



System Operator

International Rail Freight

Opportunities for Growth



February 2023

Glossary

Aggregation – The combination of multiple customers' goods into train loads, where the individual volume provided by each of them would be insufficient to support a rail service by itself.

Barking Eurohub – A rail freight terminal in East London, which serves as the destination point for freight operating via HS1 and can be accessed by trains using continental-gauge wagons. The 'Eurohub' designation was originally applied specifically to a pair of sidings formerly used for automotive traffic, but is used more generally in this report to refer to the DB Cargo managed facilities that receive trains from HS1, including the Barking intermodal terminal, where unloading and loading of Transfesa services from Spain is undertaken.

Box – A generic term used here to encompass all forms of intermodal load unit (ILU) when referring to them in general terms.

Classic routes – The British main line railway routes via the national network through Kent, Surrey and the London area to Wembley. These were used by all international rail traffic prior to the opening of HS1 and are still used by most of the remaining freight flows. The primary route is via Maidstone East and Catford and the main diversionary route is via Tonbridge and East Croydon.

Container – This term may be used to generally describe all forms of intermodal load unit, but is often taken to be synonymous with maritime 'ISO' containers i.e. those conforming to dimensions established by the International Organization for Standardization, which are typically 20' or 40' long and always 8' wide. This definition excludes the swap bodies and pallet-wide containers commonly used in intra-European logistics, therefore to avoid confusion this report uses simply 'box' or 'intermodal load unit' when referring to all types in generic terms.

Channel Tunnel Rail Link (CTRL) – the legal name for High Speed 1.

European Train Control System (ETCS) – the signalling and control component of the European Rail Traffic Management System (ERTMS). Deployment of ETCS replaces conventional lineside colour light signals with a digital system that provides in-cab information to train drivers to ensure the safe separation of trains on the network.

Eurotunnel – The company that manages and operates the infrastructure of the Channel Tunnel, operates the Le Shuttle train service and earns revenue on other trains using the tunnel, including direct rail freight.

Freight Operating Company (FOC) – A company whose primary business activity is the movement of freight using the railways.

High Speed 1 (HS1) – A high-speed railway line between London and the Channel Tunnel, carrying passenger and freight services. It opened in its entirety in 2007.

HS1 Ltd. – The concession holder for the HS1 route, which earns revenue on passenger and freight trains using it.

International freight capacity notice (IFCN) – Published annually by Network Rail as part of the timetable production process mandated by the Network Code. The IFCN is consulted 70 weeks before each Principal Change Date and contains details of all timetable paths reserved for the use of international freight via the Channel Tunnel.

IFA – A type of ‘multifret’ standard deck height (945mm) wagon.

IKA – A type of ‘megafret’ low-platform wagon, with a deck height of 825mm. Enables carriage of taller intermodal units (e.g. 9’6” high ISO containers, S45 swap bodies) on routes where the gauge clearance prevents their passage on standard height wagons.

Intermodal – Freight transport that conveys goods inside standardised load units, such as containers or swap bodies, that can be transferred between different transport modes (e.g. road, rail, ship) without the need for handling of the freight itself. Also called ‘unitised’ freight transport.

Le Shuttle – The ‘piggyback’ train service that carries either accompanied passenger road vehicles or road freight vehicles through the Channel Tunnel, between terminals located in the vicinity of the tunnel portal on each side.

Line-haul – Refers to trunk legs of freight journeys, typically between logistics hubs, as opposed to first/last mile delivery legs.

Loading gauge – A standard of clearances that defines the dimensions of vehicles and cargoes permitted to safely operate on a route, with regard to the proximity of lineside structures.

Mode Shift Revenue Support (MSRS) – A UK Government grant scheme that provides support to rail or inland waterway freight services that would not otherwise be price-competitive with road transport, in order to secure the wider environmental and social benefits of modal shift.

Nodal yard – Rail freight hubs that act as traffic staging and regulation points. Typically located close to where two or more major routes meet, they allow multiple trains to await onward paths when transferring from one busy route to another. Wembley Yard is a major existing example that is used by most Channel Tunnel freight today.

Piggybacking – The practice of carrying road vehicles on trains, as exemplified by Channel Tunnel Le Shuttle services, or operations in continental Europe where unaccompanied semi-trailers are carried on rail freight wagons.

Reefer – A refrigerated container or swap body that carries temperature-sensitive goods at regulated cold temperatures.

Semi-trailer – A road freight trailer without a front axle, which in combination with a tractor unit forms an articulated lorry.

Short straits – All routes from continental Europe to Dover, Folkestone and Ramsgate, including the Channel Tunnel. The main route for trade with the United Kingdom and the shortest route for crossing the Channel.

Société Nationale des Chemins de fer Français (SNCF) – France’s national state-owned railway company, which manages and maintains the country’s national rail infrastructure as well as operating passenger and freight services.

Swap body – A type of intermodal load unit commonly used in Europe, typically 13.6m long and with room for 26 pallets, comparable with a road semi-trailer. They can be conveyed on the same road and rail vehicles used for ISO containers, but are slightly wider in order to accommodate European standard pallets. A codification system, using metric dimensions, establishes swap body types according to height and width e.g. S45: 2.905m high x 2.55m wide.

Terminal – In rail freight terms, a terminal is any origin or destination point with a connection to the rail network, at which cargo is loaded onto and unloaded from trains.

TVM-430 – a form of in-cab signalling originally deployed in France and mainly used on high-speed lines, including HS1 and the Channel Tunnel.

Union International des Chemins de fer (UIC) – The International Union of Railways, which is responsible for the international system of wagon numbering.

Wagon – An unpowered railway vehicle used for the transportation of cargo. The type of wagon used will depend on the type of freight being transported.

WCML – West Coast Main Line.

Yard – A series of railway tracks, typically just off a mainline railway, used for the marshalling and stabling of freight trains.

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Executive Summary

Context

2022 saw stakeholders from across the rail freight and logistics industries come together to give a renewed emphasis to the long-held desire to grow the volume of rail freight operating via the Channel Tunnel. Plans are coming forward for the introduction of new services, building on additional flows established during the past few years, a DfT-facilitated industry working group has been examining the key issues affecting international rail freight, whilst in April 2022, a group of senior industry figures gathered at Barking Eurohub to make a firm collective statement of their belief in rail's potential to expand its share of cross-Channel trade. This report has been produced, with input from a range of stakeholders, to provide a concise, market-focused summary of what the barriers to and opportunities for growth in international traffic volumes are and how they can be addressed.

The Channel Tunnel originally opened in 1994 and over the remainder of the century traffic levels grew to a substantial level. Regular bulk and intermodal flows were established, with a range of end customers including household names in the automotive and consumer goods industries. Overall volume of around 3m tonnes per year was achieved by the turn of the millennium, with between fifteen and twenty train movements in each direction daily, as rail successfully captured a significant portion of the market in cross-Channel trade. However, Channel Tunnel traffic currently forms a smaller proportion of rail freight in Britain than at any point since the tunnel opened. Within the rail freight sector, international movements accounted for just 1.6 % of freight moved during the first quarter of 2022/23. This is in a context of a long-term pattern of decline, when compared with the early years of operation, a mixed experience over the past decade or so where periods of progress have been disrupted largely by external factors and, in the present, a set of immediate constraints limiting the sector's ability to reverse this historic trend. The main factors inhibiting Channel Tunnel Rail freight currently can be grouped into market, infrastructure and rolling stock constraints:

- Market
 - Insufficient aggregation of volumes;
 - The balance of trade between Britain and continental Europe;
 - Structural changes in specific industries
- Infrastructure
 - Loading gauge;
 - HS1 access;
 - Terminal capacity
- Rolling stock
 - Wagon availability;
 - Train weight restriction on HS1

Purpose of this report

The central purpose of this report is to illustrate what the growth opportunities for Channel Tunnel rail freight actually look like, in terms of commodity sector and role in the wider logistics market. This is intended to support revitalised conversations on developing

international freight, by providing a clear picture of what the industry's collective efforts are seeking to realise both now and in future. This report could serve as the topic paper for a future high-level industry event on international rail freight, as a platform for further engagement with the wider logistics sector and as an agenda for action by the rail freight industry itself.

Market Opportunities

There are five distinct 'techniques' of new or expanded rail freight flow that could realistically be expected to use the Channel Tunnel, with the right conditions and support going forwards, as well as one related opportunity to facilitate domestic rail freight growth.

- Continental style intermodal
- Classic route intermodal
- Heavy ambient product – consumer goods
- Ambient product – industrial materials/products
- High-speed express freight
- Domestic freight

Actions and Policies

Interventions to grow Channel Tunnel rail freight could come in a wide variety of forms, involving both public and private sector bodies. There is also a potential opportunity, linked to international freight capacity, to support domestic traffic in South East England. The available options include structural and regulatory changes that would be without up-front cost, short-term tactical interventions that may require modest funding and longer-term measures involving significant investment in rolling stock and infrastructure. A combination of these options will be necessary over time if the aim of sustained traffic growth is to be delivered.

- Aggregation support
- Class 92 double-heading on HS1
- Review of HS1 access and performance regulations
- Re-deployment of protected capacity for domestic freight
- Rolling stock investment
- Network enhancements

Each of these actions and policies has been linked within this report directly to the constraints they would address and the market opportunities they would support (see table next page).

<i>Market opportunity</i>	<i>Key constraints</i>	<i>Intervention required</i>
<i>M1. Continental style intermodal</i>	C1. Insufficient aggregation C2. Balance of trade C5. HS1 access C6. Terminal capacity C8. HS1 double-heading	A1. Aggregation support A2. Double-heading on HS1 A3. Review of HS1 access and performance regulations
<i>M2. Classic route intermodal</i>	C4. Loading gauge C7. Wagon availability C1. Insufficient aggregation C2. Balance of trade	A6. Network enhancements A5. Rolling stock investment A1. Aggregation support
<i>M3. Heavy ambient product – consumer goods</i>	C7. Wagon availability C2. Balance of trade	A5. Rolling stock investment
<i>M4. Ambient product – industrial materials/ products</i>	C3. Structural changes in specific industries C7. Wagon availability	A5. Rolling stock investment
<i>M5. High-speed express freight</i>	C7. Rolling stock availability Does not yet exist	A5. Rolling stock investment A3. Review of HS1 access and performance regulations
<i>M6. Domestic freight</i>	Capacity on the GB network	A4. Re-deployment of protected capacity for domestic freight



Source: Jamie Squibbs, www.jamiesquibbs.co.uk

Context

The Channel Tunnel

Constructed between 1988 and 1994, the Channel Tunnel provides the only fixed link between the island of Britain and continental Europe. It is one of the longest railway tunnels in the world, running for just over 31 miles between portals near Folkestone, Kent and Calais in northern France. It carries high-speed international passenger trains, operated by Eurostar, Eurotunnel 'Le Shuttle' trains carrying road vehicles and their occupants (on separate passenger and freight services) and international rail freight trains. The tunnel is managed and operated as a concession by Eurotunnel, a subsidiary of Getlink.



Source: getlinkgroup.com

2022 has seen key stakeholders from across the rail freight and logistics industries come together to give a renewed emphasis to the long-held desire to grow the volume of rail freight operating via the Channel Tunnel. Challenges in the road haulage sector throughout Europe, congestion on the highways network in Kent and the decarbonisation agenda all point towards this being a moment of opportunity to restate the case for international rail freight, which 'helps to reduce pressure on short straits ports and the road network through modal shift'.¹ The Department for Transport (DfT) has convened a working group to consider ways in which the market for through rail freight services to and from Britain can be supported. In April 2022, senior representatives from the DfT and the Department for International Trade joined rail and logistics industry colleagues and customers for a round table event, hosted at the Barking Eurohub terminal, where attendees 'discussed the barriers and opportunities to increase the volume of rail freight going through the Channel Tunnel'.² This report has been produced, with input from a range of stakeholders, in order to provide a concise, market-focused statement of the collective industry view of what those barriers and opportunities are and how they can be addressed.

Purpose of this report

This document has been produced in response to a renewed interest expressed by industry stakeholders during 2022 in the revival of Channel Tunnel rail freight volumes. With traffic levels in recent times having been limited in comparison to historic highs, new perspectives and approaches are required if this ambition is to be achieved. Further industry events, following on from the round table held at Barking in April 2022, will offer a platform for discussion and the consideration of options going forward. As a contribution to this process, this report is intended to support industry stakeholder awareness and understanding by setting out clearly the factors, both historic and current, that are holding international rail

¹ *Future of Freight: A long-term plan*, Department for Transport (June 2022), p.16

² 'DB Cargo UK hosts top-level talks on plans to grow international rail freight traffic', <https://uk.dbcargo.com/rail-uk-en/news/uk-news/international-rail-freight-round-table-7594124#>

freight back from developing its potential and to highlight the options available to address this. Most importantly, though, the purpose of this report is to illustrate what that potential actually looks like, by going beyond simplistic goals of simply 'more freight on rail' to explain what that new and additional freight would be, in terms of commodity sector and role in the wider logistics market.

Previous industry discussion of the approach needed to revive Channel Tunnel rail freight has focused on the interventions, especially major network enhancements, that if delivered could stimulate new traffic growth, but these have not successfully come about. This is partly due to insufficient confidence, across both the public and private sectors, to make the necessary investments to deliver those interventions. Channel Tunnel rail freight's low market share has over time become self-perpetuating, as funding and investment to address known infrastructure and rolling stock constraints have increasingly been discouraged by past setbacks and a diminished traffic base that offers fewer tangible examples of what the benefits of growth might look like.

By focussing initially on tactical, incremental interventions that will directly strengthen the offer it can make to the market, rail freight has the potential to unlock growth from a range of market opportunities. Any immediate boost to international traffic would serve as an exemplar, demonstrating what the sector can offer to prospective customers and strengthening the business case for longer-term interventions to spur sustained growth in international rail freight. Therefore, this report takes a market-focused approach, centred on what the market opportunities are for Channel Tunnel rail freight, only discussing constraints and interventions to address them in terms of the outcomes they can be expected to generate. It is based on the following concept for the revival of Channel Tunnel rail freight:

- In the short term, a market-focused approach is needed, supported by tactical interventions that can help stimulate initial growth within the most immediately attainable areas of opportunity. This means overcoming market-based constraints to, where possible, do more with the infrastructure and equipment that is already available;
- Initial success based on this approach can lead to proofs of concept for increased Channel Tunnel rail freight flows, in turn demonstrating rail freight's ability to deliver benefits to the international logistics sector and to Britain and its trading partners more generally;
- This can then support longer-term funding and investment decisions to address the known infrastructure and rolling stock constraints to allow volumes to grow further towards their full potential, across the range of market opportunities examined in this report.

Channel Tunnel Freight today

In absolute terms, rail freight volumes between Britain and continental Europe did see a sustained recovery in the years between the 2015 European refugee crisis and the Covid-19 pandemic (see graph p.14), increasing by 34% from 2016 to 2019, before falling sharply in 2020. However, Channel Tunnel traffic now forms a smaller proportion of rail freight in Britain than at any point since the tunnel opened. Within the rail freight sector, international movements accounted for just 1.6% of freight moved during the first quarter of 2022/23. This represents a decline even in the short term, when compared to the previous quarter (1.9%) or to the previous year's equivalent (2.2%), but is also a record low.³ 1.04m tonnes of freight passed through the tunnel on direct unaccompanied trains (i.e. not including Le Shuttle Freight) in 2021, compared with a late-1990s high of 3.1m tonnes.⁴



Current traffic includes a mix of import and export goods between the continent and Dagenham, Daventry, Nottinghamshire, Cheshire and Ayrshire.

The services that do operate comprise five regular flows (see table p.7). Only one of these uses High Speed 1 (HS1), between the tunnel and terminals in East London, whilst a further four run via the 'classic' network to and from a range of locations across the national network.

The refrigerated units and finished vehicle flows were both introduced relatively recently, whilst the others are more longstanding. Although these two new services were positive steps for the industry, backed by some considerable private sector investment, they came against a backdrop of loss of traffic from other previously operated flows. Rail freight once had a share of the consumer goods market that saw it carry familiar products, such as imported Italian beer, to Britain on a regular basis, but has long since ceded this to alternative transport modes. More recently, a long-running export flow of steel from Scunthorpe to Hayange, France, ceased operating during the past year.⁵ Those that remain range in frequency from daily to weekly, so overall traffic is variable from day to day.



The former Scunthorpe-Hayange steel train emerging from the tunnel at Coquelles Source: DB Cargo

³ *Freight rail usage and performance*, Office of Rail and Road (September 2022, June 2022 & September 2021)

⁴ *2021 Universal Registration Document*, Getlink (March 2022), p.22; Table TSGB0607 (RA10108) 'Channel Tunnel: traffic to and from Europe, annual from 1994', DfT, <https://www.gov.uk/government/statistical-data-sets/tsgb06>

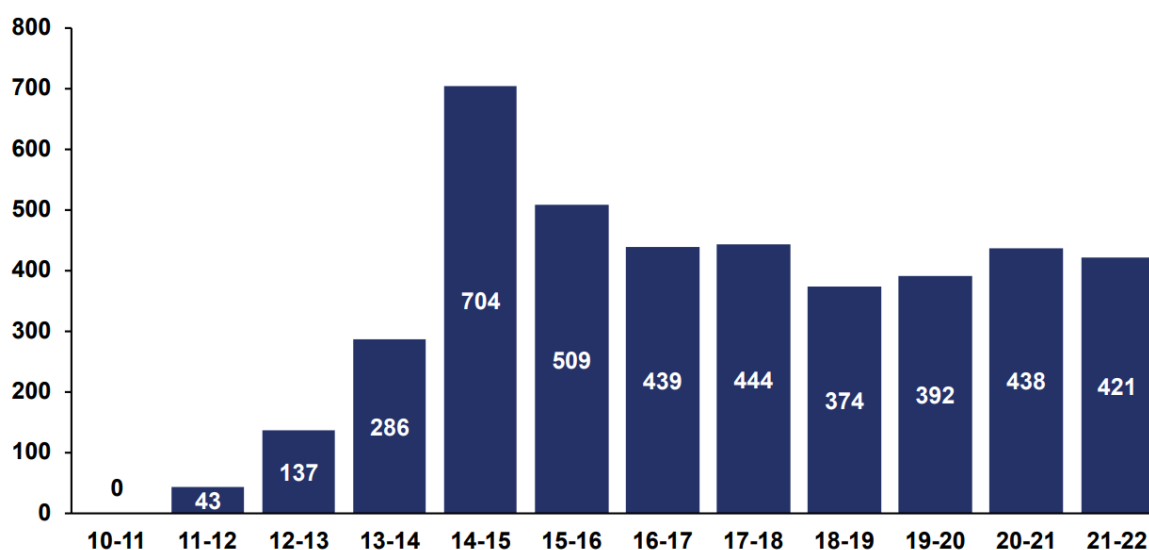
⁵ 'Freight and the UK economy', Rail Safety and Standards Board (5th December 2022); <https://www.rssb.co.uk/what-we-do/insights-and-news/blogs/freight-and-the-uk-economy>

<i>Service</i>	<i>GB origin/ destination</i>	<i>Continental origin/ destination</i>	<i>Import / Export</i>	<i>GB routeing</i>	<i>Frequency (round trips)</i>	<i>Rail vehicles hauled</i>	
<i>Movements of scrap and semi-finished aluminium and finished body pressings for the automotive industry</i>		Ditton, Cheshire (stops at Daventry)	Neuss, Germany	Both	Classic	Variable, up to 6 per week	Trains are formed of a mixture of: 1. 'Cargowagon' conventional vans 2. Intermodal wagons ('multifret' and 'megafret' wagons)
<i>Movements of finished vehicles between British and continental production sites</i>		Toton, Nottinghamshire	Kolín, Czech Republic; via Valenciennes, France	Both	Classic	2 per week	2-axle double-deck car carrier wagons
<i>Bottled water from France, loaded directly into 'cargowagon' rail freight vans</i>		Daventry, Northamptonshire	Publier, France / Riom, France	Import only	Classic	Daily	'Cargowagon' conventional vans
<i>Flow of China clay slurry for use in paper production</i>		Irvine, North Ayrshire	Antwerp, Belgium	Import only	Classic	1 per week	Tank wagons
<i>New railway rolling stock from producers across Europe, on an ad hoc basis according to when orders are delivered</i>		Various	Various	Import only	Classic and HS1	As required	Vehicles themselves are the cargo – includes passenger stock and freight wagons.
<i>Trains carry a mixture of: 1. Movements of automotive components between production and assembly sites 2. Refrigerated units bearing fresh foodstuffs and medical products</i>		Barking/Dagenham, Greater London	Murcia / Valencia, Spain	Both	HS1	3 per week	British gauge intermodal wagons (2-axle container flats)

Total traffic is far below the levels envisaged when the tunnel was constructed and significantly short of the potential offered by the capacity available, prompting Transport for the South East to note in their 2020 Transport Strategy that the ‘corridor could carry more rail freight and is underutilised at present’.⁶ This has been the view of the industry for some time and has been expressed in numerous publications, including reports by Network Rail and Eurotunnel, the operator of the tunnel.⁷

On the classic network, freight train paths in each direction between the Channel Tunnel and the London area are afforded special protection, yet only a small portion of this reserved capacity is utilised. Analysis of recent train running data showed that, over a four-week period, only 8 of the schedules listed in the International Freight Capacity Notice (IFCN) were actually used, by a combined total of 57 train movements on the network.⁸ The completion of HS1 in 2007 created still more capacity, with the intention being from the outset that freight would share in its use, yet current volumes are, as on the classic network, well below the line’s potential.

Number of freight services operated on HS1



Number of freight train services timetabled on HS1, 1st April 2010 to 31st March 2022⁹

GB-continental freight

Instead, the vast majority of goods moved between Britain and continental Europe are carried by other modes of freight transport. These are varied, encompassing several possible combinations of road haulage, sea crossings and the Eurotunnel Le Shuttle train service. Some overall journeys may also feature a rail leg, but do not use the direct rail capability offered by the Channel Tunnel (for example, freight moved on rail to a northern European port for short-sea shipping to Britain). Different approaches are



⁶ *Transport Strategy for the South East*, Transport for the South East (June 2020), p.85

⁷ *Freight Network Study*, Network Rail (April 2017), p.46; *2021 Universal Registration Document*, Getlink (March 2022), pp.22-24

⁸ Network Rail analysis. Current and forthcoming versions of the IFCN are available at <https://www.networkrail.co.uk/industry-and-commercial/information-for-operators/>

⁹ *ORR annual report on HS1 Ltd.: 1 April 2021 – 31 March 2022*, ORR (August 2022) p.8

distinguished by whether goods are moved as bulk materials or ‘unitised’ into individual intermodal boxes, known as ‘swap bodies’, or trailers. Unitised freight may be accompanied by a driver and HGV tractor unit when crossing the Channel or North Sea, or it may be unaccompanied, to be collected by a new driver upon arrival. Crossings can also be either on a roll on/roll off (‘ro-ro’) basis, or load on/load off (‘lo-lo’). Ro-ro freight is typically, but not exclusively, accompanied HGV movements, whereas lo-lo implies an unaccompanied journey leg.

Crossing Mode	Bulk / Unitised	Accompanied / Unaccompanied	Ro-ro / Lo-lo	Example
HGV & sea ferry	Unitised	Accompanied	Ro-ro	Dover-Calais ferry crossings
HGV & freight vehicle shuttle train	Unitised	Accompanied	Ro-ro	Eurotunnel Le Shuttle
Ferry only	Unitised	Unaccompanied	Ro-ro	Tilbury2 – Zeebrugge Units/trailers are transferred from ferry to quayside by port tug vehicles, not cranes. Preceding/subsequent leg may be road or rail.
Short-sea shipping	Unitised	Unaccompanied	Lo-lo	Rotterdam – Immingham Units are loaded on and off ships by crane. Example is for illustration – ships in practice operate circuits of multiple ports and may convey containers of global origin on feeder legs, as well as GB/EU trade. Preceding/subsequent leg may be road or rail.
Short-sea shipping	Bulk	Unaccompanied	Lo-lo	Steel / finished autos shipped via GB east coast ports e.g. King’s Lynn, Boston



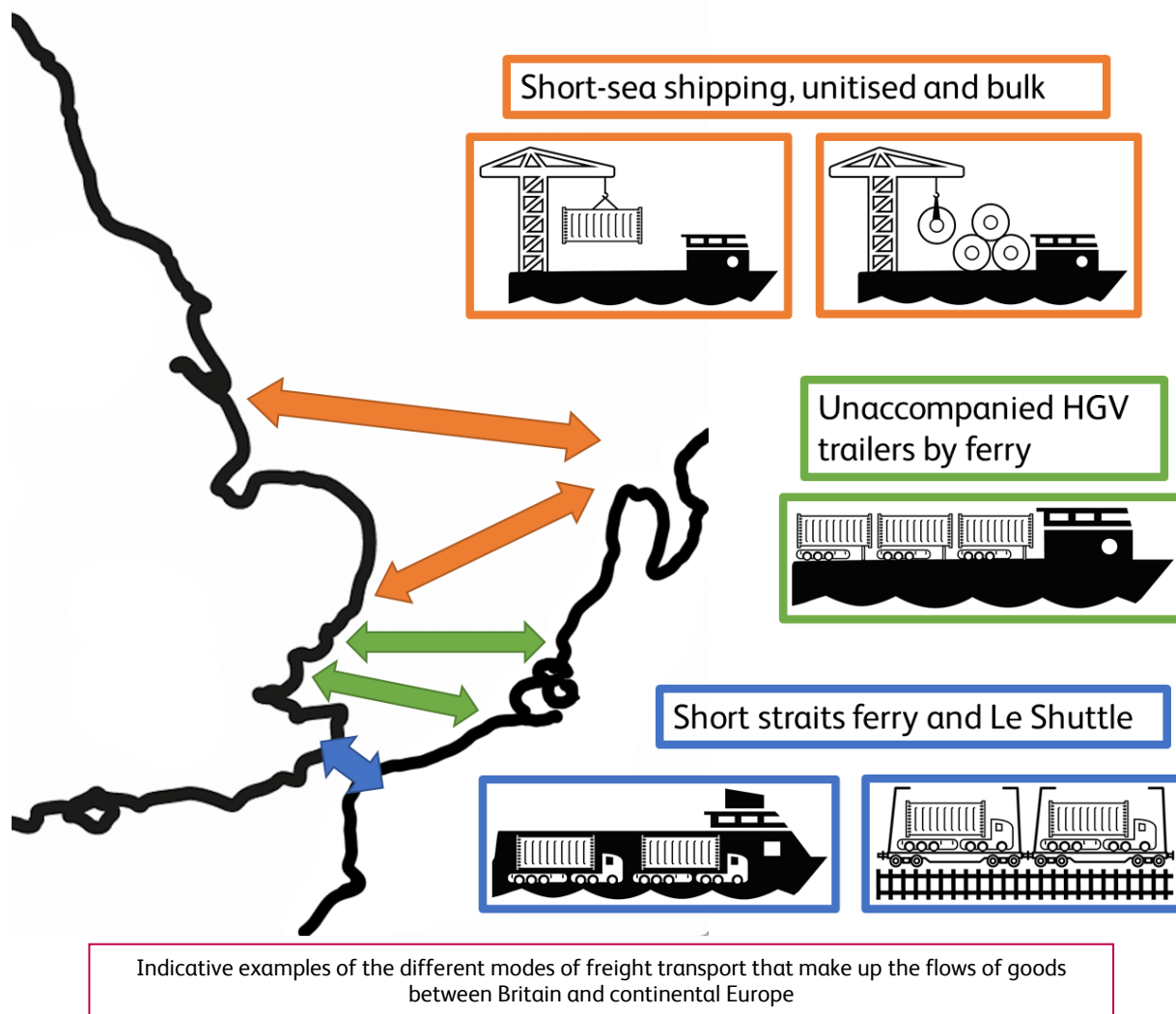
Accompanied ro-ro: HGVs on Le Shuttle Source: freightlink.co.uk



Unaccompanied ro-ro: semi-trailer being unloaded from a ferry by a tug vehicle



Unitised lo-lo short sea shipping Source: abports.co.uk



A combination of factors of reliability, flexibility and cost are responsible for these other modes having achieved predominance over rail freight in the Great Britain-continental Europe market. Past work for the DfT has modelled comparative costs (developed in 2017/18) for international rail services versus road and sea combined journeys, demonstrating that in certain scenarios it can offer a lower door-to-door cost than competitors.

Total cost door-to-door to transport a 45' container between Milan and Daventry ¹⁰	
Accompanied HGV via the Dover Straits (assuming UK domestic haulage rates used in MSRS calculations)	£1,458
Accompanied HGV via the Dover Straits (assuming Eastern European haulier)	£1,331
Rail freight via the Channel Tunnel	£1,018
Reduction in modelled cost – through rail freight vs. accompanied HGV with Eastern European haulier door-to-door	24%

¹⁰ Options for Changes to Revenue Support Freight Grant Schemes, MDS Transmodal for DfT (2019), pp.25-6

Despite this, past disruption from external shocks has affected customer confidence and current limitations prevent more potential end users in the international logistics market turning to Channel Tunnel rail freight to move their goods. The sector often operates on rolling long-term contracts which, once lost, are hard to win back. Rail is not necessarily always more expensive or less reliable than the alternatives, but the overall balance of considerations on which customers make modal choices is too often against it.

Opportunities for growth

However, rail is capable of serving a wide range of commodity sectors that are currently moving between Britain and the continent via other modes. If the right market conditions can be met, there is significant potential for rail freight to expand its volumes both in existing types of service and through expansion into new offers. Whilst the current moment is marked by historically low volumes, there are also a number of signs that point to a window of opportunity for Channel Tunnel rail freight.

Road haulage in Britain has been facing well-publicised challenges, often most visibly manifested through congestion on the road network approaching Dover.¹¹ Increased customs requirements following the UK's departure from the European Union have put pressure on all modes of international freight transport, but rail's ability to carry out checks at inland origin/destination points remains a significant advantage over road and ferry-reliant supply chains. Rising fuel costs have also impacted haulage firms and an ageing population of HGV drivers is a major structural issue that favours rail in the long-term and affects the whole of Europe. Shorter-term measures to address the driver shortage have also added to road operators' costs in recent years.¹²

Recognising the untapped potential of Channel Tunnel rail freight and the opportunity presented by current trends in the wider logistics market, interest in renewed efforts to revive Britain's international rail volumes has been rising across the industry.¹³ Potential new market entrants are working towards launching innovative new intermodal services between continental Europe and Barking, via the tunnel and HS1.¹⁴

Unusually for aspirations to grow rail freight in Britain, network capacity is not a constraint to increasing Channel Tunnel volumes. Many of the reasons for the current inability to better exploit the capacity that is available are market-based. Other known issues are related to infrastructure and rolling stock capability, with these both causing and being compounded by the suppressed market for Channel Tunnel rail freight, as investment to address physical constraints is hampered by low confidence. Consequently, public and private sector stakeholders need to come together to seek and support market-based solutions in the first instance, so that the sector can demonstrate its potential.

¹¹ *Transport Strategy for the South East*, TfSE (June 2020), p.86

¹² 'European road transport prices break new records', [logisticsbusiness.com](https://www.logisticsbusiness.com) (5th August 2022)

¹³ [Does international freight belong on rail? - YouTube](https://www.youtube.com/watch?v=...)

¹⁴ 'London - Cologne intermodal service to launch in September', *International Railway Journal* (21st June 2022)

Historic trends

The current position of Channel Tunnel rail freight is both the result of a long-term pattern of decline and of immediate constraints limiting its ability to reverse this historic trend. In the early years following construction of the tunnel, rail was able to maintain a market share in GB-continental trade that far outstripped what remains today. The Channel Tunnel was built in part on the expectation that it would attract freight business with the ability ‘to send rail freight in the same wagon or container direct from Scotland far into Europe’.¹⁵ British Rail undertook to protect a substantial amount of timetable capacity between Dollands Moor, the freight yard adjacent to the tunnel portal, and Wembley in order to provide for annual volumes of at least 8.1 million tonnes.¹⁶ One stakeholder recalls that in 1997, it was estimated that this could eventually extend to around 20 million tonnes a year.

Early growth

The first train to use the Channel Tunnel in commercial service was an international rail freight service in June 1994.¹⁷ Over the remainder of the century traffic levels grew to what, by today’s standards, was a very substantial level, though not to the full anticipated potential of the infrastructure. Regular bulk and intermodal flows were established, with a range of end customers including household names in the automotive and consumer goods industries. Intermodal traffic was facilitated by the existence of a number of aggregators, organisations that consolidated



An intermodal service from Manchester to Bari, Italy, emerging from the tunnel in northern France in the late 1990s *Source: DB Cargo*

¹⁵ ‘Eurotunnel: Who Benefits?’, Eurotunnel brochure (1987)

¹⁶ Channel Tunnel Usage Contract (29th July 1987), 3.2.1 (i) (a), p.7

¹⁷ <https://www.getlinkgroup.com/en/our-group/history/>

goods from more fragmented markets, where individual consignments are typically smaller, into sufficient volume to fill trains. These were originally arms-length bodies of each of the national railway undertakings of Belgium, France and Great Britain, respectively. Until 2001, rail was helped by a derogation allowing it to convey units up to 44 tonnes, whilst road hauliers were limited to 38 tonnes, in addition to other favourable legislation in a number of continental jurisdictions.

Overall levels of around 3m tonnes per year were achieved by the turn of the millennium, with between fifteen and twenty train movements in each direction daily. This likely amounted to regular use of roughly half of the protected capacity available on the British network, in terms of train movements, demonstrating a well-established market for international rail freight, but with plenty of remaining headroom with which progress towards the original ambitions for the tunnel might have been pursued.

Disruption post-2000

The early years of the twenty-first century then saw a dramatic drop-off in volumes, in the first instance as a consequence of security problems on the French side of the tunnel, where attempts by refugees to use trains as a means to reach the UK caused severe disruption to rail freight operations. Authorities and Eurotunnel struggled to mitigate this issue, with the result that customers turned away from Channel Tunnel freight, the aggregators went into liquidation and a much-reduced traffic base was maintained.

The Channel Tunnel also suffered a series of fires on board HGV shuttle trains during this time, which suspended services for several weeks and caused long periods of single-line working to follow, which also had negative impacts on rail freight. Levels stabilised between 1 and 2 million tonnes a year and over the past two decades traffic has seen some periods of modest growth within that range, only for new challenges to emerge and prevent this from continuing.

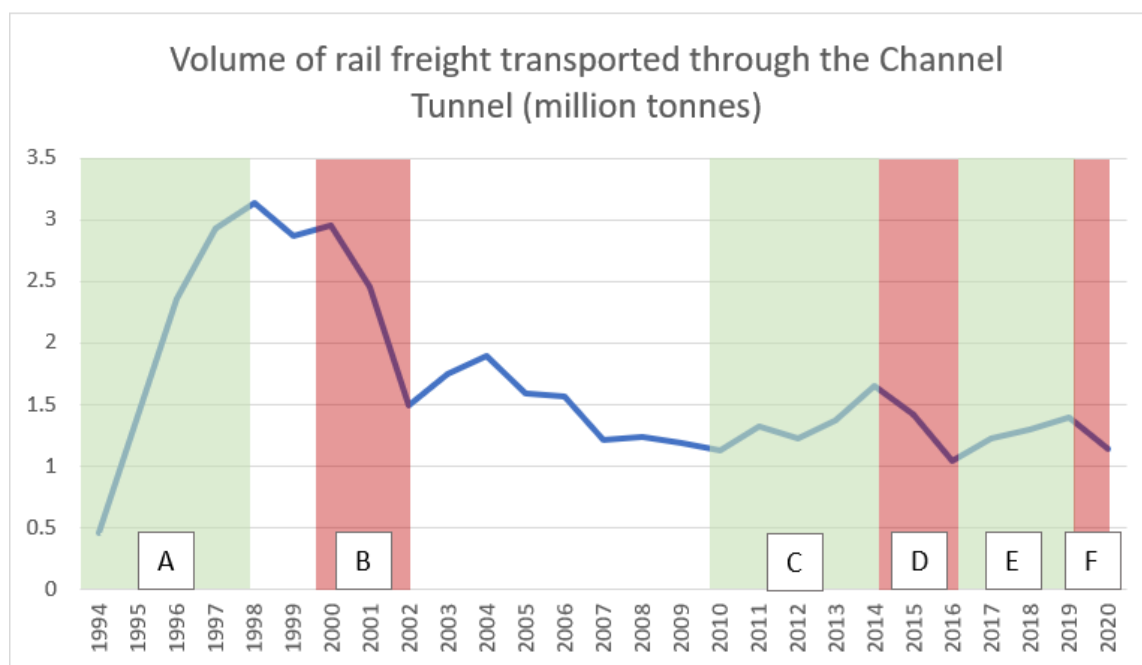
General causes of decline

A range of long-term trends have been generally unfavourable to Channel Tunnel rail freight across this period. The 2000s saw a marked decline in the French domestic rail freight market, where traffic almost halved in the decade to 2013, which had a knock-on effect to the ability to sustain services to and from Britain.¹⁸ Industrial action in France and Italy during this period also affected service quality, as did instances of damage to products during journeys. A general shift of European industry to the East favoured the simpler solution of road haulage of materials and finished products, as opposed to attempting through rail services across multiple countries.

Alternative modes tended to be competitive, offering flexibility and reliability that enabled them to retain their dominant market share, whilst EU expansion enabled Eastern European hauliers to access the market at comparatively low rates. A trend towards the use of larger swap bodies in continental logistics meant that, increasingly, the intermodal units in use would not fit within the loading gauge available on the British network, further cementing losses in the intermodal sector. Customers who had previously shipped goods in S44 units, for example, decided when these became life-expired to switch to S45s, which precluded their movement via the British classic rail network (see Constraints, C4. Loading gauge, p.18). All of these factors combined with the ongoing

¹⁸ 'Summary of SNC-Lavalin Report on Development of Rail Freight Traffic through the Channel Tunnel', SNC-Lavalin (October 2013), p.2; <https://www.getlinkgroup.com/content/uploads/2019/09/SNC-Lavalin-Freight-ExecutiveSummary-UK-281013.pdf>

security issues around Calais to compound the decline in traffic, feeding into a perception that rail freight offered relatively poor service reliability and increasing the barriers to re-entry.



A: Initial growth following opening of the Channel Tunnel

B: First period of significant security issues

C: Introduction of the Eurotunnel Incentive for Capacity Additions

D: Resurgence of security issues following 2015 European refugee crisis

E: New services via HS1, new technology and adoption of digitalisation helped spur growth

F: Coronavirus pandemic and resultant economic downturn. Withdrawal of the United Kingdom from the European Union.

Source: Table TSGB0607 (RAI0108) 'Channel Tunnel: traffic to and from Europe, annual from 1994', DfT, <https://www.gov.uk/government/statistical-data-sets/tsqb06>

2010s: intermittent progress

Some sustained success was achieved in the early 2010s, when, supported by the introduction of the Eurotunnel Incentive for Capacity Additions (ETICA) by the tunnel's operator, train numbers increased by 38% and tonnage by 46% between 2010 and 2014. Incursions onto the rail infrastructure around the French side of the tunnel intensified once again, however, in 2015 as global conflicts drove a considerable rise in migration into and across Europe. Rail freight volumes through the Channel Tunnel again fell back to a little over 1m tonnes a year as operational disruption resulted in the loss of much of the increased traffic that had been built up.

A gradual recovery was achieved over the following years, with the continuation of Eurotunnel's ETICA scheme playing a role in supporting freight and the establishment of new international intermodal services via HS1. Installation of a train scanning machine at the French side of the tunnel and moves towards digitalisation of customs processes also bolstered the security and fluid

movement of freight flows via the Channel Tunnel during this period.¹⁹ In 2019, both train numbers and tonnage grew modestly, in spite of the impact of rail industry strikes that year in France. However, the UK's withdrawal from the EU the following year has affected trade between Britain and continental Europe, whilst the wider economic downturn resulting from the Covid-19 pandemic stripped away the gains of the late 2010s and returned annual volumes to just over 1m tonnes.

Despite this, interest in the untapped potential of international rail freight is still in regular evidence from the wider logistics industry. Examples include the developers of a Strategic Rail Freight Interchange in central Scotland promoting their project with a strong emphasis on rail connectivity with continental Europe.²⁰ The opportunities presented by the Channel Tunnel remain substantial and are recognised by the rail freight sector and many of its customers, as is the need to seize more of those opportunities by addressing the range of constraints responsible for today's low traffic base.



An intermodal freight train running on HS1 from Dollands Moor to Ripple Lane, Barking
Source: *Wayne Walshe*

¹⁹ 2021 Universal Registration Document, Getlink (March 2022), p.23

²⁰ Scotland's largest international multi-modal rail freight park, PD Stirling (2020), <https://mirp.co.uk/wp-content/uploads/2022/06/About-MIRP-Brochure.pdf>

Constraints

There are multiple factors keeping Channel Tunnel rail freight volumes at their current suppressed level. In the long-term, customer confidence has been damaged as a result of the series of historic setbacks described in the previous section, with resulting investment being directed away from rail towards road haulage by supply chains that are making long-term business decisions and setting themselves up with facilities and equipment that will be in use for many years. Once business has been lost to other modes, it is not easily recovered and perceptions of unreliable service delivery are challenging to reverse, for either previous customers or potential new rail freight users. To do so, rail needs to demonstrate its credentials through establishing and building successful new or expanded services, signalling to the market that it can offer a dependable product that can rival the alternatives on cost and efficiency. This will require new approaches to overcome a wide-ranging set of immediate constraints, beginning first and foremost with rail's market competitiveness.

Market

The key challenge for Channel Tunnel rail freight is being able to put together a service offering that meets the requirements of the wider logistics market, offering customers a product and price that will attract their business, whilst generating sufficient revenue to be viable for the operator in the long term. It also needs to demonstrate service quality and reliability throughout, which in the case of international movements requires coordination across multiple operators and infrastructure managers to deliver an end-to-end journey. At present, the rail freight model is lacking elements that could enable it to better align itself to those requirements. The limited number of current Channel Tunnel flows reflects the difficulty rail faces in providing the market with options that stack up commercially for all parties.

C1. Insufficient aggregation of volumes

Rail freight is typically most competitive when moving relatively large volumes of goods over longer distances, because this multiplies the efficiency and economy of scale that a single train can deliver when compared to the many HGVs that would be needed to move the same quantity by road. Whilst this is an advantage, it does mean that to be effective rail requires the consolidation of goods at an appropriate origin point in order to form a viable whole-train service. The GB-continental Europe intermodal market is fragmented in nature, with a large proportion of goods moved being those of smaller producers, importers and exporters, in quantities far less than a train load. Very often a single trailer or swap body will have a single end customer, lending itself more immediately to transport by HGV, unless it can be combined with units from other customers to produce suitable volume for a train.

For this market to be addressable by rail, therefore, aggregation is essential. This is done successfully both in mainland Europe and for domestic intermodal flows within Britain, but the current dearth of companies fulfilling this role for Channel Tunnel rail freight is a key reason for rail's low market share. Past ventures that have done so have struggled to attract sufficient volumes on a consistent basis, given the fragmented nature of the market, where individual end customers are not a source of daily demand. Although there is ample volume crossing to and from Britain, attracting enough of it to rail is made challenging by the diffuse origins of that volume. Previous industry experience suggests that having a larger customer as an anchor tenant, committed to filling an agreed portion of the train, can help mitigate the potential for fluctuating demand from the wider market. Careful analysis of where business risk sits with any new aggregator would be required, however.

C2. The balance of trade between Britain and continental Europe

Britain is a net importer of goods, both in its trade with the rest of Europe and globally. Establishing viable freight services, especially in the intermodal sector, can be difficult when revenue is generated predominantly by trains heading in one direction, with lightly loaded returns a source of unsustainable cost. The impact of Britain's balance of trade applies to all modes of freight transport, but road haulage has lower fixed costs and can drop off imports and collect exports from separate locations in a way that rail cannot. This advantage has lessened with increasing HGV driver wages and fuel costs recently, but with Channel Tunnel rail freight being at a low ebb, the need to combine sufficient export volume with the improved share of imports it aspires to attract is especially pressing.

Possible ways for operators to address this challenge include models that mix global and European trade in goods, since the British deficit with the EU is not as wide as it is with, for instance, China. Existing China to Europe rail services do convey boxes ultimately bound for the UK as far as Germany, but with a short sea leg to Britain then required. Whilst Britain does not by itself produce sufficient volume to back-fill a rail service to China, EU countries with higher industrial output, such as Germany, export significantly more. Multi-legged rail services linking the Far East, the EU and Britain may therefore provide a means to increase the number of revenue-earning movements overall. This is part of how incorporating aggregation into the operation is critical to the prospects of international rail freight.

Operators might also choose to offer a rail service between continental Europe and Britain sold on a round trip basis, mitigating the pressure to find export volume directly. If the overall price is right, customers may be willing to use the return journey simply to move back empty units, but also have the flexibility to utilise it for any exports from Britain they can attract from the market, or to sell their space on the train to others who may have shorter-notice requirement to move a box or trailer. Such an approach is potentially better-suited to the fragmented intermodal market rail is seeking to address than relying on a single operator/aggregator body to fill every train by itself.

C3. Structural changes in specific industries

The market constraints described above primarily affect rail's competitiveness in the intermodal sector, whereas the bulk movement of industrial materials, components or products, a traditional rail freight mainstay, is affected more directly by dynamics within the industries it serves. This is true in general and in particular for international rail freight to and from Britain.

As evidenced by the fact that they make up a majority of current Channel Tunnel services (albeit in simple terms of flows, not numbers of train movements), the automotive and metals industries provide some of the key remaining customers using rail between Britain and continental Europe. However, traffic has been affected by the way major actors in the steel industry have structured their European business, for example, whilst a more general shift of manufacturing activity to the East in recent decades has not had a favourable effect for rail freight.

Whilst to some extent these wider structural factors are beyond the rail freight sector's control, it is important to adapt as best as possible and to continue offering a competitive product to these traditional client industries. Where this hasn't been achieved in recent history, share in the GB-continental Europe market has been lost to alternative modes, leaving rail with the challenge of reviving its stake from what is now a relatively low traffic base.

Infrastructure

The capability of the rail network infrastructure on the British side of the tunnel is a long-recognised constraint to the growth of Channel Tunnel rail freight. Timetable capacity exists for new or additional freight to run via both the classic routes and HS1, but the ability to accommodate such traffic is limited by physical and organisational structures. Stakeholder views within the industry vary in their emphasis on market-based constraints versus others, but few would deny that both play a role. Whilst many see opportunities to develop Channel Tunnel rail freight most immediately through getting the offer right for the market, limits to the success of this approach will eventually be imposed by the infrastructure constraints described below.

C4. Loading gauge

One of the most significant factors in the historic decline of Channel Tunnel rail freight is the restrictive standard of gauge clearance available on the British 'classic' network. Loading gauge throughout Britain is, with few exceptions, substantially tighter than on the majority of European railways and as a result the dimensions of rolling stock and cargo that can safely operate have always been smaller. This reflects the age of the network and the way it was developed, largely in the 19th century by multiple separate companies, with lineside structures built for the steam era unsuited to the needs of modern unitised logistics.

Gauge enhancements were delivered along the classic routes between the Channel Tunnel and London in preparation for the tunnel's opening and this did support the relatively significant volumes of intermodal traffic that operated in the immediately subsequent years. However, a restricted form of W9 clearance, limited on many route sections to only certain specifically stated wagon and box combinations, was all that was provided.



An example of the varying dimensions of different types of intermodal unit, with the larger 'high cube' varieties more challenging to accommodate on gauge constrained rail routes. Source: cratexcontainer.com

Freight business is expected to be attracted by the existence of the Eurotunnel System. It will be possible to send rail freight in the same wagon or container direct from Scotland far into Europe. The savings in time for freight carried by through trains using the tunnel, as compared with current journey times for rail freight travelling by sea, are expected, in many cases, to be significant. It is expected, for example, that cross-Channel container movement should take at least 24 hours less than the current best rail and sea based time of three days for the journey between Britain and northern France or Belgium.

At the same time, road hauliers will be attracted by the flexibility of a cross-Channel service that is open day and night, less vulnerable to bad weather and needs no booking.

European road and rail networks linked by the Eurotunnel System.

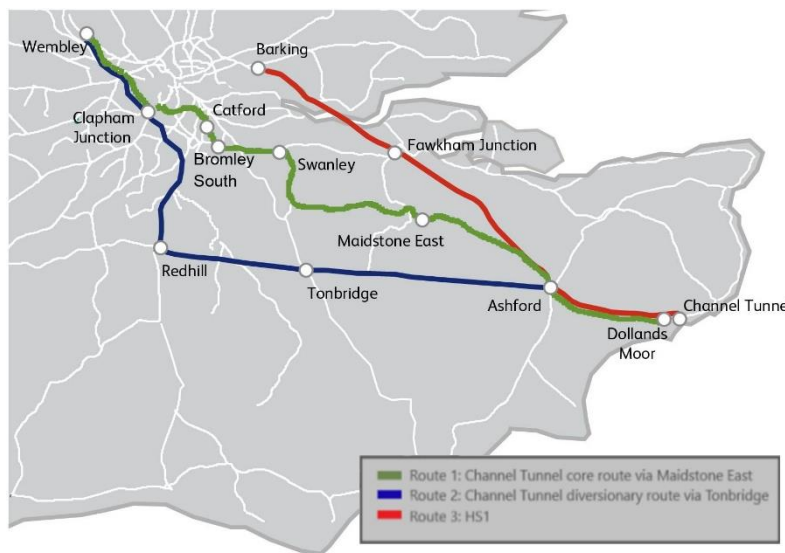
Promotional material released prior to the tunnel's completion, illustrating the network of possible freight routes envisaged. This was only possible for intermodal trains in the days when smaller units, which could fit within British loading gauge, were in use.

This was just enough to enable these routes to accommodate the forms of intermodal equipment in use at the time, with boxes typically being up to 9' 1" in height, but the trend in the wider European market since has been towards the use of larger swap bodies, now predominantly of the S45 type.²¹ This has left the classic routes through Kent, Surrey and London incompatible, with flows that once used rail via the tunnel relying on alternative modes. W9a gauge clearance, which allows S45 swap bodies to run if lower platform wagons are used, has recently been achieved on the West Coast Main Line between London and Scotland, an improvement of modest increment that is

²¹ *Channel Tunnel: 25 Years of Experience*, David Haydock (Platform 5 Publishing, 2020), p.109

nonetheless of significant benefit to domestic intermodal operations. The lesser capability of the Channel Tunnel classic routes, which are limited to a restricted form of W9 only, prevents such services operating between Wembley (on the WCML) and the tunnel. As a result, there are currently no fully intermodal freight services operating via the classic routes.

The introduction of HS1, built to a continental gauge standard, opened up significant new opportunities for through running of larger wagon and box combinations from the tunnel into Britain. However, this extends only as far as the Eurohub terminal at Barking, meaning that services operating with continental wagons must transfer their units either to British gauge wagons to proceed by rail or onto HGVs, in order to reach the rest of the country. In both cases (though only the road option is used at present), this adds time, cost and operational challenge. Industry stakeholders believe there are numerous potential customers in other parts of Britain who could be interested in using international rail freight for their intermodal needs, if they could be reached directly by a single train from the Channel Tunnel.



The Channel Tunnel 'classic' routes and High Speed 1

Although the use of British gauge wagons on HS1 would offer an apparent way to enable this technically, acceptance and availability issues mean this is not a straightforward solution to implement (see C7. Wagon availability, p.24).



A piggyback intermodal service carrying unaccompanied semi-trailers
Source: www.cargobeamer.com

It is also commonplace in continental logistics for intermodal trains to convey unaccompanied HGV trailers in wagons specially designed for this purpose. This capability is a significant part of the rail freight offer that is missing from the Channel Tunnel and British network currently. One operator provides this service through France as far as Calais, at which point the trailers have to be unloaded from their wagons and, if bound for Britain, taken forward by other means.²² This gap in interoperability reduces the benefits that rail offers by being able to move multiple trailers over long distances without tying up lorry drivers on trunk journeys. Another potential market entrant is considering a service that would include 'piggybacking'

²² <https://www.cargobeamer.com/network.html>

trailers through the tunnel and via HS1, which would be a welcome addition to the capability of continuous international rail freight.²³

C5. HS1 access

The HS1 route is free of the physical loading gauge constraints that prevent intermodal flows using the classic routes, but the availability of a modern, continental-gauge routeing option, on which freight operators are charged only marginal costs for access, has not stimulated renewed Channel Tunnel rail volumes to any great extent. In addition to only being able to reach Barking when using their preferred continental wagons, there are a range of other factors that reduce the attractiveness of using HS1 for operators due to perceptions of cost and risk.

HS1 Ltd. receive no network grant from the Government. The cost of using HS1 is sometimes cited as a deterrent to more freight use and access charges in general are typically higher for this

The High Speed 1 Concession

HS1 Ltd. is the concession holder for the HS1 route, legally the Channel Tunnel Rail Link. The concession began in 2010 and is due to run until 2040, after which ownership reverts to the Government. Operations and maintenance of the HS1 infrastructure are delivered under contract by Network Rail (High Speed).

The HS1 Network Statement is incorporated into the Concession Agreement between the Secretary of State for Transport and HS1 Ltd., as an Appendix to Schedule 3 of the agreement. The original 2006 version of the Network Statement states that ‘as per Rail Regulations 2005... HS1 has been declared as Specialised Infrastructure. The effect of such declaration is that the HS1 infrastructure is designated for use by specified types of rail service... and NR(CTRL) may give priority to that specified type of rail service in the allocation of infrastructure capacity. The priorities will be as follows, with the designated types of trains taking precedence in the following order:

- High speed international passenger trains
- High speed domestic passenger trains
- High speed freight trains
- Other trains’

This order of priority remains in force within the 2023 version of the HS1 Network Statement.

The Performance Scheme applied on HS1 is also set out within the Network Statement and Concession Agreement and ‘is designed to keep delay to a minimum for all users’. The 2023 Network Statement states that ‘Regulation 16 of the Rail Regulations 2016 provides that an infrastructure manager must establish a performance regime as part of the charging system to encourage railway undertakings and the infrastructure manager to minimise disruption and improve the performance of the railway network. The Infrastructure Manager has developed a performance regime which is incorporated in the relevant Framework Track Access Agreement or Track Access Agreement.’

²³ ‘London - Cologne intermodal service to launch in September’, International Railway Journal (21st June 2022)

premium route, since it is managed entirely without public subsidy, than on the classic network.²⁴ However, HS1 Ltd. applies Operations, Maintenance and Renewal (OMR) charges to freight only on the basis of recovering the costs directly incurred as a result of operating freight trains, whereas passenger operators are also subject to other costs.²⁵ Whilst access charges on both HS1 and for use of the Channel Tunnel are high in relative terms, they do not absolutely prevent freight from operating, as the existing flow indicates.

Should a freight train cause delay to a Eurostar service, though, it will incur charges of up to £886 a minute (£709.30 base rate, £177.32 bonus rate) in compensation to the affected operator, as established by the Performance Scheme (see The High Speed 1 Concession).²⁶ Lower rates are charged for delays to Southeastern High Speed services of approx. £120/minute.²⁷ Whilst there technically is spare capacity that could allow freight trains to be pathed during the day (potentially facilitated by use of the freight loops that were built on the line for this purpose), the risk associated with any operational incident impacting other traffic means that operators of the limited amount of freight that does run via HS1 choose to simply avoid passenger services by running overnight. Engineering access requirements mean that in practice freight movements are undertaken during the early morning or late in the evening.

The allocation of capacity on HS1 also follows a distinct regime, laid out in the Concession Agreement (see above). FOCs regularly highlight the importance of being able to provide certainty to their domestic customers, not least by securing firm access rights that give them confidence they will be able to continue to operate the service they have contracted for, for a duration that offers security. This enables them to commit to



An early-morning freight train from Dollands Moor to Barking on HS1
Source: Jamie Squibbs, www.jamiesquibbs.co.uk

taking on new business and making investments to support the growth of rail freight within Britain. On HS1, by contrast, no freight operator has ever submitted a request for firm access rights. For services using the HS1 route, the following ‘Order of Priority in the allocation of capacity’ is applied:

²⁴ DB Cargo response to ‘Five Year Asset Management Statement for Control Period 3’ issued by HS1 Ltd. (April 2019), <https://highspeed1.co.uk/media/5wchllfi/dbc-response-rv.pdf>

²⁵ 2023 HS1 Network Statement, HS1 Ltd. (April 2022), p.53

²⁶ Framework Track Access Agreement for Passenger Services between HS1 Ltd. and Eurostar International Ltd. (2020), p.21, <https://highspeed1.co.uk/media/0bgdnxj/hs1-eil-amended-and-restated-ftaa-7th-supplemental.pdf>

²⁷ Framework Track Access Agreement for Passenger Services between HS1 Ltd. and London & South Eastern Railway Ltd. (2020), p.16, <https://highspeed1.co.uk/media/wmcp5ym5/hs1-lser-5th-supplemental-ftaa.pdf>

- a) first, high speed international passenger trains (trains crossing more borders take priority);
- b) second, high speed domestic passenger trains;
- c) and third, other trains.²⁸

This leaves freight at the bottom of the formal hierarchy when capacity allocation decisions are made concerning paths on HS1. If FOCs did request and secure firm rights, this would not offer certainty of their continued access to slots in the timetable in the way it does on the national rail network. Passenger operators are prioritised on HS1 by requirement of the Concession Agreement and in recognition of the fact that they pay more than marginal costs for access to the route.

C6. Terminal capacity

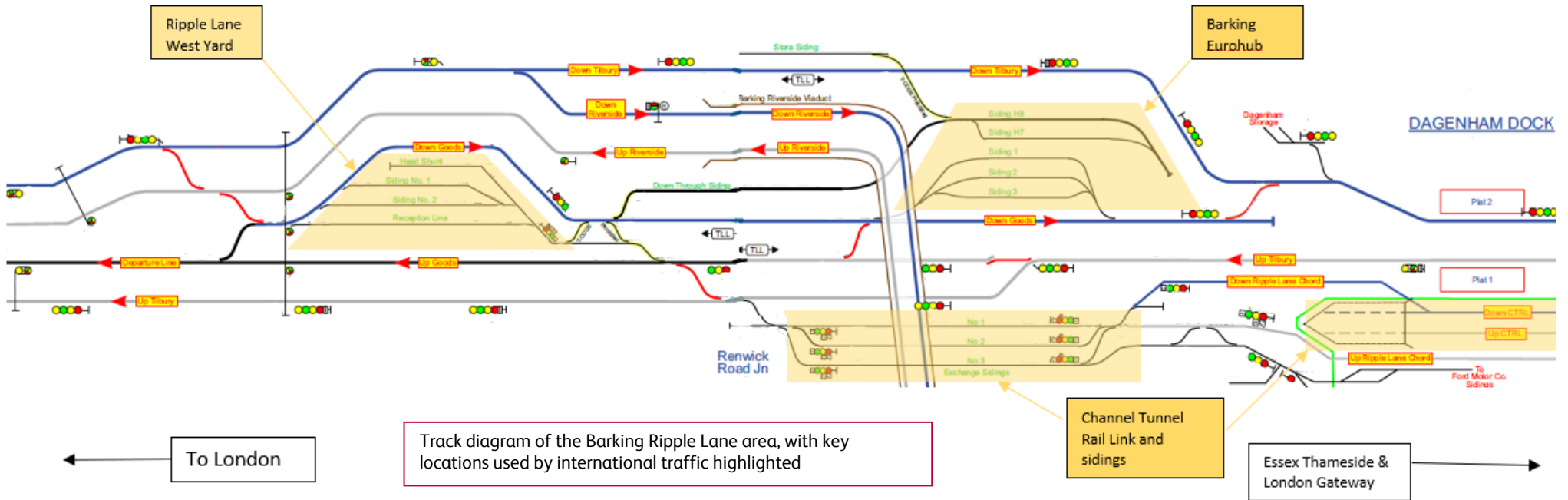
For international rail freight via HS1, the capacity of Barking Eurohub is a potential constraint to growth. The layout of the terminal and the associated infrastructure that trains must use to access it imposes the need for complex shunting arrangements involving the splitting and joining of trains, as they are unloaded and loaded in portions. The Channel Tunnel Rail Link (CTRL) Exchange Sidings, into which trains immediately arrive from HS1, are a slightly sub-optimal length at just over 750m, with 775m the established industry standard for intermodal trains. They also comprise only three roads, one of which is kept clear continuously, and provide access for domestic freight trains to a construction materials terminal and the Ford automotive plant via connections at their eastern end. There is therefore limited flexibility afforded for any splitting and joining of trains that has to be undertaken within the Exchange Sidings, as well as limited capacity for the stabling of wagon sets between journeys, which is typically required as trains run up HS1 in the early hours of the morning, returning to Dollands Moor late in the evening following the end of passenger services for the day.

Trains for the Eurohub must be shunted in sections from the Exchange Sidings to Ripple Lane West Yard, before propelling into the terminal at 3mph. Within Ripple Lane West Yard, only siding no. 2 and the headshunt are cleared to continental gauge for the use of international traffic and these roads are also length-constrained, with siding no. 2 the longest at a little over 460m.²⁹ These operations require a switch to a diesel locomotive after arrival in the Exchange Sidings, as the shunt moves are via unelectrified lines, which adds further complexity to the operation and ties up an asset that could be utilised on main line operations. This unwieldy operation is compounded by the limited arrival and departure windows dictated by overnight running on HS1.

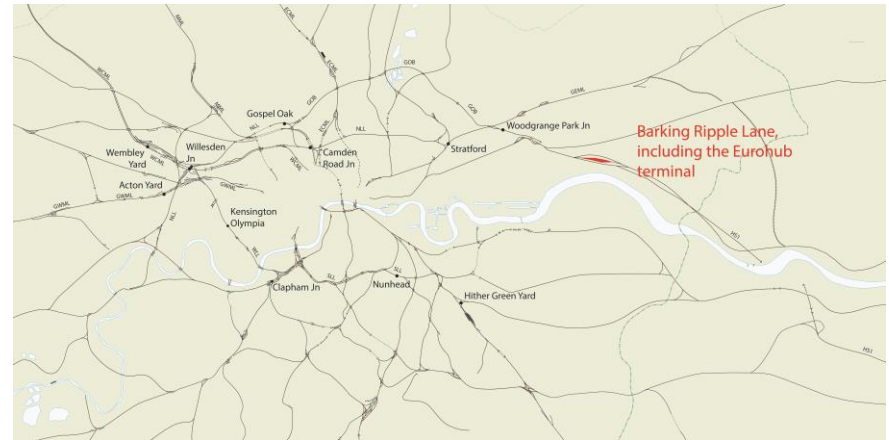
Whilst Barking Eurohub is currently used only three times a week, new aspirant operators are developing plans to introduce further services and there is limited spare capacity before the terminal itself eventually becomes a constraint to growth. Likewise, both the Exchange Sidings and Ripple Lane West Yard are used by movements of domestic freight and as such can offer only so much capacity for international traffic. Should the proposed Ripple Lane Nodal Yard scheme (see p.42) be delivered, the improved capability of the facility will see it utilised by many more freight trains serving the various terminals along the Essex Thameside. This would further increase the need for shunt moves of international trains to be conducted with greater efficiency in order to be accommodated alongside domestic flows (though the enhancement of the yard would itself also serve to facilitate this).

²⁸ 2023 HS1 Network Statement, HS1 Ltd. (April 2022), p.37

²⁹ Timetable Planning Rules: Anglia, 2023 Timetable, Version 4.0, Network Rail, <https://www.networkrail.co.uk/industry-and-commercial/information-for-operators/operational-rules/>



View of Barking Eurohub looking east, with the terminal to the left of the image and the CTRL Exchange Sidings to the right
Source: Network Rail



Location of Barking Ripple Lane within the Greater London area, with major orbital and radial routes used by freight and key locations indicated

Rolling stock

There is an awareness within the industry that the current supply of suitable rail freight vehicles is not sufficient for a rapid and substantial increase in Channel Tunnel traffic levels, even if the immediate market-based challenges can be overcome. Wagon availability and technical issues with locomotives, in combination with the infrastructure constraints described above, place limits on what could actually be operated using the rolling stock available to FOCs today. Those limits are still likely to equate to something above the historically low volumes running, so, as with infrastructure, rolling stock constraints do not prevent short-term gains being made into specific areas of the potential Channel Tunnel market, but if rail is to grow in the longer term, addressing them will become increasingly necessary.

C7. Wagon availability

A number of the market opportunities for Channel Tunnel rail freight are in the form of traffic types that require specialised wagons, either for loading gauge reasons or due to the nature of the cargo. Given the decline of the market over time, numbers of such vehicles have dwindled within the British rail freight market, as retention or procurement of fleet cannot be justified without demand to support its utilisation.

Several of the Channel Tunnel flows that do still run make use of specific wagon types that are suited specifically to the goods they carry. The France-Daventry bottled water train uses 'cargowagon' vehicles, a more traditional form of general merchandise freight wagon with sliding side doors, through which goods are directly loaded and unloaded (in contrast to intermodal systems where goods are put into a separate unit that is itself loaded on and off of a flat deck wagon). Cargowagons are well-suited to heavy ambient consumer goods products, as more efficient loading



Cargowagons being hauled on the classic network through South London *Source: Wikimedia Commons*

capability enables them to accommodate greater tonnage per vehicle than if intermodal units were used. They are also much less sensitive to loading gauge constraints, being rail-specific vehicles built to work on the British network, unlike the square-topped swap bodies favoured by continental intermodal operations. However, loading them with a dense, heavy product like bottled water puts them at the limit of their technical capability. Track geometry issues mean they are limited to 60mph while in Britain, despite being permitted to run at 125kph in France and through the tunnel. Most significantly from a future growth perspective, their numbers are limited and production of new cargowagons would be a major investment.

Similarly, automotive rail freight requires wagons designed for the haulage of finished vehicles and given their specialised nature, the majority of those suitable for use on the British network are already in regular use. The trend towards production of larger cars over the past decade has also created a challenge for rail, making it harder to accommodate them inside car-carrier wagons that themselves need to fit within the often-restrictive loading gauge of the British railway. Whilst



Refurbished car-carrying wagons. An enclosed top deck would help protect the valuable cargo, but would mean a larger wagon and therefore a gauging challenge
 Source: Network Rail

customers may prefer fully enclosed wagons to be used, affording greater protection to their products, the gauging challenge is greater when doing so. The recently introduced Toton-Valenciennes flow required an investment of £3m to refurbish and modify previously mothballed wagons to take wider and taller cars, demonstrating both that realising new rail traffic in traditional Channel Tunnel markets is possible, but also that doing so comes with challenges.

Finally, the longer-term ambition to exploit HS1 capacity for the movement of express logistics by rail will also need to address the lack of existing suitable rolling stock if it is to become a reality. Work produced so far on the concept suggests this could be achieved using adapted passenger trains in the initial phase, before introducing bespoke new stock as the market

matures, but this proposal remains relatively undeveloped at present.³⁰

As well as commodity-specific wagons, availability concerns also apply to the various kinds of flat wagon that will be needed for Channel Tunnel rail freight to grow in the intermodal sector. This links closely to the loading gauge challenges discussed in the previous section and the specific wagon and box combinations that might need to be used. As the overall pool of wagons on the continent is much larger than the British fleet, any new operators using HS1 are likely to prefer to use continental wagons to reach Barking. Although using British gauge wagons throughout might theoretically offer a way to operate beyond Barking without the need to stop and switch onto them, running British intermodal wagons is not generally favoured as it ties up scarce assets that could be in use for multiple revenue-earning domestic trips in the time that would be taken on an international journey.



IKA megafret wagons have platforms that are lower to the track. These wagons are used to carry 'high cube' boxes, including wider refrigerated units, on the W9a gauge cleared network, where width clearance, but not height, has been achieved.
 Source: Dan Adkins

In addition, using British gauge intermodal wagons on HS1 would deplete further the available fleet that might be needed should any flows via the classic routes be revived in future. The

³⁰ *European Express Freight: A Carbon-neutral Solution in Plain Sight*, Transport Intelligence for SNCF Réseau and HS1 Ltd. (2021), p.24

challenge with wagons is also pertinent to aspirations to enhance the loading gauge of the classic routes, especially when considering incremental options in the shorter term. Stakeholders have noted that for W9a clearance to be beneficial, a sufficient supply of IKA ‘megafret’ wagons would need to be found so that the opportunity to convey S45 swap bodies can be realised.

C8. Train weight restriction on HS1

Freight train weights (and by proxy, lengths) on HS1 are currently restricted by an issue with the interface between locomotives, the signalling system and the topography of the line. Gradients on HS1 limit the operable trailing weight of single-loco-hauled trains to 1100t, which in turn restricts the number of wagons they can haul, despite the fact that class 92 locomotives, which were developed specifically for cross-channel traffic, are among the most powerful ever used on the British network.

Within the British fleet, the only locomotives able to run under fully signalled conditions on HS1 are the sixteen class 92s that are fitted with TVM-430 signalling equipment, so alternative forms of traction are not an option, even if vehicles capable of pulling a higher tonnage at an acceptable level of performance could be found. The TVM system is in place on HS1 to align with the French high-speed lines used by Eurostar trains and although the European railways have a long-term aim of converting their respective national signalling systems to a single consistent European Train Control System (ETCS), this is a substantial undertaking expected to be at least a decade away, including a transitional period using both systems in combination. HS1 conversion to ETCS is not considered a realistic prospect for some years, hence freight traction is only available from the TVM-equipped class 92s.



An example of the challenging gradients on HS1, as a freight train climbs away from Dollands Moor yard
Source: Richard Dyke

Using the power from two locomotives at the front of a train, known as 'double-heading', is the only realistic way to increase the weight that can operate over the gradients on HS1, but it is not possible to do so with class 92s in their current configuration. When working in multiple, with a single driver, the power of one locomotive is distributed across both locomotives so that the overall power draw is no greater than with a single locomotive hauling the train. However, both the signalling and configuration of the locomotives for HS1 are incompatible with two locomotives being driven in tandem.

Current HS1 freight services arrive at Dollands Moor yard from the continent and are planned to split to proceed as two separate trains between there and Barking, due to this constraint. For a single driver in the front cab of the leading loco to be able to provide sufficient tractive effort from both locomotives, a technical fix is required for the Class 92 locomotives that are in use on HS1 and through the Channel Tunnel. This solution has been identified but its implementation is at present unfunded, meaning that the 1100t trailing weight restriction remains in force.



A rare instance of daytime freight on HS1 – trains occasionally return to Dollands Moor during the day when delayed from their early-morning slot. There are two class 92s at the head of this train, but only the first has a raised pantograph drawing power.

Source: Wayne Walshe

Market Opportunities

The core aim of this document is to provide industry stakeholders, decision-makers, funders and investors with an understanding of what growth in Channel Tunnel rail freight would actually look like, in terms of flows and markets. By making the aspiration to move more freight on rail via the tunnel less abstract, it seeks to make a more compelling case for the longer-term support that will ultimately be needed to generate sustained growth. This section defines five distinct ‘techniques’ of new or expanded rail freight flow that could realistically be expected to use the Channel Tunnel, with the right conditions and support going forwards, as well as one related opportunity to facilitate domestic rail freight growth. These include opportunities that would constitute ‘more of the same’ in regard to some of the currently operating flows, some that would share similarities with some of today’s traffic but incorporate new developments to their model and others that would represent something entirely new in Channel Tunnel rail freight.

M1. Continental style intermodal

This is arguably the area of most immediate opportunity for Channel Tunnel rail freight, as it simply involves extending the intermodal rail freight model that is the norm throughout much of Europe to operate through the tunnel and up to Barking via HS1. A competitive offer to the intermodal market would allow rail to take a greater share of the wide range of flows of consumer goods and their constituent materials that move between Britain and continental Europe. Large volumes of food and drink, pharmaceuticals, electronics and homeware, as well as plastics, paper and wood feature in cross-channel trade. The small proportion currently moved by rail, however, stands in contrast to the more significant role played by rail in continental supply chains for these types of goods.

Whilst the introduction of such services to and from Britain is not without its challenges, it should be achievable without the need for any significant new infrastructure or rolling stock interventions in the short term. Running additional intermodal services using continental wagons would more fully exploit the capacity and capability originally provided by the construction of HS1. The



A continental intermodal train carrying semi-trailers
Source: combined-transport.eu

industry is currently watching with anticipation as potential new market entrants develop service offerings on exactly this basis.³¹ These are aiming to introduce trains capable of carrying not only the standard swap body types in use on the continent (up to the 10'6" high S75 profile), but also piggyback unaccompanied HGV trailers, which have only previously been seen on the British railways as part of limited trial runs.³²



A continental intermodal train carrying swap bodies Source: *freefoto.com*

Key to the viability of this model is being able to address the need for aggregation of volume. Running between Barking and established hub locations within mainland Europe that are themselves fed by multiple other connections from around the continent can enable the British market to meet the aggregation challenge by plugging into the existing European intermodal rail network, which saw 11 % traffic growth in 2021, to access multiple other markets within Europe and beyond.³³ The accommodation of unaccompanied trailers is a further strength, as the ability to free up precious driver and trailer resource through the use of rail trunking is an asset to logistics customers.

Although the inability to run beyond Barking with continental wagons is a constraint, Barking is itself well-positioned for onward road distribution both regionally and nationally, given its proximity to other major logistics facilities along the Essex Thameside and to the motorway network via the M25 London ring, with rail having brought units beyond the congestion pinch points on the road network in Kent and the Dartford Crossing over the Thames. Some stakeholders also believe that transshipment of units to British gauge wagons at Barking may become worthwhile for some flows in future, despite the penalties this imposes, such is the potential demand from the wider country.

Realisation of flows using this technique would allow rail to gain share from the substantial market in unitised trade between Britain and continental Europe, which is currently heavily dominated by various forms of road, sea and accompanied shuttle train freight transport. Intermodal units are used to ship an extremely wide range of products, including food and drink, clothing, electricals and industrial components. An increased role for rail in these supply chains will deliver benefits through decarbonisation, decongestion and reduced noise and safety risk, relieving pressure on the road haulage industry and South East England's road network in the process.

M2. Classic route intermodal

This opportunity envisages a revival of the sort of consumer goods flows that ran successfully for a number of years following the construction of the Channel Tunnel and prior to the introduction of HS1, directly between locations across Europe and others across Britain. This traffic disappeared from the railway as a result of general service quality issues, as well as customers on the continent having progressively moved to the use of larger intermodal units that cannot fit within the loading

³¹ 'London - Cologne intermodal service to launch in September', International Railway Journal (21st June 2022)

³² *Channel Tunnel: 25 Years of Experience*, David Haydock (Platform 5 Publishing, 2020), p.120

³³ 'European Combined Transport in 2021 grew by almost 11 %', UIRR Press Release (23rd May 2022)



An intermodal train passing through Bromley en route to the Channel Tunnel in 1998
Source: DB Cargo

gauge of the classic routes. For example, there were once 5-6 trains per day running between Italy and Britain carrying a range of products still imported and exported today, but as the S45 swap body came into favour with end customers, they simply switched to road haulage. The opportunity for this technique lies in the fact that the volume being sought still exists and it is primarily a proposition to restore to rail what it formerly had, without necessarily needing a radically new offer to the market in general.

This is, however, the form of prospective traffic that is most reliant on capital-intensive network enhancements, in the form of gauge clearance on the classic routes. It is therefore likely to be a longer-term opportunity, but is nonetheless a key part of the aspirational outlook for the industry. Stakeholder views vary as to whether classic route intermodal ought to be a priority, given the more readily exploitable opportunities presented by HS1, but this does not have to be an either/or choice. Continental style intermodal may be more likely to generate new Channel Tunnel rail freight volume in the nearer-term, but there will be market segments and customers who may be less suited to the offer of a premium service that features relatively high track access costs and is constrained to a single destination point within Britain.

There is a long-term role for classic route intermodal in providing a rail option to customers whose needs are different, in the form of lower-cost, higher journey time services that can afford to commit British gauge wagons to lengthy continental round trips in exchange for ample protected capacity and the flexibility to directly access a wider range of destinations. Proponents of this technique point to the fact that it is a model that has worked in the past, scuppered not by lack of

demand but by the incompatibility of the British network with modern equipment. If that incompatibility can be addressed through gauge clearance, it is logical to expect that rail would win back a share of its former traffic, with the gains made likely to be in proportion to the extent of enhancement delivered. Initial clearance to W9a standard would open up the market for S45 swap bodies, the favoured unit type of large swathes of continental logistics, albeit requiring the use of low platform wagons. The ultimate aspiration of W12 would enable S45s to be conveyed on standard height platforms, such as those of 'multifret' wagons, further strengthening rail's offer by aligning capability to both the unit loads most used by end customers and the rolling stock most available to FOCs. W12 would also offer opportunities for bespoke combinations to accommodate even larger swap bodies on low platform wagons.

M3. Heavy ambient product – consumer goods

This form of traffic is currently solely exemplified by the Publier/Riom-Daventry bottled water service, but as a technique it has always had a number of strengths that suggest adding to that single flow should be an element to the industry's ambitions. Flows applying this model convey goods that in the freight sector more broadly tend to be loaded into intermodal units. The use of traditional rail freight vans, fixed body vehicles known as cargowagons, into which palletised products are directly loaded, allows rail to address the intermodal market whilst avoiding the key constraints affecting classic route intermodal. Cargowagons are built with rounded roofs to fit within British gauge down to the lowest standard of W6, so can go anywhere without the need for infrastructure interventions to clear their way. They also offer loading efficiencies over swap



The Publier/Riom-Daventry bottled water running through Kent in 2020

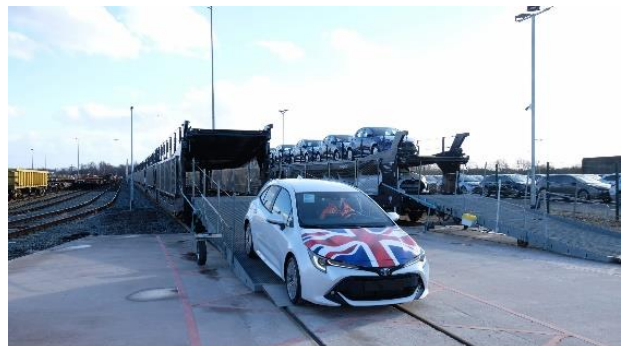
Source: *Jamie Squibbs*, www.jamiesquibbs.co.uk

bodies, with a carrying capacity of 55t per wagon compared to the 28t that can be accommodated inside an intermodal unit. As a result, past attempts to switch the bottled water flow to a unitised rail operation have proved unsuccessful.

This technique requires services to operate between locations where the direct loading of goods in and out of vans can be undertaken, so consequently it is best suited to operating entire trains on behalf of a single customer who can provide sufficient regular demand to justify a rail service. This means access to rail-connected manufacturing and production sites, as with the Publier bottling plant, is typically a critical element to making the model work. This requirement does limit the range of applications for cargowagon trains, as they are not able to access the wider market by aggregating volume in the way successful intermodal operations can. Even single customers moving train load volumes may not wish to consider this technique, if they are already using swap bodies within their wider supply chain. However, with the right customer and conditions they have clear advantages over intermodal and as such ought to be considered among the opportunities to encourage growth in Channel Tunnel rail freight. The key constraint they face is wagon availability, with upfront cost for new vehicles a clear barrier to entry. For this to be overcome, suitable flows and customers need to be identified and attracted to rail with sufficient confidence to invest in rolling stock. Initial growth in the wider consumer goods sector, in the form of intermodal flows, may help provide this by demonstrating the viability of Channel Tunnel rail freight in general.

M4. Ambient product – industrial materials/products

Similarly to consumer goods, the Channel Tunnel has historically been suited to serving industrial customers who require the international movement of their materials, components and finished products. Although at a relative low point today, the traffic base retains examples of these flows from the metals industry and has in the past year added a new flow of finished vehicles to revive its traditional association with the automotive sector. This segment of the market is otherwise largely reliant on short-sea shipping, which while currently dominant has disadvantages in terms of the amount of handling required en route and risk of exposure to the elements. Steel coil, for instance, has to be tightly wrapped to travel by ship, whilst damage to new cars in transit is a major concern no matter what mode they are distributed by. Rail can offer the movement of product between fixed points within countries, without transshipment at ports and in enclosed wagons.



The recently introduced import/export finished vehicles service at Toton, Nottinghamshire
Source: media.toyota.co.uk

This technique again has the benefit of being able to use rail vehicles that are not constrained by British loading gauge, as well as optimised tonnage per wagon due to direct loading. There are also good opportunities to maximise revenue with each-way loading, which the current Ditton-Neuss metals flow and Toton-Valenciennes automotive flow both successfully achieve. Direct connections to industrial facilities and specialised wagons are a requirement that can represent prohibitive upfront cost, but this is a barrier that has been successfully negotiated in the past and recently, when the right combination of customer and rail service offer can be developed. British gauge wagon availability for finished vehicles can also be a challenge, though international flows



The Ditton-Neuss aluminium and automotive components train, at Calais Fréthun in 2019
Source: DB Cargo

could choose to run via HS1 using continental sized car carriers, with the benefit for import volumes of accessing the substantial South East market through Barking.

Traffic has declined over time due to structural changes in European industrial organisation, as well as the challenges that have impeded Channel Tunnel rail freight generally over the past twenty years. However, Britain still has an extensive automotive manufacturing base, which includes companies that are long-standing customers of rail freight, and the relatively recent launch of the Toton-Valenciennes service was a welcome vote of confidence in rail from a major producer. There were 3/4 finished vehicles trains per day via the tunnel in the late 90s, with steel coil for use in automotive production also a former mainstay, so this technique like others remains an opportunity to re-establish for rail a market share that it formerly held. Movements from the steel producing areas of South Wales to the continent, for example, could quite conceivably be served by rail if the sector can successfully market itself to more potential customers.

M5. High-speed express freight

A further opportunity, in the form of an entirely new service proposal for the Channel Tunnel and HS1, is for the introduction of high-speed express freight services carrying smaller, discrete, time-sensitive goods such as parcels, pharmaceuticals, spare parts and high-value consumer goods. This would compete with segments of the road freight market, but also, uniquely to this potential technique, with air freight. It would have the advantage of operating trains that can match the performance of existing high-speed passenger services, thereby substantially reducing the pathing



A TGV 'La Poste' high-speed postal train at St Pancras, during a 2012 trial event *Source: Phil Marsh*

challenges and performance risk that deter conventional heavy freight use of HS1 during passenger service hours.

Recent work for HS1 and SNCF envisages a high-speed rail freight network for Europe, inclusive of an arm linking Britain to a central hub in Paris. It presents an assessment of the existing target market and a concept for a phased rail market development process, which the authors conclude could in the long-term reasonably enjoy a 25% share of international line-haul and hub activities within European express freight.³⁴ Although still at the conceptual stage, the opportunity for this new type of

international rail freight is clear and merits continued pursuit. The key challenges lie in successfully attracting business from what are already highly mature established road and air freight sectors, as well as the current lack of rolling stock with which to operate high-speed express freight services.

M6. Domestic freight

Paradoxically, since it is not international freight, there is a final distinct opportunity for rail freight that could potentially be unlocked through actions relating to the Channel Tunnel. A significant amount of timetable capacity on the classic routes between the tunnel and London is reserved for the use of international freight trains, but most of this is currently unutilised. This limits the number of domestic services, both freight and passenger, that can use those lines, without at present generating any benefits in return. The protected paths are a long-term asset that mean that if the other constraints to Channel Tunnel freight via the classic routes can be addressed, capacity is readily available for revived international flows. In the mean-time, however, it may be worth exploring a strictly limited re-purposing of a small number of paths, where there are clear and credible aspirations to unlock frustrated demand for domestic freight services.

These could in theory realise growth in any of the established rail freight commodity sectors in Britain, though the likely candidates would be construction materials or intermodal, as the two leading markets at present. Construction materials are the prevalent form of rail freight flow to the south-east of London at present, so there are likely to be opportunities to make use of any released capacity by serving that sector. In contrast, intermodal is today conspicuously absent from that part of the country, therefore the use of released capacity might be tailored to addressing that gap, potentially in concert with developing industry plans for smaller regional terminals in areas currently missing out on intermodal rail freight, or to support aspirations to restore flows to regional ports.

The changes that would be required to facilitate such a limited re-purposing of protected capacity are detailed in the next section.

³⁴ *European Express Freight: A Carbon-neutral Solution in Plain Sight*, Transport Intelligence for SNCF Réseau and HS1 Ltd. (2021), p.23

Market opportunity	GB routing	Competitor mode(s)	Aggregated / single customer	Key constraints	Gauge-sensitive?	Infrastructure enhancement required?	Actions and policies
M1. Continental style intermodal	HS1	HGV & sea ferry HGV & freight vehicle shuttle train Ferry only (unaccompanied ro-ro) Short-sea shipping (unitised lo-lo)	Aggregated (potentially with anchor tenant)	C1. Insufficient aggregation C2. Balance of trade C5. HS1 access C6. Terminal capacity C8. HS1 double-heading	No	No	A1. Aggregation support A2. Double-heading on HS1 A3. Review of HS1 access and performance regulations
M2. Classic route intermodal	Classic	HGV & sea ferry HGV & freight vehicle shuttle train Ferry only (unaccompanied ro-ro) Short-sea shipping (unitised lo-lo)	Aggregated Single customer	C4. Loading gauge C7. Wagon availability C1. Insufficient aggregation C2. Balance of trade	Yes	Yes	A6. Network enhancements A5. Rolling stock investment A1. Aggregation support
M3. Heavy ambient product – consumer goods	Classic	HGV & sea ferry HGV & freight vehicle shuttle train Ferry only (unaccompanied ro-ro) Short-sea shipping (unitised lo-lo)	Single customer	C7. Wagon availability C2. Balance of trade	No	No	A5. Rolling stock investment
M4. Ambient product – industrial materials/products	Classic / HS1	Short-sea shipping (bulk)	Single customer	C3. Structural changes in specific industries C7. Wagon availability	No	No	A5. Rolling stock investment
M5. High-speed express freight	HS1	HGV & sea ferry HGV & freight vehicle shuttle train Air freight	Aggregated	C7. Rolling stock availability Does not yet exist	No	Yes – not on the rail network, but handling facilities needed	A5. Rolling stock investment A3. Review of HS1 access and performance regulations
M6. Domestic freight	Classic	N/A	Aggregated Single customer	Capacity on the GB network	Depends on traffic type	No	A4. Re-deployment of protected capacity for domestic freight

Actions and Policies

As the previous section explains, there is a range of strong opportunities for growth in Channel Tunnel rail freight, across a number of different market segments and operational techniques. However, the current diminished traffic base indicates that action will be needed for those opportunities to be realised. This could come in a wide variety of forms, involving both public and private sector bodies. The available options include structural and regulatory changes that would be without up-front cost, short-term tactical interventions that may require modest funding and longer-term measures involving significant investment in rolling stock and infrastructure. A combination of these options will be necessary over time if the aim of sustained traffic growth is to be delivered.

Given the current constraint on public sector funding for rail enhancements and the limits to investor confidence that Channel Tunnel rail freight's weak position generates, it is to be expected that the more affordable, tactical options will be preferred in the short term. A successful trajectory would involve deployment of these initial actions and policies to stimulate modest but noteworthy growth in volumes, which in turn would over time give Government and the market the confidence to commit to the more extensive measures that will be required to restore a significant share of trade between Britain and continental Europe to rail.

The following set of actions and policies is by no means intended to be exhaustive or proscriptive. It represents the outcome of the investigation and stakeholder engagement undertaken in support of this document during the second half of 2022 and is intended to capture the various options open to the industry at this point in time. As the Channel Tunnel market develops in future, approaches will undoubtedly need to be adapted to changing circumstances and unanticipated developments, but at present the collective view of the key stakeholders Network Rail has spoken to suggests that some combination of the following items is required. Each of them has been linked within this report directly to the constraints they would address and the market opportunities they would support (see table on the previous page).

A1. Aggregation support

This report identifies that the most immediate market opportunity to add new Channel Tunnel rail freight flows, using infrastructure and rolling stock already available, is through the introduction of continental style intermodal services via HS1. The key constraint to overcome for this opportunity to be realised is the need for aggregation of sufficient volume for such services to continuously support themselves. This has been achieved in the past, but for a limited number of years at a time, with operations eventually folding. For example, a major British third-party logistics company, who are a key aggregator of Anglo-Scottish rail freight volume, ran a service between Barking and Lille from 2016 to 2018. Their view is that it would be worth returning to the concept in the current climate, but that some form of financial support would be necessary to maintain the service's commercial viability and avoid a repeat of that experience.

Other stakeholders have expressed an interest in the idea of an 'incubator fund' to support Channel Tunnel rail freight endeavours in getting off the ground. Relatively recent, DfT-commissioned research has examined the possibility of an extension of the existing domestic Mode Shift Revenue Support (MSRS) scheme, which international rail services are not currently eligible for. That study concluded that such an extension would be feasible, but this has yet to be pursued.³⁵ Stakeholder opinions vary as to whether MSRS would be the most appropriate vehicle

³⁵ *Options for Changes to Revenue Support Freight Grant Schemes*, MDS Transmodal for DfT (2019), p.50



Part of the existing intermodal flow to Barking Eurohub, via HS1, carrying product for a range of customers across the consumer goods and automotive sectors
 Source: Richard Dyke

for supporting new Channel Tunnel flows, with some being of the view that the establishment of a bespoke incubator fund would be preferable, given the unique challenges of operating Channel Tunnel services. Whatever the mechanism, though, there is a consensus that offering financial support to encourage private sector actors to fulfil the much-needed aggregator role is a key policy option that is worth further consideration. Any mechanism would need to be carefully designed to take into account which party would be taking on business risk associated with aggregation.

Past attempts in the intermodal sector have struggled with a lack of continuity of volume, which is needed to keep the

undertaking viable from day to day, and new services have tended to be loss-making for approximately 6 months after their introduction. The concept envisaged is therefore the provision of time-limited contributions to keep services going through their early days, specifically tailored to support aggregators. They would be given breathing space to attract customers up to the point of having sufficient volume not to require support, which will take time, but will be helped in doing so by having trains running to demonstrate proof of concept to the logistics market. Support would not be offered indefinitely, so although this proposal would require some public funding, the intention is that it would represent a more affordable alternative to larger-scale options, such as infrastructure enhancements, which can then be considered in the longer term.

A2. Class 92 double-heading on HS1

Double-heading freight trains running on HS1 would enable them to increase in weight and length, significantly improving the efficiency of any service using the route. The current method of splitting trains incurs time penalties and a doubling of driver resource, which adds cost to the operation. The use of two locomotives providing power in multiple so that a longer, heavier set of wagons can be hauled over the gradients on HS1 would allow operators to achieve an optimal payload on a single service right through to Barking. Current developers of potential new continental style intermodal services believe that a trailing weight of 1800t is necessary for their plans to be commercially viable, well above the limit of 1100t for a single loco-hauled train.

Rail freight through the Channel Tunnel and on HS1 is hauled by the purpose-built class 92 series of locomotives. Although freight trains through the tunnel itself are often double-headed, this does not actually increase the power draw compared to that of a single



A pair of class 92 locomotives at Dollands Moor
 Source: DB Cargo

locomotive, because power is distributed across the two when 92s are worked in multiple. It instead serves to provide marginally greater adhesion/traction in order to comply with rules for re-starting trains from a standstill on tunnel gradients. Similar requirements apply on HS1, where the gradients are even more severe.

The class 92s in use today were upgraded to be compatible with HS1's TVM-430 signalling system when the line was introduced, but this did not enable the operation of double-headed trains with control from the front cab. A technical fix has been identified by work already undertaken, but its implementation is, at the time of writing, unfunded. The cost of this solution is understood to be relatively modest, so finding a source of funding is an urgent but achievable priority for the industry.

A3. Review of HS1 access and performance regulations

Some of the key elements that currently constrain freight use of HS1 are aspects of the route's access and performance regimes. Although there is no shortage of capacity to accommodate freight services, long-term access rights are not guaranteed and the financial penalties associated with any delay caused to passenger trains create a level of risk that deters freight operators from using HS1 apart from at night. It is worthy of further investigation whether the hierarchy of access and performance charges on HS1 could be altered, either within the existing Concession Agreement or through changes, in the interest of encouraging more freight traffic onto the line.

There may be an opportunity as part of the Periodic Review 2024 (PR24) process to reconsider the prioritisation afforded to different traffic types and to better align this to policy outcomes associated with the benefits of rail freight.³⁶ The advantage of this approach is that it involves regulatory changes that would incur no up-front cost, though HS1 Ltd. note that any redistribution of capacity from passenger to freight, which pays less in track access, would affect their revenues, creating a shortfall that would have to be covered either by higher access charges for passenger operators or public subsidy. That cost, however, might be deemed acceptable if it enables rail freight growth in line with Government policy objectives such as decarbonisation and road decongestion.

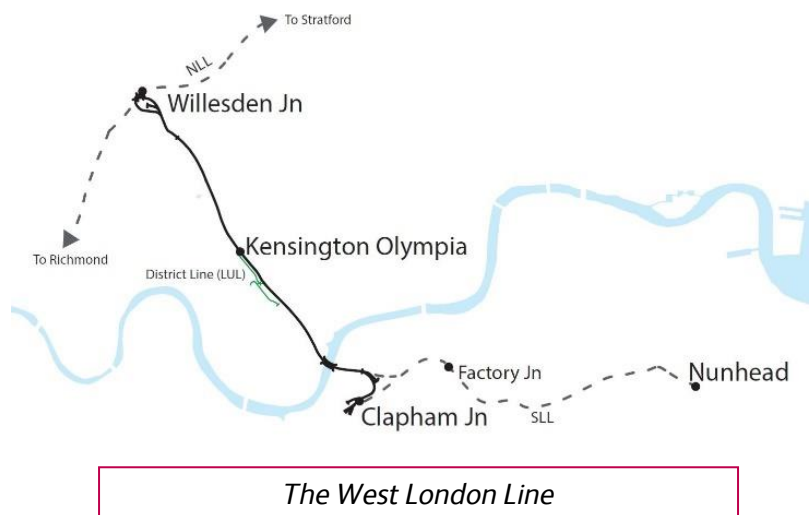
A4. Re-deployment of protected capacity for domestic freight

Whilst this report is primarily concerned with opportunities for the revival of rail freight traffic using the Channel Tunnel, it is recognised that this will take time. The level of progress that can be achieved remains uncertain and, in any case, even during its late-1990s relative heyday Channel Tunnel rail freight's volumes never came close to fully exploiting the protected capacity provided for it, the extent of which was based on traffic forecasts for the 1990s that proved to be overly optimistic and was also determined long before the addition of HS1 as a routing option. For classic route intermodal in particular, whilst a market opportunity for rail exists, the need for currently unfunded gauge clearance works to unlock it means that the return of international flows is a longer-term ambition. In the mean-time, the industry may wish to consider how to make best use of the protected capacity on the classic routes in order to support rail freight in general.

³⁶ For further information on PR24, see <https://www.orr.gov.uk/search-news/rail-regulator-asks-views-next-periodic-review-hs1-ltd>;

Responses to initial consultation on the periodic review of HS1 Ltd 2024 (PR24), DfT to ORR (22nd December 2022), p.5, <https://www.orr.gov.uk/sites/default/files/2023-01/responses-to-initial-consultation-on-hs1-pr24.pdf>

One option is to explore a strictly defined re-deployment of a small number of Channel Tunnel freight paths for the use of domestic freight. It is envisaged this could unlock c. 4 circulations per day on capacity-constrained routes known to have frustrated freight demand. This would be time-limited and confined to freight use only, with capacity returned to international use whenever it might be required, including if forecasts indicated a need for these paths to be reserved for international traffic. The West



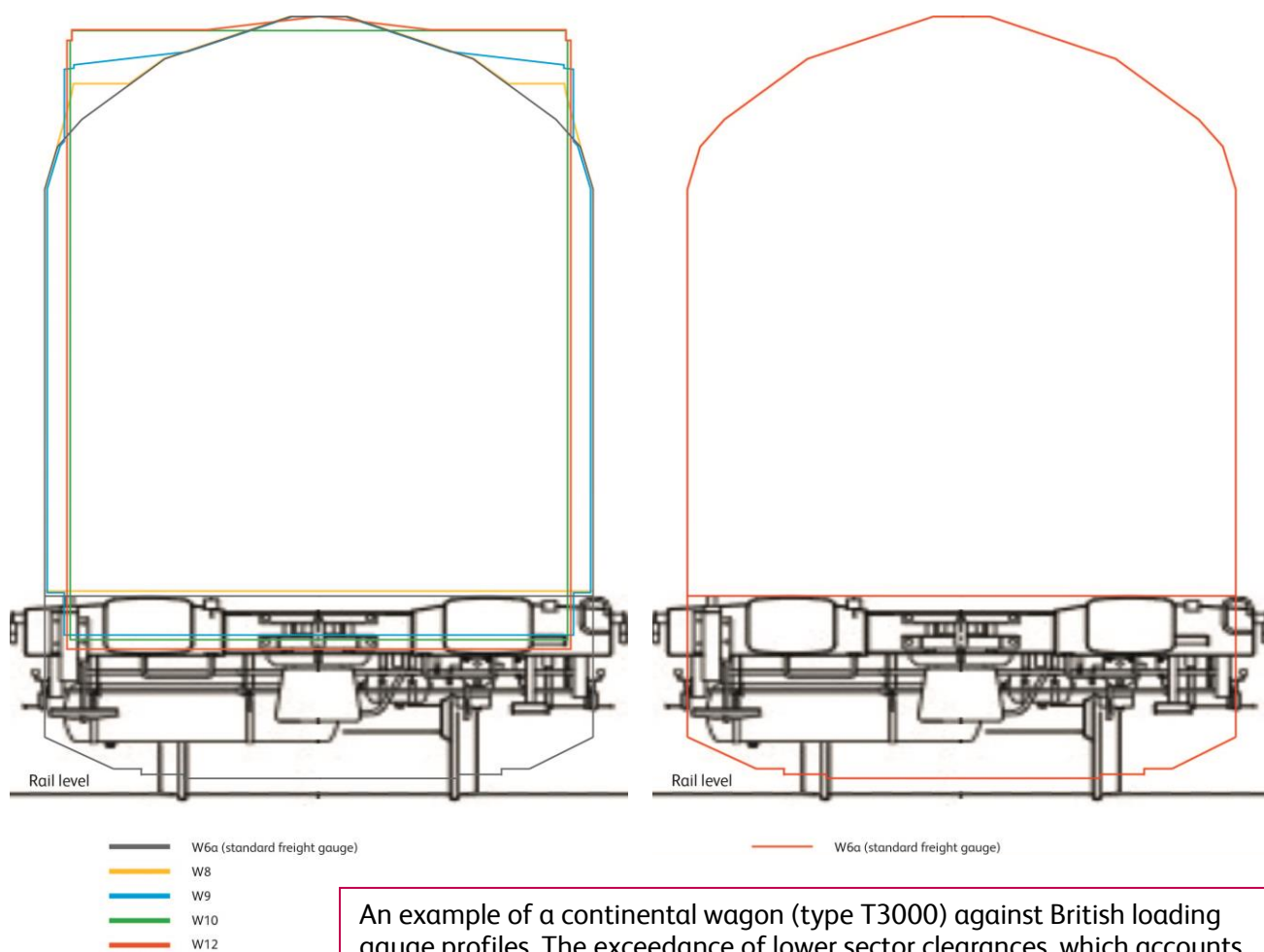
London Line, which links the Willesden and Battersea areas of the city and serves as the key north/south connection for freight across the Thames is a particular pinch point where unused Channel Tunnel paths feature throughout the day. The delivery of gauge clearance and subsequent return of classic route intermodal traffic, if funded, will prioritise the core route via Maidstone East and Catford, so there may be opportunity to utilise repurposed capacity on the Brighton Main Line, which forms part of the diversionary route (see map p.19). Customer demand for the movement of construction materials by rail on this corridor exceeds the capacity currently available to freight, whilst in the longer term it is a priority for the establishment of an Intermodal Rail Freight Interchange to serve the road-dominated South East.

The approach to reserved capacity for international freight traffic is based on agreements originally made in the 1980s, based on forecasts for rail freight traffic volumes that have never been reached. Any proposal to amend this approach and potentially release some domestic capacity would need to take account of current traffic volume expectations or forecasts, with any release likely to be time-limited and subject to regular review, taking account of the latest available forecasts at each review point.

A5. Rolling stock investment

For any of the market opportunities that are likely to be constrained in the longer term by the availability of suitable wagons, anything more than modest growth can be expected to require investment to refurbish or procure vehicles with which to operate new Channel Tunnel flows. Services conveying ambient product need specialised rolling stock, such as cargowagons or car-carriers, which do not exist in large numbers, with those that do largely taken up by established traffic flows. Likewise, if high-speed express freight via the tunnel and HS1 is to emerge, any operator will have to find a way to fund or finance the provision of rolling stock fitted for this purpose.

In the intermodal sector, the wider pool of European gauge wagons found on the continent makes availability less of a concern, but these are limited to running via HS1 and would still be subject to an approvals process if not already UIC-registered. Adapting continental wagons to enable them to reach beyond Barking would be of potential interest to operators if it could be successfully achieved, but no concrete proposal for feasible alterations that would bring such vehicles within British gauging profiles has yet been produced. Engineering, vehicle introduction approvals and safety processes, particularly in regard to running line clearances at Ripple Lane, would all also have to be negotiated. Even if it were able to address these hurdles, such an approach would create



An example of a continental wagon (type T3000) against British loading gauge profiles. The exceedance of lower sector clearances, which accounts for the challenge facing any ambition to operate beyond HS1 to Barking, can be clearly seen. *Source of wagon profile: www.euro-wagon.com*

a small captive fleet on which services would be totally reliant, which may not be a sufficiently attractive proposition to justify the necessary investment in modification works.

W12 gauge clearance on the classic routes would allow intermodal freight to operate using standard flat wagons, of the kind that make up the majority of the British fleet, so availability should not be as much of a challenge as where more specialised equipment is needed. Incremental clearance to W9a, though, which the industry is targeting as an interim measure, would enable FOCs to operate services carrying S45 swap bodies on IKA wagons, but this would necessitate either the re-deployment of megafrets currently in use by domestic traffic or the procurement of new ones, which are ultimately decisions for operators to make about how to make best use of their rolling stock resource.

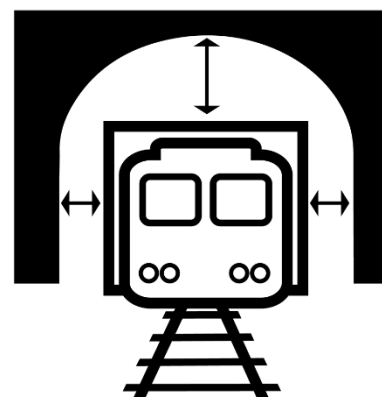
A6. Network enhancements

Although it is important for Channel Tunnel rail freight to first demonstrate its credentials by delivering more with the capacity and capability already available, in the long-term any growth that can be achieved will be limited to a relatively modest extent unless some key network capability constraints can be removed. This report suggests that a market-focused approach is needed, bringing the right rail freight product offers to the logistics market in the first instance,

establishing these to create proofs of concept, then growing the traffic base from there. This latter phase will inevitably require funding and investment from both public and private sectors, a major element of which has long been recognised by the industry as being infrastructure enhancements to the rail network itself.

Gauge enhancements

Loading gauge enhancements on the classic routes between the Channel Tunnel and Wembley are a longstanding priority of the Strategic Freight Network (SFN) Steering Group, the industry's established forum for the coordination and governance of the rail freight enhancements portfolio. The availability of funding for freight enhancements generally has come under severe pressure in light of the impact of the Covid-19 pandemic on the public finances. Nonetheless, the freight sector continues to discuss its long-term aspirations and works to build the case for investments in the network to support them, with classic routes gauge enhancements remaining high on the list of priority schemes to be pursued as soon as an improvement to the funding outlook permits. Likewise, Transport for the South East



have recently included rail freight gauge enhancements in the Kent, Medway and East Sussex package of their Strategic Investment Plan, whilst Rail Partners' submission to the Rail Freight Growth Target call for evidence lists 'W12 gauge clearance on classic network from Channel Tunnel to Wembley Yard' among infrastructure schemes necessary for growth.³⁷

A Strategic Outline Business Case (SOBC) for enhancement of the classic routes to W12 standard was completed by Network Rail in 2020. This identified the key locations where interventions, such as the reconstruction of overbridges or track lowering, would be required to achieve W12 clearance and presented a high-level range of anticipated final costs. The economic case was refreshed in 2021, accounting for the latest DfT Transport Analysis Guidance (TAG) and adding higher-growth scenarios, based on forecasting supplied by Eurotunnel. This appraisal suggested that W12 clearance on the core route, via Maidstone East and Catford, would represent high or very high value for money under the most likely cost scenarios.³⁸

Further work has since been completed to understand which sites would also need physical works to achieve W9a, in order to offer a more affordable initial offer that could enable the earlier realisation of incremental benefits, by creating the capability to accommodate S45 swap bodies on IKA megafret wagons. This has now progressed to high-level feasibility and estimating, so that an understanding of the scope of works required and cost of delivering them can be developed. Whilst the reliance on low platform wagons would retain an element of constraint to operations, W9a nevertheless presents a means by which some initial traffic growth could be generated, especially in light of the recent confirmation of W9a on the WCML, which means that achieving

³⁷ A Strategic Investment Plan for the South East: Consultation draft, TfSE (June 2022) p.65; 'Trebling rail freight can help rebalance and decarbonise a growing UK economy – Rail Partners', railbusinessdaily.com (11th October 2022), <https://news.railbusinessdaily.com/trebling-rail-freight-can-help-rebalance-and-decarbonise-a-growing-uk-economy-rail-partners/>

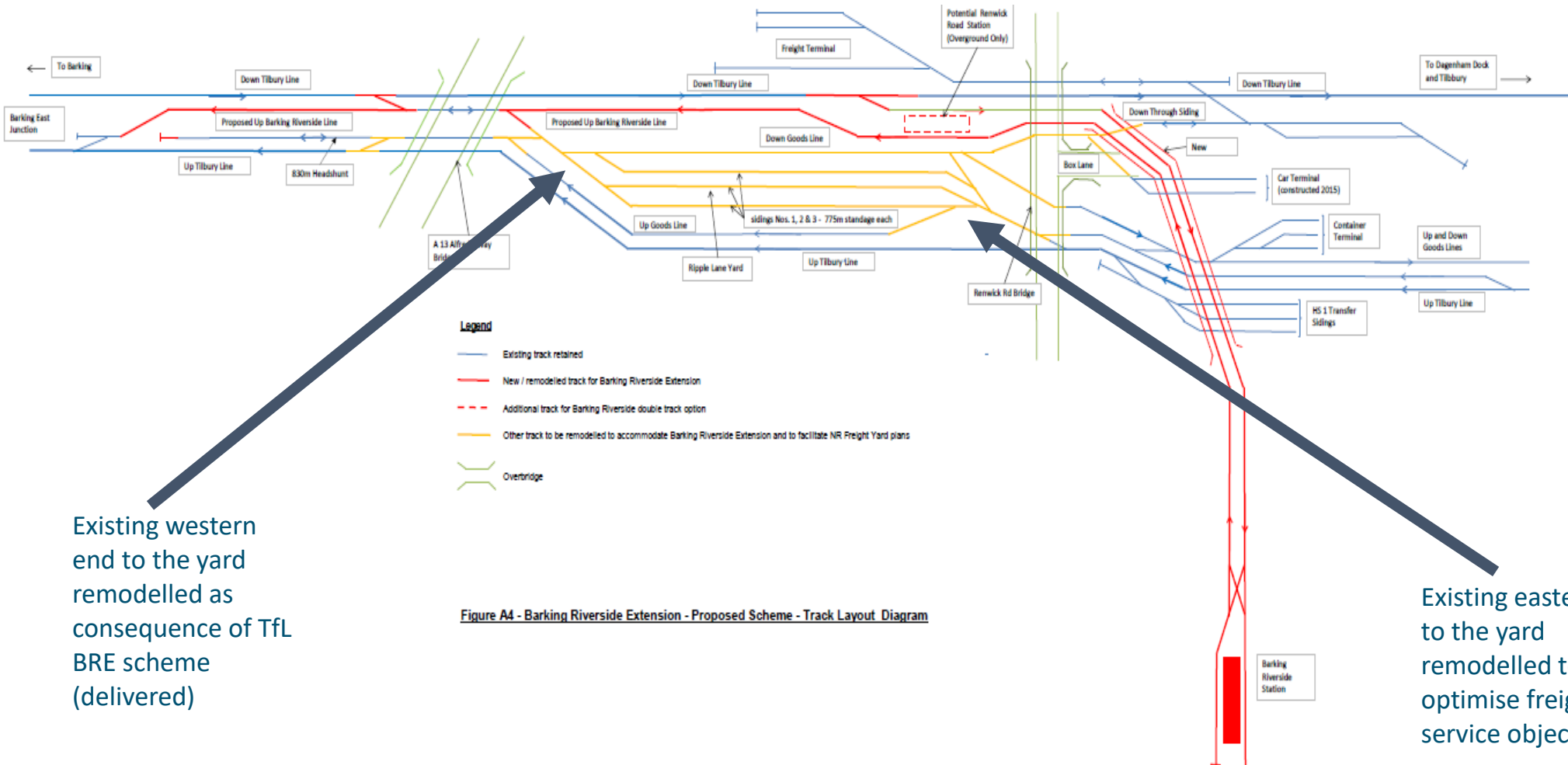
³⁸ *Channel Tunnel Classic Routes W12 gauge enhancement: Socio-economic Appraisal Report*, Network Rail (December 2021)

the same on the classic routes would enable the movement of S45s right through from continental Europe to the Scottish central belt. Given there are no purely intermodal flows able to operate at all on the classic routes today (noting some unitised traffic is carried on the Ditton service), even a handful of new services would represent a significant uplift that could in turn help make a successful case for full W12 clearance to follow. With the eventual delivery of W12, any British-gauge-compliant wagon and box combination would be able to use the Channel Tunnel classic routes, including S45s on standard height intermodal flats, the key combination of continental and British equipment needed to restore rail's former market share in this sector.

Interventions to support freight via HS1

In addition to gauge clearance on the classic routes, there are a number of infrastructure options familiar to industry stakeholders, which could facilitate additional growth of freight, beyond what might be achieved with existing spare capacity, on HS1 in the long term. Some stakeholders have suggested that, should daytime operation of freight services on the high-speed line become a reality, HS1's existing freight loops will provide for only so much new traffic before it becomes necessary to construct further regulating points to enable the pathing of still more freight trains. More pressing, though, are the constraints that the railway layout in the Barking Ripple Lane area imposes on international rail freight, in the form of the cumbersome process of splitting and shunting trains must work through in order to access the Eurohub terminal.

Network Rail has developed a scheme proposing the upgrade of Ripple Lane West Yard to create a new 'nodal yard' for freight (see diagram on the next page). One of the main drivers for this enhancement would be to improve the movement of trains between the CTRL Exchange Sidings and Barking Eurohub, which must be done by means of a shunt via Ripple Lane West Yard. A nodal yard at Ripple Lane specified to continental gauge standard (UIC GB2 gauge) would allow full-length continental gauge trains to and from the CTRL Exchange Sidings to access the yard without the need to split and join and would provide a location for such trains to layover during the day and take advantage of overnight freight slots on HS1. Potentially in combination with measures to increase the capacity of Barking Eurohub itself, as well as eventual electrification of the yard, delivery of this scheme could in the longer term ensure that the Barking area does not become a bottleneck for international freight on and off HS1. As with classic routes gauge enhancements, Ripple Lane Nodal Yard remains a priority for the rail freight sector, as expressed through the SFN Steering Group, but as a project it has reached a much more mature level of development and is ready to proceed to a Final Investment Decision as soon as this becomes possible.



- Legend**
- Existing track retained
 - New / remodelled track for Barking Riverside Extension
 - - - Additional track for Barking Riverside double track option
 - Other track to be remodelled to accommodate Barking Riverside Extension and to facilitate NR Freight Yard plans
 - ⌋ Overbridge

Figure A4 - Barking Riverside Extension - Proposed Scheme - Track Layout Diagram

Existing western end to the yard remodelled as consequence of TfL BRE scheme (delivered)

Existing eastern end to the yard remodelled to optimise freight service objectives

Explanatory diagram from early development of the Ripple Lane Nodal Yard scheme

Conclusion

A sustained revival of international traffic is a long-held ambition of the rail freight industry, but over the past two decades this has been frustrated by a range of issues and setbacks. Despite the sector's best efforts and some periods of initial promise during that time, much of the growth that has been achieved has proved temporary. Now, following increased expressions of interest from across the industry and in the context of challenges facing Britain and continental Europe's road-reliant supply chains, and the drive to meet net-zero carbon emissions goals, a moment of fresh opportunity has arisen. This report has sought to illustrate that opportunity and to point towards ways the rail freight sector, its customers and Government can regroup and refocus their collective efforts on the shared goal of a revitalised market for Channel Tunnel rail freight.

This objective remains not without its challenges and there are a number of market, infrastructure and rolling stock constraints to be overcome. In the post-pandemic economic environment, large-scale funding and investment in support of international rail freight is not likely to be forthcoming within the short-to-medium term, but there are still significant opportunities for the sector to target, which could drive increased volume through the tunnel without the need for enhancements to railway infrastructure or new equipment.

Gauge clearance of the classic routes to W12 is still the rail freight industry's firm aspiration for the longer term and will be needed for anything like the extent and diversity of market enjoyed by Channel Tunnel rail freight in the late 1990s to ultimately return. Work to understand the interventions required for W9a clearance is in progress, offering a key incremental option for the medium term. However, there are a number of market opportunities that do not require any new gauge clearance works, on which focus should be maintained in the short term. Key actions to support these opportunities include:

- Investigation of a support mechanism to enable aggregator(s) to consolidate sufficient volume for viable continental style intermodal services;
- Investigating funding to implement the known technical solution for >1,100t trailing loads on HS1, by double-heading trains with class 92 locomotives.

These actions should be of the highest priority because they stand to deliver the most meaningful impact in the short term, are relatively lower-cost and because they would directly support rail's market competitiveness versus alternative modes. They would in particular serve to stimulate continental style intermodal flows, the market opportunity with arguably the most immediate potential, as it faces relatively few constraints in terms of physical infrastructure and rolling stock availability.

To begin building momentum behind it as a compelling option for GB-continental trade, rail can demonstrate its credentials through establishing and building successful new or expanded services, signalling to the market that it can offer a dependable product that can rival the alternatives on cost and efficiency. Smaller scale interventions such as the two highlighted above can help kick-start this process by providing the impetus needed to generate initial growth and demonstrate the credibility of rail as an option. An incremental approach to classic route gauge clearance, focusing on achieving W9a to begin with, is also a key priority area for the sector in terms of the potential to secure an initial restoration of traffic volumes as a step on the way to more comprehensive

growth. If successful, such measures will need to be followed up in time by more ambitious policy and funding commitments, such as W12 loading gauge enhancements, for Channel Tunnel rail freight growth to be sustained over the long term.

Looking to the future

In the long term, there are a wide range of ambitions and possibilities for Channel Tunnel rail freight. This report has sought to highlight the immediate steps the industry can realistically take to begin addressing the historically low volumes travelling via the tunnel at present, but looking beyond the shorter term, it is possible to envisage many potential developments that could contribute to a rail revival in this market. Although growth is uncertain and unpredictable, a long-term vision of what the international rail freight sector might one day come to look like is worth setting out, both as an inspiration to action in the present and as a conversation-starter for the industry. This may include any combination of the following characteristics:

- A return of intermodal freight to the Channel Tunnel classic routes, with the ability to run the full range of contemporary wagon and box combinations afforded by W12 clearance.
- Daytime freight operation via HS1, enabling substantially increased traffic levels working in harmony with high-speed passenger services. This might even be facilitated by freight running at much higher speeds than are currently possible, by additional loops along the route and/or the introduction of ETCS signalling.
- The use of other traction types, besides the class 92, for freight on HS1. With appropriate processes put in place, this could potentially include continental locomotives.
- Increased use of Barking Eurohub by international freight, supported by the creation of a nodal yard at Ripple Lane West Yard.
- International freight services, especially intermodal ones, serving origin/destination locations nationwide.



Source: Network Rail