Department for Transport

TRANSPENNINE ROUTE UPGRADE

Outline Business Case

19th November 2018 (BICC Date)

Revised: Final Version

Background

This document sets out the five chapter business case of the Transpennine Route Upgrade.

Each of the five chapters has a specific focus - however it is recommended that these are combined and read as a whole to provide a full strategic overview.

This is a Department for Transport document developed in conjunction with our advisors, Steer, Network Rail, Transport for the North and Rail North Partnership.

The material in this document is confidential and sensitive, and is not to be circulated outside of the Department for Transport without the express permission from the Department for Transport TRU Project Team.

Contents

TRANSPENNINE ROUTE UPGRADE

Strategic Case

Executive summary

This Outline Business Case (OBC) seeks authority to progress the Transpennine Route Upgrade (TRU) to programme design. The design cost is confirmed by Network Rail (NR) as [redacted]. This splits into direct design costs of [redacted] and early works of [redacted]. NR are currently supplying the phasing of these figures across CP6. These costs will be drawn down in phases.

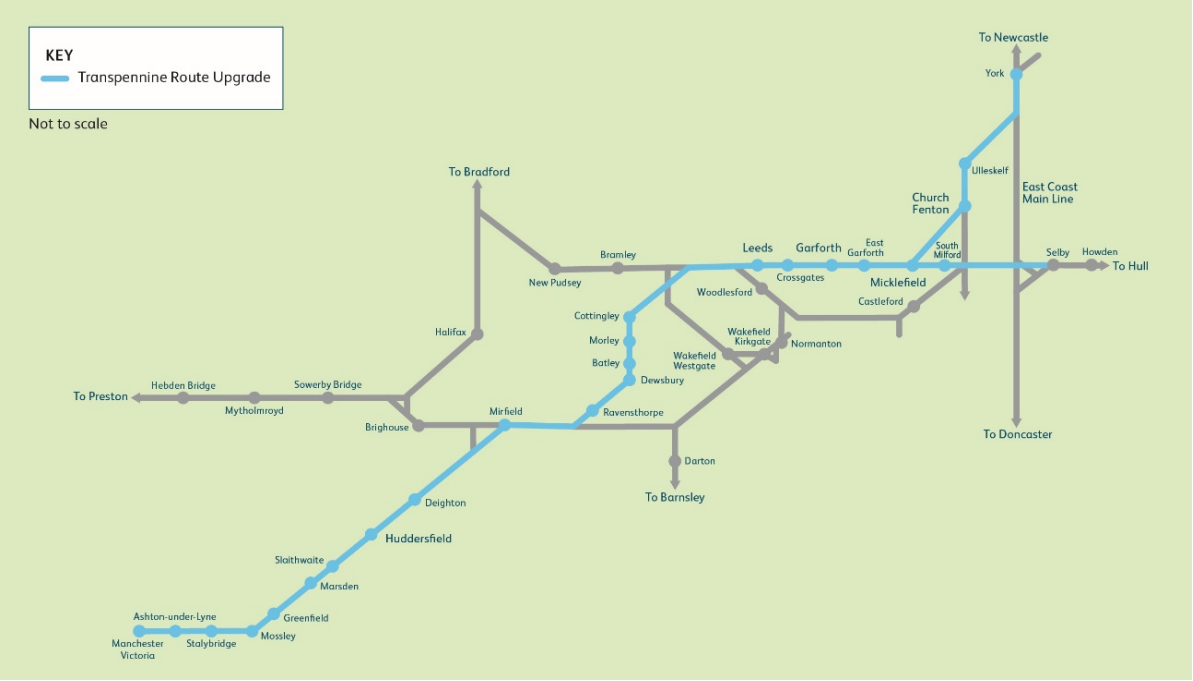
The Transpennine Route

1 The Transpennine Route is a key transport link across the North of England, with the core linking Manchester and York, via Huddersfield and Leeds. The principal rail operators on the route are Transpennine Express (TPE) and Northern. TPE services provide frequent, fast & semi-fast rail services between towns and city-centres across the North. Northern provides key local and commuter services into towns and cities. The route also supports freight services (currently about five per day per direction), links LNER services into Leeds, Cross Country services between Leeds and York, and Grand Central open access operations. The route supports a mix of services, rolling stock and operators. There are around 50 million passenger rail journeys on the route each year, around twice the number of journeys it carried 25 years ago.

2 The geography and topography of the route, with its climb to a tunnel under the Pennines at Standedge, is challenging and can be split into three key sections each with their own individual geography and infrastructure:

- From York to Leeds, a relatively flat section through open country, with several rail junctions;
- From Leeds to Huddersfield, a route constrained by urban areas, tight curves and one long tunnel;
- From Huddersfield to Manchester, crossing the Pennines with one very long tunnel at Standedge, several short tunnels, viaducts and curves that restrict speed, as well as a number of listed structures that make infrastructure interventions on the line difficult.

3 The Transpennine Route Upgrade (TRU) is a phased programme of interventions, to deliver upgraded and renewed rail infrastructure across the rail route between Manchester and York, via Huddersfield and Leeds. The map below shows the wider Transpennine services with the core upgrade route shown in blue.



The TRU programme provides a key first step in a transformation of rail travel in the north. The route sits within the wider North of England Rail Programme and the TRU represents the first phase of a potential series of major Northern Powerhouse Rail (NPR) interventions. This first phase of TRU/NPR focusses on:

- Capacity increases through service frequency and train capacity
- Performance improvements
- Journey time improvements
- Maintaining today's freight capacity and capability, with potential to add to both in the future

4 Across the Pennines, there is challenging topology, as well as limited connection to highway and motorway networks. Aside from local topography, across the whole region, average temperatures go well below 10 degrees Celsius from October to May in some areas, as well high levels of rainfall. This can begin to cause issues during the winter months to both construction and the running of existing routes and must be taken into consideration for construction work in the winter months.

5 The contrast is stark with routes in the South East, for example from London to Reading which is flat and make high speed rail less challenging to achieve than for TRU.

6 There is a choice to be made in terms of how much is done in this first step of interventions. The recommended option (SDO) is a major programme of key interventions with an optimised fit with potential future upgrades, including those being in planned in NPR. Further details on this are set out in the subsequent chapters of the business case.

The Economy of the North

7 The North of England is a major economic area in the UK generating an economic output of £317bn per year which is around a fifth of the UK's total. Improving economic performance in the North of England is central to rebalancing the UK

economy, improving UK competitiveness and productivity.

8 At the heart of the UK productivity challenge is the significant disparity between the economic performance of the North compared to the average across England - and particularly London and the South East

9 Transport can play a key role in bringing cities in the North effectively closer together and to improve commuter journeys to allow the North to function more as a single economy that has the size and scale to potentially compete globally with the largest and most prosperous places around the world. This can boost productivity as greater economic interaction improves the sharing of knowledge, resources and innovation between businesses, allows companies to access a wider pool of skills and enables businesses and staff in the North to be more mobile. A range of studies, by HS2 Ltd[1], the National Infrastructure Commission[2] and Transport for the North[3] have identified that improved connectivity is central to unlocking the North's economy and maximising economic opportunity.

Challenges and the Case for Change

10 Transport links in the North are significantly constrained. Networks are increasingly becoming crowded and congested, journeys are slow and unreliable and the infrastructure provision is relatively dated which provides limited capacity to accommodate growth. Together these factors contribute to the fundamental challenge of limited connectivity between major economic centres in the North. TRU is focused on addressing transport issues across the Pennines, particularly between Leeds and Manchester, through improving rail services – improved performance, capacity and journey times – which will support wider strategic objectives. Beyond the first phase of TRU, NPR will help improve links all across the region.

Alignment with Northern Powerhouse Rail and Strategic Objectives

11 TRU is one of three key programmes to upgrade rail in the north, within the existing North of England Programme:

- Northern Hub – a range of infrastructure upgrades to provide additional capacity, new connectivity and faster journey times on corridors to and through Manchester;
- North West Electrification; and
- Transpennine Route Upgrade

12 The first two of these are at a more advanced stage than TRU, with key elements already approved and delivered. A key issue now for TRU is to link with wider development of Northern Powerhouse Rail (NPR) in a strategic alignment across the intervention phases. The wider NPR objectives are summarised below.

- Transforming economic performance
- Improve access to opportunities across the North
- Increase efficiency, reliability and resilience in the transport system
- Promote and support the built and natural environment

13 These objectives themselves align with key national and devolved strategies and plans:

- The Government's Transport Investment Strategy
- The Government's Industrial Strategy
- TfN's draft Strategic Transport Plan

14 Improving connectivity between cities is vital to achieving the NPR vision to transform the economy of the North - cities are key centres of economic activity; the scale of cities matter to productivity; and bringing the region's cities closer together helps creates a significant economic mass that cannot be created at the individual city-region level alone.

15 Improving conventional rail is an important transport intervention:

- it is the most effective and efficient way to carry significant numbers of people directly into city-centres
- it provides faster, more reliable and environmentally sustainable journeys compared to road travel
- and it is a proven and deliverable technology
- It can be built on later

16 The objectives of TRU and wider NPR are completely aligned, and together align with wider national and regional plans and strategies.

17 TRU provides the first set of improvements that can be built on through later interventions within a wider NPR.

TRU Preferred Option

18 A total of six TRU options have been developed, spanning differing level of intervention and cost. More details on the interventions are set out in chapter 4 of the Strategic Case and in the Economic Case. The preferred TRU option/SDO offers a major transformation of the Transpennine route. The preferred TRU option – (particularly with the upgrade and electrification of Leeds – Huddersfield) -- provides a strong base upon which the wider NPR programme can build on, limits duplicative interventions and maximizes synergies with the transformative wider NPR.

19 The preferred TRU option:

- Increases scheduled services by 15% (above and beyond the existing significant franchise commitments)
- Improves performance
- Improves journey times: Manchester to Leeds by 15% (from 49mins to 41.5mins), and Manchester to York by 13.5% (from 74mins to 64mins), paving the way for further significant journey time games under NPR
- Provides a modern new electrified and four-tracked railway between Huddersfield and Leeds
- Renews most of the track across the route
- Is within the budget provision for CP6 provisionally allocated to TRU

- Provides a digital solution to signal control across the route

20 The preferred TRU option:

- provides a base for future upgrades through future TRU interventions and NPR
- aligns with key national and devolved strategies.
- is the next Key step in the transformation of rail in the north of England building on the additional services being provided by the NT/TP franchises

21 Further details on the options are set out in later sections, the Economic Case and the supporting modelling & analysis report. The table below provides a summary of the cost profiles and BCRs for the short-listed options. Note that these are headline rounded numbers. More details are in the Financial Case.

TOTAL PLANNED COST (£m Nominal)	CP5	CP6	CP7	BCR
Option 1	[redacted]			
Option 2				
Option 3				
Option 4				
Option 5				
Preferred Option				

22 Each tranche will be assessed for value for money in its own right and at the wider option level. This will ensure that if no further tranches were taken forward then the stand-alone value for money is understood.

23 It should be highlighted that the chosen option for TRU affects both future decisions of TRU and NPR, and both. For example the electrification and four tracking between Huddersfield and Ravensthorpe will potentially provide track capacity to NPR that it would otherwise fund. Also the initial partial and then, if followed, staged TRU electrification approach will require a fleet of bi-mode trains that will form the base fleet available. Dependent on a number of factors including age profile of the fleet at the time of future analysis and cascade potential, these Class 802 bi-modes can provide the TRU electrified services or be replaced by full electric trains. The value for money assessment will at that point in time assess these issues.

1. Strategic and Economic Context

Summary

1.1 The North of England is a major economic area in the UK, generating an economic output of £317bn per year which is around a fifth of the UK's. Improving economic performance in the North of England is central to rebalancing the UK economy, improving UK competitiveness and improving UK productivity. At the heart of this is the significant disparity between the economic performance of the North compared to the UK average - and particularly London and the South East.

1.2 Investment in the North's transport network can be considered in the wider context of the UK's productivity challenge, and the long-term opportunities for a more balanced UK economy. HM Treasury's (HMT) July 2015 paper 'Fixing the Foundations'[4] recognises that "growth comes either from more employment, or higher productivity". While the UK has been successful in increasing employment since the 2008 financial crisis, it has continued to lag behind international competitors on productivity and since 2009 has had lower productivity growth than the G7 average. The Office for Budget Responsibility noted in its Autumn 2017 report that persistent weak productivity growth would have significant consequences for the UK economy, both in terms of long term growth potential, and the public finances.

1.3 To address this productivity challenge HMT identified two key pillars of raising productivity:

- Encouraging long-term investment in economic infrastructure, skills and knowledge
- Promoting a dynamic economy that encourages innovation and helps resources flow to their most productive use.

1.4 Transport plays a key role in supporting both of these.

The Economic Challenge

1.5 The North's Gross Value Added (GVA) per capita is 25% below the average of the rest of England and remains 15% below the average, even when London is excluded. The level of this gap has widened since the early 1980s. Personal Incomes in Northern regions are also around 25% lower than in London and 12% lower than in the South East.

1.6 The Northern Powerhouse Independent Economic Review (NPIER) identified two main drivers for this performance gap with the rest of the country:

- Employment gap: There are not enough people in work in the North compared to other regions.
- Productivity gap: Workers in the North are less productive than other regions.

1.7 The employment gap has a number of causes. One feature relates to the age distribution of the North where relatively large proportion of older people in the North are not of working age. Amongst those of working age, there are also relatively large number of people in the region claiming incapacity benefit and job seekers allowance, some of whom fall within the category of long-term unemployed and may have become quite distant from the labour market.

1.8 The issues around productivity are more complex. The NPIER set out the underlying causes including:

- Lower share of higher skilled workers
- Lack of agglomeration
- Limited innovation
- Low levels of enterprise
- Poor connectivity and transport links

Cities and Productivity in the North

1.9 Agglomeration relates to the benefits that derive from firms and people being close to each other. A lack of agglomeration is cited frequently as a reason for the North's performance gap with the rest of the England.

1.10 Most of the economic activity and jobs in the North are concentrated within city-regions. Despite this, economic activity is generally quite dispersed across the city regions as a whole, despite the relative proximity of the largest cities (around 30 to 50 miles apart), ie the cities are not closely linked to eachother. As the IER demonstrates, economic activity is increasingly likely to be further concentrated in city-centres in future, but only if they are accessible to a much wider range of skilled workers and businesses.

1.11 Employment density measures the number of jobs within a given area and can be used as a proxy for the level of city region agglomeration in the North. The average employment density for city regions in the North, including Greater Manchester, West Yorkshire, the North East, Liverpool and Sheffield is generally lower than the average across England.

1.12 Economic activity also happens to be quite self-contained within the economic areas of the North. In many urban areas in the North the share of people who live and work in the same city is generally over 80%, with the North East Combined Authority having the largest containment rate of just under 95%.

1.13 The NPIER argues that the North's productivity challenge stems in part because economic centres are unable to fully specialise and grow to their full potential. This is due to:

- Limited access to resources, particularly skilled labour and investment
- Physical constraints to growth - physical geography of the Pennines and the need to protect the natural environment.

The Role of Transport in the Economy

1.14 Improvement in the region's rail networks can make a decisive contribution to improving the economy of the North. High quality transport links are crucial for driving agglomeration, concentrating economic activity and making an area an attractive place to invest. As shown above, Northern cities and towns are generally quite dispersed, in some cases have low population densities and some important economic centres are quite far apart. This puts pressure on transport links including both road and rail links and there is a widespread perception that the North has poorer transport than the rest of the country.

1.15 Work conducted by Henry Overman at the London School of Economics for the Northern Way[5] found that commuting between Manchester and Leeds is 40% lower than expected compared to similar city pairs that are similar distances apart. The market for travel between other cities in the North are even less developed. For example, journeys between Sheffield and Manchester and Sheffield and Leeds are relatively small given the relative size of these cities.

1.16 Transport capacity, reliability and journey time are key basic factors in the effective distance between towns and cities. Boosting the interaction with transport improvements between cities and other economic centres in the North can drive agglomeration within the key economic centres, driving economic investment in places, and increasing the interaction and trade between them.

1.17 TRU is the first phase of a transformation within NPR.

2. The Case for Change

Summary

2.1 The case for change and problem being addressed is firstly a rail transport problem of a need to renew, replace and upgrade the main rail route across the Pennines. In addition to achieving this, key interventions support to the economy and provide the first step of a rail transformation.

2.2 The route will require significant expenditure even in the absence of TRU. The renewal focussed activity is spread across the control periods, with [redacted] required in CP7 and [redacted] in CP6.

2.3 Transport links in the North are significantly constrained. Networks are increasingly becoming crowded and congested, journeys are slow and unreliable and the infrastructure provision is relatively dated which provides limited capacity to accommodate growth.

2.4 TRU will upgrade and renew the rail infrastructure from York to Manchester via Huddersfield, providing capacity, performance and journey time improvements that can benefit the Northern economy by improving direct links between its three largest cities – Liverpool, Manchester and Leeds -- and be a first stage of a wider NPR programme.

2.5 Transport plays an important enabling role in the economy and can help improve productivity by bringing places closer together which can provide people with access to a wider labour market and increase trade and competition amongst businesses.

2.6 Higher quality transport links can also make destinations more attractive to businesses and people. Improving access to international gateways, such as airports, can also encourage greater inward investment and exports.

Rail Travel in the North

2.7 Rail use and growth has traditionally been lower in the North than in other regions, but this position has reversed in recent years: growth has been greater than other regions over the last two decades. ORR data show that rail travel entirely within the North has grown at an annual rate of over 6% compared to just over 4% at a national level.

2.8 In addition, growth in longer distance passenger services has been higher than other services. Transpennine Express is growing at a faster rate than national rail passenger numbers overall, with annual revenue growing at 10%.

Journey Times

2.9 One of the key causes of limited connectivity in the North is the relatively long journey times across all of the trans - Pennine route and is a particular constraint on the direct Leeds-Manchester routes. As highlighted above, improved journey times is one of the most important and direct benefits that improved transport links can be provide by saving people time and bring places closer together to foster agglomeration.

2.10 Journey times can be relatively slow when travelling by car particularly when getting into city centres. The car journey time when travelling between Liverpool and Manchester for example is still around 51 minutes when there is limited traffic to travel a distance of around 34 miles with an average speed of only around 40 mph. The car journey time from Manchester to Leeds is over 60 minutes in limited traffic for a distance of around 46 miles. Given congestion and the lack of reliability on the M62, however, it often takes significantly longer and a predictable journey time cannot be depended on.

2.11 Cities in the North of England also, currently, have slower rail journey times compared to comparable city pairs in the UK. For example, despite similar distances between the respective city pairs, services between Reading to London average speeds of around 74 mph whilst between Manchester and Leeds services only average around 48 mph. Only Leeds to Newcastle and other services using the East Coast Main Line significantly exceed these speeds.

2.12 Comparing road and rail in the North, for city-centre to city-centre journeys rail in the north already has some journey time advantage over other modes, being able to take passengers to the heart of city centres. There is an opportunity to improve this.

Capacity

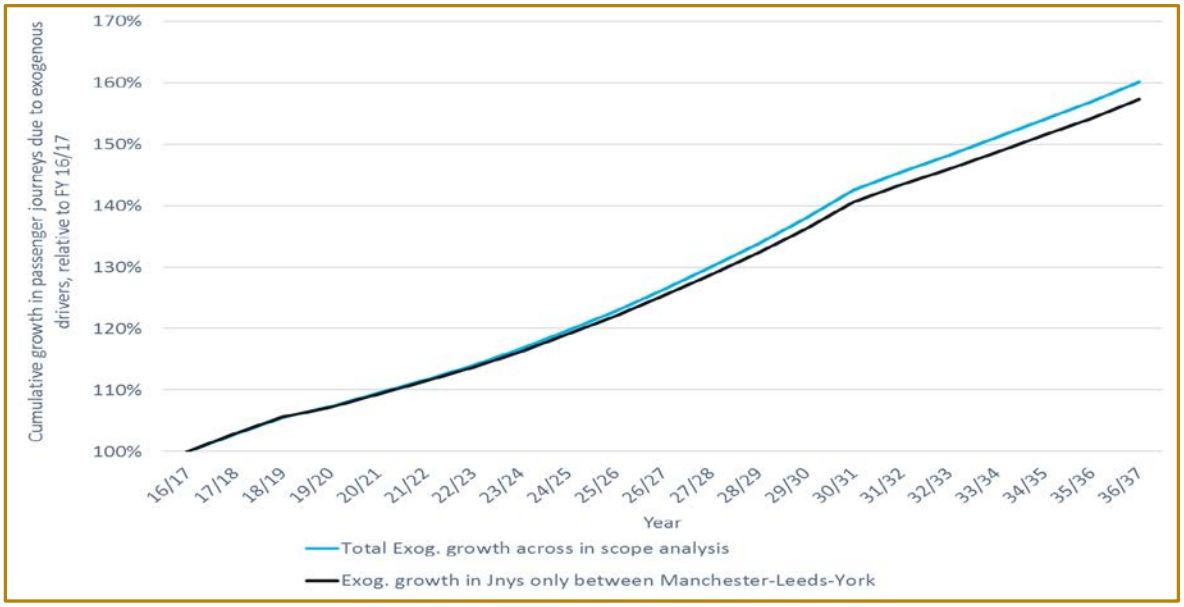
2.13 Rail passenger capacity can be considered from two dimensions: 1) passenger seats per time period - how many available seats services provide for passengers between different destinations; and 2) network capacity - how much physical capacity there is on the network to run services. The two dimensions are clearly closely related.

2.14 In terms of seat capacity, as passenger numbers have grown significantly on the Northern rail network, crowding is becoming increasingly evident. Most rail services into major cities in the North have passengers standing in both the AM and PM peak. This includes over 15% of Transpennine Express passengers arriving at Leeds, Manchester and Sheffield having to stand at peak times. As mentioned above the North has until recently had a lower propensity to travel by rail and expectations in relation to acceptable crowding are likely to be different to London and the South East of England.

2.15 The physical capacity for trains to run on the network is also heavily constrained in the North. The TransPennine route is a two-track Victorian railway technically unsuited to carrying the mixed traffic that it does support, including fast intercity trains, local stopping services and freight services and currently limited passing points at Huddersfield and Dewsbury (latter in one direction only). Leeds station is so busy it is impractical to attempt to pass trains there. These track constraints makes timetabling and maintaining performance problematic because rail capacity is optimised where trains of the same speed are operating the same stopping patterns (such as a metro service like the London Underground). However, the services on

the northern rail network sharing the same two-track railways have very different speeds and different stopping patterns which limits the potential trains per hour that can be accommodated across different routes.

2.16 Looking forward the capacity and crowding constraints on the route are likely to worsen, as a result of forecast increases in demand (see central forecast below, prepared by Steers using the standard rail industry demand forecasting approach):



2.17 The chart indicates the growth forecast using standard DfT methodology would see demand at levels approaching 60% above current levels in 20 years. Note this is just using demand drivers external to the rail industry (population, employment, GDP) and growth is likely to be higher where there are operator initiatives such as customer service and quality. Growth between the key cities across the route is forecast to be higher than the route as a whole.

Reliability

2.18 Reliability on the rail network is measured by the Public Performance Measure (PPM) which indicates the percentage of trains that reach their final destination stop within ten minutes for long distance services and five minutes for commuter services or are cancelled. The national PPM figure in 2018 for period 2 was 87.3%. Reliability for both major regional franchises in the North is less with the Transpennine Express franchise providing a PPM of 85% and the Northern franchise 86.8% (figures are for the whole franchises not just stopping services on the TransPennine route). Over the current decade, the trend for punctuality has worsened overtime for the Transpennine Express franchise: PPM was 91% in 2009-10.

2.19 Using the right-time performance measure, which indicates the percentage of trains arriving within 59 seconds of schedule, the reliability of Transpennine Express is only 46.8%, well below the 62.2% national average. Northern is just above this average.

2.20 Some of this poor punctuality is driven by the constraints of the rail network including the mixed nature of traffic using the same two-track railway. This is exacerbated by the prevalence the flat junctions at Micklefield and Stalybridge which can reduce reliability as timetables have to be aligned with different routes and delays on one part of the network can have knock-on effects to other parts.

The Congested Road Network

2.21 The National Infrastructure Assessment (NIA), NIC, 2018[6] has developed a league table of the most congested areas of England outside London. The NIC compared the ease with which people could drive from one part of an area to another at peak and off-peak times. The areas where the experience of travellers at different times varied considerably were ranked the most congested, while those where the experience was broadly similar ranked the least congested. Those in the top 25 places on the league table are all cities.

2.22 Based on this, the top 10 most congested parts of England outside London are shown below - the key TRU route cities of Manchester, Liverpool and Leeds are in the top 6. Notable is that the greatest road congestion outside of London is in Manchester:

1 Manchester

2 Liverpool

3 Birmingham

4 Portsmouth and Southampton

5 Nottingham

6 Leeds

7 Bristol

8 Brighton

9 Leicester

10 Bournemouth

2.23 The NIC identifies rail transport as the key mode to improve transport links and improve penetration into key cities.

Supporting the Economy

2.24 Rail plays a key enabling role in the economy. Improving it can directly benefit users as reduced journey times can save people and businesses time and money. More indirectly, it can help to improve economic productivity through key themes presented in the NPIER:

- Fostering agglomeration: through reducing journey times and tackling congestion, transport infrastructure can effectively bring areas closer together. This helps to concentrate economic activity and realise the benefits of greater sharing, matching and learning between workers, firms and consumers.
- Removing physical barriers to trade: improving linkages between cities and towns that may be physically separated by long distances or by natural geographical barriers (such as the Pennines) can help foster trade and increase competition amongst businesses.
- Expanding labour markets: transport infrastructure can deepen labour pools by increasing the number of workers that can access higher productivity locations.

- Making places more attractive to businesses and people: businesses are attracted to locations with higher quality transport infrastructure particularly if they provide greater access to a higher skilled workforce, improved business to business journey opportunities to improve access to suppliers and customers, improved access to finance and greater connectivity to international gateways including ports and airports.

2.25 Each of these factors is likely to have a varying degree of influence in the North given the unique characteristics of the economy, geography and stock of existing infrastructure.

2.26 The provision of transport can also be a key driver in transformational changes in land use that can unlock commercial and housing development in productive areas to support employment and population growth. There are numerous examples from major transport schemes in London which have had a significant impact on land use including the Jubilee line.

2.27 Employers in the North draw workers from smaller areas than those in the South. In 2011, almost 500,000 commuters travelled over 30km to work in London – double the number who commute that distance across all six major city regions in the North. This limited reach of labour markets means that Northern workers have fewer job opportunities, and Northern employers have much smaller labour supply pools.

2.28 A third of the UK's freight is currently moved from the North's ports, almost entirely by road. Significant growth is taking place, reflecting the investment and aspiration of port operators. Investments at Liverpool, Immingham and Tees Port have opened Northern marketplaces to global trade with container and other movements. The Transpennne rail route is not gauge-cleared for taller container trains meaning the largest inter-modal deep-sea shipping containers cannot move from east to west on standard rail wagons and in practice none of this traffic currently uses rail. This increases the cost of rail freight movements, suppresses rail freight growth and leaves more freight on roads in the North.

2.29 Supporting the international connectivity of air freight in the North has a significant economic value, and industries that rely on transporting high-value goods quickly around the globe (e.g. just-in-time services) depend on it.

Why Rail

2.30 Rail stations within major cities are usually concentrated within the key city centre area, close to where most of the jobs and businesses are located. Conventional rail is the most effective way to improve access opportunities for people in the North. The ability of conventional rail to enable people to travel long distances relatively quickly also provides the significant potential to increase the catchment areas of each city and provides more people with access to a greater number of cities.

2.31 The link between improved rail to greater passenger benefits to supporting the economy is direct and taps the key city-centre penetration advantage of rail. Rail already supports and can support further the functioning of the key cities and towns across the TRU route. Manchester, Leeds and York are key city economic areas served by rail which benefit from the unique ability of rail to penetrate into city centres, as well as link the key towns across the route including Huddersfield, Stalybridge and Dewsbury.

3. Objectives

Train Service Objectives

3.1 The proposed TRU programme has the following train service objectives:

- Capacity increases through frequency and train capacity
- Performance improvements
- Journey time improvements
- Positive/non-adverse environmental impacts

Align and Support Key National Policies and Strategies

The Transport Investment Strategy, DfT 2017, (TIS)[7]

3.2 The TIS outlines the Government's approach to transport investment. The TIS set out clearly four objectives that projects and programmes including TRU should support:

1 Create a transport network that works for users, wherever they live

- *"We know that transport users –people and businesses – want a network that is reliable, well managed and safe. Journeys that are easy, fast and comfortable, with the right connections in the right places. Our intensively used networks are ageing and face increasing demands, creating delays and undermining reliability. In places they don't provide the connections people and businesses need."*

1 Improve productivity and rebalance growth across the UK

- "*Reducing congestion and strengthening connectivity are both crucial for boosting our economy, through increasing local productivity and creating places in which people want to live and work. Our national productivity lags behind other countries and prosperity differs across the country*"

1 Enhance our global competitiveness by making Britain a more attractive place to invest

- "*The transport sector makes trade possible. Investors need effective international connections to access new markets, integrate operations into their global supply chains and to conduct business efficiently. The UK is well placed to meet these needs, but we are in constant competition with other countries to attract global businesses*"

1 Support the creation of new housing

- *"The housing market in the UK is not delivering the homes that people need. The Government's Housing White Paper set out a range of proposals to boost*

housing supply and create a more efficient housing market and transport investment should support this"

3.3 To assist with business case development the TIS clarifies the Department will ensure projects and programmes contribute directly to one or more of the above and in practice mean prioritising:

- Projects that improve user experience by addressing congestion and reliability in clearly defined ways, typically through maintenance, renewals, or capacity upgrades; especially on routes into and around our urban centres.
- Projects that deliver specific, tangible benefits to our wider objectives, for example schemes that make viable specific housing developments, or unlock identified private sector investment in jobs and industrial capability.
- Enhancements that create step-changes in connectivity and capacity where that can credibly improve the productivity or integration of our industrial, manufacturing or business clusters, both at a local and national level.
- Schemes that make the greatest contribution to environmental, safety, and health commitments, or that lead to improvements in overall user experience.

National Infrastructure Assessment (NIA), NIC, 2018[8]

3.4 The TRU programme is consistent with the NIC's objectives:

- Sustainable economic growth in every region: Full fibre digital infrastructure and urban transport networks lower the costs of connecting firms, workers and consumers; capture the benefits of higher productivity in dense clusters of firms; and enable innovation.
- International competitiveness: Low cost energy supports international competitiveness as an input to all economic activity. Promoting electric, connected and autonomous vehicle infrastructure supports the UK motor industry to stay at the forefront of innovation.
- Quality of life: Better air quality from electric vehicles, warmer homes from energy efficiency and a better designed public realm can improve people's quality of life. Resilience to floods and droughts protects people against natural disasters.

3.5 Additionally the NIC points to the strength of rail in serving city to city demand where rail investment can have the greatest impact.

Align and Support Wider Policies and Strategies

3.6 TRU can also be assessed against other relevant national, regional and local plans and strategies, summarised below.

Industrial Strategy: Building a Britain fit for the future, HM Government, 2017[9]

3.7 The Industrial Strategy focuses on the key issues of productivity so that every part of the country can realise its full potential. Within this the strategy sees transport infrastructure will be needed if the goals of the Industrial Strategy are to be met.

A Strategic Vision for Rail, DfT, November 2017[10]

3.8 This sets out the Government's vision for the rail industry:

- A more reliable railway

- An expanded network, forging new links between places to encourage economic growth
- A better deal for passengers, improving the customer experience
- A modern workforce with improved skills, training and diversity to deliver a better rail offer
- A productive and innovative sector to deliver ambitions of the railway and UK economy

Rail Network Enhancements Pipeline (RNEP): Moving Britain Ahead, DfT, March 2018[11]

3.9 The RNEP sets four priorities for investment summarised as:

- Keeping people and goods moving smoothly and safely
- Delivering the benefits from committed programmes and projects already underway
- Offering new and better journeys and opportunities for the future
- Changing the way the rail sector works for the better

Digital Railway Strategy, April 2018, DfT/NR[12]

3.10 The DRS sets out both the case for digital rail and a road map to delivering digital rail technology onto the GB rail network. DR has the potential to provide key benefits from optimisation of network capacity use and allocation, including:

- Increased capacity to meet demand;
- Better performance for passenger and freight customer journeys;
- Enabling faster journey times;
- Less disruption from renewals, maintenance and upgrades;
- Enhanced safety for passengers and workers; and
- Better asset sustainability (lower whole life cost).

3.11 TRU is seen as a key programme to be at the forefront of digital deployment, combining co-ordination of signalling renewal within the overall renewal/enhancement of TRU and set within a defined geographic scope of a modernised railway.

Rail Freight Strategy: Moving Britain Ahead, DfT, September 2016[13]

3.12 As part of the network capacity theme the Strategy recognises that alongside securing the best use of the existing network, new infrastructure may have a role to play in meeting its objectives, but it does not set out proposals for new enhancements to the network or specify in detail the freight paths that will be needed in future.

A Better Railway for a Better Britain, Strategic Business Plan 2019-2024, NR[14]

3.13 In creating a 'better railway for Britain' that supports economic growth, there is a focus on improvements for passengers, jobs, housing and growth and supporting British technology and innovation. To deliver changes in the railway, four themes have been established:

- Safe

- Reliable
- Efficient
- Growing

Single Departmental Plan, DfT[15]

3.14 The Single Departmental Plan (SDP) sets out the objectives to 2020 for the DfT and how we will achieve these, summarised as:

- Support the creation of a stronger, cleaner, more productive economy
- Help to connect people and places, balancing investment across the country
- Make journeys easier, modern and reliable
- Make sure transport is safe, secure and sustainable
- Prepare the transport system for technological progress, and a prosperous future outside the EU
- Promote a culture of efficiency and productivity in everything we do

Northern Powerhouse Strategy, HMG, November 2016[16]

3.15 This sets out the Government's strategy for addressing the economic performance gap between the North and the rest of the country. It identifies themes to strengthen the economy of the North of England (defined as the regions of the North West, the North East, and Yorkshire and the Humber):

- Strengthening connectivity between and within city regions
- Ensuring the North develops, attracts and retains skilled workers
- Making the North an attractive place for enterprise and innovation
- Promoting trade and investment

3.16 The Strategy recognises a need to enhance transport connectivity within and between the North's city regions.

Strategic Transport Plan (Draft), Transport for the North, January 2018[17]

3.17 TfN's vision is "of a thriving North of England where modern transport connections drive economic growth and support an excellent quality of life". To support this vision the STP sets out four objectives:

- Increase efficiency, reliability and resilience in the transport system
- Transforming economic performance
- Improve opportunities across the North
- Promote and support the built and natural environment

Long Term Rail Strategy Draft Update, Transport for the North, January 2018[18]

3.18 The LTRS sets out TfN's vision for rail in the North as a supporting document of TfN's draft Strategic Transport Plan. The LTRS establishes five themes for rail in the North:

- Connectivity
- Capacity
- Customer

- Community
- Cost-effectiveness

Other Key Local Strategies and Plans

- The need to improve rail links in the North is also referenced in a range of other plans prepared by the City Regions, Cities and Counties of the North, these are set out at the end this strategic case.

Align and Support Other Key Potential Interventions

NPR and HS2

3.19 TRU can be assessed in terms of how well it fits with other rail interventions. Key objectives in this respect are:

- Aligning and co-ordinating TRU with NPR/HS2
- Minimising wasted TRU and other assets where other interventions are developed in future years
- The degree of potential for dual use/sharing TRU interventions with NPR/HS2

Passengers

3.20 Improving the passenger experience is the central objective of TRU and forms the basis of the value for money assessment. The key passenger experience areas and summary impacts are set out below with further details set out in the economic case.

Passenger Experience	Impact of TRU
Journey Time	Improved journey times between Manchester, Leeds and York
Reliability	The infrastructure improvements will allow the mixed railway on the route to operate more effectively with improved performance and resultant lower average minutes lateness.
Connectivity/Frequency	Improved frequency with reduced journey times provides an improved timetable
Trains and Stations	Alongside TRU there will be new train fleets and new and improved stations
Disruption/Construction	A key trade-off will be between degree of disruption, cost of construction and speed of delivery. For example, less disruption can be planned which may result in longer construction timescales. There has been detailed plans yet and this is a key area for the next phase of development and design to consider.

Fares	There are no plans to changes the level of fares as a result of TRU.

4. The Preferred Option

Summary

4.1 Option development, sifting and selection applied a systematic process of detailed intervention assessment, cost estimation and then option selection. The Department, NR, operators and TfN worked jointly in detailed design groups over 18 months to review and finalise options. Final sifting resulted in 6 options which range in cost, scope and value for money. The preferred option delivers capacity, performance and journey time benefits within a CP6 budget cap. Other options would provide greater benefits, require greater funding and would span CP6 and CP7 interventions. The preferred option has a good fit with potential NPR interventions and at the same time provide the basis for further interventions in future Control Periods.

Option Generation and Short-Listing Process

4.2 Development of options has been focussed within the overall governance of the North of England Programme Board. Frequent design meetings have carried out intervention assessment and development/early design. This process identified a total of 31 interventions at a detailed route level and these have subsequently been narrowed, through a joint industry workshop process, to a summary of six key option choices, shown below.

Summary of Options and Anticipated Final Costs/Enhancement Funding Requirement (CP6 Only and Nominal to 2 significant figures including Do-Minimum Renewals)

	Manchester to York journey time	**Manchester to Leeds journey time**	**Electrification**	**Scheme opening year**	**Capital cost (£m, nominal prices)**
SDO1	60.5	39	Full	Phased Final 2027/28	[redacted]
SDO2	62	39	Full, but not Micklefield-Selby	Phased Final 2027/28	
SDO3	62.5	41	Victoria to Stalybridge, islands at Huddersfield, Leeds and York	Phased Final 2027/28	

SDO4	67	42.5	No new electrification	Phased Final 2026/27	[redacted]
SDO5	64	41	Full, but not Micklefield-Selby	Phased Final 2027/28	
SDO6	66.5	41.5	Victoria to Stalybridge, Huddersfield to Leeds, Ulleskelf to York	Phased Across Control Period 6	

4.3 Initial design work by Network Rail was in response to the Department's Client Development Remit (CDR) agreed between DfT and Network Rail. For design focus purposes this document set out targets:

- A journey time of 40 minutes between Leeds and Manchester, and 62 minutes between York and Manchester;
- 4 fast and 2 semi-fast long-distance services per hour;
- Capability to operate 8-car long-distance trains, and 4-car stopping trains;
- An indicative performance target of 92.5% of station calls within 5 minutes of schedule; and
- Existing freight rights as at present.

4.4 Analysis of the individual interventions for the scheme by the Department and our economic advisers suggested that some of the SPOs delivering line speed enhancements offered better value for money than others. To help guide choices, an exercise was therefore carried out to rank line speed interventions by capital cost per second of journey time saving to help direct the creation of a new overall option (SDO) which included only those line speed SPOs that were likely to offer the best value from money. This new SDO, designed to maximise the value for money of the scheme, was designated SDO5.

4.5 A further option was developed to provide a budget constrained capital spend of [redacted] in nominal terms and this option, SDO6, was created to meet this specification. SDO6 is a finessed, budget consistent version of the optimised SDO5.

4.6 The TRU scheme can be broken down into several components:

- Line speed improvements;
- Track capacity improvements;
- Electrification; and
- Signalling.

4.7 Key track capacity increases are achieved by grade separation at Ravensthorpe, and four-tracking between Ravensthorpe and Huddersfield. These allow segregation of fast and stopping services on this section of the route, allowing the introduction of an extra stopping service which can be 'overtaken' by a fast train – made possible by the four-tracking. This in turn allows a service pattern of 4 fast and 2 semi-fast trains per hour. In practise line-speed improvements cannot be delivered without the capacity interventions as trains would simply catch each other up on the section of route between Leeds and Huddersfield.

4.8 SDOs 1-4 varied both in terms of the line speed improvements offered, and the extent of proposed electrification. Analysis was carried out that sought to separate out these different dimensions, to understand the case for electrification alone. This analysis suggested that for all SDOs, over a 60-year appraisal period, the operating cost savings offered by electric traction outweighed the capital expenditure on electrification, though the incremental capex for electrification (at GRIP2) is an area subject to further assessment and DfT external review suggested the current estimates looked low in whole-life terms. Therefore whilst electrification in the absence of a budget constraint appears to offer value for money the key capex variable requires further assessment before this could be confirmed. It was on this basis that the specification of SDO5 included full electrification; it was not possible to specify electrification for SDO6 given the funding constraint applied to those options. This is an area for potential consideration in future investment decisions on the route.

4.9 In presenting the business case, it is not practical to provide detailed analysis of all options. Two options have therefore been selected to be presented in full in the Economic Case, with the other four options presented in the Economic Case appendix.

4.10 SDO6 has been selected for full analysis, given that it directly addresses the Secretary of State's instruction for the scheme and can be funded within the CP6 settlement. As an illustration of the business case for the scheme as specified by the CDR, SDO2 is also presented. The business cases for the other options mostly fall within the range of SDO2 to SDO6, with SDO1 being slightly more extensive than SDO2, but having a similar business case.

4.11 Further details are set out below on the preferred option, Single Development Option Number 6 (SDO6). A summary of the core train frequencies per hour before and after TRU are shown below. Alongside the frequency increases passengers benefit from improved journey times and performance improvements.

TRU Services - East to West

4.12	**Do-Minimum**	4.13	**TRU Do-Something**
4.14	4 Fast Trains	4.15	4 Fast Trains
4.16	1 Semi-Fast	4.17	2 Semi-Fast
4.18	1 Stopping Train	4.19	2 Stopping Trains

4.20 Note: Non-through tunnel stopping services also increase east of Huddersfield.

The Preferred Option

4.21 SDO6 is within a set budget for CP6, focusses on capacity increases, performance improvements and journey time reductions. It is focused on passenger services as a first stage of interventions.

4.22 Electrification is not continuous and the greater interventions are between Huddersfield and Leeds, which means fit with wider NPR is good if it is routed via Huddersfield. The fit with NPR will be optimised where TRU interventions are not made redundant early due to wider NPR replacing them and where TRU and NPR can share infrastructure, notably between Huddersfield and Leeds on the proposed new four-tracked electrified rail section.

4.23 Further synergies exist East of Leeds into York where HS2/NPR/TRU can share the new HS2 infrastructure.

4.24 If SDO6 is taken to the next stage of design then the phasing/tranching will be assessed as part of detailed planning. The first tranche is the least invasive, shown in very summary form below:

- Manchester Victoria to Stalybridge
- A series of interventions that reduce the journey time from line speed increases. Interventions include junction works and track straightening works.
- Morley to Cottingley
- A series of interventions that reduce the journey time from line speed increases. Interventions include station platform works and track straightening works.
- Micklefield Junction
- Interventions that reduce the journey time by line speed increases through the junction. Interventions include track recanting/curve steepness with line speed increasing to 100mph.
- Church Fenton to York
- Interventions that reduce the journey time from line speed increases. Interventions include new track formations, strengthening, new layouts to reduce conflicts and improve performance.

4.25 Electrification in SDO6 is limited to key sections of the route:

- Victoria to Stalybridge
- Huddersfield to Leeds
- Ulleskelf to York

4.26 Subsequent tranches would follow with more intensive interventions within Tranche 3, which include Ravensthorpe four-tracking and electrification. The tranche groupings are shown below:

Tranche	Projects	Type of Intervention	Benefits Journey Time (seconds)/Performance/Capacity
Tranche 1a	Leeds Capacity	Platform works to improve capacity	Capacity
Tranche 1b	York to Ulleskelf	Church Fenton to York linespeed improvements, with realignment of up and down lines to obtain 125mph capability	70 Secs Performance
	Victoria to Miles Platting & Morley	Realignment between Victoria and Miles Platting to remove sections of 40mph and 30mph speed limits, and increase linespeed to 60mph Relocate Morley station 170m closer to Leeds to provide opportunity to increase linespeed to 70mph on flatter curve, and provide improved, DDA station	80 Secs Performance
Tranche 1c	Victoria to Stalybridge	Electrify Victoria to Stalybridge Upgrade Baguley Fold crossover and remove Philips Park crossover to enable linespeed improvement	50 Secs Performance
Tranche 2	Church Fenton to Neville Hill	Linespeed improvements via realignments between Neville Hill and Church Fenton Platform works at Garforth Micklefield junction improvements	Performance
	Stalybridge to Ravensthorpe	Remodelling of Stalybridge station and approach lines Linespeed improvements between Stalybridge and Huddersfield New loop facilities at Marsden Remodelling of huddersfield station and approach lines, including new platform Four tracking Huddersfield - Ravensthorpe Resiting of Mirfield and Ravensthorpe stations	Capacity 277 Secs Performance
	ETCS & TM	Introduction of ETCS and TM across the route	Capacity Performance
Tranche 3	Neville Hill to Leeds & Church Fenton	Linespeed improvements between Leeds and Neville Hill Church Fenton realignment	27 Secs Performance
	Ravensthorpe to Leeds	Linespeed improvements between Ravensthorpe and Leeds Batley station relocation	30 Secs Performance

4.27 At this stage of development Network Rail have not firmed delivery dates but these are likely to be proposed as:

- Tranche 1 complete by 2022/23, followed by;
- Tranche 2 complete by 2023/24 and;
- Tranche 3 complete by 2024/25.

Alignment with Objectives, National Policies and Strategies

4.28 The table below summarises the preferred option's alignment with programme and wider objectives.

Objective/Strategy	Degree of Alignment	Notes
Train Service Objectives Capacity increases through frequency and train capacity Performance improvements Journey time improvements Positive/non-adverse environmental impacts Positive/non-adverse operating cost impacts on rail operations	Medium/ High	The degree of alignment is high given the capacity, performance and journey time outputs the preferred option provides. Full electrification now would provide greater environmental and train service operating costs benefits. The economic case sets out these in the next chapter. The preferred option alignment with objectives is medium/high as future interventions can follow in CP7 onwards where value for money.
The Transport Investment Strategy, DfT 2017, (TIS) Create a transport network that works for users, wherever they live Improve productivity and rebalance growth across the UK Enhance our global competitiveness by making Britain a more attractive place to invest Support the creation of new housing Projects that improve user experience by addressing congestion and reliability in clearly defined ways, typically through maintenance, renewals, or capacity upgrades; especially on routes into and around our urban centres.	Medium/ High	TRU is focused primarily on rail service outputs which will make a tangible difference to the local rail passengers. TRU is not a major transformational intervention on the scale of NPR or HS2 and so the direct wider economic impacts are unlikely on their won to rebalance the economy. However, TRU will support the economy and so the

Projects that deliver specific, tangible benefits to our wider objectives, for example schemes that make viable specific housing developments, or unlock identified private sector investment in jobs and industrial capability. Enhancements that create step-changes in connectivity and capacity where that can credibly improve the productivity or integration of our industrial, manufacturing or business clusters, both at a local and national level. Schemes that make the greatest contribution to environmental, safety, and health commitments, or that lead to improvements in overall user experience.		impact aligns with the rebalancing objective. TRU will provide station work and improved services to the new housing in Ravensthorpe, providing high alignment. Overall, TRU aligns well with the TIS. TRU makes a significant contribution to the key TIS objectives, from journey experience to safe transit.
National Infrastructure Assessment (NIA), NIC, 2018 Sustainable economic growth in every region: Full fibre digital infrastructure and urban transport networks lower the costs of connecting firms, workers and consumers; capture the benefits of higher productivity in dense clusters of firms; and enable innovation. International competitiveness: Low cost energy supports international competitiveness as an input to all economic activity. Promoting electric, connected and autonomous vehicle infrastructure supports the UK motor industry to stay at the forefront of innovation. Quality of life: Better air quality from electric vehicles, warmer homes from energy efficiency and a better designed public realm can improve people's quality of life. Resilience to floods and droughts protects people against natural disasters. Additionally the NIC points to the strength of rail in serving city to city demand where rail investment can have the greatest impact.	Medium/ High	The key areas across the NIA where TRU aligns are: The potential to deploy wide-scale digital rail infrastructure The potential to build on TRU through a TRU2 or NPR to move to cleaner rail traction. Key alignment is where TRU facilitates city-centre to city-centre travel where economic growth potential is highest.
Align and Support Wider Policies and Strategies The key themes within wider policies and strategies can be characterised as: Supporting the national, region and local economics Supporting rebalancing Direct benefits to passengers Efficiencies Early deployment of Digital Rail Technology Supporting rail freight	Medium/ High	The preferred option aligns well with these objectives. In terms of freight, the preferred option does not diminish existing freight provision but does not add capacity or capability. This may be looked again as part of a potential TRU2/NPR. Set within a modernised infrastructure, the early

		deployment of Digital Rail is a key strategic policy alignment.
NPR and HS2 Alignment	High	Where NPR adopts a southern alignment the fit with TRU is very high, limiting wasted assets and potential for shared track and electrification. In terms of HS2 the section of route between Leeds and York has the potential to be shared, optimizing project alignment and track access revenues. Overall a high fit rating.

Wider Support for TRU

4.29 There is widespread support amongst regional and local stakeholders for renewal and upgrade of the TRU route. In line with the view and representations from Transport for the North (TfN) the support is summarised as being essentially as much as possible is required in CP6 with further development for future control periods. As such the preferred option provides the potential for the first steps in a wider and supported set of interventions.

Overview of Areas to Note/Interdependencies/Issues/Risks

4.30 The key areas which at this stage are highlighted as interdependencies, issues and risks are listed below. These will need to be addressed in detail in the next phase of development where the preferred option is designed in detail.

a. Capacity outside the core TRU scope area

b. Interactions with classic rail and HS2 on approaches to Manchester Piccadilly will affect the ability of TRU services to leave the route; presentation onto the TRU will be affected by performance off-route, particularly on the LNER/ECML between York and Colton Junction and York station.

c. Leeds station and approaches capacity

d. Achievement of TRU outputs will be dependent on Leeds capacity and capability. The next phase of design will need to assess and understand any residual capacity issues that exist following committed capacity works at Leeds.

e. TRU/NPR/HS2 alignment/synergy

f. Refinement of alignment between TRU and wider NPR, including for example finessing of Ravensthorpe and east of Leeds interventions with potential additional scope and funding. Good fit with HS2 new infrastructure east of Leeds to ECML, further design work required to ensure the two projects fully align.

g. DfT (client) and NR (supplier) relationship and capability

h. A strong client and a receptive supplier will be key to success at the next phase. DfT will need to assess the skills available and augment where needed.

i. A key risk is the NR level of cost maturity at overall just short of GRIP3

j. At this stage there has still not been detailed ground inspections, for example, which could affect final costs. Further cost development is part of the proposed next phase of programme development.

k. Key design and delivery strategies:

- a rolling stock strategy to understand the choices around rolling stock and cost implications on the franchises and in a way that augments future tranches and potentially full route electrification;
- already under way a depots strategy for the whole of the North of England;
- understand the implications including cost impacts to passenger and freight operations of Digital Rail;
- an access/possessions strategy with plan and choices, including feedback into rolling stock requirements to provide an optimised industry solution (for example building the Ravensthorpe four-tracking in stages whilst keeping the classic alignment open) and aligning with related adjacent highways interventions;
- further assessment of future proofing of the preferred option intervention, ie lowering track-beds and extra land take, to understand the cost implications and potential for cost sharing with NPR.
- Co-ordination with other mode interventions adjacent to the TRU route, notably M62, A66 and Transpennine Road Tunnel. We are already in discussions with Department highways colleagues - project synergies and timings will be explored further as part of design and delivery planning.

Detail on Areas to Note/Interdependencies/Issues/Risks

Digital train control and ETCS

4.31 The current assumptions are that TRU will be equipped with Train Management Software (TMS) and European Traffic Control System (ETCS). Network Rail have identified the section of line between Stalybridge and Cottingley (Leeds) as the section of line most likely to benefit from a digital intervention as interfaces are limited to two lines which have low traffic levels. Conventional signalling will remain on the rest of the route and will be updated as Control Period funding allows.

4.32 Trans Pennine would be the first fitment of a mixed traffic main line in the country, and as such should be treated as a transition management case. Network Rail's initial cost estimating work indicates that costs are broadly similar to a conventional signalling renewal.

4.33 Initial work has started within the Network Services Digital team to quantify the costs of train fitment for the passenger railway which has been initially estimated at [redacted] Officials are working with RNP, Network Rail and the train operators to determine which trains that will require fitment based on expected operational life and operating patterns. Train operators will also have to factor in the cost of staff training and additional maintenance of train borne

equipment. A wider national debate is underway regarding the treatment of freight locomotives which operate on a network wide basis.

4.34 The decision to adopt digital train control is a key element of scope, as Network Rail are not at present developing any conventional signalling solutions between Stalybridge and Cottingley. It will therefore be essential that both the infrastructure and train fitment programme are fully integrated; as any misalignment will effectively stop any train movements on the route.

4.35 We continue to work with Network Rail at HQ and route level and expect to update BICC further as the costs and benefits case matures. Given the level of risk around digital signalling, further cost and benefit certainty will be included in the business case submissions we plan during 2019. We will also provide more detail in the scope of TMS which is being considered for the North West and which will be a key interface for this programme.

Disruption to Passengers

4.36 The renewal and enhancement of the route will have a significant impact on passengers and though still yet to be detailed will potentially have a five or six year programme of disruptive possessions from 2020 onwards including some blockades of up to 12 weeks. The possessions have been designed to take advantage of diversionary routes with works concentrated in one area at a time and trains only diverted once. Network Rail will progress disruptive access through the industry's consultative processes.

4.37 Rail North Partnership, NR and the TOCs are working closely on the number and duration of possessions and the scope of mitigations. The diversionary strategy is being refined and will be subject to further submissions. Disruption and how it will be communicated will be a key focus of the Communications Group that has been set up as part of the programme. Political leaders in the North have been made aware of the potential disruptions.

4.38 Diverted trains will use the improved capabilities of the Calder Valley and Hope Valley lines to the north and south. The Calder Valley works have now been delivered but a key risk that we are discussing with RNP is the impact on the enhanced service pattern which is due to commence in 2019. The timing of Hope Valley works is due to be finalised but we expect that they should be complete by in the early 2020s. In both cases, Trans Pennine passengers will experience longer journeys and reduced frequencies. The mitigations will also need to consider the capacity of services on the routes being used for diversion.

4.39 There will be a role for road replacement services but the geography and topology of the route can make this difficult in places and particularly in winter.

Franchise Management

4.40 TRU will affect both the TransPennine Express and Northern franchises during delivery and as they mobilise for upgraded services. The Franchise Agreements for both operators anticipates that a Franchise Change will be negotiated for the TRU project. As a result, the franchisees are anticipating that the potentially long engineering blockades carried out as part of the TRU project will be captured by Change negotiations, and not limited to the schedule 4 payments used for short term possessions. This is a key area for further assessment.

4.41 The financial status of both franchisees on the route (TPE and Northern) also represents a risk given the impact on revenue. We will continue to monitor the situation via a number of regular mechanisms including the monthly Rail North

Partnership Board, Passenger Services' SIAP and the North of England Programme Board.

Human resources

4.42 Additional train crew are likely to be required to support increased train frequency as set out in the indicative Train Service Specification. There may also be a need for additional station staff where facilities are changing; for example, to include lifts or booking offices where these are not currently in operation or on diversionary routes.

4.43 To ensure there are adequate staff in place to support an increase in train services, franchise change negotiations should allow adequate time for staff training. It takes approximately 12 months from the start of the recruitment process to a fully qualified train driver; for conductors and station staff it is between 4 and 6 months

4.44 Further maintenance staff will also be needed to service additional Overhead Line Equipment. New technologies such as ETCS will also require additional training schedules are in place ensure maintenance and operation of assets is consistent with best practice.

4.45 An additional requirement could include the need for TOC-side staff supporting digital signalling technology; both for control and rolling stock functions. Associated risks would be managed by the TOCs and would need to be incorporated into any franchise change or franchise re-letting process.

4.46 At this stage no transfer of staff between train operators is envisaged as part of TRU. Therefore, no TUPE issues are anticipated at this stage.

4.47 The requirement for additional driver training (for both new rolling stock and digital technology) involves Trade Unions, who sign off the requisite training material. Any failure to agree on the process has the potential to materially delay the introduction of new services.

4.48 These risks are being managed by train operators for the existing franchises for the introduction of new-build rolling stock. This would be similarly managed through the procurement of extra services through TRU.

DfT Client Team

4.49 The SRO will ensure a smooth handover to the new Director Network Services North. The Client team is taking steps to enhance its sponsorship capability in line with the recommendations made by the IPA review. We are working with RNP on this matter as more remote working will be required and we are taking steps with NR to ensure the possession planning, programme delivery and passenger outputs are fully integrated.

Rolling Stock

4.50 The RNP will look at rolling stock requirements arising from the possessions during construction including the potential requirement for additional rolling stock to maintain capacity as a result of extended journey times. RNP will also look at the rolling stock implications of service patterns once the route has been upgraded as a number of changes will be necessary. [redacted] Rolling stock options include the continued use of off lease Class 185s or additional bi mode trains[1].

4.51 Further detailed development of a rolling stock and depot and stabling strategy for all services using the route will be led by RNP with Network Services.

Delivery of Passenger Outputs

4.52 RNP are currently engaged in a review of rail services in the north to understand the ability of the network to accommodate services committed in the franchise. Network Services is closely involved in this work as it may require additional infrastructure for which some funding exists in the Hendy Tail or decisions on the service patterns offered.

4.53 RNP's work will inform the service patterns that can be accommodated when trains are diverted and once TRU works are complete. BICC will be updated in future submissions. In connection with this work, Network Rail is currently assessing capacity and performance issues in Manchester and Leeds over the short, medium and longer term.

4.54 It is not expected that TRU will involve a big bang delivery of Transpennine passenger benefits but a series of incremental improvements over a number of years as interventions are complete.

4.55 Network Services has looked at the capability of depot and stabling facilities across the north and found significant pressure in the light of longer and more frequent services, the possible requirements of NPR and HS2 the pressure to sell land to meet Government development targets. The Department will keep this work under review with RNP in the light of service patterns including those operating during diversions. Network Services also has feasibility work underway at sites such as Ardwick where land sales may offer opportunities for additional stabling.

Stations

4.56 The core TRU programme includes 25 stations and where major engineering work is planned. NR will need to comply with the latest statutory Accessibility Regulations which will include the provision of modern facilities and full accessibility. A Stations Design Steering Group is co-ordinating the approach to stations on the route and a 'station register' has been produced that identifies current facilities and what scope TRU is proposing to undertake at each location.

4.57 The opportunity may exist to draw in developer contributions. Examples include Batley. The opportunity will also be taken to engage with key stakeholders, such as Transport for the North and local authorities to identify opportunities and synergies with other initiatives to improve the urban realm and to maximise alternative funding routes.

4.58 The project team is also aware of the proposal by WYCA (West Yorkshire Combined Authority) to construct two new stations on the route at White Rose (between Morley and Cottingley) and at Thorpe Park (between Crossgates and Garforth). These proposals are being developed independently of TRU, however the DfT Client team have instructed Network Rail to assume that these stations will be built. WYCA have been advised that they will need to work very closely with the Rail North Partnership to agree appropriate service levels in order to maintain network performance and reduced journey times.

Managing the Relationship with TfN

4.59 The Project Director for the North of England is a member of the Rail North Partnership where TRU is a monthly agenda item. We anticipate that this group will

continue to consider the delivery of TRU with the impact on passengers and franchise performance being a particular focus.

4.60 Transport for the North (TfN) have written to the Secretary of State asking for a firm commitment to deliver the full passenger and freight benefits identified in the Client Development Remit of July 2016 which is around [redacted] The response from the SoS sets out that we will future proof interventions where we undertake work subject to business case and affordability. TfN continue to be fully engaged in the development and delivery of TRU but the DfT remains sole client. Further assessment of future proofing of the preferred option intervention, ie lowering track-beds and extra land take, to understand the cost implications and potential for cost sharing with NPR will take place.

HS2 and Northern Power House Rail Interfaces

4.61 The client team has actively engaged NPR and HS2 colleagues to ensure that interface issues are identified and addressed. Two main interfaces have been identified:

4.62 The SoS has asked that TRU focus on interventions west of Leeds and that HS2b delivers a new cut off between a point east of Garforth and just south of York. Such a new connection would allow TPE express services (and Cross Country and LNER services) to utilise the new HS2b alignment and reduce journey times by approximately2 – 3 minutes. It would also free up capacity to the east for services to Hull and local stations.

4.63 Option 6 has assumed that this connection is constructed and has reduced the amount of interventions delivered by TRU east of Leeds accordingly, on the basis that the benefits of the HS2b connection are delivered in the late 2020s. Should however, HS2b delivery slip, then TRU can revisit scope options to provide journey time reductions on the conventional railway.

Northern Powerhouse Rail

4.64 The ability for TRU to fully understand the degree of interface with the NPR programme is limited until such time as the preferred NPR route is confirmed. However, the Network Rail TRU design team has shared details of their proposed design options with the NPR team on an open basis. We believe that at a strategic level the current TRU design work does not adversely impact upon NPR's own design development work.

4.65 The dialogue between the two teams will continue as TRU completes design and moves towards delivery. In the event that either project identifies specific issues that would require TRU to alter its design then the impact, and cost implications, will be considered on a case by case basis as part of TRU detailed design work prior to full business case submission. Again we will take steps to future proof where practical.

Programme Governance and Risk Management

4.66 We plan to adapt the current North of England Programme Board and supporting PDGs to manage the programme and its risks in line with the DfT and NR MOU signed in March 2016(2). As per best practice on the Great Western and Thameslink programmes and recommended by our IPA review, we plan to appoint a programme management function to ensure integration between train, infrastructure and outputs.

[2] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/509545/mou-dft-network-rail-rail-enhancements.pdf dated March 2016

4.67 Risk management will be a key part of programme governance and will be managed between the programme team, franchise competition team and NR as appropriate. Ultimately the Department will continue to hold the reputational and cost risks of services, franchising and infrastructure issues irrespective of who is best placed to manage those risks.

4.68 We anticipate that the DfT chaired North of England Programme Board and programme outcomes will continue although in the light of the Glaister review we are considering how this and other Boards are best placed to monitor timetable development and implementation risks.

4.69 NR will seek to transfer technical and delivery risks to its contractors where possible incentivising contracts to minimise cost, schedule and quality risks.

Procurement and Contracting

4.70 The implementation of TRU will be led by [redacted] who is based in York. Network Rail has already formed two contractor 'Alliances' to expedite design and delivery and to ensure benefits can be delivered more quickly than a full tendering exercise upon completion of full design. This early choice of contracting strategy may represent a risk that best value for money is not achieved due to the resultant lack of contestability.

4.71 Both Alliances consist of contractors already providing maintenance and renewal activity on the existing network, thus ensuring good geographic and asset knowledge. They are also contractors not currently engaged in HS2 delivery, thus mitigating the risk of resource shortages. With further BICC appearances, we will be able to test whether the Alliances are performing.

TRU and Freight

4.72 BICC is asked to note that freight capability is an important feature of TRU for both TfN, freight customers and freight operators. The Client Development Remit initially specified that Network Rail should work on the basis that existing freight traffic should be accommodated. However, following representations from the freight community Network Rail was asked to consider what the costs would be to provide W10/W12 gauge clearance in order to allow containers to operate on standard freight wagons and one train per hour capacity. This work is still in development but has raised high levels of expectation.

4.73 The business case for standalone investment, in advance of continuous electrification, is weak, based on limited current and future demand. Although rail is competitive for flows of bulk materials such as stone, the short distances being travelled by containers arriving at Northern Ports generally means rail is not competitive.

4.74 However, TfN and various freight stakeholders indicate that latent demand is high and that a gauge cleared route across the Pennines would have significant strategic value in the future. Should this be true the wider environmental and social case is strong – but consideration should be given as to whether the TRU is the most suitable route. The freight addendum to this business case provides more details on potential freight benefits.

4.75 Another factor when considering freight is the impact upon the overall timetable and performance. Modelling undertaken by Network Rail suggests that the scheduling of an hourly freight path in addition to the proposed 6 fast / semi-fast and 2 local train services would be challenging. The ability to provide a clock face regular interval service would be compromised and overall operational performance significantly

worsened. In order to address these issues additional scope would be required, such as longer and more frequent passing loops.

4.76 Essentially the provision of freight capacity and capability on this route is a strategic decision that needs to be considered in light of further investment decisions if the preferred option is adopted.

Presentational Issues

4.77 TRU is a high profile programme with significant political interest from Ministers and across the region. TRU is very much the top priority for TfN in this Control Period. This stems from both the history of the project dating back to 2007, and the various stop/start decisions in 2014/15 which generated significant reputational issues for Ministers and which led to the Northern Powerhouse agenda.

4.78 At a more localised level, NR and DfT have already engaged with Northern local authorities through a series of town hall style meetings where project scope and progress has been set out. The reception has been supportive and we propose to continue these activities.

4.79 More communications effort work will be required as the actual construction works will require significant engineering possessions with consequential route closures and train diversions. Local media have already started to speculate about the degree of disruption likely to be incurred. It will therefore be critical to obtain rail industry consensus on media and stakeholder management.

4.80 We will continue to work closely with TfN who will be encouraged to own this issue as part of the wider infrastructure enhancement agenda, and their ability to work with local authorities to help facilitate construction will be invaluable. Other communications risks will arise from the impact of disruptive possessions on rail services over a long duration and the work we are doing with RNP on service patterns will enable us to better understand these issues over coming months.

4.81 Communications is a key part of the TRU project which is managed through a dedicated group that reports to the PDG and Programme Board.

5. Other Key Local Strategies and Plans

The Greater Manchester Strategy: Our People Our Place[19]

5.1 Two priorities within the Greater Manchester Strategy are specifically within the scope of TRU:

- A thriving and productive economy in all parts of Greater Manchester:
- World-class connectivity that keeps Greater Manchester moving

Leeds City Region Strategic Economic Plan 2016-2036, Leeds City Region LEP and West Yorkshire Combined Authority[20]

5.2 There are ten headline priorities which include:

- Growing business
- Infrastructure for Growth

Greater Manchester Transport Strategy 2040, Transport for Greater Manchester, February 2017[21]

5.3 The strategy has four elements:

- Support sustainable economic growth
- Improving quality of life for all
- Protecting our environment
- Developing an innovative city-region

West Yorkshire Combined Authority Transport Strategy 2040, Adopted August 2017[22]

5.4 The strategic objectives for transport are:

- Economy: Create a more reliable less congested, better connected transport network
- Environment: Have a positive impact on our built and natural environment
- People and Place: Put people first to create a strong sense of place

6. Rebalancing Toolkit

6.1 The Department's rebalancing toolkit[23] has been designed to help assess how strategic cases assess set out how a programme or project fits with the objective of spreading growth across the country. The preferred option is assessed below.

	Checklist questions	TRU/Preferred Option Score
Step 1 Setting the context	▸ What is the geographical scope of the scheme? ▸ What is the economic and social context of the area? ▸ Is the scheme expected to have impacts in an area of local or regional deprivation or below average productivity?	The TRU preferred option scores highly. The areas served by the route are areas of regional deprivation and below national average productivity.
Step 2 Identifying transport barriers	▸ What transport barriers are limiting growth in the local area or region? ▸ To what extent does the scheme address these barriers, raising economic performance in the local area or region?	There are future demand and capacity constraints that are met by the TRU preferred option that improves connectivity, capacity and reliability
Step 3 Exploring options and strategic alternatives	▸ How have strategic alternatives and options been considered for their impact on regional growth?	Option assessment has considered a range of alternatives within rail and in terms of other modes the penetration of rail is a key advantage. A wider assessment of strategic alternatives to more transformational interventions will be set out in the NPR SOBC.
Step 4 Exploring impacts of interventions	▸ What does the analysis in the Economic Case and Economic Narrative say about local and national impacts? ▸ What are the assumptions and uncertainties of these impacts (consistent with the economic case)	Assessment of the agglomeration benefits indicates the TRU preferred option provides improved productivity benefits. These are in line with the renewal and upgrade nature of the programme rather than transformational but are key benefits
Step 5 Aligning with wider local plans and objectives	▸ How is the scheme aligned with other local growth plans? ▸ Is there a plan in place with local partners to maximise its overall impact on regional growth?	The programme aligns closely with other local plans and future design will continue to include local partners TfN/RNP.
Step 6 Considering wider evidence and stakeholder views	▸ What are the attitudes of key regional stakeholders (users, residents, businesses, LAs, STBs)? ▸ What wider strategic objectives does the project align with, e.g. those in the Transport Investment Strategy?	Significant support for the TRU Preferred Option with a strong desire for this to be part of a wider set of interventions, ie the first stage of a wider NPR.

TRANSPENNINE ROUTE UPGRADE

Economic Case

Executive summary

Outline Approach to Assessing Value for Money

Introduction

24 The Economic Case for the Transpennine Route Upgrade (TRU) sets out the Value for Money (VfM) assessment of the alternative options identified in the Strategic Case. The economic, environmental, social and distributional impacts of each option are examined, using qualitative, quantitative and monetised information. In assessing VfM, all of these are consolidated to determine the extent to which the scheme's benefits outweigh its costs.

Transpennine Route Upgrade Background and Context

25 The Strategic Case sets out the background to the Transpennine Route Upgrade, how the scheme has been developed to date and the alternative scheme options.

26 The Transpennine Route is a key transport link across the North of England, with the core route linking Manchester and York, via Huddersfield and Leeds. The route supports a mix of services, rolling stock and operators, serving inter-city, inter-regional and local passenger markets, as well as freight. There are around 50 million passenger rail journeys on the route each year, roughly twice the number of journeys the route carried 25 years ago.

27 The geography and topography of the route is amongst the most challenging on the GB rail network, and can be split into three key sections each with their own individual geography and infrastructure:

- From York to Leeds – a relatively flat section through open country, with several rail junctions;
- From Leeds to Huddersfield – a route constrained by urban areas, tight curves and one long tunnel;
- From Huddersfield to Manchester – crossing the Pennines with one very long tunnel at Standedge, several short tunnels, viaducts and curves that restrict speed, as well as a number of listed structures.

28 The upgrade is part of the North of England Rail Programme, including North West Electrification and the Northern Hub (which delivers network capacity and connectivity enhancements). The passenger benefits of these infrastructure schemes are being delivered through timetable and rolling stock enhancements delivered by the current Northern and TransPennine Express franchises.

29 It is also the first phase of a series of potential Northern Powerhouse Rail (NPR) interventions, together with High Speed 2 (HS2). As such there is a choice to be

made regarding the scope of this first step of a transformation. The preferred option is a set of key interventions with an optimised fit with potential future interventions, including those delivered as part of HS2 and NPR.

30 This phase of transformation focusses on:

- Capacity increases through service frequency and train capacity
- Performance improvements
- Journey time improvements
- Maintaining freight capacity and capability, with potential to add to both in the future

Economic Case Interdependencies

31 The Business Case for the full North of England programme infrastructure schemes, including TRU, was previously presented to BICC in July 2017. That Business Case, and the VfM analysis presented in the Economic Case, considered the TRU scheme in isolation to other elements of the full North of England Programme, but also combined this with the appraisal of other North of England schemes to present a combined case for the full North of England programme. This updated Economic Case could therefore be combined with the other elements of the North of England programme to provide an updated Economic Case for the programme as a whole.

32 There are some key interdependencies with other elements of the North of England programme schemes, which need to be considered in this Business Case. Alternative TRU options include different scopes of electrification between Manchester Victoria and Stalybridge. Electrification of this part of the network, together with Stalybridge to Guide Bridge and from Philips Park Junction to Ashburys has an interdependency with other elements of the North West Electrification schemes and delivery of the franchise rolling stock plans.

33 The eventual scope of TRU will also impact on the approach to delivering NPR between Manchester and Leeds, which is being considered in the NPR business case.

Structure of the Economic Case

34 The following paragraphs provide a summary of the structure and content of the Economic Case.

Section 2 – Options Appraised

35 This section presents a summary of the Do Minimum and Do Something options presented as part of the Economic Case. The Do Minimum represents a position where the existing franchise timetable and rolling stock commitments have been delivered and that the current timetable issues on Northern are resolved. Six Do Something options were looked at as part of TRU. This Economic Case presents the evidence for two of those alternatives on the basis that these represent the range of fully meeting target outputs to being budget compliant., with the full appraisal of all options presented in the Appraisal Modelling Report.

Section 3 – Appraisal Approach

36 This section provides an overview of the approach to the quantified VfM assessment

presented in this Economic Case including a summary of the key quantified inputs to the economic appraisal.

37 The quantified economic appraisal analysis includes valuing the conventional economic benefits from changes in journey time, crowding benefits, non-user benefits, revenue impacts, TOC operating cost and capital cost impacts. Wider economic impacts have also been valued.

38 A more detailed Appraisal Modelling Report is presented as an appendix to this Economic Case.

39 Freight benefits have been considered separately and are presented in an addendum in to this Economic Case.

Section 4 – Economic, Environmental and Social Impacts

40 This section presents an assessment of the economic, environmental, and social impacts of each scenario required to prepare the Appraisal Summary Table. It draws together the quantified economic appraisal analysis presented in Section 3 with a qualitative assessment of other non-quantified considerations.

Section 5 – Value for Money Statement

41 This section daws on the economic appraisal to present the required quantified VfM outputs from the economic appraisal supporting a statement on the VfM of each option.

Section 6 – Risk and Sensitivity

42 This section describes how risk is analysed in the Economic Case, and provides the results of the sensitivity test analysis.

Section 7 – Social and Distributional Analysis

43 The section provides a summary of the social and distributional analysis of the TRU scheme impacts.

7. Options Appraised

A list of the options (Set out in the Strategic Case) that have been appraised.

Introduction

7.1 The Strategic Case sets out the Do Minimum and six options identified for the TransPennine Route Upgrade. This section provides a summary of the options presented in this Economic Case, drawing out the key factors that influence the VfM assessment.

7.2 The Economic Case presents two of the six identified options – with those options selected to represent an option which meets the requirements of the Client Development Remit, and an option which can be delivered within the [redacted] funding available. The remaining options are presented in full in the Appraisal Modelling Report appended to this Economic Case.

Do Minimum

7.3 The Do Minimum is what the business case assumes will happen if TRU is not taken forward. It is based on the current, committed or near-certain future rail infrastructure and service provision. In the case of TRU the Do Minimum reflects the timetable and rolling stock commitments as part of the Northern and TransPennine Express (TPE) franchises and the substantial programme of renewals required on the route's infrastructure to keep the route operating.

7.4 TRU modelling has used the industry standard MOIRA model. It was hoped that more complex TRU modelling including NPR and HS2 could be tested using the TfN Northern Rail Model Suite (NoRMs) but this model was not available in time. Therefore neither HS2 nor NPR are rolled into the do-minimum. In the case of HS2 any impact would cancel out as the effect would be effectively the same in the do-minimum and intervention case, with any effect likely to be an upside risk with more demand and benefits on TRU. Steer has tested the robustness of the TRU business case to NPR happening, details below. As a result these impacts are captured adequately for the purposes of this OBC.

7.5 Electrification between Manchester Victoria and Stalybridge is assumed not to happen in the Do Minimum, as it is not a committed project. To the extent that it is included within each Do Something option, capital funding for electrification of this section of track is included within the scheme costs, and reflected in the Benefit Cost Ratio.

Timetable and Rolling Stock Assumptions

7.6 The Northern and TPE franchises that were let in 2016 included significant changes to timetable and rolling stock on the Transpennine Route. The key timetable changes, facilitated by the commissioning of the Ordsall Chord, were introduced in May 2018. Further, more minor, timetable changes are planned as new rolling stock is introduced by December 2019.

7.7 Although the timetable change was accompanied by initial teething disruption and negative publicity there are currently no committed plans to materially change the committed timetable structure. The TRU business case assumes that in the medium term, the full planned timetable will come into operation.

7.8 There are two key features of the Do Minimum timetable to note: the stopping pattern of the six trains per hour between Leeds and Manchester via Huddersfield and the rolling stock assumptions. The service pattern in the Do Minimum between Manchester and Leeds via Huddersfield is summarised as follows:

- Four fast trains per hour between Manchester Victoria and York, calling at Huddersfield and Leeds (serving Manchester Airport, Liverpool Lime Street, Newcastle, Middlesbrough and Scarborough) – with a journey time of 50 minutes between Manchester and Leeds and 76 minutes between Manchester and York
- One semi-fast train per hour between Manchester Piccadilly and Hull, calling at Stalybridge, Huddersfield, Dewsbury and selected local stations between Manchester and Leeds.
- One semi-fast train per hour between Manchester Piccadilly and Leeds calling at Stalybridge, Huddersfield, Dewsbury, including all stations between Huddersfield and Leeds.

7.9 The rolling stock assumed in the Do Minimum differs from that currently committed by the franchises on some services. The rational for this is summarised as follows:

- The franchise bids had been planned on the assumption that electrification between Manchester Victoria and Stalybridge would be delivered as part of the North West Electrification programme. Services between Wigan/Manchester Victoria and Stalybridge were planned to be delivered by electric Class 319 rolling stock. This electrification is currently being considered as part of the TRU and has not yet been delivered. The Do Minimum therefore assumes bi-mode Class 769 rolling stock on these services.
- The Do Something options have been planned on the assumption that faster Transpennine Route services between Leeds and Manchester via Huddersfield will be operated by electric or bi-mode Class 802 or equivalent rolling stock. To deliver passenger capacity benefits as soon as possible the franchise bid assumed a mixture of Class 802, Class 68 and CAF rolling stock and Class 185 rolling stock on these services. To avoid the economic appraisal capturing the costs and benefits of a franchise-driven rolling stock cascade, not directly related to the infrastructure appraisal, Class 802 rolling stock is assumed to operate these services in the Do Minimum and Do Something options. What happens in the practice will be determined by the relet of the franchise.

Infrastructure renewals

7.10 The Transpennine Route programme includes a substantial programme of renewals in the Do Minimum scenario. This is as a result of two key factors:

- The new rolling stock and timetable committed by the franchises results in a material increase in tonne-miles operated on the Transpennine Route. There are currently no committed plans to increase maintenance activities or renewals programmes to mitigate the increased track damage that this causes. The Department are checking this position with ORR]
- There has been historic expectation that the TRU scheme is likely to renew the route when it happens, and therefore it would not be efficient to renew infrastructure twice in rapid succession. However, if the upgrade does not happen, a renewal of track and signalling will be necessary to allow continued operation of the railway.

7.11 Reflecting this Network Rail have identified a material renewal spend to be included in the Do Minimum.

Do Something Options

7.12 Two Do Something options have been presented in this Economic Case. Both options include significant track asset renewal, remodelling at Stalybridge and Huddersfield stations and four tracking between Huddersfield and Ravensthorpe. The key difference between each option is the extent of electrification and line speed improvements. As a result, the service pattern [ie. frequencies and stopping patterns] in each Do Something option is the same, but each option offers different:

- Journey time opportunities from line speed improvements and rolling stock choices; and
- Operating cost savings from differing scope of electrification – with full electrification in Option 2 and electrification between Huddersfield and Leeds in the Preferred Option.

7.13 The following points summarise the key changes to the service pattern in the Do Something scenario compared to the Do Minimum. A detailed service pattern diagram is provided in appendix the Appraisal Modelling Report appended to this Economic Case.

- Two additional stopping trains per hour between Manchester Piccadilly and Huddersfield via Guide Bridge, which allows local intermediate stops to be transferred from the semi fast Manchester Piccadilly – Leeds/Hull services. This increases the number of passenger trains operating between Huddersfield and Manchester from 6 to 8 trains per hour in the off peak.
- Two additional stopping trains per hour between Huddersfield and Leeds via Dewsbury, which allows local intermediate stops to be transferred from the semi fast Manchester Piccadilly – Leeds/Hull services and the Manchester Victoria – Brighouse – Leeds service and more stops to be made. This increases the number of trains operating between Huddersfield and Leeds via Dewsbury from 6 to 8 trains per hour in the off peak.
- Extension of the semi-fast Manchester – Leeds service to Hull.
- Reduction in journey time for fast services as a result of line speed improvements and journey time reduction for semi-fast services as a result of reduced stops at local intermediate stations.

7.14 The Do Something offers benefits in terms of reduced journey time, improved performance and different operating cost profiles compared to the Do Minimum. These benefits have been valued as part of the economic analysis and are presented in this Economic Case.

7.15 Table 8.1 shows a summary of the Preferred Option and Option 2.

Table 8.1: Summary of the Preferred Option and Option 2

	Manchester to York journey time (Minutes)	Manchester to Leeds journey time (Minutes)	Electrification	Scheme opening year	Capital cost (£m, nominal prices, excluding OB)
Do Minimum	74	49	-	N/A	[redacted]
Preferred Option	66.5	41.5 eastbound 43 westbound	Victoria to Stalybridge, Huddersfield to Leeds, Ulleskelf to York	Phased across CP6	
Option 2	62	39	Full, but not Micklefield-Selby	2027/28	

44 Note - This table covers activity in CP5, CP6 and CP7 as applied for appra purposes.

8. Assumptions

WebTAG sets out assumptions that should be used in the conduct of transport studies. Any further assumptions supporting the analysis should be listed.

Introduction

8.1 This section sets out the assumptions used to undertake the modelling used to inform the Economic Case for the TransPennine Route Upgrade. The Economic Case presents the two options summarised in the previous section. Detailed modelling assumptions, including the train service assumptions, are included in the Appraisal Report appended to this Economic Case. In addition to the two options presented in this Economic Case, the Appraisal Report provides detail of the full set of six options considered as part of the scheme development process.

8.2 The economic appraisal of TRU has been undertaken in line with WebTAG guidance including up to the minute guidance from PDFH. The impact of the scheme on demand, user and non-user benefits, revenue, capital costs, operating costs and the wider economy have all been incorporated into the appraisal.

8.3 In line with normal appraisal practice, in calculating the scheme impact the following have been quantified:

- Passenger journey time benefits from the post-upgrade timetable;
- Passenger crowding benefits as a result of additional capacity provided by changes to the timetable and rolling stock;
- Passenger benefits resulting from changes in rolling stock quality;
- Passenger benefits resulting from changes in punctuality on the network;
- The impact on passengers of moving three stations on the route;
- The change in passenger miles and journeys via rail, and the consequential non-user benefits;
- Wider economic benefits due to improvements in connectivity;
- Capital and renewal costs;
- Changes in franchised operator operating costs, and,
- Additional revenue to franchised operators as a result of the additional demand.

8.4 Potential benefits for freight capability have not been presented in this Economic Case at this time due to uncertainty around the capital cost for delivering freight capacity and capability and the potential magnitude of benefits. However, initial analysis indicates that material benefits (generated through the removal of HGVs

from the strategic road network), in the order of hundreds of millions of pounds (PV), could be realised through the provision of freight capacity and capability on the route. More detailed consideration of the potential benefits of providing gauge-cleared freight paths is presented in the Freight Addendum to this Economic Case.

8.5 While both options presented assume that digital signalling will be provided and the costs allow for this, the benefits of any Digital Rail schemes have been excluded from the analysis at this time. The scope of potential benefits has not yet been defined in sufficient detail to monetise as part of the quantified appraisal. The case is therefore an underestimate of benefits.

8.6 Vehicle fitment costs to enable digital operations (to passenger and freight vehicles) are not included in the economic assessment.

8.7 A separate value for money assessment of digital rail will include both infrastructure and vehicle fitment costs, when costs have been provided by NR. This will be undertaken when whole life cost data is available from NR and will form part of the next phase of design work.

8.8 There are also separate value for money assessments for: 1) the removal of some interventions that NPR may not utilise and 2) the Tranche 1 interventions. These have been commissioned following the completion of the OBC and will be presented as soon as complete to inform decisions.

8.9 The rest of this section outlines the key inputs that feed into the economic appraisal and VfM assessment.

User Benefits

8.10 The following paragraphs provide a summary of the valuation of benefits to existing and new rail users for each option. The following benefits have been quantified in calculating each option's projected user benefits:

1 Passenger generalised journey time (GJT) impacts from timetable changes;

2 Passenger crowding impacts from additional passenger capacity;

3 Passenger experience impacts from the provision of improved rolling stock;

4 Journey time reliability from additional infrastructure capacity and timetable changes; and,

5 Station access impacts where stations are moved as part of the options.

8.11 The benefits appraisal analysis is calculated using projected levels of passenger demand, driven by a combination of exogenous and endogenous factors (see the Passenger Revenue subsection for more details).

Timetable Benefits

8.12 When journey times are improved, passengers are able to save time, which can be spent productively elsewhere. TRU will deliver infrastructure enhancements to allow faster generalised journey times (GJTs), through faster end-to-end times and improved frequencies. The benefits to existing users are calculated using the product of the journey time saving in minutes and the current number of passengers who will experience the travel time savings. Benefits also accrue to new passengers who choose to travel as a result of the change in train service – with the Rule of a Half

applied. Together with the benefits of improved performance on the route, timetable benefits represent the largest user benefit from TRU.

8.13 Table 2.1 and Table 2.2 provide a summary of the changes to demand and journey time benefits and disbenefits resulting from the Preferred Option timetable, compared with the Do Minimum timetable, using 2016/17 as the comparison year. This analysis does not consider growth from any other driver between 2016/17 and the completion of the upgrade.

8.14 Table 2.1 contains the top ten flows benefiting from the timetable change in the Preferred Option sorted by GJT benefit.

Table 2.1: Top 10 flows benefiting from the Preferred Option (versus the Do Minimum, 2016/17 demand)

	Flow	Do Minimum Demand (000s)	Change in Demand (000s)	Existing GJT (mins)	New GJT (mins)	Changes in GJT (%)	Change in GJT (mins)	GJT benefit (000s mins)
1	Huddersfield <> Leeds	1,928	341	32	28	-14%	-4	9,210
2	Leeds <> Manchester	1,086	147	64	57	-10%	-6	7,386
3	Stalybridge <> Manchester	706	237	32	25	-23%	-7	6,200
4	Dewsbury <> Leeds	798	192	30	25	-18%	-5	4,748
5	Leeds <> Selby	295	90	55	44	-20%	-11	3,800
6	Manchester <> York	372	52	91	81	-10%	-9	3,705
7	Leeds <> York	1,366	94	35	34	-5%	-2	2,710
8	Mossley <> Manchester	235	57	55	45	-18%	-10	2,674
9	Leeds <> South Milford	126	46	58	44	-25%	-14	2,164
10	Huddersfield <> Manchester	600	62	43	40	-8%	-3	2,147
Top 10 Total		7,512	1,319					44,743
All Increasing Flows Total		27,292	2,434					120,815
Top 10 proportion of all increasing flows		28%	54%					37%
Net Flows Total		52,671	1,638					85,222

8.15 Nine of the top ten flows are commuting flows entirely on the Transpennine Route, which experience a high percentage decrease in GJT while being flows with a high volume of demand. The remaining flow is between Leeds and Manchester, due to the large volume of passengers travelling between these two stations. There are no other inter-regional flows in the top ten, as the level of demand on these services is lower than on commuting services and the Leeds-Manchester flow.

8.16 Table 2.2 shows the top five flows disbenefiting from the timetable change to the Preferred Option.

Table 2.2: Top 5 flows disbenefiting from the Preferred Option (versus the Do Minimum, 2016/17 demand)

	Flow	Do Minimum Demand (000s)	Change in Demand (000s)	Existing GJT (mins)	New GJT (mins)	Changes in GJT (%)	Change in GJT (mins)	GJT benefit (000s mins)
1	Leeds <> Bradford	1,647	-66	34	36	4%	1	-2,111
2	Bolton <> Manchester	1,796	-54	30	31	3%	1	-1,481
3	Manchester <> Wigan	907	-26	52	54	3%	1	-1,271
4	Leeds <> New Pudsey	473	-41	28	30	9%	2	-1,092
5	Halifax <> Leeds	589	-21	53	55	3%	2	-1,046
Top 5 Total		5,413	-209					-7,001
All Decreasing Flows Total		25,379	-795					-35,592
Top 5 proportion of all decreasing flows		21%	26%					20%

8.17 All five of top disbenefiting flows connect either Manchester or Leeds to a nearby city or town which is not on the Transpennine Route. The travel time to these places remains unchanged, but the spacing of the trains has been moved slightly to accommodate the improved service on the Transpennine Route, leading to a minor increase in GJT.

8.18 Option 2 offers faster journey times than the Preferred Option, and consequently offers greater journey time benefits.

	Flow	Do Minimum Demand (000s)	Change in Demand (000s)	Existing GJT (mins)	New GJT (mins)	Changes in GJT (%)	Change in GJT (mins)	GJT benefit (000s mins)
1	Leeds <> Manchester	1,086	247	64	54	-16%	-10	12,068
2	Huddersfield <> Leeds	1,928	427	32	27	-17%	-5	11,366

3	Stalybridge <> Manchester	706	310	32	23	-28%	-9	7,867
4	Manchester <> York	372	85	91	76	-16%	-14	5,895
5	Leeds <> Selby	295	111	55	42	-23%	-13	4,577
6	Dewsbury <> Leeds	798	155	30	25	-15%	-4	3,908
7	Leeds <> York	1,366	136	35	33	-8%	-3	3,861
8	Huddersfield <> Manchester	600	111	43	38	-13%	-6	3,739
9	Newcastle <> Manchester	219	26	164	149	-9%	-15	3,429
10	Manchester Airport <> York	207	29	125	112	-10%	-13	2,880
Top 10 Total		7,577	1,637					59,589
All Increasing Flows Total		28,934	3,025					156,883
Top 10 proportion of all increasing flows		26%	54%					38%
Net Flows Total		52,984	2,312					126,448

8.19 Table 2.3 and Table 2.4 contain the flows benefiting and disbenefiting respectively from Option 2. The flows affected are similar to the Preferred Option, albeit with some changes in order.

	Flow	**Do Minimum Demand (000s)**	**Change in Demand (000s)**	**Existing GJT (mins)**	**New GJT (mins)**	**Changes in GJT (%)**	**Change in GJT (mins)**	**GJT benefit (000s mins)**
1	Leeds <> Manchester	1,086	247	64	54	-16%	-10	12,068
2	Huddersfield <> Leeds	1,928	427	32	27	-17%	-5	11,366
3	Stalybridge <> Manchester	706	310	32	23	-28%	-9	7,867
4	Manchester <> York	372	85	91	76	-16%	-14	5,895
5	Leeds <> Selby	295	111	55	42	-23%	-13	4,577
6	Dewsbury <> Leeds	798	155	30	25	-15%	-4	3,908
7	Leeds <> York	1,366	136	35	33	-8%	-3	3,861

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9	Newcastle <> Manchester	219	26	164	149	-9%	-15	3,429
10	Manchester Airport <> York	207	29	125	112	-10%	-13	2,880
Top 10 Total		7,577	1,637					59,589
All Increasing Flows Total		28,934	3,025					156,883
Top 10 proportion of all increasing flows		26%	54%					38%
Net Flows Total		52,984	2,312					126,448

Table 2.3: Top 10 flows benefiting from Option 2 (versus the Do Minimum, 2016/17 demand)

8.20 As with the Preferred Option, the majority of flows affected are to and from Leeds or Manchester. The exception is York to and from Manchester Airport, which benefits from high existing demand and a significant journey time improvement between York and Manchester.

8.21 Table 2.4 contains the top 5 flows disbenefiting from Option 2. These are again flows to cities and towns off the Transpennine Route which see minor changes in timing to accommodate new services on the Transpennine Route.

Table 2.4: Top 5 flows disbenefiting from Option 2 (versus the Do Minimum, 2016/17 demand)

	Flow	**Do Minimum Demand (000s)**	**Change in Demand (000s)**	**Existing GJT (mins)**	**New GJT (mins)**	**Changes in GJT (%)**	**Change in GJT (mins)**	**GJT benefit (000s mins)**
1	Leeds <> Bradford	1,647	-66	34	36	4%	1	-2,111
2	Bolton <> Manchester	1,796	-54	30	31	3%	1	-1,481
3	Manchester <> Wigan	907	-26	52	54	3%	1	-1,271
4	Leeds <> New Pudsey	473	-41	28	30	9%	2	-1,092
5	Halifax <> Leeds	589	-21	53	55	3%	2	-1,046
Top 5 Total		5,413	-209					-7,001
All Decreasing Flows Total		25,379	-795					-35,592

Top 5 proportion of all decreasing flows	21%	26%					20%

Crowding benefits

8.22 Passengers prefer travelling on services which are less crowded, and make travel choices based on this. The benefit of reducing crowding is modelled as a reduction in minutes of perceived journey time. In order to quantify this benefit, a crowding model is used to compare the number of forecast passengers on each leg of each service against the number of seats and standing space on board. A range of factors, including train timings, affect the allocation of passengers to each train service, which is carried out within MOIRA.

- Table 2.5: FY36/37 totals of daily crowding minute changes for each market flow, compared with the Do Minimum (minutes per journey); a negative number indicates a worsening of crowding

Market flow	Preferred Option	Option 2
Core Manchester <> Core & Greater Manchester	(0.03)	(0.00)
Core Leeds <> Greater Leeds	(0.01)	0.01
Core Manchester <> Core Leeds	0.65	0.42
Core Manchester <> Greater Leeds	0.05	0.13
Greater Manchester <> Core Leeds	0.32	0.13
Greater Manchester, Core Leeds & Greater Leeds <> Greater Manchester & Core Leeds & Greater Leeds	(0.03)	(0.00)
Greater & Core Manchester <> York	0.95	0.67
Core Leeds <> York	0.68	0.64
Greater Leeds <> York	0.47	0.51
Liverpool <> Greater and Core Leeds	0.71	0.66
Liverpool <> York & Newcastle	1.39	1.17
Liverpool <> Liverpool & Greater & Core Manchester	0.06	0.06
Greater & Core Manchester <> Newcastle	0.42	0.14
Greater & Core Leeds <> Newcastle	0.10	(0.10)
York & Newcastle <> York & Newcastle & North-UK	0.02	0.03
North-UK <> North-UK & Liverpool & Greater Manchester & Core Manchester	0.03	0.03
North-UK <> Greater & Core Leeds	(0.09)	0.03
South-UK <> Liverpool & Greater & Core Manchester	0.02	0.02
South-UK <> Greater Leeds & Core Leeds & York & Newcastle	0.01	0.02
South-UK <> North-UK	(0.04)	(0.01)

8.23 shows the crowding benefit relative to the Do Minimum for the two options. For this analysis the benefit is summarised based on a market flow segmentation between nine zones, summarised as follows:

- Core Leeds: demand to and from Leeds station only;
- Greater Leeds: all other stations in West Yorkshire;
- Core Manchester: Manchester Piccadilly, Oxford Road, Victoria and Deansgate stations only;
- Greater Manchester: all other stations in Greater Manchester;

- York: stations in North Yorkshire and the East Riding of Yorkshire;
- Liverpool: stations in Merseyside;
- Newcastle: stations in the North East;
- North-UK: stations in the Northwest, Northumberland and Scotland; and,
- South-UK: stations to the south of the areas described above.
- Table 2.5: FY36/37 totals of daily crowding minute changes for each market flow, compared with the Do Minimum (minutes per journey); a negative number indicates a worsening of crowding

Market flow	Preferred Option	Option 2
Core Manchester <> Core & Greater Manchester	(0.03)	(0.00)
Core Leeds <> Greater Leeds	(0.01)	0.01
Core Manchester <> Core Leeds	0.65	0.42
Core Manchester <> Greater Leeds	0.05	0.13
Greater Manchester <> Core Leeds	0.32	0.13
Greater Manchester, Core Leeds & Greater Leeds <> Greater Manchester & Core Leeds & Greater Leeds	(0.03)	(0.00)
Greater & Core Manchester <> York	0.95	0.67
Core Leeds <> York	0.68	0.64
Greater Leeds <> York	0.47	0.51
Liverpool <> Greater and Core Leeds	0.71	0.66
Liverpool <> York & Newcastle	1.39	1.17
Liverpool <> Liverpool & Greater & Core Manchester	0.06	0.06
Greater & Core Manchester <> Newcastle	0.42	0.14
Greater & Core Leeds <> Newcastle	0.10	(0.10)
York & Newcastle <> York & Newcastle & North-UK	0.02	0.03
North-UK <> North-UK & Liverpool & Greater Manchester & Core Manchester	0.03	0.03
North-UK <> Greater & Core Leeds	(0.09)	0.03
South-UK <> Liverpool & Greater & Core Manchester	0.02	0.02
South-UK <> Greater Leeds & Core Leeds & York & Newcastle	0.01	0.02
South-UK <> North-UK	(0.04)	(0.01)

8.24 Both options show a net improvement in crowding conditions for passengers using the route. The increase in crowding on the shorter-distance flows is a result of the change in timetable providing more frequent services. This increase in frequency stimulates demand, which causes an increase in crowding.

8.25 Comparing the Preferred Option with Option 2, 9 of the 20 flows receive greater benefits under the Preferred Option, whereas the remaining 11 flows benefit more from Option 2. This is a consequence of the different service improvements under each option. Firstly, the Preferred Option delivers fewer journey time improvements than Option 2, and therefore stimulates less demand as a result of timetable impacts across the 20 market flows, and therefore greater crowding benefits. However, the Preferred Option delivers greater train service reliability on Northern services travelling over the Transpennine route compared with Option 2. The improved reliability stimulates higher demand, and fewer crowding benefits, on these shorter distance flows.

8.26 Overall crowding is reduced through the improved timetable offered by both the Preferred Option and Option 2.

Rolling Stock Quality Benefits

8.27 Passengers prefer travelling on new trains, and this effect is valued via a reduction in their perceived in-vehicle time corresponding to Rolling Stock quality and comfort, and applying a GJT elasticity (in line with PDFH recommendations). The Do Minimum includes the new rolling stock on fast services; therefore, the journey quality benefits from purchasing new rolling stock are limited to stock replacement on some stopping services.

8.28 These benefits are not material in their impact on the economic appraisal, but have been included.

Performance Benefits

8.29 Passengers value improved reliability in a similar way to a reduction in GJT

8.30 TRU will provide more track capacity, particularly through the four-tracking of the section between Huddersfield and Ravensthorpe. This will allow for intercity services to overtake local services, mitigating performance issues. On the other hand, the increased speed differential between intercity and stopping services on two-track sections of the route is likely to cause a deterioration in performance.

8.31 Network Rail has carried out RailSys modelling of performance on the route before and after the upgrade, analysing how performance on the route responds to initial performance perturbations. Using an Excel-based model, the performance results are transformed to a weighted average minutes of lateness for passengers traveling on the Transpennine Route for the Do Minimum and each of the two options. The difference between Do Minimum and option is then compared to determine the benefit from performance improvements in each option.

8.32 This modelling shows that the net impact of TRU on performance, compared with the Do Minimum, is beneficial.

8.33 Table 2.6 contains the Performance Benefits of the two options.

Table 2.6: FY36/37 Performance Benefits by Option (perceived minutes per journey)

	Preferred Option	Option 2
Performance Benefits	1.45	0.98

8.34 The Preferred Option provides a level of performance benefit comparable to the timetable benefit. Option 2 provides a lesser benefit, reflecting the RailSys modelling outputs provided by Network Rail. The benefit is likely to be lesser as a result of higher linespeed differentials between the fast and stopping services on the two-track sections of the route in this option.

Station access impacts

8.35 Geographical locations of rail stations are key to passenger rail journeys, and end-to-end journey times. As part of the route upgrade several stations will be relocated and rebuilt to allow additional capacity to be provided or line speed increases through track realignment. Station access modelling captures the impact of these relocations on passengers for the stations that are moved in the Preferred Option: Deighton and Morley. Batley is also relocated in Option 2. In each case the distance the station is planned to move is less than 500 metres.

8.36 A spreadsheet-based station access model is used to assess the impact on passengers of these station relocations. The model allocates station demand to a spatial distribution to analyse how access times change for affected passengers. The Appraisal Modelling Report appended to this Economic Case includes geographical analysis of how station catchments are forecast to be affected by the station relocations.

8.37 Table 2.7 shows the net user benefits from the station relocations in each option.

Table 2.7: Annual user benefits from the station relocations in each Option (000s minutes , negative indicates disbenefit)

	Preferred Option	Option 2
Access Time Impact	(572)	(496)

8.38 The station relocations result in disbenefits for both options as the stations will be moved away from the current population centres, leading to marginally more access time.

8.39 These benefits are not material in their impact on the economic appraisal, but have been included.

Non-User Benefits

8.40 The TransPennine Route Upgrade will have benefits beyond rail journey time savings. A proportion of the projected additional rail demand will be abstracted from car, resulting in a reduction in car kilometres. Reducing car kilometres has the benefit of alleviating congestion on roads, reducing noise, greenhouse gas emissions, accidents and improving local air quality. These benefits are partially offset by a reduction in indirect taxation as people switch from spending on heavily-taxed petrol and diesel, to less heavily taxed rail travel.

8.41 The reduction in car kilometres has been estimated by assuming a proportion of increased rail passenger kilometres have been abstracted from car.

Table 2.8: Summary of Non-User Benefits

	Car km removed (million km, appraisal total)	Non-user benefits (NPV, £m, 2010 prices)	Indirect Taxation (NPV, £m, 2010 prices)
Preferred Option	3,412	219.8	(114.0)
Option 2	4,316	429.6	(195.9)

8.42 Both options provide a significant reduction in car kilometres, with passengers moving to the more attractive rail service. These reductions drive differing non-user benefits, with these partly offset by a decrease in indirect taxation.

Wider Economic Impacts

8.43 Three wider economic impacts (WEIs), all driven by the journey time savings, have been valued as part of the appraisal:

- Agglomeration, or firms and individuals deriving productivity from locating in close proximity to other firms and individuals;
- A reduction in imperfect competition or markets being dominated by a small number of businesses; and,
- Labour supply impacts or individuals being able to access more employment opportunities.

8.44 An Excel model consistent with the methodology described in WebTAG Unit A2.1 has been developed to calculate these benefits.

8.45 The model uses generalised cost and demand data from MOIRA to calculate the wider economic impacts of each option. In addition, for consistency with the requirements of WebTAG, it considers trips by other modes, namely car and bus. In addition to generalised cost, the model includes access and egress times to the rail network as a key input.

8.46 The results of the wider economic impacts are summarised in Table 2.9. These represent the 2026/27 single year estimated impact as a proportion of the timetable benefits.

Table 2.9: Wider economic impacts expressed as a proportion of timetable benefits (2026/27 single year uplift)

	Preferred Option	Option 2
Percent of timetable benefits	70.8%	76.6%

8.47 The Preferred Option delivers significant WEIs, connecting the two agglomerations of Leeds and Manchester. Option 2 offers slightly higher WEIs, as it delivers faster journey times than the Preferred Option

Capital Costs

8.48 Capital cost estimates were provided by Network Rail on 18 September 2018. Table 2.10 summarises this information.

Table 2.10: Capital cost by option and year of spend (£m, nominal prices, excluding risk and optimism bias)

	Do Minimum	Preferred Option (see note 1)		Option 2 (see note 2)	
		Total Cost	Increase over Do Minimum	Total Cost	Increase over Do Minimum
2018/19	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
2019/20	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
2020/21	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
2021/22	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
2022/23	-	[redacted]	[redacted]	[redacted]	[redacted]
2023/24	-	[redacted]	[redacted]	[redacted]	[redacted]
2024/25	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
2025/26	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
2026/27	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
2027/28	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
2028/29	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Total	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
		1 including CP7 renewals		2 including VIC/GUI-SYB electrification and CP7 renewals	

Network Rail's operations and maintenance spend for the appraisal period is not included in these figures, but is modelled through the incremental change in infrastructure access charges in the operating cost model.

8.49 The Do Minimum capital costs include a significant amount of capital investment to renew the route's infrastructure such that it can continue to accommodate the current level of service. This results from the historic expectation that the Transpennine Route Upgrade scheme would be likely to renew the route's infrastructure in the longer term, and that therefore renewing the route in the shorter term would be inefficient. If, however, the upgrade does not happen, a significant renewal of infrastructure will be necessary in CP6 and CP7 to allow continued operation of the railway. Given the more limited scope of the Preferred Option, some limited renewals work will be required in CP7 on sections of the route which have not been renewed during the upgrade. These costs will total some [redacted] in nominal prices, unadjusted for risk or optimism bias. For Option 2, which is more extensive in scope, the equivalent figure is somewhat less at [redacted].

8.50 The table above shows the total capital cost for each of the Do Minimum, Preferred Option and Option 2. It also shows the difference in capital cost between the Do Minimum and each of the two options. The Preferred Option represents an increase of [redacted] over the Do Minimum, while Option 2 is an increase of [redacted]

8.51 The electrification the section of route between Victoria/Guide Bridge and Stalybridge was not included in the scope of the Transpennine Route Upgrade remit, as it was expected to be covered by the wider North of England Programme. However, it this is not the case. Therefore, a cost of [redacted] nominal, sourced from earlier electrification business case work has been added to the upgrade costs provided by Network Rail for Option 2, which requires the electrification for the whole route to realise the full benefits it offers. For the Preferred Option, Network Rail's electrification costs for this section have been provided, so no adjustment has been made (though we note that only the section between Victoria and Baguley Fold is to be electrified in the Preferred Option).

8.52 Network Rail's designs are at the GRIP 2 stage. In line with WebTAG guidance, an optimism bias uplift of 64% has therefore been applied to capital costs in the Do Minimum and the options. At GRIP 2, no explicit adjustment is made for risk.

Operating Costs

Operating cost summary

8.53 In addition to capital costs, the Transpennine Route Upgrade will involve changes in the operating costs from the new timetable and the new rolling stock. Metrics of fleet usage are combined with the operating cost unit rates, price growth rates in accordance with WebTAG guidance, and staff costs, to produce forecast operating costs to the end of the appraisal period. The operating costs over the appraisal period are calculated for each Option, but presented here as the increment compared to the Do Minimum.

8.54 Table 2.11 and Figure 2.1 present a breakdown summary by operating cost category of the net impact of the two options relative to the Do Minimum.

Table 2.11: Annual net incremental operating cost by Option relative to the Do Minimum in 2027/28 (£m, 2016/17 prices, positive indicates increase in costs)

	Preferred Option	Option 2
Capital Lease	[redacted]	[redacted]
Non-Capital Lease & Maintenance	[redacted]	[redacted]
VTAC and EAUC	[redacted]	[redacted]
Energy	[redacted]	[redacted]
Train Crew	[redacted]	[redacted]
Total Operator Costs	[redacted]	[redacted]

8.55 The following chart shows the profile of Operating Cost spend for the Preferred Option.

Figure 2.1: Incremental Operating Cost Profile over Appraisal Period – Preferred Option (£000s, Nominal)

8.56 Most costs are expected to increase in line with RPI resulting in operating costs rising over the course of the Appraisal Period. The cost profile of Option 2 is similar, with costs rising throughout the Appraisal.

Passenger Revenue

8.57 Changes in the rail offer on the route will result in increased demand and revenue on the services using the route. This revenue is included in the PVC, offsetting the capital cost of the scheme. The primary drivers for the revenue growth are:

- Exogenous growth – growth deriving from changes in population, GDP, employment, and other factors. These are calculated using the DfT's Demand Driver Generator outputs.
- Timetable – the improved journey times and frequencies offered by the post-upgrade timetable.
- Performance – the improvement in punctuality following the capacity upgrade.
- Crowding – increased demand following the release of suppression due to crowding.

8.58 Exogenous growth is common to the Do Minimum and all options, but the final three drivers vary between the Do Minimum and the options, and between the options themselves.

8.59 Table 9.12 shows the revenue generated by the two options. A significant increase in franchise revenue is generated by the improved timetable and performance delivered by the scheme. Option 2 generates 25% more revenue than the Preferred Option due to the improved journey times it offers, though the improved performance offered by the Preferred Option partially offsets this.

Table 9.12: Increased revenue generated in total over the appraisal period by the scheme, relative to the Do Minimum (£m, NPV over the appraisal period, 2010 prices)

	Preferred Option	Option 2
Revenue	[redacted]	[redacted]

Appraisal Assumptions

8.60 The Appraisal Model was populated using WebTAG guidance and the parameter values from the May 2018 Transport Appraisal Guidance (TAG) Data Book. Further details of the approach taken and assumptions made are detailed in the Appraisal Modelling Report appended to this Economic Case.

9. Economic, Environmental and Social Impacts

A Summary of the Economic, Environmental and Social Impacts

Introduction

9.1 The Transpennine Route Upgrade will have a number of economic, environmental and social impacts. This section provides a summary of these, drawing on analysis from the economic appraisal summarised in the previous section and information provided by Network Rail in their Option Selection Report as part of their December 2017 submission.

9.2 This section is structured to reflect the contents of the Appraisal Summary Table. In line with WebTAG guidance, the following seven-point scale has been used: large adverse, moderate adverse, slight adverse, neutral, slight beneficial, moderate beneficial, large beneficial.

Economy

Business Users and Transport Providers

9.3 The business user and transport providers' impacts are valued as part of the quantified economic appraisal and included in the TEE table which follows in the VfM Statement.

9.4 The business user benefits are a result of rail business users' journey time related benefits, and highway business users' decongestion benefits as a result of mode shift to rail. The combined business user benefits are shown in Table 3.1.

Table 3.1: Journey time savings for business users (£m, NPV over the appraisal period, 2010 prices)

	Preferred Option	**Option 2**
Journey Time Savings	85.1	199.2

9.5 The transport provider impact is assumed to be a net neutral impact, with the additional marginal net revenue (additional ticket sales less operating cost) assumed to be transferred to central government through changes in franchise payments.

Reliability on Business Users

9.6 Reliability in this context refers to the reliability of journey times. There are three impacts identified as a result of Transpennine Route Upgrade.

9.7 There will be highway decongestion benefits as a result of mode shift from road to rail. These have been valued as part of the quantified economic appraisal and are included under business user benefits.

Table 3.2: Reliability Impacts on business users (£m, NPV over the appraisal period, 2010 prices)

	Preferred Option	Option 2
Rail reliability impact	102.8	79.3
Road congestion impact	16.0	19.9
Total	11.8	99.3

9.8 TRU includes additional infrastructure to allow an enhanced frequency to operate while mitigating the possible negative impact on service reliability and punctuality. These benefits have been valued as part of the core Economic Case.

Regeneration

9.9 Regeneration happens when deprived areas are improved through improvements to the local economy. Regeneration impacts from transport are generally associated with changes in accessibility as people are able to better access services. These are achieved via changes in journey times, journey costs, or journey reliability. Since journey times will be reduced and reliability improved in both options, there are likely to be beneficial regeneration effects within the catchment area. However, TRU is not planned to directly support any specific regeneration proposals.

9.10 On this basis, the benefit for both the Preferred Option and Option 2 is assessed qualitatively as a **Slight Beneficial** impact.

Wider Impacts

9.11 The Strategic Case identifies improving productivity and rebalancing growth across the UK as a key objective of the scheme.

9.12 The economic performance of the North of England currently lags behind the rest of the England, with Gross Value Added (GVA) per capita on average 25% lower than the rest of England, or 10-15% when London is removed . This performance gap is largely attributable to lower levels of productivity in the North, which is in turn driven by poor connectivity, skills and investment gaps, and low enterprise rates.

9.13 The scheme will significantly improve connectivity between cities and to/from intermediary communities, making them essentially ‘closer’ and widening the potential labour market catchment. The crossover between catchment areas for principal centres will also competition between suppliers, as potential markets for their products will widen, particularly within the city-centre based service sector.

9.14 Providing better connectivity between urban centres also allows for agglomeration benefits, as businesses have more efficient access to each other. This effect also services to increase productivity.

9.15 Access to better jobs can encourage an uplift in skills, and therefore the region will therefore be more attractive to investment from high skilled, high wage businesses. Improvements such as these can further contribute to the overall goal of higher productivity. This is particularly true for businesses in city-centre locations, and the scheme is disproportionately focused on such locations, connecting key city centres throughout the region.

9.16 The economic narrative for the Wider Impacts of agglomeration, imperfect competition and labour market benefits is therefore clear, and these benefits have therefore been valued as part of the quantified appraisal. The potential importance of these effects to the Business Case justified a detailed modelling exercise using a bespoke spreadsheet-based model, validated using the Department's WITA model.

9.17 The following table contains the values of the Wider Economic Impacts:

Table 3.3: Wider Economic Impacts (£m, NPV over the appraisal period, 2010 prices)

	Preferred Option	Option 2
Wider Economic Impacts	247.0	474.7

Environmental

Air Quality

9.18 Under both options during the construction period, there will be a short-term negative impact on air quality.

9.19 The Preferred Option provides less electrification than Option 2, but would allow local services between Leeds and Huddersfield to be operated by electric rather than diesel stock, and for bi-mode stock to operate in electric mode for a greater proportion of its mileage than in the Do Minimum. However, this reduction in diesel operation is more than offset by the increase resulting from new diesel services elsewhere on the route.

9.20 Option 2 provides more electrification, with the reduced diesel operation from electrification exceeding the operation of new diesel services.

9.21 Both options result in mode shift from car to rail, resulting in a reduction in air pollutants from car travel.

9.22 Table 3.4 summarises the quantified air quality impacts.

Table 3.4: Air Quality Impacts (£m, NPV over the appraisal period, 2010 prices)

	Preferred Option	Option 2
NOx rail emissions	(0.2)	6.8
Reduced car-kms	0.1	0.2
Total	(0.1)	7.0

Noise and Vibration

9.23 There will be a short term negative impact on noise and vibration due to construction work for both options at specific locations.

9.24 Following completion of the upgrade, the replacement of diesel trains with quieter electric rolling stock will result in a decrease in train noise where trains are operated with electric traction, though impacts are modest and will be spread across the route. There will be some negative impact as a result of additional train frequency and

higher speeds, though the noise from rail services is generally assumed to have a minimal impact given other background noise. These effects are not quantified.

9.25 There is also an impact resulting from the mode shift from car to rail, as fewer car-kms mean a reduction in noise on roads.

Table 3.5: Noise Reduction (£m, NPV over the appraisal period, 2010 prices)

	Preferred Option	Option 2
Noise reduction from reduced car-kms	1.7	2.1

Greenhouse Gases

9.26 The replacement of diesel trains with electric trains on some services will reduce greenhouse gas emissions and have a beneficial impact on greenhouse gas emissions. However, as part of the improved timetable in the Preferred Option there will be new diesel services, which will bring additional emissions. The net outcome of these two effects is a small reduction in greenhouse gas emissions. In Option 2, many more services are electrified, and the reduction in greenhouse gases is commensurately higher.

9.27 As the rail service improves, modal shift from car to train will result in further reductions in greenhouse gas emissions.

9.28 Both of these reductions have been a quantified as part of this Economic Case using standard WEBTAG guidance. The value of the reduction is shown in Table 3.6.

Table 3.6: Greenhouse Gas Reduction (£m, NPV over the appraisal period, 2010 prices)

	Preferred Option	Option 2
Reduced GHGs from rail diesel use changes	8	154
Reduced GHGs from mode shift	5	6
Total	13	161

9.29

Landscape and Townscape

9.30 Both options would have widespread visual and landscape impact as a result of Overhead Line Electrification (OLE) installation along the route, and new civil structures. In particular in Option 2 there are a number of OLE structures between Manchester and Huddersfield which are within 0.5 miles of the Peak District National Park. The Preferred Option has less visual impact due to the reduced scope of electrification between Huddersfield and Manchester.

9.31 In both options, there are also some works within the Green Belt which would require careful planning.

9.32 Additionally, a number of changes to new and existing station locations will be required, along with extensive works at Heaton Lodge/ Ravensthorpe, which will extensively change landscapes and townscapes in the area.

9.33 Given that this is an existing railway line, there is already some visual disruption within the Landscape and Townscape, meaning the impacts will not be severe. For

this reason, the impact for both the Preferred Option and Option 2 has been assessed qualitatively to be **Slight Adverse**.

Cultural Heritage

9.34 There are several listed structures, railway heritage assets, registered battlefields, parks and gardens, and Scheduled Monuments in proximity to the route, including the Grade I listed Huddersfield station.

9.35 It is assumed that work will be undertaken as part of the Transpennine Route Upgrade to mitigate any potential impacts, and where possible the cost of this has been quantified and reflected in the Cost Benefit Analysis. This impact has therefore been assessed qualitatively for both the Preferred Option and Option 2 as **Neutral**.

Biodiversity

9.36 Both Options have interventions that lie within one mile of a number of Special Conservation Areas (SCA), Special Protection Areas (SPA), Sights of Special Scientific Interest (SSSI) and Local Nature Reserves (LNR). It is likely that Habitat Regulations will require a screening option is undertaken to determine whether appropriate assessment is necessary.

9.37 There will be some more localised impacts that will be considered, and where possible mitigated, through the planning process. In some locations Network Rail have permitted development rights so are not obliged to address this except where they need planning permission.

9.38 Given that further assessment may be required, this has been assessed qualitatively as **Neutral** at this time, for both the Preferred Option and Option 2.

Water Environment

9.39 The Transpennine Route crosses several rivers and numerous areas at flood risk from surface water. Additionally, the proposals at Ravensthorpe also involve development within a landfill site close to a river, meaning the potential to create new pollution pathways will need to be carefully considered.

9.40 There will be some more localised impacts that will have to be considered, and where possible mitigated, through the planning process.

9.41 It has been qualitatively assessed that, given it is expected that the negative impacts will be mitigated where possible, the impact will be **Neutral**, for both the Preferred Option and Option 2.

Social

Commuting and Other Users' Journey time

9.42 Commuter and other user benefits are a result of journey time improvements and highway business user decongestion benefits as a result of mode shift to rail. The combined commuter and other user journey time benefits are shown in Table 3.7.

Table 3.7: Journey time savings for non-business users (£m, NPV over the appraisal period, 2010 prices)

	Preferred Option	Option 2
Journey Time Savings	263.8	420.5

Reliability Impact on Commuting and Other Users

9.43 The Reliability Impact on Commuting and Other Users is as set out above for Business Users. Table 3.8 shows the quantified impacts used in the Economic Appraisal.

Table 3.8: Reliability Impacts on non-business users (£m, NPV over the appraisal period, 2010 prices)

	Preferred Option	Option 2
Rail reliability impact	257.2	165.5
Road congestion impact	168.8	210.4
Total	426.0	379.2

Physical Activity

9.44 There is evidence that using public transport can encourage physical activity, as users walk further to access public transport rather than a personal vehicle. The mode shift from car to rail resulting from enhanced public transport connectivity is therefore likely to have a moderately positive impact on physical activity.

9.45 The vast majority of journeys forecast on the Transpennine Route are expected to be longer than five miles, a widely-accepted maximum distance for walking and cycling journeys; therefore, there will be very limited mode shift to rail away from active travel.

9.46 Given the first of these impacts is likely to be more significant than the second, the physical activity impact of TRU is assessed as **Slight Beneficial**, for both the Preferred Option and Option 2.

Journey Quality

9.47 Journey quality considers how a journey is perceived from the traveller's perspective without taking into account reliability or journey time, which are both analysed within other sections of the appraisal.

9.48 The provision of new rolling stock with new passenger features and a reduction in crowding (through increased passenger capacity) on the route are likely to improve the quality of passengers' journeys.

9.49 Journey quality and crowding benefits have been valued as part of the conventional Economic Case, and values for both options are shown in Table 3.9.

Table 3.9: Journey quality (£m, NPV over the appraisal period, 2010 prices)

	Preferred Option	Option 2
Journey quality and crowding	57.5	53.2

Accidents

9.50 Transport interventions can alter the risk of individuals being killed or injured as a result of accidents. This scheme attracts people to from car to rail, a safer form of travel, meaning they are less likely to have accidents.

9.51 The values of the reduction in accidents from TRU, derived using WebTAG guidance, are shown in Table 3.10.

Table 3.10: Accident Reduction (£m, NPV over the appraisal period, 2010 prices)

	Preferred Option	Option 2
Accident Reduction	21.1	26.3

9.52

Security

9.53 WebTAG Unit A4.1 identifies the following six security indicators for public transport passengers:

- Site perimeters, entrances and exits;
- Formal surveillance;
- Informal surveillance;
- Landscaping;
- Lighting and visibility; and
- Emergency call.

9.54 In this instance, there will be almost no impact on security as there will be few changes to station facilities, with the relocated stations containing the same or better facilities as the existing ones.

9.55 Overall the security impact of the packages is assessed as **Neutral**, for both the Preferred Option and Option 2.

Access to Services

9.56 TRU will improve journey times along the route. These improvements will improve access to services and activities, thereby enhancing the range of opportunities and choices people have in connecting with jobs, services, leisure opportunities, and friends and families.

9.57 Overall, the impact on accessibility is assessed as **Slight Beneficial**, for both the Preferred Option and Option 2.

Affordability

9.58 Personal affordability reflects any change in the price of travel resulting from a transport scheme. As TRU is not proposing any changes in fares for passengers, there will not be disproportionate impacts on any particular social group.

9.59 The affordability impact of the packages is assessed as **Neutral**, for both the Preferred Option and Option 2.

Severance

9.60 The assessment of severance is primarily concerned with the impacts of the scheme on those groups who do not make up the main body of passengers. It considers the extent to which vulnerable groups might be deterred from making journeys as a result of the scheme and whether the infrastructure would introduce a hindrance to movement.

9.61 There may be some temporary severance as the result of bridge closures for electrification works; however, they will be reinstated following works.

9.62 There are expected to be level crossing closures as part of the upgrade; however, it is planned that these will be replaced these with bridges, thereby mitigating any potential severance.

9.63 It is assumed that any temporary closures will be mitigated, and that overall the severance impact is assessed as **Neutral**, for both the Preferred Option and Option 2.

Option and Non-Use Values

9.64 Option Values refer to the willingness to pay to preserve the option of using a public transport service for trips that are currently undertaken by other modes, over and above the expected value of any future use. For example, a car owner may value the option of a rail service for use in those circumstances when they cannot use their car. Non-use or existence values, on the other hand, represent the value society places on the very existence of a service or facility regardless of any possibility of future use; this may be related to its usefulness to others or as a matter of civic pride.

9.65 As TRU enhances the existing provision of services, the overall the impact of the packages is assessed as **Slight Beneficial**, for both the Preferred Option and Option 2.

10. Value for Money Statement

Developed using Value for Money Guidance

Introduction

The preceding sections have demonstrated the economic, social, environmental and public accounts impacts of the TransPennine Route Upgrade. This section brings these impacts together in this statement of Value for Money (VfM) for the scheme.
A key component of an intervention's VfM is the Benefit Cost Ratio (BCR) calculated within the transport economic appraisal for the two options presented. The transport economic appraisal combines elements from across the economic, social, environmental and public accounts impacts but, being only those elements which are conventionally monetised, is not necessarily a full reflection of a scheme's overall impact. Therefore, to reach a conclusion on the TransPennine Route Upgrade's VfM, the following sections consider both the outputs from the transport economic appraisal, including in terms of the robustness of inputs and assumptions, and also the non-monetised impacts outlined above, to give a wider Value for Money categorisation.

Public Accounts Table

The following tables contain the Public Accounts tables for the Preferred Option and Option 2.

Table 11.1: Public Accounts Table for the Preferred Option

	ALL MODES		ROAD	BUS and COACH	RAIL	OTHER
Local Government Funding	TOTAL		INFRASTRUCTURE			
Revenue	0					
Operating Costs	0					
Investment Costs	0					
Developer and Other Contributions	0				0	
Grant/Subsidy Payments	0				0	
NET IMPACT	0	*(7)*			0	
Central Government Funding: Transport						
Revenue						
Operating costs						
Investment Costs						
Developer and Other Contributions						
Grant/Subsidy Payments						
NET IMPACT		*(8)*				
Central Government Funding: Non-Transport						
Indirect Tax Revenues		*(9)*				
TOTALS						
Broad Transport Budget		*(10) = (7) + (8)*				
Wider Public Finances		*(11) = (9)*				

Notes: Costs appear as positive numbers, while revenues and 'Developer and Other Contributions' appear as negative numbers.

All entries are discounted present values in 2010 prices and values.

Table 11.2: Public Accounts Table for Option 2

	ALL MODES		ROAD	BUS and COACH	RAIL	OTHER
Local Government Funding	TOTAL		INFRASTRUCTURE			
Revenue	0					
Operating Costs	0					
Investment Costs	0					
Developer and Other Contributions	0				0	
Grant/Subsidy Payments	0				0	
NET IMPACT	0	*(7)*			0	
Central Government Funding: Transport						
Revenue						
Operating costs						
Investment Costs						
Developer and Other Contributions						
Grant/Subsidy Payments						
NET IMPACT		*(8)*				
Central Government Funding: Non-Transport						
Indirect Tax Revenues		*(9)*				
TOTALS						
Broad Transport Budget		*(10) = (7) + (8)*				
Wider Public Finances		*(11) = (9)*				

Notes: Costs appear as positive numbers, while revenues and 'Developer and Other Contributions' appear as negative numbers.

All entries are discounted present values in 2010 prices and values.

Transport Economic Efficiency

The appraisal travel time/cost and operator impacts reported within the Economy and Social impacts sections above are presented as a Transport Economic Efficiency (TEE) analysis below. Table 11.3: Transport Economic Efficiency Table for the Preferred Option

Non-business: Commuting	**ALL MODES**		**ROAD**	**BUS and COACH**	**RAIL**	**OTHER**
User benefits	**TOTAL**		**Private Cars and LGVs**	**Passengers**	**Passengers**	
Travel time	139,295				139,295	
Vehicle operating costs	0					
User charges	0					
During Construction & Maintenance	0					
NET NON-BUSINESS BENEFITS: COMMUTING	139,295	*(1a)*	0	0	139,295	0

Non-business: Other	**ALL MODES**		**ROAD**	**BUS and COACH**	**RAIL**	**OTHER**
User benefits	**TOTAL**		**Private Cars and LGVs**	**Passengers**	**Passengers**	
Travel time	124,458				124,458	
Vehicle operating costs	0					
User charges	0					
During Construction & Maintenance	0					
NET NON-BUSINESS BENEFITS: OTHER	124,458	*(1b)*	0	0	124,458	0

Business								
User benefits			**Goods Vehicles**	**Business Cars & LGVs**	**Passengers**	**Freight**	**Passengers**	
Travel time	85,109						85,109	
Vehicle operating costs	0							
User charges	0							
During Construction & Maintenance	0							
Subtotal	85,109	*(2)*	0	0	0	0	85,109	0
Private sector provider impacts						**Freight**	**Passengers**	
Revenue	606,616						606,616	
Operating costs	-266,205						-266,205	
Investment costs	0							
Grant/subsidy	-310,081						-310,081	
Subtotal	30,331	*(3)*						
Other business impacts								
Developer contributions	0	*(4)*						
NET BUSINESS IMPACT	115,439	*(5) = (2) + (3) + (4)*						
TOTAL								
Present Value of Transport Economic Efficiency Benefits (TEE)	379,193	*(6) = (1a) + (1b) + (5)*						

Notes: Benefits appear as positive numbers, while costs appear as negative numbers.
All entries are discounted present values, in 2010 prices and values

The tables above show the total benefits for the Preferred Option, inclusive of public transport travel time savings and user charges for each of the three standard user journey purposes. Commuters receive a total benefit of £139.3m PV, Business users receive a total of £85.1m PV, and Other users receive a total benefit of £124.5m PV. The impact on private sector transport providers is neutral, the net costs of Train Operating Companies being balanced by subsidy from Central Government through its periodic refranchising programme. The total value of transport efficiency benefits is £379.2m PV.

Table 11.4: Transport Economic Efficiency for Option 2

Non-business: Commuting	ALL MODES		ROAD		BUS and COACH	RAIL		OTHER
User benefits	TOTAL		Private Cars and LGVs		Passengers	Passengers		
Travel time	202,657					202,657		
Vehicle operating costs	0							
User charges	0							
During Construction & Maintenance	0							
NET NON-BUSINESS BENEFITS: COMMUTING	202,657	*(1a)*	0		0	202,657		0
Non-business: Other	ALL MODES		ROAD		BUS and COACH	RAIL		OTHER
User benefits	TOTAL		Private Cars and LGVs		Passengers	Passengers		
Travel time	217,874					217,874		
Vehicle operating costs	0							
User charges	0							
During Construction & Maintenance	0							
NET NON-BUSINESS BENEFITS: OTHER	217,874	*(1b)*	0		0	217,874		0
Business								
User benefits			Goods Vehicles	Business Cars & LGVs	Passengers	Freight	Passengers	
Travel time	199,221						199,221	
Vehicle operating costs	0							
User charges	0							
During Construction & Maintenance	0							
Subtotal	199,221	*(2)*	0	0	0	0	199,221	0
Private sector provider impacts						Freight	Passengers	
Revenue	751,060						751,060	
Operating costs	28,980						28,980	
Investment costs	0							
Grant/subsidy	-742,487						-742,487	
Subtotal	37,553	*(3)*						
Other business impacts								
Developer contributions	0	*(4)*						
NET BUSINESS IMPACT	236,774	*(5) = (2) + (3) + (4)*						
TOTAL								
Present Value of Transport Economic Efficiency Benefits (TEE)	657,305	*(6) = (1a) + (1b) + (5)*						

Notes: Benefits appear as positive numbers, while costs appear as negative numbers.
All entries are discounted present values, in 2010 prices and values

The table above show the same analysis for Option 2. In this Option, Commuters receive a total benefit of £202.7m PV, Business users receive a total benefit of £199.2m PV, and Other users receive a total benefit of £217.9m PV. The total value of transport efficiency benefits is £657.3m PV.

Analysis of Monetised Costs and Benefits

The Cost to the Broad Transport Budget, forms the cost in the BCR calculation shown below, the Analysis of Monetised Costs and Benefits (AMCB) table for the TransPennine Route Upgrade.

The TEE analysis (above) is combined with wider monetised environmental and social benefits (noise, air quality, greenhouse gases, journey ambience and accidents) and the indirect tax impacts described in Section 3 to represent the Benefits in the BCR calculation.

Table 11.5: TransPennine Route Upgrade AMCB Table (£000s, PV, 2010 prices),

	Preferred Option	Option 2
Noise	1,699	2,115
Local Air Quality	7,883	161,348
Greenhouse Gases	5,081	6,304
Journey Quality	594,825	529,789
Physical Activity	0	0
Accidents	21,110	26,282
Economic Efficiency: Consumer Users (Commuting)	139,295	202,657
Economic Efficiency: Consumer Users (Other)	124,458	217,874
Economic Efficiency: Business Users and Providers	85,109	199,221
Wider Public Finances (Indirect Taxation Revenues)	-114,231	-194,386
Present Value of Benefits (see notes) (PVB)	865,229	1,151,204
Broad Transport Budget	[redacted]	
Present Value of Costs (see notes) (PVC)		
Net Present Value (NPV)		
Benefit to Cost Ratio (BCR)		

Table 11.6 shows the NPV and BCR with Wider Economic Impacts included.

Table 11.6: Wider Economic Impacts (£000s, PV, 2010 prices)

	Preferred Option	Option 2
Wider Economic Impacts (WEIs)	247,029	474,668
PV Benefits	1,112,258	1,625,872
PV Costs	[redacted]	[redacted]
NPV (including WEIs)	[redacted]	[redacted]
BCR (including WEIs)	[redacted]	[redacted]

VfM Category

DfT's VfM Guidance, sets out the following criteria when assessing the justification for public sector investment in a scheme:

- Poor VfM if the BCR is less than 1.0
- Low VfM if the BCR is between 1.0 and 1.5
- Medium VfM if the BCR is between 1.5 and 2.0
- High VfM if the BCR is between 2.0 and 4.0
- Very High VfM if the BCR is greater than 4.0

The guidance explains that the above threshold values indicate the 'initial' VfM categorisation. [redacted]

[redacted]

11. Risk and Sensitivity

Set out how changes in different variables affect the Net Present Value/Net Present Cost. The Risk Profile should show how likely it is that these changes will happen.

Introduction

This section sets out the risks and sensitivities that have been tested as part of the appraisal review. The risks identified are in line with WebTAG Unit A5.3. Sensitivity tests have been undertaken considering the impact of other schemes which are currently being developed, and for changes to fares policies.

Risk

WebTAG requires that optimism bias and quantified risk assessment (QRA) estimates of likely additional spend, are applied to the capital cost point estimates. These are intended to account for the historic trend of underestimating capital costs for rail projects.
These parameters imply a greater uplift to the point estimates at the early stages of design compared with later stages when projects are more fully designed.
At the GRIP 2 stage, WebTAG[3] recommends applying optimism bias of 64%. At GRIP 2, no QRA adjustment is required.
At the GRIP 3 stage, WebTAG recommends optimism bias of 18%, applied to the capital costs plus the mean estimate from the QRA.
The scheme is currently at the GRIP 2 stage, so WebTAG parameters corresponding to this stage have been applied to the capital costs.

Sensitivity tests

NPR

Northern Powerhouse Rail (NPR) could have a significant impact on the case for TransPennine Route Upgrade.
An NPR implementation via Huddersfield would be likely to use TransPennine Route Upgrade infrastructure between Leeds and Slaithwaite, before transferring onto a new alignment into Manchester Piccadilly. Such a scheme would undermine the case for interventions west of Slaithwaite, but would have little impact on the case for interventions east of Slaithwaite.
An NPR implementation via Bradford would not use any of the TransPennine Route Upgrade infrastructure west of Leeds. Such a scheme would be likely to significantly reduce the benefits of TransPennine Route Upgrade following implementation, as the TransPennine Route Upgrade route west of Leeds would no longer accommodate inter-regional services.

[3] Unit A5.3, Table 3

Sensitivity tests have been carried out to understand the implications of NPR on the TransPennine Route Upgrade business case. For the Huddersfield NPR route, timetable benefits accruing to passengers on fast and semi-fast services west of Huddersfield were excluded, but those accruing east of Huddersfield were retained. Timetable benefits accruing to passengers on stopping services were assumed to be unaffected, as these services would continue to use the current alignment. Performance benefits were assumed to be unaffected, as these largely derive from the four-track section between Huddersfield and Ravensthorpe which would continue to be used by all services.

In a related test, both the benefits and the capital costs of interventions west of Huddersfield were removed.

For the Bradford NPR route, all timetable benefits to passengers on semi-fast and fast services west of Leeds were excluded, with stopping passengers again assumed to be unaffected. All performance benefits are excluded following the commissioning of NPR, as the crucial four-track section between Huddersfield and Ravensthorpe would no longer be in use.
Irrespective of the route selected for NPR, the diversion of inter-regional trains onto NPR infrastructure would release capacity on the TransPennine Route. This extra capacity would be likely to be used to run extra semi-fast and stopping services, generating some extra benefits for passengers. At this time this change in service pattern has not been modelled.
NPR is assumed to be commissioned in 2033, in line with the current NPR SOBC.

HS2

It appears likely that a junction between the existing TransPennine Route and the new HS2 alignment north of Leeds is feasible. Such a junction would allow TransPennine Route Upgrade inter-regional services to join the high-speed railway somewhere east of Micklefield, taking advantage of the line speed and capacity offered by the new infrastructure. If this junction is built, the case for TransPennine Route Upgrade interventions between Micklefield and Church Fenton (where the HS2 alignment joins the classic infrastructure) would be undermined.
A sensitivity test concerning HS2 was not deemed necessary, as neither the Preferred Option nor Option 2 provide any infrastructure upgrades between Micklefield and Church Fenton.

Fares policy

In line with WebTAG guidance, a sensitivity test on fares policy has also been carried out, with the Consumer Prices Index (CPI) replacing the Retail Prices Index (RPI) as the reference point for fares increases. The central case assumes the following:

- Up to Jan 2020 RPI+0%
- Jan 2021 – Jan 2037 RPI+1%
- Jan 2037 onwards RPI+0%

For the sensitivity test, the following fares policy has been assumed:

- Up to Jan 2020 RPI+0%
- Jan 2021 – Jan 2037 CPI+1%
- Jan 2037 onwards RPI+0%

As CPI is forecast to be lower than RPI, this implies a reduction in fares increases over the appraisal period, though note this is the case for both the Do Minimum and the options.

Results

Table 12.1 shows the results of the sensitivity tests.

Table 12.1. Results of sensitivity tests, Preferred Option

Test	Central case	NPR via Huddersfield	NPR via Bradford	Fares policy change
PVB (£000, 2010 prices)	865,229	771,449	316,773	[redacted]
PVC (£000, 2010 prices)	[redacted]	[redacted]	[redacted]	[redacted]
NPV (£000, 2010 prices)	[redacted]	[redacted]	[redacted]	[redacted]
BCR	[redacted]	[redacted]	[redacted]	[redacted]

Table 12.2. Results of sensitivity tests, Option 2

Test	Central case	NPR via Huddersfield	NPR via Bradford	Fares policy change
PVB (£000, 2010 prices)	1,151,204	912,564	535,320	[redacted]
PVC (£000, 2010 prices)	[redacted]	[redacted]	[redacted]	[redacted]
NPV (£000, 2010 prices)	[redacted]	[redacted]	[redacted]	[redacted]
BCR	[redacted]	[redacted]	[redacted]	[redacted]

Implementing NPR via Huddersfield would impact on the Preferred Option, reducing the BCR from [redacted]. A decision to implement NPR via Bradford would significantly reduce the case for the TransPennine Route Upgrade, [redacted] A switch to CPI as the reference index for fares increases would marginally decrease revenue (and hence increase the PVC slightly), but would stimulate demand, increasing the timetable and performance benefits accruing to passengers. Under this sensitivity test the BCR of the Preferred Option increases to [redacted].
[redacted].

12. Distributional Analysis

Results of the Distributional Analysis Pro Forma

Introduction

This section presents the Distributional Impacts assessment, which is used to determine the spatial and distributional extent of the benefits and disbenefits of different impacts of the scheme on specific social groups.
The approach described in WebTAG Unit A4.2 has been employed, which is comprised of three steps for the assessment of Distributional Impacts: screening, assessment and appraisal.
In addition, the 'principle of proportionality' in WebTAG guidance has been applied: a more detailed analysis has been undertaken where the impacts identified during the screening process have been found to have a material impact on the overall scheme, and more high-level analysis undertaken where impacts were less significant.

Screening

A Distributional Impact Appraisal Screening Pro-forma has been used for the screening process. As indicated in this pro-forma, an assessment of the distributional impact on User Benefits, Air Quality and Accessibility has been completed. The impact on Noise, Accidents, Security, Severance and Affordability is not assessed as these impacts are considered minimal and were reviewed in the Distributional Impact Appraisal Screening Pro-forma, presented in an appendix in the Appraisal Modelling Report appended to this Economic Case.

Assessment and Appraisal

WebTAG recommends the socio-demographic groups against which each of the eight indicators should be assessed, in table 2 of WebTAG Unit 4.2. This analysis has been undertaken for Income Distribution and Proportion of Population aged under 16, which applies to the analysis required for User Benefits and Air Quality. The Accessibility analysis would require the six other social groups to be assessed as well, but applying the principle of proportionality, and given that broadly all accessibility impacts are positive, the assessment has only been completed for these two social groups.
The assessment of the impact for User Benefits, Air Quality and Accessibility is presented below and is underpinned by the maps presented in the Appraisal Modelling Report appended to this Economic Case.

User Benefits

User Benefits are assessed against income only, and therefore the levels of income deprivation in the scope area have been analysed. The most deprived areas close to the scheme alignment include Manchester and Greater Manchester, Huddersfield, Deighton, Dewsbury, Ravensthorpe, Leeds and Greater Leeds, and Selby. All of these areas and the stations within them will benefit from an increase in service frequency and some of them

will see improved stations, therefore we can conclude that the scheme presents positive user benefits for the most deprived areas within the scope of the scheme.

Air Quality

The assessment of Air Quality against income has a similar nature to the analysis undertaken for user benefits; however, this will be limited to the sections of the alignment that will be electrified. Both the Preferred Option and Option 2 will benefit from the air quality benefits for the stations listed in the above section corresponding to the most deprived areas, except for Selby, which will not benefit from air quality improvements other than the induced mode shift from the road to the railway driven by a higher rail service frequency. With regards to the proportion of population aged under 16, the stations in areas with a high proportion of young population are mainly Deighton, Ravensthorpe, Dewsbury and Batley. All of those stations will benefit from the line electrification in both the Preferred Option and Option 2, meaning they will benefit from air quality improvements. Therefore, the scheme presents positive air quality for the areas within the scope of the scheme.

Accessibility

All the stations corresponding to the most deprived areas and to areas with a high proportion of young population will either benefit from an increase in service frequency, which will decrease the overall journey times for the users of those stations, or will benefit from a station relocation which will also improve their accessibility to the rail network. The scheme therefore presents positive accessibility benefits for the areas within the scope of the scheme.

DETAILED APPRAISAL BREAKDOWN FOR REFERENCE

		Preferred Option	***Option 2***
Option:		F46	F42
Do Minimum:		F80	F80

User Benefits		***£000 2010 PV***	***£000 2010 PV***
Timetable Benefits	(a)	348,862	619,752
Business		85,109	199,221
Commuting		139,295	202,657
Other		124,458	217,874
Crowding Benefits	(b)	52,909	56,988
Business		18,866	17,537
Commuting		16,892	21,098
Other		17,151	18,353
Performance Benefits	(c)	360,055	244,826
Business		102,828	79,355
Commuting		137,177	82,226
Other		120,050	83,246
Quality Benefits	(d)	373	515
Business		88	99
Commuting		154	242
Other		131	174
User Benefits	(e)	- 3,291	- 2,846
Business		- 643	- 564
Commuting		- 1,611	- 1,393
Other		- 1,037	- 889
User Charge Benefits	(f)		
TOTAL User Benefits	(g) = (a+b+c+d+e+f)	758,909	919,236

Non User Benefits

Congestion benefits		184,778	230,305
Business		15,980	19,917
Commuting		32,658	40,704
Other		136,141	169,684
Accident		21,110	26,282
Local Air Quality		- 68	6,951
Noise		1,699	2,115
Greenhouse Gases		5,081	6,304
Non-traded carbon benefits		7,950	154,397
TOTAL Non-User Benefits	(h)	220,551	426,354

Revenue

TRU Passenger Revenue		[redacted]
NR Passenger Revenue (franchises)		
NR Passenger Revenue (management contracts)		
Other Revenue - Cost		
Other Revenue - Revenue		
TOTAL Revenue	(i)	

Costs to Private Sector

Total CAPEX (private)	(j)	[redacted]
Total OPEX	(k)	
Premium (private)	(l)	
TRU Premium		
Other TOC Premiums		
TOTAL Private Sector Costs	(m) = (j+k+l)	

Costs to Government

Infrastructure (Road)	(o)	[redacted]
Total CAPEX	(p)	
Indirect Tax	(q)	
Fuel		
Non-fuel VOCs		
Rail tickets		
Rail fuel duty		
Premium	(r)	
TRU Premium		
Other TOC Premiums		
DfT Revenue Loss		
TOTAL Costs to Government	(q) = (n+o+p)	

Economic Appraisal Results		£000 2010 PV	£000 2010 PV
PV Benefits	(q) = (f+h+g+n)	865,229	1,151,204
PV Costs	(r) = (m+o)	[redacted]	
Net Present Value	NPV = (q+r)		
Benefit:Cost Ratio (BCR)	BCR = (q/r)		

Including WEIs	£000 2010 PV	£000 2010 PV
Wider economic impacts	247,029	474,668
PV Benefits	1,112,258	1,625,872
PV Costs	[redacted]	
Net Present Value (inc WEIs)		
Benefit:Cost Ratio (BCR)		

TRANSPENNINE ROUTE UPGRADE

Financial Case

13. Executive summary

Introduction

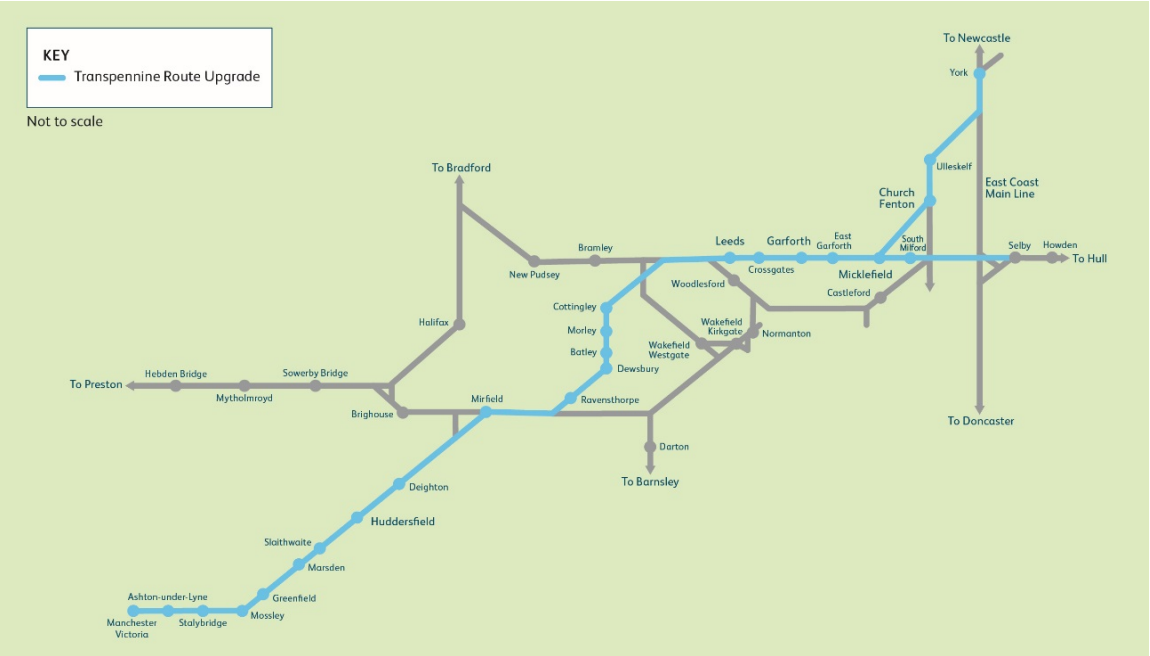
45 This Financial Case sets out information provided by Network Rail (NR) to the Department for Transport to develop the Transpennine Route Upgrade business case. At this stage the cost development is still at a relatively immature stage of development and further development and design work will need to be undertaken should the programme progress to the Design phase of scheme development. The Financial case sits within the wider Business Case submission for the TRU scheme. This Financial Case provides evidence of the programme's affordability – of the design costs, the projected scheme costs, and of consequent long term changes in the UK railway operating position (that is, operating costs compared to farebox revenue). The financial information provided should aid decision makers by providing accountancy information for different options, as well as the implications of the spend on the Department for Transport (DfT).

46 The cost and scope of the options are at a relatively immature stage of development that requires further development and design.

47 This Financial Case seeks authority to progress the TRU to programme design. [redacted] R are currently supplying the phasing of these figures across CP6. These costs will be drawn down in phases.

Background and Context

Transpennine Route Upgrade Map



48 The Transpennine Route is a key transport link across the North of England, with the core route linking Manchester and York, via Huddersfield and Leeds. The route supports a mix of services, rolling stock and operators serving inter-city, inter-regional and local passenger markets, as well as freight. There are around 50 million passenger rail journeys on the route each year, roughly twice the number of journeys the route carried 25 years ago.

49 The geography and topography of the route is amongst the most challenging on the GB rail network, and can be split into three key sections each with their own individual geography and infrastructure:

- From York to Leeds - relatively flat section through open country, with several rail junctions;
- From Leeds to Huddersfield - a route constrained by urban areas, tight curves and one long tunnel;
- From Huddersfield to Manchester - crossing the Pennines with one very long tunnel at Standedge, several short tunnels, viaducts and curves that restrict speed, as well as a number of listed structures.

50 The Transpennine Route Upgrade programme forms a key part of a wider transformation of rail travel in the north.

51 The upgrade is part of the North of England (NoE) Rail Programme, including North West Electrification and the Northern Hub (which delivers network capacity and connectivity enhancements). Whilst these sub-programmes of NoE can be viewed as discrete interventions there are key linkages between them, particularly TRU interventions west of Stalybridge. The passenger benefits of these infrastructure schemes are being delivered through timetable and rolling stock enhancements delivered by the current Northern and TransPennine Express franchises.

52 It is also the first phase of a series of the potential Northern Powerhouse Rail interventions. As such there is a choice to be made regarding the scope of this first

step of a transformation. The preferred option is a set of key interventions with an optimised fit with potential future interventions, including those delivered as part of in HS2 and NPR.

53 This phase of transformation focusses on:

- Capacity increases through service frequency and train capacity
- Performance improvements
- Journey time improvements
- Maintaining freight capacity and capability, with potential to add to both in the future

14. Cost Estimates

Capital Investment Cost

Overview

14.1 The cost data is provided by NR and provides an overview of the cost basis and description of each element of the scheme costs is provided below:

- Direct Costs – these costs are based on the Alliances' prices taken from current project delivery plans in combination with standardised rate books. These have been vetted by NR's internal assurance team and then assessed by NR's peer reviewers.
- Indirect Construction Works and Design – These costs have been calculated using the Alliances' own data.
- All rates have been issued to peer reviewers to assess - further detail below.
- DfT have also reviewed NR cost estimates and this is reported separately (CPC Review of TRU for DfT). A key summary finding of that review is that NR costs appeared low on for key items, notably electrification, and supports to approach to further cost refinement as part of future TRU design.

Direct Construction Works

14.2 Rates for labour, plant and materials have been used as the basis of the estimate. These have been sourced from the Alliances' cost data.

14.3 The Alliances have utilised specialist suppliers who have reviewed standardised GRIP 2 rate books where available. Rate books where developed by Network Rail to provide a programme wide standard for estimating at each stage of the GRIP process. Estimates have been made by suppliers and then compared against the rates books as a reference. An overview of the elements that contribute to the Direct Construction Works include:

- Railway Control Systems – The railway control system will be implemented as a complete package of works to integrate ETCS on discrete sections of the route combined with Traffic Management to coordinate off route traffic. The costing has been split into four parts:
  - Traffic Management – developed and priced by the Digital Train Control Team;
  - ETCS – Developed and priced by the Digital Train Control Team;
  - Legacy Signalling West of Leeds – developed and priced by a supplier as part of the Alliance; and,

  - Legacy Signalling East of Leeds – developed and priced by a supplier as part of the Alliance
  - Cab fitment costs associated with Railway Control Systems are not included.
- Train Power Systems – GRIP 2 rate books have been used or amended where provided by specialist contractors;
- Electrical Power and Plant – Costs were developed by a supplier with a [redacted] allowance for a Feeder Station. The Alliances partners have reviewed the pricing allowances and amended in line with the current design considerations;
- Permanent Way – prices have been developed by both Alliances independently and are predominantly based on track asset replacement. Full formation allowance has been used were capacity projects have developed new track bed requirements;
- Telecommunication Systems – no rates were provided and percentage additions used where works were required. Telecommunications standards are still not well defined although each signalling specialist has reviewed the requirement. However, allowances at this time are still being used; and,
- Buildings and Property, Civil Engineering, and Enabling Works – both Alliances have reviewed the work generated by the design teams and applied rates to the itemised works.

14.4 The following cost items are excluded from the NR direct construction costs (note these are being assessed separately as they will ultimately be industry borne and an update will be presented to BICC):

- ETCS Train Fitment – the cost of fitment is assumed to be funded through the franchising system; and,
- Depots and Stabling – any costs associated with depots and stabling are within a separate Depots, Stabling and Maintenance Facilities Strategy is being developed in conjunction with TRU by the TOCs and Rail North Partnership.

Indirect Construction Costs

14.5 Main contractor preliminary costs have been developed by both Alliances. These costs include Owner Participant works. They also allow for possession management of the railway based on the hours proposed in preliminary access strategy, although it should be noted this access strategy has not yet been finalised. The access strategy will continue to be developed through the design and implementation phases as design develops.

14.6 Other indirect costs have been developed by identifying the work roles, applying rates equal to their job description and checked against the tendered rates agreed when alliances set up. The duration of the work roles is then based on a programme provided by the Alliance, with a completion date of Quarter 4, 2026.

14.7 Overhead and Fee additions are based on the Alliance Agreements, as tendered.

Design, Project Management and Other Project Costs

14.8 NR's Alliances have reviewed the design requirements for GRIP 4 to 8. In doing so they considered the expected work-bank and timescales. A discipline lead estimate with associated numbers of Full Time Equivalents (FTEs) has been developed with tendered rates applied.

14.9 Survey costs have been assessed and applied as part of the design costs.

14.10 Each design cost also includes for Alliances' overhead and profit. The total estimated cost of design and survey work from GRIP 4 onwards equates to 13% of the Total Construction Cost.

14.11 Project management cost have been developed by quantifying the build-up of roles, and then including an allowance for a period of 3 months after completion, reflecting project close-out.

14.12 As a percentage, project management equates to around 15% of the Total Construction Costs and includes the following build up:

- Network Rail Northern Programmes team members;
- Network Rail TRU leadership team;
- An integrated delivery partner providing engineering services, risk management, project controls, health & safety, and survey management etc;
- Commercial support from an external partner;
- Consents team formed by external suppliers;
- Legal support from external supplier.

14.13 Other project costs have been developed as follows:

- Schedule 4 costs – based on the number of possessions advised, multiplied by an working assumption rate of [redacted] per hour. This rate has been derived from various NR sources based on actual and estimated costs.
- Consents & Communications – as advised by the consents team;
- TWAO costs – as advised by the consents team;
- Permanent property costs – land quantification taken from designs then classified by type and rated by the Network Rail property team; and,
- Diversionary costs – an Allowance for a diversionary route/route hardening requirement.

Risk

14.14 Risk has been developed through a four-part process:

- Discrete risk production and pricing, which then is modelled to provide a range;
- Estimating uncertainty assessed per discipline;
- A Quantified Schedule Risk Assessment (QSRA) with the duration priced; and,
- Strategic risk assessment based on a qualitative review.

14.15 A Quantified Cost Risk Assessment (QCRA) has modelled a total risk profile for each Option. An overview of both the QCRA and QSRA is provided below.

Inflation

14.16 Inflation has been applied using RPI indices, as agreed between Network Rail and the ORR.

Capital Investment Costs

14.17 Network Rail has developed assured costs for Options 1 to 4. Options 5 and 6 have been developed in collaboration between Network Rail and DfT, but have not been fully assured by Network Rail at this stage but would need to be fully assured as part of the next phase of development/design. Therefore the degree of uncertainty around these costs is potentially high and further refinement of the cost estimation and scope of works is necessary as part of the next phase of TRU, whether through standard FBC or expedited and delegated governance.

Table 1.1 : Scheme Costs (nominal including risk, £m)

Scheme Costs												
	CP5			CP6					CP7			
TOTAL PLANNED COST	Prior years	FY 17/18	FY 18/19	FY 19/20	FY 20/21	FY 21/22	FY 22/23	FY 23/24	FY 24/25	FY 25/26	FY 26/27	Total
Option 1	-	[redacted]										
Option 2	-											
Option 3	-											
Option 4	-											
Option 5	-											
Option 6	-											
DM	-											

14.18 Note that there are further do-minimum renewals in CP7 that would give a total do-minimum activity of [redacted], in nominal terms, that would be saved as a result of TRU. Note that the saved amount varies by SDO, see 4.4 below and appendix focussing on the do-minimum.

15. Budgets, Funding and Accounting Implications for DfT

Funding and Cost Assumptions

15.1 The total Anticipated Final Cost (AFC) for SDO6 at GRIP2 OBC is [redacted] and is affordable within the assumed allocated CP6 identified budget for TRU.

15.2 This Financial Case seeks authority to progress the Transpennine Route Upgrade to programme design. The design cost is confirmed by NR as [redacted] NR are currently supplying the phasing of these figures across CP6. These costs will be drawn down in phases.

Franchise Budget and Funding

15.3 The net cost impact on franchised rail operators (and therefore the DfT's Passenger Services budget) is shown below.

15.4 Short term impacts, including the specifics of any train service and rolling stock options, are subject to further development work by Passenger Services and Rail North Partnership.

UK Rail Franchise Operating Position

Table 2-1: Change in Revenue and Costs between FY 2027/28 and 2047/48

UK Rail Operating Position (£ 000s)	Option 6	Option 2
TOC operating cost change	[redacted]	
Farebox revenue		
Total		

15.5 TOC costs are shown as negative values in Table 2-1, whilst revenues are shown as positive.

Figure 16-1: Option 6 UK Rail Operating Position

Figure 16-2 Option 2 UK Rail Franchise Operating Position

15.6

[redacted]

15.7 These costs are based of the rolling stock assumptions made in the economic case.

15.8 Further refinement of these assumptions will be produced as the scheme matures in detailed design phases to understand exact rolling stock requirements and the cost implications of different rolling stock combinations.

15.9 [redacted].

16. Appendix A - Network Rail - Details on Cost Estimation

This appendix has been supplied by Network Rail and provides details on the cost estimation applied by NR for TRU.

Operational, Maintenance and Asset Replacement (OMR) Costs

16.1 Within Network Rail the Lifecycle Cost (LCC) implications of a scheme are now a high priority in the consideration of scheme options. LCC has already been established as a fundamental consideration in the decision making process for evaluation and sifting of options on the TRU programme. The work being done on TRU is a ground-breaking and demonstrable example of the application of LCC techniques for large and complex railway schemes.

16.2 The methodology for developing a forecast of LCC for TRU involved a synthesis of Network Rail tools developed by its Advanced Analytics team. These are:

- **CoBALT (Cost Benefit Asset Lifecycle Tool)** - A generic LCC model that supports consistent LCC analysis for any asset over its lifecycle, it is capable of considering all relevant costs of a Option and producing results that can be used for cross comparison.
- **ICM (Infrastructure Cost Model)** – Cost forecast tool for: asset replacement, performance impact, safety, infrastructure condition, maintenance and operation.

16.3 Each tool was applied to appropriate interventions (that is, Single Programme Options, or Interventions). ICM was used to model Interventions 1 to 3, with CoBALT applied to Interventions 4 to 24. This methodology has only been used as part of the optioneering stage, and has not been used in the economic analysis.

Benchmarking

Benchmarking Exercise and Results

16.4 The spend profile for TRU has been compared with other recent schemes to show the scale and spread of its constituent cost elements. Figure 2-1 shows that the spread between Civils, Signalling, Electrification, Track and Buildings is more even than for GWEP and London to Corby (both of which are dominated by Electrification costs). TRU is more similar to NWEP in its spread of cost elements, but is of a substantially greater scope.

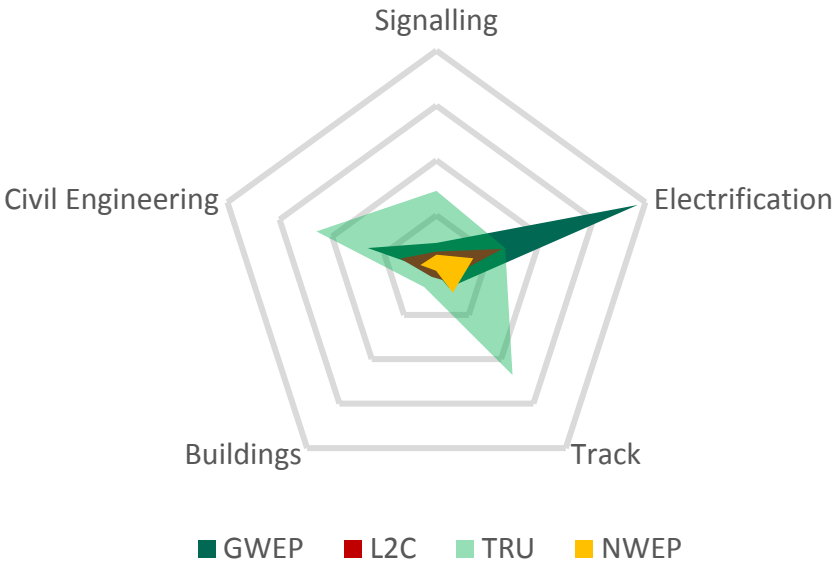


Figure 1.1: Comparison between major rail investment programmes.

16.5 As part of the development of costs for the TRU programme, an internal benchmarking exercise has been undertaken. This section summarises this exercise, as well as actions taken as a result of the benchmarking exercise.

16.6 The rates used in the benchmarking exercise have been sourced from the Alliances, Network Rail projects, and the cost consultant. The rates have been provided from either projects on site or from previous GRIP 3 to GRIP 5 estimates.

16.7 Benchmarking information was taken from the following sources:

- Railway Systems and Telecoms – rates provided by TRU Alliance Partners and Digital Train Control;
- Train Power Systems – rates derived from supplier's delivery of: NWEP, Northern Hub and GWEP;
- Electric Power and Plant – provided by suppliers;
- Permanent Way – provision from a supplier and from Calder Valley project, as well as rates used in CP6 and High Output data;
- Building and Property, Civil Engineering and Enabling works – provided by a supplier based on framework delivered projects; and,
- Labour – all labour resources have been provided by the Alliances or Network Rail based on tendered rates or frameworks.

16.8 In addition to this internal benchmarking, an external benchmarking exercise was undertaken by the DfT's technical advisors. This exercise found that the majority of elements priced by TRU were within the expected ranges, but that:

- **Permanent Way** costs had been priced at the low end of the benchmark ranges; and,
- **OLE** Costs were above the expected cost, but within the range of recent projects including GWML and NWEP.

16.9 TRU has responded to these issues noting that the majority of the schemes used for the benchmarking of permanent way costs related to much smaller sections of track work, and that the greater scope of TRU will allow for sufficient economies of scale to realise an outturn cost towards the bottom of the benchmark range.

16.10 For OLE costs, the current estimates for TRU are in the region of [redacted] per single track km (stk) including risk. This compares to [redacted] per stk for GWML, and [redacted] per stk for NWEP. It is considered that a total of [redacted] per stk relates to the actual cost of electrification, and that the variance from this on GWML and NWEP is a result of high levels of 'abnormal' costs, relating to scope change and poor project management. TRU is therefore targeting a cost in the region of [redacted] per stk, but has priced at GRIP 2 on the basis of recent experience on other projects. The [redacted] per stk rate is considered to a conservative estimate of the project costs, as the design for TRU develops towards GRIP 3 and beyond, a reduction in the expected cost of OLE should be realised.

Contingency and Risk

QCRA

16.11 The Quantitative Cost Risk Analysis (QCRA) utilises an Excel based @Risk model containing the estimate values with their respective uncertainty, and the quantified cost risks. The QCRA contains the intervention risk data, with amendments made to existing risks to reflect the integrated works of the Option, and additional risks at programme level.

16.12 The results of the QCRA indicate that, at an 80% confidence level, the programme costs for Option 6 will be within [redacted].

16.13 The P80 risk total for each option is shown in Table 1.5 below.

Table 1.1 : QCRA (P80) by option (nominal, £m)

Option	Total cost excl risk	Risk	Total cost incl risk	Risk as % of total cost
Option 1	[redacted]			
Option 2				
Option 3				
Option 4				
Option 5				
Option 6				
DM				

16.14 Note: this table covers activity in CP5 and CP6.

QSRA

16.15 The Quantitative Schedule Risk Analysis (QSRA) using Primavera Risk Analysis adopted the following process:

- The use of a simple high level schedule containing all interventions imported into Primavera Risk Analysis software. Each intervention within the options were modelled as a single activity, with a cumulative normal probability distribution of possible durations for that intervention;
- All Interventions were analysed using 'Entry into Service' as the end point;
- The normal probability distribution of durations applied to each Intervention were populated the schedule risk analysis was run;
- The simple high level nature of the option schedule, without constraints to the relation/ sequencing between Intervention representing activities, meant that paths to optimal delivery were considered.

16.16 The QCRA and QSRA analysis did not include opportunities (i.e. positive risks). The output of the analysis concluded that, with a 90% confidence level, the programme would be complete by the year 2029. However, the tranching or phased approach to programme delivery will mean that an early release of benefits can be achieved throughout the programme construction phase.

Assurance

16.17 Each intervention has been reviewed and reassessed by the Alliances to provide a direct cost element that the organisations would endorse. The Network Rail estimating team had oversight of this process and full transparency of cost development.

16.18 Through this process additional costs have been applied including:

- Preliminaries;
- Design;
- Network Rail project management costs; and,
- Other project costs.

16.19 The costs for Options 1 to 4 have been through an internal Network Rail process of assurance. The costs have been challenged and approved by the Alliances and a through a final review and approval from Network Rails IP Team.

16.20 The four core SDO costs presented have been collectively developed and have been reviewed by a number of parties including;

- Internal Peer Review;
- External Peer Review on behalf of the DfT;
- Both Alliance Leadership Teams;
- IP Programmes Board Route Delivery Directors; and,
- Route Delivery Directors.

16.21 SDO5 and SDO6 have been developed on a decremental basis from the core four SDOs and would need to be subjected to fuller review if taken forward into design.

Future Cost Plan Development

16.22 Further development of the cost plan during the design stage will benefit from clarifications surrounding the potential implementation strategy and how the staging of the works will be delivered.

16.23 It is anticipated that there may be material revisions to the cost of preliminaries. For the current costs, these have been included at 44% of construction cost: further development should reduce these overheads. As the scheme is developed through GRIP3 and GRIP4, estimating uncertainty will be eliminated, reducing the risk profile of the scheme. Design development costs are also being reviewed in light of the tranching strategy.

16.24 Further work completed within the design stage will provide greater insight on the risks and opportunities of the project, and this will produce a more refined picture of the project costs.

Managing cost and risks

16.25 To ensure that commercial alignment is achieved during the cost planning exercise a dedicated multidisciplinary cost planning group has been created. The group undertakes monitoring, feedback and coordination of tasks related to programme costs. It uses periodic meetings every four weeks as a forum to discuss, with a focus on the following elements of cost plan alignment:

- Reviewing and validating updated scheme options and requirements;
- Remeasurement;
- Rate and Access Strategy review and agreement issues;
- Programme Management review;
- TWAO and consents development;
- Environment and property development;
- Survey information;
- Discrete risk development;
- Value Engineering Input; and,
- Life Cycle Cost Inputs.

16.26 The multidisciplinary approach seeks to provide a platform through which consensus can be reached and potential interdependences can be explored. It also provides a flexible platform through which additional disciplines can be introduced as the programme progresses from design to delivery. Currently the following programme disciplines attend the group meetings:

- Cost Planning (TRU);
- Planning;
- Engineering;
- Access and Methodology;
- Life Cycle Costs;

- Value Engineering; and,
- Risk.

Construction Stage

16.27 The construction stage contracts with the Alliances are based on a target price arrangement. This contract is based on outputs; this approach means that delivery risk is held by the Alliance. Change management is therefore expected to occur internally within an Alliance. This reduces the Network Rail exposure to risk. External to the Alliances, risk related to the provision of track access and changes in programme scope are held by Network Rail.

Oversight

16.28 The Owner's Representative team manage and review the process of developing cost estimates and verification. In addition to this, the PMO validates and verifies that the Alliances have delivered costs appropriate to the programme design. This process is described in more detail in the Management Case.

17. Appendix B - Network Rail - Key Assumptions on Cost Estimation

This appendix has been supplied by Network Rail and provides details on the cost estimation assumptions by NR for TRU.

Owner	Assumption	Impact	Notes
DfT	It is assumed that the DfT will provide clarity on the system requirements for the TRU programme following the BICC meetings in November 2018, to allow Network Rail to progress with these works	Network Rail will develop detailed design on assumed system direction. Changes to direction	The DfT to provide
Network Rail	Network Rail corporate governance accepts the approach being taken with regard to tranching and staged funding		
DfT	There is no significant change to the client development remits beyond those received to date	Significant changes to the CDR would result in major rework and potentially invalidate all development work done to date. This would result in increased costs and delay to GRIP 4 / 5 development.	
DfT	All critical resource (materials, personnel and plant) will be available when required to deliver the programme as anticipated	The next phase is reliant on having the required levels of engineering, project management and design staff in place to meet the needs of the programme. Funding is also required to secure plant and materials for future phases.	Early funding is crucial to being able to secure plant and materials for future phases, it is highly recommended that this is considered as part of this funding package. Early award of funding also provides security for staff and will aid in longer-term retention ensuring the programme has the required levels of resource.

DfT	NR have assumed that there is no significant change in scope once a chosen option is confirmed	A change in political stance / direction on the programme during the next phase could significantly influence the overall programme because of rework, also increasing the costs to the programme.	Maintain close liaison with the Department in order to ensure expectations are managed and met accordingly, to ensure minimum impact on the programme. Early funding will secure development of the next phases, reducing the influence of the external political environment.
Network Rail	Access will be available to undertake the necessary surveys and compound mobilisation works	Delays to surveys will inevitably have a knock on effect to detailed design development, with the potential to prolong GRIP 4 / 5.	Early negotiation with stakeholders to agree access requirements.
	There will be no objection to consents including TWAO related requirements.	Any significant objections could delay completion of GRIP 4 /5 design until resolution is agreed with all relevant stakeholders.	Early funding to allow consents works to be undertaken. Early communication with stakeholders to reduce likelihood of objection and allows time to mitigate against objections.
	There will be no change to operational requirements as a result of misalignment of scope with key stakeholders e.g. TOCs & FOCs	Changes or lack of agreement on operational requirements has the potential to cause delay to GRIP 4 / 5 phases or result in a significant amount of rework.	Bring in operator resource. Early and constant communication with key stakeholders.
Network Rail	It is assumed that a Digital Rail Delivery partner can be procured in time to integrate GRIP 4 design solutions with the existing alliance	Lack of integration between DTC and the existing Alliance could result in significant design rework.	
Network Rail	It is assumed that Network Rail will continue to support the programme and alliancing approach to delivery currently being adopted, and the procurement strategy will not change.	Change in strategy would have significant impact to the programme in terms of cost and schedule because of the efficiencies gained through Alliancing being lost.	
DfT	It is assumed that the DfT will authorise train fitment of ETCS along the route	Unable to implement planned staging strategy that ETCS can be implemented prior to major infrastructure interventions. This impacts on design solutions.	
	There will be no EU legislation changes on interoperability requirements	This would have significant impact on the programme scope and planned implementation.	Implement Design / standard freeze as early as possible.

17.1 Within the costs presented some efficiencies and opportunities have been identified, efficiencies include:

- Through the development of the scheme some full interventions may reduce in scope, this will have a positive impact in the design development costs;

- An overlap of design development of certain tranches may reduce the cost profile
- Access and mobilisation costs are currently without survey information; these requirements could change or be deferred into the detailed design stage

17.2 Opportunities include:

- Through the development of the scheme from Option 1 through to Option 6 offers a reducing level of design development requirements and shorter timescales. These may reduce the overall cost impact;
- The GRIP 5 design cost allowance is made for all Tranches, there is an opportunity to only request for Tranche 1 allowance and update each time a Tranche FBC is submitted.

CP7 Requirements for Transpennine Route

17.3 Assessments undertaken by Network Rail have informed the minimum level of intervention on the TRU route. These assessments show that, due to the current franchise commitments increasing the tonnage on track, there will be a substantial volume of work required in CP7. Furthermore, signalling asset end-of-life assessments have shown that a significant majority of the signalling assets are forecast to become life expired by circa 2030.

17.4 Therefore the route will require significant expenditure even in the absence of TRU. The renewal focussed activity is spread across the control periods, [redacted] The Do Minimum scenario (outlined in the economic case) involves a capital investment of [redacted] (shown in Table 1.1), with just over [redacted] required in CP7 (shown below in Table 4.1).

17.5 To varying extents, the Options developed for the TRU programme obviate the need for asset replacement work to be undertaken. Option 1 involves the most comprehensive upgrade to the route, and would replace all near-life expired assets, leaving no further asset replacement work required in CP7. The remaining Options replace near-life expired assets to varying extents, and there is a subsequent quantum of asset replacement work required in CP7, as shown below.

CP7 Asset Replacement Costs (nominal, £m)

Option	Asset replacement requirement in CP7 (£m, nominal)
Option 1	[redacted]
Option 2	
Option 3	
Option 4	
Option 5	
Option 6	
DM	

Impact of A Decision to Proceed Delay

17.6 Current evidence of the business case process (shown through the TRU OBC process and evidence from other sector submissions) indicates that it takes 12-14 months from the point of submission to the point of instruction. The basis of the TRU proposal in December 2017 assumed that funding requirements would not impact the schedule for delivery. Should further business cases be required to support the funding release for the programme the following impacts are likely :-

17.7

- Delay to the completion of the programme of 12-14 months due to business case process affecting the critical path
- Inability to contract effectively with market due to stop/start nature of process leading to increases in cost and uncertainty
- Inability to retain resource levels (including specialist skills) due to stop start nature of process increasing risk to programme leading to increases in cost and uncertainty
- Inability for TRU to commit to our disruptive plan to operators starting in December 2020.

TRANSPENNINE ROUTE UPGRADE

Management Case

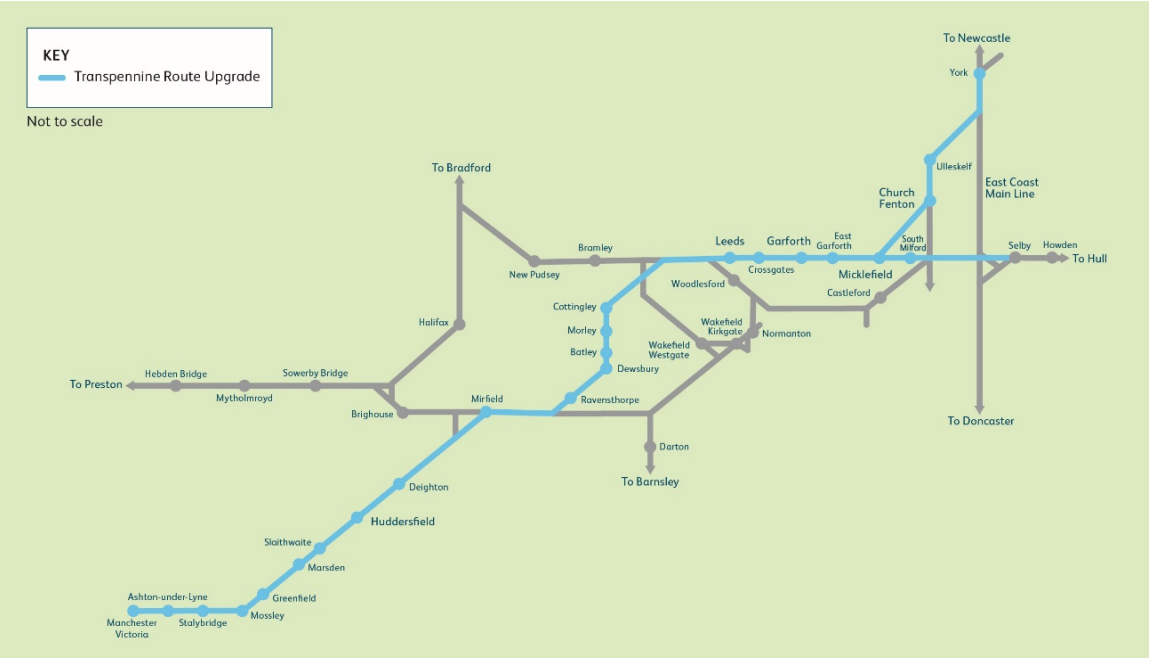
18. Executive summary

Introduction

54 The Management case is the main body of evidence presented to decision makers regarding the delivery plan for the Transpennine Route Upgrade (TRU) programme of works. The Management case sits within the wider Business Case submission for the TRU programme. It sets out the capability of the project delivery structures to effectively and efficiently control the execution and implementation. The evidence presented within this case builds upon previous submissions by Network Rail to the Department for Transport (DfT), and presents the current development of the project management frameworks, as well as the planned future management structures of the TRU organisation.

Background and Context

Transpennine Route Upgrade Map



55 The Transpennine Route is a key transport link across the North of England, with the core route linking Manchester and York, via Huddersfield and Leeds. The route supports a mix of services, rolling stock and operators serving inter-city, inter-regional and local passenger markets, as well as freight. There are around 50 million passenger rail journeys on the route each year, roughly twice the number of journeys the route carried 25 years ago.

56 The geography and topography of the route is amongst the most challenging on the GB rail network, and can be split into three key sections each with their own

individual geography and infrastructure:

- From York to Leeds - relatively flat section through open country, with several rail junctions;
- From Leeds to Huddersfield - a route constrained by urban areas, tight curves and one long tunnel;
- From Huddersfield to Manchester - crossing the Pennines with one very long tunnel at Standedge, several short tunnels, viaducts and curves that restrict speed, as well as a number of listed structures.

57 The Transpennine Route Upgrade programme forms a key part of a wider transformation of rail travel in the north.

58 The upgrade is part of the North of England Rail Programme, including North West Electrification and the Northern Hub (which delivers network capacity and connectivity enhancements). The passenger benefits of these infrastructure schemes are being delivered through timetable and rolling stock enhancements delivered by the current Northern and TransPennine Express franchises.

59 It is also the first phase of a series of the potential Northern Powerhouse Rail interventions. As such there is a choice to be made regarding the scope of this first step of a transformation. The preferred option is a set of key interventions with an optimised fit with potential future interventions, including those delivered as part of in HS2 and NPR.

60 This phase of transformation focusses on:

- Capacity increases through service frequency and train capacity
- Performance improvements
- Journey time improvements
- Maintaining freight capacity and capability, with potential to add to both in the future

19. Governance & Organisation Structures

19.1 The TRU organisation sits within the wider Network Rail business, which itself is overseen by the DfT. This section details the governance and organisational structure and relationships between the various stakeholders responsible for the delivery of TRU programme. The hierarchical structures discussed in this section are shown in Figure 1.1

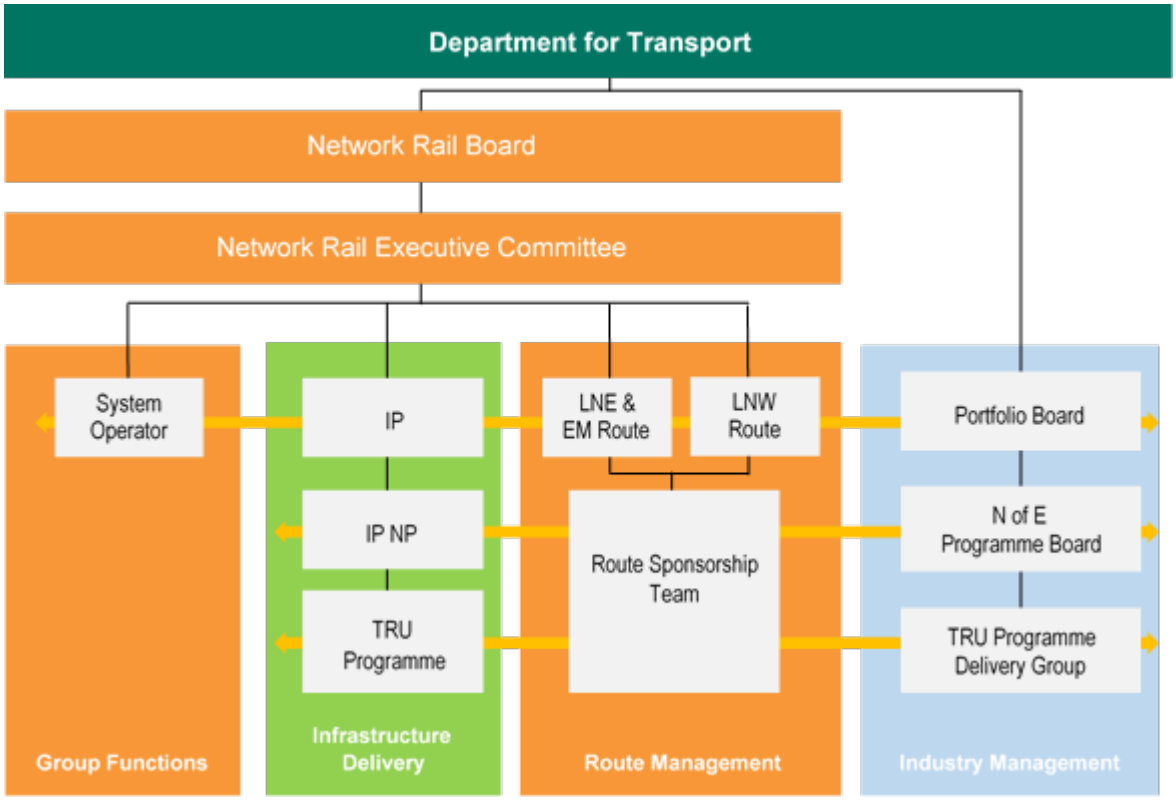


Figure 1.1: TRU Governance Structure and broader Industry Organisation Chart

Governance

Department of Transport

19.2 The programme has been organised in accordance with the prevailing directorate structure within Rail Group.

Network Services

19.3 Network Services comprises six teams. Rail infrastructure enhancements in the North region are the responsibility of the North and Stations team. The Director of Network Services has delegated authority from the Permanent Secretary to assume the role of Senior Responsible Owner (SRO) for TRU. Responsibility for the delivery of the

programme outcomes has been delegated to the Deputy Director of the North and Stations team who acts as Programme Director for the programme.

19.4 The delegated authorities and responsibilities include for the SRO:

- Ensuring that the project is set up to make an unambiguous and demonstrable link to strategic policy;
- Translation of this policy intent into clear deliverables which are established and agreed with senior stakeholders;
- Carrying out a robust and commercially viable options appraisal, which balances risk with opportunity, as part of initial project feasibility;
- Establishing a firm business case for the project during the initiation/definition phase and ensure that any planned change continues to be aligned with the business;
- Identifying and securing the necessary investment for the business case (this includes both budget and operational resource);
- Designing and implementing robust, appropriate and transparent project governance;
- Building strong and effective relationships with key stakeholders, justifying their trust and retaining their confidence, and obtain their commitment to benefits realisation.
- Ensuring that there is a coherent organisation structure and appropriately detailed project plan;
- Building the right team, securing necessary resources and skills and providing clear lines of accountability;
- Providing appropriate support, steer and strategic focus to the Project Director.
- Ensuring that any changes to agreed project benefits are flagged appropriately within project governance and that the business case is updated accordingly (throughout project life-cycle);
- Identifying, understanding and driving the successful mitigation of project risks;
- Escalating serious issues quickly and with confidence to senior management and/or Ministers;
- Developing strong and effective engagement between the project team and its stakeholders and sponsors;
- Ensuring that communication processes are effective and that the project's objectives and deliverables continue to be consistent with the organisation's strategic direction;

Programme Governance and Risk Management - RNEP

19.5 TRU will be governed as part of RNEP and we plan to adapt the current North of England Programme Board and supporting PDGs to manage the programme and its risks in line with the DfT and NR MOU signed in March 20164. As per best practice on the Great Western and Thameslink programmes and recommended by our IPA

[4] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/509545/mou-dft-network-rail-rail-enhancements.pdf dated March 2016

review, we plan to appoint a programme management function to ensure integration between train, infrastructure and outputs.

19.6 Risk management will be a key part of programme governance and will be managed between the programme team, franchise competition team and NR as appropriate. Ultimately the Department will continue to hold the reputational and cost risks of services, franchising and infrastructure issues irrespective of who is best placed to manage those risks.

19.7 We anticipate that the DfT chaired North of England Programme Board and programme outcomes will continue although in the light of the Glaister review we are considering how this and other Boards are best placed to monitor timetable development and implementation risks.

19.8 NR will seek to transfer technical and delivery risks to its contractors where possible incentivising contracts to minimise cost, schedule and quality risks.

Steer/SDG/Rail Analysis

19.9 Rail Analysis (RA) has been responsible, alongside the NSD team, for overseeing the Value for Money (VfM) assessments carried out by Steer of the economic cases developed for the works proposed to deliver the programme outcomes. Rail Analysis has also provided advice during the development of the business cases.

19.10 Additionally, the Rail Statistics team will be consulted when industry performance reports are developed that are used to contribute to the demonstration of benefits realisation.

Passenger Services

19.11 Passenger Services is responsible for franchise competitions and the management of franchises that have been awarded.

19.12 Passenger Services is also responsible for implementing the suite of strategic policies that originate both from Rail Strategy and Security and from Passenger Services within each of the franchise agreements.

High Speed Rail Group

19.13 High Speed Rail Group is responsible for overseeing the development of HS2 and NPR, and we have worked together on TRU development as part of the OBC.

Portfolio Office

19.14 The Portfolio Office is responsible for monitoring and maintaining the programme portfolio of Rail Group. The Portfolio Office maintains the pipeline of future projects and programmes in addition to providing monthly updates on the current portfolio, with data gathered from the route enhancement programmes.

19.15 The Portfolio Office also administers the risk reporting system and escalates high exposure risks to Rail Board for consideration and action.

19.16 The Portfolio Office owns and maintains the benefits management framework for Rail Group that is used to manage benefits realisation for each route programme.

Centres of Excellence

19.17 CoEs are specialists in their relevant areas of expertise. They give assurance and clearance for business cases before project teams can submit a business case to a DfT investment board for approval. There is a CoE for each of the five cases in a business case: Policy and Strategy Units for Strategic case, Transport Appraisal

Strategic Modelling (TASM) for Economic case, Strategic Finance and Planning for Financial case, Group Procurement and Corporate Finance for Commercial case, and Project, Programme Management (PPM) for Management case.

Rail North Partnership

19.18 The Rail North Partnership Board governs the franchise management of Northern and TransPennine Express. It is constituted from three representatives from Transport for the North (TfN), three from the Department for Transport and an independent chair.

19.19 The Secretary of State retains financial oversight of the franchise contracts, with funding coming direct from the DfT. Any financial changes to the Franchise Agreements must be signed off in the first instance by the Rail North Partnership Board, and are then subject to the same Rail Investment Board approval as other projects within Passenger Services.

Network Rail

19.20 Oversight and governance functions of Network Rail are undertaken by the Network Rail Board, which ensures that executive committee decision making and governance process is fit for purpose. Within Network Rails devolved governance structure, the internal client for TRU is the Routes – The Routes perform the operations and maintenance function of the Network Rail business, and are therefore the key internal client that will use the upgraded infrastructure. The geography of TRU runs across two Routes: London North Eastern and East Midlands (LNE&EM), and London North Western (LNW). The LNE&EM and LNW Route Executive Committees form the internal clients for the programme.

TRU

19.21 Within the TRU Organisation there is a NR TRU Programme Management Office (PMO) which comprises specialists acting on behalf of Network Rail as the Owner in the delivery of TRU. Through this they are responsible for developing the strategy and providing processes to assure governance and ensure consistency. The PMO liaises with stakeholders and ensures the programme is delivered efficiently.

19.22 PMO specialist support is provided through eight key functions that are specifically designed to achieve maximum benefit to the TRU programme, these functions are:

- **Commercial** – Responsible for all strategic management as well as assurance of Commercial, Procurement, Investment and Estimating activities on the TRU programme.
- **Engineering Services** – The engineering services function provides dedicated engineering resource to establish and define the requirements of the project.
- **Stakeholder Engagement** – Identifies and communicates between the TRU programme and key stakeholders, to develop the best outcome for all.
- **Sustainability** – This function aims to unlock the social, economic and environmental value of the programme with an industry leading sustainability approach.
- **Programme Controls** – Undertakes the data gathering, management and analytical processes used to predict, understand and constructively influence the time and cost outcomes of the programme.

- **Health and Safety** – A dedicated Health & Safety resource to support and enable positive actions for health and wellbeing. With a focus on continuous improvement to support Network Rail's health and safety vision.
- **Client Services** – Supports the TRU programme through coordinating client engagement, communications and providing or facilitating Route Asset Manager approvals.
- **Performance Excellence** – Implementing best practice project management techniques to ensure that TRU is delivered within the time and budget constraints. This function will deploy LEAN management and examine lessons learned to continuously improve the TRU programme.

19.23 The PMO was set up following observations of industry best practice.[5] Operating within multiple cross-functional disciplines, the PMO enables the following:

- Consistent project and programme management and guidance;
- Accurate resource management;
- Priorities managed based on timelines, demand and budget;
- Management and upskilling of resource;
- 'Lean' management techniques;
- Focus on client outputs;
- Alignment with NR Monthly Business Review (MBR) process; and,
- Integrated cost planning process.

19.24 The adaptable PMO structure combined with the Alliance framework sets the TRU Organisation up to deliver the scope of works efficiently, safely, and with the flexibility to change as the programme matures.

19.25 For infrastructure design and delivery, the Governance for Railway Investment Projects (GRIP) methodology is being applied. This is the rail industry standard methodology for management and control of projects. The GRIP process is applied at both a programme and project[6] level (referred to as GRIP for Programmes and GRIP for Projects respectively).

19.26 These standards are set by Network Rail, and it is the responsibility of the PMO to manage TRU through the GRIP for Programmes methodology. It is the responsibility of the Alliances to manage TRU projects through the GRIP for Projects methodology. The GRIP for Programmes process aligns with best practice Managing Successful Programmes (MSP) frameworks.

19.27 GRIP for Programmes specifies the standards that the programme must adhere to in order to advance through the programme lifecycle. The following stages are defined as the programme lifecycle:

- **Identify Options** – High level examination of the programme, considering strategic fit, vision, costs, duration, risks, and future proofing;

[5] A comprehensive review of lessons learned and incorporated on the TRU programme is available in the Performance Benchmarking Report

[6] The TRU programme currently comprises several 'interventions', and the majority of the Business Case refers to 'interventions' as opposed to 'projects'. Interventions will be packaged together to form projects as the programme develops. The term 'projects' is used in this section to highlight the difference between the two established governance frameworks – GRIP for Programmes and GRIP for Projects.

- **Define Programme** – Exploration of the options for delivering the required outcomes and benefits, together with robust and detailed planning for delivery;
- **Deliver Tranches** – Implementation of the various programme control structures to ensure the capability is delivered and aligned to organisational and programme objectives; and,
- **Programme Closure** – Placing structures and supporting mechanisms in place to ensure the ongoing implementation of the programme benefits is realised, and removing the programme resource from day to day operation of the railway.

19.28 To advance between stages a number of key outputs must be presented at the GRIP for Programmes stage gate review.

19.29 Within the programme a number of projects are then defined, which are administered through the GRIP for Projects framework. This framework contains a series of stages that must be completed in full before the project can advance, these stages are:

- **Output Definition** – Definition of the needs and requirements of the project;
- **Feasibility** – Definition of the scope of investment and identification of the constraints. Confirmation that the project aligns with organisational strategy and the outputs can be delivered within the financial constraints;
- **Option Selection** – Development of options for addressing constraints. Assessing and selecting the most appropriate option that delivers the stakeholder requirements;
- **Single Option Development** – Prioritisation of options to produce a single design for further development;
- **Detailed Design** – Complete engineering design to specification to which it will built. This stage also includes a reassessment of the costs, time, and resource requirements of the project;
- **Construction, Test & Commissioning** – Delivery of the infrastructure complete with commissioning and testing studies;
- **Scheme Handback** – Transfer of the asset to the operator; and,
- **Project Closeout** – Settlement of contractual obligations, and an assessment of benefit returns. Final removal of any project support systems.

19.30 The management structures set out in the GRIP guidance will be the principle method for ensuring that the TRU Organisation is managed and delivered effectively. The organisational structure is set up to complement both the GRIP for Programmes and the GRIP for Projects frameworks.

Organisational Structures

National and Sub-National

19.31 The DfT functions as the government department responsible for implementing transport policy within the UK. For the rail sector, the DfT provides the strategic direction for operation and investment in both England and Wales. The DfT is also responsible for letting franchises to Train Operating Companies (TOCs), regulating

passenger fares, and funding investment in the railway through Network Rail and other third party bodies.

19.32 Following the reclassification of Network Rail as a public sector body, the relationship with regard to infrastructure investment between the DfT, the Office for Rail and Road (ORR), and Network Rail has evolved. Collaboration between Network Rail and the DfT has increased to ensure that the policy objectives set by the DfT and executed by Network Rail are done in a way that achieves value for money of public expenditure.

19.33 Within the North of England, the DfT and Transport for the North have entered into the Rail North Partnership, this partnership manages the Northern and TransPennine Express franchises.

Network Rail

19.34 Network Rail is the public sector organisation with responsibility for the maintenance and operation of rail infrastructure in England, Scotland and Wales. The internal business structure is aligned across three main functions - these are:

- **Group Functions** – Including Corporate Care, System Operator, and Technical Authority Roles, this business coordinates the Network Rail group operations, technical standards and governance functions;
  - Within the Group Function the System Operator role coordinates the use of rail infrastructure, developing national timetables and identifying long-term capacity requirements.
- **Routes** – The routes manage the operation, maintenance, and renewals of railway infrastructure, these businesses are aligned with route geographies across the rail network in addition to a national route to serve freight operations; and,
- **Route Support** – The provision of services to routes, including: Business Services and IT. Route Support also includes delivery organisations Group Digital Railway and Infrastructure Projects which deliver digital modernisation and enhancement projects respectively.

TRU Organisation

19.35 Under the direction of the PMO there are two delivery Alliances, these are:

- **West of Leeds (Transpire Alliance)** – responsible for the delivery of TRU works between Copley Hill Junction and Manchester Victoria;
- **East of Leeds (TRUe Alliance)** – responsible for the delivery of TRU works between Leeds (Excluding Leeds Station) and York.

19.36 The NR TRU PMO is responsible to ensure successful delivery, consistency and effective programme controls are in place and enacted. Within the PMO and in line with Systems Engineering principles an Engineering Services function has been established to ensure delivery across the TRU Organisation is joined up. Engineering Services is run with the Integrated Delivery Partner with support from other areas of Network Rail for operational modelling, and is incorporated within the PMO.

20. NR Industry Learning

Introduction

20.1 NR have sought, with a view to maximising the value for money of the programme, a process of industry learning has been undertaken in which the TRU organisation seeks to draw upon evidence of similar projects, and to measure programme performance against these.

20.2 The industry learning process has helped the TRU organisation implement several innovative initiatives and sustainable solutions, both in design and through its early interventions. This has reduced both costs and risks, thereby increasing the value for money of the TRU programme.

20.3 As part of this process, an NR dedicated team has captured a series of 'Lessons Learned' from other projects. This followed the National Audit Office (NAO)'s observation of Great Western Route Modernisation (GWRM) that "Network Rail should capture all of the learning from its experience of introducing both new technology and new ways of working on the Great Western infrastructure programme. It should use this to create more realistic plans for future projects, including the Midland Main Line and Transpennine [...] electrification schemes."

20.4 Lessons have been learned from across Network Rail's portfolio, but with a focus on the following schemes. These have been considered on the basis of their having been completed recently, as well as having scope and/or cost similar to TRU:

- Great Western Mainline (GWRM);
- Gospel Oak to Barking Electrification (GOBE);
- North Western Electrification Programme (NWEP); and,
- Great Northern Great Eastern Upgrade (GNGE).

20.5 A summary of the NR programme specific lessons learned are provided in Table 2.1

Table 2.1: Industry Learning – Issues and Actions

Area & Programme		Issues	Actions Taken on TRU Programme
Programme Structure	GOBE, NWEP	• No overarching programme covering all aspects of electrification (from design through to mains installation, registration, OLE for power, ATF, panning and snagging) leading to congested worksites during installation, as multiple activities get scheduled concurrently in the same possession.	In line with the recommendations, TRU established a Programme Leadership Team (PLT) and Programme Management Office (PMO), comprising Network Rail and partner organisations. TRU is in close liaison with the System Operator - a full customer

		• Lack of coordination of interfacing projects: Lack of programme integration • Lack of coordination between infrastructure projects and the System Operator timetabling function, including both short and long term timetable planning. Leading to disruption for passengers during and post construction.	focused plan will be enacted which prioritises Route Communications, Route Planning, delivering work within possessions, and working closely with Train Operators.
Alliances	GOBE	• Contracting strategy and associated contract incentives need to be properly developed to promote the right behaviours of contractors that align with the objectives of the project	TRU acted upon that recommendation by creating two alliances – East of Leeds and West of Leeds. The use of Alliances is a new way of working with each alliance made up of several industry-leading organisations. These were brought into the programme earlier than on other projects in order to build relationships early.
Roles and Responsibiliti	GOBE, GNGE, CP5LL	• Lack of key people on the project who have appropriate “Big” project experience. Lack of clear definition of roles and responsibilities. Lack of competence to perform role	TRU addressed this by creating a clear set of structures, in particular the PLT and the role of the Principal Programme Sponsor. This means that TRU has clear channels of responsibility.
Document Management	GOBE	• Inconsistent document control led to delays in design which led to inefficiencies which impacted on construction resulting in the programme going over budget; • Poor documentation for health and safety resulting in hand backs being delayed for 2+ years	TRU took this on board and recognised that good document management is key to the success on any project. As part of TRU’s relationship with one of its partner organisations (Jacobs) it has a single source of document management– (ProjectWise), ensuing documents are categorised and stored in folders relevant to their purpose.
Culture and Behaviour	GOBE, NWEP	• Poor communication between senior management and project staff on key decisions; • Lack of agreed contracting strategy at the start of the project promoted the wrong behaviours and inefficient working; • Lack of clear decision-making process – too many people involved; Lack of opportunities to learn basic technical knowledge offered to new-starters;	The programme has embraced a culture of collaboration – sharing ideas across our teams to help us to think about everyone at every step of our journey and achieve best practice for our own people.

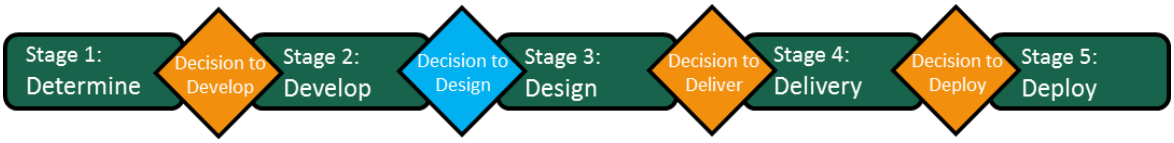
		• Setting quantity targets drives the wrong behaviours and encourages 'cherry picking'	
Expert Panels / Assurance	GOBE, GNGE	• Early stage designs not undergoing a constructability review; • AFCs were immature and rushed which led to construction issues; • Evidence gathering for assurance process very slow; • Lack of understanding re evidence required for TSI assurance process	TRU has convened 'expert panels' as a key part of its internal assurance process. The panels typically comprise 20 colleagues from across the rail industry who reviewed specific proposals for interventions – or options – along the route. The outcome of these panels was independent assessment of ideas and plans, leading to ideas being challenged, improved, and either endorsed or (where deemed appropriate) rejected.
Sustainability	GWEP, NWEP	• Environmental issues were poorly understood and there was an inconsistent approach to managing environmental and consents discharges; • No dedicated environmental resource; • Lack of accountability; • Late discovery of creatures which led to objections to the scheme and escalating project costs; • Key suppliers shouldn't have been able to pick and choose materials – sustainable products should have been mandated; • TWAO process was uncoordinated and underestimated time required to complete	A sustainability lead sits within TRU's Programme Management Office and is responsible for social value and environment. The programme has made sustainability a Key Result Area (KRA) and built a sustainability strategy that incorporates the UN's sustainability goals and ensure TRU's Alliances have dedicated Environment Managers and Social Value Managers.

21. Programme Plan

Introduction

21.1 The preferred option of TRU is proposed as a programme of works of a series of individual interventions and associated changes across the Transpennine Route. Together these interventions deliver the outcomes and benefit opportunities. The TRU programme will be delivered using Network Rail's GRIP for Programmes framework.

21.2 The programme has now completed the Develop stage of the GRIP for Programmes Lifecycle. During this stage the detailed definition and planning for the programme has been undertaken. This Business Case will inform the Decision to Design. Following an approval decision from the DfT investment panel the programme will immediately proceed with the Design phase.



21.3 Through the Develop stage, it has been identified that programme delivery mechanism (during the Delivery stages) will be undertaken in tranches. Delivery by tranches ensures that programme outputs are aligned to the strategic direction of the programme, and also enables the early release of benefit opportunities. This approach reflects the MSP principle of delivering programmes in stages to bring forward benefit realisation.

21.4 Each tranche will be composed of a series of interventions that together deliver outcomes that can be received as passenger benefits. Each intervention within the tranches will be delivered using GRIP by the respective geographic delivery team.

21.5 The detailed following programme timeline outlines the periods through which the projects within the TRU programme will pass through the GRIP for Projects stages. Detailed project programme plans are shown in separate documents to this Management Case.

21.6 Running in parallel with the infrastructure works, a staged introduction of ETCS train fitment programme will be implemented. This methodology was developed with consideration given to programme risk, cost, and complexity of design.

Project Resource Requirement

21.7 Within the rail industry there are strategically limited labour, plant and material resources that require careful consideration, especially with regard to the wider industry mobilisation. Within a similar timeframe to TRU, resources may also be required on HS2, East/West Rail and other enhancement programmes in the North of

England. Due to the large capacity of Network Rail in the construction sector, many of the resources required are strategically held, however the availability of other resources is subject to market demand. At this stage of the programme an outline assessment of the critical resources has been undertaken which shows the key dependency of each resource. The Alliances have undertaken work to ensure that they have the capabilities and resources available to them to deliver the programme.

Critical Path

21.8 Following analysis of the resource constraints for the TRU programme, NR undertook a critical path study. The critical path analysis revealed that two work-streams are shown to have independent sequencing of similar lengths. These are:

- Remodelling of Huddersfield Station through to the Ravensthorpe flyover installation (Including Batley Station Relocation); and,
- Church Fenton Track Upgrade.

21.9 The Huddersfield to Ravensthorpe work is considered to be the critical path of greater significance as the allocation of time to complete the works is based on the complexity and scale of the upgrade. In contrast the Church Fenton upgrade is restricted by blockade access periods.

21.10 Both work-streams are dependent on Transport and Works Act Orders (TWAOs), and the critical path will vary depending on the support from local authorities, as well as the number of objections that are received in response to the TWAO application.

21.11 The Ravensthorpe works are further complicated by the geography of the route, as there is no diversionary route that could feasibly be used as an alternative between Huddersfield and Mirfield.

21.12 Moving forward, the TRU Organisation will monitor the critical path, and update as the programme progresses through the TWAO process. Greater clarity will also be gained of the diversionary route impacts and current operational impact on the existing railway. With this information the critical path dependencies will be updated and presented within the FBC.

Milestones

21.13 Tracking of milestones is a key tool for the control of all schedules. A number of milestone groups have been developed for application to different aspects of the programme. Milestones have been informed by the resource and critical path constraints of the programme and have been integrated with wider Network Rail performance measures as well as strategic programme goals. During the detailed design phase quantified milestones will be developed from the overview milestone groups shown in Table 3.1:

Table 3.1: TRU Milestones for Programme Delivery.

Milestone Types	Description
Enhancement Delivery Plan (EDP) Milestones	The Enhancements Delivery Plan sets milestones for projects that Network Rail is committed to deliver within the Control Period. It is used by the regulator to hold to account and to give visibility of Network Rail plans. Network Rail publishes the EDP every quarter. The milestone for infrastructure authorisation is stated within the EDP. This milestone is subject to the final investment decision.
Route Scorecard Milestones	A delivery performance milestone for the Route organisation, which Network Rail uses to monitor performance.
Schedule Adherence Milestones	Network Rail Schedule Adherence Milestones enable monitoring of compliance with the GRIP process. These milestones must be defined in each schedule as a minimum. A selection of the Mandated Milestones forms part of the Schedule Adherence Key Performance Indicator (KPI) measure. This measure only takes into account Level of Control 1 and 2 projects.
Programme Lifecycle Milestone	These Milestones define the overall Programme Lifecycle in line with GRIP for Programmes. These milestones will develop with clarity through programme execution, with full agreement from delivery partners
Programme/ Project Performance Milestone	Milestone that the TRU PMO uses to monitor the performance of the Delivery Partners supporting the programme. These are proposed and agreed with instruction to a Delivery Partner.
Integration Milestone	A series of corresponding GIVE/GET milestones that link dependent activities delivered by others.

21.14 The milestone structure reflects the management of the programme, with additional milestones for both projects and activity integration. In this way the risks to the programme are reduced as active monitoring can be undertaken through the process against milestones at all programme levels.

Programme Dependencies - For Design Phase Assessment

21.15 The following section outlines both Infrastructure and Non-infrastructure dependencies for the TRU Programme. With this knowledge a detailed communications strategy has been developed to ensure that the TRU organisation can respond to internal and external programme changes and inform both stakeholders accordingly.

Infrastructure Works

Internal Programme Dependencies

21.16 Within the TRU programme there are significant interdependencies between the interventions that must be managed in order to deliver a unified upgrade programme. The major section of dependent works is centred around the Huddersfield to

Ravensthorpe four-tracking and associated separated junctions. These will be assessed further within the design phase.

Logistics Interfaces

21.17 The Transpennine Route presents a significant logistical challenge due to the topographic and meteorological conditions. To enable efficient programme delivery a coordinated management and logistics system is proposed. This will utilise a multi-tiered system that cascades resources away from centralised Hubs to compounds along the route and subsequently delivers to site.

21.18 These logistical movements present a significant interface with construction work, the detailed logistic movements will become finalised once a route option is selected. A dedicated highways logistics team will be established whose responsibility will be to identify highway impacts, negotiate solutions with local stakeholders and ensure that the impact of traffic movements and road closures is mitigated as much as possible.

External Programme Dependencies

21.19 As a programme of works, TRU forms part of the wider rail infrastructure environment. In order to ensure successful programme delivery there is a clear need to integrate the TRU works with this wider environment.

21.20 Network Rail has been appointed by the DfT to lead the industry level integration. The purpose is to engage with the rail industry as a whole to realise the release of benefits through a phased configuration approach.

21.21 There are significant CP5 schemes linked to the TRU programme, these include:

- North of England Programmes LNW;
- Transpennine Route Intermediate Interventions;
- Depots and Stabling linked to new Rolling Stock; and,
- Traction Power Supply Equipment.

21.22 The successful delivery of these interdependencies is necessary to deliver the TRU outputs.

21.23 Wider programme interfaces exist which have been considered during the development of the TRU programme, specifically the following projects:

- High Speed 2 (HS2);
- Northern Powerhouse Rail (NPR);
- Leeds Integrated Station Masterplan;

21.24 These works are not considered to be fully interdependent on the TRU programme, however wider industry impacts of the programme synergies will be explored during the detailed design stage. Furthermore, opportunities presented by the programme interfaces of strategic significance are explored in the strategic case, this is especially pertinent to HS2 and Northern Powerhouse Rail.

Non-Infrastructure Works

21.25 In order to fully realise the proposed benefits ties to the wider industry are required, the following non-infrastructure programmes are required to deliver the full benefits of TRU.

- Rolling Stock programme of either electric or bi-mode trains;
- Timetable developments;
- Cab fitment of DTC equipment; and,
- Re-franchising Timescales.

21.26 For identified interfaces within the TRU programme, Interface Definition Documents have been created. These documents record the detail of interface agreements between two interfacing parties, whilst overlaying programme dependencies to ensure the interfaces are correctly integrated. Each document is developed from an early stage within the programme and continues to be maintained and developed at agreed milestones throughout programme development to programme completion.

22. Assurance

Programme Assurance

Assurance Plan

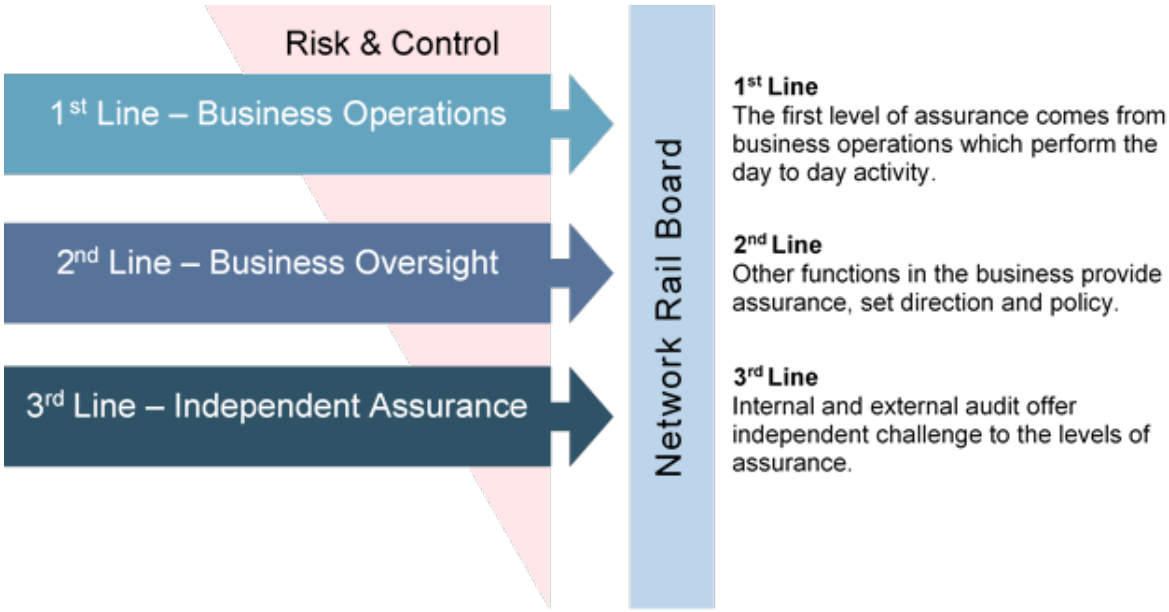
22.1 As part of the BICC submission a separate DfT Integrated Assurance Plan will be submitted. Set out below are details on the NR assurance process applied to TRU.

22.2 The TRU organisation undertakes assurance through a multi-layered system known as the 'three lines of defence' model. A variety of assurance methodologies have been utilised to ensure the most appropriate assurance process is followed for any specific task, as well as for the wider programme. Assurance is risk-based, linked to major decision points, and action focused. The assurance framework utilises the following assurance processes:

- Integrated Assurance – undertaken as part of the production process for deliverables;
- Audit – either of the programme as a whole, or of specific areas;
- Measurement of key metrics – utilising key performance metrics defined by the programme to determine performance;
- Peer Reviews – expert reviews for the programme;
- GRIP for Programmes Stagegates – a gated review with the Route Sponsor;
- GRIP for Projects Stagegates – a gated review with the Route Sponsor; and,
- P3M3 Maturity Assessments (or similar) – external maturity assessment of programme approach.

22.3 The 'three lines of defence' assurance model places responsibility for assurance at all levels of project management. Figure 4.1 shows an overview of this assurance process.

Figure 4.1: Network Rail Assurance Approach



22.4 The first line of defence starts with the delivery organisations (TRUe Alliance, and Transpire Alliance). Each team undertakes self-assurance of its deliverables in accordance with standards and requirements set out by Network Rail. The assurance process at this stage is primarily based on the three tier Produce, Check, and Approve process.

22.5 Monitoring of progress for deliverables at this initial stage is undertaken through various reviews, these include:

- Key Performance Metrics – measured by the PMO;
- Project Stagegate Reviews – signed off by the Sponsor (on behalf of the Route); and,
- Integrated Engineering Lifecycle Phasegates – Precursors to the project stagegate focussing on engineering deliverables.

22.6 The second line of defence comes from the PMO: in addition to producing programme management deliverables, it also provides assurance on work provided by programme delivery partners. It does this using the following mechanisms:

- On-going integrated assurance with the delivery partners of products and deliverables; and,
- GRIP for Programmes Stagegate reviews – These are undertaken at the end of each stage, and are signed off by the Sponsor on behalf of the route.

22.7 In addition to PMO assurance of programmes, IPNP also ensures that programme outputs meet with the strategic direction set for TRU. Compliance with their requirements is achieved through:

- On-going review of programme level outputs;
- Selective audits of the programme; and,
- The ongoing measurement of key programme metrics.

22.8 The third line of defence reflects the external assurance by owners, funders and key stakeholders. Beyond the three tier assurance framework additional assurance can also be undertaken, by both internal and external stakeholders. Within Network Rail

there are a number of key departments external to IPNP that have an oversight role on the performance of the programme. These include:

- Routes (LNE&EM and LNW) – as represented by the Sponsor and ultimately the route managing director, utilises the GRIP for Projects and GRIP for Programmes stage gate process to sign off on the gated reviews to ensure that the programme and its projects are assured;
- System Operator – Reviews the system proposals and funding submissions made to the DfT through the 'Tender Vet' (peer review) process; and,
- Investment Projects – Undertakes audits of Northern Programmes and TRU to ensure compliance with Network Rail mandated standards.

External Assurance

22.9 Beyond Network Rail, the TRU organisation is audited by a number of government departments and agencies, to ensure oversight and external review of public funds, these include:

- National Audit Office;
- Office of Rail and Road;
- Infrastructure Projects Authority;
- The DfT; and,
- HM Treasury.

22.10 Outside of the main programme assurance frameworks, TRU also adheres to strict assurance for several of the programme delivery support mechanisms. These are covered in the following sections:

Commercial Assurance

22.11 Network Rail implements a system of Commercial Panels that have been delegated by the Network Rail Board via the Executive Committee to review and approve contracting strategies, contract award recommendations, modifications, variations and claims.

22.12 The IPNP Regional Commercial Panel (RCP) is approved by the Procurement Executive Panel and oversees the TRU organisation.

22.13 The key principles for the panel's terms of reference are:

- All decisions by the panel are minuted and recorded via the Gateway process;
- A quorum of individuals need to approve any decision; and,
- The panel includes permanent legal representation.

22.14 The Commercial Management Plan Report forms the basis on the commercial focus of the project. Moving forward, assurance of the programme will be measured against the activity outlined in the Commercial Management Plan.

Financial Assurance

22.15 The costing work undertaken during the preparation of the Business Case have been assured through Network Rail's internal processes. The costs were collectively developed and have been reviewed by a number of parties including:

- Internal Peer Review;

- Both Alliance Leadership Teams;
- IP Programme Board;
- Route Delivery Directors; and,
- External Peer Review on behalf on the DfT.

Programme Controls

22.16 Programme controls assurance is a requirement for both the TRU programme as a whole, and for each of the delivery partners. This is undertaken in accordance with the TRU Programme Assurance Execution Plan.

22.17 Assurance of the programme is undertaken by IPNP in line with the governance guidance set out in the IPNP Programme Controls Strategy.

22.18 Assurance of delivery partners is undertaken by the TRU PMO against the requirements set out in the relevant assurance documentation. This is undertaken through:

- Ongoing compliance checks by the PMO team;
- Pre-planned deep dive audits;
- Business Case submission evaluation; and,
- Baseline evaluation.

22.19 Ongoing compliance checks are supplemented by regular weekly ‘vis-board’ sessions, which provide a visual overview of progress against programme tasks and allow for early, transparent identification of programme risks and areas of delivery which are behind target. This also allows for any threats to dependent tasks to be identified early, and appropriate mitigation to be deployed.

22.20 In addition, as a public organisation, Network Rail and its suppliers are subject to challenge by the DfT and other governmental organisations as to the processes, systems and approach to delivery of TRU.

Technical Assurance

22.21 As the TRU organisation is utilising a collaborative approach to project design and delivery, technical work is being undertaken by parties both internally and externally to TRU and Network Rail. For this reason, a clear and robust technical assurance framework has been developed.

22.22 Technical assurance standards are set out by IPNP to ensure consistency. The following conditions are placed on both internal and external engineering deliverables, which must:

- be prepared collaboratively with the relevant Network Rail engineering representative, exercising reasonable professional care and skill;
- include consideration of safety by design, constructability, sustainability and environmental responsibility;
- meet the requirements specified;
- be compliant with the Computer Aided Design (CAD) and Building Information Modelling (BIM) standards;

- integrate with other engineering deliverables and disciplines as demonstrated through the Interdisciplinary Check (IDC) process; and,
- be successfully installed, tested, commissioned, operated, maintained and disposed of in the conditions which exist in the operational railway environment.

22.23 Technical assurance is undertaken by Network Rail's engineers, with a view to ensuring the acceptance of the suppliers' engineering deliverables. Supplementary staff will be provided by the Delivery Partner if required. The engineering assurance organisational structure has been created to align with the three core work-streams (East of Leeds, West of Leeds, and Leeds Central Projects).

22.24 Technical assurance is undertaken separately from the design, check, and approve process of producing deliverables. The technical reviewer is required to confirm that:

- The supplier has followed the correct process when producing the deliverable;
- The deliverable complies with the contract requirements and where applicable the Requirements Documentation, i.e. CRD/RRD/DRRD;
- The deliverable complies with any discipline-specific standards - these standards are subject to challenge as part of on-going work within the programme;
- Any conclusions and qualifications are clearly documented and understood, including deviation from standards and the need for any product approvals;
- All supporting paperwork is accurate and complete; and,
- Any issues raised in the IDC and Interdisciplinary Review processes are documented and addressed satisfactorily.

22.25 Further assurance of the technical work is provided in the costing of proposed works; these costs undergo separate assurance as outlined in the financial case.

22.26 The levels of scrutiny levels and associated implementation processes are used within Network Rail for all major infrastructure programmes. For this reason, this assurance framework carries a low exposure to risk due to established assurance and oversight for technical delivery.

23. Communications and Stakeholder Management

Communications

23.1 The TRU organisation is complex and impacts upon a diverse range of communities across the North. To ensure that the internal and external communications of the programme are dispatched effectively, a communications strategy has been implemented.

23.2 The objectives of the communications strategy are:

- To ensure that all stakeholders are well informed about the programme including benefits, key drivers for the programme and associated impacts;
- Raise awareness of TRU and its benefit across public, passenger and stakeholder audiences;
- Raise awareness across affected passenger groups of scheduled service changes in order to help them plan and minimise the impact of possible disruption;
- Manage and minimise the impact of work required on; communities, residents and the wider public affected; and,
- Minimise reputational risk to the programme and Network Rail.

23.3 Specific objectives have been developed for the following stakeholder groups:

- Passengers;
- Local Communities;
- Politicians and Businesses;
- Media; and,
- Internal stakeholders.

23.4 Further information regarding these specific objectives can be found in the TRU Communications Strategy.

23.5 All communications objectives are measured to ensure that the communications activities are achieving the desired outcomes. Each period, reports are circulated to the programme manager, route communications and other relevant parties.

23.6 A key component of the strategy ensures that the key messages emanating from the TRU Organisation align with the narrative of the Great North Rail Project[7]. As the programme develops further key messaging will be agreed, including key messaging

[7] The Great North Rail Project is the brand identity for several Rail projects across the North of England

for interventions and projects of significant importance. This additional messaging will be agreed through the North of England Strategic Communications Group.

Stakeholder Management - NR Project Approach

23.7 The following sets out a proposed NR stakeholder approach. Close co-ordination with the Department will be necessary to confirm these activities within the design phase. TRU has an active Stakeholder Engagement Strategy (SES) led by a Stakeholder Steering Group (SSG). The SES identifies the main stakeholder groups and individuals impacted by TRU and describes how their interests in TRU will be taken into consideration. The SES provides a framework through which detailed communications and stakeholder engagement plans can be developed for a variety of options within the TRU programme.

1 The overall approach to engagement is outlined in the following steps:

2 Identify the TRU stakeholders;

3 Identify their interest and influence regarding the programme, including if we require information or consents from them;

4 Decide on the most appropriate methods of communicating with stakeholders (inform, consult, and engage) and the most appropriate time to do this; and,

5 Feedback, measure engagement and continuously improve.

23.8 The stakeholder engagement strategy has been heavily influenced by lessons learned from previous infrastructure programmes. Pertinent lessons learned and subsequent actions taken by TRU are shown in the table below:

Action	Implemented
Create and communicate the stakeholder & consents management plans to the Programme early in the project life cycle	November 2017
Robust stakeholder engagement strategy is implemented	From February 2017
Early Council involvement	From February 2017
Early community interface/ drop-in sessions	Arranged from spring 2017
Establish a programme Stakeholder Steering Group	Established May 2017
Consider the best approach to TWAOs to avoid delays in the programme	Built into selection process and timescales built in
Good standard of consultation delivered	TRU will be one of the first major programmes to utilise the new Network Rail Consultation Toolkits, and will build on the previous engagement and relationships that Network Rail and Routes have already conducted. This will ensure all engagement is consistent, with clear branding and good quality materials.

23.9 Key achievements of the stakeholder engagement process include the establishment of:

- the North of England Programme Board (NoEPB);
- TRU Delivery Group (PDG);
- TRU Development Steering Groups (DSG);
- North of England Strategic Communications Group;
- Communications Groups with various stakeholders on individual issues;
- Route Asset Manager Support Team;
- Programme of comprehensive engagement with Members of Parliament;
- Community and Council engagement forums for preliminary works;
- Intervention evaluation and review process; and,
- Audit programme for communications and stakeholder engagement.

23.10 TRU continues to engage with the wider industry in order to implement the most appropriate engagement strategy. It has done this to date through a comprehensive consultation process to acquire a detailed lessons learned log. The TRU organisation has also established a number of forums through which various industry partners and stakeholders can interact with the programme.

TfN Technical Reference Group

23.11 Through TRU development both the policy and franchise management elements of TfN have been involved in the development of the scheme. This engagement has enabled the Rail North Partnership to understand the infrastructure plans and inform the future timetable development.

23.12 Through this process the needs of passengers have been well represented by Network Rail, consultants, train operators and DfT. However, there remain some difficult choices as to the timetable that should operate on this route, similar to some of the problems recently experienced with recasting services at local stations. This means that TfN engagement is vital for developing the scheme, both from a construction perspective and also informing the scope of franchise changes.

23.13 With this in mind, the Technical Reference Group (TRG) was set up by TfN to support Network Rail and DfT in identifying the right infrastructure interventions that will enable an improved timetable to be delivered. The TRG includes member authorities along the TRU route and advises TfN's Officer Reference Group and the TfN Board as to any TRU-related issues. The group meets when required, to support the progression of the scheme through the business case and consultation stages.

23.14 Terms of reference have been clearly set out that define how the group will work; the key themes include:

- Assisting the DfT to develop the strongest possible business case for investment
- Understanding the ITSS from a local perspective
- Utilising technical consultancy advice and local expertise to assist Rail North / TfN formulate a strategic view of TRU for the North of England

23.15 From a franchise change perspective, the group is also expected to:

- Support Rail North Partnership and DfT identify and fully understand future franchise impacts/commitments.
- Understand and feed local considerations into the development of a robust access plan
- Understand and feed local considerations into a potential tranche delivery programme

24. Programme Delivery and Benefits Realisation

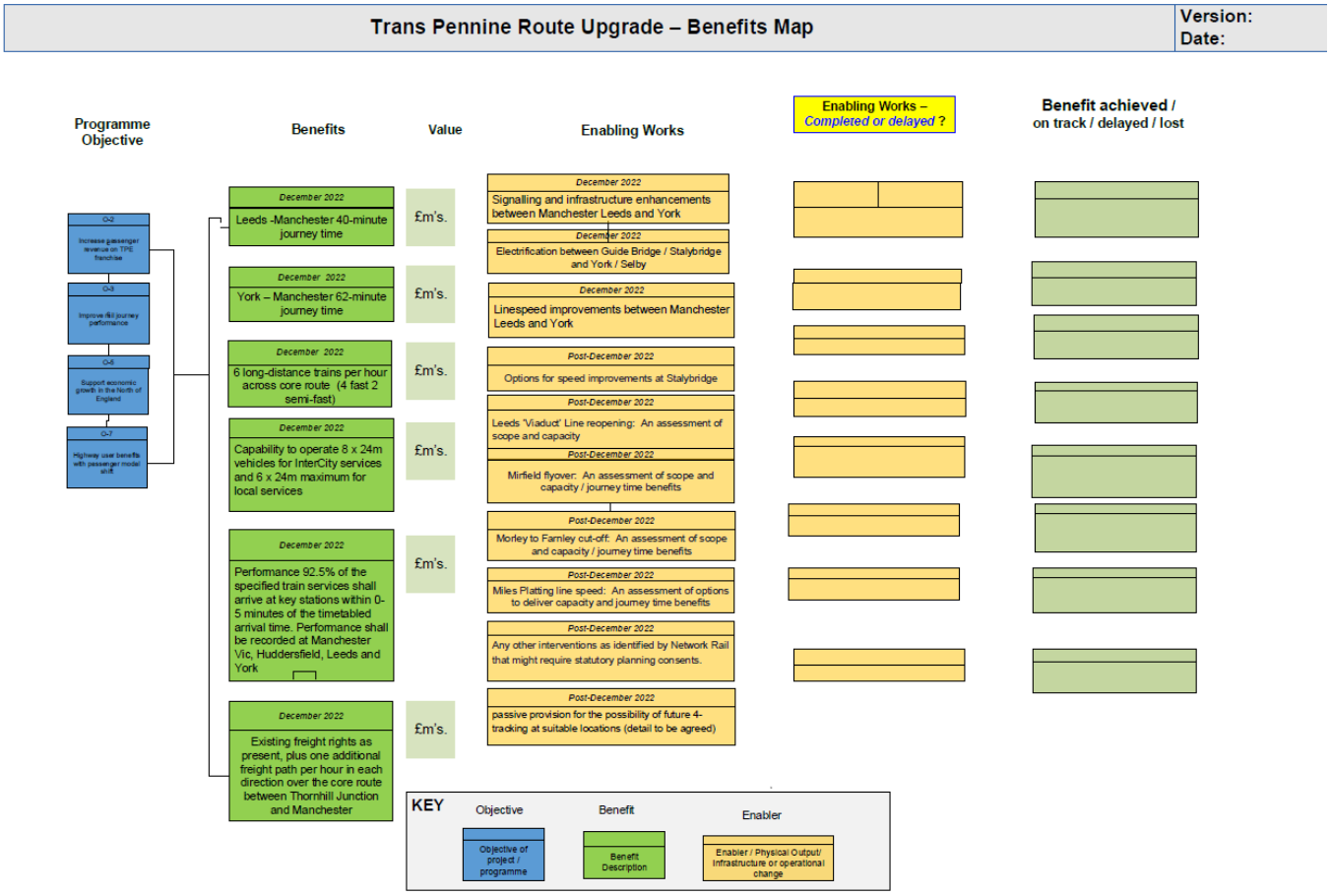
Benefits Management, Realisation, and Evaluation

24.1 Fully realising the benefits of infrastructure investment will only occur through a coordinated approach of both passenger services and rail infrastructure delivery. The TRU scheme will deliver the following benefits:

- Capacity increases;
- Performance Improvements;
- Journey time improvements; and,
- Maintaining freight capacity and capability.

24.2 In order to achieve these benefits for passengers, both infrastructure and operational changes need to be implemented on the TRU core route and beyond. Network Rail as the delivery organisation will provide the infrastructure upgrades that present the benefit opportunity to the Train Operating Companies. The Rail North Partnership will manage the franchise process to ensure benefits are realised through operational improvements. This approach will ensure that the upgraded infrastructure is utilised fully and benefits maximised to achieve value for money. Set out overleaf is the OBC stage benefits realisation map:

Benefits Realisation – OBC Map



24.3 The following sections detail how the separate organisations will ensure the benefits are realised.

Infrastructure Delivery

24.4 The benefits management strategy of the TRU programme sets out the approach to benefits management and the framework within which realisation will be achieved. The strategy sets out a risk based approach to benefits realisation, this strategy is being followed by both the programme and business units.

24.5 The benefits lifecycle of the project has been split into four sections which run in parallel with the programme from inception to delivery. The five stages are detailed as:

- Identify – A multidisciplinary review of the known benefit streams includes the creation of a benefits map with an accompanying benefit measure by which monitoring and evaluation can be taken against;
- Quantify – Taking the Identified Benefits, a quantifiable baseline will be established, this stage has been completed in advance of the Business Case submission;
-

- Value and Appraise - Throughout the detailed design phase the quantity of the baseline benefit level will be established for each expected benefit. The anticipated benefit will then be incorporated into the Full Business Case submission;
- Plan – Development of procedures and timelines for realising benefits. Ensuring that appropriate measures are in place for accountability; and,
- Realise – Throughout the programme delivery, the expected outcomes are measured as the works are implemented.

24.6 The benefit planning process ensures accountability and transparency for:

- the realisation of identified benefits;
- the changes on which they are dependent;
- the mitigation of dis-benefits; and,
- the identification and leveraging of any emerging benefits.

24.7 The benefit realisation plan will be used to document and track the realisation of benefits across the programme. The benefits realisation plan will also include capability assessment and critical dependency analysis, to ensure a holistic programme approach to benefit realisation is implemented.

24.8 The critical success factors for benefits management include:

- Outline clear accountabilities and responsibilities across the benefits management lifecycle and ensure correct people are in roles;
- Ensure each element of the benefit management lifecycle has been implemented at the appropriate programme stage;
- Confirm that the approach to quantification of benefits is agreed with stakeholders; and,
- Ensure reviews are undertaken at each appropriate stage of the programme to confirm benefits remain valid and are signed off with benefits owners.

Passenger Services

24.9 Rail North Partnership has outlined that further decisions will need to be made regarding, but not limited to: ETCS equipment, station changes, and possession planning. With a rolling requirement for decision making, a standard approach for other franchises has been to have an on-going ‘Change Programme’ running in tandem with the day-to-day management of the franchise. This has been used for:

- Great Western Electrification, where multiple timetable changes have been brought together as infrastructure and rolling stock allows; and,
- Northern and TransPennine Express, following delays to infrastructure completion and resulting need to amend bid timetables.

24.10 Having dedicated staff resources to oversee the changes, both from a franchising authority and TOC perspective, means a full record of any changes in assumptions can be tracked. Financial modelling of the change is typically undertaken every 2 years, with interim payments being made if significant changes in costs are required.

24.11 A rolling programme of franchise changes agreed in this way allows journey time savings (and the associated revenue benefits) to be agreed with the operator, and captured as part of the financial modelling process, this then can be fed back to the DfT via adjusted franchise payments.

24.12 The medium and long term benefits of the TRU programme will be captured as part of future franchises, with bidders having the opportunity to use the infrastructure in the most beneficial manner. Specification of the new franchises, in consultation with Transport for the North members, will be an important factor in ensuring the TRU benefits are fully realised.

Monitoring and Evaluation

24.13 In order to maintain the consistency of programme control across multiple projects IP maintain a Project Control Cycle (PCC). The PCC ensures that time, cost and quality targets are delivered by Network Rail. Within the PCC, a Review and Control stage exists which creates an iterative cycle through which the project can circulate until the deliverables are finished to an acceptable standard.

Work Streams and Implementation

24.14 The construction approach for implementing the interventions has been categorised into the following work streams:

- Infrastructure – Required to support the operation of planned passenger and freight services, infrastructure is categorised into the following areas:
  - Track – For the full length of the Transpennine Route the track will be upgraded, this work will provide line speed, capacity and reliability improvements. Efficient methods for track renewal will be utilised including parallel track relaying from trains, and the use of the High Output Track Systems in areas where ‘Adjacent Line Open’ efficiencies can be realised;
  - Trackside Equipment – A range of both new and legacy assets to be installed along the route to monitor and control the operation of the railway;
  - Sidings – Integration of Sidings with new signalling systems to ensure safe operations; and,
  - Level Crossings – Where possible crossings are to be closed and the associated rights of way removed or transferred to alternative routes.
- Systems – A range of monitoring and control systems that allow the operation of the route to perform efficiently, the interconnected control system includes the following components:
  - Traffic Management System (TMS) – A legacy integration system that advises Signallers and Operators to optimise the traffic flow on the network;
  - European Train Control System (ETCS) – A train protection system which issues speed authorisation to trains through on-board and track-side equipment. ETCS allows greater utilisation of track assets and will be implemented on the route between Leeds and Manchester, the ETCS system also includes safe track side working support systems, whereby track sections can be blocked for on-site working through portable devices;

  - Communications – For voice and data transmission GSM-R equipment will be upgraded;
  - Connected Driver Advisory Systems (C-DAS) – Provides drivers with advisory speed and route driving data on an in-cab display;
  - Legacy Control Systems – In areas outside of the proposed ETCS implementation area track side colour light signals will be implemented;
- Rolling Stock – Traffic on the Transpennine Route will be a mixture of diesel, electric and bi-mode trains, and where necessary will be fitted with ETCS equipment.
- Traction Power – New Overhead Line Equipment is to be installed with complementary Electrical Control Operator systems to ensure consistent supply of power with sufficient monitoring capabilities.
- Stations and Depots – Selected stations along the route are to be modified to provide line speed, capacity and performance improvements. Where possible this work will coincide with blockades for track work. Depot operations will be address as part of proposed engagement with Network Rail Routes and Railway Undertakings.
- Civils – All civil assets are to be reviewed, and where necessary modified to support the enhanced service levels.

24.15 The implementation strategy utilises a tranche approach, this phases in the infrastructure works and benefit realisation, delivering early benefits throughout the construction period.

Contract Management

24.16 The contract structures of the TRU Organisation align with the working principles set out in the Project 13 Blueprint – an industry led initiative to improve infrastructure delivery. The key components of the Project 13 initiative are:

- The owner is central and leads the enterprise, defining long-term value;
- Suppliers and advisors have direct relationships with the owner;
- An Integrator actively engages and integrates all tiers of the market; and,
- The Key suppliers, owner, advisor and integrator work as one team to optimise value.

24.17 TRU is being delivered via sub-programmes: West of Leeds, and East of Leeds, with the majority of Works planned to be delivered via an Alliancing form of contract. The Alliance form is structured to be open, collaborative and promotes the prompt and mutual resolution of any disputes. Part of the Alliance contract is a commitment to transparency and open-book accounting, these arrangements form the backbone of a Target Cost mechanism, and the sharing of risk.

24.18 In the Initial development stages the contracts are let using a Target Cost mechanism.

24.19 To incentivise efficient delivery, whilst maintaining a Value for Money focus, the implementation stages of the TRU programme will include Key Performance Indicators and the potential for the Alliance suppliers to gain additional profit or loss.

Contingency Plan

24.20 At this stage of programme, a high-level summary of the measures the TRU organisation have adopted to mitigate the risk of service implementation failure has been produced. These actions are summarised as follows:

- Six Month Fire Break – A six-month fire break between entry into service and timetable change will is proposed as part of the TRU management process. Any exception to this rule would need to be approved through TRU delivery group. During the fire break, the new capability can be utilised for performance resilience and recovery in perturbed situations, and for Short Term Planning Applications.
- Rolling Stock Contingency – In addition to the six-month firebreak enacted by Network Rail, a value for money exercise to determine the cost of maintaining the lease of existing rolling stock beyond the infrastructure handover date will be tested. This will prevent the cascade of trains occurring before replacements are operational thus restricting the knock-on implications across the network. The results of this exercise will be included in the Full Business Case submission.
- Industry System Schedule Integration – For TRU, Infrastructure Projects Northern Programmes are responsible for industry system schedule integration to track all the capabilities required to deliver the timetable change. For example, infrastructure, rolling stock, depot & stabling, driver training etc. In the lead up to a timetable change, a series of readiness reviews will be held against this schedule to inform a go/no-go decision. This responsibility is allotted by the DfT which maintains overall accountability for system integration.
- Migration Strategy – The TRU Organisation will develop a migration for each timetable strategy for each timetable change, considering the infrastructure, processes and people changes required to delivered the timetable change.
- Asset Management Plan (AMP) Process – As part of wider operations and Maintenance integration activity the TRU Programme has developed, in conjunction with LNE&EM and LNW, an AMP process. This reflects the complications introduced by the scope of the TRU Programme, the complexities of the Delivery Partner model and the tranche delivery mechanism.

25. Risk Management

25.1 Risk management is a key component of programme delivery across all organisations responsible for the TRU programme. At a programme-wide level, risk is allocated amongst the organisations as follows:

- DfT acts as system integrator, and holds risks that are associated with: Integration, Strategic and Economic changes;
- RNP is responsible for; Depots and stabling, franchising strategy, and procurement. RNP also holds risks associated with the integration of the franchises and the development and realisation of benefits of the TRU programme;
- Network Rail System Operator holds timetable planning and enactment risks;
- The TRU Organisation holds the strategic infrastructure delivery risk;
- The Alliances hold the Design and construction risk.

25.2 The remainder of this section details the approach of each organisation to risk management.

Department for Transport

25.3 Risks and issues are managed in accordance with Department's risk management policy. The risk and issue management procedures for Rail Group are maintained by the Portfolio Office which provide standard tools and templates to ensure risks are managed consistently across Rail Group. Programme risks are captured and reported via the central risk register for Rail Group that is maintained on the Management Information System (MIS).

25.4 As the approach to risk management is in accordance with Rail Group Policy with major risks and issues overseen by the Network Services Board, a separate risk management strategy has not been produced.

25.5 Network Rail manage infrastructure delivery risk in accordance with their own risk management policy.

25.6 Risks relevant to the delivery of Northern and TransPennine Express services (and associated Franchise Changes) are managed by Rail North Partnership, who feed issues into DfT's Passenger Services risk register. On-going management of the franchise contracts, with regard to both passenger-facing and financial risks, is provided by the Rail North Partnership Board who meet on a monthly basis.

Network Rail

25.7 Network Rail defines risk as the impact of uncertain events on a projects objective. All references to Risk Management (RM) cover mitigation of threats, pursuit of opportunities and effective evaluation and treatment of uncertainties.

25.8 The TRU organisation risk reviews are held at least once every four weeks. Risk reviews are held at both tranche and sub-programme level. The delivery partners are responsible for ensuring these risks reviews are held, and ensuring the appropriate personnel are in attendance.

25.9 In tandem with the risk review process, the tranches and sub-programmes will also update a risk register to effectively monitor and control risks. Responsibility for risk ownership should, where possible, be allocated to the party best placed to direct its management. Specific actions to manage a risk should be allocated to an individual who has the ability to undertake the action

25.10 If the risk can no longer be managed by the TRU programme this risk is to be escalated to the appropriate level within Network Rail. These risks are removed from their current level risk register and will sit in the risk register aligned to their new ownership status. In addition to general risks captured within the risk register and risk review process, risks relating to costs and schedule will also be subject to a Quantitative Cost Risk Analysis (QCRA) and Quantitative Schedule Risk Analysis (QSRA) respectively.

25.11 A TRU Organisation wide QCRA will be undertaken by the TRU Risk and Value Manger and assured by the IPNP Principle Risk and Value Manager as and when necessary. Typically, this will be undertaken following, but not limited to, these situations:

- Sub-programmes/Tranches and/or projects are showing slippage against their schedule adherence;
- Significant risks to the programme have been identified;
- Significant change to the programme has been initiated;
- Risk contingency has been significantly drawn down; or,
- At the request of a significant stakeholder.

25.12 The level of confidence in delivering key milestone completion dates will be determined by completion of a QSRA as required by GRIP, typically at the completion of GRIP Stage 3 and the commencement of all subsequent stages.

25.13 The risk strategy enacted on the TRU Organisation aligns with the wider Network Rail Risk and Value Management Plan.

26. Appendix A - NR Alliance Management

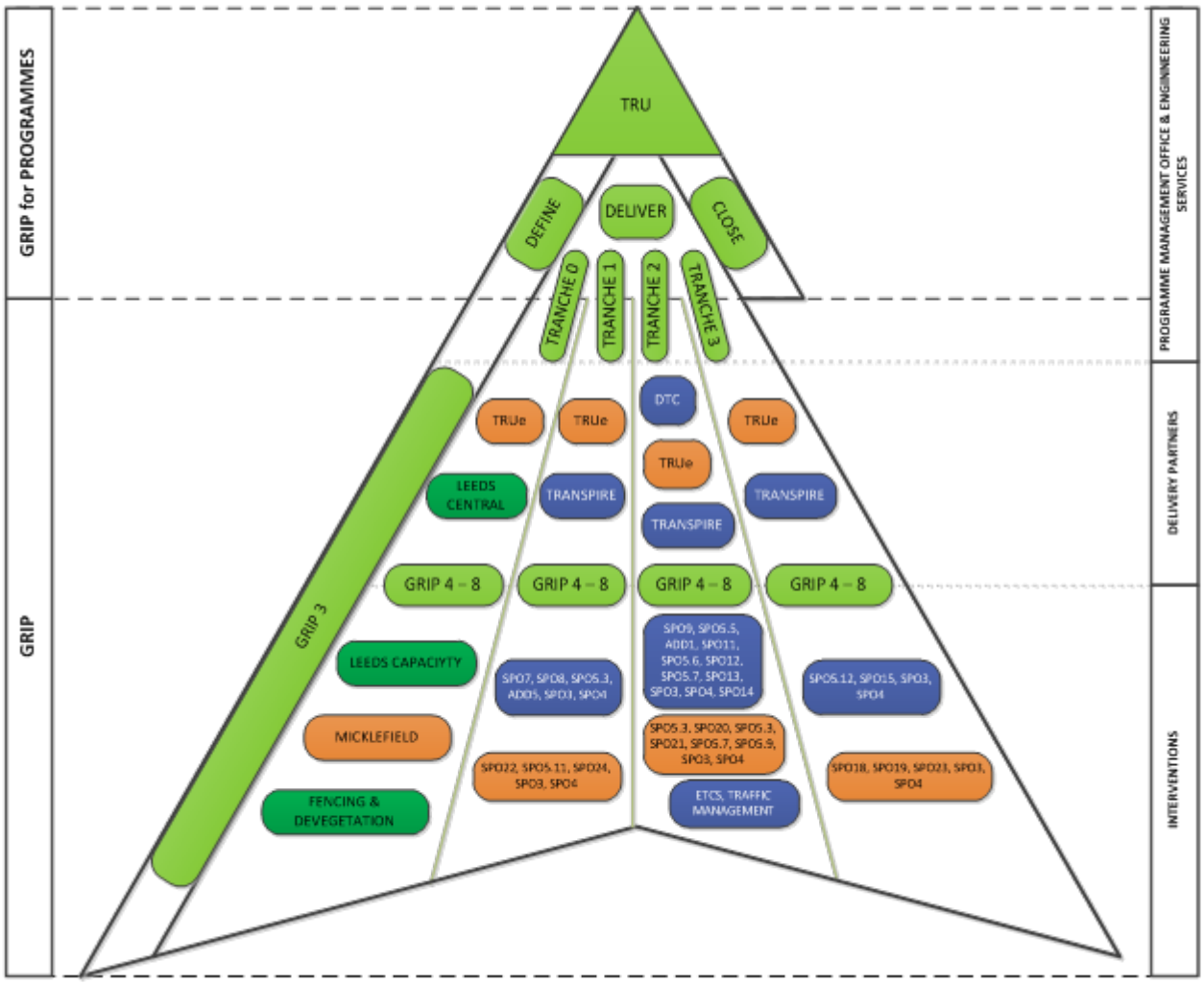
This appendix has been supplied by Network Rail and provides details on the alliance management.

TRU will be managed as a programme as it will oversee a series of changes across the Transpennine Route in order to deliver the outcomes and benefits. The TRU programme will be delivered using Network Rail Governance for Railway Investment Projects (GRIP) for Programmes. The programme is currently in the Development stage of the GRIP for Programmes Lifecycle.

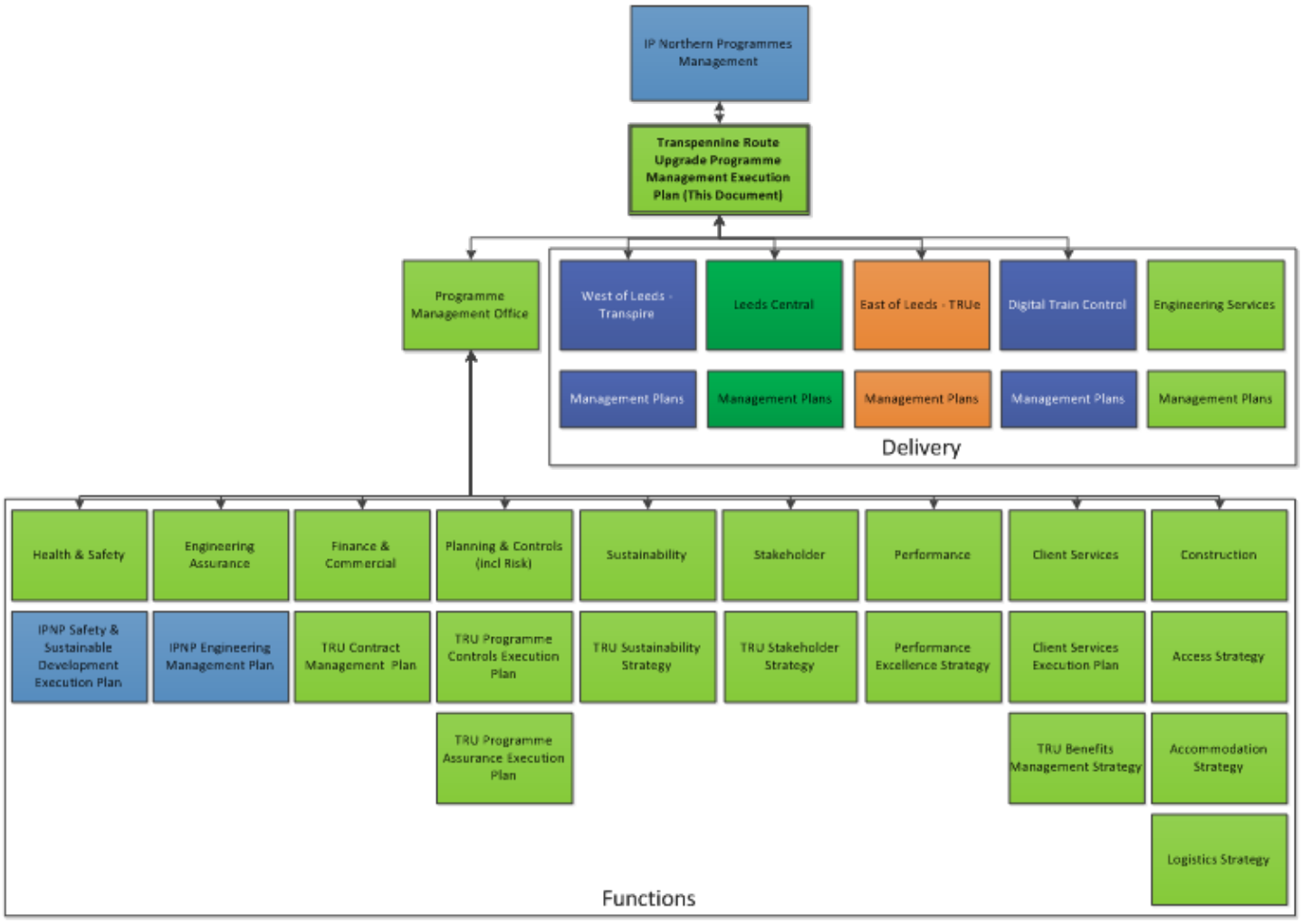
During this stage the detailed definition and planning for the programme is undertaken. As the Programme moves into the Deliver stage it will be broken down into Tranches ensuring that the ouputs delivered are aligned to the strategic direction of the programme and enables the early release of benefits.

Each Tranche will comprise a series of interventions that together deliver a distinct step change in capability and benefit delivery. Each Tranche will be delivered as a project using GRIP and, depending on the locations, delivered by the respective Geographical Delivery Teams or Alliances. Each identified intervention is a section along the Transpennine route where a change is required to contribute towards the Programme outcome. Each intervention will be delivered as a project using GRIP.

The figure below is a Programme Components Diagram that visualises what has been described in this section.



To ensure effective management of the Programme, the delivery teams and the functions have produced their own Management Execution Plans. Each will derive their direction from this document and also feed in to this document any programme changes that occur during the programme duration. This is represented in the document hierarchy shown below.


IP Northern Programmes Management
Transpennine Route Upgrade Programme Management Execution Plan (This Document)
Programme Management Office
West of Leeds - Transpire
Leeds Central
East of Leeds - TRUe
Digital Train Control
Engineering Services
Management Plans
Management Plans
Management Plans
Management Plans
Management Plans
Delivery
Health & Safety
Engineering Assurance
Finance & Commercial
Planning & Controls (Incl Risk)
Sustainability
Stakeholder
Performance
Client Services
Construction
IPNP Safety & Sustainable Development Execution Plan
IPNP Engineering Management Plan
TRU Contract Management Plan
TRU Programme Controls Execution Plan
TRU Sustainability Strategy
TRU Stakeholder Strategy
Performance Excellence Strategy
Client Services Execution Plan
Access Strategy
TRU Programme Assurance Execution Plan
TRU Benefits Management Strategy
Accommodation Strategy
Logistics Strategy
Functions

27. Appendix B - Tabulated Benefits and Capture/Measure

Intervention/ Activity	Current/Do-Min	TRU Future	Capture/Measure
Greater Capacity	Four fast trains per hour between Manchester Victoria and York, calling at Huddersfield and Leeds (serving Manchester Airport, Liverpool Lime Street, Newcastle, Middlesbrough and Scarborough) – with a journey time of 50 minutes between Manchester and Leeds and 76 minutes between Manchester and York One semi-fast train per hour between Manchester Piccadilly and Hull, calling at Stalybridge, Huddersfield, Dewsbury and selected local stations between Manchester and Leeds. One semi-fast train per hour between Manchester Piccadilly and Leeds calling at Stalybridge, Huddersfield, Dewsbury, including all stations between Huddersfield and Leeds.	Two additional stopping trains per hour between Manchester Piccadilly and Huddersfield via Guide Bridge, which allows local intermediate stops to be transferred from the semi fast Manchester Piccadilly – Leeds/Hull services. This increases the number of passenger trains operating between Huddersfield and Manchester from 6 to 8 trains per hour in the off peak. Two additional stopping trains per hour between Huddersfield and Leeds via Dewsbury, which allows local intermediate stops to be transferred from the semi fast Manchester Piccadilly – Leeds/Hull services and the Manchester Victoria – Brighouse – Leeds service and more stops to be made. This increases the number of trains operating between Huddersfield and Leeds via Dewsbury from 6 to 8 trains per hour in the off peak. Extension of the semi-fast Manchester – Leeds service to Hull.	Designing and implementing robust, appropriate and transparent project governance; Building strong and effective relationships with key stakeholders, justifying their trust and retaining their confidence, and obtain their commitment to benefits realisation. Key Partnership: DfT/NR/RnP/Franchise
Improved Reliability	The national PPM figure in 2018 for period 2 was 87.3%. Reliability for both major regional franchises in the North is less with the Transpennine Express franchise providing a PPM of 85% and the Northern franchise 86.8% (figures are for the whole franchises not just stopping services on the TransPennine route). Over the current decade, the trend for punctuality has worsened overtime for the Transpennine Express	TRU will provide more track capacity, particularly through the four-tracking of the section between Huddersfield and Ravensthorpe. This will allow for intercity services to overtake local services, significantly improving performance. NR have not provided the timetable and performance modelling in a form that indicates PPM or right time but the passenger benefits in term of improved	Designing and implementing robust, appropriate and transparent project governance; Building strong and effective relationships with key stakeholders, justifying their trust and retaining their confidence, and obtain their commitment to benefits realisation.

	franchise: PPM was 91% in 2009-10. Using the right-time performance measure, which indicates the percentage of trains arriving within 59 seconds of schedule, the reliability of Transpennine Express is only 46.8%, well below the 62.2% national average. Northern is just above this average. Some of this poor punctuality is driven by the constraints of the rail network including the mixed nature of traffic using the same two-track railway. This is exacerbated by the prevalence the flat junctions at Micklefield and Stalybridge which can reduce reliability as timetables have to be aligned with different routes and delays on one part of the network can have knock-on effects to other parts.	reliability/performance minutes are significant.	Key Partnership: DfT/NR/RnP/Franchise
Timetable (Improved Journey Times and Improved Connectivity)	Key do-min journey times are: Manchester to Leeds (49 minutes) and Manchester to York (79 minutes)	The preferred option journey times are: Manchester to Leeds (41.5 minutes) and Manchester to York (66.5 minutes)	Designing and implementing robust, appropriate and transparent project governance; Building strong and effective relationships with key stakeholders, justifying their trust and retaining their confidence, and obtain their commitment to benefits realisation. Key Partnership: DfT/NR/RnP/Franchise
Digital Railway	Conventional Signalling Renewal Assumed	ETCS and TM on core TRU route	Designing and implementing robust, appropriate and transparent project governance; Building strong and effective relationships with key stakeholders, justifying their trust and retaining their confidence, and obtain their commitment to benefits realisation. Key Partnership: DfT/NR/RnP/Franchise

Asset Renewal/Replace	Track and signal renewal estimated by NR at between [redacted] in nominal terms in CP6	All do-min renewals that would have occurred in CP6 are covered in SDO6 interventions	Designing and implementing robust, appropriate and transparent project governance; Building strong and effective relationships with key stakeholders, justifying their trust and retaining their confidence, and obtain their commitment to benefits realisation. Key Partnership: DfT/NR/RnP/Franchise
Future/NPR Proof	The preferred option reduces the potential for any abortive or wasted asset development.	The preferred option reduces the potential for any abortive or wasted asset development.	Designing and implementing robust, appropriate and transparent project governance; Building strong and effective relationships with key stakeholders, justifying their trust and retaining their confidence, and obtain their commitment to benefits realisation. Key Partnership: DfT/NR/RnP/Franchise

28. Appendix C - Safety and Sustainability

This appendix has been supplied by Network Rail and provides details on TRU safety and sustainability

28.1 The TRU Organisation is pursuing a programme of significant social, economic and environmental value. Within the TRU Organisation a commitment to achieving Building Research Establishment Environmental Assessment Method (BREEAM) infrastructure standards has been made. This pilot methodology assures, measures, and communicates the sustainability performance of the programme.

28.2 Through the TRU Sustainability Steering Group the TRU Organisation has worked collaboratively to agree on the direction of the programme. This can be summarised in the following delivery plans:

- Future-proofing skills and improving diversity;
- Educational Legacy;
- Local Jobs and Supply Chain;
- Carbon and resource efficiency;
- Enhancing biodiversity and ecology;
- Supporting a thriving third sector;
- World class community engagement;
- Stakeholders as our biggest advocate;
- Technology and the digital railway; and,
- Accessibility and inclusion.

28.3 The PMO will ensure that detailed sustainability requirements are integrated into relevant systems and processes including contract documents and the programme wide requirements validation and verification process.

28.4 The sustainability plan for the TRU Organisation complements the wider Safety and Sustainability Development (S&SD) strategy produced by IPNP as a governance structure for all programmes within the NP portfolio. The strategy ensures the requirements for programmes to meet Safety and Sustainability objectives are clear, and that an appropriate framework exists to engage with the continuous improvement process. The IPNP S&SD team provide advice on and assurance for arrangements in the S&SD strategy.

28.5 The BREEAM programme provides an assurance framework for an effective and systematic delivery of sustainability objectives and commitments, as well as existing Network Rail environmental, social and economic requirements.

TRANSPENNINE ROUTE UPGRADE

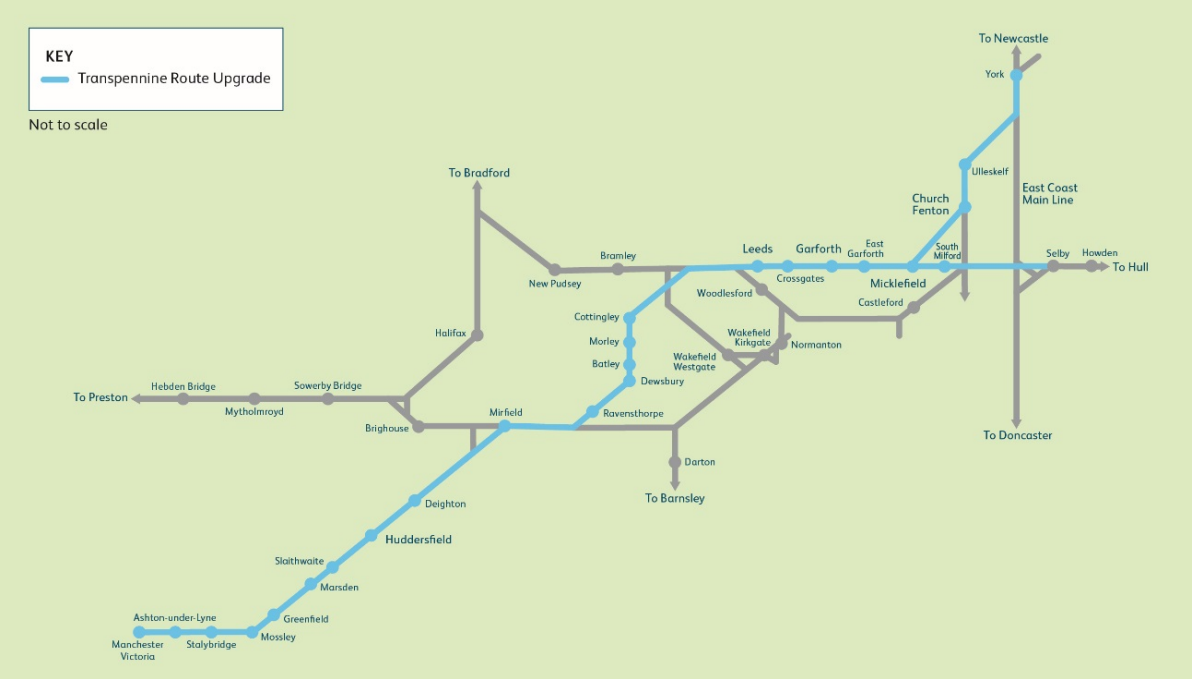
Commercial Case

29. Executive Summary

Introduction

61 This Commercial case sits within the wider Business Case submission for the TRU programme. It details the planned commercial engagement and procurement strategy for TRU. It also provides evidence of the key timescales relating to the project's commercial activity.

Background and Context



Transpennine Route Upgrade Map

62 The Transpennine Route is a key transport link across the North of England, with the core route linking Manchester and York, via Huddersfield and Leeds. The route supports a mix of services, rolling stock and operators serving inter-city, inter-regional and local passenger markets, as well as freight. There are around 50 million passenger rail journeys on the route each year, roughly twice the number of journeys the route carried 25 years ago.

63 The geography and topography of the route is amongst the most challenging on the GB rail network, and can be split into three key sections each with their own individual geography and infrastructure:

- From York to Leeds - relatively flat section through open country, with several rail junctions;
- From Leeds to Huddersfield - a route constrained by urban areas, tight curves and one long tunnel;
- From Huddersfield to Manchester - crossing the Pennines with one very long tunnel at Standedge, several short tunnels, viaducts and curves that restrict speed, as well as a number of listed structures.

64 The Transpennine Route Upgrade programme forms a key part of a wider transformation of rail travel in the north.

65 The upgrade is part of the North of England Rail Programme, including North West Electrification and the Northern Hub (which delivers network capacity and connectivity enhancements). The passenger benefits of these infrastructure schemes are being delivered through timetable and rolling stock enhancements delivered by the current Northern and TransPennine Express franchises.

66 It is also the first phase of a series of the potential Northern Powerhouse Rail interventions. As such there is a choice to be made regarding the scope of this first step of a transformation. The preferred option is a set of key interventions with an optimised fit with potential future interventions, including those delivered as part of in HS2 and NPR.

67 This phase of transformation focusses on:

- Capacity increases through service frequency and train capacity
- Performance improvements
- Journey time improvements
- Maintaining freight capacity and capability, with potential to add to both in the future

30. Scheme Specification

The Department for Transport acts as the system integrator and the ultimate client for TRU. It has procured Network Rail to develop the TRU programme, and as such has drafted a Client Development Remit (CDR), which outlines the DfT's requirements of Network Rail. This is explored in the Strategic Case with regards to the broad programme requirements, and here in the Commercial Case with regards to the scope of the programme.

Client Development Remit

DfT's Requirements for TRU

30.1 The DfT developed the client development remit to define the specific target outputs that the TRU programme should achieve. Network Rail committed to delivering on these commitments in a cost effective and timely manner.

30.2 The high level strategic outputs of TRU, as defined in the CDR, are detailed in the Strategic Case. These provide target outputs which have driven the proposed interventions that have been assessed in the Economic and Financial Cases.

Network Rail's Response to the CDR

30.3 In response to the CDR, Network Rail developed four core options (also known as Single Development Options – SDO's) which meet the target outputs to differing extents, and with associated variations in cost. Each option is a combination of smaller works projects which combine to fully or partially satisfy the CDR. In addition to the four options initially developed by Network Rail, a further two options have been deveoped to meet specific policy or spending constraints. All of the options are cognisant of the elements of scope set out in the strategic case.

30.4 The six options are described in the Strategic Case, and a Value for Money assessment has been undertaken for each of the options as part of the Economic Case and appendices. The affordability and deliverability of each option is discussed in the Financial Case and the Management Case respectively.

30.5 It is anticipated that, once a preferred option has been chosen and further scheme development has taken place, a detailed scope of deliverables will be developed.

CDR Requirements

30.6 The CDR also details the broad scope of the TRU programme, noting that:

- Manchester Victoria / Guide Bridge – Stalybridge electrification is now part of the TRU scope;
- New stations at Thorpe Park and Millshaw should be assumed to be operational before TRU is completed;
- Works at Manchester Victoria and York station are assumed to be delivered by other parties, and are not in TRU scope;
- A Depots, Stabling and Maintenance Facilities Strategy will be developed in conjunction with TRU by the TOCs and Rail North Partnership.
- Rail North Partnership (RNP) will be responsible for transacting any necessary rolling stock changes with franchisees;
- Off-core route works are not in scope;

30.7 In addition to the above, CDR v2.0 indicates that TRU should assume that no connection is provided on/off HS2 between Garforth and Ulleskelf. However, direction has been provided by the Department that Network Rail should make provision for such a connection. This has formed part of the development of SDO6, and will be reflected in the revised CDR. Further aligned development with NPR will be essential in this design.

Franchise Impacts

Overview

30.8 The Transpennine Route Upgrade will have a direct impact on rail franchises, in particular the TransPennine Express and Northern franchises. This will include impacts on the franchises during infrastructure delivery, such as requirements for blockades and diversionary services, as well as the impacts of introducing improved services once the infrastructure upgrades are completed. The process by which these impacts are managed is explored below.

Diversionary Strategy

30.9 The following outlines the initial considerations for Train Operating Companies, at the current stage of the scheme's lifecycle, as further option selection decisions are made greater clarity surrounding the construction requirements will allow for refinement of the diversionary strategy.

30.10 At this stage of scheme development, a remit has been issued by the DfT to Network Rail. The remit instructs Network Rail to investigate a cost effective plan that minimises disruption, while delivering the programme in a timely manner. Once the preferred option is selected, detailed design work can commence, and a detailed diversionary strategy will be produced to ensure the needs of passengers are met. Further to the remit issued to Network Rail, the Rail North Partnership has also investigated potential impacts on train operating companies during disruption.

30.11 One of the key considerations for Network Rail is the requirement for upgrade work in order to prepare diversionary routes for use when there are blockades in place on the main Transpennine route. Such expenditure has the potential to reduce delays during diversions. However, a balanced approach is required between the cost of enhancements on alternative routes, and reimbursement payments that will be required for extended delays should the enhancements not be implemented.

Possessions Planning

30.12 During the design phase for infrastructure works, it has been assumed that a 5 or 6-year programme of possessions will be required from 2020/2021 onwards. This could include several long blockades (of up to 12 weeks) each year, though the scale of possessions required is still subject to discussion between Network Rail and train operators. A more accurate picture will to develop over the next 12 months through the TRU Access and Planning Design Steering Group meetings.

30.13 The Franchise Agreements for both operators anticipates that a Franchise Change will be negotiated for the TRU project. As a result, the franchisees are anticipating that the long engineering blockades carried out as part of the TRU project will be captured by Change negotiations, and not limited to the schedule 4 payments used for short term possessions.

Rolling Stock Requirements

30.14 Another aspect of the possession plan relevant to franchise change is the revised train plan that would operate, and the potential requirement for additional rolling stock to maintain capacity as a result of extended journey times.

30.15 Informal discussions with TransPennine Express suggests that 10-car-bi-mode operation is their preferred way of operating during blockades. This allows 2 trains an hour Leeds to Manchester Victoria, which would then split and head to Liverpool and Manchester Airport. At York these Split to form Newcastle/ Middlesbrough and Edinburgh/Scarborough services.

30.16 The 10-car-bi-mode options maintains capacity and ORCATS - allocated passenger revenue during the disruptive possessions. However, this option requires a number of additional Class 802s to allow multiple working between York and Manchester Victoria. It would effectively mean that the loco-hauled sets are not used for Leeds/ Manchester Journeys during possessions, as they cannot operate in multiple. An alternative plan could involve a shuttle service that maintains frequency but not through connectivity, this approach would reduce the risk of delayed services transferring delays to the wider network.

30.17 An initial assessment has been made in conjunction with the operators, through RNP's work on the depot and stabling strategy. The table below shows the number of units required for each line of route within the ITSS (for the purposes of modelling only) and compares the total number of units with the December 2019 timetable plan.

1.1: Table Showing the Unit Requirements of Services in the ITSS.

Express Services	Calls	Units
Man Airport - Middlesbrough	Fast	6
Man Airport - Newcastle	Fast	6
Liverpool - Edinburgh	Fast	10
Liverpool - Scarborough	Fast	6
Manchester Picc - Hull	Semi	5
Manchester Picc - Hull	Semi	5
Maintenance Spares		6
Total express units		44
Current express units on order to support Dec 2019 TT		32
Additional express units to procure		12

30.18 The rolling stock presented above is derived from a practical standpoint of the anticipated investment strategy to maximise utilisation of new infrastructure during

operation. Within the commercial case the most likely commercial decisions and implications are presented, further discussion of the rolling stock assumptions is provided below. These are subject to a further detailed rolling stock strategy which will follow the OBC decision to proceed.

30.19 Fast services are anticipated to use Hitachi Class 802 bi-mode stock, with the possibility of 7-car[8] sets created through extending the 5-car set already ordered for use from December 2019. One of the benefits of extending the order for bi-mode rolling stock is that it could be used for journeys routed to and from Middlesbrough or Scarborough whilst still providing journey time benefits on the upgraded Transpennine route.

30.20 However, with First Group having also ordering 13 sets of 5-car Locomotive Hauled Coaching Stock, there is flexibility as to how these express services are resourced.

30.21 For stopping services there is more flexibility as to how the services could be resourced. The choice of whether the route is electrified or not has an implication both on rolling stock procurement and timetable performance.

30.22 Electric multiple units are likely to be readily available in the relevant timeframe, with options available to extend Northern's Class 331 CAF order if required.

30.23 If the route is not electrified, diesel rolling stock with performance characteristics at least as good as Class 185s is expected to be required for the stopping services. These are expected to be available as some Class 185s would be replaced on Manchester to Hull services.

30.24 However, platform capacity at Leeds in particular may limit the train length for these services and Class 195s (as an addition to Northern's order) may need to be used in 5-car formations. The long term availability of diesel rolling stock may be limited by emissions standards and the desire to move to more environmentally-friendly fuels.

30.25 The table below summarises the rolling stock requirements for stopping service as stated in the ITSS.

Table 1.2: Requirements for Rolling along the Transpennine Route

Stopping Services	Calls	Units	Vehicles Required
Leeds to York	Stopping	4x 4 car	16
Leeds to Selby	Stopping	5x 4 car	20
Leeds to Manchester	Stopping	9x 5 car	45
Maintenance spares		4	18
Total suburban units		22	99 vehicles

30.26 Further work to assess the right balance of rolling stock investment and service provision should continue once more information is available about construction programme and final infrastructure scenario is confirmed.

30.27 Further detailed development of a rolling stock strategy is required. This will set out the key issues, choices and opportunities. Analysis by Steer for the Department indicates that at the very minimum a small number of new trains will be needed to provide the increased express and local services that the TRU infrastructure allows - whilst retaining all existing stock. This minimum addition to existing stock would involve circa 8 new trains at around [redacted]

[8] The procurement of 7-car sets is a commercial consideration, which will be progressed via negotiation between TransPennine Express and the Rail North Partnership. This is a separate consideration from the economic case for TRU, which has been assessed on the basis of using 5-car units, reflecting the current contract with Hitachi. Benefits and costs of introducing 7-car sets do not form part of the economic case for TRU.

[redacted]. However, to optimise usage of new electrified express sections and local services (and performance benefits) would require a more detailed review of existing leasing arrangements such as local DMUs replaced with EMUs and Class 185s replaced with Class 802s. The rolling stock strategy will also assess choices and costs of digital rail fitment options.

Managing Franchise Change

30.28 DfT has agreed that Network Rail will take a larger role in the pre-submission phase of franchise competitions. Part of this relationship is the integration of Network Rail staff within the DfTs franchise letting teams. This ongoing collaboration will ensure that franchise specifications are consistent with Network Rail's plans, making best use of available capacity, providing reliable timetables and ultimately providing benefits to passengers.

30.29 The Franchise Agreement for both TransPennine Express and Northern requires the operator to co-operate with Network Rail and the franchising authority in developing the 'North TransPennine Upgrade' – i.e. TRU. It states that any resulting change in train service specification will be a franchise change.

Key Interdependencies

30.30 TRU is one of three key programmes to upgrade rail in the north, within the existing North of England Programme:

- Northern Hub – a range of infrastructure upgrades to provide additional capacity, new connectivity and faster journey times on corridors to and through Manchester;
- North West Electrification; and
- Transpennine Route Upgrade

30.31 The first two of these are at a more advanced stage than TRU, with key elements already approved and delivered.

30.32 A key issue now for TRU is to link with wider development of Northern Powerhouse Rail (NPR) in a strategic alignment across the intervention phases.

30.33 The DfT, as a client for all these programmes, undertakes a key co-ordination role. The North of England programme is led by the DfT Network Services Directorate and close working is already underway to ensure future design and decsions are aligned with NPR.

30.34 The key decision points following BICC will be the Full Business Case stage where design of interventions will need to ensure alignment with other programmes across the north.

30.35 The key fora to monitor the design development are the client design meetings with NR which meet monthly and the North of England Programme Boards which meet every 6 weeks and the One Rail Programme Boards. The FBC will itself be cleared by BICC (or a BICC nominated delegated process).

30.36 The Diversionary Strategy, Possessions Planning, Rolling Stock Requirements and Managing Franchise Change will draw on key input and expertise from TfN/RnP/DfT Passenger Services, the franchises, NR and client DfT. Resourcing for these is envisgaed to be drawn from the design funding element of the NR funds provided

post-OBC and will also be resourced from existing resources within DfT and TfN/RnP.

30.37 The assumed governance for TRU is to move to FBC after OBC, with updates as agreed to BICC and/or delegated boards. If an alternative governance approach is adopted this would be subject to agreement by BICC.

31. Procurement and Contracting

Sourcing Options

31.1 Infrastructure enhancement works will be delivered by NR who will define the contractual arrangements required for each scheme.

31.2 The Department has made provisional allocation of funding for TRU in CP6, from DfT funds. Alternative funding sources have not been considered by either the Department or NR and would be the subject of further assessment for FBC. However, further exploration of this option for TRU would likely incur significant delays to delivery timescales and have not so far been considered.

31.3 Delivery of the new train services and benefits to customers will be enabled through the franchises and details are set out in this business case.

Procurement Strategy

31.4 Infrastructure enhancements will be managed through the extant CP5 process as refined by the Hendy and Bowe reviews and in line with the DfT and NR MOU signed in March 20169.

31.5 Delivery of rail infrastructure enhancements is the responsibility of NR and its sub-contractors whilst rolling stock procurement will be delivered through the franchises.

31.6 NR Sponsor teams will deliver the required enhancements through the NR Infrastructure Projects team and through further contractual arrangements as required. Contractual arrangements will be developed on a scheme by scheme basis by NR and are subject to NR's governance processes.

Risk Allocation and Transfer

31.7 Risks to the programme will be managed between the programme team, franchise competition team and NR as appropriate. Ultimately the Department will continue to hold the reputational and cost risks of services, franchising and infrastructure issues irrespective of who is best placed to manage those risks.

31.8 NR will manage the delivery risks. Risks relating to the interface with other strategic rail priorities are discussed and managed through the DfT North of England Programme Board and programme outcomes will be managed via the relevant DfT governance and management arrangements.

[9] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/509545/mou-dft-network-rail-rail-enhancements.pdf dated March 2016

31.9 Technical and commercial risks relating to the delivery of the infrastructure enhancements will mostly be held and managed by NR. Significant risks will be reviewed through the North of England Programme Board.

31.10 NR will seek to transfer technical and delivery risks to its contractors where possible incentivising contracts to minimise cost, schedule and quality risks.

Rail North Partnership

31.11 In addition to core DfT functions detailed above, DfT also has a role to play as part of the Rail North Partnership, alongside Transport for the North.

31.12 The Rail North Partnership (RNP) is responsible for managing the delivery of passenger services in the North, through management of Northern and TransPennine Express. All commercial discussions are led by RNP and overseen by the Rail North Partnership Board

Personnel Management and Resourcing Planning

31.13 The delivery of TRU will have limited implications for personnel management within the TRU organisation itself. There is greater potential for personnel management implications at a franchise level, and these are detailed below.

Human Resourcing

31.14 Additional train crew are likely to be required to support increased train frequency as set out in the indicative Train Service Specification. There may also be a need for additional station staff where facilities are changing; for example, to include lifts or booking offices where these are not currently in operation.

31.15 In addition to increases in operational staff, further maintenance staff will be needed to service additional Overhead Line Equipment. New technologies such as ETCS will also require additional training schedules are in place ensure maintenance and operation of assets is consistent with best practice.

31.16 To ensure there are adequate staff in place to support an increase in train services, franchise change negotiations should allow adequate time for staff training. It takes approximately 12 months from the start of the recruitment process to a fully qualified train drive; for conductors and station staff it is between 4 and 6 months.

31.17 Additional staff and training costs have been accounted for in the Financial Case.

People Management

31.18 In proportion to the number of additional train crew, extra management staff would be required to support head office functions.

31.19 An additional requirement could include the need for TOC-side staff supporting digital signalling technology; both for control and rolling stock functions. Associated risks would be manged by the TOCs and would need to be incorporated into any franchise change or franchise re-letting process.

Trade Union Implications

31.20 The requirement for additional driver training (for both new rolling stock and digital technology) involves Trade Unions, who sign off the requisite training material. Any

failure to agree on the process has the potential to materially delay the introduction of new services.

31.21 These risks are being managed by train operators for the existing franchises for the introduction of new-build rolling stock. This would be similarly manged through the procurement of extra services through TRU.

TUPE Regulations

31.22 At this stage no transfer of staff between train operators is envisaged as part of TRU. Therefore, no TUPE issues are anticipated at this stage.

Resourcing of Key TRU Strategies

31.23 There are key areas highlighted as requiring delivery strategies once a preferred option is selected and these will need to be addressed in detail in the next phase of development where the preferred option is designed in detail.

- a rolling stock strategy to understand the choices around rolling stock and cost implications on the franchises;
- already under way a depots strategy for the whole of the North of England;
- understand the implications including cost impacts to passenger and freight operations of Digital Rail;
- an access/possessions/diversionary strategy and plan and choices, including feedback into rolling stock requirements to provide an optimised industry solution (for example building the Ravensthorpe four-tracking in stages whilst keeping the classic alignment open)
- further assessment of future proofing of the preferred option intervention, ie lowering track-beds and extra land take, to understand the cost implications and potential for cost sharing with NPR.

31.24 The project teams for these activities will be drawn from the client, TfN/RNP, NR and franchises. For DfT and TfN/RNP the resourcing will be drawn from the existing team capacity, for example NSD/Major Projects. And for the TfN/RNP the resourcing will be drawn from Passenger Services activities. There will also be franchise involvement in design activity alongside NR/DfT/TfN/RNP, which will draw on NR design resources to fund. Overall, these activities will be funded from base/core overhead resources and NR project funding already assessed as part of requested budget provision.

Risk Allocation and Transfer

31.25 Risks to the programme will be managed between the programme team and NR as appropriate. Ultimately the Department will continue to hold the reputational and cost risks of services, franchising and infrastructure issues irrespective of who is best placed to manage those risks. The approach to management of risk in the programme is set out Management Case.

31.26 NR will manage the delivery risks. Risks relating to the interface with other strategic rail priorities will be managed via the relevant DfT governance and management arrangements.

31.27 Technical and commercial risks relating to the delivery of the infrastructure enhancements will mostly be held and managed by NR. Significant risks will be

reviewed through the North of England Programme Board. NR will seek to transfer technical and delivery risks to its contractors where possible incentivising contracts to minimise cost, schedule and quality risks

32. Appendix A - Network Rail – Procurement and Contracting

This appendix has been supplied by Network Rail and provides details on the procurement and contracting approach adopted by NR to date and the default to be adopted for delivery of TRU.

Overview

A.1 The existing approach to procurement for the TRU programme as a whole is two-fold: in the first instance, the Department for Transport has procured Network Rail to lead the development of the TRU programme and its subsequent delivery. Then, Network Rail has procured alliances and partners in order to support the development and delivery of the infrastructure works themselves. This is detailed in the remainder of this section.

Procurement of Network Rail

Approach to Procurement

A.2 Network Rail has sought to learn lessons from previous upgrade programmes. The lessons learned have been used to change the operation and governance approach undertaken in enhancement delivery works. This change in approach to delivery has been embedded within the TRU organisation, and can be characterised by the five working principles of TRU:

- Promotion of a culture of openness and honesty about problems, which learns from mistakes, and in which there should be no surprises;
- Always looks for win-win situations with customers, stakeholders, and those affected by the programme;
- Collaborative working with partners, not suppliers, to create and maintain a fully integrated and engaged Programme team;
- Commitment to continuously improve in all areas of work; and,
- Making the best decisions for the Programme, not what may be best solely for a constituent sub-programme (East of Leeds, West of Leeds, etc.).

A.3 Within Network Rail the Infrastructure Projects (IP) team coordinates the delivery of infrastructure upgrades. IP is bound by the Network Rail Contract and Procurement Policy. Compliance with this policy is mandatory for all Network Rail staff including all subsidiaries, Network Rail Alliances, and employees of companies acting on behalf of Network Rail.

Value for money

A.4 The Infrastructure Projects Northern Programmes (IPNP) team was specifically created to deliver enhancements within the North of England, with TRU as one of its constituent programmes.

A.5 By having IP as its main delivery arm, Network Rail ensures that large, complex and high risk projects are delivered by a competent infrastructure delivery organisation. It balances the appropriate level of risk control and project complexity with cost effective delivery. It does this by allowing internal resources and systems to be used in the most cost effective way.

A.6 In addition, through IP being the technical authority for Network Rail on cost planning, commercial strategy and delivery, it is able to provide an expert service, set policy, and provide assurance and governance on capital delivery to the Board and Executive Committee.

A.7 Through management of the cost plan, assured and peer reviewed by Network Rail specialists, high cost items are explored and assessed for betterment. The value management process is embedded within the cost plan delivery, targeting cost reductions during the development stage.

A.8 IP with alliancing constitutes considerable sector knowledge. IP has established collaboration events and behavioural management processes in order to open the programme up to opportunities to continuously develop its staff. This continuous development of staff offers clear time related benefits throughout the programme.

Network Rail Procurement Strategy

Sourcing Options

A.9 One of the core components of the delivery strategy of TRU is the utilisation of alliance partners. The rationale for selecting alliance partners was to bring together the necessary expertise to design and deliver this multi-disciplinary route upgrade programme of works, ensuring continuity and ownership of all elements from design through to construction, whilst meeting the challenging timescales for the Programme. The alliance vehicle allows NR to incentivise delivery of outcomes, de-risk the development through Early Contractor Involvement (ECI) and transfer ownership of risk to those best place to manage it. This approach ensures that collaboration is a key component of the project delivery process. The alliance groups have been created to provide technical advice and have thus shaped the proposed infrastructure interventions.

A.10 An alliance creates a ‘virtual’ organisation by bringing parties together and agreeing to act in a certain way to achieve a common goal. The aim of this is to drive efficiencies whereby the alliance outputs exceed those that could be achieved by organisations acting individually.

A.11 The alliance structure is the basis of a strong ECI process. Continued use of the alliance framework will ensure a consistent knowledge base throughout the delivery process.

A.12 This approach is informed by lessons learned from other programmes, and industry best practice for efficient project delivery. It ensures a consistent project delivery team can work through engineering design and implementation challenges.

A.13 The alliance partners on the TRU programme originate from a broad spectrum of construction industry participant clients, contractors and consultancies. It is therefore able to provide the full range of pre- and post-contract commercial services experience for the delivery of construction projects within a regulated public sector environment.

A.14 The goals and behaviours of the alliance are contained in the Alliance Charter by way of a Mission Statement and Alliance Principles which describe the behaviours required of the participants. The Contract contains further obligations for the Participants to perform the works in accordance with the Charter and to review and amend the Charter during the course of the Works.

A.15 The inclusion of Network Rail within the alliances as Owner Participant creates efficiencies and promotes value for money in a number of ways including:

- Providing knowledge and expertise in regulatory, governance and rail construction requirements ensuring that alliance outputs are suitable for their purpose in both content and timescale, therefore increasing the capability of the alliance to produce 'right first time' documentation; and,
- Gaining a first-hand knowledge of Contractor processes and systems by working within the alliance as work progresses which leads to a more in depth understanding of the alliance outputs and reduces the time and resource needed for assurance functions.

A.16 The alliance vehicle allows Network Rail to incentivise delivery of outcomes, de-risk the development through ECI and transfer ownership of risk to those best placed to manage it. This approach ensures that collaboration is a key component of the project delivery process.

Strategy Overview

A.17 The Network Rail Board approved the TRU programme procurement strategy in December 2015. This covers the entire TRU delivery structure, including East of Leeds and West of Leeds Alliances, Leeds Central, and Digital Train Control. Approval was also given for a suite of contracts and frameworks to procure the services of a programme engineering delivery partner and a commercial delivery partner.

A.18 TRU engaged early with its delivery partners and agreed the terms and conditions for an Alliance Development Agreement (ADA) and Project Alliance Agreement for East of Leeds and Pure Alliance Agreement for West of Leeds.[10] The Alliances develop solutions for the programme to verify and validate, for business planning purposes, before moving into a detailed design and delivery phase.

A.19 The Alliance vehicles are defined structures that works can be contracted under, allowing the Programme to decide what commitment it wishes to make with the Alliances and when it wishes to do this. It also ensures consistency and contractual continuity from development through to delivery of output capacity, and finally the release of benefits.

A.20 Leeds Station Capacity is being delivered through a 'hub and spoke' arrangement, with IPNP acting as the hub to align the spokes of signalling, track and infrastructure works. A hub and spoke arrangement has been developed for Leeds Station due to

[10] Need some kind of summary of why these approaches are different and what it means

this specified intervention having been scoped in advance of the establishment of the TRU alliancing vehicles and the required delivery timescales.

A.21 A competitive tender for the building and civils works has been concluded. Value and capability has been secured by utilising the IP Track Switches and Crossings Alliance, which will remodel the station track layout, and IP Signalling Framework who have competitively tendered the delivery of Re-control and Re-lock of the station. All three contract agreements will sign up to an overarching collaborative agreement to align staging and access strategies, whilst maintaining operational capacity at the station.

A.22 A fourth sub-programme, Digital Train Control, has been established to focus on the development of European Train Control System (ETCS) and Traffic Management solutions for TRU. Network Rail Programme Board is currently considering a procurement strategy for the selection of a partner to deliver ETCS capability for TRU. Lessons learned from past European digital deployments, in particular Denmark, show the benefits of starting business change scoping activates early in project development. As the TRU DTC Business Change programme develops, so its input to and relationship with the DfT System Integration work-stream, undertaken by IP NP, will be understood.

A.23 Procurement of Traffic Management will be a part of the Digital Railway Programme's national framework. This framework is currently in development, but also aspires to procure on an outcome based industry approach, rather than on a project-by-project basis. This will reduce the risk associated with parallel Traffic Management procurement exercises, in addition to interface issues between the national Digital Railway Programme, and the routes and suppliers.

A.24 The procurement of the two alliances to deliver pre-construction works means that services such as design, surveys, statistics, cost planning, constructability, access and programming have benefitted from Early Contractor Involvement (ECI), allowing for an industry-wide TRU submission.

A.25 The TRU procurement strategy represents a robust process that affords confidence that the final outturn cost of TRU will align to the estimates presented in the Financial case.

Capability and Skills

A.26 Several organisations have key roles in the delivery of the TRU Programme. The combined capabilities and skills complement each to deliver the upgrade programme in the most efficient way. Figure 33.1.1 demonstrates the linkages between these organisations, and each organisation's capabilities and skills are detailed below.

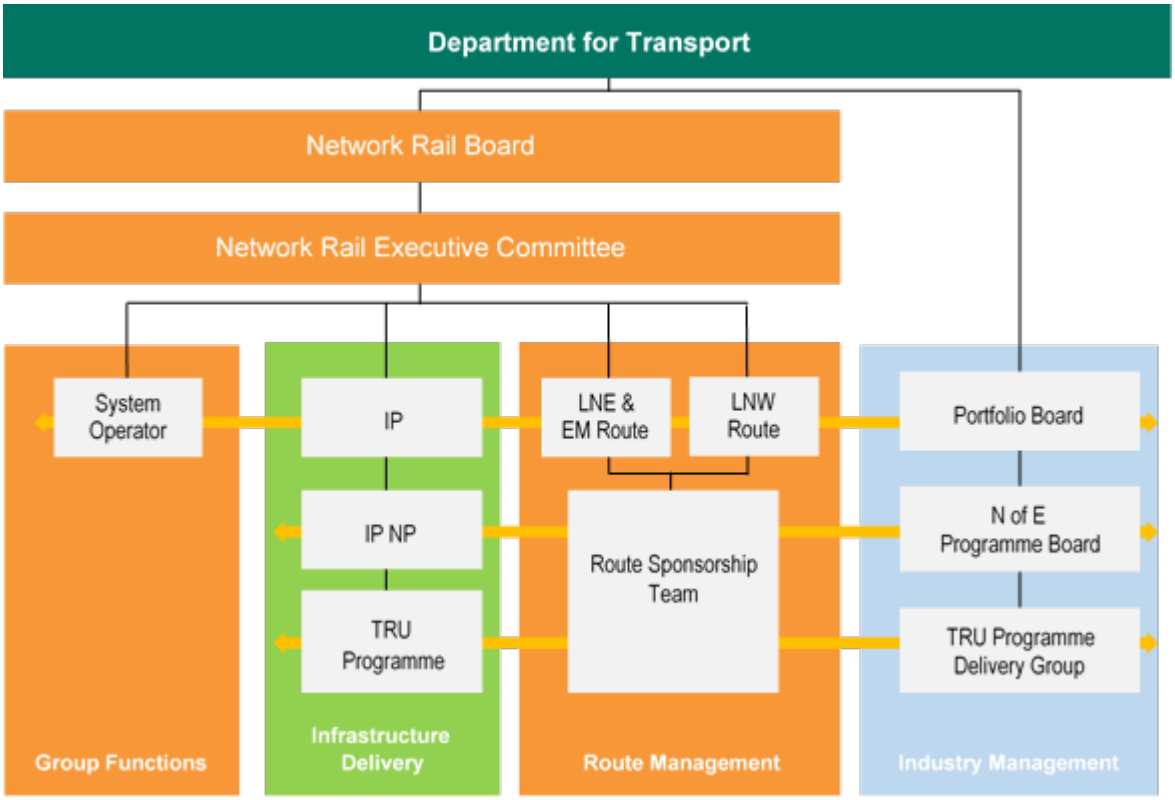


Figure 33.1 Organisations delivering the Transpennine Route Upgrade

Network Rail (Infrastructure Projects)

A.27 The Commercial Discipline within Infrastructure Projects encompasses 4 distinct areas of expertise, namely Cost Planning, Commercial Management, Claims Management and Collaboration. The Commercial vision is to develop and deploy effective People, Process & Systems supported by an assurance and governance regime to establish and maintain an industry leading commercial services culture and capability that:

- Demonstrates industry leadership in the pursuit of deeper and more effective collaboration;
- Drives progressive supply chain engagement, collaboration and improved supplier performance, bringing tangible and sustainable value to industry and the taxpayer;
- Develops its capability in the commercial stewardship of infrastructure investment such that it can better influence and predict what rail work 'will cost', and are effective in managing commercial risks and liabilities, and can demonstrate what works 'did cost' and 'why';

- Drives an improved benchmarking capability to illustrate what rail works ‘should cost’ and ‘why’ so as to better inform investment decisions and the pursuit of value for money and targeted efficiencies;
- Drives Industry change, such that new and progressive commercial techniques are adopted and become business as usual across the rail supply chain, embedding structured continuous improvement for all;
- Drives improved stakeholder confidence in Network rails capability to predict and influence cost and drive efficient, value for money investment in rail infrastructure in a sustainable way; and
- Is recognised by industry as progressive and active in driving industry change.

A.28 Network Rail’s Commercial Discipline is continuing to drive industry change through collaboration, cross industry engagement and improved communication of its commercial and delivery expectations around behaviours and performance, as measured via national performance metrics. In addition, reinforcing standardised approaches to measurement to improve cost control, efficiency and benchmarking and support a culture of commercial accountability.

TRU

A.29 The TRU commercial structure has been sized to reflect the complexity of the programme and its delivery timescales. Commercial programme support is provided by various commercial teams within TRU. These teams operate at a sub-programme level, including:

A.30 Network Rail’s Hub and Spoke arrangement for the Leeds Station sub-programme

- A similar Hub and Spoke arrangement for the IPNP Digital Train Control sub-programme; and,
- Within the two alliances - set up to deliver infrastructure programmes East of Leeds and West of Leeds.

A.31 Each commercial team is led by a Senior Commercial Manager. The programme is working with a commercial delivery partner to compliment Network Rail’s capability and skills, ensuring that specialist resources are available.

TRU PMO

A.32 The Programme Management Office (PMO) has been created to assist the delivery of the TRU programme. It runs in parallel with the delivery programmes to provide assurance processing and governance as well as strategy development for the TRU programme.

A.33 The Commercial function of the PMO provides specialist support to ensure the TRU Organisation has the commercial management capability and resource required to successfully oversee the design and construction stages of the TRU Programme. The commercial function is responsible for all strategic management as well as assurance of Commercial, Procurement, Investment and Estimating activities on the TRU programme.

A.34 The process of developing how requirements are received into the Programme through the PMO, and how the commercial and contractual relationship between all Programme functions is managed, is discussed further in the Management Case.

A.35 The commercial and contractual relationships are set out in three key documents:

- The PMO handbook;
- The Owners Representative Handbook; and,
- The Alliances Governance Handbook.

A.36 These documents contain the process and governance structure for relaying requirements from the DfT through Network Rail to the relevant delivery partner. This can be summarised as follows:

- The PMO client services team receive instruction from the Network Rail sponsor team; then,
- The PMO makes recommendations to the Programme Leadership Team (PLT):
  - For work instruction within the Alliance frameworks, agreement and contractual direction is agreed between the Owners Representative and PLT; or,
  - For work outside of the Alliance frameworks, the Route Delivery Director is empowered to act as the Employers Representative.

A.37 This hierarchy also works in reverse, whereby an Alliance or contract vehicle can request clarification or direction on significant scope items.

A.38 The Owners Representative draws on the expertise in the PMO functions to establish the specific requirements for contracting with the Alliances. These requirements are verified and validated by the PMO prior to issue. Subsequently, the expertise in the PMO verifies and validates the Alliance proposals, ensuring they meet the requirements of the programme, before a formal contract instruction is issued by the Owners Representative for the Alliance to proceed.

A.39 This process is assured at regular intervals by Network Rail via Programme Peer Review and the Tender Vet process.

Transpire (West of Leeds Alliance)

A.40 The Transpire Alliance is contracted to deliver infrastructure works for the TRU programme west of Leeds. It consists of three participants in addition to Network Rail, these are:

- Amey;
- Arup; and,
- BAM.

A.41 Within Transpire, a commercial team has been set up to aid the successful delivery of the alliance objectives. Specific work streams that the commercial team aids include:

- Cost Management;
- Procurement and Contract Management;
- Change Management; and,
- Risk Management.

A.42 The alliance commercial team works with external stakeholders to transfer programme information and aid the efficient working of Transpire. As such, the commercial team oversees the implementation of communication, document control, and training.

TRUe (East of Leeds Alliance)

A.43 The TRUe alliance consists of three contracted parties partnered to deliver infrastructure works for the TRU programme east of Leeds. The three alliance members in addition to Network Rail are:

- Siemens;
- Volker Rail; and,
- J Murphy & Sons.

A.44 To ensure that the TRUe alliance delivers in an efficient manner, a commercial support service has been developed. It pro-actively leads a cost management function with estimating and procurement activities, as well as broader commercial services

A.45 The commercial team oversee the TRUe alliance providing support to each of its internal disciplines. As well as external stakeholders, the commercial team discharge the following functions:

- Commercial Management;
- Quantity Surveying;
- Production Management; and,
- Estimating and Estimating Governance.

A.46 In addition to its commercial support services, the TRUe commercial team also support and lead the safety and welling of those within TRUe.

A.47 The TRUe commercial team produce rolling forecasts that help all parties within the Alliance manage costs. Through lessons learned, the commercial team are now focused on a delivery led structure, with fixed points of contact for each commercial deliverable.

Risk Allocation

A.48 Risks associated with undertaking the works in each sectional award under the alliance agreements are held by the alliance (Alliance Risk) to the extent that it does not trigger other provisions in the contract. The Sectional Target Cost is not subject to escalation and is deemed to be inclusive of all cost, overhead, profit and risk/contingencies and may only be adjusted by the occurrence of an Adjustment Event. An Adjustment Event includes:

- A scope variation;
- A change to statutory requirement;
- A breach or default by the owner; or,
- Any event or circumstance expressly referred to as an Adjustment Event in the Adjustment Event Guidelines.

A.49 Scope variations are intended to cover significant changes and amendments to the scope of the works or the fundamental requirements of the works with less significant occurrences falling under the Alliance Risk. The contract provides a mechanism for clarifying this allocation of risk by requiring the production of Scope Variation Benchmarking Guidelines by the Alliance. This acts as part of a project proposal

which provides examples of directions by the Owners Representative to assist in determining whether scope variations have occurred. The guidelines are agreed by the owner as part of the project proposal evaluation process, so that both the owner and alliance have a self-generated common understanding of change risk.

A.50 Owner retained risk for items such as adjustment events will be assessed and held by the programme for each tranche.

Financial Structure

A.51 The payment approach that will be adopted is a target cost mechanism whereby a 'Sectional Target Cost' is agreed between the owner and the alliance as part of an Alliance Project Proposal submission and owner review.

A.52 The target cost will be established from rates cards and fixed fee percentages for overhead and profit that were secured through the competitive procurement for each of the alliances. Risk will also form part of the alliance target cost.

A.53 The contractor's entitlement to payment during the course of the works includes:

- Reimbursable costs actually and properly incurred;
- Fee which consists of a lump sum overhead and profit and risk overhead and profit; and,
- Pain / gain share under the risk / reward regime.

A.54 The commercial incentive model in each alliance agreement incorporates a risk and reward regime. The process involves both owner and alliance taking equal share of the difference between actual costs and agreed target cost. A further 'Performance Reward Amount' incentive may be introduced into any particular section. This can be applied where performance exceeds stretch performance targets in specified Key Result Areas (KRAs). The resulting 'Performance Modifiers' shall be used in the risk / reward regime to calculate any modification to the section gain-share or section pain-share.

Personnel Management

A.55 The delivery of TRU will have limited implications for personnel management within the TRU organisation itself. There is greater potential for personnel management implications at a franchise level, and these are detailed below.

Human Resourcing

A.56 Additional train crew are likely to be required to support increased train frequency as set out in the indicative Train Service Specification. There may also be a need for additional station staff where facilities are changing; for example, to include lifts or booking offices where these are not currently in operation.

A.57 In addition to increases in operational staff, further maintenance staff will be needed to service additional Overhead Line Equipment. New technologies such as ETCS will also require additional training schedules are in place ensure maintenance and operation of assets is consistent with best practice.

A.58 To ensure there are adequate staff in place to support an increase in train services, franchise change negotiations should allow adequate time for staff training. It takes

approximately 12 months from the start of the recruitment process to a fully qualified train drive; for conductors and station staff it is between 4 and 6 months.

A.59 Additional staff and training costs have been accounted for in the Financial Case.

People Management

A.60 In proportion to the number of additional train crew, extra management staff would be required to support head office functions.

A.61 An additional requirement could include the need for TOC-side staff supporting digital signalling technology; both for control and rolling stock functions. Associated risks would be manged by the TOCs and would need to be incorporated into any franchise change or franchise re-letting process.

Trade Union Implications

A.62 The requirement for additional driver training (for both new rolling stock and digital technology) involves Trade Unions, who sign off the requisite training material. Any failure to agree on the process has the potential to materially delay the introduction of new services.

A.63 These risks are being managed by train operators for the existing franchises for the introduction of new-build rolling stock. This would be similarly manged through the procurement of extra services through TRU.

TUPE Regulations

A.64 At this stage no transfer of staff between train operators is envisaged as part of TRU. Therefore, no TUPE issues are anticipated at this stage. Contract Management

Overview

A.65 The choice of alliancing as the structure for the delivery of TRU has specific implications with regards to contract management, and these are outlined in this section. In general, the choice of alliancing as a delivery structure is intended to reduce risk and complexity in contracting, by bringing together delivery partners at an early stage of development, and thereby ensuring that scope is well understood by all parties and contracts can thus be agreed efficiently and with minimal risk.

A.66 This section details the key aspects pertinent to contract management, including the structure and length of contracts, timescales, key performance indicators, as well as payment mechanisms and performance management.

Assurance

A.67 As part of Network Rail's drive for 'Value for Money' outcomes through the pursuit of commercial excellence and "One Vision, One Way", the IP commercial profession has sought to capture and consolidate all of the best practice and templates from across the business into a Commercial Practitioner's Handbook. The aim of the handbook is to support and inform all bands and roles within the commercial profession of the latest processes and practices.

A.68 Network Rail has also developed a Commercial Management Plan, the aim of which is to outline how the processes laid out in the IP Commercial Practitioner's Handbook

are reflected within an Alliance environment, specifically the roles and responsibilities of Network Rail staff. Network Rail has not mandated that the Alliances should comply verbatim with the IP handbook, but has encouraged that the processes and procedure of the Alliances are laid out within their respective 'Governance Handbooks'.

A.69 Network Rail shall utilise the Commercial Management Plan as the basis of any Assurance Audits.

Contract Structure

A.70 Network Rail is currently engaging with both alliances to understand what the most appropriate contractual mechanism is, and the corresponding risk allocation. The outputs of this engagement will determine whether any contracting will be on either:

- a defined scope of works basis, whereby contracts align with specific deliverables (such as the construction of bridges); or,
- on an outputs basis, whereby contracts align to the DfT's strategic outputs (such as reductions in delay minutes).

A.71 A number of contracting scenarios to deliver TRU have been identified, alongside their associated risk allocation (see Risk Allocation section below) between owner and contractor.

A.72 Discussions between the DfT and Network Rail over the optimal contracting strategy for TRU are ongoing, and will be finalised in advance of the Full Business Case submission. The current intention is to agree a long term series of interventions, with priority being given to those interventions that deliver the greatest return at the lowest cost, and that can be delivered in the next control period (CP6).

A.73 For the purposes of contracting, each intervention will be packaged into a series of tranches; each tranche will provide a standalone output capability to enable the release of benefits.[11]

A.74 To support the establishment of optimal contracting arrangements, TRU has selected a Commercial Delivery Partner to support the commercial management function, specifically with regards to estimating and providing support to the Owners Representative.

A.75 Scope and contract change is being managed with the DfT through Network Rail's Portfolio Board and North of England Programme Board. Change is communicated via the Principle Programme Sponsor to the Client Services team in the PMO and recorded through the IPNP Programme Change Panel with escalation to Strategic Change panel where required.

Contract Length

A.76 Sectional awards to the alliances will be instructed for the delivery of outcomes as detailed in the requirements for each tranche.

[11] Further detail of the tranching strategy for TRU is provided in the Management Case.

A.77 The Owners Representative, with support from the PMO, will produce a Request for Estimate (RFE) and Section Development Notices (SDNs) for each of the respective alliances, for each development and delivery tranche.

A.78 Each RFE & SDN will set out the owners Value for Money (VfM) requirements incorporating the technical requirements outlined in the intervention Client Requirements Document (iCRD). The VfM statement defines the project, advises on the DfT outputs and benefits as detailed in the CDR and sets out Network Rail required section capabilities along with the respective iCRD and acceptance criteria.

A.79 Each alliance, in response to an RFE or SDN, will provide a fully costed and scheduled proposal identifying how it will measure and satisfy the requirements articulated in the Owners VfM statement, ensuring that Value for Money outcomes are obtained and demonstrated to the stakeholders and key parties on an ongoing basis.

A.80 Once accepted by the Owners Representatives, the alliance proposals will determine the contract length for each section and will be for the full duration of the respective development or delivery section.

Programme Timescales

A.81 The programme timescales are detailed by GRIP stage below. Contracting will be based upon the decision point, with timescales following on from this.

	START
GRIP 3 – Option Selection	ONGOING
GRIP 4 – Single Option Development	ONGOING
GRIP 5 – Detailed Design	ONGOING
GRIP 6 – Construction & Entry into Service	DP
GRIP 7 & 8 – Handback & Close Out	DP + 4 Years

Programme Timescales

Key Performance Indicators

A.82 The Programme has established eight Key Results Areas (KRAs) designed to drive programme performance, minimum conditions of satisfaction, and stretch performance metrics around the following areas:

- People;
- Safety;
- Commercial/Finance;
- Delivery;
- Engineering;
- Stakeholder Engagement;
- Environment and Sustainability; and,
- Return on Investment.

A.83 Key Performance Indicators (KPIs) are set on a yearly basis and facilitate the realisation of the KRAs. These are being monitored at weekly control boards

throughout the development phase. Furthermore, achievement of the KPIs is embedded in the objectives for the programme personnel.

A.84 The alliance proposal for each delivery section is required to advise on how the KRAs are to be developed, managed and delivered through specific KPIs.

Payment Mechanisms and Incentives

A.85 The liability of pain to the alliances is capped at [redacted], which is fixed at the agreement of any Section Target Price for East of Leeds Alliance and is directly proportional to the actual costs incurred for the West of Leeds Alliance.

A.86 Interim payments to the alliances will be made by Network Rail on a rolling four-week cycle, with exposure capped for each sectional award in line with the commercial incentive model in the alliance agreement.

Performance Management and Reporting Arrangements

A.87 The programme shall continue to utilise the four-weekly Network Rail MBR reporting cycle and any necessary interface to Network Rail's Oracle accounting system.

A.88 A guiding principle of the alliance approach is a fully collaborative and 'no-blame' culture where all decisions must be made unanimously. Therefore, all alliance reporting is made to the Alliance Leadership Team (ALT). The ALT is made up of key individuals from all alliance participants, who hold an executive function. This reduces duplication and ensures improved communications between the participants.

A.89 This process is explained further in the Alliance Handbook, Owner Representatives Handbook, and PMO Governance Handbook.

A.90 The MBR process is supported through the alliances production of the Work Status Report.

A.91 Both alliances have appointed an independent auditor to review the information presented by the Alliance Management Team (which carries out management functions on behalf of the ALT), and to report this to the Alliance Leadership Team members.

33. Appendix B - Overview Client Programme Risk Management

A.92 Risk management is a key component of programme delivery across all organisations responsible for the TRU programme. At a programme-wide level, risk is allocated amongst the organisations as follows:

- DfT acts as system integrator, and holds risks that are associated with: Integration, Strategic and Economic changes;
- RNP is responsible for; Depots and stabling, franchising strategy, and procurement. RNP also holds risks associated with the integration of the franchises and the development and realisation of benefits of the TRU programme;
- Network Rail System Operator holds timetable planning and enactment risks;
- The TRU Organisation holds the strategic infrastructure delivery risk;
- The Alliances hold the Design and construction risk.
- The remainder of this section details the approach of each organisation to risk management.

Department for Transport

A.93 Risks and issues are managed in accordance with Department's risk management policy. The risk and issue management procedures for Rail Group are maintained by the Portfolio Office which provide standard tools and templates to ensure risks are managed consistently across Rail Group. Programme risks are captured and reported via the central risk register for Rail Group that is maintained on the Management Information System (MIS).

A.94 As the approach to risk management is in accordance with Rail Group Policy with major risks and issues overseen by the Network Services Board, a separate risk management strategy has not been produced.

A.95 Network Rail manage infrastructure delivery risk in accordance with their own risk management policy.

A.96 Risks relevant to the delivery of Northern and TransPennine Express services (and associated Franchise Changes) are managed by Rail North Partnership, who feed issues into DfT's Passenger Services risk register. On-going management of the franchise contracts, with regard to both passenger-facing and financial risks, is provided by the Rail North Partnership Board who meet on a monthly basis.

A.97 The current live risk register is presented in a separate document to the suite of OBC chapters.

34. Appendix C - NR Lessons Learned

This appendix has been supplied by Network Rail and provides details on lessons learned from previous projects.

Introduction

34.1 With a view to maximising the value for money of the programme, a process of industry learning has been undertaken in which the TRU organisation seeks to draw upon evidence of similar projects, and to measure programme performance against these.

34.2 The industry learning process has helped the TRU organisation implement several innovative initiatives and sustainable solutions, both in design and through its early interventions. This has reduced both costs and risks, thereby increasing the value for money of the TRU programme.

34.3 As part of this process, a dedicated team has captured a series of 'Lessons Learned' from other projects. This followed the National Audit Office (NAO)'s observation of Great Western Route Modernisation (GWRM) that "Network Rail should capture all of the learning from its experience of introducing both new technology and new ways of working on the Great Western infrastructure programme. It should use this to create more realistic plans for future projects, including the Midland Main Line and Transpennine [...] electrification schemes."

34.4 Lessons have been learned from across Network Rail's portfolio, but with a focus on the following schemes. These have been considered on the basis of their having been completed recently, as well as having scope and/or cost similar to TRU:

- Great Western Mainline (GWRM);
- Gospel Oak to Barking Electrification (GOBE);
- North Western Electrification Programme (NWEP); and,
- Great Northern Great Eastern Upgrade (GNGE).

34.5 A summary of the programme specific lessons learned are provided in Table 2.1

Table 2.1: Industry Learning – Issues and Actions

Area & Programme		Issues	Actions Taken on TRU Programme
Programme Structure	GOBE, NWEP	• No overarching programme covering all aspects of electrification (from design through to mains installation, registration, OLE for power, ATF, panning and snagging) leading to congested worksites during installation, as multiple activities get scheduled concurrently in the same possession. • Lack of coordination of interfacing projects: Lack of programme integration • Lack of coordination between infrastructure projects and the System Operator timetabling function, including both short and long term timetable planning. Leading to disruption for passengers during and post construction.	In line with the recommendations, TRU established a Programme Leadership Team (PLT) and Programme Management Office (PMO), comprising Network Rail and partner organisations. TRU is in close liaison with the System Operator - a full customer focused plan will be enacted which prioritises Route Communications, Route Planning, delivering work within possessions, and working closely with Train Operators.
Alliances	GOBE	• Contracting strategy and associated contract incentives need to be properly developed to promote the right behaviours of contractors that align with the objectives of the project	TRU acted upon that recommendation by creating two alliances – East of Leeds and West of Leeds. The use of Alliances is a new way of working with each alliance made up of several industry-leading organisations. These were brought into the programme earlier than on other projects in order to build relationships early.
Roles and Responsibiliti	GOBE, GNGE, CP5LL	• Lack of key people on the project who have appropriate “Big” project experience. Lack of clear definition of roles and responsibilities. Lack of competence to perform role	TRU addressed this by creating a clear set of structures, in particular the PLT and the role of the Principal Programme Sponsor. This means that TRU has clear channels of responsibility.
Document Management	GOBE	• Inconsistent document control led to delays in design which led to inefficiencies which impacted on construction resulting in the programme going over budget; • Poor documentation for health and safety resulting in hand backs being delayed for 2+ years	TRU took this on board and recognised that good document management is key to the success on any project. As part of TRU’s relationship with one of its partner organisations (Jacobs) it has a single source of document management– (ProjectWise), ensuing documents are categorised and stored in folders relevant to their purpose.

Culture and Behaviour	GOBE, NWEP	• Poor communication between senior management and project staff on key decisions; • Lack of agreed contracting strategy at the start of the project promoted the wrong behaviours and inefficient working; • Lack of clear decision-making process – too many people involved; Lack of opportunities to learn basic technical knowledge offered to new-starters; • Setting quantity targets drives the wrong behaviours and encourages 'cherry picking'	The programme has embraced a culture of collaboration – sharing ideas across our teams to help us to think about everyone at every step of our journey and achieve best practice for our own people.
Expert Panels / Assurance	GOBE, GNGE	• Early stage designs not undergoing a constructability review; • AFCs were immature and rushed which led to construction issues; • Evidence gathering for assurance process very slow; • Lack of understanding re evidence required for TSI assurance process	TRU has convened 'expert panels' as a key part of its internal assurance process. The panels typically comprise 20 colleagues from across the rail industry who reviewed specific proposals for interventions – or options – along the route. The outcome of these panels was independent assessment of ideas and plans, leading to ideas being challenged, improved, and either endorsed or (where deemed appropriate) rejected.
Sustainability	GWEP, NWEP	• Environmental issues were poorly understood and there was an inconsistent approach to managing environmental and consents discharges; • No dedicated environmental resource; • Lack of accountability; • Late discovery of creatures which led to objections to the scheme and escalating project costs; • Key suppliers shouldn't have been able to pick and choose materials – sustainable products should have been mandated; • TWAO process was uncoordinated and underestimated time required to complete	A sustainability lead sits within TRU's Programme Management Office and is responsible for social value and environment. The programme has made sustainability a Key Result Area (KRA) and built a sustainability strategy that incorporates the UN's sustainability goals and ensure TRU's Alliances have dedicated Environment Managers and Social Value Managers.

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