge	W12
Electrification	✖ Not electrified

5.5 BASINGSTOKE TO READING LINE

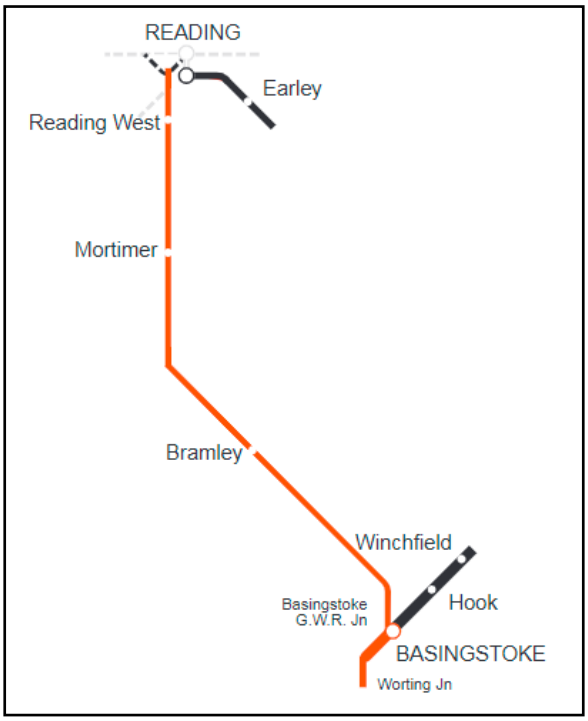


Figure 21 - Map of Basingstoke to Reading Line (Source: Network Rail)

The Basingstoke to Reading Line diverges from the South West Main Line (SWML) at Great Western Junction and provides a crucial link between the SWML and Great Western Main Line (GWML). Great Western Junction is a flat junction meaning that trains travelling towards Southampton must cross three lines in order to access the South West Main Line Down Slow. There is currently no alternative W10 gauge cleared diversionary route for intermodal traffic travelling between Basingstoke and Reading. It is because of this that the time available to do enhancements and maintenance on the line is restricted.

Key facts

Strategic Route Section SRS J.09	
Name	Southcote Junction to Basingstoke
Section Start/ End	Southcote Junction to Basingstoke
Operators' Ref	SW125
Engineers' Ref	BKE 37m76ch to 51m31ch
Length	13.5 miles
Linespeed Max	75mph
Route Availability	RA8
Freight Gauge	W10
Electrification	**X**

5.6 GREAT WESTERN MAIN LINE

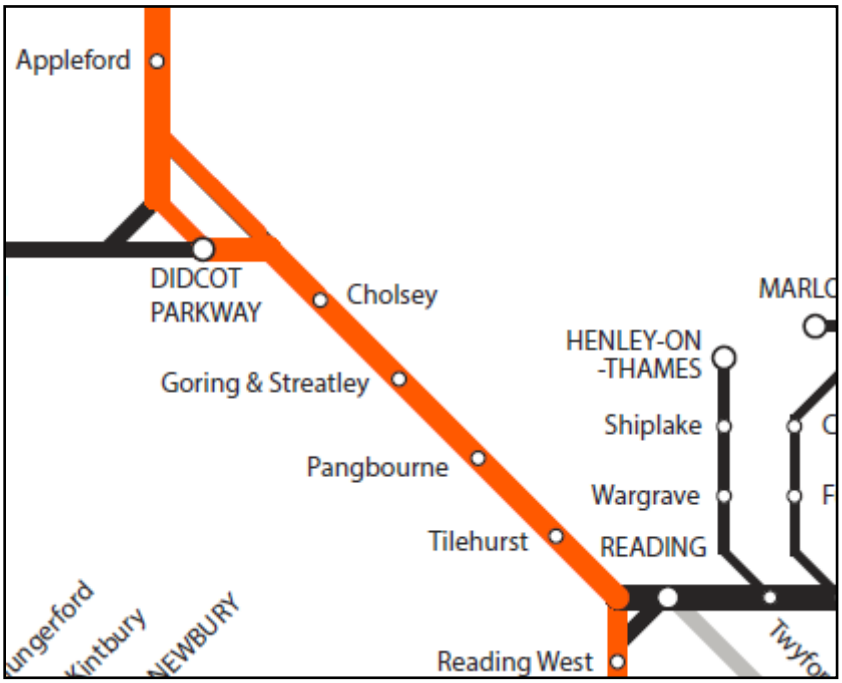


Figure 22 - Map of the Great Western Main Line between Reading and Didcot (Source: Network Rail)

Overview

The Great Western Main Line is a major route between London and the West. The line has recently been electrified to 25kV AC overhead lines between London Paddington and Cardiff as part of the Great Western Electrification Programme. Freight trains operating between Southampton and the Midlands access the mainline via the Reading West Curve travelling towards Didcot before diverging from the mainline at Didcot East Junction to access the Cherwell Valley Line. There are several sidings at Didcot which accommodate some freight traffic.

Key Facts

Strategic Route Section SRS J.03	
Name	Great Western Main Line
Section Start/ End	Reading to Didcot
Operators' Ref	GW103
Engineers' Ref	MLN1 36m 00ch to 53m 10ch
Length	17.1 miles
Linespeed Max	75mph
Route Availability	RA8
Freight Gauge	W10
Electrification	✓Overhead Lines 25kV AC

5.7 CHERWELL VALLEY LINE AND CHILTERN MAIN LINE

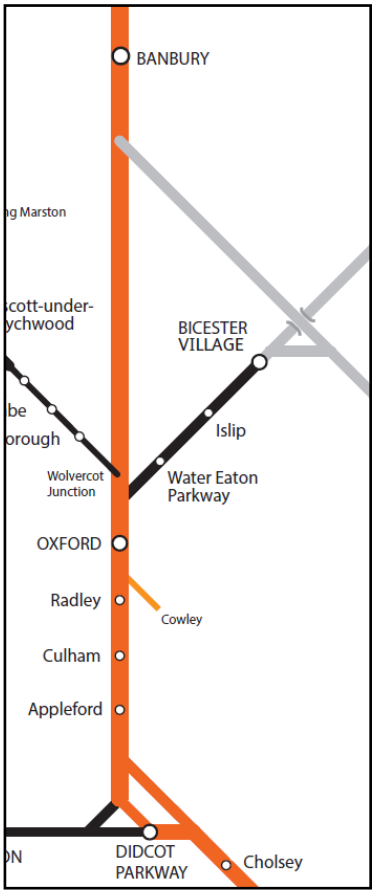


Figure 23 - Map of the Cherwell Valley Line and part of the Chiltern Main Line (Source: Network Rial)

Overview

The Cherwell Valley Line links Didcot, Oxford and Banbury and joins the Chiltern Main Line at Aynho Junction. This is also a busy rail corridor with multiple passenger services interacting with freight services. The line is predominantly two-track with a short four-track section through Oxford and is not electrified.

The East West Rail project plans to link Oxford, Bedford and Cambridge through a new railway which roughly follows the former Varsity Line. This will provide additional connectivity between the cities as well as the opportunity for rail freight from the Solent to access the 'Golden Triangle' of freight distribution – an area of Northamptonshire, Leicestershire and Derbyshire that is the location of many key freight distribution centres as well as being a region of the UK that can reach 90% of the population within four hours[53] .The western section of this line between Oxford and Bedford is due to be completed in 2024.

[53] https://www.bbc.co.uk/news/business-45210148

Strategic Route Section SRS J.03	
Name	Didcot to Oxford
Section Start/ End	Didcot Parkway / Didcot East Jn / Foxhall Jn to Wolvercot Jn
Operators' Ref	GW200 / 240 / 250
Engineers' Ref	DEC 52m 66ch to DEC 54m 00ch DCL 53m 12ch to DCL 66m 32ch DWC 0m 0ch to DWC 0m 32ch
Length	13.3 Miles
Linespeed Max	Predominant Line Speed 90mph
Route Availability	RA8
Freight Gauge	W10 (W12 between Didcot North Jn and Oxford North Jn)
Electrification	**X**
Strategic Route Section SRS J.03	
Name	Oxford to Coventry South
Section Start/ End	Wolvercot Jn to Nuneaton Sth Junction
Operators' Ref	GW200 / 240 / 250
Engineers' Ref	DCL 66m 32ch to CNN 9m 34ch
Length	17.1 miles
Linespeed Max	75mph
Route Availability	RA8
Freight Gauge	W10
Electrification	**X**

*Freight travelling between Southampton and the Midlands leaves this SRS at Aynho Jn (DCL 81m 13ch) and joins SRS M.01

Key Points

- The rail route from Solent to the Midlands is one of the most critical freight routes in the UK.
- Rail freight in the Solent area is focused almost exclusively at the Port of Southampton with over 32 trains per day on average arriving or departing.
- The route to the Midlands passes through Basingstoke, Reading, Didcot, Oxford to Birmingham sharing lines that are already congested with passenger services.

6. KEY SECTORS

6.1 ROAD-RELIANT SECTORS

Highways England's strategic economic growth plan, *Road to Growth* identifies certain sectors of the economy that rely on the road network more to prosper than others e.g. a manufacturer moving goods within its supply chain.[54]

The *Road to Growth* uses Standard Industrial Classifications (SIC) division to understand the breakdown of the economy. SIC classifies business establishments and other statistical units by the type of economic activity in which they are engaged and where a significant proportion of activity relies on the road network, these can be classed as a road-reliant sector.

The primary road-reliant sectors can be summarised as:

- **Logistics and Retail** – specialist hauliers, postal and courier activities, as well as warehousing, storage, and the movement of retail goods;
- **Primary materials** – this includes the extraction of coal, petroleum, natural gas, metal ores and other mining and quarrying activity;
- **Manufacturing** – the movement of food, beverages, wood products including paper, plastic products, other non-metallic mineral products and includes the automotive and agricultural industries.
- **Construction and Civil Engineering** – both a direct user of roads in terms of moving vehicles used in construction, the movement of building materials and heavily reliant on inputs of manufactured goods.

These road-reliant sectors are all present within the Solent to Midlands corridor – by comparing with Continuing Survey of Roads Goods Transport and with local industries and business locations, the next section provides a summary of some road-reliant industries linked to the Solent to Midlands corridor. Most smaller industries e.g. mail carriers come under the headings of the sectors listed above, demonstrating the overall reach of road-reliant sectors.

Road to Growth is in the process of being updated and part of this will include a re-evaluation of road-reliant sectors across all industries. This is due for publication in late 2021/early 2022.

Automotive Industry

Automotive is a key sector within the manufacturing road-reliant sector. The A34 is critical to the automotive industry within the UK, in particular by supporting the export of assembled vehicles through port of Southampton. There are several automotive manufacturers in the Solent to Midlands Corridor particularly in the West Midlands.

- BMW (Oxford)

[54] The Road to Growth – Our Strategoc Economic Growth Plan – Highways England https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/600275/m160503_the_road_to_growth_Our_strategic_economic_growth_plan.pdf

- Vauxhall (Luton)
- Warnerbus (Dunstable)
- Jaguar Land Rover (Solihull, Halewood and Castle Donnington)
- BMW/Mini (Swindon)

The Department for Transport's 'Transport Infrastructure for our Global Future' report published in 2017 stated that there were 530,000 vehicles exported out of Southampton Port in 2016, about 40% of total UK automotive production.[55] Automotive freight by rail is generally dependent on a suitable rail connection to the automotive plant as this removes the need for an intermediate road journey between the rail terminal and the automotive plant. More rail connected plants could mean that more automotive freight could be transported by rail.

In addition, whilst the majority of these movements are coming from other parts of England, within and immediately adjacent to the corridor are automotive manufacturers who rely on the A34 for supply chain movements, such as BMW Oxford, as well as Britain's "Motorsport Valley" where various Formula One racing teams are based, such as Mercedes at Brackley.

As automotive is included under 'grouped goods' as part of the CSRGT data detailed later in this report, their high volume shows the automotive industry's reliance on the SRN. The movement of assembled cars is a high-value good. Although some are transported by train, there is potential for some modal shift to rail. At present, road is the more economically viable option for flows of imported cars arriving by sea into Southampton due to the dispersed location of dealerships around the country.

Agriculture and Food Products

Also, under the heading of primary materials as a road-reliant sector, agriculture is a prevalent industry in the Solent to Midlands corridor. There are multiple agriculture industries including arable and livestock farming as well as food distribution.

The CRSGT data, highlighted later in this report, will demonstrate how prominent food products are in being transported on the A34 as they are one of the top five commodities transported in and out of the Solent area by road to almost all regions including considerably longer distances to Yorkshire and the North East and the North West. There are multiple food producers within the Solent to Midlands corridor e.g. Greencore Foods in Northamptonshire which will likely use the A34 for distribution.

Agricultural freight would be able to be transported by rail, however it can be generally assumed that the reason road is relied on as primary transportation is due to the cost and time. However, as there is a significant amount of food products transported to/from the north, there is a possibility to explore the use of rail for agricultural produce from the Solent e.g. to the Midlands, the North West and North East, distances over 100 miles.

A significant point is how important the A34 is for local freight transportation, for example local farm traffic sometimes use the A34. Total modal shift would be impossible for agricultural freight however due to its prominence in all regions it is worthy of examination.

[55] Transport Infrastructure for our global future - A Study of England's Port Connectivity – Department for Transport (2017) https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/710030/transport-infrastructure-global-future-a-study-england-port-connectivity.pdf

Equestrian

Newbury Racecourse is within close proximity to the A34 as shown on figure 24 below.

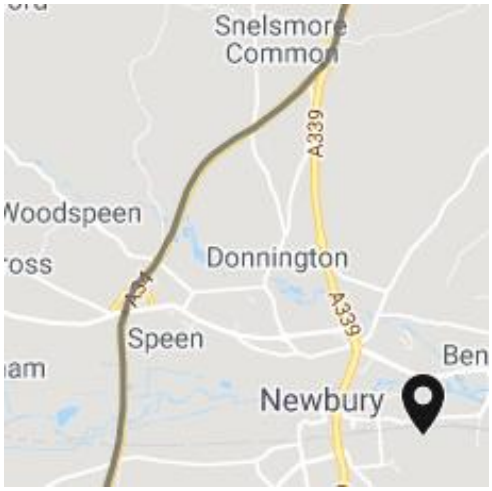


Figure 24 - Location of Newbury Racecourse Source: Highways England

In the 2014 West Berkshire Local Transport Plan Freight Strategy, it is noted that "West Berkshire's racehorse and agricultural associated industries located mainly in the rural areas generate significant volumes of freight movements". It also notes that "most of these movements are likely to be associated with delivery and maintenance of farms and stock such as animal feed, horseboxes and movements of agricultural machinery and livestock; all of which are essential for the day to day running of West Berkshire's farming and equine industries".[56] Similarly to agricultural transportation, the equestrian and horse-racing industry makes up smaller journey distances and the goods themselves are mostly unsuitable for rail transportation, making road their primary mode. This demonstrates the importance of the A34 corridor to local freight transportation, not just freight coming to and from the ports. The congestion and unreliable journey times on the A34 may have a greater adverse effect on those making local trips than on those frequently making longer distance trips. These goods and especially the transportation of the horses themselves, are considered high-value goods.

Defence and Logistics

The defence sector and its supply chain are frequent users of the A34 corridor with the British Army base at Aldershot and the training grounds of the Salisbury Plains in Wiltshire. There are other military sites within close proximity to the A34 for example, RAF Brize Norton which is the largest station in the Royal Air Force with 5,800 Service Personnel, 1,200 contractors as well as installations at locations including Bicester, Andover and Salisbury Plain.

Furthermore, according to the Oxfordshire LEP, the Ministry of Defence plan to deliver the National Defence Logistics Hub for the UK Armed Forces which will be located just outside Bicester and is likely to involve significant use of the A34 corridor. The MoD also use the Marchwood Military Port at the Port of Southampton as part of their operations, and it is the base of 17 Port and Maritime Regiment as part of the Royal Logistics Corps. Marchwood also has a rail connection via the Fawley Branch line with regular rail freight services operating to and from the site.

[56] https://info.westberks.gov.uk/CHttpHandler.ashx?id=38703&p=0

There are no specific volumes for how much of this freight is transported, but it is safe to assume some military freight will account for cross-corridor travel on the A34.

6.2 KEY RAIL SECTORS ON THE CORRIDOR

The Southampton to the Midlands rail route is dominated by the intermodal sector[57] with 82%[58] trains in 2019/20 being of that designation, compared to 26% in GB. The 9,408 intermodal trains that ran in 2019/20 is equivalent to around 300,000 HGV movements[59].

The route is also a key corridor for automotive freight with 10.4% of trains carrying that commodity. This is compared to 1.6% of trains in GB overall. Just under half of all automotive trains in GB go to/from Southampton.

Construction materials (aggregates) make up 6% of trains compared to 29.1% of trains in GB overall.

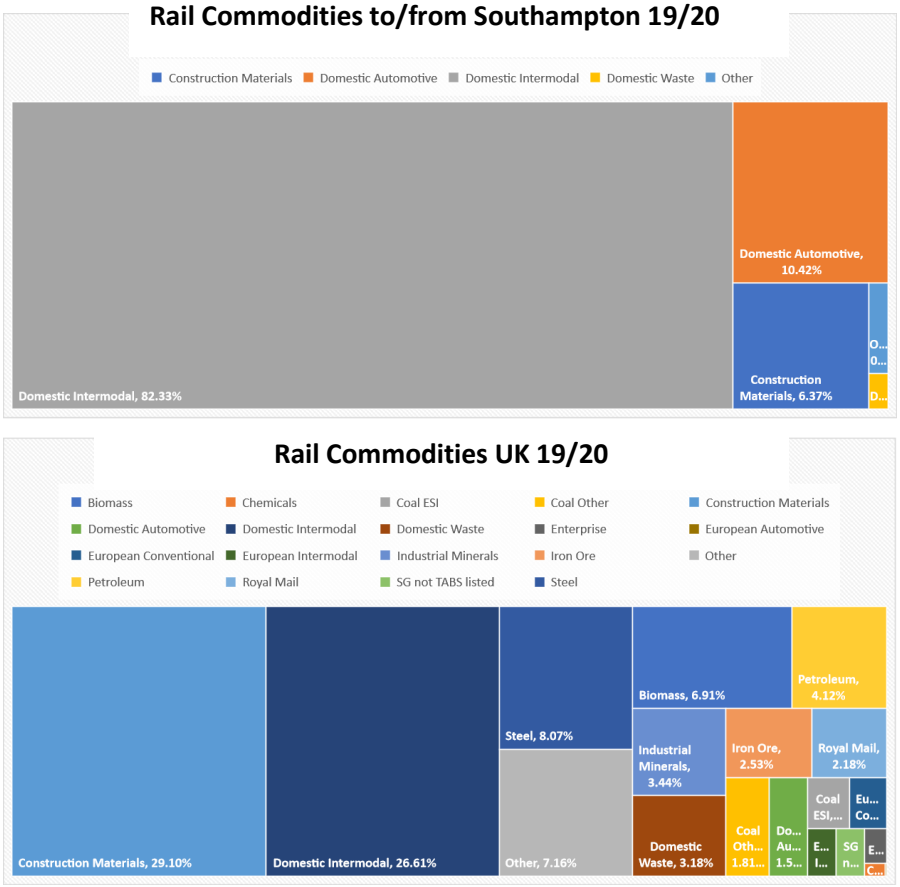


Figure 25 - (above) percentage of trains by commodity to/from Southampton and (below) % percentage of trains by commodity for the UK rail network (Source: Network Rail)

Intermodal

The intermodal (containerised) sector is the most dominant on this rail corridor and the second most dominant in the UK. Intermodal is freight that can be moved by more than one form of transport and is usually carried in containers of which there are multiple types. The most common type of container in the deep-sea maritime sector are the 9ft 6in height International Organization for Standardization (ISO) containers. There are several different lengths of container ranging from 20 feet to 50 feet long in the UK, although there are even longer boxes in use in North America . The size of these containers means that in order for rail freight companies to transport this size of container on a standard height wagon, W10 rail gauge is required. The core route between Southampton and the Midlands is cleared for W10 traffic. The flexibility of the containers means that an extensive variety of goods can be transported in them on the railway. . Intermodal services on this corridor are operated by DB Cargo, Freightliner and GBRf.

[57] It should be noted that 'domestic intermodal' in this context is any freight that starts and finishes its journey within the UK therefore this includes 'ports intermodal' that arrives from abroad at UK seaports.

[58] FDM eligible trains, see Appendix B. Trains are calculated by origin/destination location and include all freight trains travelling to or from Southampton.

[59] Based on an assumption of 32 lorries per train. It is likely that this number will increase with the introduction of longer freight trains.

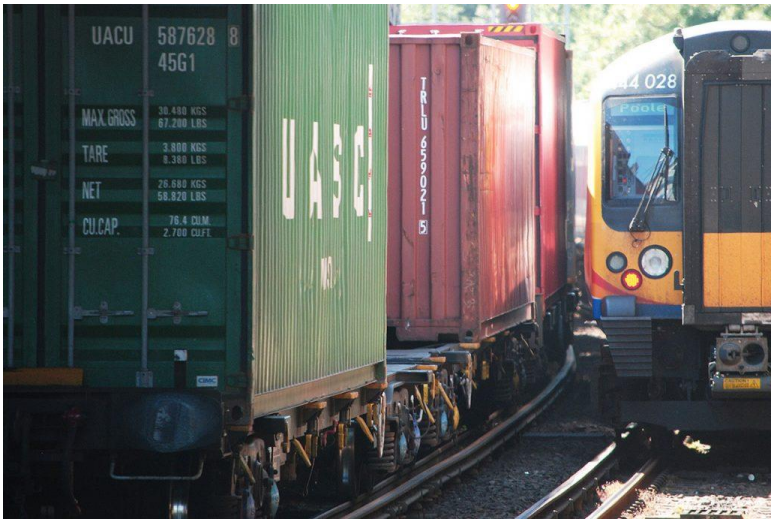


Figure 26 - Container traffic on the South West Main Line (source: Network Rail)

Automotive

Automotive trains make up a significant minority of trains on this rail corridor. Major automotive factories using the rail route include:

- Mini Cowley, Plant Oxford (BMW) in Oxford
- Halewood (Jaguar Land Rover) in Liverpool
- Castle Bromwich (Jaguar) in Birmingham

From these locations a large percentage of cars and vans are exported, with a notable number of those being exported via Southampton Docks. As outlined in the 'Key Road Sectors' section, of the majority of automotive exports are transported by road to the port of export, with rail making up the a significant minority. Imports are transported almost 100% by road owing to the varying destination locations they must be transported to once within the UK, however there is a limited amount of BMW automotive freight imported at Southampton and moved by rail. Automotive services on this route are operated by DB Cargo.

Construction Materials (Aggregates)

There is some aggregate rail freight to and from the Solent Area. The vast majority of aggregates by rail are brought into the Solent area exclusively from the Mendip quarries (Whatley/Merehead) to the railheads at Bevois Park, Eastleigh Chicknall Sidings, Botley, Fareham and further along the coast at Chichester, West Sussex with a limited amount of imported Spanish Gypsum loaded at the Western Docks and transported to Mountfield in East Sussex. Unlike intermodal and automotive traffic, the rail freight journey distances are much less.

Both the EEH and TfSE studies reference the British Geographic Survey published report, 'Collation of the results of the 2014 Aggregate Minerals survey for England and Wales' (2016). This shows the relative importance of the aggregates/

construction material markets to the counties in each Sub-National Transport Body (SNTB) area, including those related to imported sand and rock as can be seen in the following graphs.

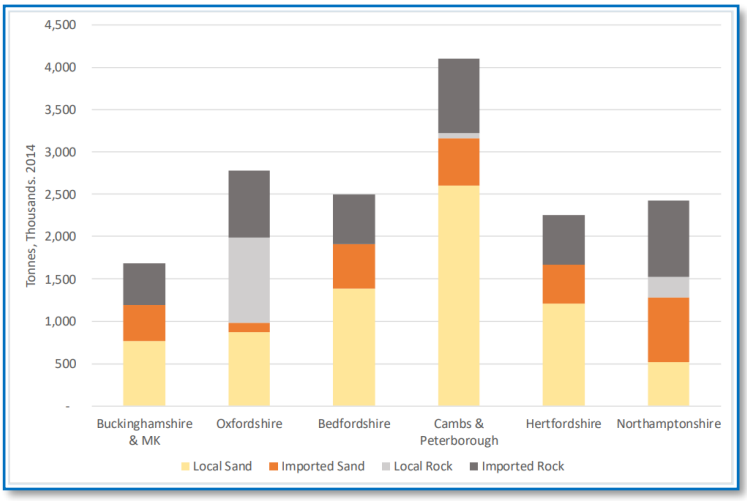


Figure 27 - Tonnage of aggregates used by county in the EEH area (Source: EEH Freight Study, 2019)

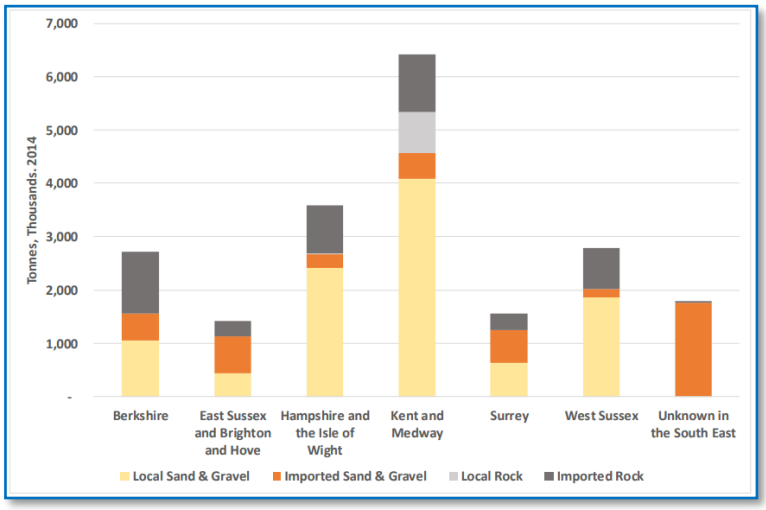


Figure 28 - Tonnage of aggregates used by county in the TfSE area (Source: TfSE Logistics and Gateway Review, 2019)

Although not specific to aggregates from the Solent area the graphs do show the relative importance of the imported commodity to the areas along this freight corridor.

Key Points

- The Southampton to the Midlands rail route is dominated by the intermodal sector
- The route is also a key corridor for automotive rail freight with 10.4% of trains carrying that commodity. Just under half of all automotive rail services in GB go to/from Southampton.
- Construction materials (aggregates) make up 6% of rail freight services compared to 29.1% of rail freight services in GB overall.
- The A34 is a strategic route for several road-reliant sectors where freight and goods for an industry can only or mostly travel on road – this covers large industries such as automotive where over 1000 vehicles are transported by road to Southampton port daily as well as automotive supply chain movements. Road-reliance is also key for more regional industries such as equestrian – the A34's proximity to Newbury Racecourse means it provides a key strategic role for these goods and livestock.

7. FREIGHT BETWEEN THE SOLENT AND THE MIDLANDS

7.1 INTRODUCTION

This section describes the freight and logistics market across both rail and road between the Solent ports and the Midlands. The Covid-19 pandemic has had a profound impact on almost every aspect of society and freight and logistics is no different except that several sectors have remained relatively buoyant in these difficult circumstances for example the food sector. In order to provide insight into how the market operated in 'normal' times, the section below uses data from before the Covid-19 pandemic. Analysis of the current and future impact of the pandemic is included in later sections.

7.2 PRE-COVID FREIGHT VOLUMES

ROAD VOLUMES (2019 DATA)

Data from the calendar year 2019 shows that the corridor had a daily flow of between 4000 and 6000 HGVs. This makes the A34 one of the busiest trunk roads on the SRN, with more than twice the volume of HGVs on the A66 and more than the A14, which serves Britain's largest container port Felixstowe. Between 15-20% of all traffic on the A34 is HGVs, which is above the national average of 5%.

Data from 11 count sites on the A34 was analysed providing an indicative range of HGV vehicle flows northbound along the A34 from the M3 to the M40 between each junction. Numbers reflect average daily traffic Monday-Friday throughout 2019.

Full analysis of the junctions and count sites are in Appendix A. On average, the key freight volumes noted in the A34 corridor are:

- Around 4000 HGVs are observed entering the A34 from the M3 junction – the location of this junction is the direct route to the A34 from the Port of Southampton, so it can be assumed most of these vehicles have come from the Solent area.
- 1000 HGV vehicles travelling northbound and 900 vehicles travelling southbound turn onto the A303, the key route for Somerset, Devon and Cornwall from the A34.
- 2,500 HGV vehicles travelling northbound and 1,750 vehicles travelling southbound turn onto the M4, the key route for Bristol and South Wales.
- Most traffic heading north on the A34 exits on the M40 at around 5,400 vehicles a day and similarly most traffic heading southbound on the A34 was previously heading south on the M40, at around 6,200 vehicles.

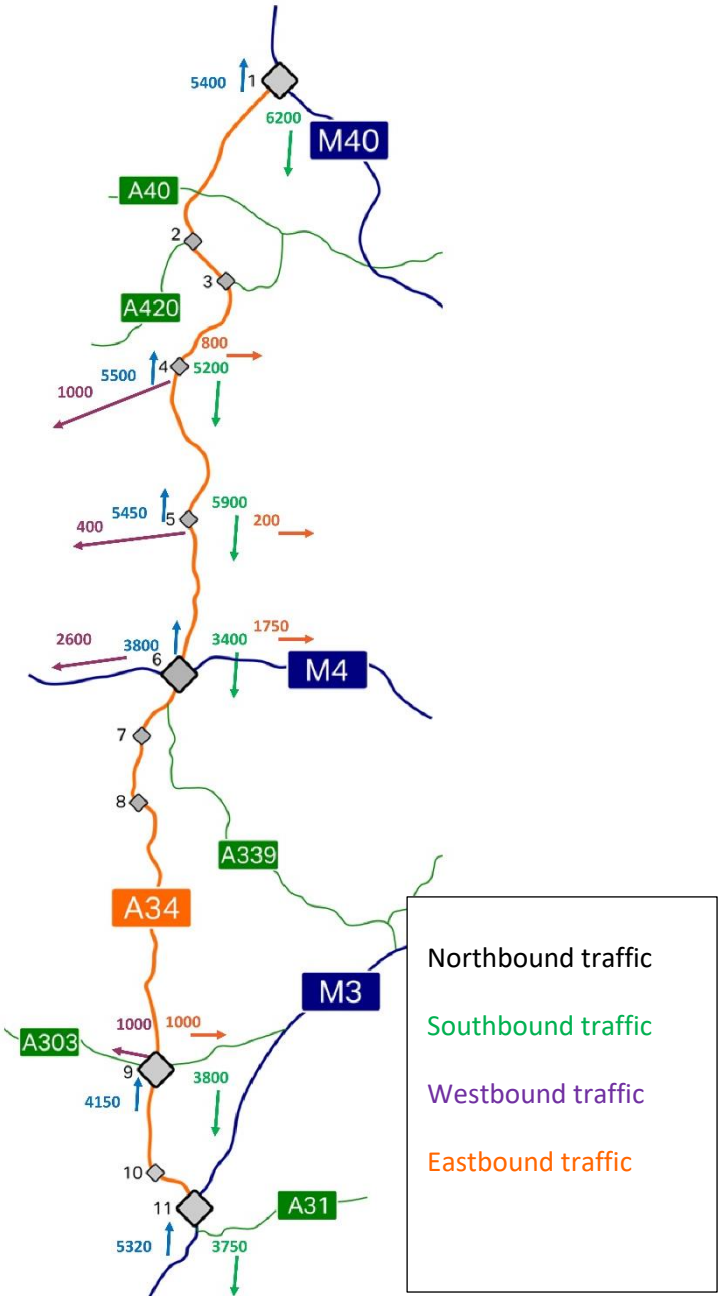


Figure 29 - Key traffic flows on the Solent to Midlands Corridor (Source: Highways England)

It is generally accepted that rail freight is becomes economically viable over longer distances of >100 miles for consumer goods and > 50 miles for bulk goods[60] [61] . As outlined above, many of the HGVs that travel on the A34 are either coming from or going to the M40 which connects to the West Midlands and North West. This takes those journeys over the 100 and 50-mile thresholds, which shows that there is a substantial amount of long-distance HGV traffic that travels the distance required for rail freight to be a viable alternative.

Figure 29 shows the flow of mainline traffic both south and northbound on the A34 alongside the number of vehicles leaving at each junction. Reflective of the data counts above, it shows that whether travelling north or south in the corridor, the M4 junction is where most vehicles leave the A34 with the A303 junction also having a significant number of vehicles exiting the A34. The number of long vehicles travelling the full length of the A34 averages out at about 4000 both north and southbound.

RAIL VOLUMES (2019/20 DATA)

Rail has a relatively low market share of the overall freight network with most of the traffic being moved by road, primarily via the A34. Rail freight in the Solent is focused at the Port of Southampton with little to no rail freight at the other Solent Ports. Therefore, for the purposes of this analysis, we have considered all freight trains that travelled to or from the locations below that are within the vicinity of Southampton.

Timetable Name
MARCHWOOD F.L.T.
MARCHWOOD M.O.D.
MARCHWOOD MOD GBRF
SOTON W DOCKS SHED 107
SOUTHAMPTON EASTERN DOCKS
SOUTHAMPTON M.C.T.
SOUTHAMPTON UP YARD
SOUTHAMPTON W DOCKS (GBRF)
SOUTHAMPTON WESTERN DOCKS
MILLBROOK HANTS..F.L.T.
TOTTON YARD (FL)

Figure 30 - List of origins/destinations for timetable analysis of trains to and from Southampton (Network Rail timetable data)

[60] Harris, N. G. and McIntosh, D. (2003). The Economics of Rail Freight.

[61] https://www.railfreight.com/business/2020/08/20/new-style-rail-parcels-nearer-to-delivery/

In total, **11,751** freight trains eligible for FDM[62] ran to and from the above locations in financial year 2019/20, a slight increase on the previous year (**11,059**). This makes up 7.1% of GB freight movements in 2019/20.

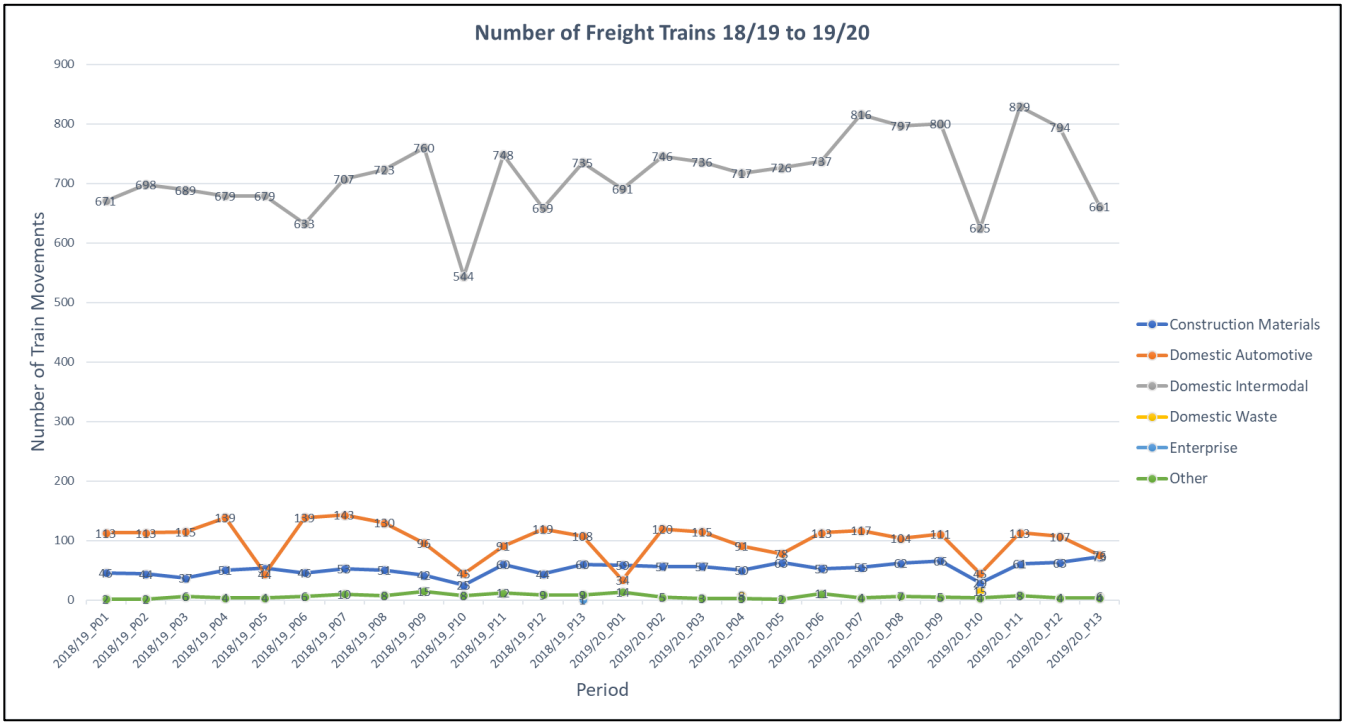


Figure 31 - Number of FDM trains per railway period by commodity between P1 2018/19 and P13 19/20 (Source Network Rail timetable data / TABS)

The number of trains running across most commodities has stayed generally consistent over the last two years with intermodal showing some growth year-on-year. Drops in P10 over the past two years can be associated with the Christmas break and more recently, the Covid-19 outbreak, although volumes have quickly recovered. It should also be noted that this data does not consider the increasing length of freight trains, which may mean volumes go up while the number of trains stay consistent.

[62] Freight Delivery Measure – FDM – More details are in Appendix B

7.3 FREIGHT ORIGINS, DESTINATIONS, HUBS AND TERMINALS

RAIL DESTINATIONS

Analysis was undertaken on origins and destinations for freight on the corridor using Network Rail data. One limitation of this analysis is that we cannot identify where freight continues on to after reaching the final rail destination – it is assumed that the majority of onward freight journeys will be undertaken on the road network. An understanding of the road network adjacent to rail terminals is essential in understanding how the rail terminal can grow. Future phases of this study should look to understand final destinations for rail freight and their links to the road network. Analysis of the timetable showed that the number of freight trains travelling to and from Southampton was roughly the same. Looking at trains travelling from Southampton, over 80% of trains travelled to the West Midlands, North West and North East, using the core route between Southampton and Birmingham. The vast majority of these trains use core W10 gauged cleared route via Basingstoke, Reading and Oxford.

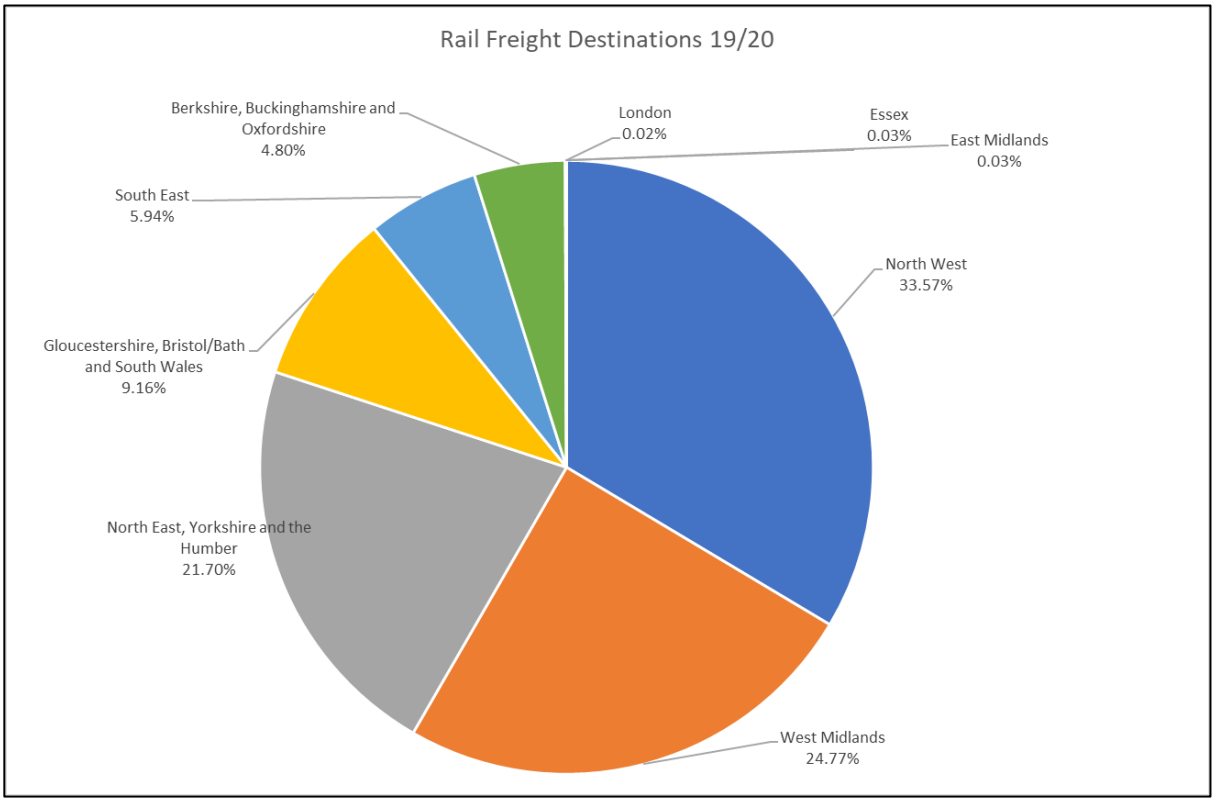


Figure 32 - Destinations for Rail Freight to/from Southampton during 19/20 (Source: Network Rail)

The below map shows the destinations for freight from Southampton in 19/20.

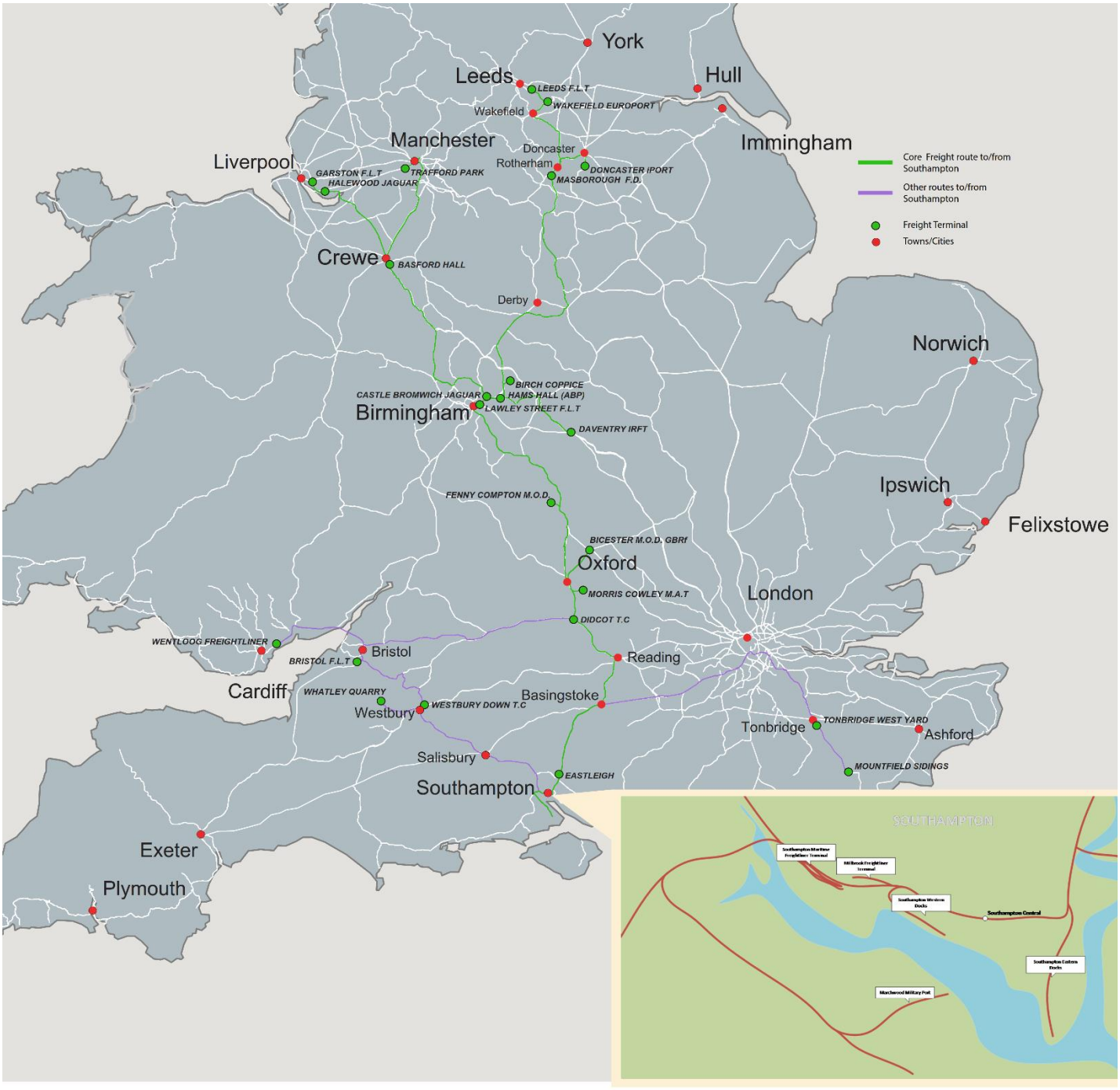


Figure 33 - Map of key rail freight sites on the Solent to Midlands Corridor (Source: Network Rail)

The key freight terminals for the Southampton to the Midlands route for intermodal traffic are: Birmingham Lawley Street F.L.T, Leeds F.L.T, Manchester Trafford Park , Garston F.L.T., Birch Coppice, Hams Hall, Doncaster, Wakefield and Masborough (Rotherham). There is also a significant intermodal flow to and from Wentloog near Cardiff. Key terminals for automotive traffic are: Oxford Mini Cowley (Plant Oxford BMW Mini), Castle Bromwich (Jaguar Land Rover) and Liverpool Halewood (Jaguar Land Rover).For aggregates traffic, key terminals are located at Whatley Quarry and Tonbridge. . It should be noted that some construction movements are driven by Network Rail and can fluctuate year on year depending on ongoing major rail projects. Full details on destinations for freight to and from the Solent can be found in Appendix B.

Figure 34 - Lawley Street Freightliner Terminal, Birmingham (Source: Network Rail)

7.4 MODE ROUTING ANALYSIS

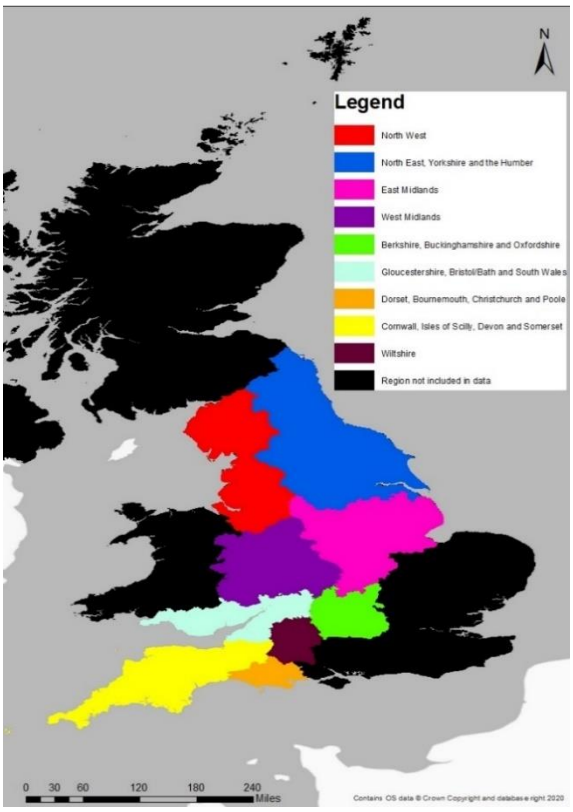


Figure 35 - Map showing zones covered by requested CSRGT data (Source: Highways England)

The Department for Transport collects data on the activity of GB-registered HGVs (weighing 3.5 tonnes plus as part of the Continuing Survey of Road Goods Transport (CSRGT). Approximately 230 vehicles a week are requested to provide data on all domestic trips and then this is scaled up to the registered HGV population in the UK. This data is limited in this sense as it might not provide a full picture and it assesses HGV movements Monday-Friday only, but currently CSRGT data is the best source of information to compare road movements, destinations and commodity types to the rail network.

A number of different routing study zones have been identified as key routes that use the A34. Movement of goods is based on inbound and outbound movements to the Solent area (Portsmouth, Southampton, Isle of Wight, South and Central Hampshire). These zones are detailed in Figure 35 above.

Full analysis is available in Appendix C.

The predominate flow of goods in the Solent area is to and from the West Midlands (Zone 4) with 1.8 million tonnes inbound and 1.6 million tonnes outbound.

Figure 36 below details the summary of gross goods lifted between the Solent and all routing zones. These figures are exclusive of empty vehicles. There will also be some variations in routes taken by drivers and in destinations. Please note, the Solent area itself has not been considered as a destination for the purposes of this study – typically this freight uses the local MRN network.

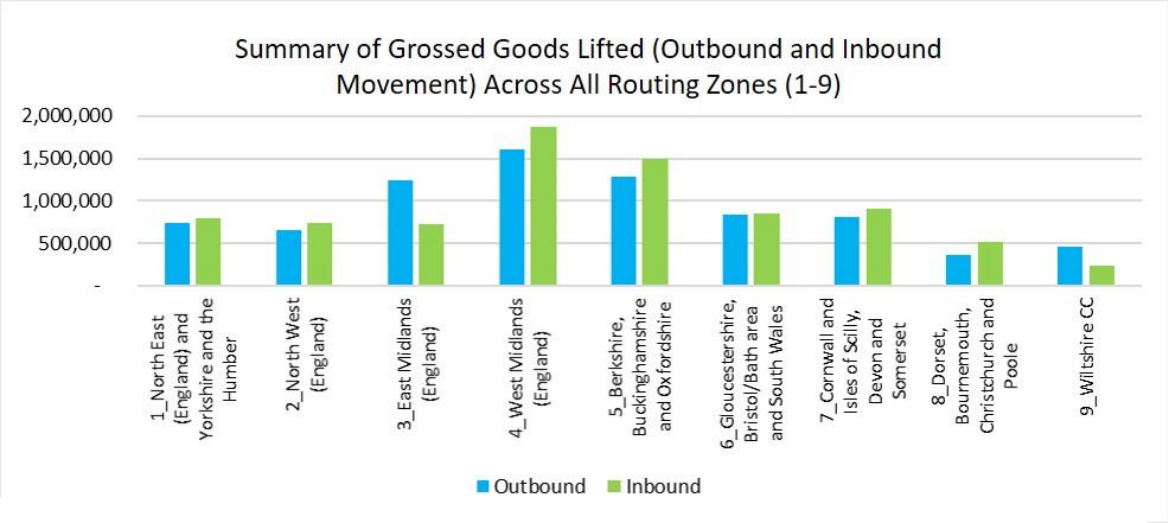


Figure 36 - Summary of Grossed Goods Lifted (Outbound and Inbound Movement) Across All Routing Zones (1-9) (Source: Highways England)

7.5 ROAD/RAIL SHARE

For further information, figure 37 details the indicative road and rail share to/from the Solent in %. These figures were calculated from Network Rail 2019/20 data and the CSRGT data used above to create an estimated figure of road and rail share for England. The method used to calculate market share involved converting the rail services running between the Solent and each region into lorry movements based on 32 HGVs per train equivalent[63]. This is an approximation based on typical load factors and an indicative average distance between Southampton and a central freight terminal in that region. From the synthetic new higher total of road movements, it is possible to obtain the proportion that rail has. When volumes to a region are relatively low the introduction of a new rail service has a greater impact in rail's market share than say to the West Midlands where adding an extra train only lifts rail's market share by a small percentage.

Routing Study Zone	Indicative Rail Share to/from Solent (%)	Indicative Road Share to/from Solent (%)
1- Yorkshire and the North East	42	58
2 - North West	53	47
3 - East Midlands	5	95
4 - West Midlands	21	79
5 - Berkshire, Buckinghamshire and Oxfordshire	7	93
6 - Gloucestershire, Bristol/Bath and South Wales	17	83
7 - Cornwall, Isles of Scilly, Devon and Somerset	6	94
8 - Dorset, Bournemouth, Christchurch and Poole	0	100
9 - Wiltshire	0	100

Figure 37 - Assumed mode share by region based on Network Rail timetable data and CSRGT data (Source: Highways England)

[63] Based on an assumption of 32 HGVs per train. It is likely that this number will increase with the introduction of longer freight trains on this route.

7.6 ROUTING ZONE ANALYSIS

The next section documents CSRGT analysis by commodity type and details further details the gross goods lifted by commodity, gross trips and gross vehicle KMs travelled by commodity. The top five commodities by road in and out of the Solent area by routing zone has also been identified. With advice from freight experts, a threshold of over 100,000 tonnes moved annually will be flagged for further investigation. These higher volumes are shown below using bold text. [64] This data is on average and estimates for 2019. Please note that 'routing zone' is established by the CSRGT map above.

The CSRGT data is compared to the relevant rail data on each area in order to provide commentary on the key commodities on each individual corridor and potential options for modal shift on this corridor. Commodities on rail are recorded as per the Network Rail Track Access Billing System (TABS)[65].

Zone 1: Yorkshire and the North East

Routing Area	*Direction*	*Commodity*	*Tonnage*	*Total Vehicle KMs (million)*
Yorkshire and the North East (Zone 1)	Outbound from Solent	**Food Products, beverages and tobacco**	**186, 700**	**2.8**
		Unidentifiable goods	**114, 500**	**1.6**
		Wood and products of wood/cork	**104, 500**	**1.3**
		Chemicals and Chemical products	79, 000	0.2
		Secondary Raw material	57, 400	0.9
	Inbound to Solent	**Metal ores and other mining/quarrying products**	**253, 400**	**1.05**
		Chemicals and chemical products	**150, 200**	**3.6**
		Basic metals and fabricated metal products	76, 000	1.6

[64] Grouped goods are a combination of goods from any category. Unidentifiable goods are goods that do not fit under any of the 16 category headings.

[65] More information on rail data inclusions/exclusions can be found in Appendix B

		Food products, beverages and tobacco	63,100	2.3
		Textile and Textile products	53,900	0.7

Figure 38 - Zone 1: Yorkshire and the North East Road Commodities (Source: Highways England)

The dominant commodity outbound from the Solent area to the North East and Yorkshire is food products, beverages and tobacco – further analysis of this shows that 32% of these goods are fish or fish products. The dominant commodity flow to the Solent area from the North East and Yorkshire are metal ores and other mining products. There are five commodities of significance annually transporting over 100,000 tonnes of goods between the Solent and the North East/Yorkshire.

The typical routing for vehicles travelling to the North East and Yorkshire from the Solent would be M3 → A34 → M40 →A43 →M1 → A1 (M). While there may be some driver variation, it can be safely assumed almost all vehicles travelling between the Solent and the North East/Yorkshire use the entire length of the A34 from Winchester to Oxford in either direction.

By far, the dominant commodity travelling on rail is intermodal (container) traffic to and from the port which follows the core route to Birmingham then continues the journey north via Derby. Yorkshire and the North East is home to major intermodal terminals at Leeds (Leeds F.L.T), Wakefield, Rotherham and Doncaster (Doncaster International Rail Port) in which rail transfers on to road for onward journeys.

Rail Data

Routing Area	Direction	Commodity	Total Trips	Total Trip KMs (Millions)
Yorkshire and the North East	Outbound from Solent	Domestic Intermodal	1309	0.545 m
		Other	3	0.001 m
		Domestic Waste	0	0.000 m
		Domestic Automotive	0	0.000 m
		Construction Materials	0	0.000 m
	Inbound to Solent	Domestic Intermodal	1227	0.545 m
		Other	3	0.001 m
		Domestic Waste	0	0.000 m
		Domestic Automotive	0	0.000 m
		Construction Materials	0	0.000 m

Figure 39 - Zone 1: Yorkshire and the North East Rail Journeys and Total Trip KMs (Source: Network Rail)

The distances covered by road freight on this corridor are well over the 100 miles (consumer goods) and 50 miles (bulk goods) distance in which rail freight becomes a viable choice. A significant amount of freight from the Solent was carries food and drink, indicating that these imports are a key flow on this route. Much of this may be suitable for switching to rail freight however further investigation is required to ascertain the types of food and drink and key hauliers for these road flows. Chemical products are also a key movement on this route.

In the outbound direction, there is a very high flow of mining and quarrying products on this corridor (10, 800 road journeys) travelling to the Solent Ports. There is potential for modal shift to rail freight, however, there is not a currently established market on this route. Like the outbound direction, chemical products are also a key flow but would require further investigation on suitability for rail freight

Zone 2: North West

Routing Area	*Direction*	*Commodity*	*Tonnage*	*Total Vehicle KMs (million)*
North West (Zone 2)	Outbound from Solent	**Food products, beverages and tobacco**	**117, 400**	**0.9**
		Grouped goods	95, 000	1.7
		Transport Equipment	82, 300	2.7
		Secondary Raw Material and waste	72, 800	1.1
		Metal ores and other mining/quarrying products	60, 400	1.7
	Inbound to Solent	**Secondary raw materials**	**182, 000**	**1.4**
		Chemicals and Chemical products	**135, 400**	**3.4**
		Grouped Goods	84, 000	2.4
		Other non-metallic mineral products	65, 700	0.5
		Metal ores and other mining/quarrying products	61, 200	1.1

Figure 40 - Zone 2: North West road commodities (Source: Highways England)

The dominant commodity outbound from the Solent area to the North West is food products, beverages and tobacco. The dominant commodity to the Solent from the North West is secondary raw materials, with a high proportion of these being agricultural products. There are three commodities of significance each transporting over 100,000 tonnes annually.

The typical routing for vehicles travelling to the North West from the Solent would be M3 →A34 →M40 →M6. While there may be some driver variation, it can be safely assumed that almost all vehicles travelling between the Solent and the North West use the entire length of the A34 in either direction.

The dominant commodity travelling on rail is intermodal (container) traffic to and from the port which follows the core route to Birmingham then continues the journey north via the West Coast Main Line. The North West is home to major intermodal terminals at Manchester (Trafford Park), Ditton (3MG Widnes) and Liverpool (Garston F.L.T) in which rail transfers onto road for onward journeys. There is also a sizable automotive market on this corridor due to the presence of a major assembly point at Liverpool Halewood (Jaguar Land Rover).

Rail Data				
Routing Area	Direction	Commodity	Total Trips	Total Trip KMs (Millions)
North West	Outbound from Solent	Domestic Intermodal	1503	0.587 m
		Other	0	0.000 m
		Domestic Waste	0	0.000 m
		Domestic Automotive	323	0.119 m
		Construction Materials	0	0.000 m
	Inbound to Solent	Domestic Intermodal	1792	0.587 m
		Other	1	0.000 m
		Domestic Waste	0	0.000 m
		Domestic Automotive	314	0.119 m
		Construction Materials	0	0.000 m

Figure 41 - Zone 2: North West Rail journeys and total trip KMs (Source: Network Rail)

Like the North East, the distances covered by road freight on this corridor are well over the 100 miles (consumer goods) and 50 miles (bulk goods) distance in which rail freight becomes a viable choice. 4,600 road journeys were made from the Solent carrying food and drink, indicating that food imports are a key flow on this route. Much of this may be suitable for switching to rail freight, however, further investigation is required to ascertain the types of food and drink and key hauliers for these road flows.

117,400 tonnes of road freight on this corridor was 'secondary raw materials' or recycled materials. These journeys are in the inbound (to Solent) direction indicating that they are for the export market. The UK exports around two-thirds of its plastic waste abroad for recycling[66] with other secondary materials also sent abroad for recycling due to limitations on UK processing capacity. The proposed Environment Bill[67], currently being debated by the UK government, will have the power to ban plastic exports[68] and may reduce overall demand for secondary waste transport on this corridor into the future. This suggests that it would not be practical to consider this for modal shift as the long-term future is uncertain. However, as the UK builds its internal recycling capability, rail freight should be considered as a sustainable way of transporting large amounts of waste to recycling sites.

[66] https://www.bbc.co.uk/news/science-environment-46566795

[67] https://services.parliament.uk/bills/2019-21/environment.html

[68] https://www.bbc.co.uk/news/science-environment-51315458

Zone 3: East Midlands

Routing Area	*Direction*	*Commodity*	*Tonnage*	*Total Vehicle KMs (million)*
East Midlands (Zone 3)	Outbound from Solent	**Grouped Goods**	**183, 800**	**0.3**
		Metal ores and other mining/quarrying products	**171, 300**	**0.4**
		Food products, beverages and tobacco	**159,600**	**2.6**
		Unidentifiable goods	**147,500**	**1.9**
		Other non-metallic mineral products	**118,660**	**1.3**
	Inbound to Solent	**Other non-metallic mineral products**	**151,000**	**1.8**
		Food products, beverages and tobacco	**143,700**	**2.4**
		Furniture and other manufactured goods	**102,000**	**4.3**
		Grouped Goods	92,000	2.1
		Transport Equipment	69, 700	1.5

Figure 42 - East Midlands (Zone 3) Road Commodities (Source: Highways England)

The dominant commodity from the Solent to the East Midlands is grouped goods, a mixture of various goods transported together. The dominant commodity to the Solent from the East Midlands is other non-metallic mineral products equalling over 150,000 tonnes of which 64% is cement/lime and 36% is glass. There are eight commodities of significance each transporting over 100,000 tonnes annually demonstrating this region should be an area of priority for investigation.

The typical routing to the East Midlands from the Solent would be M3 →A34 →M40 →A43 →M1. While there may be some driver variation, it can be safely assumed that most of these vehicles use the entire length of the A34 in either direction.

There has been very little rail freight between the Solent and the East Midlands. This is due to the lack of good rail freight terminals in the Eastern Midlands until very recently and the route between the Solent and the eastern side of the East Midlands being fairly circuitous. The ongoing East West Rail (EWR) project will provide a new rail route connecting the Cherwell Valley Line, the West Coast Main Line and the Midland Main Line. These new routes will create a rail link between the Solent Ports and the high concentration of warehouses and distribution centres in the East Midlands. It will also provide an alternative route between Oxford and Birmingham enhancing the overall capacity and

resilience of the line. The Rail Freight Group has indicated that there are several potential suitable freight rail sites on the EWR route[69] outlining the significant potential for both current and new freight flows on this route. Further investigation should be undertaken to gauge industry interest in freight sites on the corridor as well as to understand the overall impact on future freight demand (current rail freight forecasts do not consider the impact of new routes).

Rail Data

Routing Area	Direction	Commodity	Total Trips	Total Trip KMs (Millions)
East Midlands	Outbound from Solent	Domestic Intermodal	1	0.000 m
		Other	0	0.000 m
		Domestic Waste	1	0.000 m
		Domestic Automotive	0	0.000 m
		Construction Materials	0	0.000 m
	Inbound to Solent	Domestic Intermodal	1	0.000 m
		Other	0	0.000 m
		Domestic Waste	0	0.000 m
		Domestic Automotive	0	0.000 m
		Construction Materials	0	0.000 m

Figure 43 - East Midlands Rail journeys and total trip KMs (Source: Network Rail)

The opening of this new rail line will make this route more attractive for rail freight and may encourage modal shift to rail from road. Grouped goods, metal ores and other mining/quarrying products and food, drink and beverages make up key exports to the Solent by road with other non-metallic mineral products, food products, beverages and tobacco, furniture and other manufactured goods making up the key imports. The next stage of this study should ascertain the key customers of these commodities and work with stakeholders to make the case for the opportunities for modal shift through East West Rail.

A recent example of modal shift is the opening of the new Strategic Rail freight Interchange at East Midlands Gateway which has already attracted new services from major ports including Southampton. The catchment for this is the Nottingham and Derby area. It shows that new well thought out rail freight terminals can attract new rail services which means modal shift from road to rail. There are other developments at different stages of planning in the South Midlands. Northampton Gateway, a new Strategic Rail Freight Interchange, is currently under construction with connections to the West Coast Main Line. Once EWR has opened, this will have direct connections through to the Cherwell Valley line and onwards to Southampton.

This brings us on to the West Midlands which is the biggest generator and attractor of freight to and from the Solent.

[69] http://www.rfg.org.uk/wp-content/uploads/2017/07/E-W-Rail-Position-Paper-July-2017.pdf

Zone 4: West Midlands

Routing Area	*Direction*	*Commodity*	*Tonnage*	*Total Vehicle KMs (million)*
West Midlands (Zone 4)	Outbound from Solent	**Grouped Goods**	**327,900**	**6.0**
		Wood and products of wood and cork	**302,400**	**3.06**
		Unidentifiable goods	**273,000**	**4.7**
		Chemicals and chemical products	**214,900**	**2.06**
		Equipment and material utilized in the transport of goods	85,000	2.0
	Inbound to Solent	**Food products, beverages and tobacco**	**509,400**	**10.9**
		Grouped Goods	**283,100**	**3.4**
		Mail	**230,500**	**2.8**
		Chemicals and chemical products	**201,700**	**2.7**
		Transport Equipment	**173,900**	**2.1**

Figure 44 - West Midlands (Zone 4) Road Commodities (Source: Highways England)

The dominant commodity outbound from the Solent to the West Midlands is grouped goods totalling over 300,000 tonnes moved annually. The dominant commodity inbound to the Solent from the West Midlands is food products, beverages and tobacco with over 500,000 tonnes. The amount of mail transported is also significant as there are 10 regional Royal Mail hubs within the Birmingham area hence the high volume of mail transported. The West Midlands is also home to the National Distribution Centres (NDCs) for most parcel and pallet network companies and hence it works using a hub and spoke logistics model. It is important to note that for both the inbound and outbound annual goods transported these are the highest numbers across all routing zones. In total, there are nine commodities of significance transporting over 100,000 tonnes annually.

The typical route for vehicles travelling from the Solent to the Midlands would be M3 → A34→M40. While there may be some driver variation, it can be assumed most of these vehicles travel the full length of the A34 in either direction.

The West Midlands is a major hub for rail freight with almost 3,000 trips a year to and from the Solent. The dominant commodity travelling on rail is intermodal (container) traffic to and from the port which travels via Oxford to Birmingham and areas around Birmingham. The West Midlands is home to several major intermodal rail freight terminals at Birmingham Lawley Street, Birmingham Hams Hall and Tamworth Birch Coppice. These three terminals

make up almost a third of all intermodal traffic on the Solent to the Midlands route. There is also a regular automotive service to and from Castle Bromwich (Jaguar) in Birmingham, but this is in the minority of journeys.

Rail Data

Routing Area	Direction	Commodity	Total Trips	Total Trip KMs (Millions)
West Midlands	Outbound from Solent	Domestic Intermodal	1516	0.375
		Other	12	0.003
		Domestic Waste	0	0.000
		Domestic Automotive	64	0.015
		Construction Materials	0	0.000
	Inbound to Solent	Domestic Intermodal	1230	0.375
		Other	15	0.003
		Domestic Waste	0	0.000
		Domestic Automotive	64	0.015
		Construction Materials	1	0.000

Figure 45 – West Midlands rail journeys and total trip KMs (Source: Network Rail)

Generally, the distances covered by road freight on this corridor are well over the 100 miles (consumer goods) and 50 miles (bulk goods) distance in which rail freight becomes a viable choice. For outbound journeys from the Solent the dominant commodities are grouped goods (mix of commodities), goods and products of wood and cork and unidentifiable goods (not fitting into any other category). Further investigation into key customers and the make-up of these 'grouped goods' travelling via road freight on this corridor is required to fully understand whether there are any potential markets for modal shift to rail. In the inbound direction to the Solent, the dominant road commodities being carried are food products, beverages and tobacco, grouped goods and mail. As discussed previously, much of this may be suitable for switching to rail freight however further investigation is required to ascertain the types of food and drink and key hauliers for these road flows.

As outlined above, unlike other areas to/from the Solent there is a significant amount of mail traffic on this corridor with over 11,800 journeys being made. The reason behind this is likely because the West Midlands is home to Royal Mail's National Distribution Centre, UPS's National Hub, several Amazon distribution centres, Hermes National Hub and many more distribution centres in which mail will be sent to both consumers and businesses in the Solent area. A Royal Mail rail service, operated by DB Cargo, currently takes mail and parcels between several locations on the West Coast Main Line using Class 325 electrical multiple units. Royal Mail has recently announced the location of their new national hub which is rail connected at DIRFT 3. Other organisations across the UK parcel and rail industry are showing a keen interest in the expansion of what is being called the 'express parcels sector'[70] [71] [72] to take pressure of the existing road network. The Network Rail Freight Network Study (2017) notes that such services will be similar to existing Royal Mail services and utilising traction and rolling stock with passenger running characteristics, conceptually this sector will exploit the superior transit speed offered by rail over road to affect faster and more carbon efficient movements of parcels and retail/consumer goods. Such express services would typically operate between rail served hubs but could also involve the servicing of key population centres where there is an opportunity to use existing city centre passenger stations outside peak hours. More generally, higher speed rail freight operations have a potentially significant role to play in achieving a lower carbon solution for retail and commercial logistics into

[70] https://www.railtechnologymagazine.com/Rail-News/porterbrook-signs-supply-deal-for-new-rail-parcel-service

[71] https://www.railfreight.com/business/2020/08/20/new-style-rail-parcels-nearer-to-delivery/

[72] https://www.networkrail.co.uk/wp-content/uploads/2017/04/Freight-Network-Study-April-2017.pdf Page 27

congested urban centres, with electric last mile delivery[73]. The mail sector has become increasingly important, particularly during high street retailer closures during the Covid-19 pandemic. Growth of the parcels sector is expected to continue with global parcel shipping forecast to double by 2026[74].

Considering this corridor specifically, the road route is more direct than the rail route which means that rail freight options are limited. However as current and proposed mail rail freight trains are of a similar design to passenger trains, there is more flexibility on the route they can take. East West Rail will also provide an important link between hubs on the Cherwell Valley Line, West Coast Main Line and Midland Mainline meaning that the journey opportunities will increase, and journey times will improve. Network Rail and Highways England will continue to investigate this market in future phases and will engage with the existing ongoing rail express parcel workstreams across the industry to ascertain the options for the Solent to the West Midlands route.

Zone 5: Berkshire, Buckinghamshire and Oxfordshire

Routing Area	*Direction*	*Commodity*	*Tonnage*	*Total Vehicle KMs (million)*
Berkshire, Buckinghamshire and Oxfordshire (Zone 5)	Outbound from Solent	**Grouped Goods**	**280,400**	**5.4**
		Unidentifiable Goods	**178,000**	**2.2**
		Equipment and material utilized in the transport of goods	**171,200**	**1.5**
		Food products, beverages and tobacco	**170,200**	**1.2**
		Other non-metallic mineral products	89,600	0.9
	Inbound to Solent	**Secondary raw material and waste**	**425,500**	**2.0**
		Food products, beverages and tobacco	**421,900**	**2.8**
		Grouped Goods	**255,600**	**5.0**

[73] https://www.networkrail.co.uk/wp-content/uploads/2017/04/Freight-Network-Study-April-2017.pdf Page 27

[74] Pitney Bowes Parcel Shipping Index https://www.pitneybowes.com/content/dam/pitneybowes/us/en/shipping-index/pb-parcel-shipping-infographic-2020-final-hires-rev2.pdf

		Goods moved in the course of household and office removals	**135,900**	**0.9**
		Coke and refined petroleum products	57,300	0.2

Figure 46 - Zone 5: Berkshire, Buckinghamshire and Oxfordshire Road Commodities (Source: Highways England)

The dominant commodity outbound from the Solent to Berkshire, Buckinghamshire and Oxfordshire are grouped goods. The dominant commodity that goes into the Solent from Berkshire, Buckinghamshire and Oxfordshire are secondary raw material and waste. However, it is important to note that of the inbound grouped goods, it is estimated that 31,400 tonnes of these are automobile industry products that very likely go direct from the BMW Mini plant in Oxford to Southampton Port. There are eight commodities of significance each transporting over 100,000 goods annually.

The typical routing for vehicles travelling from the Solent to Berkshire, Buckinghamshire and Oxfordshire is M3 → A34. Dependent on their destination, some of these vehicles may leave the A34 before Oxford but again it can be assumed that most of these vehicles will travel the full length of the A34 in both directions.

The main rail commodity on this corridor is domestic automotive driven by the presence of Plant Oxford, a BMW facility where Minis are manufactured. There are also some limited domestic intermodal movements starting in this area.

Rail Data

Routing Area	Direction	Commodity	Total Trips	Total Trip KMs (Millions)
Berkshire, Buckinghamshire and Oxfordshire	Outbound from Solent	Domestic Intermodal	2	0.000 m
		Other	9	0.002 m
		Domestic Waste	0	0.000 m
		Domestic Automotive	221	0.027 m
		Construction Materials	0	0.000 m
	Inbound to Solent	Domestic Intermodal	90	0.010 m
		Other	10	0.001 m
		Domestic Waste	0	0.000 m
		Domestic Automotive	229	0.028 m
		Construction Materials	0	0.000 m

Figure 47 – Berkshire Buckinghamshire and Oxfordshire rail journeys and total trip KMs (Source: Network Rail)

Compared to areas further north, the overall number of rail freight movements to and from this area is fairly low, especially the rail intermodal market. This could be due to the relatively short distances between the counties and the Solent area (under 100 miles) making rail freight a less attractive choice economically. However, it is still within the distance in which bulk materials are viable for rail freight. There is a large amount of secondary (recycled) raw material and waste heading towards the Solent (21,100 trips), presumably for export from the UK. As detailed in the section discussing the North West, this market is likely to change as a result of the forthcoming Environment Bill. This will mean less export of secondary materials and more secondary bulk materials being processed in the UK. In the short term, rail could provide a more carbon and financially efficient way of transporting this waste for export whilst in the long term, rail should be considered for transporting secondary goods to UK based recycling facilities.

Consumer goods (such as food and drink and 'grouped goods') are less viable for rail freight at this distance so future phases of this scheme should look to ascertain how road freight on this particular corridor can be used most efficiently both in terms of overall highway capacity but also in terms of carbon efficiency.

Zone 6: Gloucestershire, Bristol/Bath and South Wales

Routing Area	*Direction*	*Commodity*	*Tonnage*	*Total Vehicle KMs (million)*
Gloucestershire, Bristol/Bath and South Wales (Zone 6)	Outbound from Solent	**Food products, beverages and tobacco**	**200,700**	**5.1**
		Chemicals and chemical products	82,200	0.9
		Unidentifiable goods	77,300	1.0
		Machinery and equipment	73,700	0.5
		Grouped Goods	71,000	1.9
	Inbound to Solent	**Grouped goods**	**234,700**	**2.7**
		Food products, beverages and tobacco	**171,000**	**3.1**
		Basic metals and fabricated metal products	**151,000**	**0.9**
		Other non-metallic mineral products	78,600	0.4
		Machinery and equipment	58,300	0.9

Figure 48 - Zone 6: Gloucestershire, Bristol/Bath and South Wales Road Commodities (Source: Highways England)

The dominant commodity outbound from the Solent to Gloucestershire, Bristol/Bath and South Wales are food products, beverages and tobacco. The dominant commodity travelling from Gloucestershire, Bristol/Bath and South Wales are grouped goods. Of the vehicles travelling to the Solent from this area, 41% of vehicle kms are from empty vehicles which would suggest there is a high volume of picking up goods from the ports to then travel to this area. There are four commodities of significance, each totalling over 100,000 tonnes transported annually.

The typical routing for vehicles travelling from the Solent to Gloucestershire, Bristol/Bath and South Wales is M3 → A34 →M4. The M4 junction of the A34 is where the largest number of vehicles exit the A34, sometimes up to 3000

HGVs daily. The majority of these vehicles will travel roughly half the length of the A34 to egress onto the M4 – this provides some insight into the congestion issues at this junction with many vehicles exiting the A34 here.

Rail Data				
Routing Area	Direction	Commodity	Total Trips	Total Trip KMs (Millions)
Gloucestershire, Bristol/Bath and South Wales	Outbound from Solent	Domestic Intermodal	408	0.099
		Other	2	0.000
		Domestic Waste	13	0.001
		Domestic Automotive	0	0.000
		Construction Materials	19	0.002
	Inbound to Solent	Domestic Intermodal	408	0.099
		Other	1	0.000
		Domestic Waste	14	0.001
		Domestic Automotive	0	0.000
		Construction Materials	80	0.002

Figure 49 - Gloucestershire, Bristol/Bath and South Wales rail journeys and total trip KMs (Source: Network Rail)

This corridor by rail is slightly different to the other routes in that there are two alternative ways of reaching this area by rail. Some trains use the main route via the South West Main Line, Basingstoke, Reading and then continue west on the Great Western Main Line towards Bristol and Wales instead of turning north onto the Cherwell Valley Line. Other trains use a more direct route via Westbury and Bathampton Junction. However, this route is not gauge cleared for standard W10 intermodal freight trains. Therefore, specialised wagons are used on this route. The vast majority of rail services are to Wentloog near Cardiff in Wales. These then connect to destinations throughout Wales via the road network. It should be noted that the Bristol container terminal is currently closed and hence any rail traffic for this city has to go to Cardiff and then brought back by road.

Like previous sections, the key road commodities are grouped goods and food and drink. The distances covered, particularly for Wales, mean that both bulk and consumer commodities are viable for modal shift. Further investigations should be undertaken to understand the major organisations involved in these road flows and the exact nature of the commodities being carried.

Zone 7: Cornwall, Isles of Scilly, Devon and Somerset

Routing Area	*Direction*	*Commodity*	*Tonnage*	*Total Vehicle KMs (million)*
Cornwall, Isles of Scilly, Devon and Somerset (Zone 7)	Outbound from Solent	**Coal and lignite; crude petroleum and natural gas**	**193,800**	**2.1**
		Food products, beverages and tobacco	**189,100**	**1.3**
		Secondary raw material and waste	**146,000**	**1.5**
		Grouped Goods	83,500	1.1

		Unidentifiable Goods	75,200	1.1
	Inbound to Solent	**Food products, beverages and tobacco**	**333,400**	3.5
		Metal ores and other mining/quarrying products	**311,200**	3.0
		Coke and refined petroleum products	**188,200**	0.6
		Coal and lignite; crude petroleum and natural gas	47,900	0.5
		Grouped Goods	47,300	0.4

Figure 50 - Zone 7: Cornwall, Isles of Scilly, Devon and Somerset Road Commodities (Source: Highways England)

There are six commodities of significance, each transporting over 100,000 tonnes of goods annually. The dominant commodity outbound from the Solent to Cornwall, Isles of Scilly, Devon and Somerset is coal and lignite (crude petroleum and natural gas). This zone is the only routing zone to have coal/oil as a dominant commodity. The dominant commodity inbound to the Solent from Cornwall, Isles of Scilly, Devon and Somerset is food products, beverages and tobacco, of which a high percentage is dairy products and ice cream, typical exports for this region.

In the inbound direction towards the Solent, food and drink is the dominant commodity as is the case with other areas. Another very significant movement from this area is the metal ores and other mining/quarrying products commodity. This is due to the very high concentration of quarries within the Mendip Hills area. Some quarries are served by rail but not all. This rail traffic from the Mendips makes up the majority of rail freight to and from this area connecting to the Solent. It is important to note that there are currently limited freight train services to/from the Solent to/from this zone – the reasons for this include the absence of any intermodal terminal/s in south west England; and gauge clearance limitations. The Network Rail strategic studies for the South West (see page 14) are reviewing these aspects in more detail.

Rail Data

Routing Area	Direction	Commodity	Total Trips	Total Trip KMs (Millions)
Cornwall, Isles of Scilly, Devon and Somerset	Outbound from Solent	Domestic Intermodal	0	0.000
		Other	0	0.000
		Domestic Waste	0	0.000
		Domestic Automotive	0	0.000
		Construction Materials	94	0.009
	Inbound to Solent	Domestic Intermodal	0	0.000
		Other	0	0.000
		Domestic Waste	0	0.000
		Domestic Automotive	0	0.000
		Construction Materials	49	0.009

In the inbound direction towards the Solent, food and drink is the dominant commodity as is the case with other areas. Another very significant movement from this area is the metal ores and other mining/quarrying products commodity. This is due to the very high concentration of quarries within the Mendip Hills area.

The typical routing for vehicles travelling from the Solent to Cornwall, Isles of Scilly, Devon and Somerset would be M3 →A34 →A303. The A303 junction has up to 1000 HGVs exiting from the A34 daily.

Zone 8: Dorset, Bournemouth, Christchurch and Poole

Routing Area	*Direction*	*Commodity*	*Tonnage*	*Total Vehicle KMs (million)*
Dorset, Bournemouth, Christchurch and Poole (Zone 8)	Outbound from Solent	**Food products, beverages and tobacco**	**111,800**	**1.6**
		Grouped Goods	78,700	1.4
		Secondary raw materials and waste	50,200	0.1
		Goods moved in the course of household and office removals	38,800	0.2
		Basic metal and other fabricated metal products	32,200	0.8
	Inbound to Solent	**Grouped Goods**	**187,600**	**1.4**
		Food products, beverages and tobacco	**105,200**	**1.6**
		Coke and refined petroleum products	99,400	0.6
		Wood and products of wood/cork	36,200	0.2
		Secondary raw material and waste	30,700	0.1

Figure 51 – Dorset, Bournemouth, Christchurch and Poole Road Commodities (Source: Highways England)

The dominant commodity outbound from the Solent to Dorset, Bournemouth, Christchurch and Poole is food products, beverages and tobacco. The dominant commodity from this area to the Solent is grouped goods. There are three commodities of significance, each totalling over 100,000 tonnes of goods transported annually.

In order to give a whole picture, this region has been included but it is unlikely traffic travelling from the Solent to Dorset, Bournemouth, Christchurch and Poole would use the A34 – the typical route would be M27→A31. Due to the short distances involved in these journeys rail would not be a viable option.

Zone 9: Wiltshire

Routing Area	*Direction*	*Commodity*	*Tonnage*	*Total Vehicle KMs (million)*
Wiltshire (Zone 9)	Outbound from Solent	**Grouped Goods**	**116,900**	**0.7**
		Food products, beverages and tobacco	98,500	0.2
		Unidentifiable Goods	90,400	0.7
		Chemicals and chemical products	42,700	0.4
		Other non-metallic mineral products	42,300	0.2
	Inbound to Solent	**Secondary raw materials**	**101,300**	**0.1**
		Grouped Goods	50,300	0.08
		Equipment and material utilised in the transport of goods	27,100	0.1
		Chemicals and chemical products	19,800	0.4
		Goods moved in the course of household and office removals	13,500	0.08

Figure 52 – Zone 9: Wiltshire Road Commodities (Source: Highways England)

The dominant commodity outbound from the Solent to Wiltshire is grouped goods. The dominant commodity going from Wiltshire to the Solent area is secondary raw materials. Predominantly, goods to this region are outbound from the Solent. There are two commodities of significance, each transporting over 100,000 tonnes annually.

Vehicles for this region may use the A36 to Salisbury but as it is a poor quality route for HGVs, it can be assumed drivers may choose to use either the M3 →A34 →then either A303 or the M4 for travel to north or west Wiltshire.

Distances are short and not generally suited to rail but there is a small amount of rail freight on this corridor, mainly construction materials/aggregates to and from Westbury.

7.7 SUMMARY

The table below details the top 5 commodities in terms of road volumes from all regions outbound from the Solent and inbound to the Solent using the A34. These are the commodities which will be analysed further. The category 'Unidentifiable goods' has been omitted.

Direction	*Routing Zone/Region*	*Commodity*	*Tonnage*	*Total Trips*	*Total Vehicle KMs (million)*
Outbound from Solent	West Midlands	Grouped Goods	327,900	11,300	6.0
	West Midlands	Wood and other products of wood/cork	302,000	14,800	3.06
	Berkshire, Buckinghamshire and Oxfordshire	Grouped Goods	280,000	13,200	5.4
	West Midlands	Chemicals and Chemical products	214,900	9,300	2.06
	Gloucestershire, Bristol/Bath and South Wales	Food products, beverages and tobacco	200,700	9,800	5.1
Inbound to Solent	West Midlands	Food products, beverages and tobacco	509,400	18,500	10.9
	Berkshire, Buckinghamshire and Oxfordshire	Secondary raw materials and waste	425,000	21,200	2.0
	Berkshire, Buckinghamshire and Oxfordshire	Food products, beverages and tobacco	421,000	23,000	2.8
	Cornwall, Isles of Scilly, Devon and Somerset	Food products, beverages and tobacco	333,400	11,600	3.5
	Cornwall, Isles of Scilly, Devon and Somerset	Metal ores and other products of quarrying/mining	311,200	11,400	3.0

Figure 53 – Road Commodities Summary (Source: Highways England)

For outbound journeys from the Solent the dominant commodities are grouped goods (mix of commodities), goods and products of wood/ cork, food, beverages and tobacco and chemicals and chemical products. For these commodities, further investigation into key end customers, main hauliers and the exact nature of the items being carried via road freight on the outbound routes is required to fully understand whether there are any potential markets for modal shift to rail.

In the inbound direction to the Solent, the dominant road commodities being carried are food products, beverages and tobacco, secondary raw materials and waste and metal ores and other products of quarrying/mining. The food products, beverages and tobacco commodity sector is discussed above. Secondary raw materials and waste (recycled materials) also a key market. As discussed earlier in the document, this market may change significantly as a result of the result of the forthcoming Environment Bill. This may mean less export of secondary materials and more secondary bulk materials are processed in the UK. In the short term, rail could provide a more carbon and financially efficient way of transporting this waste for export whilst in the long term, rail should be considered for transporting secondary goods to UK based recycling facilities. Metal ores and other products of quarrying/mining is also a significant sector on road. Aggregate traffic is already a well-established market on rail. Network Rail and Highways England should work with the industry partners to assess how this existing established market can be expanded further.

It should also be noted that, whilst not in the top ten movements, the mail and parcels sector is significant on certain routes, particularly between the Solent and the West Midlands, and offers opportunities for modal shift and can be faster and more flexible than traditional rail freight. The West Midlands is home to Royal Mail's National Distribution Centre, UPS's National Hub, several Amazon distribution centres, Hermes National Hub and many more distribution centres in which mail will be sent to both consumers and businesses in the Solent area. A Royal Mail rail service, operated by DB Cargo, currently takes mail and parcels between several locations on the West Coast Main Line using Class 325 electrical multiple units. Royal Mail has recently announced the location of their new national hub which is rail connected at DIRFT 3. Other organisations across the UK parcel and rail industry are showing a keen interest in the expansion of what is being called the 'express parcels sector'[75] [76] [77] to take pressure of the existing road network. The express parcels sector has an advantage over the traditional rail freight market in that converted passenger stock can be used, operating at the same speeds as passenger services. Such paths use less capacity on the timetable overall. The mail sector overall in the UK has become increasingly important, particularly during high street retailer closures during the Covid-19 pandemic. Growth of the parcels sector is expected to continue with global parcel shipping forecast to double by 2026[78]. Network Rail and Highways England will continue to investigate this market in future phases and will engage with the existing ongoing rail express parcel workstreams across the industry to ascertain the options for the Solent to the West Midlands route.

[75] https://www.railtechnologymagazine.com/Rail-News/porterbrook-signs-supply-deal-for-new-rail-parcel-service

[76] https://www.railfreight.com/business/2020/08/20/new-style-rail-parcels-nearer-to-delivery/

[77] https://www.networkrail.co.uk/wp-content/uploads/2017/04/Freight-Network-Study-April-2017.pdf Page 27

[78] Pitney Bowes Parcel Shipping Index https://www.pitneybowes.com/content/dam/pitneybowes/us/en/shipping-index/pb-parcel-shipping-infographic-2020-final-hires-rev2.pdf

KEY POINTS

- Further investigation into key end customers, main hauliers and the exact nature of the items being carried via road freight on the key routes is required to fully understand whether there are any potential markets for modal shift to rail.
    - Food and drink is a key commodity to many areas in the corridor. Network Rail and Highways England should look to understand the key organisations involved in these movements and engage with them to understand any barriers to model shift. The use of temperature-controlled containers and swapbodies is an option.
    - Chemical and chemical products are also moved in high quantities on this corridor. Network Rail and Highways England should look to understand the key organisations involved in these movements and engage with them to understand the nature of this market. The use of tanktainers for a range of chemical products is an option and these can be moved in general intermodal trains.
    - Secondary materials and waste (recycled materials) is a significant commodity on this route. Rail could provide a more carbon and financially efficient way of transporting this waste for export whilst in the long-term, rail should be considered for transporting secondary goods to UK based recycling facilities. Network Rail and Highways England should engage with ongoing workstreams around recycled materials taking place across the industry and make the case for rail as a mode for transporting these goods.
    - Aggregate traffic is already a well-established market on rail. Network Rail and Highways England should work with the industry partners to assess how this existing established market can be expanded further.
    - Whilst not in the top ten movements, the mail and parcels sector is significant on certain routes and offers opportunities for modal shift and can be faster and more flexible than traditional rail freight. Network Rail and Highways England will continue to investigate this market in future phases and will engage with the existing ongoing rail express parcel workstreams across the industry to ascertain the options for the Solent to the West Midlands route.

8. FUTURE FREIGHT GROWTH

8.1 RAIL FREIGHT DEMAND FORECASTS-INTRODUCTION TO RAIL FREIGHT FORECASTS

In July 2020 Network Rail published rail freight forecasts at the GB level in the following reports:

- Rail freight forecasts: scenarios for 2023/24[79];
- Rail freight forecasts: scenarios for 2033/34 and 2043/44[80]; and
- Routeing of rail freight forecasts[81].

The forecasts were commissioned from consultants MDS Transmodal and were developed with stakeholders. The main forecasts, such as total rail freight volumes between origins and destinations in GB, were developed in 2018 and early 2019 and therefore do **not** take account of the following factors:

- The impact of COVID-19; and
- The impact of the Government's policy of net zero greenhouse gas emissions by 2050, which was introduced in June 2019
- The impact of Brexit (except in relation to HGV drivers' wages).

A scenario-based approach was used for these forecasts. For 2043/44, for example, the following main scenarios were defined:

- Scenario A: factors which favour rail freight and low total market growth;
- Scenario B: factors which favour rail freight and high total market growth;
- Scenario C: factors which favour road freight and low total market growth;
- Scenario D: factors which favour road freight and high total market growth; and
- Scenario E: a central scenario.

[79] https://www.networkrail.co.uk/wp-content/uploads/2020/08/Rail-freight-forecasts-Scenarios-for-2023-24.pdf

[80] https://www.networkrail.co.uk/wp-content/uploads/2019/04/Rail-freight-forecasts-Scenarios-for-2033-and-2043.pdf

[81] https://www.networkrail.co.uk/wp-content/uploads/2020/08/Routeing-of-rail-freight-forecasts.pdf

The highest scenario for rail freight is generally Scenario B since it reflects factors which favour rail freight relative to road freight (such as high fuel prices and high wages) and high total market growth (high growth in the total road and rail freight market, such as in trade volumes). The lowest scenario is usually Scenario C since it combines factors which favour road freight (low fuel prices and wages) with low total market growth. The detailed assumptions for each scenario are shown in the report on the 2023/24, 2033/34 and 2043/44 forecasts (see citations).

None of these scenarios take account of the capacity of the rail network – they project potential demand for rail freight but do not address the ability of the rail network to accommodate this demand.

Most of the scenarios (C, D and E) do not take account of train lengthening. Train lengthening is being progressed on this corridor and could result in an increase in trains per day relative to the forecasts. This is an increase because it should improve rail's competitiveness, although the impact is uncertain because it will also result in a reduction in the number of trains required for a given tonnage.

Finally, none of the scenarios include forecasts for new rail freight markets, such as express freight, also known as light logistics. This could mean that all the forecasts are under-stated.

8.2 NATIONAL FORECASTS

Before presenting the forecasts for the corridor (see below) it is worth summarising the forecasts at the GB level, to provide some context for the corridor forecasts. In terms of the average number of trains per weekday, the GB-wide forecasts show a 74% increase between the base year and 2043/44 under the central scenario, scenario E (from 286 trains per day in each direction to 498). The intermodal sector is expected to account for 64% of the net growth, followed by 38% provided by the construction materials sector. All the other commodity sectors combined show a small net reduction of 2%, although this includes some increases such as metals (2%) and biomass (1%), offsetting a reduction in coal volumes. This illustrates the importance of the intermodal and construction sectors for future rail freight growth at the GB level.

8.3 RAIL FREIGHT FORECASTS FOR THIS CORRIDOR

For this study, Network Rail has extracted the details of the rail freight forecasts for one section of this corridor. The section between Basingstoke and Reading was selected since it captures almost all the forecast flows between Solent and the Midlands (and beyond). This is because there are very few realistic alternative routes for these flows, such as routes via Bristol or Chippenham, although it is possible that such routes will be available more widely in future following upgrades (such as gauge clearance upgrades). It should be noted however that there are a minority of flows to and from the Solent that do not travel via Basingstoke and Reading and these are not included within the forecasts.

However, it should be noted that the Basingstoke to Reading section captures some flows which are not to or from the Midlands – for example flows between Solent and London, Bristol or Cardiff. It also captures flows to or from Eastleigh as well as to or from Solent. These flows are included in the forecasts presented in this section.

Finally, all the forecasts presented in this section are for the average number of trains per weekday in each direction. Forecasts are presented for 2043/44, as a proxy for the end-year of the study, 2050. They are also

presented for the base year used for the forecasts, 2016/17. None of the forecasts take account of path utilisation, so the number of paths required to accommodate these volumes would likely be higher[82].

Figures 54 and 55 show that the forecasts vary by scenario, with the highest growth applying to Scenario B (c. 20 additional trains per day in 2043/44 relative to 2016/17) and the lowest to Scenario C (5 additional trains per day in 2043/44 relative to 2016/17). The central scenario, Scenario E, shows growth of 9 additional trains per day relative to 2016/17.

Assuming each train journey is equivalent to between 30 and 40 lorry journeys on average, growth of 20 trains per day under Scenario B could remove between 600 and 800 lorry journeys from the roads per day, in each direction, if that growth consists of commodities that have switched from road to rail

Total trains per day and per direction by scenario for Basingstoke to Reading section		
	2016/17	**2043/44**
A	23.1	33.3
B	23.1	43.0
C	23.1	28.5
D	23.1	35.3
E	23.1	32.0

Figure 54 – Total Trains per day and per direction by scenario for Basingstoke to Reading section.

[82] Some rail freight sectors such as intermodal operate scheduled services, so the requirement for paths is relatively predictable, and a path can be allocated for each scheduled service, with a confidence that most services will run; resulting in high path utilisation. However in some sectors such as the construction sector, the demand for the cargo is more variable. In order to accommodate such variable demand, it is necessary to have several available paths – often to several different destinations, even though not all of them will be used; resulting in low path utilisation. [https://www.networkrail.co.uk/wp-content/uploads/2020/08/Rail-freight-forecasts-Scenarios-for-2033-34-and-2043-44.pdf]

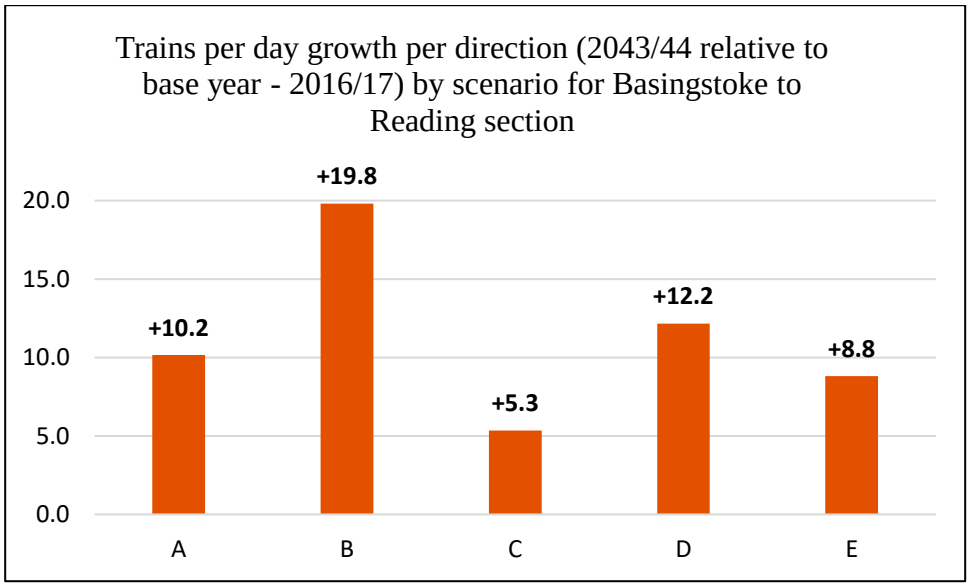


Figure 55 – Trains per day growth per direction (2043/44 relative to base year – 2016/17) by scenario for Basingstoke to Reading section

As discussed in the forecast reports, the forecasts are broken down by commodity sector – fifteen sectors in total. Figure 56 shows that under the central scenario, Scenario E, the intermodal sector accounts for c. 80% of total volumes in 2043/44, followed by automotive (14%) and NR engineering (5.5%).

Total trains per day in each direction for Basingstoke to Reading section – Commodities breakdown			
	2016/17	2043/44 E	2043/44 E – Percentage of Total Trains per day
Automotive	3.9	4.5	14.0%
Construction Materials	0.0	0.1	0.2%
Engineering	1.7	1.8	5.5%
Intermodal	17.4	25.6	80.0%
Other	0.1	0.1	0.3%
Totals	**23.1**	**32.0**	**100.0%**

Figure 56 – Total trains per day in each direction for Basingstoke to Reading section – Commodities breakdown under scenario E.

Next, the origins and destinations of the forecast volumes are addressed.

Figure 57 shows, for all commodity sectors, in 2043/44 under the central scenario, the most important regional origin or destination is expected to be the North West (c. 30% of total volumes), followed by the West Midlands (21%) and Yorkshire & the Humber (18%). The Midlands and the North (including Scotland) account for 82% of the total, while other regions account for 18%. Whilst the Midlands and the North account for the vast majority of flows, other origins

and destinations are also important. All the forecasts in figures 57 (and 58) are for volumes to or from the Solent (including Eastleigh) – mainly to or from the Port of Southampton.

Total trains per day in each direction for Basingstoke to Reading section – Regions breakdown			
From/To South East:	2016/17	2043/44 E	2043/44 E – Percentage of Total Trains per day
East Midlands	1.6	2.0	6.4%
Eastern	0.0	0.8	2.5%
Greater London	0.0	0.2	0.6%
North East	0.0	0.1	0.3%
North West	7.9	9.5	29.6%
Scotland	0.0	2.1	6.6%
South East	2.7	3.2	9.9%
South West	0.1	0.2	0.6%
Wales	1.0	1.4	4.3%
West Midlands	5.9	6.8	21.4%
Yorkshire & the Humber	4.0	5.7	17.9%
Totals	**23.1**	**32.0**	**100.0%**

Figure 57 - Total trains per day in each direction for Basingstoke to Reading section – Regions breakdown

Figure 58 is similar to figure 57 but refers to intermodal volumes only. The regional distribution is similar to figure 56, but the Midland and the North (including Scotland) account for a higher proportion of the totals (c.88% rather than 82%). This reflects the importance of long-distance flows for the intermodal sector.

Intermodal trains per day in each direction for Basingstoke to Reading section – Regions breakdown			
From/To South East:	2016/17	2043/44 E	2043/44 E – Percentage of Total Trains per day
East Midlands	1.0	1.5	5.8%
Eastern	0.0	0.8	3.1%

Greater London	0.0	0.1	0.5%
North East	0.0	0.1	0.4%
North West	5.9	7.4	28.8%
Scotland	0.0	2.1	8.2%
South East	0.6	0.7	2.6%
South West	0.1	0.2	0.7%
Wales	1.0	1.4	5.3%
West Midlands	5.3	6.1	23.9%
Yorkshire & the Humber	3.5	5.3	20.5%
Totals	**17.4**	**25.6**	**100.0%**

Figure 58 – Intermodal trains per day in each direction for Basingstoke to Reading section – Regions breakdown

8.4 CONCLUSIONS ON RAIL FREIGHT FORECASTS FOR THIS CORRIDOR

The rail freight forecasts for this corridor show significant growth under all scenarios, with growth of c. 20 trains per day under the highest scenario (Scenario B) and of 5 trains per day under the lowest scenario (Scenario C). Growth of 20 trains per day, for example, would remove the equivalent of up to 800 lorry journeys from the roads per day in each direction.

The intermodal sector is expected to continue to be the dominant commodity sector. Under the central scenario (Scenario E), for example, intermodal is expected to account for c. 80% of total volumes in 2043/44.

Long-distance flows are also expected to continue to dominate. Under the central scenario, for example, the Midlands and the North (including Scotland) are together expected to account for c. 82% of total volumes in 2043/44.

The scenarios probably understate the uncertainties around future rail freight volumes on this corridor.

On a positive note, there is the potential for much higher volumes than those projected under the highest scenario (Scenario B) because, as mentioned above, none of the scenarios take account of the policy of net zero greenhouse gas emissions by 2050. Assuming the relevant routes would all be fully electrified by 2043 or 2050, and that low carbon solutions for HGVs will be difficult and costly, particularly for long-distance journeys, growth could be much higher than 20 trains per day. Growth could also be higher due to the development of new markets, such as express freight, which is also not reflected in the forecasts (as mentioned above). Higher growth due to either factor – the net zero policy or new markets – would probably require significant increases in the capacity of the rail network on the corridor, to accommodate these volumes.

On a negative note, there is the potential for lower volumes than those projected under the lowest scenario (Scenario C) because, as mentioned above, none of the scenarios take account of COVID-19. If COVID-19 leads to lower trade growth in the longer term, lower growth may apply. Conversely, rail freight volumes have now generally recovered to their pre-Covid levels (see section 9) and this may mean that the pandemic has less of a long-term impact on rail freight volumes than was initially anticipated.

Another key uncertainty is Brexit. The forecasts did not take account of this factor, except in relation to HGV drivers' wages. The report on the forecasts (insert ref to MDS report on 2033 and 2043 forecasts, page 17) suggests that

Brexit could have a positive or negative impact on future growth on this corridor. It could have a positive impact because it could lead to a switch in trade volumes from the EU to the rest of the world, and the latter would use deep sea ports (including Southampton) and tends to involve longer inland journeys, which favour rail. It could have a negative impact if Brexit results in lower economic growth.

In summary, this review of the forecasts suggests two main conclusions: first that the forecast scenarios may understate future uncertainties and second that there is at least the potential for significant growth in rail freight volumes on this corridor – for growth of over 20 trains per day, which could result in rail volumes doubling relative to current levels.

8.5 ROAD FREIGHT

At present no road freight forecasts have been considered. However, as part of the refresh of Highways England's Regional Transport Models (RTM2), total vehicle freight forecasts for the years of 2031,2041 and 2051 will be available in Q3 2021. The forecasts have been commissioned from MDS Trans Modal and as such are consistent with the Network Rail forecasts. The forecasts will be at an all vehicle level rather than being split by commodity and will not take into account the impact of Covid-19.

KEY POINTS

- Under all scenarios there is a growth on the Solent to the Midlands rail corridor. The highest growth applies to Scenario B (c. 20 additional trains per day in 2043/44 relative to 2016/17) and the lowest growth to Scenario C (5 additional trains per day in 2043/44 relative to 2016/17). The central scenario, Scenario E, shows growth of 9 additional trains per day relative to 2016/17.
- Network Rail and Highways England should continue to work together to apply relevant data sources to further develop the strategy for this important corridor; allowing a holistic approach to identifying the solutions and interventions required to balance road and rail freight traffic whilst adhering to wider policy initiatives and targets

9. IMPACT OF THE COVID-19 PANDEMIC

9.1 IMPACT ON THE RAIL NETWORK

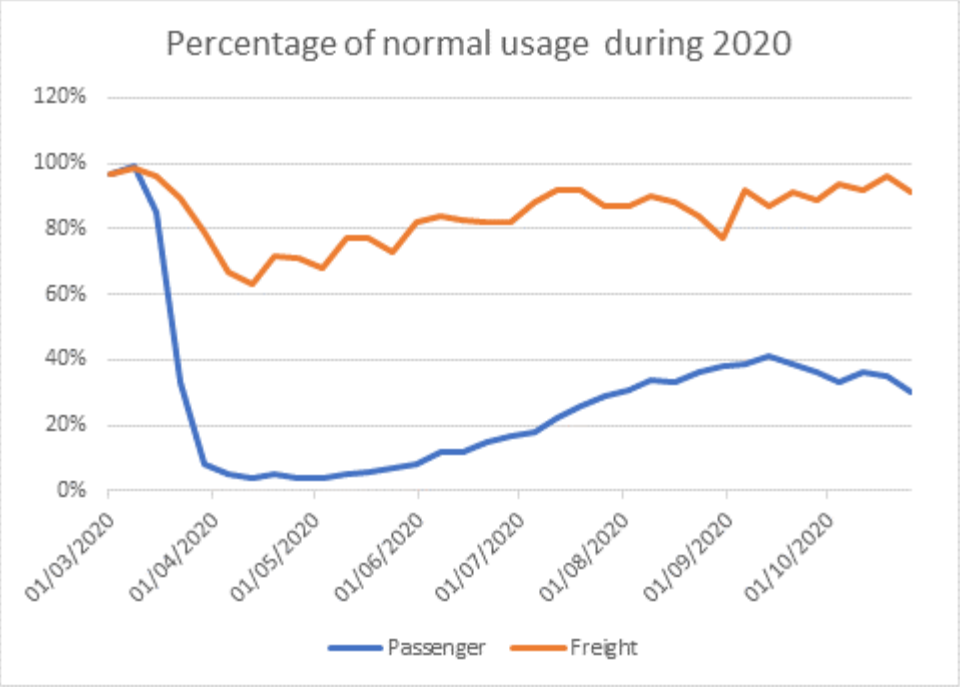


Figure 59 - Freight vs. Passenger trains, percentage of normal use (Source: Network Rail Freight team weekly freight train running summaries and 'Transport use by Mode: Great Britain since 1 March 2020', Department for Transport; (https://www.gov.uk/government/statistics/transport-use-during-the-coronavirus-covid-19-pandemic)

N.B Passenger figures reflect ridership as a percentage of the equivalent week in 2019. Freight figures reflect total trains run as a percentage of total run in a typical week in early 2020 (week commencing 02/02/2020)

At the time of writing, the Covid-19 pandemic has had and continues to have a profound impact across both the road and rail networks. The COVID-19 pandemic has had a particularly significant impact on the rail sector. During the early stages of the UK government's response to the pandemic, the Government advised the public to only use public transport if absolutely necessary. Passenger rail usage subsequently dropped significantly leading to a large reduction in the number of trains timetabled to run. During the first lockdown through to July, passenger rail use was less than 20% of normal use. Freight use on the railway also dropped during this period but only to just over 60% of normal use demonstrating an ongoing requirement and demand for freight. Since that time both freight has recovered to almost 100% of normal use with passenger services showing much less of a recovery. The pandemic is still ongoing and the full extent of the long-term impact on both passenger and freight transport is still unknown.

9.2 IMPACT ON THE STRATEGIC ROAD NETWORK

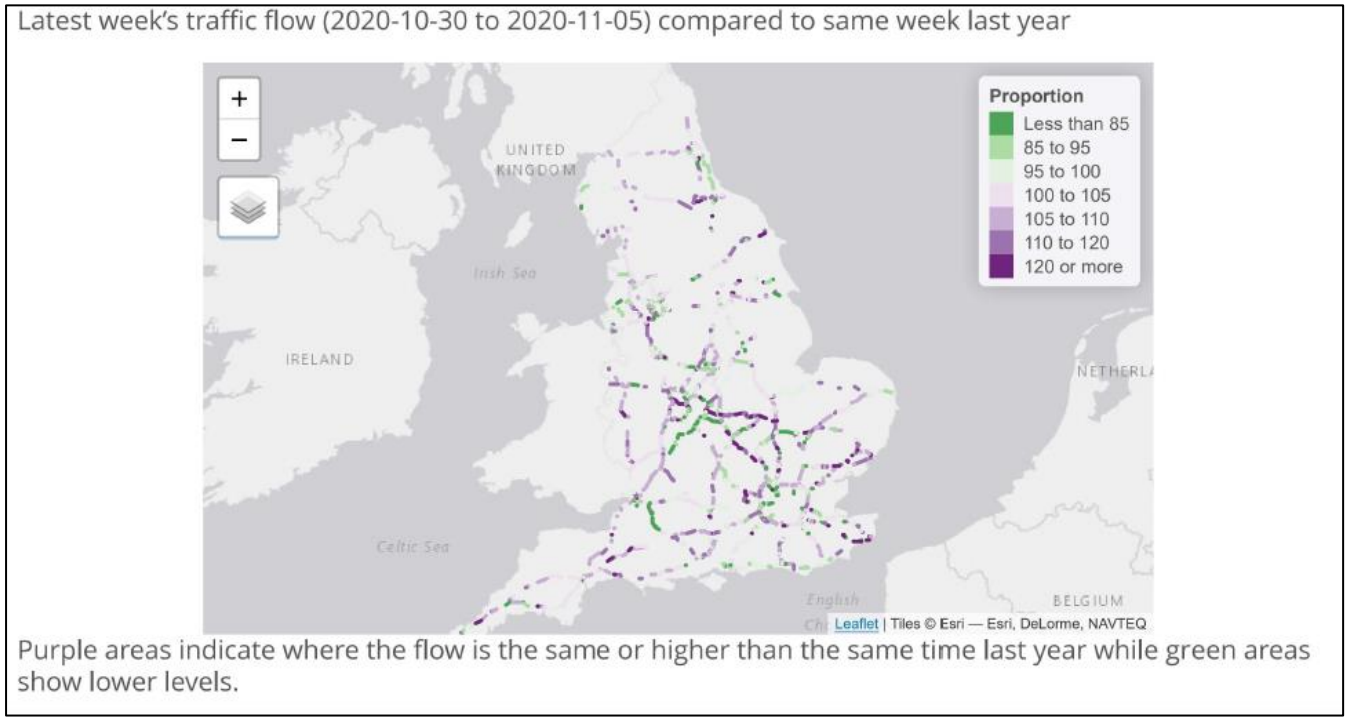


Figure 60 - Traffic on the SRN 30/10/20 - 05/11/20 (Source: Highways England)

The impact of COVID-19 and the changes this has made to how people and goods move continues to be seen on all transport networks. Whilst it continues to be too early to draw definitive conclusions, as has been the case with other modes of transport overall use on the SRN is less than year-on-year. This has been driven by a significant drop in car use, although this has fluctuated through the year and regionally dependent on national or local restrictions in place.

The SRN has however seen, in certain places and corridors, increased year-on-year freight movement. This has largely been seen in established logistics hotpots, such as the golden triangle in the East Midlands. It is likely that these increases relate to wider societal changes, such as increased online purchasing, and wider market factors such as air freight being moved on dedicated freight flights having been disrupted by there being less passenger flights to use and hence no cargo capacity. In addition, the delay to international shipping due to shortage of production and the physical lack of shipping containers in the Autumn caused a backlog of deliveries. Hence in the diagram illustrated above the dark purple shows significant extra volumes of HGVs moving from Felixstowe on the A12 and A14. There was also a one-off occurrence as many exporters moved extra goods to warehouses in Mainland Europe between October and December to lessen the immediate effect of Brexit regulations on January 1st. This again is reflected in strong freight flows to RoRo ports such as Dover, Harwich and Portsmouth.

In terms of the A34/M27 corridor it is too early to interpret conclusively any impact and whether these might be short- or medium-term impacts. Periodic review of year-on-year traffic comparison mapping would suggest that relative to some other locations there has been more modest changes in the number of freight movements, albeit, as Figure 62 shows for the comparison of the first week of November in 2019 and 2020 an increase in freight movements on the A34, A303 and M4. This is an aspect of the study that should be kept under review in 2021/22.

Key Points

- Rail freight has been resilient against the uncertainties surrounding Covid-19 whereas passenger demand has been severely impacted.

- The road network has proved resilient under Covid-19 and some freight movements have even seen an increase in comparison to 2019. This could be partly attributed to an increase in online shopping and a backlog of deliveries, but it is unclear what the long-term effects are on the SRN.

10. MODAL SHIFT AND NETWORK EFFICIENCY

10.1 INTRODUCTION

One of the objectives of this study is to ascertain how both rail and road modes can be used most efficiently, in terms of their carbon emissions and respective network capacity. For carbon emissions, the UK government has set out its legal commitment to achieve 'net zero' greenhouse gas emissions by 2050. Organisations within the transport sector, which is the biggest contributor to greenhouse gas emissions in the UK[83], must take action to help achieve this target. Regarding network capacity, the road network between the Solent and the Midlands experiences regular congestion, particularly at peak times, most noticeably at the M3 junction close to Winchester and the M40 junction close to Oxford. Modal shift from road to rail could provide a significant opportunity to help relieve the capacity challenges on the road network and help reduce the overall greenhouse gas emissions from the transport sector.

10.2 THE CHARACTERISTICS OF ROAD AND RAIL FREIGHT

Over long distances and for high volumes, rail is the more cost-effective option for moving freight. [84]. Road freight is more cost-effective for shorter distances, such as the last mile from a rail freight interchange or movements under 50 miles for bulk traffic and 100 miles for consumer goods. It is generally accepted that rail freight becomes economically viable over longer distances of >100 miles for consumer goods and > 50 miles for bulk goods[85] [86]. Rail can carry significantly more tonnes of freight per journey than road and therefore benefits from the economies of scale. Most road journeys to and from the Solent enter and leave the A34 at its junction with the M40 (see Appendix A) which links to destinations well over the 100-mile distance in which consumer goods become viable for rail freight. For these longer distance journeys, it is potentially more cost-effective to move freight by rail.

Road and rail have similar reliability in terms of journey time. In the case of the A34, at peak times there is a delay of 5-12 minutes particularly at the M3 and M40 junctions respectively – however, outside of these times, the road network has reliable journey times, allowing the free-flowing strategic journeys to continue. The reliability of rail

[83] 2019 UK Greenhouse Gas Emissions data, Department for Business , Energy and Industrial Strategy: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/957687/2019_Final_emissions_statistics_one_page_summary.pdf

[84] The value of freight – Vivid Economics on behalf of the National Infrastructure Commission https://nic.org.uk/app/uploads/Future-of-Freight_The-Value-of-Freight_Vivid-Economics.pdf p.37

[85] Harris, N. G. and McIntosh, D. (2003). The Economics of Rail Freight.

[86] https://www.railfreight.com/business/2020/08/20/new-style-rail-parcels-nearer-to-delivery/

freight as a whole has been steadily improving over the past decade[87] and on the Solent to the Midlands rail route specifically, rail reliability is comparable to road in that the average delay from timetabled services to or from Southampton was just under 3 minutes in 2019/20[88].

However, the rail network is limited in terms of location. As shown in this study, there is a significant amount of freight going to and from the Solent area to areas of the country where there is a lack of direct rail provision to support freight transportation, for example East Midlands, South Wales and Berkshire/Buckinghamshire. However, with the addition of the new Strategic Rail Freight Interchange at East Midlands Gateway and East West Rail, this could increase rail freight transportation going forward. The road network enables access to more of the UK and ultimately, the freight's final destination point, meaning it remains an important form of transportation for journeys up to 100 miles and in terms of first and last mile connectivity to other locations.

In the UK, the transport sector is the biggest contributor to greenhouse gases accounting for 27% of all emissions in 2019 [89]. Work is ongoing across the transport industry to look at decarbonisation with the Department for Transport due to publish the 'Transport Decarbonisation Plan' in 2021 which "will set out in detail what government, business and society will need to do to deliver the significant emissions reduction needed across all modes of transport, putting us on a pathway to achieving carbon budgets and net-zero emissions across every single mode of transport by 2050"[90] Within transport, the biggest contributor to greenhouse gas emissions is passenger cars (55%) followed by HGVs (16%) and LDVs (16%).

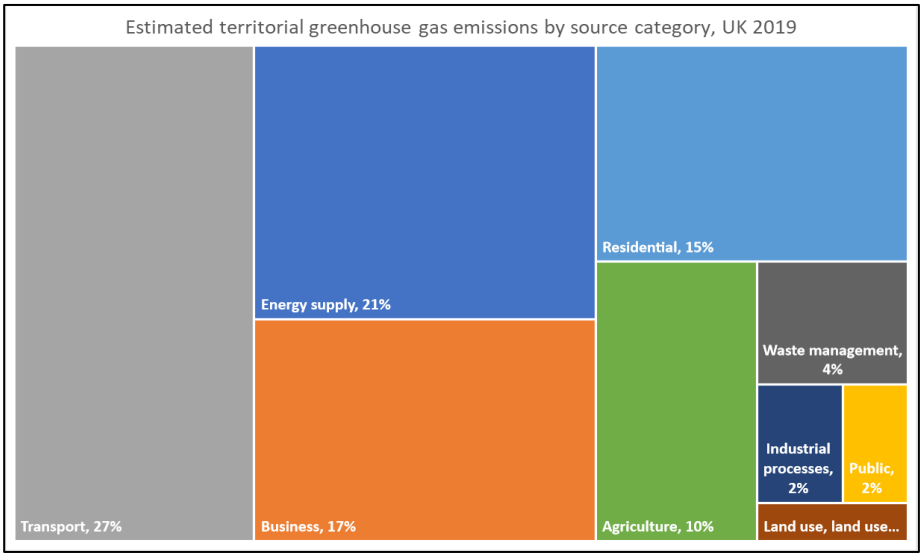


Figure 61 - Estimated territorial greenhouse gas emissions by source category, UK 2019 Source: Department for Business, Energy & Industrial Strategy

[87] The value of freight – Vivid Economics on behalf of the National Infrastructure Commission https://nic.org.uk/app/uploads/Future-of-Freight_The-Value-of-Freight_Vivid-Economics.pdf p.20

[88] FDM eligible trains, see Appendix B

[89] Department for Business, Energy & Industrial Strategy greenhouse emissions statistics https://www.gov.uk/government/statistics/final-uk-greenhouse-gas-emissions-national-statistics-1990-to-2019

[90] Department for Transport - Decarbonising Transport Setting the Challenge p5 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/932122/decarbonising-transport-setting-the-challenge.pdf

The UK government has already announced an end to the sale of diesel and petrol cars and vans by 2030[91] which will significantly reduce the proportion of emissions produced by passenger cars as they are phased out of the market and replaced with emission-free vehicles. Zero emission passenger cars are already widely available, and the Government have committed to the expansion of charging infrastructure to accommodate an expansion of electric vehicle ownership[92]. The UK government has also committed to consult on a date for phasing out the sale of diesel HGVs, however, the method of decarbonising HGVs themselves is currently not clear and therefore is likely to take longer to achieve than the decarbonisation of passenger cars. Consequently, the proportion of transport greenhouse gas emissions from HGVs is likely to grow.

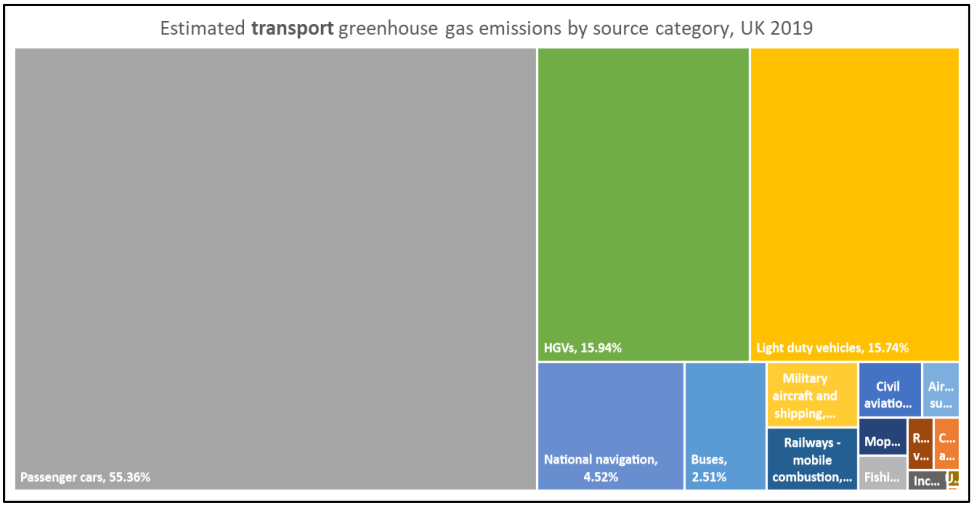


Figure 62 - Estimated transport greenhouse gas emissions by source category, UK 2019 Source: Department for Business, Energy & Industrial Strategy

Modal shift to rail offers a unique opportunity for the decarbonisation of the HGV traffic as it is currently the only transport mode capable of moving both people and heavy goods using a zero-carbon solution[93]. Even when hauled by a diesel locomotive, rail freight produces less emissions per journey owing to the significantly higher volumes that can be carried. In this way modal shift to rail offers an opportunity to reduce carbon emissions produced by HGVs in the short to medium term.

For the long-term, the Traction Decarbonisation Network Strategy, undertaken by Network Rail, sets out the approach to making the rail network zero-carbon. It outlines how railway traction accounts for the greatest proportion of emissions within rail. With all traction electricity for electric rail services matched by an equivalent amount of nuclear power, the emissions can be considered almost entirely from diesel train operation. For rail to support the UK in achieving its net-zero legislative target, diesel operation will need to reduce and potentially cease[94]. Once diesel locomotives are removed from the network, rail will offer an efficient, completely carbon-free solution for freight.

[91] The Ten Point Plan for a Green Industrial Revolution – HM Government

[92] The Ten Point Plan for a Green Industrial Revolution – HM Government

[93] Traction Decarbonisation Network Strategy – Network Rail

[94] Traction Decarbonisation Network Strategy – Network Rail

10.3 MODAL SHIFT TO ADDRESS THE CAPACITY AND DECARBONISATON CHALLENGES

Freight is likely to increase in both the short and long-term and both the road and rail network are required to be more efficient to support this demand. By having a transport system that works together, and works efficiently, will bring wider benefits for the economy and environment as the decarbonisation initiatives across both rail and road gathers pace. The road network has been the primary transporter of freight due to its access to multiple key destinations across the UK - however Highways England can do more to support the freight industry by ensuring a solution to congestion issues and utilise technology to improve our network still more could be done to support the industry by working on solving congestion issues, working with freight operators to ensure more carbon-friendly journeys and striking an optimal balance between road and rail freight.

In order to support the freight industry further exploration is needed into why freight customers choose the mode of transportation for their goods. It is proposed Network Rail and Highways England work together on a study to further explore this decision and see where improvements can be made for both networks to provide the optimum balance for freight on both networks. The rail network should also look to address any structural limitations that restrict freight end-users choosing rail for their journeys.

Modal shift to rail also provides a unique and exciting opportunity to help the road sector meet the capacity and carbon challenges on the Solent to the Midlands corridor, especially for those journeys that are >50 miles and > 100 miles for bulk and consumer goods respectively. It is acknowledged, however, that modal shift to rail will not be the only solution to decarbonisation of the HGV network. Recent research has shown that measures such as modal shift will move the UK significantly closer to net-zero but will not on its own be sufficient without other technologies to decarbonise the road fleet needing being considered.[95] Nonetheless, it is clear that modal shift to rail will provide significant decarbonisation benefits, even in the short-term, as well as freeing up precious capacity on the busy road network.

Modal shift to rail will mean that there is increased demand on the existing rail network between the Solent and the Midlands. To help meet future increased demand, the rail sector must take the available opportunities to expand its network as well as address any structural constraints restricting modal shift occurring.

10.4 STRUCTURAL OPPORTUNITIES

There are opportunities to improve the awareness and understanding of the benefits that modal shift to rail freight can offer. The Department for Transport has identified that the Rail Freight industry can be hard to access for outsiders not familiar with it and that the potential benefits of using rail freight are not well explained by the rail industry[96]. The Solent to the Midlands Multimodal Freight Strategy has aimed to help improve awareness of the benefits that modal shift to rail can offer and future phases of this study, as well as other associated industry strategies, should aim to continue to build awareness of the benefits of using rail freight.

10.5 RAIL INFRASTRUCTURE INVESTMENT OPPORTUNITIES

[95] Transport & Environment (2020). How to decarbonise the UK's freight sector by 2050 p.33 https://www.transportenvironment.org/sites/te/files/publications/Study_How%20to%20decarbonise%20the%20UKs%20freight%20sector%20by%202050.pdf

[96] Rail Freight Strategy (2016), Department for Transport

Train length

The maximum length at which trains can operate on a given route, before taking into account the effect this has on their overall weight, is dictated by distances between junctions and the standage available in loops and at other regulating points. There needs to be sufficient room for a train to be safely stopped when needed, without blocking junctions or other running lines. For lighter commodities, these are the main factors that influence maximum permissible lengths on each route.

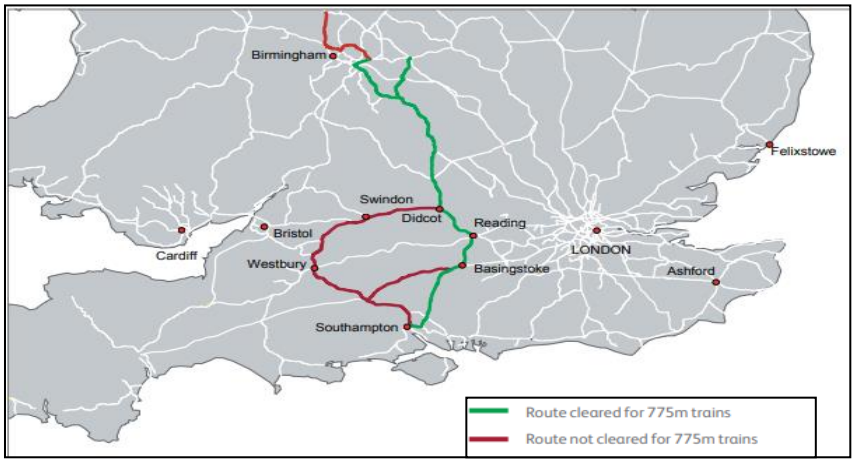


Figure 63 - Routes cleared for 775m freight trains Source: Network Rail

The Southampton Freight Train Lengthening Scheme (SFTL) has enabled the core route between Southampton and the Midlands via Basingstoke, Reading and Didcot to be capable of supporting 775m freight trains but length restrictions remain on the W12 gauge cleared diversionary route via Andover and the longer non-gauge cleared route diversionary route via Westbury and Swindon. In addition to infrastructure capability, it should be noted that running 775m trains also requires adequate traction power.

For trains hauling the heavier bulk commodities, maximum lengths are intrinsically bound up with trailing weights, which are limited by route topography, locomotive traction power and the strength of wagon and locomotive couplers. The longer a train, is, the heavier it is and therefore the harder it will be for it to travel up inclines. The vast majority of freight trains on the Solent to the Midlands route are moving intermodal freight which is generally lighter than bulk materials.

Further expanding the number of wagons that freight trains can haul could provide an opportunity to make more efficient use of railway timetable capacity.

Gauge

Freight trains, especially in the intermodal sector, are also constrained physically by the structures they must pass through, such as tunnels, platforms and lineside equipment. Loading gauge standards define what profile of train can be accommodated on a given route and on routes where clearances are insufficient, containerised traffic in particular can be prevented from running or forced to use more specialised wagons.

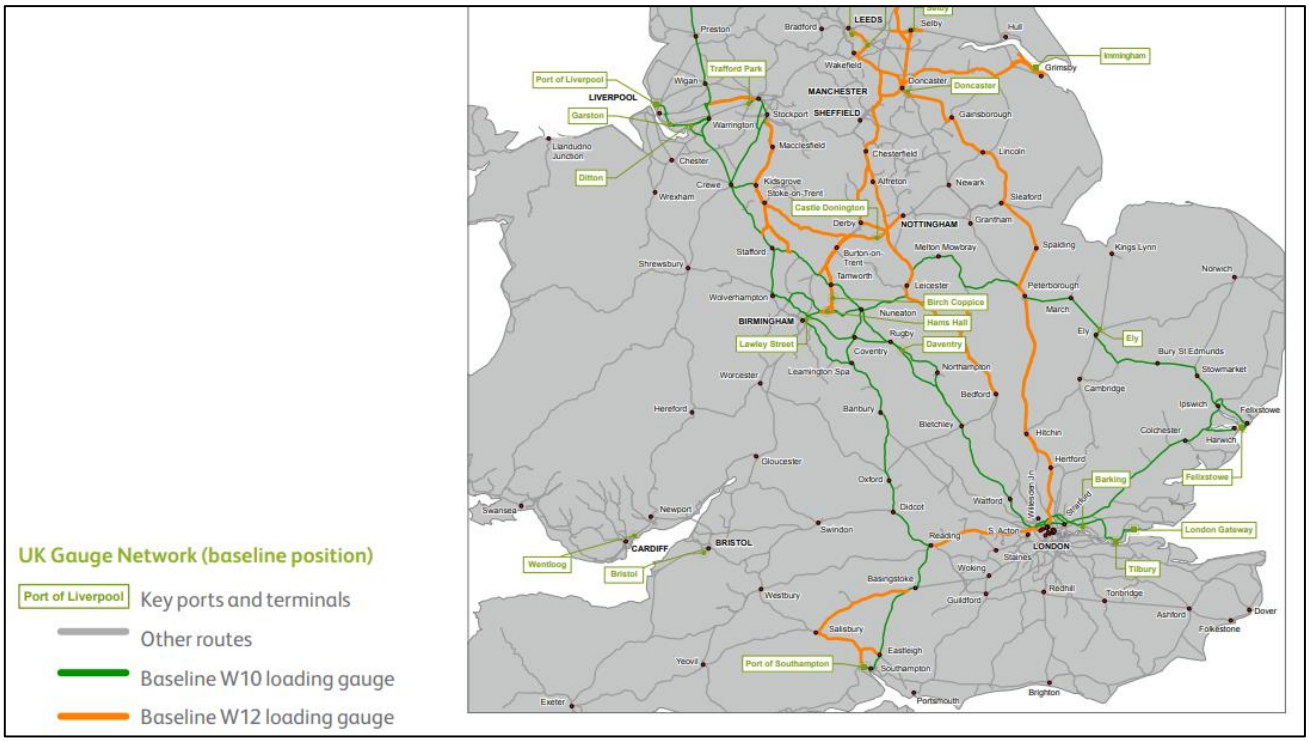


Figure 64 - Rail gauge on the Solent to the Midlands rail route. Source: Network Rail

W10 Gauge 9ft 6in height International Organization for Standardization (ISO) containers are now the dominant size in the deep-sea maritime sector. In order for rail freight companies to transport this size of container on a standard height wagon, the W10 gauge is required.

The route between Southampton and Basingstoke via Salisbury is cleared for W10 and W12 trains meaning that intermodal trains can use this as a diversionary route if the route via Winchester is not available. Other routes may be used for freight but are not cleared for W10 or W12 gauge trains. Specialised wagons can be used to lower the overall height of the combination in order to accommodate taller containers. These specialised containers offer the opportunity for new routes and markets to be tested by operators and end users for commercial viability before significant investment is made into gauge clearing new routes. Lack of gauge clearance therefore should not be seen as prohibitive to exploring new routes for freight customers.

Route Availability

According to the RSSB "The Route Availability (RA) system provides a consistent and simple method for undertaking an assessment of the compatibility of the weight (that is, the static load characteristics) of rail vehicles with the capacity of underline bridges.[97]" Each train is given a RA number based on the axle loadings and spacings. Every underbridge on the mainline network also receives a RA number based on its capacity. Routes are then assigned RA numbers based on the bridge with the lowest RA rating on it. This system allows any train with an RA of the route or lower to travel on that route. The route availability is predominantly 8 throughout the route between the Solent and the Midlands. This defines the maximum axle weight that can be carried, which for RA8 is just under 23 tonnes per axle. It is important to note that the intermodal and automotive commodities, which dominate rail freight on this corridor, are fundamentally light traffics and therefore would not be restricted by the route availability on the route. Some commodities, such as construction materials, are often conveyed in wagons with a RA rating of up to RA10. Although these exceed the route RA over much of the network, they can be allowed over selected routes through a mechanism known as the Heavy Axle Weight process, which permits derogations. These allowances are in many cases made subject to speed restrictions at specific locations, due to the condition of bridges or viaducts the train will pass over. Works to improve the condition of structures can permit the lifting of Heavy Axle Weighting (HAW) restrictions.

Electrification

The rail industry has the opportunity to reduce its carbon emissions significantly through the electrification of more of the railway network. The core route between the Solent and the Midlands is partly electrified but there are some gaps in coverage, and these are detailed in section 2.5. The Network Rail Traction Decarbonisation Plan includes proposals fill the gaps in electrification coverage on the route. These proposals also outline the rolling stock that may be required to operate a decarbonised railway. Lack of electrification should not be seen as a barrier to modal shift as even if hauled by a diesel locomotive, rail freight is more carbon efficient or high loads and over long distances than the equivalent HGV journey.

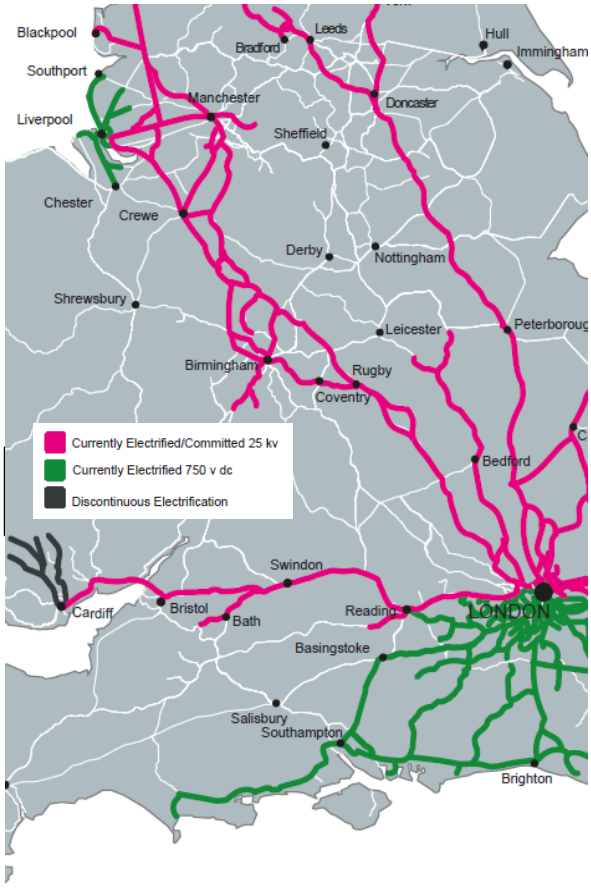


Figure 65 - Map of Current Rail Electrification source: Network Rail

[97] Assessment of the Compatibility of Rail Vehicle Weights and Underline Bridges (RSSB) https://www.rssb.co.uk/standards-catalogue/CatalogueItem/GERT8006-Iss-2

10.6 RAIL INFRASTRUCTURE CAPACITY

Basingstoke Great Western Junction Capacity

A key opportunity for expanding the capacity of the network, and therefore how many freight trains can operate is expanding the capability of Basingstoke Great Western Junction. The Network Rail Wessex Route Study in 2015 and Freight Network Study in 2017 identified Basingstoke Great Western Junction as the location that constrains the accommodation of additional freight paths between Southampton and Reading. The exact level of service that triggers the requirement for an intervention at Basingstoke Great Western Junction is not yet known. This will be explored as part of phase 2 of the Network Rail and Highways England joint Solent to the Midlands Freight Strategy as well as phase 2 of the Network Rail South West Main Line strategic study.

Oxford Rail Corridor

The Oxford Rail Corridor study identified significant growth in demand for rail on this important corridor and sets out the level of services required to meet future growth up to 2043. The study recommended a portfolio of interventions that would help the railway accommodate these demand requirements.

The analysis in this study has identified the opportunity for new freight paths from the Oxford corridor to East West Rail. This will provide a new route between the Solent, the Midland Main Line and East Coast Main Line. This may open up potential new markets that currently do not currently exist owing to the lack of a clear freight route.

10.7 RAIL RESILIENCE IMPROVEMENT OPPORTUNITIES

Diversionary Capability between Reading and Basingstoke

Intermodal and automotive trains that run on the corridor between the Solent and the Midlands generally use the Reading to Basingstoke line which is the only W10 cleared route that links the South West Main Line with the Great Western Main Line. At present, there is no suitable diversionary route or traffic. There is an opportunity for the rail industry to expand the resilience and attractiveness of this corridor through investing in a new route for rail freight travelling on the core route between Southampton and the Midlands. . Having an alternative route would not only mean the current line has much improved resilience during disruption but a new, gauge cleared route could open new markets for timetabled regular, rather than diverted, services. Therefore, this could be an opportunity to expand the number of overall train paths available between Southampton and the West Midlands, via two routes.

One other option could be for trains to divert via Woking, Chertsey and Old Kew Junction to access the West Coast Main Line. This would have the advantage of avoiding the Great Western Mainline and route via Oxford, should they be closed for any reason. At present the route via Kew is only cleared for W8 gauge whereas freight operators would prefer to achieve W10 or W12 clearance on this route

Network Rail will investigate these options further as part of phase 2 of the Solent to the Midlands Multimodal Freight Strategy.

10.8 RAIL TIMETABLE OPPORTUNITIES

Rail freight services share the railway infrastructure, and therefore timetable capacity with passenger train services which are often faster and more frequent than rail freight. The Covid-19 pandemic has meant that there has been much less requirement for the quantum of passenger services, meaning that freight services have had more flexibility in regard to when they operate. As the UK emerges from the pandemic there is uncertainty at how passengers will

return to the railway. The rail industry has a unique opportunity to explore the prospect of being more flexible with the timetable throughout the day and look more holistically at the balance between freight and passenger services.

10.9 RAIL TERMINAL CAPACITY AND AVAILABILITY

Any new freight flows will need to have access to the rail network, either through direct rail connectivity or through a rail freight interchange where freight can transfer onto road for the next stage of the journey. The transport industry should work with the Sub-national Transport Bodies, local authorities, freight and logistics operators as well as end users to explore the opportunities to expand the network of rail freight interchanges as well as safeguard the existing

network of railheads and strategic rail freight sites across the UK, ensuring that facility is effectively connected to the wider road network for associated first/last mile movements.

Key Points

- Rail is more cost effective than road over long distances and for high loads. Road is more effective for shorter distances, such as the last mile from a rail freight interchange or local movements.
- Rail has a similar reliability in terms of journey times than road. Average delay for trains to/from the Solent was less than 3 minutes in 19/20 compared to a peak-time delay o 5-14 minutes on road. Furthermore, rail reliability has been steadily improving over time.
- Rail is more efficient in terms of greenhouse gas emissions, even if the load is hauled by a diesel locomotive. Rail has a clear decarbonisation route whereas HGV decarbonisation is not yet clear.
- Modal shift to rail also provides a unique and exciting opportunity to help the road sector meet the capacity and carbon challenges on the Solent to the Midlands corridor, especially for those journeys that are >50 miles and > 100 miles for bulk and consumer goods respectively.
- It is acknowledged that modal shift to rail will not be the only solution to decarbonisation of the HGV network.
- To expand and increase rail freight, opportunities must be taken to expand the capability of the network as well as build awareness of the benefits that modal shift to rail can bring.

11. RECOMMENDATIONS AND NEXT STEPS

11.1 RECOMMENDATIONS

The aim of this study has been to identify a series of recommendations that relate to how Network Rail, Highways England and wider stakeholders can work together to achieve the right balance of road and rail freight traffic to/from the Solent area to ease congestion on the A34, unblock road and rail infrastructure constraints and meeting the national net-Zero carbon targets set by government.

These recommendations can be categorised into four main, overarching recommendations with sub-recommendations:

1. Continued joint working

This strategic study has been a pilot that has shown how the road and rail industries can work together in a positive and collaborative way to understand the issues common to both our networks and identify the areas where further investigation could provide an improved and efficient service to our freight and logistics customers.

It is therefore the first sub-recommendation of this study that Network Rail and Highways England continue to work together on progressing the recommendations of this study.

a) **Network Rail and Highways England should continue to work together to further develop the strategy for this important corridor; allowing a holistic approach to identifying the solutions and interventions required to balance road and rail freight traffic whilst adhering to wider policy initiatives and targets**

Further to the continued investigation of this specific road and rail corridor, this study also recommends that other joint working opportunities are identified across the road and rail networks for both people and freight movements.

b) **Network Rail and Highways England will identify other areas that would benefit from joint working to provide customers, both freight and passenger, with an improved service; this could be through other corridor or strategic studies and by working with our wider stakeholders**

It is also recommended that both Highways England and Network Rail need to co-ordinate future phases of this work at a national level, but that where appropriate, local workstreams are taken forward by route or regional teams. This will ensure that location specific constraints, issues and opportunities are not missed, but that the overall intention of improving freight flows along the whole corridor are not lost and are driven forward.

c) **Future phases of the study to be coordinated nationally by Network Rail and Highways England, through the appropriate teams from each organisation**
d) **Network Rail Regions/Routes to identify specific studies and develop interventions to enable the operation of additional freight services by rail**
e) **Highways England to identify and develop appropriate road schemes to ease congestion on the corridor whilst remaining mindful of the aspiration to move more freight on to rail**

f) Network Rail and Highways England will take the outputs of the specific road and rail focussed studies and develop a pipeline of investment for the corridor

The study conclusions also note that once a rail freight service reaches its final destination the onwards journey is highly likely to be continued via the road network; understanding the interface between road and rail in these circumstances should also be investigated in future phases of this work.

g) A joint piece of analysis should be commissioned by Network Rail and Highways England to understand the interface between road and rail at specific rail terminals. This analysis should also look to identify potential new rail terminals/Rail Freight Interchanges (RFI) on the corridor - including new terminals for new markets. This could also be achieved through joint working through specific strategic studies as per sub-recommendation 1d and 1e, above

This study has shown that there are real benefits of working in close collaboration with Sub-National Transport Bodies (SNTBs) such as England's Economic Heartland, Midlands Connect and Transport for the SE.

h) Network Rail and Highways England commit to working in collaboration with the relevant SNTBs on any future studies related to this corridor or any other corridors that are taken forward as a result of this work

2. Removal of the barriers to rail freight growth

This study has shown that the rail network is heavily congested along this corridor for both freight and passenger services. This means there are a series of infrastructure constraints that need to be removed before additional services can be operated.

The recommendation, therefore, is for Network Rail to seek to remove the infrastructure constraints to rail freight growth that have been identified through this study. It is suggested this is achieved through specific Region/ Route based studies as stated in sub-recommendation 1d, above.

a) Network Rail's Wessex Strategic Planning team to progress a Wessex specific strategic study, in their 2021/22 programme, to investigate the solutions and interventions required to enable the operation of increased freight flows out of the Solent in line with the forecasts and new market aspirations set out in this study

It is recognised that to encourage more rail freight our customers will need to feel confident that the goods being transported will be delivered in an efficient and robust way. This is unlikely to be achieved without providing diversionary capability to routes that cannot currently be used by freight traffic.

b) Network Rail will include the development of diversionary capability in future strategic studies and take forward specific workstreams as appropriate to provide suitable diversions for freight traffic along this corridor

Not only should Network Rail seek to accommodate forecast growth on current routeings to areas already linked by rail, but consideration should be given to how new markets and new routes can be unlocked for rail freight traffic to be operated. This unlocking of new markets would be likely to increase freight growth expected on this corridor above that included in the scenarios looked at in this study and therefore further demand modelling will be required.

c) Further modelling work to be undertaken to understand the potential impacts of 'new markets' on the level of future train service required to meet additional demand from these markets. This modelling should include data from all relevant sources including those held by the SNTBs, Government departments and other key stakeholders. This could be carried out as a standalone piece of analysis or as part of the studies identified in sub-recommendation 1e and the Wessex specific study already identified in sub-recommendation 2a

The analysis undertaken here has shown that the East Midlands is poorly connected to the Solent area and therefore there are many freight journeys made using road as rail is unavailable. The study has recognised the importance of the East West Rail programme in connecting the Solent area to the East Midlands and the distribution centres and warehouses situated there.

d) **The East West Rail programme to consider the findings of this strategic study to understand the implications of using the East West Main Line for freight services originating or destined for the Solent ports**
e) **Identify other rail routes, such as those to the West, that may provide new markets for freight growth to and from the Solent ports**

As the economy emerges from the restrictions related to COVID-19, further analysis may be required to understand how the pandemic has impacted the freight market and what that means for the conclusions of this study.

f) **Further modelling work to be undertaken to understand the impacts of COVID-19 on freight markets. This could be carried out as a standalone piece of analysis or as part of the studies identified in sub-recommendation 1e and the Wessex specific study already identified in sub-recommendation 2a**

There are several workstreams ongoing nationally aiming to address the wider barriers to modal shift.

e) **Network Rail and Highways England should engage with wider industry programmes aimed at relieving identified constraints to modal shift, including but not limited to, the upcoming DfT Cross-modal Freight Strategy.**

3. Unlocking new markets for Rail Freight

The analysis of future rail freight demand and the commodities and volumes being transported via roads has identified some potential opportunities for further development and investigation. Other commodities that should be investigated through the appropriate strategic studies or workstreams are:

a) **Food and drink freight is a key commodity flow to many areas in the corridor. Network Rail and Highways England should look to understand the key organisations involved in these movements and engage with them to understand any barriers to model shift to rail**
b) **Chemicals and chemical products are also moved in high quantities on this corridor. Network Rail and Highways England should look to understand the key organisations involved in these movements and engage with them to understand the nature of this market**
c) **Secondary materials and waste (recycled materials) is a significant commodity on this route. Rail could provide a more carbon and financially efficient way of transporting this waste for export whilst in the long-term, rail should be considered for transporting secondary goods to UK based recycling facilities. Network Rail and Highways England should engage with ongoing workstreams around recycled materials taking place across the industry and make the case for rail as a mode for transporting these goods**
d) **Aggregate traffic is already a well-established market on rail. Network Rail and Highways England should work with the industry partners to assess how this existing established market can be expanded further**

e) **Whilst not in the top ten movements, the mail and parcel sector is significant on certain routes and offers opportunities for modal shift and can be faster and more flexible than traditional rail freight. Network Rail and Highways England will continue to investigate this market in future phases and will engage with the existing ongoing rail express parcel workstreams across the industry to ascertain the options for the Solent to the West Midlands route.**

4. Decarbonisation of freight movements

The government's targets for a net-Zero carbon society by 2050 have now filtered down into the policy and strategic direction of Network Rail, Highways England and our wider stakeholders and customers. This study has shown that there is a considerable and significant amount of freight commodities that are currently moved by road and that this has a large impact on the release of greenhouse gasses and other pollutants into the atmosphere.

This study therefore recommends a phased approach to deliver the decarbonisation benefits of a move from road to rail for freight traffic. For instance, further phases of this work should seek to understand what increase in rail freight is achievable with minimum intervention or before the full traction decarbonisation of the rail network is achieved. The eventual goal should be for a fully decarbonised rail freight system, but moving from road to rail, even if still using diesel rolling stock, will provide some environmental benefit in the short to medium term.

a) **Network Rail to continue to work with government and the freight industry to enable a fully decarbonised rail freight system**
b) **Individual, Region/ Route specific strategic studies and schemes, identified by Network Rail, should seek to understand what is required to operate more freight on the rail network in the short, medium, and long term (to 2050) thereby providing incremental environmental benefits**

As well as the focus on the rail network, the study also recommends that Highways England continues to work with government and the logistics industry to identify how decarbonisation can be achieved for those commodities that still require road transport as part of or the whole of the journey.

c) **Highways England to continue to work with government and the logistics industry to enable a fully decarbonised road freight system**

11.2 NEXT STEPS

Network Rail and Highways England will work with the wider industry and other stakeholders to develop the exact scope, programme and governance structure for future phases of the Solent to the Midlands Multimodal Freight Strategy.

Network Rail and Highways England have developed a specific set of actions that enable the recommendations set out above to be satisfied. These are detailed below:

ID	Action Content	Recommendation
A1	Develop a memorandum of understanding that outlines NR and HE's shared goals for this corridor and key areas of focus, using the lessons learnt from this study.	**1a**
A2	NR/HE to suggest additional corridors at existing engagement sessions for further investigation using similar principles to this study.	**1b**
A3	Identify relevant teams within each organisation to lead the workstream for future phases and agree a remit jointly with the freight industry.	**1c**

A4	Network Rail and Highways England in conjunction with the Department for Transport will develop a joint remit for the next stage taking forward the key themes identified within this study. This next stage could include: - Understanding the level of future growth accommodated via rail (agreed in conjunction with HE). This may mean amending current economic modelling to reflect rail growth over and above the current scenarios. This reflects the impact of new markets and decarbonisation. - Engage with existing proposals and strategies looking to decarbonise the road and rail networks - Expanded investigation into the key road markets identified in in Phase 1, including proposing how those locations/markets can be better served by rail. This will involve extensive stakeholder consultation at local levels. - Engaging with existing workstreams that are looking to remove structural barriers to using rail freight. - Engaging with major infrastructure projects such as East West Rail and DfT clients/other funders to champion the case for unlocking rail freight capacity within their designs.	**1a, 1c, 1d, 1e, 2c, 2d, 2e, 2f, 2g, 3a, 3b, 3c, 3d, 4a, 4c**
A5	Engage with NR Freight and Network Strategy team research and other research to fully understand the barriers to use of rail freight by key markets + HE	**1f, 2c**
A6	NR Led Strategic Study to commence in 2021/22 that focuses on the route between Southampton and Reading. The exact scope of this will be agreed with the wider rail industry but is likely to focus on: - Diversionary Capability [Reading to Basingstoke alternative] - Meeting future demand through timetable solutions and/or infrastructure solutions. - Relieving other constraints to demand and performance on this route - Understanding stakeholder aspirations for rail on this corridor and proposing how rail can help meet those aspirations. - Quantifying the decarbonisation benefits of additional freight capacity The Network Rail Western Route and North West and Central Region Strategic Planning teams could also commission similar studies to ensure the entire corridor is investigated. Whilst these studies will be completed at a local level, they should report their findings regularly to the overarching national workstream (see **ACTION 4)**	**2a, 2b, 4b**
A7	HE to take outputs of this study and feed into route strategies, further lorry parking studies, economic development planning and decarbonisation strategies.	**1e**
A8	To support the next steps, it is key that Network Rail engage with EWR Co who are developing the line between Bletchley to Cambridge to gain an insight into their plans for the Railway and understand how this will	**2d**

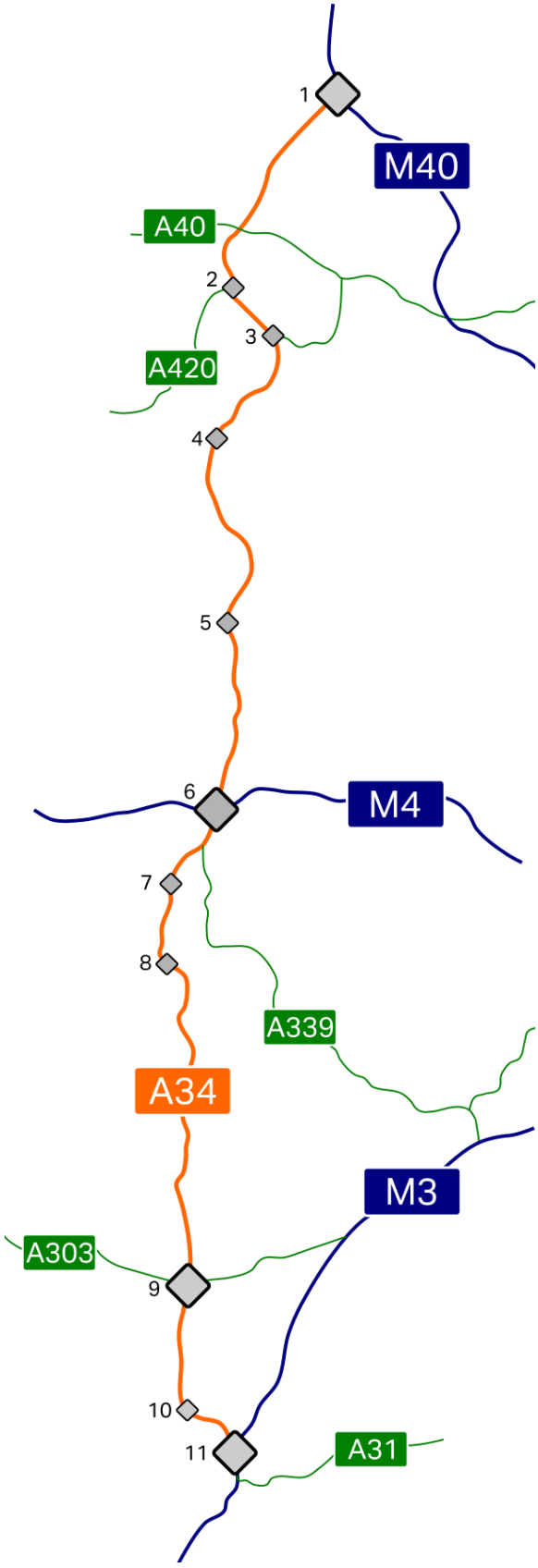
	accommodate the Freight discussed in this document. Engaging directly with EWR Co is critical to closing out the recommendation and influencing the development- “The East West Rail programme to consider the findings of this strategic study to understand the implications of using the East West Main Line for freight services originating or destined for the Solent ports." - **Agree approach to engagement with EWR Co. following this study.**	

THIS PAGE IS INTENTIONALLY LEFT BLANK

APPENDIX A – FULL COUNT SITE ANALYSIS FOR A34

WebTRIS data was identified and downloaded for count sites on the A34 between Junction 9 of the M3 and Junction 9 of the M40. Some sites were excluded due to their proximity to other sites or the quality of the data record being too poor. Including the motorway junctions this results in 11 count sites, distributed as shown in the diagram alongside. These are (from north to south) located at:

1. Junction 9, M40
2. A420 (Oxford Western Bypass)
3. A423 (Oxford South Bypass)
4. A415, Abingdon
5. A34, East Ilsley
6. Junction 13, M4
7. A4. Newbury West
8. A343, Wash Water, Newbury SW
9. A303, near Norton (Sutton Scotney)
10. A272. near Littleton (Winchester N)
11. Junction 9, M3 (Winchester E)



In all cases, figures refer to the average daily traffic flow taken Monday – Friday and refer to the number of vehicles which were over 6.6m in length. This means that in addition to HGVs, some coaches may be included in the data, however these numbers should not materially affect the analysis.

Presented next to the absolute figure for the daily average in each table is the percentage of overall traffic represented. Therefore, a figure of 5,232 / 14.5% would mean that 5,232 vehicles over 6.6m were counted as the average working day total, representing 14.5% of the total traffic on the route.

Tables are presented from south – north, in line with the route taken by traffic coming from Southampton Docks.

There follows the data in south – north order.

M3 Junction Summary								
	M3 Northbound				M3 Southbound			
	Offramp		Onramp		Offramp		Onramp	
Jan	5,128	17.2%	210	7.0%	204	5.9%		
Feb	5,460	16.7%	243	7.3%	238	6.2%		
Mar	5,581	16.0%	267	7.5%	282	6.8%		
Apr	5,197	15.4%	250	7.7%	267	7.0%		
May	5,435	15.9%	298	8.8%	255	6.6%		
Jun	5,255	14.1%	251	7.5%	272	6.6%	3,172	8.3%
Jul	5,701	16.5%	264	8.0%	316	7.5%	4,375	14.8%
Aug	5,345	15.1%	268	8.0%	298	6.9%	3,723	11.5%
Sep	5,636	16.3%	244	7.3%	254	6.4%	4,120	12.4%
Oct	5,578	17.2%	253	7.5%	260	6.7%	4,087	13.4%
Nov	5,265	16.1%	269	7.4%	289	6.9%	3,776	12.1%
Dec	4,265	14.4%	217	6.2%	230	5.9%	3,073	10.8%
Avg	5,317	15.9%	251	7.5%	263	6.6%	3,763	11.9%

- As can be seen, aside from in December, over 5,000 lorries a day turning onto the A34 from the northbound carriageway of the M3 every day, comprising 16% of the traffic.
- Very little traffic either leaves the A34 to head north on the M3 or comes from the north to turn onto the A34, unsurprisingly, as this traffic would use alternative routes like the A303. (Confirms design for free flow from A34 South / M3 South and v.v.)
- Data for the first half of 2019 is missing for the M3 Southbound.

A34 / A272								
	Northbound				Southbound			
	Mainline		A34 Exit Slip road		Mainline		A34 Exit Slip road	
Jan	4,570	20.7%	160	4.0%	4,709	18.2%	174	5.0%
Feb	4,906	20.2%	179	4.1%	4,979	17.3%	190	5.1%
Mar	5,000	20.1%	199	4.2%	5,117	16.6%	210	5.3%
Apr	4,746	18.6%	187	4.3%	4,795	15.9%	190	5.5%
May	4,792	18.6%	200	4.4%	4,920	16.1%	200	5.6%
Jun	4,621	19.1%	217	4.4%	5,040	15.5%	203	5.3%
Jul	5,125	19.1%	226	4.8%	5,298	16.3%	197	5.5%
Aug	4,799	17.5%	207	4.4%	4,986	14.7%	179	5.5%
Sep	5,058	19.7%	227	4.6%	5,187	16.2%	218	5.9%
Oct	4,963	19.7%	196	4.2%	5,114	17.0%	199	5.6%
Nov	4,631	19.7%	200	4.2%	4,815	16.7%	190	5.6%

Dec	3,747	17.1%	152	3.7%	3,831	14.5%	153	4.9%
Avg	4,735	19.2%	195	4.3%	4,909	16.2%	192	5.4%

- The percentage of traffic is higher, with vehicles over 6.6m averaging 19.2% northbound and 16.2% southbound, emphasising the significant role freight plays on this route (a national average is c. 5% for the Key Route Network).
- It is unclear why the numbers for this counter are c. 1,000 lower than for the preceding and following.

A34 /A303												
	Mainline				**Northbound Exits**				**Southbound Exits**		**A303 - A34**	
	Northbound		Southbound		A34 to WB A303		A34 to EB A303		A34 to A303		Both Directions	
Jan	3,949	18.0%	3,637	17.7%	944	11.2%	74	9.8%	855	15.9%	1,368	14.0%
Feb	4,190	17.1%	3,910	16.8%	997	11.1%	73	9.6%	916	15.3%	1,441	13.8%
Mar	4,285	16.1%	3,987	15.9%	1,039	10.9%	82	10.3%	958	14.7%	1,415	13.4%
Apr	4,082	15.4%	3,800	15.1%	965	11.0%	85	10.9%	929	14.5%	1,431	13.6%
May	4,191	15.7%	3,820	15.4%	963	10.9%	95	11.1%	922	13.9%	1,462	13.4%
Jun	4,299	15.1%	3,596	14.2%	1,000	10.6%	93	11.2%	970	13.6%	1,479	13.6%
Jul	4,513	16.0%	4,098	15.5%	1,034	11.3%	101	12.1%	995	14.5%	1,568	14.1%
Aug	4,217	14.1%	3,841	13.9%	1,016	11.2%	101	11.8%	997	13.8%	1,806	15.4%
Sep	4,434	15.7%	4,060	15.2%	1,014	11.0%	92	11.1%	971	14.4%		
Oct	4,313	16.4%	3,916	16.2%	1,038	11.3%	97	11.0%	957	14.8%		
Nov	4,092	16.0%	3,670	15.5%	967	10.5%	74	8.8%	953	15.0%		
Dec	3,256	13.9%	2,962	13.6%	811	9.8%	87	10.9%	743	13.2%		
Avg	4,152	15.8%	3,775	15.4%	984	10.9%	88	10.7%	929	14.5%	1,493	13.9%

- Approximately ¼ of northbound traffic on the A34 turns west on to the A303, with very little traffic turning east (due to alternative routes).
- Approximately 1/5th of long vehicular traffic heading south on the A34 turns onto the A303 (W) for Somerset, Devon and Cornwall. Known key demand generators include Andover (Twinning's / Ocado) and Amesbury (Home Bargains). Junction has short on slips – very poor for HGVs especially A34 North as it is uphill.
- More traffic (c. 500 vehicles a day) turns onto the A303 from the A34 than the reverse.

A34 / A343								
	Northbound				**Southbound**			
	Mainline		A34 Exit Slip road		Mainline		A34 Exit Slip road	
Jan	4,466	18.5%	42	5.0%	4,515	19.4%	142	3.7%
Feb	4,754	17.5%	52	5.7%	4,779	18.1%	166	4.2%
Mar	4,863	15.8%	57	5.3%	4,981	17.4%	185	4.1%
Apr	4,687	15.9%	55	6.1%	4,797	16.5%	178	4.4%
May	4,814	16.2%	65	6.5%	4,908	16.9%	192	4.6%
Jun	4,865	15.5%	77	6.9%	4,812	16.0%	218	4.9%

Jul	5,006	16.1%	57	6.1%	5,113	16.9%	172	4.3%
Aug	4,688	14.5%	58	6.0%	4,844	15.1%	176	4.4%
Sep	5,043	16.0%	56	5.6%	5,180	16.7%	203	4.2%
Oct	4,916	16.9%	55	5.7%	4,949	17.5%	208	4.5%
Nov	4,756	16.5%	58	5.6%	4,780	17.2%	189	4.0%
Dec	3,694	14.5%	48	5.1%	3,785	15.1%	137	3.5%
Avg	4,725	16.2%	57	5.8%	4,793	16.9%	178	4.2%

- Very little traffic exits to the A343, with approximately 2/3rds of traffic from the A34 to A343 coming from the north. This traffic may be linked to servicing the Newbury retail park near Greenham.
- At averages of 16.2% and 16.9% of total traffic in each direction, the composition of traffic at this location matches consistently with that at the junction with the M3, although it is marginally higher than the "mainline" percentages seen at the A303 junction.

A34 / A4										
	Northbound				**Southbound**					
	Mainline		A34 Exit Slip road		Mainline		A34 Offramp		A34 Onramp	
Jan	4,259	18.1%	203	5.6%						
Feb	4,987	17.6%	383	8.2%	4,919	18.5%	200	7.9%	351	6.4%
Mar	5,262	16.8%	266	5.9%	5,209	18.7%	184	7.7%	276	4.9%
Apr	5,007	16.2%	290	5.9%	5,002	17.8%	176	7.7%	282	5.2%
May	5,192	16.6%	288	5.7%	5,103	18.3%	180	7.7%	313	5.4%
Jun	5,246	15.9%	302	6.6%	5,078	18.0%	204	8.9%	311	5.8%
Jul	5,396	16.6%	346	7.4%	5,359	18.5%	179	8.4%	310	6.2%
Aug	5,088	15.1%	302	6.4%	5,089	16.4%	169	7.9%	301	5.6%
Sep	5,455	16.5%	280	5.6%	5,435	18.3%	185	7.6%	323	5.1%
Oct	5,280	17.2%	297	6.2%	5,179	19.0%	178	7.6%	306	5.1%
Nov	5,101	16.7%	276	5.6%	4,703	18.4%	161	7.0%	299	5.1%
Dec	3,933	14.6%	213	5.1%	3,898	16.3%	137	6.4%	249	4.9%
Avg	5,033	16.5%	287	6.2%	4,991	18.0%	177	7.7%	302	5.4%

- About 5% of northbound traffic exits onto the A4, potentially serving the north of Newbury.
- Long vehicles continue to make up c. 16.5% of northbound traffic, although a slightly larger proportion of southbound traffic is over 6.6m.
- For every month with data, significantly more traffic joins the southbound A34 carriageway than exits to the A4 southbound

A34 / M4				
	Northbound		**Southbound**	
	Mainline	A34 Exit Slip road	Mainline	A34 Exit Slip road

Jan	3,515	18.0%	2,425	12.1%	3,357	17.9%	1,605	15.9%
Feb	3,750	17.3%	2,654	12.3%	3,479	16.6%	1,892	16.7%
Mar	3,912	16.7%	2,682	11.6%	3,765	16.5%	1,804	15.6%
Apr	3,732	15.9%	2,544	12.1%	3,572	15.6%	1,682	15.1%
May	3,808	16.4%	2,621	12.3%	3,659	16.1%	1,777	15.9%
Jun	3,962	15.3%	2,618	12.6%	3,774	15.2%	1,752	15.8%
Jul	3,993	16.4%	2,716	12.8%	3,703	15.5%	1,710	15.1%
Aug	3,843	14.7%	2,618	12.0%	3,527	14.4%	1,797	15.6%
Sep	4,038	16.1%	2,728	12.1%	3,871	15.9%	1,919	15.8%
Oct	3,942	16.9%	2,699	12.2%	3,710	16.6%	1,840	16.0%
Nov	3,793	16.5%	2,689	12.0%	3,609	16.4%	1,827	15.8%
Dec	3,028	14.6%	2,135	11.1%	2,910	14.4%	1,525	15.0%
Avg	3,788	16.2%	2,587	12.1%	3,576	15.9%	1,755	15.7%

- The percentage of vehicles over 6.6m heading north continues to be between 16 and 17%.
- However, in comparison to the previous count, the southbound percentage is lower, suggesting (due to the counter location) that a notably larger number of vehicles join the A34 southbound from the M4 than exit the to the M4.
- Around 40% of the larger vehicles heading north on the A34 consistently turn onto the M4, compared to only 33% of southbound traffic.

East Ansley				
	A34			
	Northbound		Southbound	
Jan	4,925	16.3%		
Feb	5,256	15.7%		
Mar	5,519	15.3%		
Apr	5,219	14.9%	5,150	14.7%
May	5,323	15.3%	5,357	15.4%
Jun	5,497	14.7%	5,428	14.9%
Jul	5,577	15.1%	5,398	15.0%
Aug	5,362	14.0%	5,248	14.1%
Sep	5,702	15.1%	5,698	15.3%
Oct	5,549	15.6%	5,459	15.7%
Nov	5,383	15.2%	5,373	15.5%
Dec	4,351	13.8%	4,379	14.1%
Avg	5,318	15.1%	5,281	15.0%

- There is no key junction at East Ilsley (Berkshire Downs) – Alignment very up and down – site of a no HGV trial.
- Flows are evenly matched north and southbound at this point
- Whilst the absolute numbers are consistent with other readings, the percentage is marginally lower, suggesting that this section of the A34 has heavier car use than others.

Abingdon - A34 / A415								
	Northbound				Southbound			
	Mainline		A34 Exit Slip road		Mainline		A34 Exit Slip road	
Jan	2,324	21.9%	155	3.9%	5,410	19.5%	229	4.0%
Feb	5,720	18.2%	530	4.6%	5,883	19.1%	256	4.3%
Mar	5,886	17.8%	452	3.6%	6,131	18.5%	267	4.0%
Apr	5,615	17.4%	400	3.6%	5,769	17.8%	236	3.9%
May	5,674	17.8%	443	3.9%	6,114	19.2%	247	4.0%
Jun	5,903	17.1%	452	3.7%	6,111	17.7%	252	3.8%
Jul	6,015	17.6%	473	4.0%	6,059	18.0%	264	4.2%
Aug	5,787	16.6%	410	3.8%	5,844	17.1%	286	4.5%
Sep	6,128	17.8%	468	3.9%	6,347	18.4%	266	4.0%
Oct	5,976	18.3%	439	3.8%	6,132	19.0%	258	4.0%
Nov	5,743	18.1%	470	3.9%	5,909	18.6%	257	3.8%
Dec	4,255	17.5%	323	3.6%	4,840	16.8%	207	3.4%
Avg	5,438	18.0%	418	3.8%	5,891	18.3%	248	4.0%

- It is assumed that the January Northbound reading is an error due to the low absolute number.
- The percentage of traffic longer than 6.6m is significantly higher than just to the south at East Ilsley, whilst the absolute numbers are also higher, suggesting a notable increase in traffic on the road, perhaps associated with Abingdon businesses but also those from Didcot (the quality of ATC data prohibits investigation of this to confirm).
- Demand generators include Tesco RDC at Didcot and significant housing growth in Abingdon / Didcot areas has increases traffic levels significantly – especially on Abingdon – Oxford section.

Oxford Bypass - A34 / A423 (Southern Bypass)								
	Northbound				Southbound			
	Mainline		A34 Exit Slip road		Mainline		A34 Exit Slip road	
Jan								
Feb	5,526	19.2%	991	6.9%			1,022	7.8%
Mar	5,677	18.7%	962	6.4%			921	5.9%
Apr	5,347	18.2%	900	6.5%			773	5.2%
May	5,378	18.6%	1,034	7.4%			948	6.3%
Jun	5,697	17.8%	1,037	7.0%			982	5.6%
Jul	5,734	18.6%	1,058	7.2%			858	5.5%

Aug	5,531	17.5%	901	6.3%		724	4.6%
Sep	5,879	18.7%	1,109	7.4%		865	5.2%
Oct	5,747	20.4%	1,156	8.0%		854	5.6%
Nov	5,414	19.0%	1,183	7.8%		866	5.6%
Dec	4,451	17.0%	824	6.2%		584	4.2%
Avg	5,488	18.5%	1,014	7.0%		851	5.6%

- No data is available for the southbound through traffic on the mainline.
- Whilst the absolute number of large vehicles has not changed substantially, they now make nearer 1/5th of northbound traffic.
- Approximately 1/6th of large traffic leaves the A34 northbound at this junction with the Oxford Bypass (Southern/Eastern), and the absolute numbers leaving southbound are similar.
- Overall traffic levels step up substantially as the A34 becomes the Oxford Western Ring road at this point. Particular congestion after North bound on slip as traffic merges with A34 North.
- BMW Mini Plant at Cowley traffic will use this junction.

Oxford Bypass - A34 / A420								
	Northbound				Southbound			
	Mainline		A34 Exit Slip road		Mainline		A34 Exit Slip road	
Jan	4,763	16.5%	411	5.0%	4,644	16.8%	1,061	8.1%
Feb	5,141	16.0%	452	5.2%	5,139	16.4%	1,175	8.0%
Mar	5,330	15.4%	474	5.1%	5,338	15.8%	1,254	7.9%
Apr	5,008	15.1%	356	4.3%	4,984	15.0%	1,172	7.8%
May	5,014	15.4%	446	5.3%	5,189	15.7%	1,215	8.1%
Jun	5,328	14.6%	488	5.2%	5,309	14.8%	1,302	8.0%
Jul	5,381	15.7%	493	5.6%	5,168	15.1%	1,379	8.7%
Aug	5,043	12.0%	460	4.6%	5,069	14.5%	1,205	7.8%
Sep					5,567	15.6%	1,168	7.7%
Oct					5,345	16.4%	1,167	8.0%
Nov	5,186	16.7%	456	6.1%	5,115	16.1%	1,223	8.1%
Dec	4,292	15.0%	316	4.9%	4,284	14.5%	931	6.9%
Avg	5,062	15.2%	432	5.1%	5,099	15.6%	1,186	7.9%

- It is likely that the traffic leaving the A34 here is travelling into Oxford (there is a small retail park to the east of the junction), as the A420 westbound heads south and destinations west along it are easier reached along the A415 which has a junction with the A34 at Abingdon Business Park (see the traffic numbers previously stated).
- Traffic remains evenly balanced north/south bound, and is approximately 15% of all traffic

- It is of note that significantly more traffic (over twice as much) joins the A420 from the A34 southbound as opposed to northbound.

Oxford Bypass - A34 / A44								
	Northbound				Southbound			
	Mainline		A34 Exit Slip road		Mainline		A34 Exit Slip road	
Jan	5,012	18.4%	749	5.1%	5,117	19.2%	977	11.4%
Feb	5,327	17.8%	846	5.2%	5,615	18.5%	956	10.4%
Mar	5,546	17.1%	898	5.1%	5,838	18.2%	938	9.9%
Apr	5,263	16.6%	831	5.2%	5,268	15.8%		
May	5,166	16.9%	950	5.8%	5,688	17.6%		
Jun	5,535	16.2%	935	5.2%	5,832	16.7%	989	12.8%
Jul	5,614	16.9%	984	5.7%	5,777	17.1%		
Aug	5,469	16.0%	896	5.3%	5,579	16.1%		
Sep	5,701	17.2%	937	5.2%	6,006	17.6%		
Oct	5,568	17.9%	873	5.2%	5,813	18.5%		
Nov	5,233	17.3%	913	5.3%	5,641	18.2%	1,001	10.5%
Dec	5,505	17.1%	929	5.1%	5,908	18.0%	914	9.1%
Avg	5,416	17.1%	886	5.3%	5,676	17.6%	964	10.7%

- The consistency of numbers at all junctions on the bypass suggests that a large amount of lorry traffic continues around Oxford on the A34 in both directions, rather than servicing the town.
- Unlike at the A420, the numbers leaving the A34 to join the A44 are much more balanced between directions.
- There are a number of sheds and distribution facilities (including Parcelforce) located near this junction, including London Oxford Airport – although this is not a significant cargo airport.

M40 Junction								
	A34 Joining M40				M40 Joining A34			
	Northbound		Southbound		Northbound		Southbound	
Jan	5,166	18.5%	303	5.8%	350	7.0%	5,836	24.6%
Feb	5,411	17.5%	343	6.2%	402	7.3%	6,255	24.3%
Mar	5,621	17.1%	337	5.8%	415	7.6%	6,442	24.4%
Apr	5,287	16.1%	368	6.3%	402	7.2%	6,038	21.7%
May	5,256	16.5%	324	5.7%	436	7.6%	6,262	22.5%
Jun	5,652	16.1%	376	5.9%	442	7.4%	6,444	23.0%
Jul	5,681	16.7%	353	5.9%	477	7.7%	6,523	23.0%
Aug	5,457	15.6%	355	6.1%	413	7.1%	6,220	21.3%
Sep	5,783	16.9%	351	6.4%	436	7.7%	6,631	23.9%
Oct	5,661	18.0%	351	5.9%	418	7.2%	6,370	23.9%
Nov	5,409	16.9%	382	5.7%	411	6.7%	6,278	24.0%

Dec	4,403	14.8%	274	4.3%	321	5.6%	5,104	21.4%
Avg	5,396	16.7%	342	5.8%	412	7.2%	6,216	23.2%

- As can be seen, the vast majority of traffic heading north on the A34 heads north on the M40, and similarly most traffic heading southbound on the A34 was previously heading south on the M40.
- Approximately 55% of the large traffic heading north on the M40 joins at this location from the A34
- Due to data quality, it is not possible to make a similar comparison for southbound traffic leaving the motorway.
- Junction has had a number of upgrades over the years – most recently a three lane M40 S / A34 S flow and two lane A34 N / M40 N flow through – reflecting the near quarter of traffic which is HGV's undertaking the M40 South / A34 South movement.

APPENDIX B – RAIL DATA NOTES AND FULL TRAIN COUNT

For the purposes of this the Solent to the Midlands study, Network Rail has included train movements that are eligible for the industry wide Freight Delivery Measure (FDM) from the Network Rail Business Objects database.

The ORR describe FDM as:

> *"The percentage of freight trains that arrive at their destination within 15 minutes of their scheduled arrival time. Freight trains are only considered to have failed FDM where the delay was caused by Network Rail. These measures include all freight trains (loaded or empty) operated by freight operators, excluding services operated on behalf of Network Rail (e.g. sandite, ballast and engineering trains) and any passenger charter services. Circumstances where trains are not included within FDM are:*
>
> *– any train cancelled for commercial reasons;*
>
> *– light engine trains (Class 0 trains);*
>
> *– any planned or scheduled cancellation;*
>
> *– very short term planning (VSTP) schedules, where train moves are arranged through the Control Office, rather than timetable planners."*

More information on the exclusions/inclusions for FDM can be found here
https://dataportal.orr.gov.uk/media/1233/freight-quality-report.pdf

The below table shows freight destinations to/from Southampton during 2019/20. Data excludes trains that travels from one Southampton location to another – for example Southampton M.C.T to Marchwood.

Network Rail Region	Route	Destination Location	Commodity	Train Count to Southampton	Train Count from Southampton	Total
Eastern	Anglia	TILBURY I.R.F.T. (FLT)	Domestic Intermodal	2	0	2
		TILBURY LCT (FLT)	Domestic Intermodal	1	0	1
	East Coast	DONCASTER IPORT GBRF	Domestic Intermodal	230	222	452
		YORK YARD SOUTH (FLHH)	Other	3	2	5
	East Midlands	CHADDESDEN SDGS	Domestic Waste	0	1	1
		EAST MIDS GATEWAY TML DBC	Domestic Intermodal	1	1	2
	North East	BARROW HILL UP SDG NO 1	Other	0	1	1
		LEEDS F.L.T.	Domestic Intermodal	639	655	1294
		MASBOROUGH F.D.	Domestic Intermodal	217	229	446
		WAKEFIELD EUROPORT	Domestic Intermodal	141	203	344
NW & C	Central	BESCOT DOWN SIDE	Domestic Intermodal	1	0	1
		BESCOT UP ENGINEERS SDGS	Domestic Intermodal	1	0	1
		BICESTER MOD GBRF	Other	10	9	19
		BIRCH COPPICE EXCHANGE SDG	Domestic Intermodal	237	295	532
		BIRCH COPPICE FREIGHTLINER	Domestic Intermodal	238	227	465
		CASTLE BROMWICH JAGUAR	Domestic Automotive	64	64	128
		DONNINGTON RFT GBRF	Other	1	0	1
		DORRIDGE	Domestic Intermodal	1	0	1
		FENNY COMPTON	Other	0	1	1
		FENNY COMPTON M.O.D.	Other	12	0	12
		HAMS HALL GBRF	Domestic Intermodal	244	240	484
		KINETON MOD GBRF	Other	2	11	13
		LAWLEY STREET F.L.T.	Domestic Intermodal	508	754	1262
		SMALL HEATH LAFARGE AGGR	Construction Materials	1	0	1
	North West	CREWE BAS HALL S.S.M.	Domestic Intermodal	317	30	347
		GARSTON F.L.T.	Domestic Intermodal	195	415	610
		HALEWOOD (JAGUAR CARS)	Domestic Automotive	314	323	637
		LONGTOWN MOD GBRF	Other	1	0	1
		TRAFFORD PARK EURO TERM	Domestic Intermodal	250	245	495
		TRAFFORD PARK EURO TML GBRF	Domestic Intermodal	142	136	278
		TRAFFORD PARK F.L.T.	Domestic Intermodal	651	677	1328
	WCML South	DAVENTRY INT RFT RECEP FL	Domestic Intermodal	237	0	237
		DB CARGO FAN A & B SIDINGS	Construction Materials	0	1	1
		WILLESDEN DC RAIL SDGS	Domestic Waste	0	1	1
Southern	Kent	ASHFORD CRANE DEPOT	Construction Materials	1	1	2

		MOUNTFIELD SIDINGS (GBRF)	Construction Materials	251	0	251
		TONBRIDGE	Construction Materials	1	0	1
		TONBRIDGE WEST YARD GBRF	Construction Materials	7	255	262
		EASTLEIGH ARLINGTON (ZG)	Domestic Automotive	6	3	9
		EASTLEIGH EAST YARD	Other	5	5	10
		EASTLEIGH EAST YARD	Domestic Intermodal	92	52	144
		EASTLEIGH EAST YARD	Construction Materials	2	1	3
		EASTLEIGH WORKS GBRF	Other	1	1	2
		EASTLEIGH WORKS-ALSTOM-FL	Domestic Intermodal	4	4	8
		LUDGERSHALL MOD GBRF	Other	0	2	2
		PENGAM RECEPTION SDGS GBRF	Other	0	2	2
	Wessex	SALISBURY	Construction Materials	1	0	1
Wales & Western		AVONMOUTH WEST WHARF (FLHH)	Domestic Intermodal	13	13	26
	Wales	WENTLOOG (FREIGHTLINERS)	Domestic Intermodal	385	386	771
		BRISTLFLT	Domestic Intermodal	10	9	19
		BRISTOL EAST DEPOT DBC	Construction Materials	2	3	5
		DIDCOT T.C.	Domestic Automotive	12	28	40
		DIDCOT T.C.	Domestic Intermodal	88	2	90
		KENNINGTON JN	Domestic Intermodal	1	0	1
		MEREHEAD QUARRY (FHH)	Construction Materials	1	1	2
		MORRIS COWLEY M.A.T.	Domestic Automotive	217	193	410
		OXFORD	Domestic Intermodal	1	0	1
		STOKE GIFFORD (FLHH)	Construction Materials	1	0	1
		WESTBURY DOWN T.C.	Other	1	0	1
		WESTBURY DOWN T.C.	Domestic Waste	14	13	27
		WESTBURY DOWN T.C.	Construction Materials	76	15	91
		WHATLEY QUARRY	Construction Materials	29	70	99
	Western	WHATLEY QUARRY F LINER HH	Construction Materials	20	24	44
			Total	**5903**	**5826**	**11729**

APPENDIX C

Routing Study Zone 1 – Yorkshire and North East

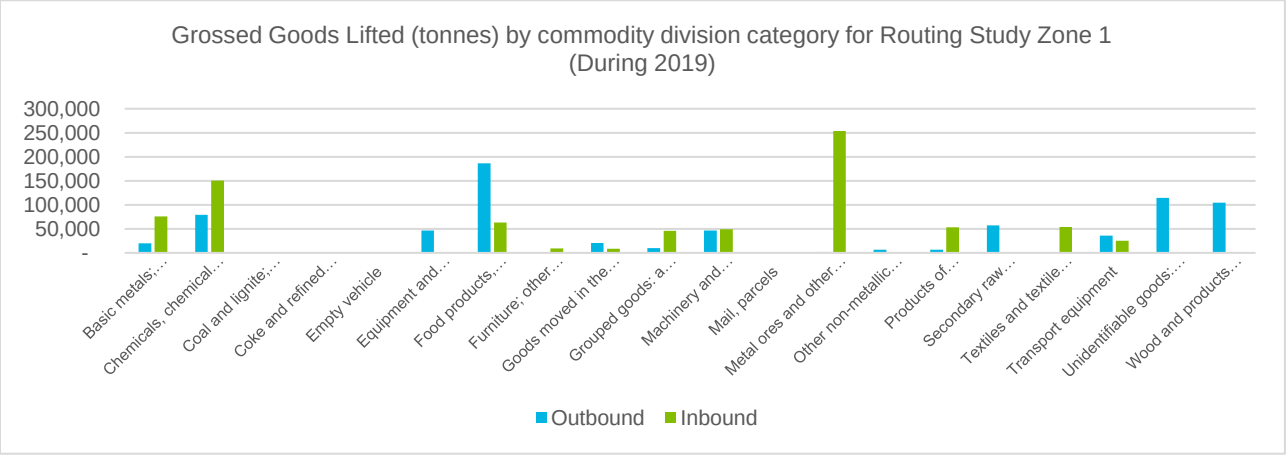


Figure A.1: Grossed Goods Lifted (tonnes) by commodity division category for Routing Study Zone 1

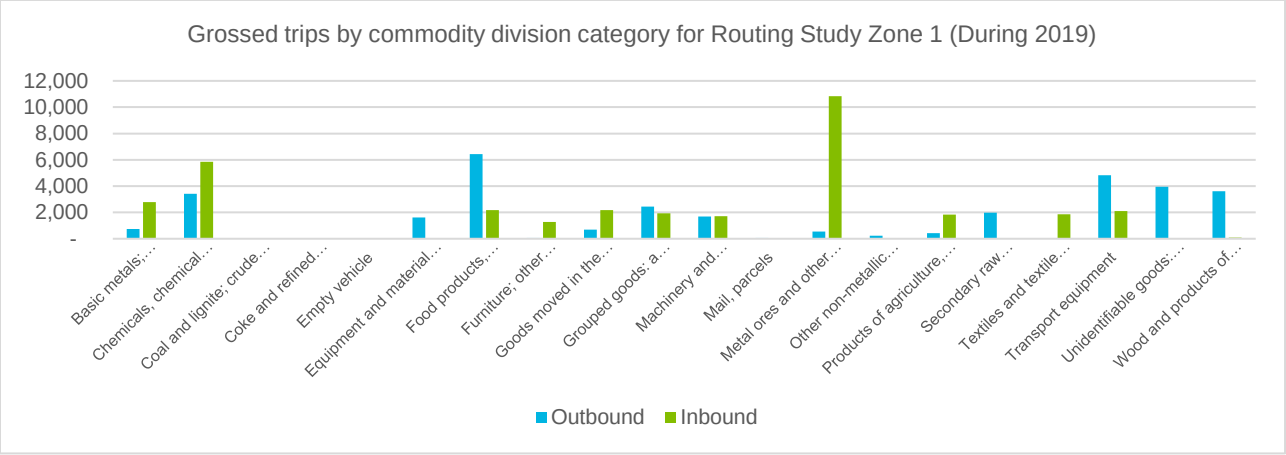


Figure A.2: Grossed trips by commodity division category for Routing Study Zone 1

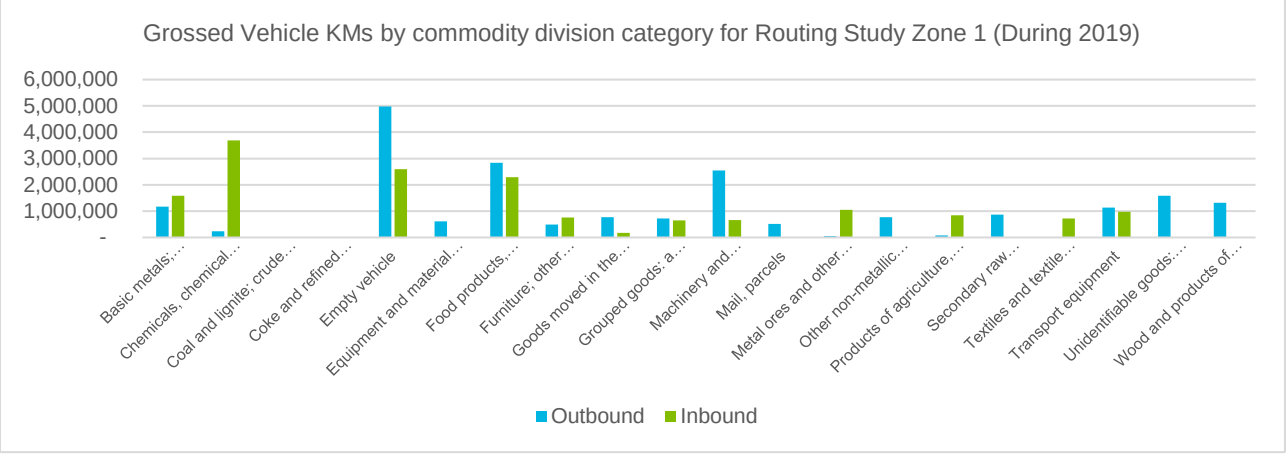


Figure A.3: Grossed Vehicle KMs by commodity division category for Routing Study Zone 1

Routing Study Zone 2 – North West

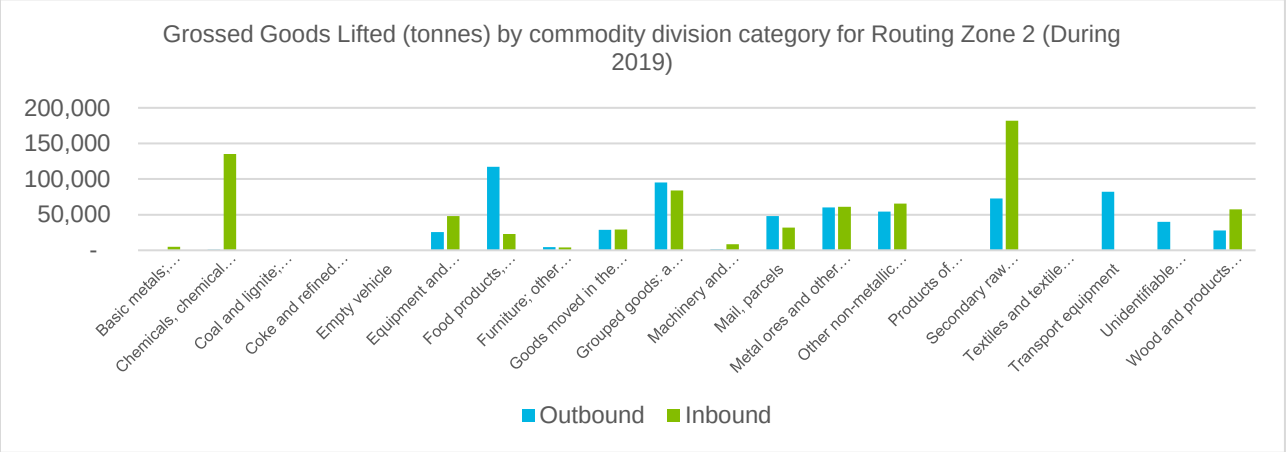


Figure B.1: Grossed Goods Lifted (tonnes) by commodity division category for Routing Study Zone 2

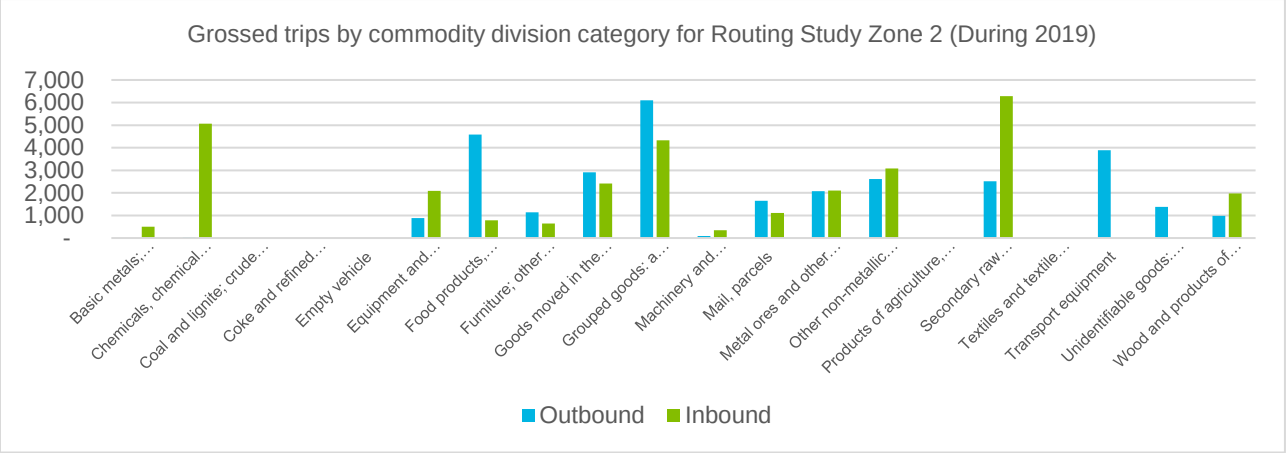


Figure B.2: Grossed trips by commodity division category for Routing Study Zone 2

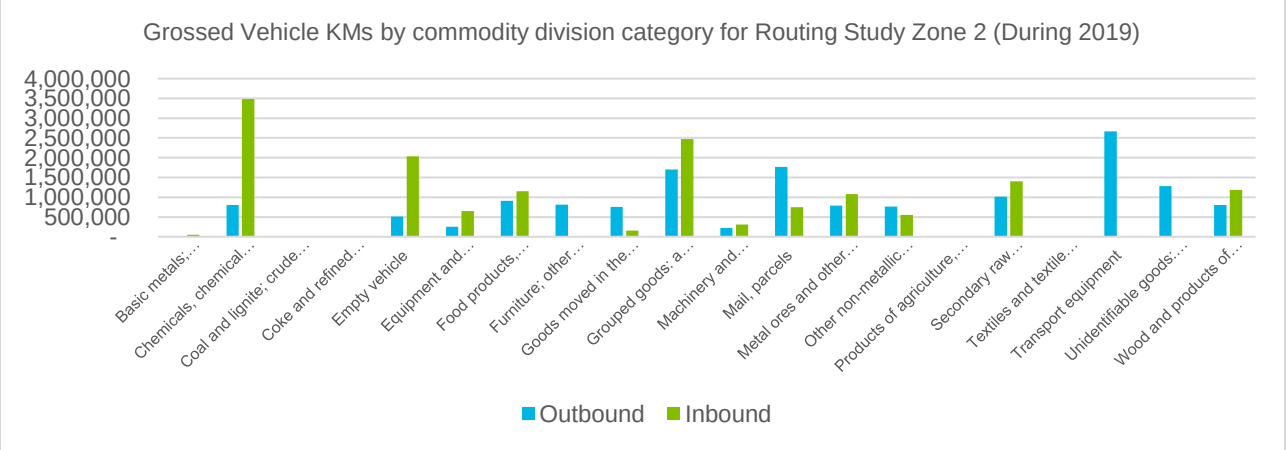


Figure B.3: Grossed Vehicle KMs by commodity division category for Routing Study Zone 2

Routing Study Zone 3 – East Midlands

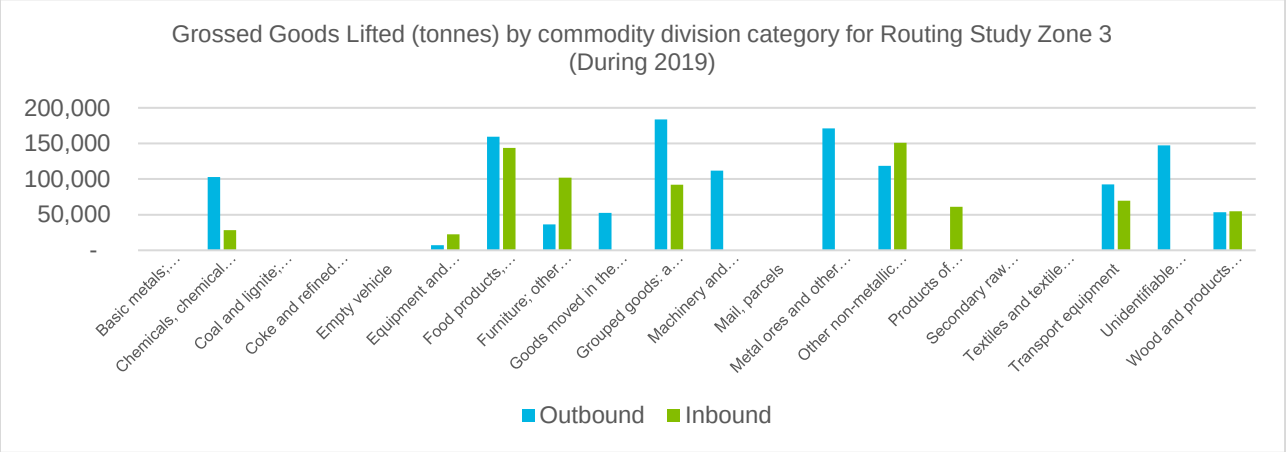


Figure C.1: Grossed Goods Lifted (tonnes) by commodity division category for Routing Study Zone 3

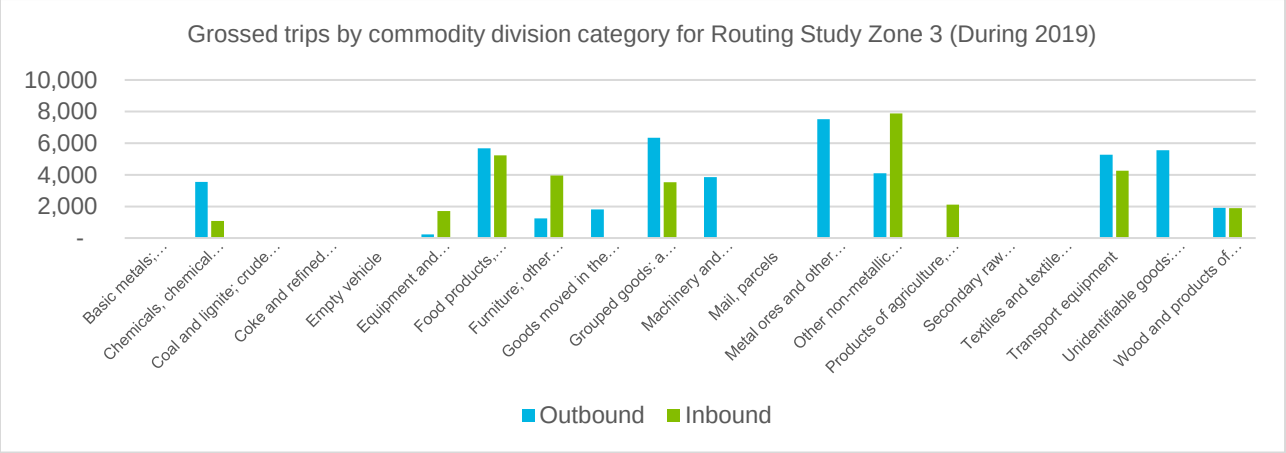


Figure C.2: Grossed trips by commodity division category for Routing Study Zone 3

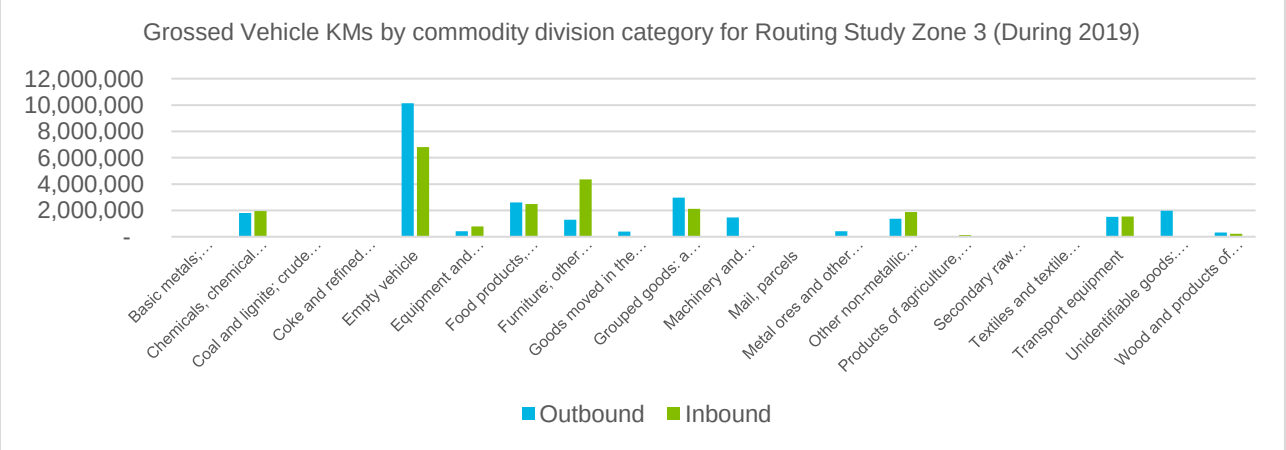


Figure C.3: Grossed Vehicle KMs by commodity division category for Routing Study Zone 3

Routing Study Zone 4 – West Midlands

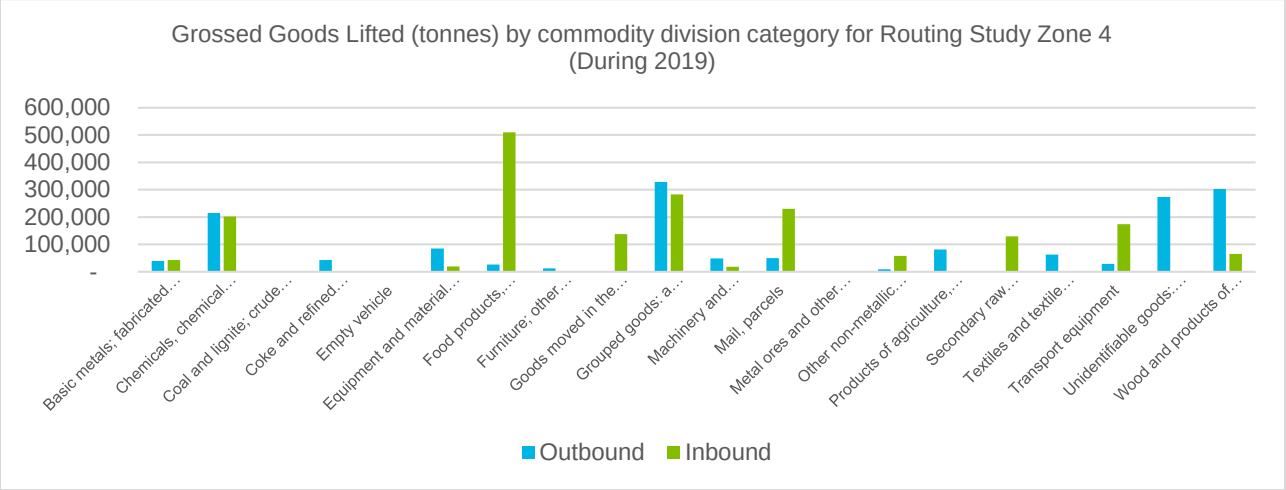


Figure D.1: Grossed Goods Lifted (tonnes) by commodity division category for Routing Study Zone 4

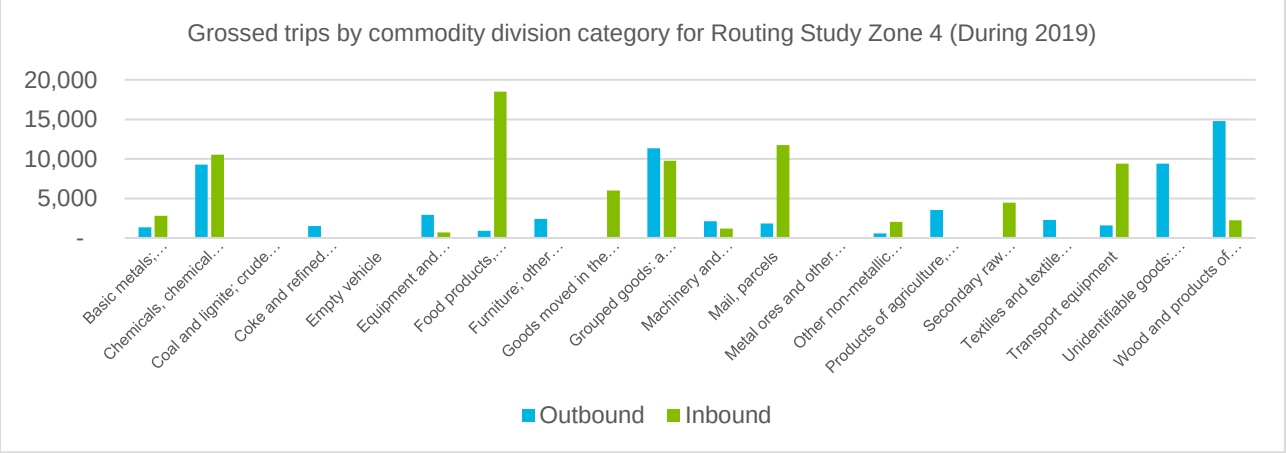


Figure D.2: Grossed trips by commodity division category for Routing Study Zone 4

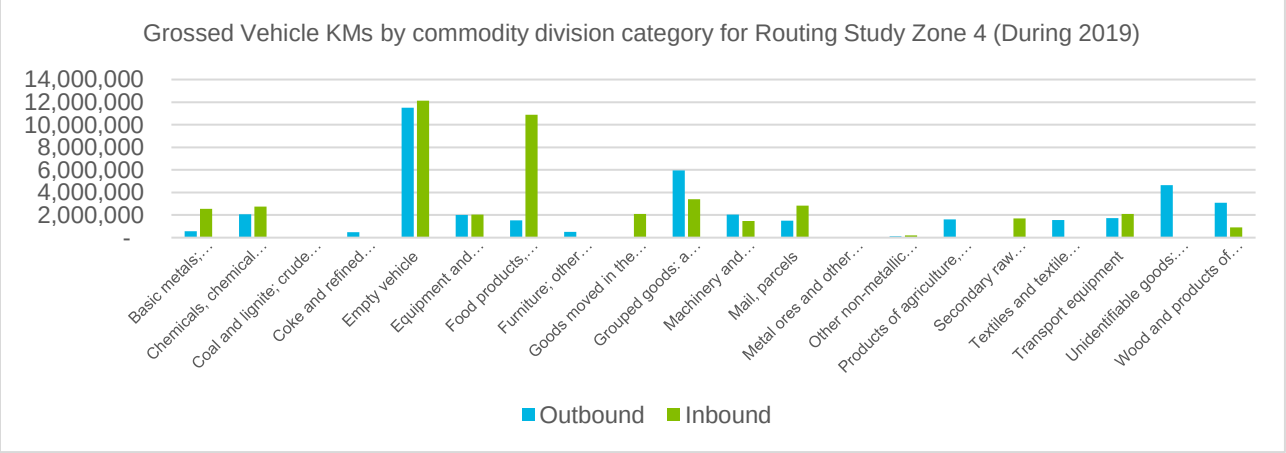


Figure D.3: Grossed Vehicle KMs by commodity division category for Routing Study Zone 4

Routing Study Zone 5 – Berkshire, Buckinghamshire and Oxfordshire

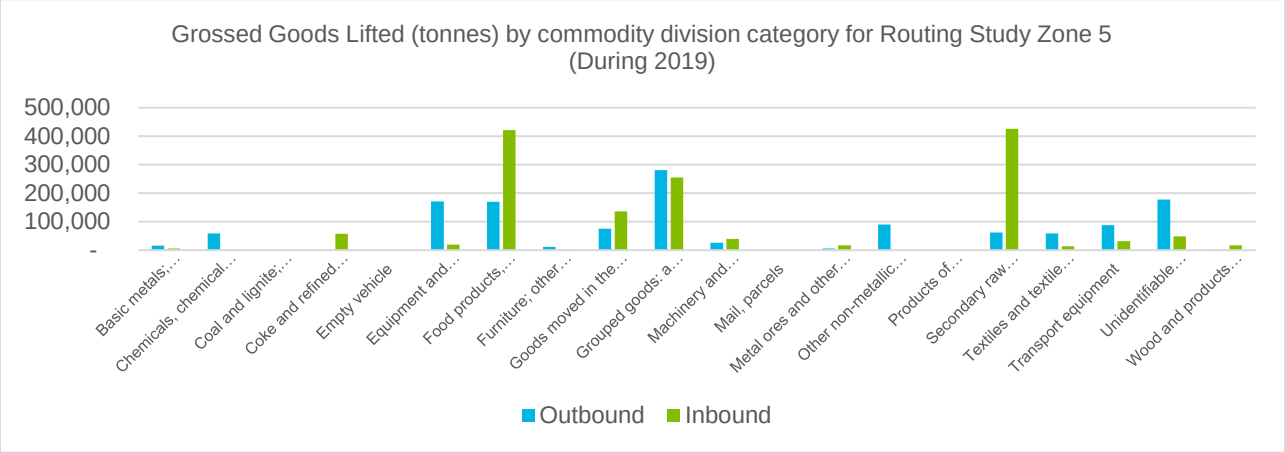


Figure E.1: Grossed Goods Lifted (tonnes) by commodity division category for Routing Study Zone 5

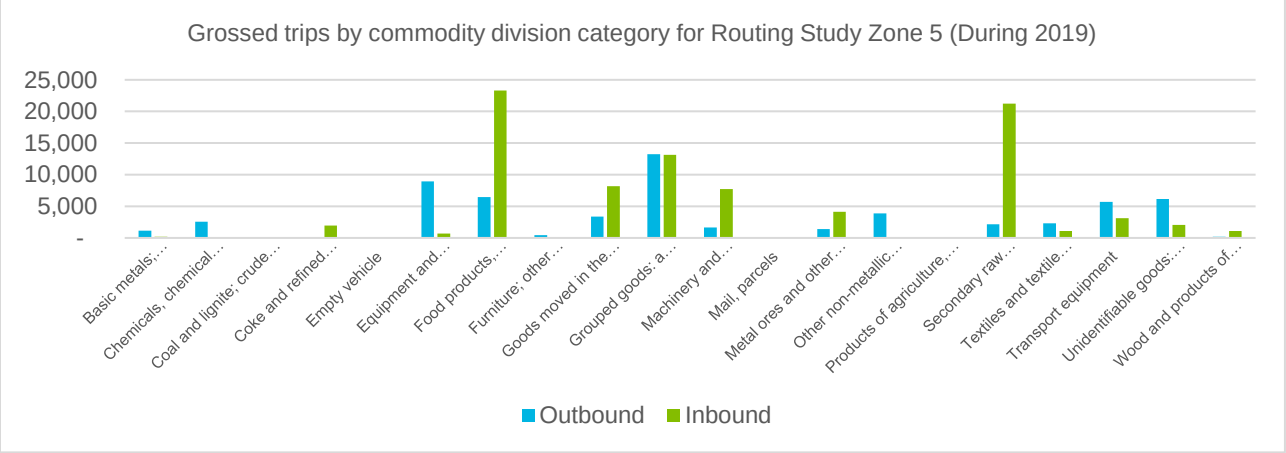


Figure E.2: Grossed trips by commodity division category for Routing Study Zone 5

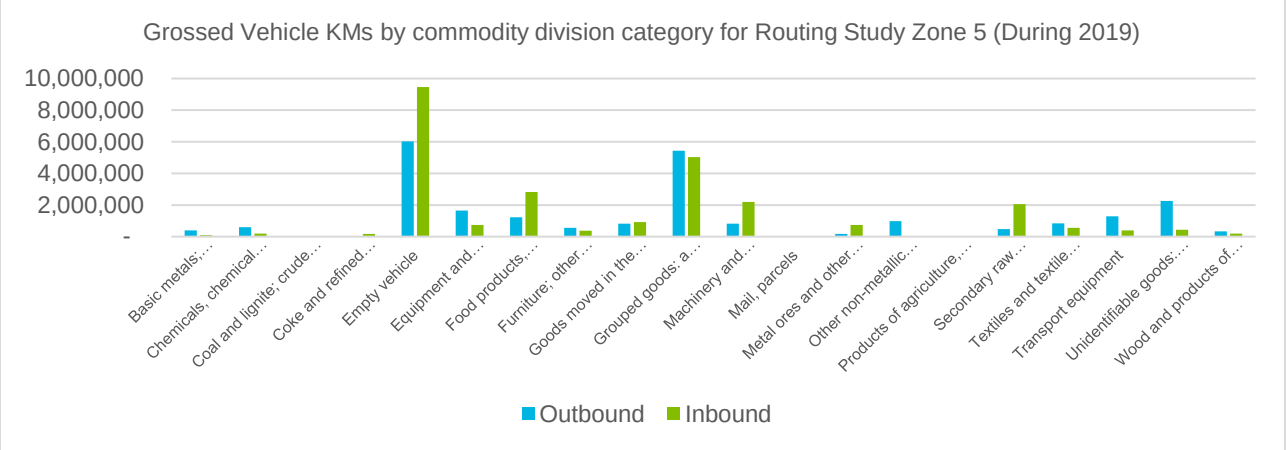


Figure E.3: Grossed Vehicle KMs by commodity division category for Routing Study Zone 5

Routing Study Zone 6 – Gloucestershire, Bristol/Bath and South Wales

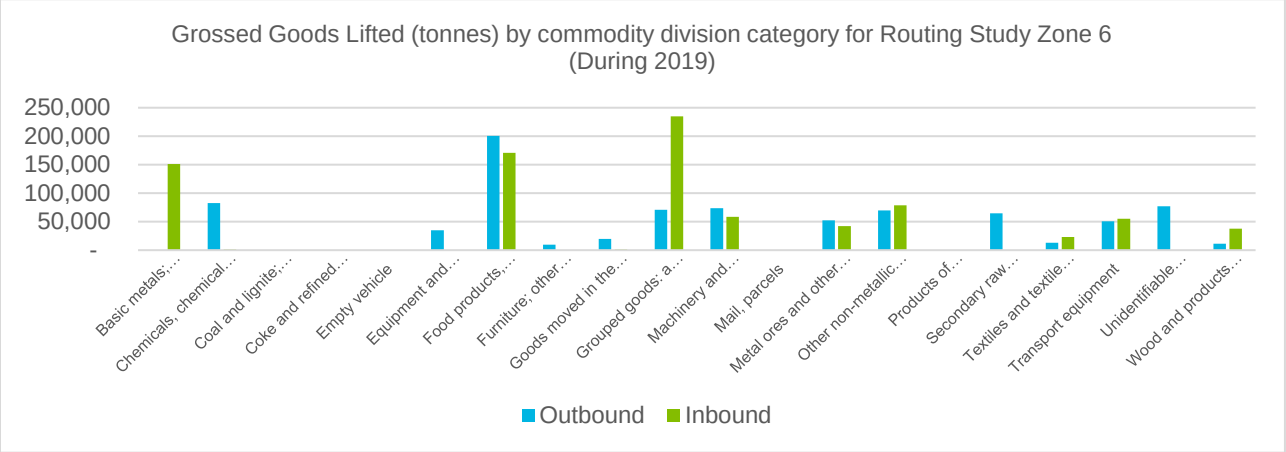


Figure F.1: Grossed Goods Lifted (tonnes) by commodity division category for Routing Study Zone 6

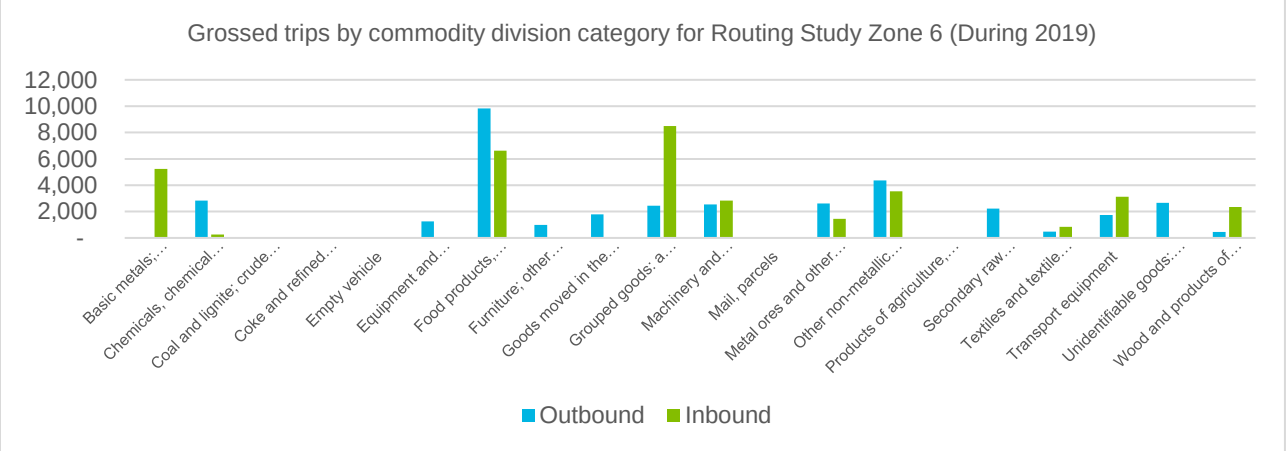


Figure F.2: Grossed trips by commodity division category for Routing Study Zone 6

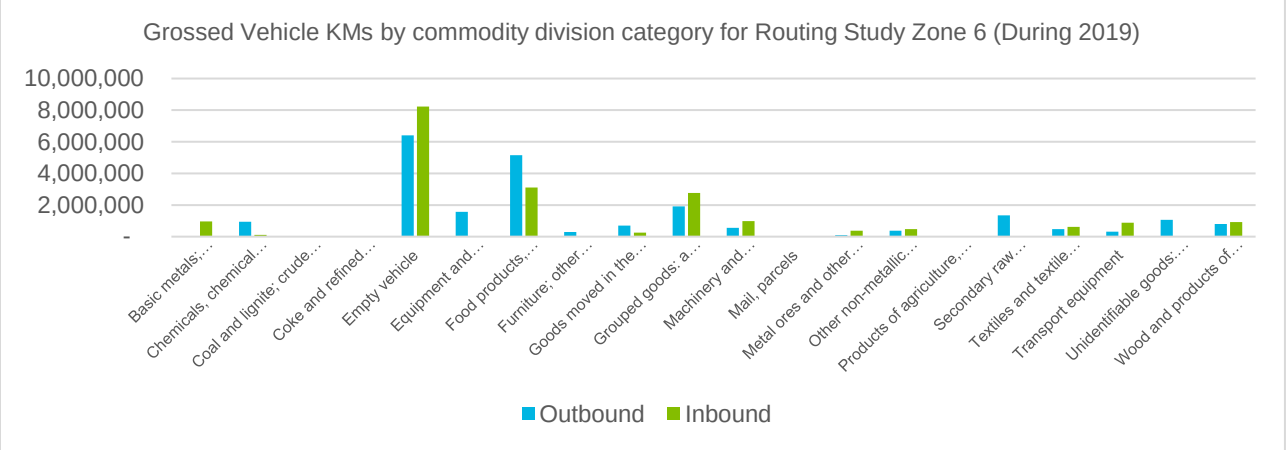


Figure F.3: Grossed Vehicle KMs by commodity division category for Routing Study Zone 6

Routing Study Zone 7 – Cornwall, Isles of Scilly, Devon and Somerset

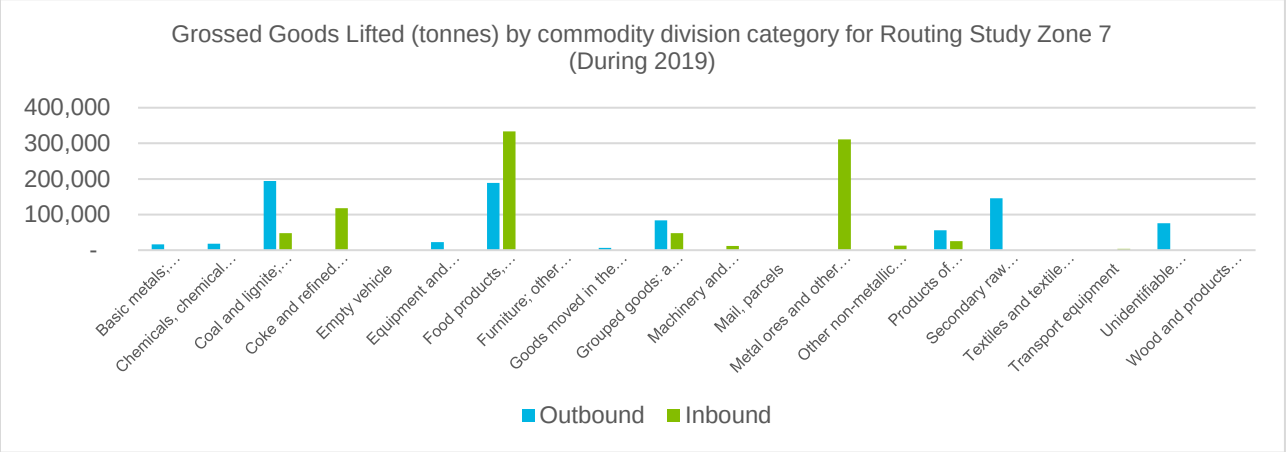


Figure G.1: Grossed Goods Lifted (tonnes) by commodity division category for Routing Study Zone 7

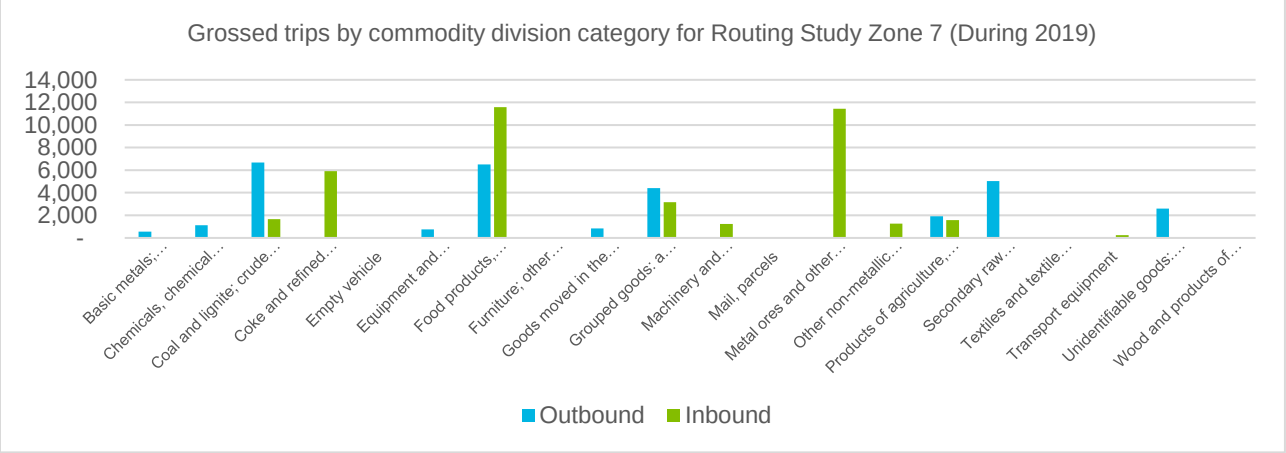


Figure G.2: Grossed trips by commodity division category for Routing Study Zone 7

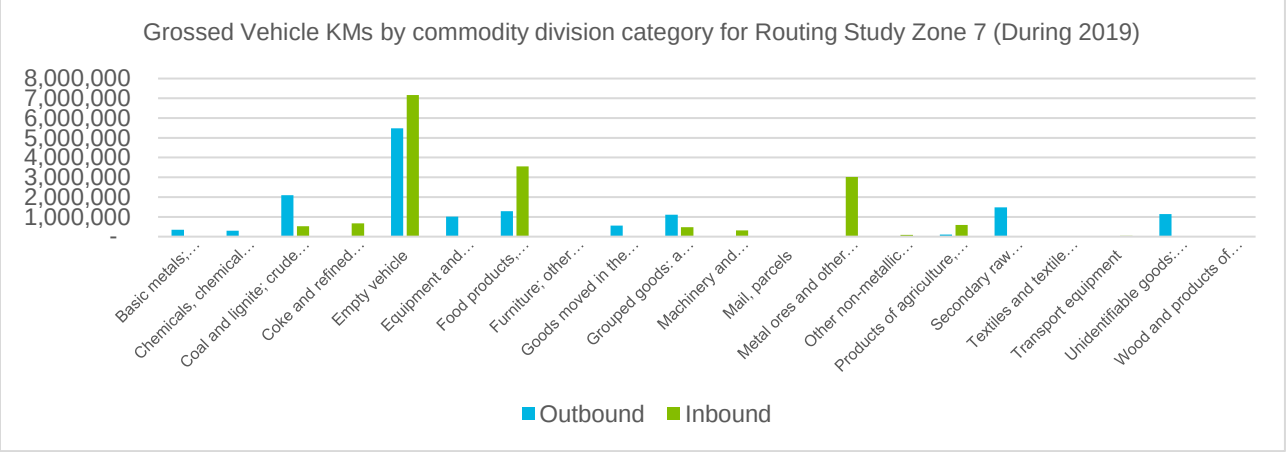


Figure G.3: Grossed Vehicle KMs by commodity division category for Routing Study Zone

Routing Study Zone 8 – Dorset, Bournemouth, Christchurch and Poole

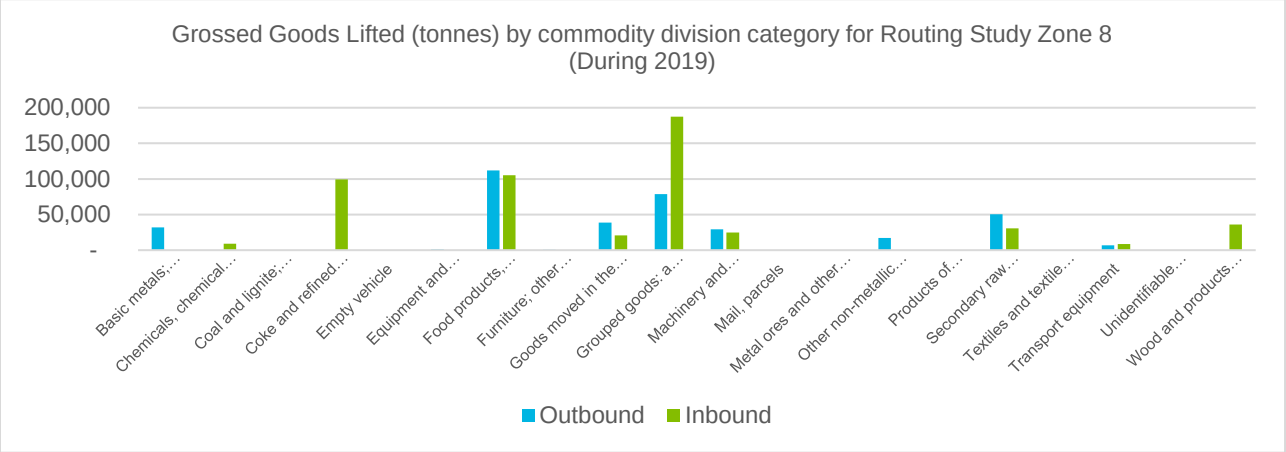


Figure H.1: Grossed Goods Lifted (tonnes) by commodity division category for Routing Study Zone 8

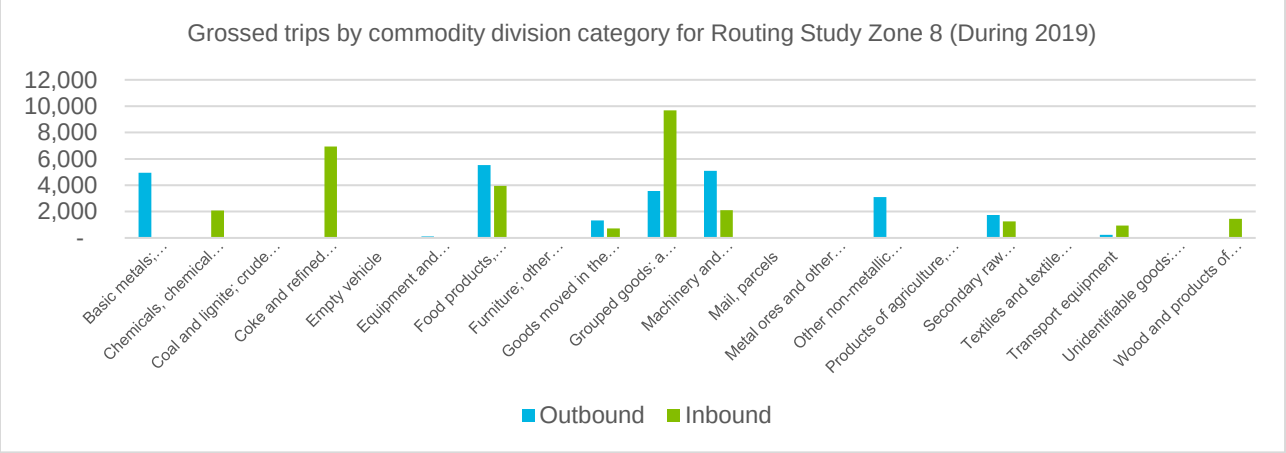


Figure H.2: Grossed trips by commodity division category for Routing Study Zone 8

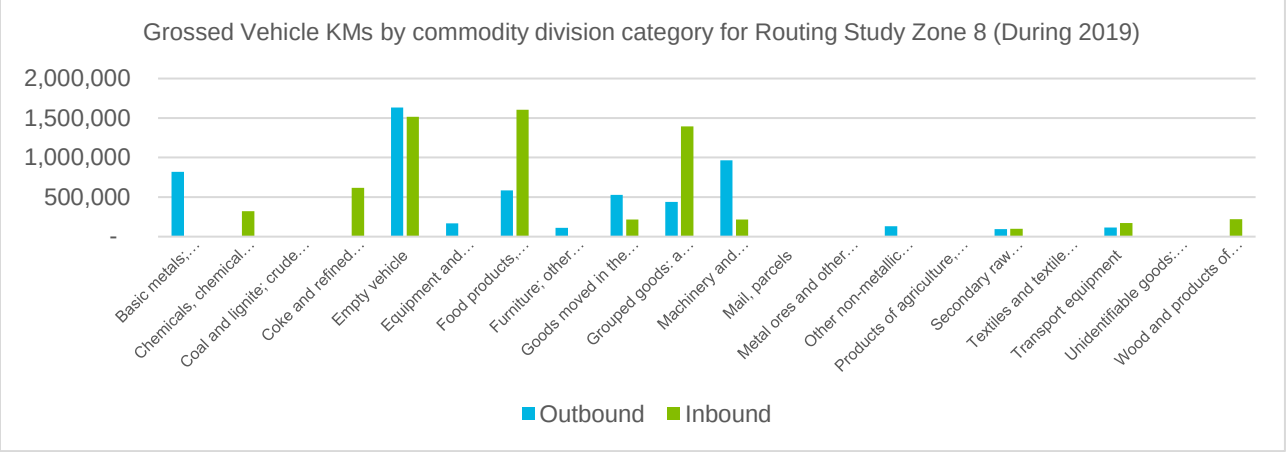


Figure H.3: Grossed Vehicle KMs by commodity division category for Routing Study Zone 8

Routing Study Zone 9 – Wiltshire

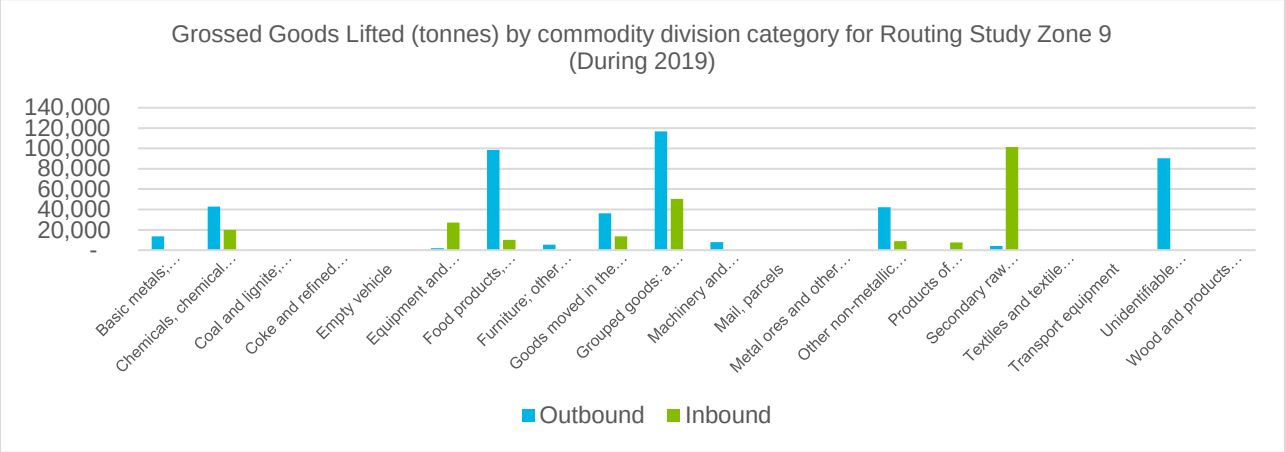


Figure I.1: Grossed Goods Lifted (tonnes) by commodity division category for Routing Study Zone 9

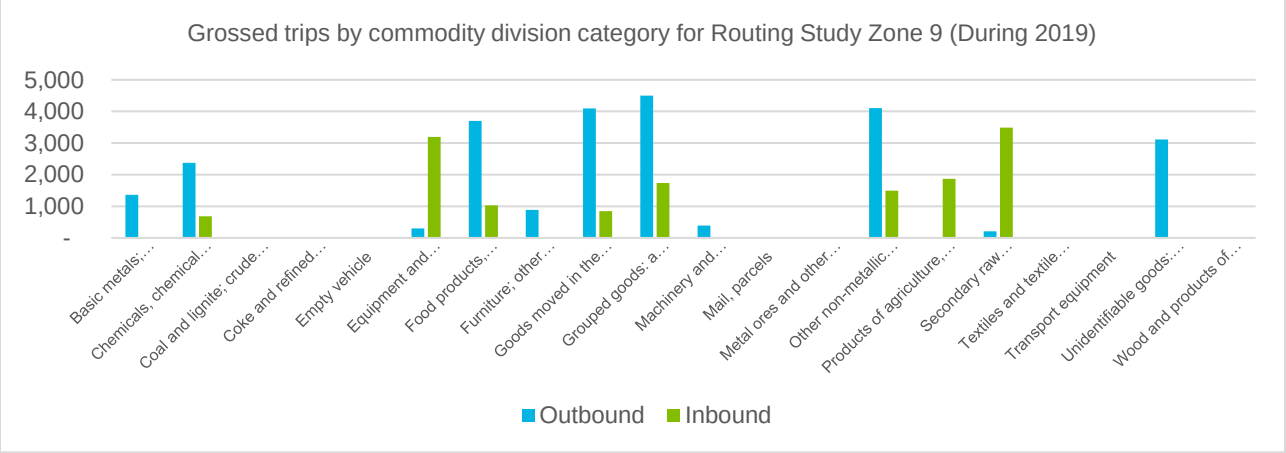


Figure I.2: Grossed trips by commodity division category for Routing Study Zone 9

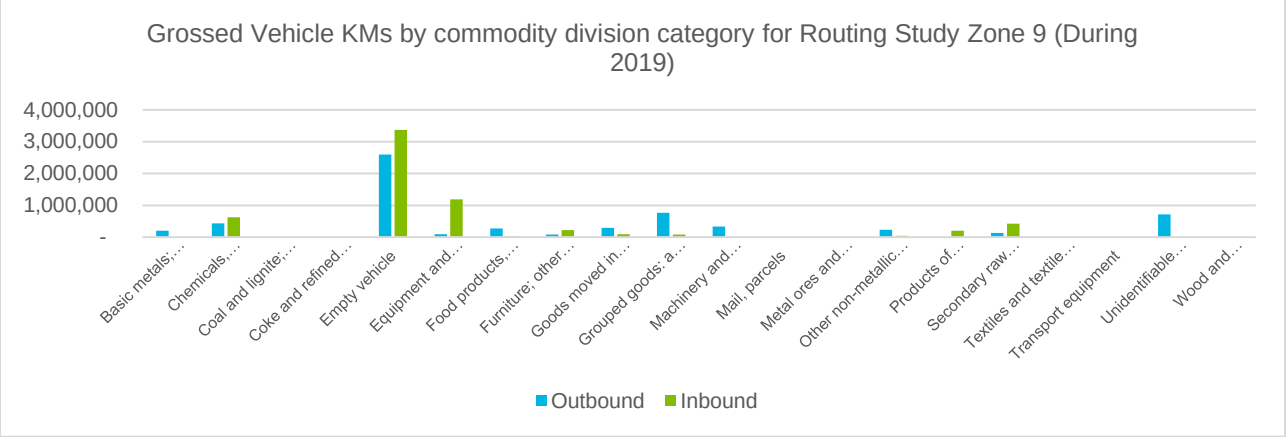


Figure I.3: Grossed Vehicle KMs by commodity division category for Routing Study Zone 9