BETTER VALUE RAIL

Guidance on capturing the benefits of rail transport proposals

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UNDERSTANDING BENEFITS

This guidance document forms part of the Better Value Rail toolkit designed to shape good proposals for railway transport projects. The focus here is on understanding how a proposed project will capture and evaluate the benefits it seeks to generate. Benefits can be described in social, economic and environmental terms, and are assessed and quantified as part of developing the socio-economic parts of a business case.

Better Value Rail focuses on the early stages of business case development where it might not be appropriate or possible to carry out detailed cost-benefit analysis. That said, it is important to consider the way in which a business case will mature to include such analysis: knowing how value will be demonstrated is important when defining the early strategic objectives of a proposal.

The guidance below describes how the benefits shaped by strategic objectives are given more detail and how they are assessed in terms of socio-economic value. It shows the ways in which rail transport is able to promote benefits, describing what it's good at, and the scale of change that makes the most of its strengths.

Use this guidance to help shape a proposal's strategic case for change, and to build understanding of how benefits can be quantified, detailed and assessed as the business case for a proposal matures.

Department for Transport

Office of Rail and Road

Network Rail

Part A: DEVELOPING RAIL ASPIRATIONS

A.01 Introduction

This paper has been prepared by the Economic Analysis Team at Network Rail, based on the Better Value Rail principles developed jointly across the DfT, ORR and Network Rail. This guidance is consistent with DfT Transport Analysis Guidance. It discusses the market and economic conditions that are likely required for rail to become the appropriate transport mode to deliver the national and regional government's objectives on economy, society, and environment. It outlines the importance of developing the strategic case for change and discusses how rail can contribute to meeting the outcomes set by policy makers, particularly in supporting economic growth and connectivity.

This paper is written to help support the development of rail's aspirations at early stages, often before a Strategic Outline Business Case (SOBC) is required. For example, this can be used when strategic planners and sponsors at Network Rail are developing rail aspirations as part of the long-term planning process. However, some of the components discussed in this paper are also applicable throughout the development of a rail project and business case.

It is specifically targeted at schemes in England and Wales rather than those in Scotland, although many of the principles discussed here will be common to both jurisdictions.

The paper includes high level, indicative volume of demand that is likely required to support the economic case of new stations at early development. The second part of the paper

includes a case study on how the guidance is being used to help identify priority areas in a recent rail study that Network Rail is working on.

For early stage such as Strategic Outline Business Case, it's expected a proportional high-level demand modelling (such as trip rate) be deployed to forecast the potential scale of passengers and benefits. As a scheme develops further, promoters and funders would like to understand the forecast benefits in more detail (such as how much demand is abstracted, which passengers benefit from the new station service and by how much). Institute for Transport Studies Leeds has recently finalised a multi-modal methodology for forecasting demand and appraising benefits in cases where the majority of demand for a new station is abstracted from an existing mode. More sophisticated approaches like this help better shape decision making and optioneering of the scheme, but not expected at early stage development of a rail scheme.

A.02 Objectives and roles of rail

At an early stage of developing a rail aspiration, it is important to demonstrate the following:

- The Case for Change and the strategic narrative of the rail aspiration: i.e., what are the problems and opportunities that are driving a proposal to alter the transport system. What is the logic by which a change to the transport system will support the achievement of governmental (whether national, regional, or local) objectives? Indeed an economic case shouldn't be started until there is a clear understanding on what the strategic case is – presenting the strategic content and narrative, demonstrating why there is a need for a change in transport system. Only then a transport solution and economic case should be developed

- Identify the links between the transport sector and non-transport sectors of the economy, for example, by articulating how improvements to transport systems can support improved performance of labour markets by improving access to employment. It

should then articulate how rail can contribute to achieving the economic, societal and environmental outcomes set by the government.

- The relationship between transport connectivity, economic growth and environmental sustainability should be understood and presented; and

- It should consider whether cheaper, more efficient alternative mode exists or not, rather than focusing on rail as the only solution to a transport problem. A tool to help choose the correct transport mode can be found here https://www.bettervaluerail.uk/home/strategy/multi-modal-assessment-tool/.

- Rail requires certain market and economic conditions in order for it to provide good value for money, including size of communities and population in the catchment areas. Rail should be part of an integrated transport system, connecting people and business between key regional and urban centres and between modes.

In summary the development of rail aspirations should be objective-led, and evidence based, and it should outline what the roles of rail are. Once the strategic context and objectives have been defined, and the transport problems have been understood, only then a solution can be developed. Further information on defining the strategy can be found on https://www.bettervaluerail.uk/home/strategy/

National and regional government's objectives should be identified. Recently, DfT 's focus on policy has shifted towards:

- Meeting customers' needs,
- Delivering financial sustainability,
- Contributing to long-term economic growth,
- Levelling up and bring the union together; and
- Delivering environmental sustainability.

Sub-national transport bodies and combined authorities increasingly have the accountability to lead on the levelling up of their own economies and develop transport strategies for their areas. It's important to identify what regional stakeholders' objectives are for the economies and transport network, and to demonstrate how rail can help to achieve them.

A.03 Natural advantages of rail

The core markets of railway are defined by its key characteristics: speed, volume, and access to city centres. It has several natural advantages over other transport modes including:

- Rail can move a large number of passengers into and between cities and towns,
- Rail is suited to move people between regional and urban centres, offering competitive speeds and journey times compared to road and other public transport;
- Rail can move a large volume of containerised and bulk goods between distribution centres; and
- Time spent travelling on a train is often used more productively (for example business travel) compared to car and other public transport modes.

Recognising the natural advantages of rail enables scheme promoters to identify the market conditions that allow rail to be competitive and economically viable. Heavy rail is not always the most efficient solution to transport problems. Light rail, which is often cheaper to build and operate than "heavy rail", could be a better alternative mode in some circumstances depending on the transport issue. For example, light rail often enables better penetration into the city centre, offering better door to door connectivity and greater linkages to other transport modes. Rail often requires significant infrastructure cost and may not be an economically viable option for moving a (relatively) small number of people between places, when buses and coaches are often the more competitive public mode choice.

Therefore, it is important to articulate the transport problems and identify objectives set by the government, to understand how rail can help to solve the transport problems. Alternative transport modes should be considered at early stage to enable the right mode is being selected.

A.04 Transport, economic growth, and employment densities

In the long term, the sustainable economic growth of our national and regional economies will be driven by increasing productivity. Investing in the infrastructure (whether that be physical or in skills and education) to increase productivity is therefore a key objective of the government, and indeed has driven much of the investment in the rail industry in the past twenty years. The reason for this is that a lot of the barriers to improved productivity have been spatial – i.e. the fact that economic activities take place in one place (which enables greater specialisation) and people that have the right skills tend to live in another area (for a variety of economic, social and environmental reasons), and this has been identified as being a barrier to higher productivity.

Therefore transport plays a key role in supporting economic growth by connecting business-to-business and business-to-people, enabling economic activities to take place. Transport enables employers and businesses to gain access to each other and a wide pool of labour. Businesses that are well connected to each other and have good access to a large pool of labour will increase business interactions, generate economic activity, and become more productive.

There are three measures of connectivity to business and employment centres:

- Access to businesses for other businesses (B2B) which relates to agglomeration resulting from clustering of economic activities and knowledge spill over between sectors.
- Access to labour supply for businesses and increasing labour productivity by reducing cost of reaching a larger pool of labour.
- Access to employment of a working age population; this has an impact on the working age population and improving access to jobs. This should apply to areas of high deprivation and low participation rates and potential for increased amenity benefits.

Conventional welfare gain analysis which uses value of time evaluation to estimate the benefits of improved transport links to rail users (and non-rail users) is a relatively easy and effective method to estimate the benefits of transport investments to the society and economy. It enables funders to compare schemes across transport and non-transport sectors. In welfare analysis, it is assumed that there is no market failure and there is perfect competition. Hence any changes in the transport market will feed through (and therefore reflect) changes in prices (including wages) or activities (i.e. jobs) in other markets.

When market failure exists or there are barriers to competition, the wider economic impacts of improved transport links may not be captured. For most rail schemes, the conventional welfare approach is sufficient and proportional. While for major schemes, the wider economic benefits can be substantial especially when the investment is transformational. The impacts of specialisation, which aren't captured in welfare gain, can manifest themselves in three main ways:

- Agglomeration – density of economic activity
- Improved competition (i.e. lower price mark ups)
- Improved access to labour markets.

However, specialisation in one area because of becoming relatively better connected (which would be expected to lead to higher productivity) might lead to less specialisation (i.e. lower productivity) in other areas which become relatively less well connected. Therefore it is important to consider both local and aggregate impact (i.e. is there an "additional" net impact to the national economies).

It is also important to have access to local and regional economies for leisure opportunities. Connecting communities and improving access to education and leisure are one of the key objectives of regional and national government. This also supports the levelling up of economies. Rail's definition of 'leisure markets' covers a very broad spectrum of journey purposes, ranging from drivers of demand which are far from discretionary (e.g. access to

education or medical services) to those that are highly discretionary (i.e. holidays). The "leisure" market indeed serves a number of specific journey purposes including:

- Access to towns and city centres for their amenities such as retail and medical services
- Access to towns and city centres for their financial and commercial services such as banking.
- Access to tourist destinations for day trips; and
- Access to tourist destinations for holidays.

The roles of town and city centres are changing, and the balance between office, retail, residential and recreational will evolve over time to adapt to changes in worker and consumer behaviours – again, the current pandemic has and will change the economic function of cities and towns, but is unlikely to change the direction of urbanisation.

Reducing the cost and time to travel would increase the level of economic and social activities. Previous analysis from the Long Distance Market Study published by Network Rail show that when the time and cost of travel (of any mode) between two places are very long (more than 3 hours), most people do not travel to undertake business interactions. As the travel time decreases from 3 hours, the barriers to business activity reduce and the interactions between business become more likely to take place, to the point where (less than 30 minutes), there are low barriers to interaction, and few gains to be made from improving transport connectivity. Therefore, rail schemes that help to reduce the time (and cost) of travel will increase the level of economic and social activities undertaken. However, the marginal benefits of improvement will depend on the amount of time spent on travelling. Appendix C01 contains graphs showing how willingness to travel varies by journey purpose

A.05 Mode share and employment densities

Analysis undertaken by the Economic Analysis team through developing strategies for Transport for the North have shown rail's mode share is closely related to employment density (i.e. the concentration of jobs in a given area). Higher employment densities reflect a high level

of clustering of economic and business activities, which in turn tends to have higher productivity. Rail is the ideal and competitive mode to serve the city centers and big towns as it has the natural advantage of moving many people into reginal and urban centres. And city centres and large towns are usually made up of office-based jobs, with many concentrating in high rise buildings resulting in high level of employment density and high productivity.

Network Rail's analysis shows that as employment density increases, the proportion of passengers that commute by rail increases and rail becomes the "efficient" mode to connect people to business. As employment density reaches 30 to 50 jobs per hectare, the proportion of commuters by rail starts to take off (and conversely start seeing a fall in commuting by car), as illustrated in figures 1 and 2.

Figure 1: Rail's mode share and employment densities by city

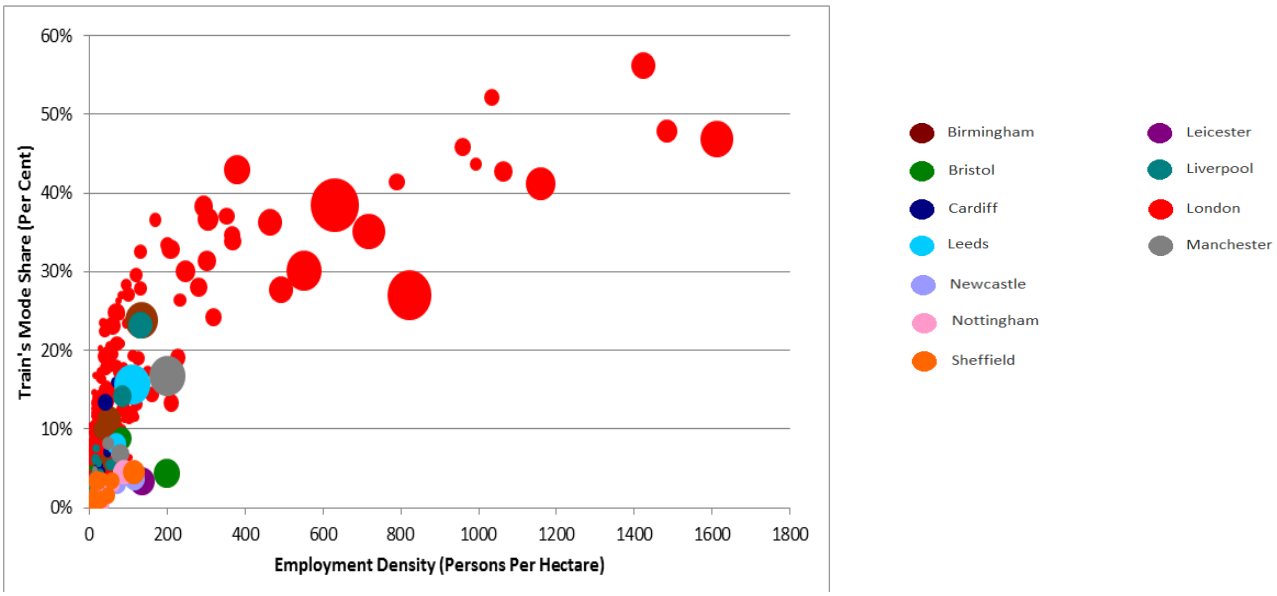
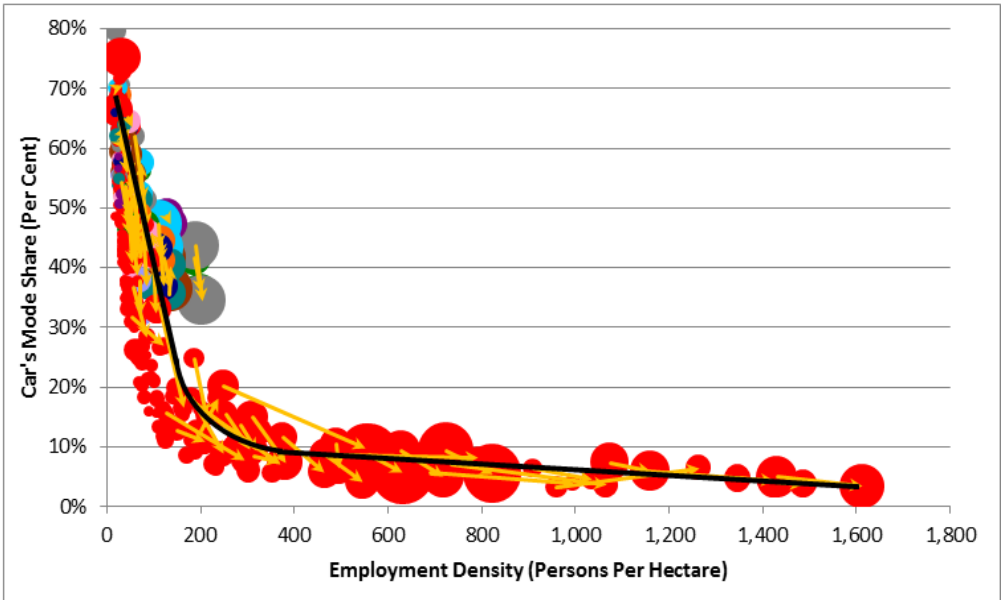


Figure 2: Car's mode share and employment densities by city



Pre-pandemic studies that focused on the economic impact of agglomeration, - clusters of business activities on economies of scale – have found that a doubling of employment density lead to a to 4% increase in labour productivity, and in many of our largest cities the only way of achieving these levels of concentration has been through improved rail connectivity. Correspondingly, road congestion in our major urban centres is a barrier to achieving higher concentrations of economic activity.

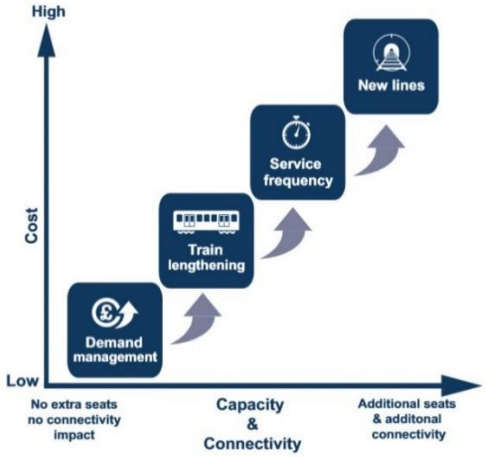
A.06 Developing rail schemes

New rail corridors or a step change in a rail service level generally require a large volume of passengers and substantial wider economic and rail user benefits to justify its high cost. Because of the high costs associated, connectivity aspirations are more likely to progress further when it can make best use of existing or planned infrastructure. Scheme promoters should also consider how well the rail aspiration or scheme can integrate into the wider

transport network too. As well as understanding the size of the transport market, it should describe how rail can help to capture a significant market share, shifting passengers to rail from other modes. It should be noted that development of rail aspirations is often conditional on value for money and subject to affordability.

Therefore, when developing rail schemes, it is important to consider how uncertain the benefits, and demand of improvements are, and what alternatives might exist which have the potential to drive significantly lower capital or operating expenditures. As Figure 3 illustrates, understanding the level of transportation change that is required will help put a focus on developing options which are the most efficient: i.e changing the order of magnitude of the connectivity and capacity against the associated cost. Cheaper options which utilise existing resources should be considered first to understand if there is an efficient way to solve the transport problems. Step changes to rail services including building new lines are often expensive and would require a high level of demand and benefits to justify the cost. Figure 3 shows the relationship between costs of scheme and the likely scheme outcomes in terms of capacity and connectivity.

Figure 3. Capacity, connectivity, and cost



Improving transport provision and increasing connectivity between places can help to stimulate regional economic growth, but it is not enough by itself. Regional economies often require investments in other forms of physical infrastructure (such as housing, schools, business sites) as well as social infrastructure (skills and education, low levels of crime, etc.) to achieve an increase in productivity and growth in economic outputs. Therefore, where rail investment is being as proposed as part of a “transformational” change, it is important that its impacts are considered as part of an intervention rather than it being perceived as the intervention.

Similarly, in some places, rail is likely to remain uncompetitive or uneconomic unless there is a significant shift in policy or traveller behaviours favouring rail. When an urban centre is self-sufficient with low employment density or its demand for labour can be met locally, demand for travel is often more likely to be best served by more cost-efficient modes such as cars and buses.

Even when rail is considered as an appropriate mode to help address the identified transport problems, it should consider whether light rail is better than heavy rail, in terms of better capabilities such as, better penetration into city and urban centres connecting communities. This is further explored on the Better Value Rail website.
https://www.bettervaluerail.uk/home/strategy/multi-modal-assessment-tool/

Appendix C02 summarises the key factors that should be considered when prioritising rail aspirations, as discussed in previous section.

A.07 Whole life costs consideration

Often when assessing a new rail project or idea, scheme developers tend to focus on the capital expenditure (cost) of the scheme, identifying what enhanced infrastructure is needed. Indeed, operating costs, such as rolling stock lease, fuel, drivers, operational and maintenance of stations, are often substantial and affect the value for money category of a scheme significantly. Whole life costs including operating cost and costs associated with renewal of

assets should also be considered. For further information on rail operating costs, see https://www.bettervaluerail.uk/home/examine/

A.08 Forecasting demand at new station

Understanding whether a new rail service is likely to be appropriate requires scheme promoters to understand both the current market conditions and also to take a view of what market conditions are likely to arise in the longer term, depending on whether or not a rail option is pursued. Rail promoters are therefore usually required to provide a demand forecast for proposed new services or new stations. It is important to note that understanding how a new service will affect the market for travel in an area is important not just for the development of the economic case (one of the five business cases), but also for informing the case for change and broader strategic case for a scheme.

Forecasting rail demand at a new station is challenging and a bespoke approach is often required to identify the push and pull factors that affect demand for rail. Each forecasting approach has its advantages and disadvantages and there is no single unambiguously “true” forecast of future demand. Indeed, the primary function of demand forecasts is to help understand the risks around a particular investment rather than necessarily “predicting” the future. Which forecasting techniques will be most appropriate depends on what research question is being asked: an additional train on top of an existing service would most likely make an elasticity-based forecasting approach most appropriate. However, an elasticity-based approach would not be suitable for forecasting the impact of opening a new station or a new line since there is no “base” demand for a percentage change to apply to.

For these types of scheme. it is common for scheme promoters to use trip rate approach, i.e. the average number of rail trips made by a typical resident in an area that shares similar economic, societal and demographic factors, to estimate the number of rail demand in the catchment area. This method doesn’t involve route or mode choice and is often used for

smaller investment schemes or an area with a smaller population catchment. Others may develop more sophisticated modelling such as mode choice (logit) model to estimate the generation and distribution of trips by different modes. In general, there is nothing wrong (and much that is right) with adopting a simple approach. Simple models tend to be easy to understand and represent a starting point from which an investment can be quickly and easily understood. However, as the level of investment increases, what is considered “proportionate” also changes. Larger, multimodal models are often costly to construct and require longer lead times to run, but it is necessary and important in cases where significant modal shift is expected and as the scheme develops further. A recent study on Rail Opening Appraisals undertaken by ITS looked into the current industry approach on forecasting and appraising new stations and new lines. It concluded that multi-modal approach is needed when the newly rail trips are mostly generated from other modes (i.e. modal shift to rail, although it recognises that the approach has to be proportional and appropriate at early stage of a scheme and understanding the strategic narrative is vital too, along with an economic case.

When developing a forecast, scheme promoters should consider the demand drivers: identifying the key markets served by the new station, understanding its catchment area and whether there are new housing and employment growth within the catchment area of rail. It should identify whether the station is a trip generator (e.g. the starting point of a return trip to an urban centre) or whether the new station is a destination.

For a trip generator, the demand exercise should aim to understand where people go to and what the main journey purposes are likely to be. For example, where do people need to go for work, leisure, and business and whether rail can help to take them to where they want to go. It’s also important to evaluate the source of demand, whether the rail trips are likely to be abstracted from nearby rail stations or other transport modes or whether it is a new generated trip. This affects the revenue impact to the government as rail often requires operational subsidies to operate. Scheme promoters should consider the subsidy requirement thoroughly and understand the financial impact to the public sector especially during the current times when rail finances are tight.

Station footfall is also affected by the supply side factors – the pull factors – including the level of service provision that can affect demand and the pricing policy. Promoters should consider how attractive the station is compared to other modes, and whether there are car parks to accommodate passengers who access the station by car. Other rail factors such as performance of the line, crowding level of services may also affect number of passengers who want to use rail at the new station.

A.09 Benefits quantification and new stations

The economic case and value for money of serving a new train station is highly affected by its demand, operational costs and users and non-users benefits. For example, a new station on an existing line and served by existing passenger services making extra stop on the route, will tend to have much lower operational costs than a new station on a completely new branch line which is likely to require additional staff and rolling stock vehicles to operate. The economic case is also affected by whether existing passengers on the trains are going to be adversely affected by longer journey times due to stopping at additional stations. Furthermore, if the new stations are just purely "abstracting" passengers from nearby stations, then the net revenue generation to the rail industry is likely to be low irrespective of the socioeconomic gain of diverting passengers from one station to another.

This section illustrates the potential range of passenger numbers that is required to support the development of a new train station. It should be noted that it is a very high-level exercise that tries to show the range of potential rail demand that a scheme can support, based on theoretically, but practical, operational assumptions. It is indicative only and should be accompanied with a strong strategic narrative and clear understanding of how the scheme meets the objectives set out by the national and regional government. It should also recognise that a strong BCR is not always needed to support a case if it also has a strong strategic case A value of money category is needed only for illustration purposes – so the analysis can "reverse-engineer" what the demand of the new station may look like.

Three scenarios are developed to reflect how the new stations may be served, whether by existing passenger services or additional trains which can affect the operational cost significantly.

- Scenario 1 assumes the new train station is served by existing passenger services, by calling the services at an additional stop (i.e the new station). In this scenario, it assumes no additional train operational costs.
- Scenario 2 assumes two new train stations on a branch line, and the new stations are served by one train per hour.
- Scenario 3 assumes two new train stations on a branch line and the new stations are served by 2 trains per hour.

Figure 5 shows the level of demand required under each scenario in order to achieve at least a medium (or high value in scenario 1) value for money case. A medium value for money is when the benefit-cost ratio is 1.5, using the value for money category definition from DfT' s Transport Appraisal Guidance. Information presented here is for reference only and further bespoke analysis and presentation of evidence and cases are needed for each individual scheme

Figure 5: Number of passengers by scenario

Scenario #	Results	Estimated minimum annual number of passengers per station to get a Value for Money case	Value for Money Rating
S1	1 New station on existing network, no train OPEX	150,000	High
S2	2 New stations, branch line (1tph)	250,000	Medium
S3	2 New stations, branch line (2tph)	400,000	Medium

The high-level analysis shows that a typical new station on a branch line would require 150,000 to 400,000 passengers to provide at least a medium value for money case. Of course, station demand is highly sensitive to the assumptions being made including journey time improvement (switching from other transport mode to rail), and the number of abstracted rail journeys (from other stations). Fare per journey and operating costs are often specific to the route and areas, and likely to be different from the assumptions used here. The demand numbers presented here are therefore indicative only and can vary significantly between schemes. Appendix D presents the results of the high-level socio-economic appraisal for each scenario. It should be noted this is for reference only, and further advice on developing a business case should be sought.

When developing the case for a new station, one should consider the population catchment of the new station area. For example, what is the population within 5 km and 10 km of the new station? An area with higher population within 5 km of the new station is likely to support a stronger economic case than a station with low population within the 5 km of the station. However, in some cases connecting to a smaller settlement can be viable if the smaller settlement acts as a hub for a several other settlements, particularly in a rural area where other public transport options are not available.

Network Rail is developing a First & Last Mile project to allow promoters to consider how to connect potential passengers to stations, and take account in incorporating active travel, integrated bus services and appropriate provision for car parking. Further details will be provided in the future.

When developing a business case for a new station, once should consider all five cases including the strategic case and understands the case for change. Other key factors such as the financial case, management and commercial case should be considered too.

Part B: A CASE STUDY

B.01 Introduction

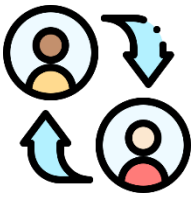
A case study is introduced here to show how priority areas are identified through understanding the natural advantages of rail and economic and market conditions for rail to have a strong strategic and economic case.

Network Rail is helping England's Economic Heartland (EEH), a sub national transport body to demonstrate the role rail can play in taking forward the ambitions set out within their region's draft Transport Strategy. It identifies priority areas and corridors where rail connectivity can be improved.

B.02 Multiple Criteria Assessment

Stakeholders have initially wanted to assess multiple locations in the region for connectivity-related conditional outputs to be developed. An objective led and evidenced based approach is required to fairly select locations which are likely to have the biggest impact to passengers, communities and the economy. A multi-criteria analysis (MCA) is developed to narrow down the list of locations based on several agreed and quantifiable economic criteria. It is a decision-making tool that evaluates multiple (possibly conflicting) criteria as part of the decision-making process. It also helps to identify priority areas where rail is "right" mode for meeting the region's objectives and likely to have an economic case. The proposed criterion are:

Criterion	Explanation
Population	The larger the population of a location, the more passengers that will benefit from a connectivity improvement.

	
Employment Density 	Network Rail's analysis has indicated that a minimum level of employment density is required before business rail travel starts to accelerate. Before this employment density level, even if large rail improvements are delivered, it will not significantly increase the number of business travellers.
GVA per Job 	The productivity of workers will affect how much the economy will 'level up' post a rail connectivity intervention.
Rail Service Opportunity 	This criterion examines how the current Generalised Journey Times (GJTs) to other regional locations compare to the expected GJT for the size of the location against the national average. The expected GJT is determined by the observed average GJT of similar sized employment centres from across the country.
Market Opportunity (to abstract from Car modal share)	This criterion looks at whether there is a big travel market and the rail modal share.

	If a location has a large market but a low rail modal share this represents an opportunity for rail to abstract passengers from road. Conversely small markets with low rail modal share are unlikely to see large increases in rail patronage with improvements to the rail service and therefore receive a lower score.

In terms of scoring, each location is scored between 1 and 5 for each criterion, with 5 being the highest score.

B.03 Criteria 1: Population

The population scoring has been tailored to the size of locations across the UK. Locations with higher populations are scored higher with mainly cities receiving a score of 5.

Score	Score details	Data used to represent the current state
1	<50,000	ONS Population Estimates for local authorities mid-2019
2	50,001-150,000	
3	150,001-300,000	
4	300,001-450,000	
5	>450,000	

B.04 Criteria 2: Employment density

This scoring is based on a national employment density analysis on UK cities undertaken by Network Rail's Economic Analysis Team. It showed a correlation across cities that once a location reaches 50 workers per hectare rail business travel increased sharply.

Score	Score details	Data used to represent the current state
1	<25 workers per hectare	2018 Business Register and Employment Survey: open access, using the MSOA data where the train station is located
2	25-50 workers per hectare	
3	50-100 workers per hectare	
4	150-200 workers per hectare	
5	>200 workers per hectare	

B.05 Criteria 3: GVA per head

The GVA scoring has aligned to the GVAs per head of local authorities from across the country. Generally, the data shows that locations in the South have a higher GVA than locations in the North. Higher GVA areas score higher under this criterion because they are able to generate higher economic returns (e.g. tax revenue and increase in economic output) for the country given an improvement to the transport network.

Score	Score details	Data used to represent the current state
1	<£40,000	

2	£40,001-50,000	Office for National Statistics 2018 Regional gross value added (balanced) by industry (£m) divided by 2018 Total Jobs (ONS Jobs Density)
3	£50,001-55,000	
4	£55,001-60,000	
5	>£60,000	

B.06 Criteria 4: Rail Service Opportunity

All flows across the UK were examined for this exercise to examine the average rail GJT between locations of a certain size (employment) and distance. The GJT from each key location to the other EEH locations were examined and compared to the expected GJT (the average GJT between locations of a similar job market size based on national UK rail data). If the actual GJTs to EEH locations were higher than the expected GJT this demonstrates that the rail service in underperforming compared to similar locations in the UK, and therefore it scores highly with a score 4 or 5 depending on how far away the actual GJT is versus the expected GJT. Conversely is the actual GJT is lower than the expected GJT it shows that the rail service is over performing compared to the national average and therefore scores poorly.

Score	Score details	Data used to represent the current state
1	<-40%	NR National GJT Analysis examining for all flows the total jobs for both the origin and destination and the GJT between them.
2	-10 to -40%	
3	-10 to +10%	
4	+10 to +40%	

5	>40%	

B.07 Criteria 5: Market Opportunity

The market opportunity criterion takes into consideration two factors: the size of the market and the rail modal share. The size of the rail market for this analysis is determined by totalling the business user demand per day to other locations. The second factor considered is the rail modal share; this is the percentage of rail business users out of all journeys made between the EEH locations.

Examples of the scores are;

	Rail Modal Share by Business Journeys per day to defined regional centres			
Score	**<750**	**751-2,000**	**2,001-5,000**	**>5,001**
1	>2%	>4%	>5%	>20%
2	<2%	2-4%	3-5%	8-12%
3		<2%	2-3%	5-8%
4			<2%	2-5%
5				<2%

B.08 Next steps

15 places in the regions have been selected based on meeting the “economic and market” criteria. Analysis is then undertaken to estimate the monetary value of improving connectivity by 10 % (measured by generalised journey time) between these regional centres by assessing the socio-economic, environmental and wider economic impact on commuters, business and

leisure users. This helps to identify and rank places that are likely to yield highest economic and environmental impact and achieving a value for money business case should the aspirations be developed further.

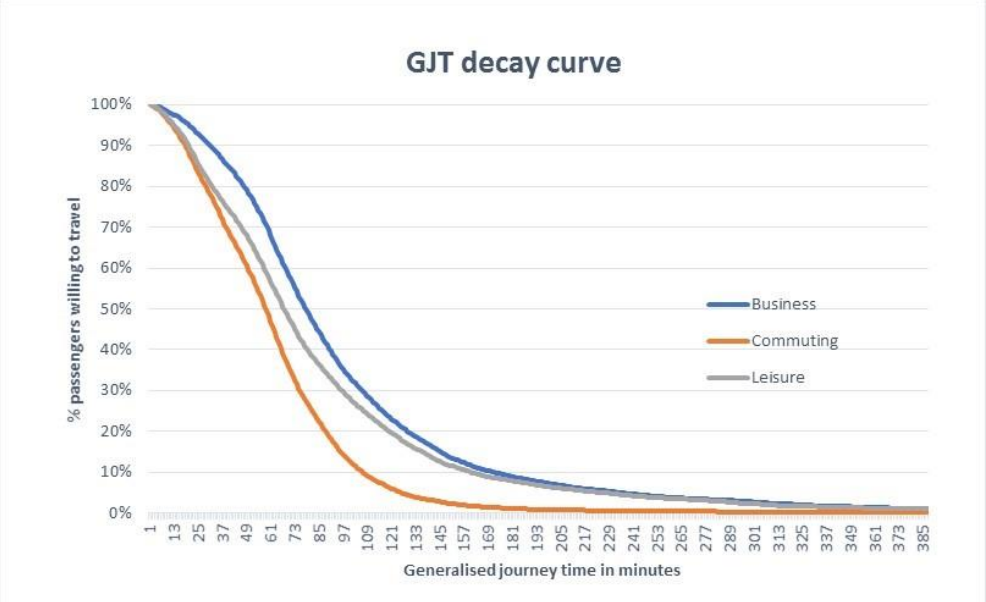
This is then further developed by identifying places where there are opportunities for rail connectivity to be improved and packages of rail aspirations will be developed, subject to further feasibility assessment, value for money and affordability.

Part C: **APPENDIX**

C.01 Willingness to travel by journey purpose

As an example, figure A shows an analysis of rail decay functions by journey purpose, it is clear to see how steep the decay function is for commuting compared with business and leisure. A steep decay curve for commuting suggests when journey time is low, a large proportion of people are willing to commute by rail. As journey time increases, a smaller number of people are willing to commute by rail. It falls very sharply when the generalised journey time is above 50 minutes or so.

Figure A: Decay curves - Willingness to travel by journey purpose



Business to business connectivity can be measured in terms of “effective density” which is a function of how well connected a place is and the size of businesses (e.g. number of employees in an area). The better connected a place is, the higher the effective density it has. Connecting to a large employment centre also increases its effective density.

C.02 Checklist for prioritising rail aspirations

Most of the questions below should be considered, at high level, in the early stage of strategic planning:

Policy Objectives

- ❑ Do the aspirations meet the objectives of the funders and government policy? Are they aligned with their priorities?
- ❑ How likely is it for the aspirations to be developed further and be funded?

Economy

- ❑ Are economic activities and business interactions already happening at places where services are intended to serve? Is there a sizable transport market (of all modes)?
- ❑ Does increasing services to the aspirational level improve national and regional economic productivity?
- ❑ Does increasing services to the aspirational level help to improve employment density and support structural changes in employment?

Transport Market & Network Considerations

- ❑ Does the intended market characteristics match rail’s natural strengths? Will the market be better served by other modes?
- ❑ Is the aspirational connectivity improvement sufficient to trigger a modal shift to rail from other modes?

- ❑ Is there any evidence to suggest the current transport and rail markets are "suppressed"?
- ❑ Do the aspirational service levels make use of existing/future planned infrastructure?

C.03 Appraisal summary

This section shows the appraisal summary table for the number of passengers assessment presented in the section A09, for each scenario (scenario 1 to 3).

Key assumptions included the scenarios are:

- Capital expenditure – A new 2 platform station with no land acquisition costs
- Operating cost – For scenario 1, no additional train operating cost is required (e.g. new rolling stock or extra train mileage), only include additional station operational costs for an unmanned station. If a new or extended rail service is required to serve the new station this will have a profound impact on the new station business case.
- The average journey time benefit to each new passenger is assumed to be10 minutes.
- 60-year Transport Appraisal Guidance compliant appraisal, with opening year set to 2028
- Disruption or longer journey time to existing passengers has not been modelled as it entirely depends on the number of passengers passing through the area which can vary widely across the country.
- 15% of the new station revenue is assumed to be abstracted from existing stations/other modes (and therefore is not considered new revenue to the railway in the appraisal)
- Once the station is open, it is assumed the background rail demand growth to be one percent per year.
- Optimism bias of 66% is assumed to the capital expenditure.

Figure B shows the present value of cost and benefits (in 2010 prices) for each scenario.

Figure B: Appraisal summary

Results of socio-economic appraisal	S1	S2	S3
	[£m PV, 2010 prices]		
Net benefits to consumers and private sector (plus tax impacts)			
Rail user journey time benefits	4.11	14.77	23.04
Non user benefits - road decongestion	1.22	4.37	6.81
Non user benefits - noise, air quality, greenhouse gases & accident benefits	0.21	0.76	1.19
Rail user and non user disruption disbenefits during possessions	-0.78	-1.56	-1.56
Indirect taxation impact on government	-1.65	-10.34	-16.12
sub-total (a)	**3.11**	**8.01**	**13.36**
Costs to government (broad transport budget)			
Initial capital costs	10.22	20.44	20.44
Non user benefits - road infrastructure cost changes	-0.01	-0.02	-0.04
Revenue transfer*	-10.23	-65.32	-101.87
NR operating costs and TOC operating costs transfer**	1.58	50.26	90.36
sub-total (b)	**1.56**	**5.35**	**8.89**
Net Present Value (NPV) (a-b)	**1.55**	**2.66**	**4.47**
Benefit Cost Ratio to Government (BCR) (a/b)	**2.00**	**1.50**	**1.50**

*Total revenue benefits = revenue benefits to private sector + revenue transfer to government (d)

**Total change in operating costs = change in operating costs to private sector + change in operating cost transfer to government (e)
Present Values (PVs) are in 2010 market prices and are discounted to 2010 using Social Time Preference discount rates: see Table A.1. The appraisal is in accordance with the DfT's TAG appraisal guidance. Results are shown for the relevant option/scenario etc relative to the Base Case. For net benefits etc, benefits are shown as positive. For costs to government etc, costs are shown as positive.
This is a summary version of the TEE tables.