A66 Northern Trans-Pennine project

TR010062

4.1 Project Development Overview Report
Appendix 6 Highways England Business Case A66 Schemes

APFP Regulations 5(2)(q)

Planning Act 2008

Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

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Planning Act 2008

The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

A66 Northern Trans-Pennine project Development Consent Order 2022

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Appendix 6 Highways England Business Case A66 Schemes

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Highways England Business Case

A66 Schemes

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Document sign-off

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Table of Contents

2.1 Business strategy

The single departmental plan describes the Department for Transport's (DfT's) objectives for 2015 to 2020. These are:

- Boosting economic growth and opportunity;
- Building a One Nation Britain;
- Improving journeys; and
- Safe, secure and sustainable transport.

It is these objectives that are filtered down into national, regional and local policy for use when determining the need for and objectives of transport options.

Highways England is the government company tasked with the operation, maintenance and improvement of the Strategic Road Network (SRN) on behalf of DfT. The aims of Highways England are to ensure that the network is:

1. Safe and serviceable;
2. Accessible and integrated; and
3. Supporting economic growth with a modern and reliable road network that reduces delays, creates jobs, helps business and opens up new areas for development.

DfT's first Road Investment Strategy (RIS 1) covered investment in the SRN during the 2015 to 2020 road period which was the first step in a long-term programme to improve England's motorways and trunk roads. The outcome from RIS 1 was the definition of performance specifications, investment plans and a commitment to funding for a number of options where it was deemed most necessary. From this came the requirement for a programme of Strategic Studies to explore options to address some of key challenges identified. One of these studies was the Northern Trans-Pennine Study which comprises the identification of issues and potential interventions on the A69 and A66/A685 corridors. The results of the study are intended to inform investment decisions are made with regards to the second Road Investment Strategy (RIS 2) which covers the second road period of 2020 to 2025.

Transport for the North (TfN), has a vision for the North of England to be a dynamic area of economic growth which complements the London and South East economy and helps to rebalance and grow the national economy. TfN's Transport Strategy and Investment Plan identifies the improvement of North of England east-west road links as fundamental to the growth of the North of England economy, and the lack of Trans-Pennine connectivity has been identified as a major barrier to realise economic growth in the Northern Powerhouse Independent Economic Review (IER). Improvements to the A66/A685 and A69 will positively contribute towards the development of the Northern Powerhouse, which sets out a vision for 'improved east-west major road links to ensure more reliable journey times between major cities within the North' and 'effective road connections to the country's major ports in the North of England'.

Cumbria County Council and Tees Valley LEP are also in the process of undertaking studies to examine connectivity beyond the immediate A69 and A66/A685 corridors. East-west route connectivity is particularly critical for access to Teesport and Durham Tees Valley Airport, providing international connectivity and opening up logistics, freight, container market and aviation-related opportunities for businesses in the Tees Valley and to attract global investment. The route is also an important link for the chemicals and energy companies located at Wilton, and for a number of the Tees Valley's Enterprise Zones. There are currently key east-west links which are considered not to be of an acceptable standard for their strategic importance. These routes include the A66 and A69. East-west connectivity is also an important element in delivering elements of Cumbria's Strategic Economic Plan helping to deliver the economic benefits associated with major energy, nuclear and advanced manufacturing related development in the sub-region. There are also strong linkages with Scotland, and the need to improve cross border transport links and connectivity.

2.2 Drivers for change

2.2.1 Internal business drivers

The key internal business drivers relate to the objectives and resultant policies of national, regional and local bodies. These policies are centred around economic development and the use of transport schemes to facilitate this.

The **Highways England: Strategic Business Plan 2015-2020** recognises that the roads which make up the SRN are a key enabler of economic growth and prosperity. These factors are essential to quality of life. It states that 98% of UK manufacturers consider the condition of roads on the network to be critical to the potential success of a business. Highways England consider that in order to improve the capacity and performance of the network, it will be required to modernise the network. The **Highways England: Delivery Plan 2015-2020** builds on the Strategic Business Plan and provides detail on how the company intends to focus on supporting economic growth, a safe and serviceable network and an accessible and integrated network. The RIS is a key part of this. As previously mentioned, **RIS2** is a crucial internal business driver in order to secure funding for the second road period of 2020 to 2025.

The **Northern Powerhouse: One Agenda, One Economy, One North** – A Report on the Northern Transport Strategy, published in March 2015, identifies that the number, capacity and reliability of east-west road connections is seen as a constraint on the North of England economy. There is a requirement to tackle co-ordination issues in the north so that the whole of the north can be more than the sum of its parts and function as a single, globally significant economic area. The highways vision plan contains a number of aims and aspirations which are of direct relevance to this study, particularly:

- Improve the east-west major road links to ensure better and more reliable journey times between the major cities within the North;
- Ensure effective road connections to the country's major ports in the North of England; and
- Future roads investment in enhancements, maintenance and renewals are better planned between the different organisations.

The ambition for the North of England to be a dynamic area of economic growth which complements the London and South East economy and helps to rebalance and grow the national economy, encapsulated by the Northern Powerhouse Agenda, will benefit from improvements made to the A66 corridor. It is the importance of the A66 as a strategic east-west route which makes the strategic case for intervention, ensuring that the link does not constrain the future economic growth associated with the Northern Powerhouse agenda.

2.2.2 The **Northern Powerhouse Independent Economic Review (IER)**, published in June 2016, sets out a 'transformational' economic future for the North, in which there are substantial

improvements in the skills base, in innovation performance, and in transport connectivity, all which are projected to raise the growth rate of the North's productivity, GVA and employment markedly above past trends, helping to close the productivity and prosperity gap compared with the rest of England. By 2050, GVA is projected to be some 15% higher than a 'business as usual' projection - this means that in 2050, GVA is £97bn higher (in 2015 prices) in the 'transformational' scenario than in the 'business as usual' case. Productivity is some 4% higher and some 850,000 additional jobs are projected compared with 'business as usual' in 2050, and 1.56m more jobs than in 2015.

Achieving this transformation will require long-term improvements in the various drivers of productivity and output growth, including transport connectivity. The IER finds that poor transport links between key settlements are restricting access to centres of employment and reducing the attractiveness of areas for investment, thereby reducing the agglomeration effects, consequently limiting its potential productivity. Addressing transport issues will require "..a new and transformational approach to planning and implementing new transport infrastructure which will enable transformational growth", including targeted investment in new road infrastructure and enhanced global connectivity through ports and airports.

The **National Infrastructure Plan 2014** sets out that the government's aim is to create a national road network fit for the 21st century, which improves economic productivity and supports growth across the country. It seeks to increase capacity, support development, strengthen connectivity, improve reliability and resilience, and to ensure a road network of the best possible quality. The government's vision is the transformation of the nation's road network over the next quarter of a century. This is in line with the case for interventions on the A66.

The **National Infrastructure Commission** (NIC) was created in 2015 to provide an analysis of the UK's long-term infrastructure needs. It will deliver a long-term plan and assessment of national infrastructure needs early in each parliament, setting out what Government is expected to do over the next five year period. One of the focus areas of the NIC is a plan to transform the connectivity of the Northern cities. The Commission will begin work on a national infrastructure assessment, looking ahead to requirements for the next 30 year period. Again, the interventions to the A66 are intended to support this agenda.

The objective of the **2010 – 2015 Government Policy: Freight** is to create an efficient freight transportation system that can help support the national economy. The aim was to improve the reliability of routes for freight traffic, reducing costs through improved journey times. The A66 is a key freight route in the North and, as such, is of significant importance.

A comprehensive review of the freight and logistics industry in the North of England, including freight demand, traffic flows and assessment of the existing infrastructure was undertaken in **TfN's Northern Freight Study**. The study identified that:

- 80% of road freight tonnage in the North is domestic traffic, most of which is relatively short haul and therefore difficult for rail to compete for. This places a heavy burden on the strategic road network.

- Longer distance flows of freight are dominated by North-South movements. Most currently moves by road, including to remote ports, which may not reflect optimal locational, modal and mileage outcomes. Switching these flows to rail or shipping through Northern ports will require investment in the currently constrained East-West axis in the North to reach ports or rail corridors for southwards movements.

- Forthcoming step changes in Northern port capacity (which include the in progress Liverpool2 scheme plus prospects for a redeveloped and expanded Lift-on/Lift-off (LoLo) terminal on the Tees and broader expansion plans for short-sea LoLo and Roll-on/Roll-off (ro-ro) on the Humber) present an opportunity for the North of England to capture a substantial increase in the share of the ferry and container traffic coming to the UK.

- Currently programmed road and rail transport network upgrades will at best, keep pace with demand, and do not include drivers to positively change the investment and locational patterns of Northern freight and logistics. Rail freight is forecast to decline under Do Minimum assumptions, while road freight (tonnes lifted) is forecast to grow by ~25% by 2043.

2.2.3 External business drivers

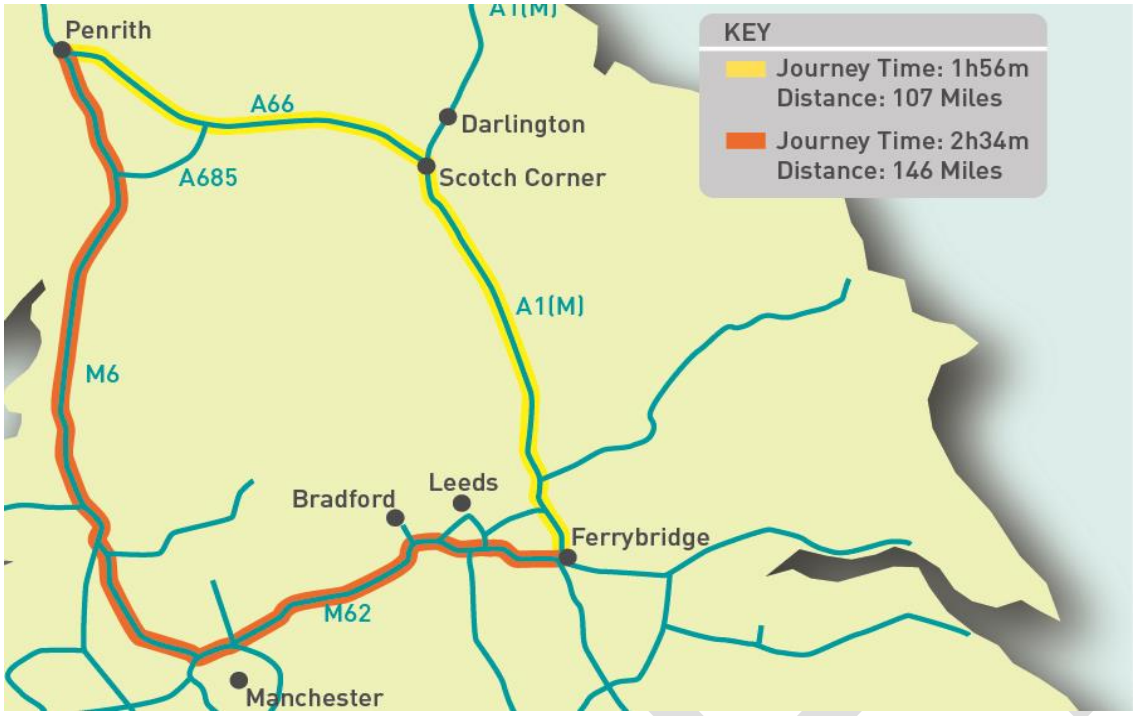
The North East Combined Authority, Tees Valley Authorities, Cumbria, and York, North Yorkshire and East Riding **Growth Deals** are part of a long-term plan to build a stronger economy and a more balanced society. The funding deals are devolved from Central Government into the hands of Local Authorities, businesses, colleges and universities with the intention of facilitating transport improvements to assist with local economic growth. Each area has secured funding from the **Local Growth Fund** and is committed to the provision of new jobs and houses. Economic and housing growth is also anticipated as a result of the **Local Development Plans.** In the areas surrounding the A66 (Eden, Richmondshire, Darlington, York, North Yorkshire and East Riding), 16,293 new homes and 3,000 jobs are planned as part of growth deals and Local Plans. This growth will generate increased traffic and therefore the provision of A66 interventions is likely to support the growth agenda in the North.

The consensus from **stakeholders** consulted as part of this study is that the A66 is seen by all as part of the strategic network and by some as the 'route of choice' for freight and long distance traffic trying to avoid the M62. An upgrade to full dualling would be supported to improve reliability and reduce costs (improved fuel consumption), and improve the regional economy.

2.2.4 History and issues with existing arrangements

The A66 currently serves as a strategic road link for the North of England and as an important national link for north south journeys. It is the most direct route between the Tees Valley, North Yorkshire, South Yorkshire, parts of West Yorkshire, the East Midlands, Eastern England and North Cumbria, Glasgow, much of the central belt of Scotland and Cairnryan (for access to Northern Ireland and the Republic of Ireland). For some journeys, the A66 can serve as an alternative and more direct east-west crossing to the M62. For example, Figure 1 shows that from Ferrybridge (A1/M62 junction) to Penrith (M6/A66 junction), the route is approximately 39 miles and 38 minutes shorter via the A1 and A66 than the alternative route via the M62, M61 and M6.

Figure 2: Journey Time Comparison – A66 versus M62/ M6 (Source: Google Maps)

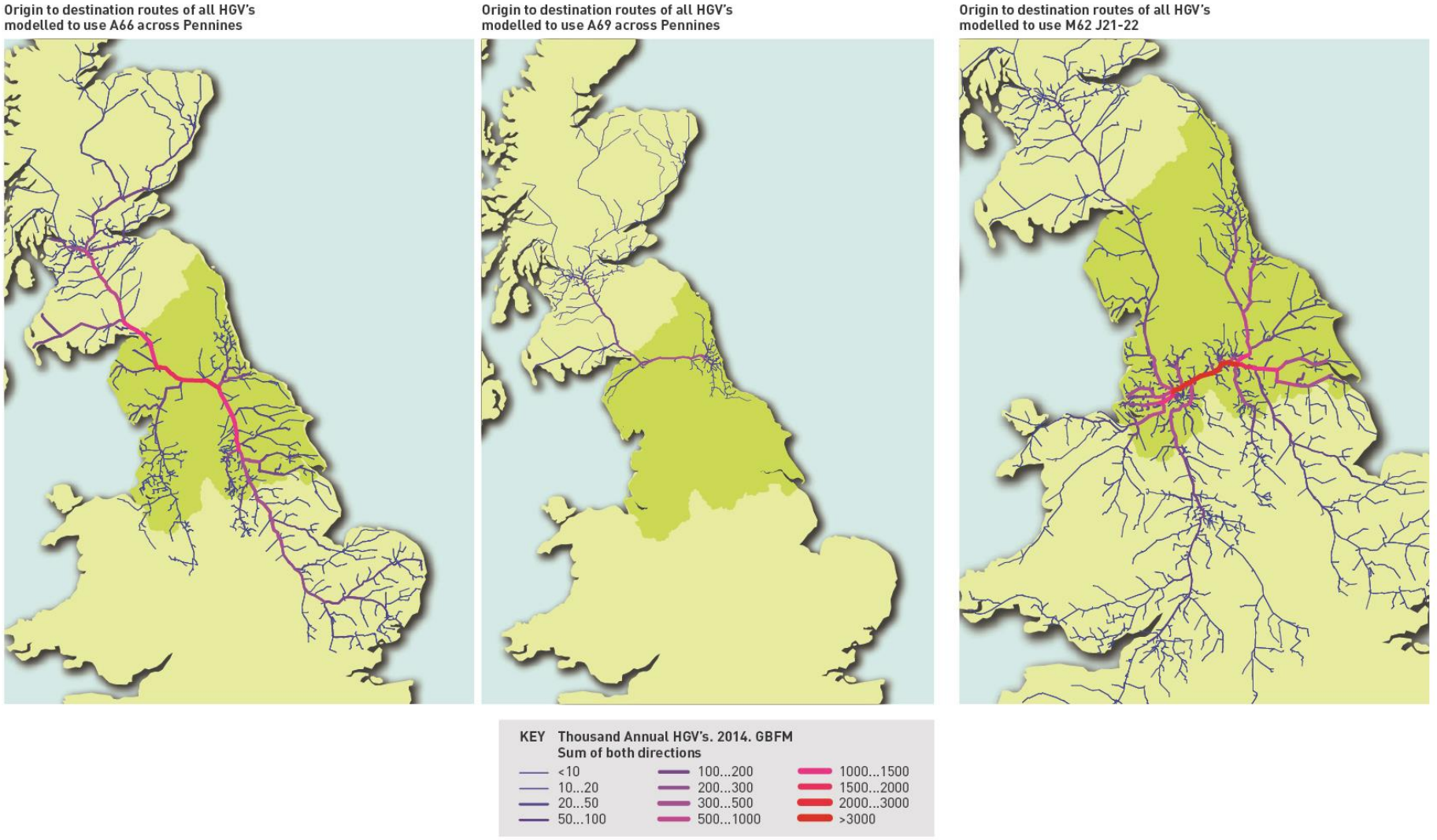


The A66 has a high freight flow, with commercial vehicles representing over 20% of total vehicles on most sections of the route between Scotch Corner and Penrith. The typical % HGVs expected (annual average daily traffic) is 15% for motorways, 12% for trunk roads and 8% for principal roads. This demonstrates the high usage of the A66 for HGV traffic in relation to the varied carriageway standards.

The expectation is that freight traffic generated in the North of England and Scotland will continue to grow, and that Northern Powerhouse aspirations for the Ports and the economy as a whole will only accelerate this growth. Time savings, shorter distances and more reliable journeys are critical for freight operators and have a direct impact on operating costs and the real economy.

Figure 2 provides a comparison of origins and destinations for HGVs travelling across the Pennines at three locations, the A66, A69 and M62 from the GB Freight Model. The figure illustrates significant modelled HGV flows using the A66 for strategic connections between the east of England, the North West and Scotland.

Figure 2: GB Freight Model – HGV Origin/Destination Information for A66, A69 and M62 – Trans-Pennine Screenline



The existing evidence shows that the A66 is under-utilised given the comparative travel distances and journey times, particularly by freight traffic. The analysis undertaken using the 'GB Freight Model' for the TfN Northern Freight Study, for example, estimates (based on travel distances and journey times) that use of the A66 for Trans-Pennine movements by commercial vehicles should be double the volume of current flows, with those journeys using the M62 instead with the A66 corridor potentially accounting for 23% of Trans-Pennine HGV traffic compared to 13% at present. Consultation with stakeholders confirms that the A66 is used less by freight traffic than it should be, due to the actual and perceived unreliability of the route compared with north-south routes and the M62.

The completion of the upgrade of the A1 Leeming to Barton Scheme to three lane motorway standard up to the junction with the A66 at Scotch Corner (due to be completed by Spring 2017) will make the A1/A66 route even more attractive as a strategic route due to reduced journey times and improved safety.

Other studies of the A66 east of the A1 between Scotch Corner and Tees Valley and west of the M6 between Penrith and Workington are also being undertaken within a similar timescale to this study, recognising the future importance of an upgraded strategic link between the Tees Valley area, such as Teesport and Port of Tyne as well as west coast ports such as Port of Workington in Cumbria.

In addition to its strategic function, the A66 is an important access link to local and regional services for communities along the route, particularly as there is minimal alternative public transport provision. Due to its rural nature large areas of the A66 corridor are ranked in the top 5% most deprived in England in terms of barriers to key local services, such as a GP surgery, primary school, supermarket and Post Office. Therefore, they are reliant on good highway links to services and employment opportunities. The A66 is also a link to popular local and regional tourism destinations, such as the North Pennines and Lake District.

Despite its strategic importance, the current mix of single and dual carriageway standards affects the performance of the A66 and makes the route unattractive, with evidence from operations data and stakeholders showing that:

- There are regular closures along the route due to planned road works for maintenance. For example there were 24 closures for planned works in 2015 between Greta Bridge and Scotch Corner;
- There are regular closures along the route due to incidents and weather impacts (high winds, flooding and snow). For example in 2012 there were 23 closures due to incidents between Greta Bridge and Scotch Corner;
- There are sections of the route where there are a higher number of collisions than the national average, particularly between Greta Bridge & Scotch Corner; and Temple Sowerby & Brough;
- The diversionary routes are either poor or involve long detours, particularly for HGVs due to the weight and height restrictions on the A685;
- There are local severance issues where the local road network intersects with the mainline carriageway causing delays and road safety issues; and
- As shown in Figure 3 there is a considerable variability in average speeds, making journey times unreliable on all routes.

Figure 3: Speed Variability on A66 and A685

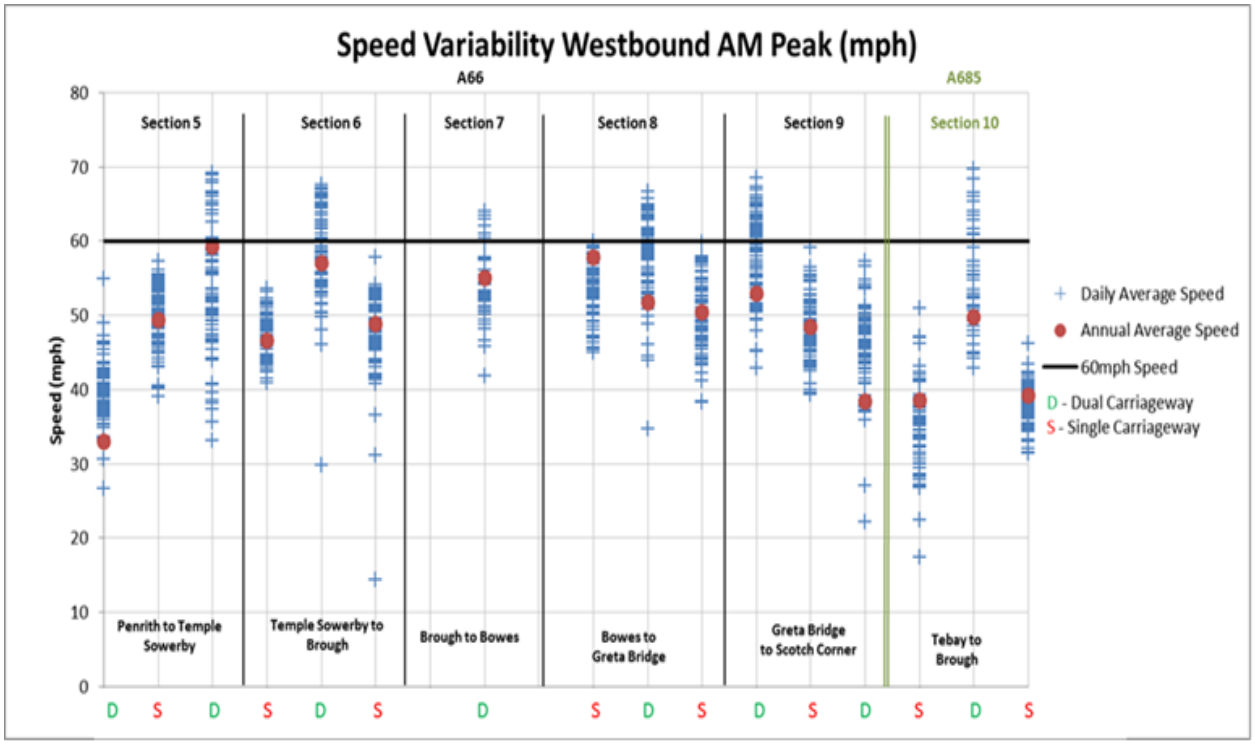


Figure 3 illustrates speed variability on the A66 and A685. The information is derived from Highways England - Traffic Master data comparing daily average speeds with annual average speeds for each section. For example on Section 9 - Great Bridge to Scotch Corner single carriageway section the graph shows a range of daily average speeds between 59mph and 39mph with an annual average speed of 48mph.

The single carriageway sections of the route make it more difficult to keep the A66 open if incidents occur and, given the quality of the diversionary routes, makes it an unreliable highway link both in actual and perceived terms. This is particularly the case for freight operators for whom route reliability is a key criteria in decisions such as route choice and timing of journeys.

Most communities along the route have been by-passed by previous interventions. Kirkby Thore (population 760), where the route runs directly through part of the village, and there are negative environmental impacts, is the only remaining existing settlement on the A66 without a bypass.

The A685 between Brough and the M6 at Tebay via Kirkby Stephen is a single carriageway route. There are HGV restrictions at two points around Kirkby Stephen which mean that this more direct route travelling between the North East and North West cannot be used as a through route by HGVs.

Furthermore due to the proximity of the existing A66 carriageway to existing sensitive uses, including residential properties, there are a number of Noise Important Areas (NIAs) declared along the existing A66 corridor. There is also one Pollution Climate Mapping (PCM) link adjacent to the A66 corridor, at the A6 north of the A6 / A66 junction at Penrith, which is below EU limits. In addition, some sections of the existing carriageway are classified as Flood Risk Zone 2 / 3, indicating a Medium / High Risk of Flooding and are also at risk of surface water flooding. The existing traffic runs in close proximity to nationally designated heritage (Scheduled Monuments, Registered Parks and Gardens and Listed Buildings); landscape sites (North Pennines Area of Outstanding Natural Beauty (AONB) and extended Yorkshire Dales National Park on the A685); and River Eden SAC and North Pennines SAC / SPA and 17 SSSIs.

The following table summarises the key current and future route issues in the A66/A685 corridor.

Route No.	Current Issues/Problems	Additional Future Issues/Opportunities
A66	• Although the A66 is a particularly important strategic route for freight traffic, journey unreliability does not meet the requirements of an efficient freight industry, causing poor service delivery, unproductivity and higher transport costs. • Unreliability of journey times due to impact of slow moving vehicles on single carriageway route sections. • Journey uncertainty due to the impact of incidents on single carriageway route sections making it more difficult to keep the route open. • High frequency and significant impact of road closures, due to roadworks and bad weather. • Poor diversionary routes, particularly for HGVs. • Lack of real time journey information exacerbates journey uncertainty issues. • Poor access to services and employment opportunities for people living in the Local Econmomic Impact Area. • Lack of rail line to provide alternative public transport link to road. • Major environmental constraints. including Special Areas of Conservation, SSSIs and 21 Noise Important Areas along the A66 and A685 corridors.	• No major highway improvement schemes committed to the A66/A685 corridor except for minor works. • Capacity and reliability of east-west road connections is a constraint on the future growth of the North of England economy. • The completion of the upgrade of the A1 to motorway standard between Leeming and Barton by 2017 will make the A1/A66 route attractive as a strategic route in future. • The extention of the Yorkshire Dales National Park creates additional envirnonmental contraints on potential A685 improvements.
A685	• Restrictions on HGVs use.	

2.2.6 Business need and service gaps

The current performance and limitations of the A66 corridor are considered to be a major barrier to future economic development of the North. It is imperative that improvements are delivered in order to tackle the issues and to meet the aims of stakeholders such as National Government, One North, Transport for the North, Highways England, the LEPs and Local Authorities. Improving connectivity in the North of England cannot be tackled with the existing infrastructure in place and thus there is a strong business need for improvements to the A66 corridor.

The need for intervention is summarised in the following table:

Case for Intervention on the A66

- The A66 is a key national and regional strategic link for a range of south north and east west movements, particularly for freight.
- The A66 is the most direct route between the Tees Valley, North Yorkshire, South Yorkshire, parts of West Yorkshire, the East Midlands, Eastern England and North Cumbria, Glasgow, much of the central belt of Scotland and Cairnryan (for access to Northern Ireland and the Republic of Ireland).
- For some journeys the A66 can serve as an alternative and more direct east-west crossing than the M62 which is currently the only major east-west crossing of the Northern UK between Derby and Edinburgh.
- Despite the strategic importance of the A66, the route between the A1 at Scotch Corner and the M6 at Penrith is only intermittently dualled and still has six separate sections of single carriageway sections in 49.5 miles.
- The mix of road standards affects the reliability, resilience, safety and attractiveness of the route (real and percieved) , meaning that is underutilised as the key strategic east-west link north of the M62 corridor.
- If the route is not improved the performance will inhibit improvements to links between cities and global connectivity, and threaten the transformational growth envisaged by the Northern Powerhouse agenda.
- Interventions on the A66 will therefore meet the study objectives in having a positive impact on travel reliability and network resilience; and
- Improving future national and regional connectivity and promoting economic growth in the North of England

2.2.7 Impact of not changing/doing nothing

Except for minor works, there are no highway improvement schemes committed to the A66 corridor. Furthermore, there are no specific plans for improving any rail links which would have a direct impact on the study area. Without investment in addressing the issues identified, the current problems are forecast to persist, if not worsen, in the future.

However, there are current highway improvement schemes which could have an impact on demand for the A66 and increase its value as a national strategic route. The current work on the upgrade of the A1 to three lane carriageway standard up to the junction with the A66 (the final stage of A1 Leeming to Barton is underway) by 2017 will make the A1 / A66 route more attractive as a strategic route, assuming that issues with the A66 can also be addressed. Coupled with increased congestion on the M62, this could increase the demand for the A1 / A66 route between south and north UK.

The expectation is that freight traffic generated in the North of England and Scotland will continue to grow, and that Northern Powerhouse vision for the Ports and the economy as a whole will only accelerate this growth. Time savings, shorter distances and more reliable journeys are critical for freight operators and have a direct impact on operating costs and the real economy.

The existing evidence shows that the A66 is under-utilised given the comparative travel distances and journey times, particularly by freight traffic. The analysis undertaken using the 'GB Freight Model' for the Northern Freight Strategy Study, for example, estimates (based on travel distances and journey times) that use of the A66 for Trans-Pennine movements by commercial vehicles should be double that of current flows, with those journeys using the M62 instead.

Given the importance of the A66, as a strategic east-west route, it is this function which will need to be enhanced to ensure that the current links do not constrain the economic growth associated with the Northern Powerhouse agenda. Failure to address current issues, particularly those which have a strategic impact, will have a detrimental impact on Transport for the North's development and infrastructure aspirations for the North of England, in particular:

- The multimodal TfN Freight Study for the North's aspiration to support trade and freight movement within the North and to national/international markets;
- Better connectivity to the region's Airports, to realise the economic benefits of improved global connectivity through better aviation links;
- Improved connectivity between different parts of the region, bringing city regions closer together; and
- Enhancements to the capacity of ports in the North of England and the future importance of a strategic link between the Tees Valley area ports and Northern Cumbria west coast ports such as Workington.

2.3 The programme/project

2.3.1 Scope

The strategic objective of the NTPR Study is to investigate the potential to create a new strategic corridor linking the A1 with the M6 by upgrading one or both of the A66/A685 and A69 routes and making other improvements along their length. Further aims are to improve east-west connectivity within the North of England, whilst considering the impact that any options may have on wider east-west links between the M62 corridor and the Scottish border, build network resilience and promote economic growth.

2.3.2 Study Objectives

The study objectives are summarised in the following table:

No.	Study Objectives
1	Understand the current performance and constraints of the existing road infrastructure, and confirm the strategic case for considering further investment.
2	Identify options for a new strategic corridor upgrading one or both of the A66/A685 and A69 and making other improvements along their length.
3	Understand the operational benefits and challenges of the construction of each of the options, including issues with weather related resilience, diversions following incidents, the safety impact on road users and local communities and highway maintenance impacts.
4	Understand the benefits and impacts resulting from the provision of a new strategic corridor - including the benefits and impacts accruing on the M62 and other existing trans-Pennine routes, including local roads - to further inform the strategic and economic case for investment in new road infrastructure in the corridor.
5	Have reference to and reflect wherever possible the key findings of the other northern Strategic Studies (Trans Pennine Tunnel and Manchester(M60) North- West Quadrant). Specifically, understand the interdependencies between the potential options arising from these studies.

2.3.3 Strategic benefits

There will be strategic benefits to a range of users and stakeholders if the interventions are realised.

The current standard of the route, principally its unreliability, is constraining use of the route and inhibiting strategic connectivity and economic growth. It is the importance of the A66 as strategic east-west route which makes the strategic case for intervention, ensuring that it does not constrain the future economic growth associated with the Northern Powerhouse agenda. The ambition for the North of England to be a dynamic area of economic growth which complements the London and South East economy and helps to rebalance and grow the national economy, encapsulated by the Northern Powerhouse Agenda, increases the importance of the A66.

The Northern Powerhouse: One Agenda, One Economy, One North – report documents aspirations to develop a strategy that will explore options to significantly upgrade the A66 from Scotch Corner to Penrith, thus connecting the A1 in the east with the M6 in the west. It is believed that improvements of this nature could potentially create an additional major east-west connection in the North of England to complement the M62, with more reliable journey times between cities in the north.

TfN's Independent Economic Review (IER) supports this aim, stating that achieving transformational growth will require long-term improvements in the various drivers of productivity and output growth, including transport connectivity. The IER finds that poor transport links between key settlements are restricting access to centres of employment and the attractiveness of areas for investment, thereby reducing the agglomeration effects which would help grow its productivity. Addressing transport issues will require "..a new and transformational approach to planning and implementing new transport infrastructure which will enable transformational growth", including targeted investment in new road infrastructure and enhanced global connectivity through ports and airports.

Interventions will therefore have a positive impact on travel reliability, network resilience and future national and regional connectivity and economic growth.

2.3.4 Key stakeholder and customer requirements

There is significant local interest in the NTPR study, and a Stakeholder Reference Group (SRG) has been established to provide input into the project as it develops. A list of the stakeholders on the SRG is included in Annex 7.1.

Meetings between the integrated delivery team and representatives of the Stakeholder Reference Group were conducted in 2015 in order to establish the views of various parties and all relevant feedback has been taken into account during the preparation of the Stage 1 report.

Following consideration of the initial findings of the Stage 1 report by the DfT and Highways England which identified issues and the requirement for intervention, an option generation workshop was held in January 2016 which was attended by representatives from each organisation and the integrated delivery team. Delegates were invited to identify a long list of interventions which could potentially alleviate the issues and meet the intervention specific objectives. The long list of options was presented to the Stakeholder Reference Group (SRG) on 13th April 2016 where a workshop session was held to discuss any additional options not previously identified. The final long list of options is included in Annex 7.2.

The current and future issues in the A66/A685 corridors, and the need for intervention, were used to generate a set of intervention-specific objectives, shown in the following table, which were agreed with the SRG.

Theme	Description
Economic Growth	Support the economic growth objectives of the Northern Powerhouse agenda
	Improve access to regional economic centres and local growth sites served by the A66/A685 and A69
Connectivity	Ensure the improvement and long-term development of the SRN through providing better national connectivity
	Improve the A66/A685 and A69 as strategic connections for freight traffic
	Maintain and improve access for tourism served by the A66/A685 and A69
	Improve (and as a minimum maintain) access to services and jobs for all local road users
Network Performance	Improve journey time reliability for road users
	Reduce the number and seriousness of incidents involving road users, including Non-Motorised Users (NMUs)
	Improve the resilience of the routes to the impact of events such as roadworks and severe weather events
Environment	Reduce the impact of the routes on severance for local communities
	Minimise adverse impacts on the environment and where possible optimise environmental improvement opportunities

2.3.5 Options (applicable for strategic outline business case and outline business case stages)

Three categories of options were developed as follows:

- **Route Long Interventions**: Options for improving the routes as a whole, involving large scale route improvements or a large number of smaller improvements of similar types along the routes. A route long weather resilience sub-category was also included on the A66 due to the number of interventions aimed at tackling this issue.
- **Individual Highway Interventions**: Options aimed at improving one localised part of the route, either a junction or a specific route sub-section.
- **Individual Non-Highway Interventions:** Any interventions in the study area aimed at tackling route issues without the need for a highway scheme.

In order to determine which of the long list of options should be taken forward, scoring and sifting of the long-list of options was undertaken. The shortened list was then subject to the more detailed Option Assessment Framework (OAF).

The resultant shortlisted options can be seen in the below table and following diagram:

Route	No	Option	Description
A66	4	A66 Dualling	• Dual all remaining single carriageway sections of the A66 • Includes Option 5 – A66/A6 Junction Upgrade to improve existing 'At Grade' junction.
	5	A66/A6 Junction Upgrade	• Could be delivered as stand alone scheme or as part of the full dualling option (4)
	6	Scotch Corner to Greta Bridge Dualling	• Dual one section of the A66 • Could be delivered as stand alone scheme or as part of the full dualling option
	7	Brough to Temple Sowerby Dualling	• Dual one section of the A66 • Could be delivered as stand alone scheme or as part of the full dualling option
A685	8	Kirkby Stephen By-pass	• Single carriageway by-pass of Kirkby Stephen

2.3.6 Risk and issue management | risks and opportunities

The key risks identified with the shortlisted interventions are as follows:

- **Delivery risk**: due to unforeseen constraints the scheme may not be deliverable from an engineering perspective, or may become very costly to deliver;
- **Benefit risks**: scheme benefits may be lower than currently estimated for the following reasons:
    - Improving the attractiveness of the route may attract more traffic and reduce scheme benefits;
    - Double-counting
- **Environmental risk**: more detailed environmental assessment work may identify adverse impacts on critical aspects of the local environment. Key risks in this area are the potential impacts on landscape, heritage and ecological designations. Furthermore, there is the potential to affect flood plain storage capacity and water quality as a result of the proposals;
- **Business risk**: the appetite for funding major road improvement schemes may change with changes to government and/or policy.

2.3.7 Constraints

As with any scheme, there are a number of internal constraints associated with the schemes proposed. Internal constraints include availability of resources and staff and availability of funding. In terms of external constraints the greatest risk at this time is political and financial uncertainty with regards to Brexit.

Corridor Constraints

The A66/A686 is broken up into five sections. Section seven is the current dual section over Stainmore/Bowes and has no works associated with it. The options considered are:

- Option 4 – Full Dualling + A66/A6 Junction Improvement comprising:
    - Section 5
    - A66/A6 Grade Separated Junction
    - Section 6
    - Section 8
    - Section 9

- Option 5 – A66/A6 Junction Improvement Only
- Option 6 – Scotch Corner – Greta Bridge Dualling Only (Section 9)
- Option 7– Temple Sowerby to Brough Dualling Only (Section 6)

The constraints for Option 4 are:

- Section 5
  - Western tie in – Existing culvert that appears wide enough for dual carriageway
  - Overhead cables at western tie in
  - Scheduled Ancient Monument (SAM), one within scheme and another at western tie in
  - Listed structure to the south side of the A66
  - At the eastern tie in, existing structures for underpass

- Section 6 – part 1
  - At the western tie in, a listed structure is located on the north side of the A66
  - At western tie in, existing underpass, appears to be wide enough for dual carriageway
  - Kirkby Thore is located to the south of the proposed alignment, with areas of Kirkby Thore being a SAM
  - To the North of Kirkby Thore is the British Gypsum Plant and the railway line
  - A water course crosses the proposed alignment, which is also an SSSI
  - The existing A66 passes through a SAM between Kirkby Thore and Crackenthorpe
  - At the Eastern Tie in, there is a railway overbridge
  - To the south of the tie in, there is an ancient woodland and a water course that is also a SAC

- Section 6 – Part 2
  - Western tie–in
  - An SSSI is located on the north side of the A66 to the west of Warcop
  - Warcop Army training ground and associated buildings run along the A66, mainly to the north, with some small buildings and land to the south
  - The A66 runs along an area of outstanding natural beauty (AONB) to the north
  - Eastern Tie in.

- Section 8 – part 1
  - There is an existing underbridge on the A66 at the A67 interchange. The structure appears wide enough for a dual carriageway
  - Listed buildings are present to the south side of the A66 at the eastern tie in

- Section 8 – part 2
  - At the western tie in there is a listed building to the north side of the A66
  - Along this section listed structures are present to the north and south side of the A66, resulting in a pinch point.

- Section 9
  - Listed Buildings are located along the A66
  - To the west of the eastern tie-in, the existing A66 passes through a SAM

The additional constraints for A66/A6 Junction (Option 5) are:

- The fire station, police station and their accesses are located to the south east of the roundabout
- The A686 is located to the North East

The constraints for the A685 Kirkby Stephen By-pass (Option 8) are:

- A water course crosses the A685 at the northern Tie in, this is also a SAC
- Kirkby Stephen is located to the east of the proposed alignment
- Several SSSi's are located to the west of Kirkby Stephen.
- There are SMs to the south of the scheme.
- The scheme is within the National Park at the southern end.

Environmental Constraints
The topography varies across the corridor, from the lowest points in the River Tees and River Eden valleys to the highest point on Bowes Moor, between approximately 100m above sea level to circa to 426m above sea level.

The Scheme corridor crosses / lies in close proximity to statutory environmental designations of national value, including: 71 Scheduled Monuments; North Pennines AONB; Yorkshire Moors National Park extension (in relation to A685); River Eden and its tributaries Special Area of Conservation (SAC) and the North Pennines Moors SAC / Special Protection Area (SPA); and, 17 SSSIs. There are five NIAs along the A66 corridor. There are no Air Quality Management Areas (AQMAs), although there is one PCM link adjacent to the scheme corridor at Penrith. The scheme corridor is predominantly classified as Flood Risk Zone 1 (low risk) but various sections of the corridor are within areas designated as Flood Risk Zone 2 / 3 (medium to high risk) of fluvial and surface water flooding. There are also a number of important footpaths and cycle routes which traverse / lie in close proximity to the scheme corridor. There are a number of existing residential properties adjacent to the scheme corridor within the conurbations, towns, villages and isolated properties along the existing A66 and A685 carriageways.

2.3.8 Key assumptions
The key assumptions in relation to the strategic case for improvements to the A66 corridor are that policies relating to the growth of the North of England economy continue to support the case for an improved east-west strategic crossing and that these policies and strategic case are considered in investment decisions for RIS2.

For environmental topics it has been assumed that mitigation in accordance with the DMRB can be applied. Where there is uncertainty over mitigation, or a perception that mitigation would be above the standard or difficult to provide, appraisal scores have assumed a precautionary/worst case approach. For most topic areas there is a high level of uncertainty as to the likely final score outcome, largely due to the early stage of this process and partly due to the lack of the appropriate level of traffic modelling for environmental topics.

2.3.9 Dependencies
There are inter-dependencies with studies of other Trans-Pennine crossings as the strategic case for interventions on the A66 will depend, in part, on other improved east-west crossings, such as a Trans-Pennine Tunnel.

2.4 Recommendation

The major improvements to the A66 considered by this study would be a good fit with strategy and policy objectives for the North of England. These improvements could radically improve the most direct road route between the Tees Valley, North Yorkshire, South Yorkshire, parts of West Yorkshire, the East Midlands, Eastern England and North Cumbria, Glasgow, much of the central belt of Scotland and Cairnryan (for access to Northern Ireland and the Republic of Ireland).

In turn, these improvements would generate potential benefits and opportunities for the North of England economy by:

- Reducing journey times and improving the reliability of journeys, thereby improving connectivity between regions and economic productivity;
- Providing a viable alternative to the M62 for many east-west journeys, reducing journey times and improving network resilience and the efficiency of freight operations;
- Providing vital support to the growth strategy of ports in the North and East of England, by improving access to and between these ports and those in North West England and Scotland; and
- Increasing the economic impact and value of other strategic road network improvements in Northern England, ensuring that the opportunities presented by improved north-south routes are maximised by the upgrading of the major east-west route across Northern England.

3. Economic case

3.1 Purpose

The purpose of the economic case is to assess the value for money (VfM) of the options being proposed, that is, to assess whether the benefits delivered outweigh cost of delivering the schemes.

3.2 Economic options

The options for the A66 are either:

- Do Nothing: no changes to the existing infrastructure;
- Dual the remainder of the A66 and include the A66 / A6 junction improvement (Option 4);
- A66 / A6 junction improvement as a stand-alone scheme or as part of phasing of the full dualling option (Option 5);
- Dual Scotch Corner to Greta Bridge as a stand-alone scheme or as part of phasing of the full dualling option (Option 6); and
- Temple Sowerby to Brough Dualling as a stand-alone scheme or as part of phasing of the full dualling option (Option 7).

Furthermore, a scheme to provide a bypass of Kirkby Stephen on the A685 has been considered (Option 8).

The difference between the options in cost and benefit terms is the cost and benefit attributable to the improvement schemes and therefore the basis for assessing the schemes VfM.

3.3 Economic options analysis

3.3.1 Approach to options appraisal

A high level scoring of the options is carried out using the scoring criteria contained in Table 3.1.

Score	Criteria				
	Requirements	**Quality**	**Time**	**Affordability**	**Risk Profile**
1	Does not meet quality criteria	Does not meet quality criteria	Unable to deliver requirements to target	Far in excess of budget	Very high risk – difficult to mitigate or to provide contingency
3	Does not meet majority of needs	Does not meet majority of quality criteria	Delivers some requirements to target	In excess of budget	High risk – can mitigate with contingency
5	Meets around 50% of needs	Meets around 50% of quality criteria	Delivers around 50% of requirements to target	Delivers key requirements within budget	Medium risk – with mitigation & contingencies in place
7	Meets most key needs	Meets most key quality criteria	Delivers most key requirements to target	Delivers most key requirements to budget	Low risk
10	Meets key needs & most others	Meets key quality criteria & most others	Delivers key requirements & most others to target	Delivers key requirements to budget & most others	Very low risk

Table 3.1: Option Appraisal Scoring

Options	Analysis					
	Requirements	Quality	Time	Affordability	Risk Profile	Total Score
Do Minimum	1	1	1	No cost	5	8
Dual A66 (4)	10	10	5	Budget unknown at this time so not scored	3	28
A66 / A6 junction improvement (5)	3	3	10		5	21
Dual Scotch Corner to Greta Bridge (6)	5	5	7		5	22
Temple Sowerby to Brough Dualling (7)	5	5	5		5	20
A685 Kirkby Stephen Bypass (8)	3	3	5		1	12

Table 3.2: Option Appraisal Scoring Results

The results in Table 3.2 indicate that delivering an improvement option on the A66 / A685 outscores the Do Minimum. The full dualling option provides the highest overall score.

3.3.2 Requirements - critical success factors

Critical Success Factors (CSF) >>	Deliver Economic Growth	Improve Connectivity	Improve network performance	Minimise adverse environmental impacts
Dual A66 (4)	Will facilitate local, regional and north-wide economic growth through step change in east – west route provision	Will improve connectivity for strategic east – west movements, freight, tourism and local residents	A fully dualled route will improve journey time reliability, resilience of the route during incidents or maintenance and reduce collisions	Any improvement scheme has the potential to result in adverse environmental impacts but there are opportunities to mitigate these
A66 / A6 junction improvement (5)	Will provide some economic growth by relieving a congested pinch point on the route and improving access to Penrith	Will improve local connectivity into Penrith	Will improve reliability and safety through this junction	
Dual Scotch Corner to Greta Bridge (6)	Will provide some economic growth by improving one section of the A66	Will partially improve connectivity for strategic east – west movements, freight, tourism and local residents	Will partially improve journey time reliability, resilience of the route during incidents or maintenance and reduce collisions	
Temple Sowerby to Brough Dualling (7)	Will provide some economic growth by improving one section of the A66	Will partially improve connectivity for strategic east – west movements, freight, tourism and local residents	Will partially improve journey time reliability, resilience of the route during incidents or maintenance and reduce collisions	
A685 Kirkby Stephen Bypass (8)	Improving the A685 will provide some economic benefits	Will improve connectivity along this route which provides a link to the M6 south from the A66	Will partially improve journey time reliability along this section of the A685	

Table 3.3: Critical Success factors

3.3.3 Quality

Highways England's Major Project's Project Control Framework (PCF) defines the outputs required at each stage of the PCF lifecycle, and the quality criteria for those outputs. The quality of the outputs is assessed against the quality criteria by the respective quality reviewer, defined in PCF. Value management, which may be considered to enhance the quality of the outputs, is an integral part of PCF. The project team will be required to identify opportunities to enhance value for money during the design, development, and construction of the project, record these and monitor implementation.

3.3.4 Time

Based on estimates provided by Highways England's Commercial team it is anticipated that each of the options can be delivered by the dates indicated in the table below.

Option	Opening Date
Dual A66 (4)	2026
A66 / A6 junction improvement (5)	2023
Dual Scotch Corner to Greta Bridge (6)	2024
Temple Sowerby to Brough Dualling (7)	2026
A685 Kirkby Stephen Bypass (8)	2024

3.3.5 Cost analysis and affordability

The outturn cost of delivering the schemes have also been estimated by Highways England's Commercial team is presented in the table below along with the present value of cost (PVC) in 2010 prices.

Option	Outturn Cost (£m)	PVC (£m)
Dual A66 (4)	[redacted]	£631
A66 / A6 junction improvement (5)	[redacted]	£63
Dual Scotch Corner to Greta Bridge (6)	[redacted]	£84
Temple Sowerby to Brough Dualling (7)	[redacted]	£309
A685 Kirkby Stephen Bypass (8)	[redacted]	£68

3.3.6 Risk and issue management | risk profile

The risks associated with the economic case have been identified and scored according to probability and impact using the risk matrix in Table 3.4.

PROBABILITY						
>75%	Almost Certain 5	5	10	15	20	25
20 to <75%	Likely 4	4	8	12	16	20
2 to <20%	Possible 3	3	6	9	12	15
0.02 to <2%	Unlikely 2	2	4	6	8	10
>0.02%	Rare 1	1	2	3	4	5
	IMPACT	Insignificant 1	Minor 2	Moderate 3	Major 4	Catastrophic 5

Table 3.4: Risk Matrix

Table 3.5 summarises these risks and their scoring in terms of impact on the economic case presented within this report.

Risk	Impact	Probability	Combined
Changes to future traffic growth assumptions lead to change in benefits either up or down.	4	4	16
Changes to construction costs inflation lead to change in costs either up or down	4	3	12
Scheme not delivered in anticipated timescales delays opening year and affects spend profile	1	2	2
Traffic model isn't WebTAG compliant so results are affected	3	4	12
Lack of variable demand modelling affects model results & therefore economic case	4	3	12
Lack of modelling of redistribution impacts affects model results & therefore economic case	3	3	9
Incorrect estimate of construction costs affects economic case	4	4	16
Total			**79**

Table 3.5: Risk Matrix

3.4 Benefits identification

3.4.1 Assumptions for economic cost benefit analysis

To estimate the scheme impacts a spreadsheet based traffic model has been developed and applied. This model has the following characteristics:

- The model is the Northern Transpennine Route Assessment Model (NTRAM) and operates in Microsoft Excel;
- It is a corridor based model covering the strategic road network routes of A69, A66 and A685;
- A spreadsheet model gives ability to model a number of time periods and each hour between 07:00-21:00 is represented discretely, along with an average of 21:00-07:00
- Demand in the NTRAM is split into light and heavy vehicles (no trip purposes included in model);
- The model is calibrated / validated to 2015 traffic count and journey time data. Validation is focussed on the strategic road network mainline and local road sections and junctions are not validated;
- Future year models are available for 2025 and 2040, and include growth based on TEMPRO forecasts for the North West and North East; and
- No wider rerouting or variable demand effects are included in the modelling.

The economic appraisal was generated using the following economic assumptions:

- The appraisal year is 2016;
- A scheme opening year of 2025;
- Costs and benefits are appraised over the period from the current year (2016) to 60 years after scheme opening (2084);
- Investment costs distributed between year 2016/17 and 2028/2029;
- All costs and benefits converted to 2010 prices;

- All costs and benefits discounted to 2010 present values;
- The market price adjustment factor is assumed at 19.0% in-line with WebTAG;
- Discounting is applied at 3.5% up to 30 years from scheme opening followed by 3.0% for the remainder of the appraisal period;
- Delays during construction have not been estimated or included at this stage;
- Benefits are modelled in 2025 and 2040;
- PV Benefits are calculated for travel time savings, vehicle operating cost changes, greenhouse gases and accidents;
- Travel time savings, vehicle operating costs and changes in greenhouse gases are calculated using the values and formulas provided in WebTAG;
- Traffic growth is assumed to be zero after 2040; and,
- Indirect taxation impacts are estimated using the formulas in WebTAG.

The identified scheme impacts are outlined in Table 3.6 and the quantified impacts reported in Table 3.7 with the monetised PVB values in Table 3.8. All of the impacts apart from reliability and wider economic benefits are used in calculating an initial BCR, with these two elements added to form the adjusted BCR.

Benefits	Description
Journey Times	Upgrade of the carriageway from single to dual, or through junction improvements will lead to journey time savings across all time periods. Much of the study area caters for strategic trips and thus the daily traffic profile and benefit stream is not skewed by the peaks. Rather, benefits are dispersed more evenly across the period from 07:00-19:00.
Accidents	The dualling schemes are designed to increase capacity and thereby significantly reduce the need for light vehicles to overtake slow moving heavy goods vehicles on busy sections of single carriageway.
Vehicle Operating Costs	As a result of the schemes there is an increase in average vehicle speed and therefore a slight increase in vehicle operating costs.
Reliability	Provision of dual carriageway sections will reduce delays, incidents and the need for route closures, all of which currently impact on journey time reliability.
Wider Impacts	Wider impacts have only been considered in the full dualling option and have been estimated using the approach of Homes and Communities Agency's Additionality Guidance. The option assessed is projected to accelerate housing deliveries and improve employment prospects of residents along the corridor by reducing commuting costs and improving the attractiveness of the corridor for business choosing where to locate. The total benefits presented in this assessment represent the monetised value of the additional jobs projected to be created as a result of the scheme.

Table 3.6: Scheme Benefit Description

Option	Year	Dual A66	A6 / A66 Junction	Dual Scotch Corner to Greta Bridge	Temple Sowerby to Brough Dualling	A685 Kirby Stephen Bypass
Journey Time: Hours Saved ('000)	2025	1,828	541	107	948	58
	2040	1,959	580	116	1,002	63
Accident: Annual Reduction in Personal Impact Crashes	2025	12.9	-	7.0	6.5	-
	2040	7.6	-	3.8	3.6	-
Greenhouse gases: KG CO2 Reduced	2025	--11.74	0.00	-0.73	-3.32	0.00
	2040	-13.62	0.00	-0.76	-3.49	0.00
Reliability: Hours Saved ('000)	2025	362	126	39	285	14
	2040	387	134	42	294	15
Cumulative Dwellings Delivered	60yrs	230	-	-	-	-

Table 3.7: Scheme Benefit Quantification

Option	Dual A66	A6 / A66 Junction	Dual Scotch Corner to Greta Bridge	Temple Sowerby to Brough Dualling	A685 Kirby Stephen Bypass
Journey Times	£414	£90	£20	£196	£13
Accidents	£16	£0	£8	£8	£0
Vehicle Operating Costs	-£45	£0	-£2	-£23	£0
Greenhouse Gases	-£36	£0	-£2	-£9	£0
Reliability	£72	£17	£8	£53	£3
Wider impacts	-£22	£0	-£1	-£4	£0

Table 3.8: Scheme Benefits PVB (£m)

Using the model the results of the economic case have been calculated as shown in Table 3.9. The adjusted benefit to cost ratio provided in the table is based on the further inclusion of reliability and wider economic benefits in the assessment.

Item	Value (£m in 2010 prices)				
	Dual A66	A6 / A66 Junction	Dual Scotch Corner to Greta Bridge	Temple Sowerby to Brough Dualling	A685 Kirby Stephen Bypass
Climate Change	-£36	£0	-£2	-£9	£0
Accidents	£16	£0	£8	£8	£0
Economic Efficiency: All Purposes	£369	£86	£18	£173	£12
Wider Public Finances (Indirect Tax Revenues)	£22	-£0	£1	£4	£0
Present Value of Benefits (PVB)	**£370**	**£86**	**£26**	**£176**	**£12**
Present Value of Costs (PVC)	**£631**	**£63**	**£84**	**£309**	**£68**
Net Present Value (NPV)	**-£261**	**£23**	**-£57**	**-£133**	**-£56**
Benefit to Cost Ratio (BCR, Initial)	**0.59**	**1.37**	**0.31**	**0.57**	**0.18**
Benefit to Cost Ratio (BCR, Adjusted)	**0.79**	**1.64**	**0.41**	**0.74**	**0.22**

Table 3.9: Financial Model Outputs – Initial BCR

The impact of the scheme on other operating and maintenance costs has not been included within the financial model. However, it is estimated that these will increase slightly as a result of the scheme as it will lead to more infrastructure to maintain than in the Do Minimum situation.

3.4.2 Sensitivity

The VfM score is most sensitive to changes in the scheme capital costs and journey time benefits. The other quantified impacts are a small percentage of overall journey time benefits and therefore any changes to these values will have little impact on the overall score.

Two sets of sensitivity tests have therefore been undertaken. The first involves recalculating the BCR values with the high and low costs provided by the Highways England commercial team (the results presented in the previous section are based on the central costs). The second test involves varying the amount of reassigned traffic from other routes, this is assumed to equate to a 5% uplift in A66 flows in the central case result but values of 10% and 15% have been assessed.

Table 3.10 presents the results of the high and low cost sensitivity tests.

Scenario	Dual A66	A6 / A66 Junction	Dual Scotch Corner to Greta Bridge	Temple Sowerby to Brough Dualling	A685 Kirby Stephen Bypass
Benefit to Cost Ratio (BCR, Initial) – High Costs	**0.37**	**0.99**	**0.23**	**0.40**	**0.13**
Benefit to Cost Ratio (BCR, Initial) – Central Costs	**0.59**	**1.37**	**0.31**	**0.57**	**0.18**
Benefit to Cost Ratio (BCR, Initial) – Low Costs	**0.73**	**1.79**	**0.41**	**0.73**	**0.23**
Benefit to Cost Ratio (BCR, Adjusted) – High Costs	**0.49**	**1.19**	**0.30**	**0.52**	**0.16**
Benefit to Cost Ratio (BCR, Adjusted) – Central Costs	**0.79**	**1.64**	**0.41**	**0.74**	**0.22**
Benefit to Cost Ratio (BCR, Adjusted) – Low Costs	**0.98**	**2.14**	**0.54**	**0.96**	**0.29**

Table 3.10: High and Low Cost Sensitivity Test BCRs

The results indicate that with the high or low point of the cost range, the BCRs respectively decrease or increase but for the majority of schemes the variation isn't sufficient to change the overall value for money category.

It is only the option to fully dual the A66 that is affected by the second sensitivity test. The results are presented in Table 3.11.

Scenario	Dual A66
Benefit to Cost Ratio (BCR, Initial) – 5% Reassignment	0.59
Benefit to Cost Ratio (BCR, Initial) – 10% Reassignment	0.62
Benefit to Cost Ratio (BCR, Initial) – 15% Reassignment	0.65
Benefit to Cost Ratio (BCR, Adjusted) – 5% Reassignment	0.79
Benefit to Cost Ratio (BCR, Adjusted) – 10% Reassignment	0.83
Benefit to Cost Ratio (BCR, Adjusted) – 15% Reassignment	0.87

Table 3.11: Reassignment Sensitivity Test BCRs

With higher levels of reassigned traffic, the scheme benefits, and therefore BCRs, increase slightly. However, the change is only around 10% increase in BCR and doesn't alter the value for money category of the A66 dualling scheme.

3.5 Dependencies

Section 2.3.9 summarises the key dependencies of the case for improvements to the A66 corridor.

3.6 Health and safety impact assessment

No assessment of the potential health and safety impacts of the options has been undertaken to date.

3.7 Equality impact assessment

An appraisal of the Distributional Impacts of each Route Option has not been undertaken at this PCF stage. The spreadsheet model developed for this study limits the value of undertaking a Distributional Impact analysis (formally Social Distributional Impacts), which looks to consider the variance of a transport interventions impacts across different social groups across eight key indicators:

- User Benefits;
- Noise;
- Air Quality;
- Accidents;
- Security;
- Severance;
- Accessibility; and
- Personal Affordability.

Should any of the options progress further, it is proposed that a Distributional Impact Appraisal is undertaken during the next PCF Stage of the study when it is anticipated that the Highways England Northern Regional Model will be available, providing an appropriate tool with which to conduct a Distributional Impact appraisal.

3.8 Environmental impact appraisal

Environmental Impacts

Option	Noise*	Air Quality*	Greenhouse Gases*	Landscape	Townscape	Historic Environment	Biodiversity	Water Environment
Dual A66	Neutral	Neutral	Neutral	Moderate Adverse	N/A	Moderate Adverse	Large Adverse	Moderate Adverse
A6 / A66 Junction	Slight Adverse	Slight Adverse	Slight Beneficial	Slight Adverse	N/A	Slight Adverse	Slight Adverse	Moderate Adverse
Dual Scotch Corner to Greta Bridge	Slight Beneficial	Neutral	Neutral	Slight Adverse	N/A	Neutral	Slight Adverse	Moderate Adverse
Temple Sowerby to Brough Dualling	Slight Beneficial	Neutral	Neutral	Moderate Adverse	N/A	Slight Adverse	Large Adverse	Moderate Adverse
A685 Kirby Stephen Bypass	Slight Beneficial	Neutral	Neutral	Large Adverse	Moderate Beneficial	Slight Adverse	Large Adverse	Moderate Adverse

Table 3.8: Environmental Impact Summary

* *WebTAG does not give scores for these topics; these are estimates only, based on a 7 point scale in order to give some proportion to the appraisal.*

Noise
There are five Noise Important Areas (NIAs) declared along the scheme corridor (at Ravensworth Lodge / Fox Grove, Slapestones, Rovegill House, south of Kirkby Thore and Warcop). The schemes could result in an increase of traffic flows / speeds, which may lead to worsening of the noise levels at these NIAs, though this could also be mitigated and improved. There are a number of existing residential properties adjacent to the Scheme corridor, within towns such as Penrith, Appleby-in-Westmorland, Brough and Kirkby Stephen, as well as villages and scattered properties along the existing A66 and A685 carriageways. Online widening could result in sensitive receptors being located closers to the carriageway, particularly around the northern part of Kirkby Thore, therefore increasing noise levels at these receptors. Conversely, the schemes may result in traffic being moved away from existing receptors, whereby reducing noise levels, particularly at the southern part of Kirkby Thore and Kirkby Stephen. Therefore, the overall impact is considered to be Adverse as there is a likely increase traffic speed with potential increases / decreases in noise levels at existing NIAs and sensitive receptors.

Air Quality
There are no AQMAs located within or adjacent to the Scheme corridor. The nearest AQMAs at the western end of the corridor are situated within Kendal (approximately 15.1km south-west of the scheme) and within Carlisle (approximately 28.2km north of the scheme). In the east, the nearest AQMA is situated within Durham (approximately 37.8km north) and Ripon (approximately 35.3km south). These AQMAs have been declared for exceedances of the annual mean NO2 objective as a result of emissions from road traffic. The only road link classified under PCM within or immediately adjacent to the Scheme corridor is the A6 in Penrith, classified as a PCM link with 20-30 µgm-3 annual mean (2014). The schemes could result in an increase of traffic flows / speeds, which may lead to exceedances of the AQS objective thresholds at receptors at this PCM link.

There are a number of existing residential properties adjacent to the Scheme corridor, within towns such as Penrith, Appleby-in-Westmorland, Brough and Kirkby-Stephen, as well as villages and scattered properties along the existing A66 and A685 carriageways. Online widening could result in sensitive receptors being located closer to the carriageway and these properties could experience slightly worsening air quality. Conversely, the schemes may result in traffic being moved away from existing receptors, thereby improving air quality conditions, particularly at Kirkby Thore and Kirkby Stephen. Therefore, the overall impact is considered on balance to be Adverse although there are potential increases / decreases in air quality pollutant concentrations at sensitive receptors.

Greenhouse Gases
As a result of the schemes there is likely to be an increase in traffic flows along the whole of the A66 corridor. As such, it is anticipated that greenhouse gas emissions will increase. In addition, the limited traffic modelling has shown that the schemes will likely lead to increases in speed across existing single carriageway sections but decreases along sections that are currently dualled. Increased speed would have an adverse effect on emissions due to vehicles operating at lower fuel efficiency.

Through dualling, however, it is likely that slow moving traffic will be reduced, particularly around Kirkby Thore and Kirkby Stephen. The reduction in slow moving traffic will decrease emissions. Therefore, the reduction in slow moving traffic and reducing queuing at the A6/A66 junction would have a beneficial impact on greenhouse gas emissions as vehicles are operating closer to optimum efficiency. Furthermore, the creation of a bypass along the A685 corridor would reduce journey distances for any traffic heading to the north-east from the M6.

Overall, on balance, a neutral impact is anticipated due to the potential increases / decreases in greenhouse gas emissions.

Landscape
The landscape along the majority of the scheme corridor is predominantly rural with nucleated settlements / dispersed farmsteads, though there are already urbanising influences, including transportation corridors, industrial / commercial areas and high voltage pylons in the vicinity of the scheme corridor. Online widening as part of the schemes would result in changes to the character, local landform and disruption to the existing field pattern and introduce further urban elements into the landscape. This would reduce the quality of the landscape, visual amenity and landscape setting of heritage assets. However, there are opportunities through environmental design measures, including landscape planting and introduction of false cuttings, to minimise the impact and replace some landscape features.

The schemes will have a greater adverse impact on the wider landscape character where the schemes go off line as they will bisect currently rural areas situated away from existing transportation corridors. The schemes also have the potential to affect the character or visual amenity from the North Pennine AONB through offline / online widening and establishment of weather resilience measures (e.g. snow fencing). Also the Kirkby Stephen bypass would affect the extended area of the Yorkshire Dales National Park.

Townscape
As a result of the Kirkby Stephen scheme, there is likely to be an improvement in the quality and character of the townscape due to the reduction in traffic flows through the settlement.

Historic Environment
The schemes lie within / in close proximity to the 169 Scheduled Monuments (SM) and significant numbers of Listed Buildings & Conservation Areas. Online and offline widening as part of the schemes may have a potentially adverse impact on fabric and setting of SMs, Conservation Areas and Listed Buildings. There is also potential to enhance / improve the setting of monuments at Kirkby Thore and Carkin Moor by moving traffic away from the assets. There is likely to be improvements / deterioration in the setting of listed buildings and conservations areas due to the schemes dependent on whether the schemes are moving traffic away or closer. There is a high potential for disturbance of buried known and unknown archaeology associated with all archaeological and historical periods, particularly for offline widening elements of the scheme.

Biodiversity
Some of the schemes cross the River Eden SAC and lie in close proximity to Natura 2000 sites and SSSIs. Online and offline widening, particularly the bypass around Kirkby Thore which forms part of the Temple Sowerby to Brough dualling, may have a potentially large adverse impact on the Natura 2000 sites and other designated ecological sites. Potential moderate to slight adverse impacts upon priority habitats, including traditional orchards, lowland dry acid grassland, deciduous woodland and semi-improved grassland, as land take is needed for the online widening and the offline sections. The loss of such habitats is primarily associated with the Temple Sowerby to Brough dualling.

Water Environment
The nearest significant watercourses to the schemes are the River Eden and River Greta. There are also a number of ordinary watercourses which are within/immediately adjacent to the Scheme corridor. The schemes also have the potential to adversely affect drinking water supplies and the ability of the watercourses to support biodiversity, particularly the River Eden SAC.

The majority of the Scheme corridor is located within Flood Zone 1, which indicates a low risk of flooding from fluvial sources. However, sections of the A66 and A685 are situated within a mixture of Flood Zones 2/3 indicating a medium/high risk of fluvial flooding. The Environment Agency's Risk of Flooding from Surface Water Map shows the majority of the Scheme corridor is at very low and low risk of flooding. However, there are isolated areas where a medium to high risk of surface water flooding has been identified, particularly around Warcop, Kirkby Thore and Smallways. The schemes also have the potential to reduce the capacity of the floodplain and increase surface water run-off due to an increased area of impermeable surfaces, though this is anticipated to be mitigated through inclusion of attenuation features within the design of the scheme.

There are water abstraction licenses from groundwater sources but no groundwater source protection zones within close proximity to the schemes. The underlying groundwater along the scheme corridor is classified as a mixture of low importance to high importance aquifers. The only Groundwater Source Protection Zone (SPZ) within 2km of the Scheme corridor is at the western end at Penrith; the corridor runs through Zone 3 of this SPZ. Therefore, the A6 / A66 junction improvements may have an adverse impact on the underlying groundwater.

3.9 Whole life value assessment (extant methodologies).

In line with the DfT's WebTAG, the costs associated with the development, construction, operation and maintenance of each Option have been accounted for and the impacts have been assessed over a 60 year appraisal period from option opening.

The Options are expected to have a 120 year design life. In line with the guidance provided in WebTAG unit A1.1 Cost Benefit Analysis, the residual value of the option has not been included in the appraisal.

3.10 Key findings from the strategic and economic cases

The strategic and economic cases for the schemes lead to the following conclusions:

- Dualling the A66 will provide many strategic benefits, many of which are not quantifiable within this study. Based on the quantifiable benefits this option is shown to generate sufficient benefits to warrant further appraisal of the strategic and economic case for this improvement.
- The improvement to the A6/A66 junction is shown to provide the best economic case of the option, although more detailed junction modelling will be required to confirm the benefits of this option.
- Of the two partial dualling options the Temple Sowerby to Brough section has a stronger economic and strategic case than the Scotch Corner to Greta Bridge option given its length and the relative extent of current issues on each section.
- The provision of a bypass to Kirkby Stephen on the A685 provides very poor value for money and the National Park constrains the improvements which can be made without generating considerable environmental disbenefits.

3.11 Recommendation – the preferred option (for outline business case)

The recommendation of the strategic and economic assessment of the options for improving the A66/A685 corridor is that all options with the exception of the Kirkby Stephen By-pass are taken forward for further more detailed appraisal.

4. Commercial and Procurement case

4.1 Market analysis

Market analysis is a key aspect, both in terms of informing option design, operational /maintenance requirements and the procurement route. Given the timescales associated with delivering options, new framework contracts will need to be let by Highways England. During this process, Highways England will have the opportunity to obtain further market analysis, ensuring that preferred suppliers can offer the range of capabilities required to progress the options.

The construction timeframe is anticipated to coincide with a period of innovation within the motor vehicle industry and change in travel patterns, as well as other wider changes, such as changing social mobility, agglomeration of populations back into cities and changes to goods distribution models. Technology will play a developing role, ensuring that the scheme is fit for purpose over its whole life. As a result, continued market analysis to monitor developments in technology will also be essential and used to inform and update the commercial and procurement strategy.

4.2 Supplier relationship

Highways England works closely with stakeholders and suppliers to ensure that their road network is safe, efficient and meets the needs of road users. The Highways England Strategic Business Plan states that an integral part of the strategy for improving the capacity and performance of the network involves continuing to build relationships with partners, helping Highways England to meet the increasing investment challenge by:

- changing the way Highways England design and package work;
- working with suppliers to develop their capacity and capability;
- working with Transport Focus to better understand and improves people's experience on the network; and
- working more closely with regional and local partners tasked with delivering economic growth.

Furthermore, Highways England's Supply Chain Strategy notes that developing collaborative relationships is a key aim, allowing Highways England to draw more strongly on learning and innovation from both UK and overseas best practices. Currently, Highways England utilises the Collaborative Delivery Framework (CDF) to procure design, construction and professional services in a cost effective way. A key element of the CDF is collaboration and knowledge sharing amongst the suppliers to promote innovation and best value. Aligned with this, the CDF includes the Collaborative Performance Framework (CPF), a tool used to monitor performance but also obtain client feedback.

4.3 External factors

The key external factors (strategic risks and dependencies) have the potential to impact on the commercial viability and procurement options available to Highways England. The Strategic Case Sections 2.3.6 to 2.3.9 provide further details.

4.4 Commercial and Procurement strategy and Procurement options

Highways England's procurement framework for the delivery of major highway schemes is known as the CDF. It provides a procurement route for any project over £15m thus avoiding individual OJEU procurement events. The principles of the CDF are to achieve continuous improvement in health and safety, sustainability, quality, time and cost.
Suppliers to progress any of these options would be appointed through CDF.

The arrangement with the existing supplier to deliver this study is due to terminate in Autumn 2016. If the scheme enters the next stage of assessment, suppliers on the CDF would be invited to tender for the work to deliver the Options Phase of PCF.

4.5 Commercial estimates / performance management /assurance

These elements are discussed in Chapters 5 and 6.

4.6 Risk and issue management - risk allocation and transfer

External risk allocation and transfer will be defined as per the CDF. Highways England's Project Manager would be primarily responsible for risk management and the dissemination of information at regular intervals to the SRO and Project Board.

4.7 Human resources – including TUPE

There are no personnel or TUPE impacts from this scheme.

4.8 Procurement timelines

The table below outlines the activities and indicative timescales to appoint a highways design / traffic modelling supplier. This is based on estimated timescales for appointing a supplier from the CDF.

No.	Activity	Duration
1	Tender documents preparation (Project Team)	1 week
2	Undertake supplier capacity and capability check	1 week
3	Time given to suppliers to submit their tenders	2 weeks
4	Assessment of tenders	1 week
5	Standstill period	1- 2 weeks
6	Target Cost Negotiation	1 -2 weeks
Total Duration		7-9 weeks

5. Financial case

5.1 Impact of accountancy and tax treatments

The accountancy and tax treatments associated with the scheme are not known at this stage as they depend, to a certain degree, on the final procurement approach adopted. Subject to investment approval, these factors will be investigated in detail during PCF Stage 1.

5.1.1 Tax implications

All tax implications are not currently known. However, Non Recoverable VAT will be payable on any option where the majority of the works will be outside of existing Highways England boundaries.

5.1.2 Balance sheet

The balance sheet implications are not known at this stage.

5.2 Financial appraisal

Scheme cost estimates have been produced by Highways England's commercial estimating team for each of the options. These have been developed based on indicative scheme drawings produced by the project team. Maximum (P90), most likely (P50) and minimum (P10) cost estimates have been produced accounting for different levels of uncertainty.

5.2.1 Full financial model

Key assumptions informing the generation of the capital costs include:

- Options and Development Costs – PCF Stages 1-5
- Land – Estimates of the land acquisition costs have been provided by Land Valuation Team. Other elements have had to be estimated, including any properties required for Compulsory Purchase Order (CPO).
- Construction – Using the high level construction programme developed for each Option and drawing on Highways England's Commercial Services Division's cost databases and tools. Includes preliminaries and method related costs.
- Non recoverable VAT – This is derived from an estimate of the proportion of works value outside the highway boundary, to the nearest 5%
- Project Risks – The Risk Register forms the basis of the Project Risk Assessment included in the cost estimate
- Uncertainty – Where risks are difficult to quantify with any precision, project specific adjustments are included
- Programme Risk and Inflation

5.2.2 Summary of costs

The table below summarises the outturn costs for each of the options.

Option	Minimum	Most Likely	Maximum
Dual A66	[redacted]	[redacted]	[redacted]
A6 / A66 Junction improvement	[redacted]	[redacted]	[redacted]
Dual Scotch Corner to Greta Bridge	[redacted]	[redacted]	[redacted]
Temple Sowerby to Brough Dualling	[redacted]	[redacted]	[redacted]
A685 Kirby Stephen Bypass	[redacted]	[redacted]	[redacted]

Outturn Cost Estimates

5.2.3 Efficiency Plan

Highways England is committed to delivering VfM for the public and has a commitment to deliver total efficiency savings of over £2.6bn over a 10 year period beginning in 2015. Highways England intends to add value benefits through:

- Reducing costs to deliver the same product and / or outcomes
- Producing higher quality / longer lasting products
- Early or increased realisation of benefits
- Reduction of negative economic consequences

The scheme will continue to be developed in line with the guidelines set out in Highways England's Efficiency and Inflation Monitoring Manual. The manual lays out the approach to measuring, recording and monitoring efficiencies as committed in the Highways England Delivery Plan 2015-2020

5.2.4 Budget arrangements

Funding for the scheme is to be provided from DfT / Highways England budgets.

5.2.5 Funding profile and affordability

The table below presents the funding profiles developed by the Highways England commercial team for each of the options.

	16/17	17/18	18/19	19/20	20/21	21/22	22/23	23/24	24/25	25/26	26/27	27/28	28/29
	yr 1	yr 2	yr 3	yr 4	yr 5	yr 6	yr 7	yr 8	yr 9	yr 10	yr 11	yr 12	yr 13
Dual A66	[redacted]												
A66 / A6 junction improvement	[redacted]												
Dual Scotch Corner to Greta Bridge	[redacted]												
Temple Sowerby to Brough Dualling	[redacted]												
A685 Kirkby Stephen Bypass	[redacted]												

Funding of Project Costs (£m)

5.3 Risk and issue management / finance risks

Section 6.9 of the Management Case provides details of the risk and issue management process that has been used for PCF Stage 0 and will continue to be used for subsequent PCF Stages. A summary of the risks surrounding the costs estimates and funding are provided below:

- Scheme cost estimates – The forecast cost of the schemes are an order of magnitude estimate, and as such, there is a risk that the cost / construction programme is likely to change when the design of the schemes are developed in more detail
- Inflation – Given the timescales for completion of the schemes, there is a risk of change in the rate of inflation (both up and down) which could mean that actual inflation is different to the forecast rate of inflation included within the estimates.
- Operation / maintenance cost estimates – No detailed assessment of operation and maintenance cost changes has been included at this stage.
- Land cost estimates – Land cost estimates have been prepared as a desktop exercise and there is therefore a risk that the costs and time associated with acquiring land may change as a result of further assessment in the future.
- Timescale estimates – Broad assumptions have been made with regard to the time required for acquiring land and following statutory planning processes, which means that there is a risk that these processes will take longer and be more costly than has been assumed.
- Ground conditions – Unforeseen ground conditions could impact on the delivery of the schemes, representing additional cost in delivering technical solutions and costs resulting from delays.
- Funding – Specific funding has not been secured. The costs associated with the development and construction of the schemes are significant. Locking in funding will be important to the development of the scheme.

5.4 Employee and non-employee resource plan/assumptions

Resource plans and associated assumptions are generated on a phase-by-phase basis. Subject to investment approval, study team consultants will be chosen from the CDF preferred suppliers via a competitive mini-tender process for the Options phase of the study. Following this process, Highways England will have a clear plan of resource requirements and associated assumptions.

5.4.1 Full-time equivalent employee labour requirements planned

The employee labour requirements are not known at this PCF stage.

5.4.2 Full-time equivalent non-employee labour requirements planned

The non-employee labour requirements are not known at this PCF stage.

5.5 Funding arrangements

The funding arrangements for the next stage are not currently known.

6. Management case

6.1 Introduction and objectives

The Management Case assesses whether the option is deliverable. In line with the DfT Transport Business Case guidance, an explanation of the project planning, governance structure, risk management, communications and stakeholder management, benefits realisation and assurance elements of the proposal are provided. The aim is to provide a clear understanding of what needs to be done, as well as why, when and how, with measures in place to identify and manage any risks. The details outlined are applicable to all Options as, at this early stage in the study process, the details of the overall management structure adopted for the development and construction of any of the Options are the same, regardless of which option is taken forward.

Project Control Framework (PCF)

The overall management of the project will be in accordance with Highways England's PCF (which sets out how Highways England, together with the DfT, manage and deliver major improvement projects.

6.2 Programme/project dependencies

The delivery of any option has a number of internal and external factors upon which the option depends. The known project dependencies and how they relate to option delivery are set out in Section 2.3.9.

6.3 Programme/project governance, organisation structure and roles

The project will be governed by a Project Board. The Project Board includes the SRO, Senior User and Senior Supplier. The board is supported by the Project Manager and various technical specialists from Highways England and supply chain at the request of the SRO. The Project Board will be appointed as part of starting up the project.

Assurance for the project will be carried out under the Highways England ICF processes, Highways Investment Board, and internal Major Project procedures, such as the Project Control Framework. On entry to the Project Control Framework the option will be subject to peer reviews and audits such as OGC Gateway Reviews and Stage Gate Assessment Reviews.

6.4 Programme/project plan

A high level plan showing each stage of the PCF delivery process is contained below.

For all of the proposed options, it is assumed that PCF Stage 1 to the end of Stage 5 will follow the same timeframe as detailed below:

Stage	Date
PCF Stage 1 Start: Options Identification	Jan-17
PCF Stage 1 End: Options Identification	Aug-18
PCF Stage 2 End: Options Selection	Sep-19
PCF Stage 3 End: Preliminary design	Apr-20
PCF Stage 4 End: Statutory Procedures and Powers	May-21
PCF Stage 5 End: Construction Preparation	Dec-21

For PCF Stage 6 (Construction, Commissioning and Handover Open for Traffic) and Stage 7 (closeout), the durations will be variable depending on the options as detailed below:

Stage	Date				
	Dual A66	A66 / A6 junction improvement	Dual Scotch Corner to Greta Bridge	Temple Sowerby to Brough Dualling	A685 Kirkby Stephen Bypass
PCF Stage 6 End	Dec-26	Jul-23	Jul-24	Dec-26	Jan-24
PCF Stage 7 End	Dec-26	Jul-23	Jul-24	Dec-26	Jan-24

6.5 Communications and stakeholder management

A detailed communications and stakeholder management strategy has not been developed at this stage as the scheme is not currently within a forward delivery programme. A Communications Plan was developed for the study and this will be shared to inform the development of a Communications Plan during start-up of the scheme. A Stakeholder Reference Group was established for the study which included representatives from the local authorities, combined authorities, local enterprise partnership, campaigners, and other statutory bodies. The Reference group met at the end of each stage and enabled the stakeholders to input to the study and provide feedback on the emerging findings. This was supplemented by informal stakeholder engagement exercises with local highways authorities and others as appropriate.

There will be a requirement to conduct formal consultation with the public to confirm the preferred route. Further consultation with statutory bodies will also be required at key milestones in line with best practise and statutory procedures. Consultation with statutory undertakers has not been undertaken as part of the feasibility study and will be done in PCF stage 1.

6.6 Programme/project reporting

On entry to PCF, the Project Team and Project Board will be established. The Project Board will be chaired by the Senior Responsible Owner for the project, and attended by the Senior User (NDD representative) and Senior Supplier (usually the Supplier Director) and other attendees at the discretion of the SRO. The timing of project board meetings will be date or event driven, as appropriate and decided by the SRO.

The Project Manager will be responsible for providing relevant reporting to inform the Project Board of project progress and other matters. Highlight reports for the project board are likely to include an update on: progress against milestones, key issues and risks, actual and forecast financial information, forward look, and items escalated to the Project Board for consideration/a decision. The format and content of these reports will be agreed with the SRO, as part of establishing the project board and defining the Terms of Reference during the start-up phase of the project.

Financial reporting will be carried out in accordance with the requirements of Major Projects Portfolio Office and statutory processes.

On entry to PCF, the scheme will be subject to audits and reviews through the Stage Gate Assessment Review and the Office of Government Commerce Gateway Review processes. The outcomes of these reviews will be provided to the Senior Responsible Owner.

6.7 Implementation of work streams

The key work streams for executing the work are all contained within the table in section 6.4.

6.8 Change management

A Change Management Plan has been established, outlining how changes are proposed, accepted, monitored and controlled and addressing the following activities:

- Identification and inventory of change requests;
- Analysis and documentation of the impact of requested changes;
- Approval or rejection of change requests; and
- Tracking changes and updating of project documentation to account for approved changes.

For the next PCF Stages, the change management process will continue to be undertaken in line with the Highways England PCF protocols. The stages required in the process to control change include as a minimum: clear identification of a requested change, the assessment of its impact, agreement to proceed with the change and re-baselining of scope, time, cost, quality, and is owned and administered by the Project Manager.

6.9 Risk and issues management

A proportionate level of assessment has been undertaken, at an appropriate level of detail for a strategic study.

The key risks are:

1. The findings of the strategic study are indicative; therefore there is a risk that the value for money assessment and BCR calculation could change as a result of further assessment using a bespoke transport modelling tool in the next stage.
2. The option concepts have been based on high level designs. Detailed design may identify issues which mean that the concepts are not deliverable as they stand.
3. The forecast cost of the option identified by the study is an order of magnitude estimate. Therefore there is a risk that the costs are likely to change when the solution is designed.
4. The assessment of the technical feasibility and deliverability of options undertaken as part of the study is heavily reliant on engineering judgement and may change as a result of further assessment.
5. Lands cost estimates have been prepared as a desk top exercise as part of the study. There is a risk that the costs and time associated with acquiring land may change as a result of further consideration in the next stage.
6. Broad assumptions have been made about the time required for acquiring land and following statutory planning processes (where applicable). Therefore, once these issues are considered in more detail, there is a risk that these processes will take longer and be more costly than have been assumed.

On entry to the Project Control Framework, a risk workshop would be held to identify the delivery risks to the option.

6.10 Benefits realisation plan

Following successful delivery of the option, it will be important to determine whether the forecast impacts of the option and anticipated benefits have materialised. As such, a robust strategy will be put in place for both the benefits realisation and the associated monitoring and evaluation and a Benefits Realisation plan developed. The Plan ensures that a process is in place to assess whether the option objectives have been successfully realised. As part of this plan, a programme of monitoring will be established from pre-construction through option construction, and for a period of up to 5 years post-option opening.

A Benefits Realisation Plan enables benefits that are expected to be derived from the project to be planned for, managed, tracked and realised. The most important element of a successful project is that it delivers its intended outcomes. An outcome is a result of change which affects real world behaviour or circumstances, and may lead to one or more benefits. A benefit is a measurable improvement resulting from the changes and outcomes introduced by the project. A benefit must be perceived as an advantage by one or more stakeholders.

Benefits management evolves as the project progresses, and is one of the few elements of project delivery which spans the whole lifecycle of the project, from conception to evaluation to post delivery.

6.11 Programme/project reviews

Programme / project reviews will continue be undertaken in line with the requirements of the PCF, ensuring that the project is keeping to the programme timeframes, and also to identify any issues or problems that may impact delivery of the option. The key review formats include:

- ***Stage Gate Assessment Review (SGAR)*** – evidence based review intended to draw on documentation and activities already produced to ensure that the project has followed the PCF and is ready to proceed to the next stage, subject to investment authorisation.

- ***Independent Assurance Review (IAR)*** – IARs take the form of a 'peer review', whereby independent project managers from outside the project examine the process and likelihood of successful delivery of the project. It is a mandated assurance process for all publically funded major projects.

- ***Operations Technical Leadership Group (TLG)*** – In order to ensure that best practice is applied across relevant programmes of work, the project will be required to present operational solutions to the Operations TLG. The review by the TLG will enable the sharing of knowledge and will achieve consistency of approach across designs.

6.11.1 Reviews completed

The SOBC and supporting documentation have been subject to both a SGAR and IAR at PCF Stage 0.

6.11.2 Project evaluation reviews

On entry to PCF, the option will be subject to audits and reviews through the Stage Gates Assessment Review (SGAR) and the Office of Government Commerce Gateway Review processes.

6.11.3 Post implementation review

Major Projects with a capital cost of over £10m are subject to the Post Opening Project Evaluation process. The evaluation will compare the anticipated costs, benefits and other impacts (dis-benefits) with the outturn situation at one and five years after opening. During the development of the scheme it will be necessary to develop a scheme evaluation plan to set out and agree the scope of the post opening evaluation.

6.11.4 Post project review

A post project review is important for evaluating and learning from the project lifecycle. It enables the project team to define what has been achieved by the investment of money and time into implementation. A project review would be undertaken at the end of the study, should the project receive the necessary investment approvals through to construction.

6.12 Lessons learnt

Recording lessons learnt will be a “live” process that happens throughout all the PCF stages in the delivery of the project.

6.13 Contingency plan

If the option enters the next stage of development, and there is a risk of premature closure, it would be possible to establish break points in the contract before it is awarded to a supplier. This would allow the project team to commission the work in stages, and help to facilitate early closure if the risk materialises. All Highways England contracts include standard termination clauses which explain the circumstances in which a contract may be terminated and the subsequent impact.

6.14 Management case findings and conclusions

If the scheme enters the next stage of development, it will be managed in accordance with PCF best practice, and OGC assurance processes.

The standard list of PCF deliverables will be reviewed with the SRO to tailor the requirements of PCF to the project.

7. Annexes

7.1 Stakeholders

• Associated British Ports (Port of Barrow)	• Gateshead Council	• Port of Blyth
• Association of North East Councils	• Hartlepool Council	• Port of Sunderland
• BHS County Access and Bridleways Officer	• Historic England	• Port of Tyne
• Campaign to Protect Rural England (CPRE)	• Lake District National Parks Authority	• Port of Workington
• Carlisle	• Lancashire Council	• Ramblers Association
• CBI North East	• Lancashire LEP	• Redcar & Cleveland Council
• CBI North West	• Middlesbrough	• Road Haulage Association
• Cleveland Police	• National Farmers Union	• South Tyneside Council
• Confederation of Passenger Transport	• National Trust	• Stockton on Tees Council
• CTC - The National Cycling Charity - NE	• Natural England	• Sunderland Council
• Cumbria Chamber of Commerce and Industry	• Network Rail	• Tees Valley LEP
• Cumbria County Council	• Newcastle Upon Tyne Council	• Transport for the North
• Cumbria LEP	• Nexus	• Transport Scotland
• Cumbria Police	• North East Chamber of Commerce	• Wildlife Trusts
• Cumbria Tourism	• North East Combined Authority / NE LEP (Chairman)	• York, North Yorkshire & East Riding LEP
• Darlington Council	• North East LEP	• Peel Ports – Dublin, Glasgow, Liverpool, Heysham, Manchester and Sheerness
• DfT Regional Engagement Team	• North Tyneside Council	• Friends of the Lake District
• Durham Council	• North Yorks LEP	• Northumbria Police
• Durham Police	• North Yorkshire Authority	• Friends of the Earth
• Environment Agency	• North Yorkshire Police	• Northumberland Tourism
• Federation of Small Business (North East)	• Northern Rail	• Freight Transport Association (FTA)
• Federation of Small Business (North West)	• Northumberland County Council	

7.2 Long List of Options

Intervention Category	Ref	A66 Corridor - Potential Options
Route Long Interventions	2.1	Dual the whole of the A66 corridor.
	2.4	Fewer junctions and/or provision of local access roads.
	2.10	Review of all diverge points and right-turn lanes and improve where required.
	2.11	Improvement/grade separation of key junctions.
	2.15	Enable one lane to remain open in each direction at all times on dual carriageway sections.
	2.17	Introduction of technology to improve information provision
Route Long Interventions (Weather Resilience)	2.2	Upgrade the pavement surfacing to a more resilient material.
	2.5	Wind barriers or planting to provide protection to vehicular traffic.
	2.7	Improved information on wind and snow issues.
	2.8	Flood risk mitigation.
	2.16	Additional maintenance equipment such as snow ploughs or a salt depot stored centrally along the A66 route, in order to ensure more efficient operations.
	2.18	Introduction of snow fencing.
Individual Highway Interventions	2.3	Grade separation of the A6/A66 roundabout junction.
	2.9	Realignment of the carriageway to the north of Kirkby Thore.
	2.12	Improvements to the A66/Main Street priority junction at Kirkby Thore.
	2.14	There are a large number of HGVs generated by an industrial area midway along Section 6 (near Kirkby Thore). Consideration should be given to the grade separation of the access junction.
	2.19	Introduction of gradual extension to dual carriageway sections to improve merging of traffic at dual/single sections.
	2.20	Dual Section 9 (Scotch Corner to Greta Bridge).
	2.21	Improvement of A688 between the junctions with the A66 and A1 as an HGV route.
	2.22	Dual Section 6 (Temple Sowerby to Brough).

Intervention Category	Ref	A685 Corridor - Potential Options
Route Long Interventions	3.1	Dual the whole of the A685 corridor.
	3.3	Potential for a new HGV route either following a straight alignment or via a tunnel.
	3.4	Remove A685 from PRN.
Individual Highway Interventions	3.5	Construct a by-pass around Kirkby Stephen.
	3.6	Modifications to Kirkby Stephen to facilitate HGV movements.

7.3 Option Summary

Summary of Options and NPV

OPTIONS ANALYSIS					
	£'m	**£'m**	**£'m**	**£'m**	**£'m**
OPTION	**Dual A66**	**A66 / A6 junction improvement**	**Dual Scotch Corner to Greta Bridge**	**Temple Sowerby to Brough Dualling**	**A685 Kirkby Stephen Bypass**
BENEFITS	£370m (PVB)	£86m (PVB)	£26m (PVB)	£176m (PVB)	£12m (PVB)
ONE OFF CAPITAL COSTS	£631m (PVC)	£48m (PVC)	£63m (PVC)	£239m (PVC)	£53m (PVC)
ANNUAL RUNNING COSTS	Not quantified	Not quantified	Not quantified	Not quantified	Not quantified
WHOLE LIFE COSTS – 17 YRS	Not quantified	Not quantified	Not quantified	Not quantified	Not quantified
CONTINGENCY COSTS	Included in capital costs	Included in capital costs	Included in capital costs	Included in capital costs	Included in capital costs
NPV	-£261m	£38m	-£37m	-£63m	-£41m
RISK	Not quantified	Not quantified	Not quantified	Not quantified	Not quantified
COMMENTS					