

Rail Delivery Group

Response to consultation:

The National Infrastructure Assessment: Call for Evidence

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Name: Mark Havenhand
Organisation: Rail Delivery Group
Address: 200 Aldersgate Street, London EC1A 4HD

Business representative organisation.

Introduction: The Rail Delivery Group (RDG) was established in May 2011. It brings together Network Rail and passenger and freight train operating companies to lead and enable improvements in the railway. The purpose of the RDG is to enable Network Rail and passenger and freight train operating companies to succeed by delivering better services for their customers. Ultimately this benefits taxpayers and the economy. We aim to meet the needs of:

- Our Members, by enabling them to deliver better outcomes for customers and the country;
- Government and regulators, by developing strategy, informing policy and confronting difficult decisions on choices; and
- Rail and non-rail users, by improving customer experience and building public trust.

For enquiries regarding this consultation response, please contact:

Mark Havenhand
Industry Planning Manager
mark.havenhand@raildeliverygroup.com
07718 004159

Rail Delivery Group
2nd Floor, 200 Aldersgate Street
London EC1A 4HD

Overview

The Rail Delivery Group (RDG) welcomes the opportunity to contribute to the National Infrastructure Assessment Call for Evidence. The response has been led by the RDG Planning Oversight Group, who's remit is to provide strategic planning information for decision makers, including overseeing the Long-Term Planning Process work at Network Rail.

The key points of the RDG's response are as follows:

- In recent years, Britain has had the fastest growing and safest railway in Europe. Rail journeys have doubled in the last 20 years and are expected to double again by 2040. Over the last decade the industry has also halved the subsidy required per passenger. Today the industry generates sufficient revenue to cover its day to day running costs. This is a remarkable success story.
- This success has delivered much for the country but leaves the industry with significant challenges to deliver the capacity and the level of service customers expect. There are specific parts of the network where the level of performance and crowding has reached unacceptable levels and this must be addressed as a priority.
- The rail industry is already working with its funders and stakeholders to deliver a range of infrastructure investments which will support the growth of the economy at a national, regional and local level. However, these will only just be able to keep pace with expected levels of demand growth.
- The highest value infrastructure investments proposed by the rail industry are those which seek to address the most severe performance and crowding challenges on the network. The capacity of the rail network to carry more passengers and freight services is fundamental to the industry delivering more punctual comfortable journeys, and ultimately supporting and driving a number of socio-economic benefits.
- Through its Long Term Planning Process (LTPP), the rail industry has agreed long term forecasts for passenger and freight demand, and has developed a further 'pipeline' of enhancements to address anticipated capacity bottlenecks.
- Alongside conventional infrastructure solutions, the more widespread use of digital signalling technologies could provide an alternative means of increasing the capacity of the network. These technologies are being developed as part of the industry's extensive modernisation agenda.
- The industry is working to diversify its sources of funding, moving away from a historic reliance on government funding and investigating the potential for greater private financing.

Cross-cutting issues

Q1: What are the highest value infrastructure investments that would support long-term sustainable growth in your city or region?

The railway plays an essential role supporting sustainable economic growth, by enabling the safe, fast and efficient movement of large volumes of passengers and goods into and between major economic centres, their catchments, and international gateways. The rail network is particularly important to the success of large urban areas, where some of the most productive parts of the economy are based. The huge volumes of commuters carried by the railway drive the economic growth of the nation.

Great Britain has one of the fastest growing railways in Europe and the second most intensively used – passenger journeys have more than doubled since 1996, adding up to over 1.69 billion journeys per year. £30 billion of goods are moved by the freight sector every year, equating to £10.1 billion of added value that the rail sector contributes to the UK economy every year. In addition, the supply chain employs around 120,000 with an estimated annual economic contribution of around £7 billion. However, the significant growth in demand brings both benefits and challenges – the performance of the network has become inadequate in many areas, and passengers experience levels of crowding well beyond acceptable levels.

The rail industry is already working with its funders and stakeholders to deliver a range of infrastructure investments which will support the growth of the economy at a national, regional and local level. Current initiatives such as the 'Northern Powerhouse' are a positive step towards a more polycentric pattern of economic and urban development in Great Britain. It is recognised that a more even pattern of economic development across the country would in itself lead to a more efficient, effective and even utilisation of railway resources over the network.

The Thameslink and Crossrail projects are nearing completion, and both will deliver a significant increase in capacity on services into London, and will dramatically reduce journey times by providing new cross-London journey opportunities. Across the North of England, a more diverse range of services will be able to operate as a result of the Ordsall Chord - a short stretch of line linking the cities of Manchester and Salford scheduled to begin passenger operation in December 2017.

Looking further ahead, government and the National Infrastructure Commission have both expressed their support for four schemes which will transform the rail network:

- HS2, which will provide fast, high capacity services between London, Leeds, Manchester, the East and West Midlands and South Yorkshire. The integration of HS2 with the existing network will also allow for faster direct trains to cities such as Liverpool, Newcastle, Glasgow and Edinburgh; and will increase capacity for freight on the conventional network.
- Crossrail 2, which will transform travel across London and the wider South East, linking destinations to the South West and North East of London with direct train services.
- Northern Powerhouse Rail (also referred to as HS3), the strategic priority for providing significantly better rail links between the key economic centres in the North. The project is aimed at transforming the rail journeys between the key economic centres of Leeds, Manchester, Liverpool, Newcastle, Sheffield and Hull, together with Manchester Airport.
- East West Rail, which will provide improved connectivity by providing new and rehabilitated infrastructure along the corridor between Oxford, Milton Keynes and Cambridge.

Through its LTPP, and ongoing dialogue with funders and stakeholders, the industry has identified a further range of recommendations designed to enhance the capacity and connectivity of the railway. The LTPP consists of a number of different elements, which, when taken together, seek to define the future capability of the rail network over a 30-year horizon¹:

- Market Studies forecast future rail demand, and develop conditional outputs for future rail services. These outputs are based on stakeholders' views of how rail services can support delivery of the industry's strategic goals – covering economic growth, reducing environmental impacts, enhancing quality of life and improving affordability.
- Route Studies develop options for future services and identify options for investment in specific areas of the network. Options are based on the conditional outputs and demand forecasts from the Market Studies, and are assessed against economic appraisal criteria to provide choices for funders.
- Cross-Boundary Analysis considers options for services that run across multiple routes, providing consistent assumptions across Route Studies.
- Network Studies consider network wide issues such as providing capacity for freight, or enhancing the inclusivity of the railway.

Each study or analysis is delivered through a Working Group, including funders and train and freight operators, which will consult wider stakeholders such as local authorities, passengers, freight users and their representatives and Local Enterprise Partnerships as part of their work. A Board oversees the delivery of the work and all studies will be published on Network Rail's website in draft form and subject to consultation for 90 days. The final study will then be established within 60 days of its publication subject to approval from the Office of Rail and Road.

Through its LTPP the industry has identified the scale of the capacity challenge on the network. This shows that:

- The volume of rail passengers into London in the peak hour is three times the combined volume of all other urban centres.
- The level of crowding (expressed as number of passengers to available seats) on services into London today is, on average in the peak hour, a third more severe than on any other parts of the network into major urban centres.
- Nine of the ten busiest stations in the country are in London (Birmingham New Street is the exception). Over the past 20 years, passenger demand at London Waterloo, the country's busiest station in terms of passenger numbers has doubled.

Whilst the committed programme of enhancements will provide a 10% increase in peak seats into central London (relative to current levels), and a 30% increase in overall capacity, this will only broadly be able to keep pace with the expected increase in demand.

These aggregate figures mask significant variation between routes. Standing is common on many inner suburban services, in part reflecting the fact that these trains are designed to carry high volumes of standing passengers over short distances. Of greater concern is standing on outer suburban and long distance services, given the longer journey lengths and resulting need for some passengers to stand for long periods of time. Without further interventions, the Brighton and South West Main Lines are expected to be experiencing severe levels of crowding by 2026, with some passengers having to stand for over 30 minutes. The industry is developing proposals to address the severe capacity challenges it faces on these routes, which should be taken forward as a priority.

Recent work undertaken under the auspices of the LTPP has also identified a number of stations that need congestion relief schemes. A combination of years of under-investment in stations (apart from a select few such as Reading, Birmingham New Street and London King's Cross), as well as significant passenger growth, will lead to many stations being severely overcrowded in the coming years. Priority stations to be addressed in the short term comprise Clapham Junction, London Liverpool Street and London Euston.

Alongside additional physical infrastructure, digital signalling technology can offer a less disruptive approach to increasing the capacity of the network, in turn supporting sustainable economic growth. Other industries, from aviation, to roads, and the London Underground, have already unlocked significant additional capacity through digital control systems. Rail has the opportunity to make use existing technology, similar to systems currently being used on the London Underground, and due to be deployed in the coming months and years on Thameslink, Crossrail and HS2.

The industry's vision for new technologies is set out in the recent Rail Technical Strategy Capability Delivery Plan², which covers 12 Key Capabilities (KCs). One example is KC02: 'Minimal disruption to train services'. This aspires towards 100% availability of assets when needed, which requires investment in a range of technologies and new approaches to infrastructure renewal and maintenance, for example in real time asset intelligence that leads to 'predict and prevent', coupled with a far more modular approach to infrastructure assets that leads to rapid 'swap in, swap out' replacement. Lowering the cost of the infrastructure will also be a significant contributor to long-term sustainable growth and opportunities for connecting communities, particularly on less intensively used parts of the network. KC11: 'Low-cost railway solutions', is focused on this.

Finally, infrastructure investment in a number of key areas will enable the freight sector to realise its potential in serving the British economy and driving down carbon dependency:

- A rail network fit for freight: dedicated investment in a Strategic Freight Network linking key deep sea, short sea and bulk ports with the terminals and railheads serving centres of production, distribution and consumption.
- Railheads and terminals: a network which adequately reflects projected traffic levels and patterns

- Network performance and availability: enhancing the capability of the network to support longer, heavier and faster freight trains.

Beyond these priority investments, the interventions identified by the LTPP form a further 'pipeline' of choices for funders covering the entire network. These are designed to be taken forward on a rolling basis, as and when individual projects reach sufficient design maturity, enabling better alignment with franchising and facilitate a broader range of funding models.

Q2: How should infrastructure most effectively contribute to the UK's international competitiveness? What is the role of international gateways for passengers, freight and data in ensuring this?

The government's recent industrial strategy³ identifies upgrading infrastructure as one of its 10 key pillars for driving growth. As the strategy indicates, high quality transport infrastructure can reduce delays, and raise productivity by enabling towns and cities to achieve agglomeration effects, supporting the rebalancing of the economy.

An effective, extensive and reliable rail network can effectively bring cities and their catchments closer together, opening up new markets, improving access to extensive pools of labour, providing new employment opportunities, encouraging the transfer of knowledge and improving the efficiency of supply chains. Rail can support this in four key ways:

- Connectivity – by providing higher frequencies, new direct services, more convenient connections and reduced journey times. Connectivity to other modes; whether air, sea or local modes, is also key.
- Capacity – providing sufficient seats or standing space to allow sufficient numbers of passengers to undertake the journeys they need to make.
- Performance – providing a reasonable level of certainty of journey duration to allow passengers and businesses to plan effectively, avoiding spending unproductive time on disrupted services, or having to allow additional time for their journeys in the anticipation that services could be disrupted. For goods markets especially, competitiveness is extremely sensitive to journey time.

Through its LTPP and ongoing dialogue with funders the rail industry has set out a series of interventions to improve the connectivity, capacity and performance of the network.

Improving access to ports is one of the key priorities for the rail freight strategy. As referenced in the response to Q1, the Strategic Freight Network aims to provide a freight-capable network linking ports with inland terminals close to the main centres of population. The priority investment corridors to improve access to ports comprise:

- Felixstowe / North corridor: the priority freight scheme to establish a direct freight capable route from Felixstowe through the Midlands to the North West avoiding London. This will become the country's high capacity arterial maritime intermodal import/export corridor, enhanced through a programme of interventions to address bottlenecks at Haughley Junction, Soham, Ely, Peterborough, and Leicester.
- Solent / North West corridor: linking the UK's second largest deep sea port to the distribution and manufacturing heartlands of the West Midlands and North West, serving both import maritime intermodal traffic and export automotive traffic. Beyond near term initiatives to optimise train lengths ultimately line of route capacity will become constrained with the interaction of forecast passenger and freight volumes, potentially requiring major interventions such as grade separation at Basingstoke.
- Trans Northern corridor: the work of Transport for the North in developing Northern Powerhouse Rail offers a new northern rail freight opportunity, building on the major port developments in the

Liverpool and Hull and Humber City Regions. It demands identification and development of a freight capable Trans-Pennine corridor serving intermodal and industrial traffic between manufacturing centres and ports, and bulk construction flows serving northern cities.

- Cross-London corridor: enhanced cross-London freight capacity on the North London and Gospel Oak to Barking lines through the development of 'filter lanes' to separate the movement of freight services joining/leaving these orbital London lines from the high frequency passenger service. This would be underpinned by rerouting of non-London destined traffic through the Felixstowe/North Corridor (where this offers a more direct route) and the realisation of a Thameside Nodal Yard complementing that established at Wembley.

Rail links to and from airports and ports can be considered to be gateways to the country. However, the current quality of these links is variable; therefore, more targeted investment to make all airport and port links an equivalent standard is therefore desirable.

The enhancements pipeline includes a number of schemes specifically designed to increase train ridership to airports, including Western Access to Heathrow and enhancements to the passenger circulation facilities at Gatwick Airport station. Responding to the work of the Airport's Commission, the Government has recently agreed that the most appropriate way to increase airport capacity in the South East is through a third runway at Heathrow. In making this decision the Department for Transport (DfT) noted that Heathrow Airport already has good rail and road links, but in future these will be improved by direct access from Heathrow to Crossrail and linked to HS2 at Old Oak Common. Network Rail's report into Southern Access to Heathrow published in April 2016 identified significant economic benefits could be accrued by a link from Heathrow Airport into the existing South West Trains network near Staines. Such a scheme would enable direct services from a wide range of towns in Surrey, Hampshire and South West London to the airport.

Rail infrastructure can most effectively contribute to the UK's competitiveness more directly, through the development of new rail technologies and talent, which could allow the UK to export expertise and skills. The industry has set out a modernisation agenda which will accelerate the adoption of new technologies and working practices, with the aim of strengthening efficiency, enhancing the skills of the workforce and ultimately the quality of the customer experience. The industry intends to use the opportunity of delivering these priorities to realise the wider economic potential of a vibrant, world-class UK-based supply chain by collaborating with the Rail Supply Group to deliver their strategy 'Fast Track to the Future'. Rail investments form a significant part of the potential workload for the UK-based supply chain, and provide the confidence to support investment in skills, equipment and innovation. This investment will support efficient delivery and provide a platform for import substitution and, ultimately, an increase in exports.

Q3: How should infrastructure be designed, planned and delivered to create better places to live and work? How should the interaction between infrastructure and housing be incorporated into this?

The best way to assess and deliver the benefits of better places to live and work is to collaborate effectively with a variety of stakeholders throughout the design, planning and delivery process. Relevant stakeholders include funders, business groups, local authorities, operating companies, and user groups. The rail industry's planning processes already encourage extensive stakeholder involvement: in the Market Studies, future demand and requirements (expressed as 'conditional outputs') of the rail network were built upon stakeholders' views, and thorough review of how rail services can support delivery of the market's strategic goals. In Route Studies, when options are developed for geographically aligned routes they are assessed against the identified market study outputs, funder and stakeholder criteria, and an early assessment of value for money.

Early stage planning and design could arguably be further improved to focus upon 'better places to live and work' through increasing consideration of social value planning and wider benefits in the appraisal of options. Wider benefits such as community improvement, jobs creation, and social value can be difficult to capture in an economically aligned business case. Effective project sponsorship will be key to providing an infrastructure option which delivers the benefits outlined in earlier integration of strategies and planning.

There is also the opportunity to promote rail and the industry as a 'good neighbour' that will introduce new technology and ways of working that, for example, minimise the impacts of infrastructure maintenance on neighbours (noise, vibration) through better design and operation.

It is important that housing and more sustainable transport modes are considered jointly. Ideally, development planning should be integrated with transport planning; ensuring higher densities of development around transport nodes, and the appropriate distribution of employment opportunities. Improving bus or cycle connectivity to existing stations may provide the connectivity to support development as part of a wider transport strategy.

Where contingent developments such as housing are dependent upon infrastructure, early collaboration and integration are key to successful delivery of ultimate benefits. For example, large housing developments can deliver benefits of better living and working if they are situated near a station. However, aspirations for new stations need be considered carefully alongside the market characteristics and long term plans for the corresponding rail corridors. The construction of new stations on congested parts of the network, or where the adding a new stop would disadvantage long distance passengers, can act to contradict other industry objectives such as reducing journey times or increasing capacity.

For the rail sector, the railway station is the key interface where the industry has the opportunity to help create better places to live and work. Its 'Vision for Stations'⁴ sets out nine principles to help achieve this:

- Customer focused
- Intelligent use of technology
- Seamless journey experience
- Reflect local needs and opportunities
- Safe and secure environment
- Entrepreneurial spirit
- Flexible and long-term stewardship
- Shared industry know-how
- Optimised network

The industry recognises the need to support an enhanced role and profile of stations within the communities of Britain through facilitating them as demonstrators of technology, active supporters to local small businesses and community organisations.

The rail industry also recognises the need to engage with other wider policy such as industrial strategy, land use and housing planning to help ensure a closer match between rail demand and capacity. It is committed to encouraging new ways of delivering its plans by engaging with a wider range of partners.

Q4: What is the maximum potential for demand management, recognising behavioural constraints and rebound effects?

As discussed in the response to Q1, demand for rail infrastructure services has increased consistently in recent years, and is set to continue under any forecast scenario. Where demand is expected to outstrip capacity, the LTPP works to identify options to address the resulting gap. Notwithstanding required infrastructure enhancements of varying scales, in a capital and capacity constrained environment, demand management can provide additional tools to alleviate or redistribute some demand for the benefit of increased efficient use of an existing network.

The rail industry has practised demand management through pricing for many years, and customers are familiar with the concept of saving money by avoiding the busiest times. The more widespread adoption of online ticket retailing has been instrumental in supporting this trend, and as technology evolves customers will be able to buy tickets in an increasing number of different ways.

The growth of smart ticketing offers considerable potential at being able to tailor this in a way that is easy for consumers to use and understand. In particular, there is considerable potential to use smart pricing in the context of the traditional season ticket market to further encourage the existing trend towards working from home for at least part of the working week. This will also offer companies the potential to provide part-time and shift workers with season tickets that reflect how they work.

At the moment, traditional season ticket products do not provide mechanisms to credit non-use and can therefore encourage travel to work at the margins where the incentive of 'saving' a day's trip might otherwise tip the balance towards staying at home.

However, the contribution which smart ticketing can make towards managing demand should not be overestimated. For example, research carried out in 2007, 2012 and 2014 from three separate sources placed a considerable question mark over the ability of pricing and smart ticketing alone to tackle the periods of most intense demand. For commuting such as into central London, this is typically the period between 08:00 and 08:45 Monday to Friday, where there are many services that are at absolute capacity. Studies into the kind of price differentials that might be required to shift people away from this peak established that there was an extreme inelasticity for this period, meaning that price differentials would need to be at politically untenable levels to achieve any meaningful shift in travel patterns.

Fare regulation has not changed for 20 years, and the existing peak fare structure sits within a very crowded product structure which has evolved in a very short term tactical way and is subject to multiple layers of regulation. This complexity, and the risk of there being customers which stand to lose from overhauling fares regulation, has meant that the political will to undertake such a review has not been forthcoming. However, this is set to change, as it was recently announced that passengers on trains between London and Sheffield or Scotland will be among the first to benefit from an overhaul of rail fare regulations as part of the tests agreed between train companies and the government. Due to start in May 2017, the trials to simplify the complex rail fares system will mean:

- **A route will be overhauled** to reflect what is actually on offer, ending the existing situation where changes to train services in many cases only allow fares to be added to the system rather than older, less relevant routes which customers do not use being removed from the fares system to make it clearer;
- **A best value end-to-end 'through fare'** will be offered for test journeys where customers change trains, by offering one price combining the cheapest fare for each leg of the journey. Current rules require operators to set and maintain a through price even where there are cheaper deals;
- **Easier journey planning** by showing customers the best price in each direction on selected routes, allowing customers to mix and match the best fare – like airline bookings.

This requires changes to regulated return fares dating back to the 1980s that can't be sold easily online, giving customers much more clarity and simplicity.

A ten-point plan and design guidelines for ticket machines include getting rid of jargon, informing customers when a machine will start to sell cheaper off-peak tickets and making clear what types of tickets machines do and do not sell. All the improvements to ticket machines will be in place by the end of 2017, several by the summer.

On an infrastructure level, day-to-day demand spikes and recovery from incidents can be managed through improved traffic management technologies and performance strategies. For example, one element of the Digital Railway programme is deployment of a traffic management system which could assist signallers and operators to more efficiently manage increased levels of train service on the infrastructure.

Q5: How should the maintenance and repair of existing assets be most effectively balanced with the construction of new assets?

Any activity on assets should be directed to support statutory and customer requirements. In the case of infrastructure, this normally means delivering safe, reliable assets that have capacity and functionality when the customer requires them. A balance needs to be struck between ensuring that the established capability of existing infrastructure is retained (where still required to meet customer needs), and investment to offer new and improved capabilities (providing expanded services to existing and new customers).

Network Rail's capital expenditure is typically disaggregated between maintenance, renewals and enhancements:

- Maintenance activity involves keeping the existing assets in a fit-for-purpose state, without requiring significant replacement of the asset
- Renewals occur on a periodic basis and involve the replacement of the asset with a modern equivalent capable of delivering a comparable output.
- Enhancements entail the replacement of an existing asset, or supplementing the existing infrastructure with new assets, to deliver an enhanced level of output – primarily accommodating an increased level of traffic.

Whilst the precise level of maintenance and renewals activity will be dependent on a range of factors, some level of activity will always be required, even if the assets are not used on a regular basis. However, investment in a range of technologies and new approaches to infrastructure renewal and maintenance offers the opportunity to deliver improved maintenance techniques and procedures that will in turn deliver asset renewal more efficiently/quickly, and with less disruption to services, than is possible today.

In contrast, enhancements are discretionary in nature, and are developed and implemented where circumstances require. As discussed previously, the rail industry's LTPP is the primary route by which these drivers are identified – with the Market Studies identifying likely changes in demand, and the Route Studies identifying the interventions required to support this. Whilst maintenance and renewals activity are effectively covered by income from passengers, enhancements require government investment, and consequently decisions around which enhancements to progress are made by the industry's funders – under current arrangements principally the DfT and Transport Scotland.

Q6: What opportunities are there to improve the role of competition or collaboration in different areas of the supply of infrastructure services?

When the rail sector was privatised in the 1990s, responsibility was split between managing the infrastructure and operating train services. Whilst there was a strong justification for this division, at the same time this has generated some inefficiency and misaligned incentives, which have prompted several external reviews.

The sector is responding to these reviews in a number of ways, most importantly through accelerating the process of Network Rail devolution, which encourages greater collaboration between the infrastructure provider and passenger and freight operators. Network Rail further recognises the benefits of collaborating with train operators in an increasing number of 'railway alliances'. These can be undertaken through a number of models, such as the joint management of ScotRail and Network Rail Scotland, with ultimate aim of providing enhanced service and value to users and funders.

In the renewal and enhancement of rail infrastructure, Network Rail additionally welcomes competition and collaboration. Indeed, most railway renewals and enhancements are already provisioned through market competition.

Increased collaboration with the supply chain through Early Contractor Involvement is now widely recognised to be essential in helping to keep costs down. The 'Staffordshire Alliance' of Atkins, Laing O'Rourke, Network Rail and VolkerRail is successfully delivering infrastructure to address a historic bottleneck on the West Coast Main Line in the Stafford Area, and the Digital Railway Programme is aiming to maximise supplier buy-in

from an early stage to drive down costs and ensure alignment of supplier capability with the emerging needs of a railway which adopts digital signalling on a more widespread basis.

Q7: What changes in funding policy could improve the efficiency with which infrastructure services are delivered?

Funding is the commitment of ultimate payment mechanisms to pay for the revenue requirement of the infrastructure provider. The funders will be parties recognising benefits arising from railway enhancements, but without the infrastructure provider taking on a capital repayment liability.

Currently the rail industry derives its funding from taxpayers, users and third parties. Government policy for a number of years has been to shift the burden of funding from the taxpayer towards users, and this trend is expected to continue. Accompanying changes to channel more government funding through train operators, rather than through payment of a direct grant to Network Rail, are designed to encourage greater efficiency through a stronger focus on users. Third party investment primarily takes the form of rental payments for property, or contributions from the beneficiaries of enhancement schemes.

Securing financial contributions from the beneficiaries of enhancement schemes is a means to ensure that the industry is able to monetise the value it creates for third parties, as opposed to this value being lost. The Shaw Report challenged Network Rail to 'explore new ways of paying for the growth in passengers and freight on the railway' and identifies that the private sector also has a part to play in supplementing available railway funding, particularly for enhancement projects, for example from property developers, local businesses, airports, freight terminals, train operating companies as well as from other parts of the public sector (for example local authorities and Passenger Transport Executives) and publicly funded bodies (for example Local Enterprise Partnerships or Growth Deals).

Whilst securing of such funding is not new to the business, the future incremental non-government funding requirement for infrastructure schemes will be a higher scale and will need to focus on some key priorities. To pursue these opportunities, Network Rail will need to:

- Integrate its processes for strategic planning and prioritisation of projects (which also involves the DfT) with its seeking of funding commitments for example prioritising projects supported by third party funding. This is a change to long-established public-sector and railway industry practice which ranks projects primarily by a cost-benefit analysis including non-financial and socio-economic elements.
- Develop a pipeline and gear up for project preparation and procurement.
- Put in place additional internal commercial capability to seek and manage funding commitments at earlier stages of project development.

Funding plans are being developed to capture non-DfT incremental funding, the value of which will be dependent on a wide range of variables and subject to caveats and assumptions around certainty, phasing and availability of ring fenced and other government funding.

Recognising that third party funding requires significant lead times to reach commitment, enabling work is already under way to support mobilisation of the required route-led capability by spring 2017. This includes the development of funding and governance guidelines and high level local funding strategies, sharing of proven practice, organisation proposals including a route business development role to lead this activity and consideration of commercial tools, resource and governance requirements across the business. Network Rail is also engaging more widely across the industry for support to unlock funding locally, and is supporting the RDG's Alternative Finance and Project Delivery workstream.

Additionally, the structure and geographies in which funding is provided can have secondary efficiency impacts on a variety of factors, such as flexibility of long-term planning and supply chain confidence. Network Rail is moving its enhancements model towards a progressive funding situation built around stage gate joint governance, which aims to resolve some of the inefficiencies created by the existing five-yearly control period structure.

Q8: Are there circumstances where projects that can be funded will not be financed? What government interventions might improve financing without distorting well-functioning markets?

Financing involves the provision of capital by private sector investors and lenders in the expectation of a repayment of capital and/or, a financial return on capital.

In general, the cost of private sector finance will typically be higher than the public sector cost of capital faced by Network Rail. Therefore, the use of private sector capital will create incremental value for money if the efficiency and performance gains, innovation and the risk transferred outweigh the extra cost of finance (the differential is at historic lows), transaction costs and any incremental interface costs. Projects which cannot be structured to separate adequately risks to the project's promoters from risks to be borne by Network Rail are likely to be delivered more effectively through Network Rail's standard procurement processes. In addition, there is a minimum size of project for private sector financing to make commercial sense and the scale of some projects will be relatively small.

Supported by Cambridge Economic Policy Associates (CEPA), the RDG's Alternative Finance and Project Delivery workstream has undertaken a two-phase project to consider:

- The obstacles faced by investors interested in rail and the opportunity for private delivery and/or finance to play a greater role; and
- How the obstacles might best be best addressed in order to take advantage of the opportunities identified.

The project identified clear opportunities for the sector, but also found some key obstacles which together mean that projects can be funded but not financed:

- Significant change requires whole industry support.
- It is not clear what the industry is being asked to achieve, beyond an aspiration to attract private finance.
- Projects have a lack of certainty throughout their development, which investors dislike.
- Many current projects are unsuitable to attract private finance / delivery and would need to be rethought to be able to do so.
- There is a lack of clarity and transparency which has a strong negative impact, particularly if the industry fails to speak with one voice.
- Level of interaction between projects adds complexity to seemingly simple schemes.
- There is complexity which can be perceived as the industry not having a 'can do' attitude, particularly in terms of timescales and processes.
- The industry may not currently have the required skill set and the private sector needs to have confidence in the industry's capabilities.

The report made the following key recommendations to improve financing in the rail industry:

- There should be a clear and transparent process for seeking private involvement.
- An appropriate detailed and independent approach to value for money analysis is required. Value for money is predicated on effective transfer of risk to the party best placed to manage it.
- Costs to investors should be minimised, and project timescales should be short as practicable.

- A sustainable pipeline of PPP projects (including for the longer term) should be developed and published. The aim should be for a pilot programme of 5-6 projects.
- ORR should review its accessibility to investors and ensure that regulation facilitates alternative approaches, without undermining the principles of the existing track access regime. Project promoters will potentially bear risk on the outputs of the assets they deliver, but not on wider system outputs (which they could not effectively control and to attempt to transfer this risk to them would be poor value for money). The exception to these assumptions might be a concession under which a whole region of network is to be recapitalised by the private sector which takes over as a network owner and operator.
- Projects to be structured appropriately (standardised where possible, e.g. contract form, risk share, etc.). It will be necessary to structure availability or usage payments to the project deliverers based on the availability and performance of their assets. Many schemes may not be fully self-funding, meaning that DfT and other funders may need to consider how it allocates its long-term support to privately financed assets, including some projects which may have some element of other funding as well as generating project income.
- Institutional capacity in the industry needs to be developed and relationships built directly with the private sector.

There is currently a strong availability of funds looking to invest in infrastructure, part of an ongoing and upward trend of greater allocation of long term investment into infrastructure assets. The evidence suggests that there would be a strong take up for a pipeline of appropriately structured deals which could either offer a self-generating revenue stream for investors and/or which provide opportunities for efficiency and innovation; provided the identified obstacles can be addressed.

Delivery credibility should be supported by the introduction of the 'Integrated Assurance' improvements but will also be dependent upon DfT funding continuity to enable committed projects to be taken to conclusion. In addition, to increase Network Rail's attractiveness to third-party investors, it is important to address the size of Network Rail's existing debt and to develop a future funding approach that is more sustainable.

Q9: How can we most effectively ensure that our infrastructure system is resilient to the risks arising from increasing interdependence across sectors?

There are a variety of interdependencies which arise between infrastructure sectors – some of which have been identified by the National Infrastructure Commission for investigation, which can provide uncertain and varied risks to service provision. For example, a key interdependence for rail is with the energy sector. An increasing degree of electrification of the rail network can bring a number of economic and environmental benefits, but requires a robust and reliable energy supply network.

Increased collaboration and visibility between sectors, alongside effective integration of resilience in planning, asset management, and operations, can help identify and mitigate these risks. For example, the rail sector working with key stakeholders such as Highways England, National Grid, MI5, and the Environment Agency could allow for information sharing and the development of strategies cognisant with identified interdependencies and risks in areas as diverse as climate change, environmental management, energy policy, and security incidents etc.

Long-term consideration for interdependence and resilience could be built into planning through engagement between contingent system operators, regulators, government organisations and stakeholders in different sectors. Collaborative working with other transport operators can produce resilient operational strategies where interdependent risks arise. For example, a failure of a transport mode – such as a major road incident – may significantly increase pressure upon rail transport along a geographically similar route.

Another way of ensuring resilience is to be less reliant by managing the energy mix differently through, for example, increasing the proportion of energy recovered through regenerative braking, energy generation

and storage technologies, self-powered (battery) trains, etc. This is covered by KC05 'Optimum energy use' in the RTS Capability Delivery Plan.

Climate change poses challenges for the resilience of infrastructures and their interdependencies. For example, better drainage and the management of flood events collectively will help manage impacts across sectors.

Q10: What changes could be made to the planning system and infrastructure governance arrangements to ensure infrastructure is delivered as efficiently as possible and on time?

The planning processes of Network Rail's Enhancement Programme 2014-2019 were recently the subject of a review by Dame Colette Bowe. One recommendation made by the Bowe Report, when issued in November 2015⁵, was for the DfT and Network Rail to reset the formal framework for enhancements planning, implementation and oversight. The issues highlighted, and processes put in place, could provide lessons learnt for wider how infrastructure planning and governance is conducted with a variety of funders.

In response to the report's recommendations, both the DfT and Network Rail issued a Memorandum of Understanding⁶ to jointly commit to new working practices and governance. The Enhancement Improvement Programme has been established to address major structural issues in the industry around the planning and delivery of enhancements.

Additional governance has been put in place to assist in the timely and efficient delivery of works, and to recognise that projects and programmes in early development are highly immature. Network Rail now aims to develop a pipeline of projects to be put through a series of joint decision points, so that funding is committed progressively and the value for money of delivered outputs is tested at key points in development. Funding should only be committed to progress to the subsequent joint decision point, to ensure clarity of cost and outcome expectations. Through this process, it is envisioned that at each stage planning faces discipline to investigate an increasing clarity of scope, outputs, outcomes, and benefits, as well as decreasing risk to funding and timely delivery.

Alongside these improvements to the planning and delivery of rail enhancements, the planning system could arguably be further improved in a number of areas. Continued review of processes and planning strategies on a variety of levels is required to ensure that supporting processes are effective, and that infrastructure developments have line of sight to national, regional, and local goals. For example, the Transport and Works Act could be reviewed to reflect experiences of major programmes. Similarly, if timelines of delivery for contingent projects and programmes are not aligned, then it can lead to frustration of stakeholders and delays to benefits. Collaborative working and transparency through such processes can provide opportunities of continuous improvement and likelihood of efficient delivery on time.

Q11: How should infrastructure most effectively contribute to protecting and enhancing the natural environment?

Existing rail infrastructure can frequently offer a habitat for a range of wildlife. However, difficulty arises when the primary use of this land, safe railway operation, potentially limits or comes into conflict with these environmental benefits. As such, proper planning and an understanding of estate and ecological management are required to provide both transport and environmental benefits. Gathering environmental data in partnership with organisations outside of the rail industry, and contributing to national datasets by enabling access to experts to catalogue habitats and species on railway land, provides a better understanding of the rail estate and information on affected species.

Major investment projects are often required to enhance natural environments and some are involved in the biodiversity 'net gain' trials. Collaboration is key to effectively deliver environmental benefits, including within; data collection and analysis, access, use of natural resources, use of personnel and knowledge sharing.

The industry has agreed a series of Rail Sustainable Development Principles⁷, and recognises the need to embed these in all its activities.

At the national level, government policy will be critical to meeting to ensuring sustainable outcomes. It is vital that the correct incentives are in place to make the best decisions for the whole railway and for the long term.

Ensuring better alignment between operator and infrastructure manager and between operational and capital costs will be fundamental to delivering sustainable long-term benefits for customers and taxpayers; environment and society. Greater consistency in sustainability performance and collaboration across devolved routes and investment projects needs to be ensured – there is still significant variation in how routes and train operators collaborate on issues including noise, non-traction energy and asset renewals.

Although whole life costs are considered, environmental and social benefits are often the first to be cut when project costs come under pressure, leading to higher operational costs. It is vital to ensure that opportunities for greater operational efficiency are not so easily lost to ‘value engineering’ projects. This balance between capital and operational costs will be critical in ensuring a more sustainable railway.

Q12: What improvements could be made to current cost-benefit analysis techniques that are credible, tractable and transparent?

Business cases for transport investments are typically supported with cost benefit analyses which follow the guidance set out in the HM Treasury Green Book⁸ and DfT Transport Appraisal Guidance (WebTAG)⁹. These use welfare benefits (for example, the value of savings in travel time) as key measures of the benefits of transport investments. However, maximising welfare benefits is not always the sole or even main objective of decision-makers. For example, economic growth, rebalancing the economy and deficit reduction represent different objectives; and the investments that would be most effective at achieving these are not necessarily the same as those that would maximise a traditional welfare-based Benefit / Cost Ratio. It is important that business cases consider the extent to which the investments are likely to achieve the desired objectives, even if this is difficult to quantify precisely, rather than the extent to which they meet objectives which are easier to measure but are not the primary goal of decision makers.

It is also important that cost-benefit analyses consider the full range of costs and benefits from a given scheme. This includes using whole-life cost estimates, and assessing schemes at an overall programme or strategic level. Transport investments are increasingly being planned as part of wider development strategies that include multiple investments in transport, housing and other infrastructure, as well as non-infrastructure investments such as in skills and training. Consequently, assessing the transport investment in isolation will not give a fair assessment of the overall strategy. As referenced in the response to Q3, wider benefits such as community improvement, jobs creation, and social value can be difficult to capture in an economically aligned business case.

Although there are a number of ways in which transport cost-benefit techniques could be improved, it is important that decision makers do not place too much emphasis on a single quantitative output – numbers like the benefit-cost ratio should be one of the key things that inform a business case and thus decision-making, but not the only one. There are few, if any, major investments for which cost-benefit analysis is likely to accurately quantify, let alone value, all the relevant considerations. Ironically, appraisal guidance itself often recognises this, stressing the importance of qualitative considerations in the overall decision. In practice, however, an arguably disproportionate amount of effort is sometimes put into the quantitative cost-benefit analysis.

Transport

Q13: How will travel patterns change between now and 2050? What will be the impact of the adoption of new technologies?

Growth in rail travel markets, or indeed any mode, is dependent on a number of changing factors and trends: macro-economics such as employment and economic activity, land use, micro-economics such as travel costs and competition, demographics of population and age, consumer tastes and perceptions, and the supply of travel opportunities such as modal generalised journey times can all affect travel pattern changes.

As part of the LTPP, Network Rail facilitated the production of four Market Studies to estimate how demand is expected to change over the subsequent 30 years in rail’s four key markets: long distance, London and South East, regional urban and freight. The passenger Market Studies concluded that the number of rail journeys would double over broadly the next 25 years. This growth is expected to be driven by a combination of economic and population growth, and deep rooted structural trends in the market which have supported

growth over the last two decades. These trends include re-urbanisation and growth of the 'knowledge-based' economy in large towns and cities. A positive shift in rail's competitive position against car travel has also contributed to growth, although in rail's largest markets (most obviously the commuter market into central London) travelling by car rarely offers a practical alternative. The strength of these underpinning structural trends were particularly evident during the economic downturn of 2008-9 when the passenger market continued to grow throughout despite a 6 per cent fall in economic output (although a change in ticket purchasing patterns did place greater pressure on passenger revenue growth during this period).

Whilst the economic impact of the decision to leave the European Union is uncertain, the medium to longer term drivers of rail growth remain fundamentally robust. As a result, it is difficult to construct plausible scenarios in which rail passenger demand growth stagnates, particularly in markets where rail is fundamentally aligned to the direction of economic development – commuting into large cities, high speed travel between urban areas, and providing connections to international gateways.

Based on the Office for Budget Responsibility's (OBR's) most recent forecast for the UK economy it is anticipated that the rail passenger market in England and Wales (measured in terms of passenger kilometres travelled) will grow by 13 per cent between 2015-16 and 2023-24, with a range around this central forecast of between 8 per cent and 18 per cent reflecting the OBR's range for GDP growth over the period to 2021. This forecast reflects 'external' drivers of rail passenger demand only (for example, anticipated economic and population growth), and is based upon an assumption that rail fares will increase by no more than the Retail Price Index (RPI) measure of inflation during the term of the current parliament.

In addition to this 'external' growth, once completed the committed components of the Railway Upgrade Plan could generate up to 9 billion more rail passenger kilometres per year by the end of CP6 - an increase of up to 15 per cent on today's total - even before major schemes such as HS2 and Crossrail 2 are taken into account. Further growth can also be expected as the result of operator initiatives delivered through the franchising process. As a result, committed improvements to the railway are expected to make a substantial contribution to demand and revenue growth over the next Control Period, potentially doubling the level of growth delivered by 'external' factors only.

Changes in energy generation policy and the simultaneous impact of a globalised steel manufacturing market have prompted a period of rapid structural change in rail freight's commodity base. This structural shift entails the loss of traditional commodities such as coal for the electricity supply industry and reductions in steel rail industry raw material / finished product traffic.

However, whilst volumes of coal for energy generation have reduced significantly, demand for rail freight is expected to grow strongly across a range of other commodity sectors: intermodal, construction, automotive and express freight and urban logistics. A new geography of rail freight demand is emerging, an increasing density southward from a line between the Humber and the Mersey increasingly focused on sectors with a fiercely competitive road haul alternative.

Adopting new technologies that can significantly reduce the cost of the delivery of railway services to customers will open up new market opportunities and present new options for connecting people with jobs, family and friends. Taking a radically different approach to the design, build and operation of the railway network will open up opportunities for less intensively used parts of the network, bringing the many benefits of rail to more people.

Major new technologies of note emerging in the UK rail sector include those which enhance national and regional infrastructure capability (such as High Speed Rail and Digital Railway signalling), and those which enhance transport service provision (such as 'Smart Ticketing' and digital communications technologies). The former should build upon rail's established economic benefits with technologies providing opportunities of enhanced inter-regional connectivity, increased capacity on congested routes, and better operational performance. The latter may allow for increased user experience and productivity, as passengers can prospectively integrate journey planning, efficiently purchase travel, and work on the move with high-speed internet connectivity.

Technologies of note emerging in other sectors include the possible development of new transport modes, such as Autonomous Vehicles (AVs) along road networks. If technology develops to maturity where AVs can operate safely at high speed in a coordinated manner, it could arguably provide large benefits and advantages to road transport. However, rail may still maintain an advantage with the efficiency it transports

large volumes of passengers. Indeed, AVs could be regarded less as a competitive threat, but as a complimentary means to plan for – for example, station planning and development could integrate AVs as an additional transport mode in a customer's journey.

Should AVs become viable modes that compete with mass transit, then decisions will have to be made as to whether their rollout is purely market led, or whether regulation and a level of accompanying infrastructure is to be invested in at a city, regional or national level. Where there are finite resources, there will be opportunity cost impacts from deciding to invest in infrastructure and systems for AVs, instead of the already established modes. This may slow down the forecast rate of growth of these modes, including rail.

Assuming some form of regulation and supporting infrastructure for AVs is granted, then the impact it has on changing patterns of rail demand travel will be critically dependent on the eventual form it takes. Careful long-term forward planning and in-depth consideration is required to ensure that infrastructure and systems to support AVs act to complement sunk and planned infrastructure investments in other modes.

The industry continues to assess the prospects for further growth under a range of scenarios. Most recently the RDG commissioned a study that addresses the question of how resilient rail demand is to a broad range of future 'shocks' to the economy¹⁰. The Commission is invited to discuss this work with RDG.

Q14: What are the highest value transport investments to allow people and freight to get into, out of and around major urban areas?

Rail's key strengths are in transporting large volumes of passengers, both for long distances between major cities, and for short distances within large urban areas. Many of the largest urban areas in England and Wales are already served by dense urban rail networks; all of which have experienced significant growth in passenger demand in recent years.

As highlighted in the response to Q1, following the completion of the schemes currently committed or underway, the next priority for the rail industry will be to support the delivery of the priority schemes identified by its funders and the National Infrastructure Commission. The schemes which fall within the remit of this question comprise Crossrail 2 and Northern Powerhouse Rail.

The next category of schemes is those which the industry has identified as priorities in light of the severe capacity challenges they seek to address. All of these interventions will support travel into, out of and around London; comprising upgrades to the Brighton and South West Main Lines, and interventions to address passenger crowding at Clapham Junction, London Euston and London Liverpool Street stations.

The next highest value investments are the projects set out in the enhancements to improve access to major urban areas. Examples include:

- Greater London: potential increased capacity of up to 27 trains per hour delivered by Great Eastern Main Line Upgrade Programme through train headway reductions.
- Northern city regions: transformation in the North of England to be delivered by the Northern Powerhouse Rail Programme (specific schemes and outputs to be developed).
- West Midlands: various interventions to accommodate passenger growth on services into Birmingham as part of the Midlands Rail Hub.
- Leicester: increased capacity to accommodate passenger and freight growth through Leicester delivered by Midland Main Line Programme.

In addition to enhancements, removing 'barriers' between transport modes through – for example – improved interchange, addressing ticketing and more personalised information will support the greater mobility of people and goods. New technology will support greater mobility and the true 'door to door' experience. Key Capability 3 'Efficient passenger flow through stations and trains' and Key Capability 9 'Personalised customer experience' in the CDP and the RDG Customer Experience activities address these areas. Additionally, the end point of having intelligent and autonomous trains is to deliver far greater flexibility and

far more journey opportunities that will support greater movement in and around urban areas and connect seamlessly with other mobility services.

Q15: What are the highest value transport investments that can be used to connect people and places, as well as transport goods, outside of a single urban area?

The key arteries for long distance rail travel in Great Britain comprise the following:

- East Coast Main Line: London Kings Cross to Leeds, York, Newcastle and Edinburgh.
- Great Western Main Line: London Paddington to Reading, Oxford, Bristol, Cardiff, Swansea and Plymouth.
- Midland Main Line: London St Pancras to Leicester, Nottingham, Derby and Sheffield.
- West Coast Main Line: London Euston to Birmingham, Manchester, Liverpool, Preston and Glasgow.

HS2 represents a significant expansion in capacity and connectivity from London to the Midlands and the north, with Phase 1 between London, Birmingham and Handsacre (near Lichfield) to be opened in 2026. Without HS2, the West Coast Main Line will be unable to meet the demands placed on it by passengers, freight or the economy. By 2033 HS2 services are expected to be running on Phase 2 between London, the Midlands, North West, Yorkshire and North East. Ultimately HS2 will offer transformational levels of connectivity between destinations currently served by the East Coast, West Coast and Midland Main Lines; and will provide links to international gateways at Birmingham and Manchester airports, and Heathrow via an interchange at Old Oak Common. For the East and West Coast Main Lines, the highest value investment comprise the various schemes included in the enhancements pipeline to provide additional capacity to support existing and post-HS2 traffic patterns. Examples include the East Coast Main Line Power Supply Upgrade project, and capacity improvements at Newcastle station.

Northern Powerhouse Rail aims to transform rail connectivity between the main economic centres of the North by offering faster and more frequent journeys. It will deliver enhanced east-west rail links with significantly reduced journey times and higher frequencies by developing a network comprised of new routes in some corridors, and significant upgrades in others. HS2 will be an integral part of Northern Powerhouse Rail, and Northern Powerhouse Rail and HS2 will together deliver the vision of city to city links, both east-west and north-south. Northern Powerhouse Rail will also be an integral part of the wider rail network and needs to be planned as such from the outset. Northern Powerhouse Rail stations will be integrated with local services with smart ticketing across the network.

The Great Western Main Line is currently undergoing an extensive upgrade which will deliver electric trains and increased train frequencies, and further enhancements in the future will build on this programme of work. Towards the west end of the route, the highest value investment will be to address the resilience of the coastal section from Exeter to Newton Abbot through Dawlish and Teignmouth. The Exeter to Newton Abbot Resilience Programme is being developed by Network Rail to achieve this.

In recent years the reopening of previously closed rail lines has transformed connectivity and brought significant new traffic to the railway. A particularly successful recent example has been the Borders Railway, which has linked Edinburgh and the Scottish Borders by rail for the first time since the closure of the 'Waverley Line' in 1969. Opportunities exist to support similar schemes elsewhere on the network.

Investing in the technologies that will enable the closer running of trains and far greater flexibility in delivering services will directly support connecting people and goods outside of a single urban area.

Q16: What opportunities does 'mobility as a service' create for road user charging? How would this affect road usage?

Although not strictly related to road user charging, Mobility As A Service (MAAS) offers further opportunities for people to access rail by providing people with far greater flexibility and choice as to how they use rail services. For example, through purchasing packages of travel as opposed to the more traditional season tickets and not having to purchase individual and different tickets for different modes.

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² Rail Technical Strategy Capability Delivery Plan, RSSB, 2017: <https://www.rssb.co.uk/rts/Documents/2017-01-27-rail-technical-strategy-capability-delivery-plan-brochure.pdf>

³ Building our Industrial Strategy: Green Paper, Department for Business, Energy & Industrial Strategy, 2017: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/585273/building-our-industrial-strategy-green-paper.pdf

⁴ Vision for Stations, RDG, 2015: http://www.raildeliverygroup.com/files/Publications/2015-10_vision_for_stations.pdf

⁵ Report of the Bowe Review into the planning of Network Rail's Enhancements Programme 2014-2019, Department for Transport, 2015: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/479560/bowe-review.pdf

⁶ Memorandum of understanding between Department for Transport and Network Rail on rail enhancements, Department for Transport, 2016: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/509545/mou-dft-network-rail-rail-enhancements.pdf

⁷ Rail Sustainable Development Principles, RSSB: <https://www.rssb.co.uk/improving-industry-performance/sustainable-development/rail-sustainable-development-principles>

⁸ The Green Book: Appraisal and Evaluation in Central Government, HM Treasury, 2011: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/220541/green_book_complete.pdf

⁹ Transport analysis guidance: WebTAG, Department for Transport: <https://www.gov.uk/guidance/transport-analysis-guidance-webtag>

¹⁰ Rail Demand Resilience Study, Final Report, Mott-MacDonald / Rail Delivery Group, 2016.