

The Northumberland Line

Economic Narrative

Northumberland County Council

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Quality information

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1. Introduction to the Economic Narrative

1.1 Purpose

The purpose of the Economic Narrative is to articulate why the transport investment is needed to achieve economic objectives and how it is expected to achieve these. Through this process, the narrative defines the scope of the analysis in terms of the impacts to consider and the mechanisms through which these are expected to occur. The Economic Narrative sets out the context for the subsequent analytical methods required to capture and quantify the expected impacts.

TAG guidance strongly emphasises that the economic impacts of transport investment are context specific. The economic impacts depend on agents' responses to a specific shock; in particular the capacity and capability of agents to take advantage of the opportunities made available and the relative size and scale of these opportunities relative to the base case. This has two implications for appraisal:

- i. The inclusion of economic impacts within transport business cases should be considered an integral part of the appraisal design and not an add on at the end of the process; and
- ii. When applying TAG in scheme appraisal, the approach taken should be selective and not mechanical; it should be applied on the basis of a scheme's expected economic impacts.

TAG highlights that given the importance of context specificity in understanding the economic impacts; the first stage of the appraisal process should be the development of the Economic Narrative.

In summary, the Economic Narrative is the main tool through which scheme promoters articulate and justify why a transport investment is needed to achieve the economic objectives set out in the Strategic Case as well as defining and justifying the scope of the analysis.

To this end, the Economic Narrative for the Northumberland Line scheme includes information on the following:

1. Identification of the expected positive and negative economic impacts and a description of the extent to which these are expected to achieve any economic objectives in the Strategic Case, as well as any significant unintended economic impacts of the scheme;
2. Justification of why these impacts are expected to occur on the basis of economic theory and context specific evidence;
3. Identification of the welfare change associated with these impacts, arising, for example, from market failures;
4. Identification and justification of the proportionate level of analysis to quantify and value the impacts.

1.2 Narrative Overview

This report complements the Economic and Strategic Cases in the Outline Business Case and sets out the economic rationale for the scheme. This report also shows how the proposed scheme will achieve national government and regional regeneration objectives in an area adversely affected by the decline in the mining industries that has struggled to recover. The impacts of this decline have been compounded by a lack of good transport connectivity and a 'cycle of decline'. The narrative is supported by consultation with local businesses and stakeholders.

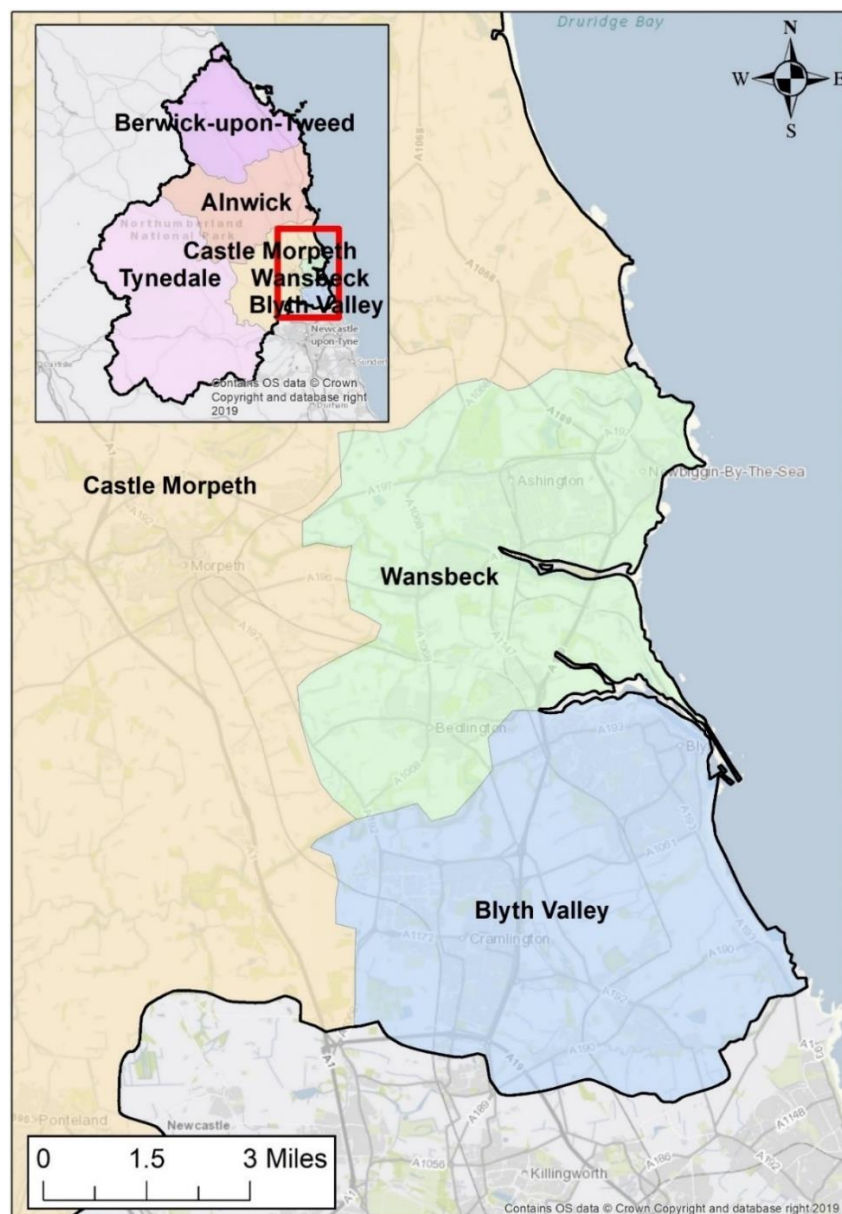
This narrative provides evidence of the process by which the railway line will act as a much-needed catalyst for economic development and growth in the South East Northumberland area. The area has faced, and will continue to face, economic challenges, which have been inherent in the region since the early 1990s. Whilst there is evidence of growth in some areas, it is at a much slower rate than the rest of the region and nationally. This is not helped by the low levels of skills in the area.

Compounding the issue of slow economic growth in the area is the poor transport connectivity within, and beyond, South East Northumberland. Whilst there are good highway links to North Tyneside and Newcastle, the network is congested in peak periods and journey time reliability is an issue. Whilst a comprehensive bus network connects South East Northumberland with Tyne and Wear, journey times are long and services suffer from the same congestion issues as cars. There is no rail network currently serving the South East Northumberland communities of Ashington and Blyth and those wishing to travel by rail must travel further afield to Cramlington, Morpeth or into Tyne and Wear. All of these factors mean that the South East Northumberland area is perceived as being relatively isolated with the implications this has for inward investment, the retention of young people (who need to find employment opportunities) and the development of the necessary skills that are so essential to attracting new businesses, especially those in higher value sectors.

As well as the 'traditional' economic impacts such as monetised journey time savings (captured in the initial BCR assessment), this economic narrative aims to demonstrate how the Northumberland Line will be a catalyst for economic development and regeneration in South East Northumberland and the surrounding area.

For the purposes of the economic narrative, the area primarily being considered is the former districts of Wansbeck and Blyth Valley, which is the area the railway line passes through. The former districts are illustrated in Figure 1-1 below and the study area is further discussed in Appendix A.

Figure 1-1: Northumberland Line Former Districts



Quantification of the wider economic benefits of the Northumberland Line uses outputs from the Northumberland Line transport modelling, which incorporates the full catchment area of the line.

1.3 Regional Economic Context

The last thirty years have seen the North East region, and Northumberland, undergo significant economic changes as the manufacturing sector has declined. Many of the urban areas, including South East Northumberland, were built around the ship building and mining industries, which closed in the 1980s, leading to high levels of unemployment and social deprivation across the area.

The North East region has seen some successes in recent years and productivity within the region is growing. However, the region is still fragile and economic growth lags behind that of other regions. As a consequence, there are still large pockets of deep economic and social deprivation across the region. The drivers of this economic growth that has occurred have been the main urban centres of Newcastle/Gateshead and Sunderland, and these cities have become significant attractors of travel demand from across the study area as a consequence. Census data shows that Newcastle and North Tyneside are important locations for employment for residents of South East Northumberland.

There is a section of society that has been left behind by this growth and remains workless and often without qualifications. These people require assistance across a range of interventions to help them get back into work – transport is a part of that assistance once the decision to seek training and work has been taken, especially where work opportunities and pockets of unemployment are not close by.

Population changes have seen the number of people living in outlying parts of the North East, including Northumberland, increase, as people seek a better quality of life or take advantage of lower house prices. This drift of population to outer areas of the North East has clear consequences for travel demands and behaviour, which the transport network has not yet fully adjusted to.

The existing North East has an economy that is reliant on the public sector, manufacturing and healthcare for its wealth. These key sectors have individual transport requirements, not least the requirement to assemble a workforce into one place at the start of every day. Going forward however, the region has strong aspirations for economic growth to ensure the region challenges the rest of the UK in terms of productivity and is less reliant on the public sector for employment. Crucial to achieving this growth will be exploiting the potential of emerging sectors in advanced engineering, life sciences, the digital economy and professional services. Transport networks have a role to play in achieving this potential and it is important that transport links from South East Northumberland are improved if the South East Northumberland area is to benefit from this economic growth.

1.4 Structure

Following this introductory section, the report has been prepared with the following structure to align with TAG guidance for developing the economic narrative for wider economic benefits:

- Section 2: Identification and Justification of the Expected Positive and Negative Economic Impacts
- Section 3: Identification of the Welfare Effects of Economic Impacts
- Section 4: Identification of the Proportionate Level of Analysis to Quantify and Value the Impacts

2. Identification and Justification of the Expected Positive and Negative Economic Impacts

2.1 Introduction

This chapter of the report summarises the likely economic impacts which could result from the Northumberland Line scheme and the benefits that this will have on the South East Northumberland Area.

2.2 Economic Impacts Expected from Scheme

Transport investments can have many varied economic impacts. Some may be specific objectives of the scheme, others may be unintended impacts. It should also be acknowledged that not all economic impacts will be positive, some maybe negative. For example, if a scheme results in jobs relocating to other urban areas, this dynamic clustering effect may have negative productivity impacts resulting from dis-agglomeration economies.

It is a requirement of TAG that the Economic Narrative identifies and justifies all significant positive and negative impacts which are expected to occur as a result of the scheme under consideration

The types of positive or negative wider economic impacts that may result from a scheme are outlined below, alongside commentary on whether these impacts are likely to be realised with the Northumberland Line scheme.

Induced Investment

Induced investment incorporates two areas for consideration:

- Dependent development – developments may be considered dependent on a transport scheme if the existing transport network cannot reasonably accommodate the additional traffic associated with a new development;
- Imperfectly competitive markets – benefits normally occur if a reduction in transport costs (to businesses and/or freight) allows for an increase in production or output in the goods or service markets that use transport.

Consultation has been undertaken with officers at Northumberland County Council to identify if any proposed development within the study area is considered dependent on the Northumberland line scheme going ahead. There are a number of known congestion spots on the highway network, particularly on the approaches into Tyne and Wear. Highways England has advised that they will object to any proposed development which increases the number of vehicles travelling through the A19/A189 Moor Farm junction during peak periods. In this respect, development within South East Northumberland is dependent on a transport scheme which alleviates the A19/A189 Moor Farm junction and the Northumberland Line scheme will remove vehicles from the A19/A189 junction in peak periods. At the current time however, Northumberland's Local Plan is still to be adopted and no individual proposed development has been identified a dependent on the Northumberland Line scheme. Quantification of dependent development has therefore not been undertaken.

The Northumberland Line is an existing freight railway line. Reopening the line to passenger services will have little impact on transport costs for business and freight. An increase in production or output of goods is therefore unlikely as a result of the Northumberland Line scheme. This is a view supported by businesses consulted as part of the development of the scheme. Further quantification of imperfectly competitive markets has therefore not been undertaken.

Employment Effects

Employment effects also incorporates two areas for consideration:

- Labour supply impacts - transport is most likely to be a barrier to employment when an area has poor connections to employment centres and/or high transport costs relative to incomes;
- Move to more productive jobs – most likely when accessibility is increased and jobs relocate to high productivity locations.

South East Northumberland has suffered economically since the closure of the mining and manufacturing industries in the 1980s and 1990s. There is a lack of jobs in the local area and unemployment is high. Jobs exist in neighbouring Tyne and Wear but transport connectivity to the area is poor, with long journey times by both private car and public transport. The Northumberland Line scheme will offer a new mode of transport to allow residents of South East Northumberland to access jobs in Tyne and Wear, with journey times being up to half of that using other forms of transport. The labour supply impacts of the Northumberland Line scheme are expected to be significant and quantification of these benefits has therefore been undertaken.

The Northumberland Line scheme will improve accessibility to South East Northumberland. The improved transport offer could act as an incentive for firms and/or workers to relocate. The quantification of these benefits however is challenging and would require use of a land use transport interaction model. A model such as this is not currently available and the quantification of a move to more productive jobs has not been undertaken.

Productivity Impacts

Productivity impacts most likely occur when a potential transport scheme increases the accessibility of an area to a greater number of firms and workers, thereby impacting on the level of agglomeration. Productivity impacts are most often observed when the transport scheme falls within, or is neighbouring a functional urban region.

The Northumberland Line scheme will increase the accessibility of firms within both Tyne and Wear and South East Northumberland to a wider pool of labour. People will also be able to travel more easily between existing firms within the catchment area of the railway line. It is already known through consultation with businesses that some firms are struggling to fill current vacant positions. The Northumberland Line scheme is therefore expected to have productivity benefits and quantification of these benefits have therefore been undertaken.

On the basis of the above, the potential economic impacts of the Northumberland Line scheme, which have been quantified as part of this appraisal, are summarised below:

- Labour supply impacts through making jobs more accessible to residents of South East Northumberland;
- Productivity impacts through increasing the accessibility of firms and increasing the available labour pool for current employers within the North East region.

2.3 Benefits to South East Northumberland Region

The Northumberland Line scheme will be an important facilitator of economic activity, growth and development in South East Northumberland and the surrounding area. For a relatively poorly connected area, where economic activity and development potential is underperforming due to a lack of good transport links, a new passenger train service will help to address the economic and development issues identified by offering:

- a means to improve employment levels;
- a means to address low productivity;
- a means to address deprivation and low skills levels.

As discussed in Appendix B, the South East Northumberland area has higher levels of unemployment and lower levels of productivity when compared with other areas in Northumberland, the North East and nationally. Many of the problems inherent in South East Northumberland stem from its industrial past and the area has struggled to recover and forge a new identity.

In this context, the railway line will be a facilitator of economic activity by providing much-needed connectivity to employment opportunities in Tyne and Wear and the wider region. It will also increase the labour supply for existing industries ensuring that specialist industries can draw on a much wider area to fill vacancies.

As well as impacts that could start to reverse the previous decline in employment, the improved connectivity is also likely to enhance productivity (e.g. GDP or GVA per worker) via the agglomeration benefits that will result from faster and more reliable journey times.

The wider economic impacts are expected to be 'additional' at a national level. As discussed in the appendices, the local economic context is that productivity, employment levels and skills are below national averages due to poor connectivity to opportunities in the wider region. This suggests that improvements in accessibility can be expected to have positive impacts on both employment and productivity within South East Northumberland without requiring any significant displacement of jobs or business from outside the region.

2.4 Justification for Expecting Specific Impacts

TAG Unit A2.1 states that the expected impacts should be justified on the basis of economic theory and context specific evidence. The robustness and relevance of the economic theory and context specific evidence used to identify and justify the expected economic impacts will inform the weight placed on the analysis within the value for money assessment.

The section below outlines the justification for expecting specific wider economic impacts to arise from the Northumberland Line scheme based on the specific economic context of the local area.

2.4.1 Employment Effects

Expected Impact – Higher employment in the local area

The Northumberland Line scheme will provide a new mode of transport connecting South East Northumberland with Tyne and Wear. Journey times by public transport are expected to be significantly reduced as a result of the scheme, with journey times lower than the car during peak periods. It is therefore expected that the reductions in the generalised cost of commuting will increase the number of jobs accessible to potential employees and increase the number of potential candidates for vacancies. Both effects can be expected to lead to greater levels of employment.

As shown in Appendix B, there is powerful evidence showing that employment in the South East Northumberland area falls behind that of the rest of the region and nationally. This trend has been evident since the closure of the traditional industrial sectors at the end of the last century. Whilst the area has been adjusting to this change, this has resulted in a reliance on lower paid or public sector occupations, which is impacting on the productivity of the region.

Despite the decline in traditional industry, house building has continued in the area with working-age residents typically having to travel by car out of the area to find employment. As jobs in the study area have declined, there have been significant increases in the distances travelled to work for workers who live in this area. This is most prevalent in the Wansbeck area, which has seen the percentage of people commuting 5km or less reducing from 52% in 1991 to 33.5% in 2011 (Census). Wansbeck has not seen the same investment as Blyth Valley, which benefits from the Port of Blyth and the Renewable Energy sector.

Consultation with representatives of businesses, carried out during the development of this economic narrative, highlighted the issues surrounding the lack of suitable staff to fill the skilled jobs that were available, as well as commuting issues for those who were more suitable.

By opening up new markets and by providing much better linkages between centres of employment and specific skills in the labour market, several key labour market objectives can start being met. These will include:

- Reductions in the relatively high proportion of people in unemployment;
- Reductions in the dependency on historical forms of employment;
- Increases in employment in higher value sectors;
- Increases in labour market diversification.

2.4.2 Productivity Impacts

It is expected that the Northumberland Line scheme will address low productivity in the following ways:

- Reducing the barriers to business interaction created by current poor accessibility between South East Northumberland and Tyne and Wear. These benefits are expected to arise from improved labour market interactions, knowledge spill-overs and linkages between intermediate and final goods suppliers.
- Addressing deprivation and low skills levels to support increases in employee productivity – increasing the range of employment opportunities available to current and potential employees is expected to address skills shortages in the local economy leading to increased productivity for local businesses.

Expected Impact – Reducing barriers to business connectivity supporting increases in productivity

Areas of low productivity is one of the most important areas of concern to the Government given that UK productivity as a whole lags behind that of our European neighbours (and other countries). As described in Appendix B, and summarised in the figure below, productivity is even lower in Northumberland, and has been falling. When assessing GVA per head of population, productivity is estimated at just over 60% of the UK average.

Figure 2-1: GVA per Head in Northumberland as a % of National Average



The passenger service will directly address the current connectivity issues by increasing the number and range of employees who can realistically commute to work in the area.

TAG Unit 2.4 states that it expects productivity impacts to occur in Functional Urban Regions (FURs), or outside of FURs if the transport scheme improves accessibility to a local employment centre. Newcastle-upon-Tyne is identified as the core area of a FUR, with South East Northumberland forming the hinterland to this FUR. Given that the area to benefit most from the Northumberland Line scheme is within the FUR, and that the scheme improves accessibility to the key regional and employment centre of Newcastle-upon-Tyne, the productivity benefits from the scheme can be expected to be noticeable.

Expected Impact – Addressing deprivation and low skills levels to support increases in employee productivity

Although there is no direct means of quantifying how much new transport infrastructure can reduce relative levels of deprivation and help to improve skills levels in an area, there is no doubt that South East Northumberland's poor transport connectivity to Tyne and Wear has played a part in the deprivation levels observed in the area as well as the low level of skills attainment.

The decline of traditional industries in the area has not been matched by increases in activity in 'replacement' economic sectors and long journey times to neighbouring Tyne and Wear, where many of these 'replacement' economic sectors have located, has exacerbated this.

As a result, the indices of multiple deprivation (IMD) have shown that compared to the national average, deprivation in South East Northumberland remains high across a number of different measures. By helping the process of stimulating economic activity through improved transport links such as the Northumberland Line, long term improvements in deprivation will be possible as local people will have more opportunities both within South East Northumberland and in Tyne and Wear via better links to a wider range of jobs and training opportunities.

A more economically active – and less deprived – local population will also generate more GVA per head and will help kick-start a virtuous process whereby increases in wealth allow relative deprivation levels to subside over time. As more of the local population enters the labour market and becomes economically active, the underlying reasons for current deprivation will start to be addressed.

3. Identification of the Welfare Effects of Economic Impacts

3.1 Introduction

In section 2 of this report, the expected economic impacts of the Northumberland Line scheme have been identified. As outlined in TAG Unit A2.1, the next stage of analysis is to identify the effect these will have on welfare (cost benefit analysis).

The starting assumption of all transport appraisals is that the welfare effects of economic impacts are captured by user benefits. Cost benefit (welfare) analysis (based on the principles of the HM Treasury Green Book guidance) is used to determine the value for money of investment spend. Cost Benefit Analysis (CBA) is the preferred approach because it captures a broad range of impacts, such as economic, environmental and social, thereby demonstrating the effect of a transport investment on welfare.

However, it is recognised in TAG that if there are market failures that mean the economy is not functioning efficiently, user benefits will not fully capture all of the welfare effects associated with economic impacts; in other words, there will be wider economic impacts.

TAG Unit 2.1 goes on to state that 'assessment and inclusion of wider economic impacts in the economic case should only be undertaken if scheme promoters can identify and justify the presence of market failures'. The market failures present in the local economy around the Northumberland Line area are discussed below.

3.2 Market Failures within Local Economy

Evidence suggests market failure is a reality in South East Northumberland. Evidence includes employment rates lower than other areas in the North East, high levels of social deprivation and the need for better public transport to access opportunities outside of the immediate area of interest. Importantly, there are development sites for housing and employment that are slow coming forward, due to a lack of interest of the UK business community, with insufficient inward investment to raise living standards. This comes at a time when the wider North East economy is showing strong signs of economic recovery after the recession, with new and better jobs being created. However, this success does not seem to be apparent universally and certainly not in South East Northumberland.

Giving people better access to jobs and other opportunities will help overcome this market failure. Moreover, it will give developers the confidence to invest in the area and build houses with the likelihood of land uplift values.

The varying landscape of demand for employment land and housing alone demonstrates that market failure is not consistent across Northumberland. It is certainly not consistent with other development sites in Tyne and Wear which are showing good signs of economic activity and job creation. If the requirement for employment land remains static in South East Northumberland, then this places greater demand for better transport provision to reach these other opportunities in neighbouring authorities.

Market failures within South East Northumberland are summarised in the following section in terms of those market failures which impact on productivity and those market failures which affect employment.

3.2.1 Affecting productivity

Section 2 of this report has identified an expected impact on productivity in the study area from the increased agglomeration caused by improved accessibility to/from South East Northumberland through the new railway line.

TAG Unit A2.4 describes the agglomeration impact as 'a particular type of place based effect, in which individuals and firms derive productivity benefits from locating in close proximity to other individuals and firms. These benefits arise as a result of individuals and firms interacting with one another and are an important factor in the formation of clusters. Agglomeration economies arise from improved labour market interactions, knowledge spill-overs and linkages between intermediate and final goods suppliers - these can occur within an industry (localisation economies) and/or across industries (urbanisation economies).'

The local economy displays various features which suggest market failures in key aspects relevant to productivity:

- Low productivity of current businesses in the area – productivity in Northumberland as a whole is below the England average, with GVA per Capita being only 60% of the English average. Although this is not available for the South East Northumberland area, given the current economic situation in the area, the situation is expected to be the same;
- Skills shortages - South East Northumberland has a higher proportion of residents with no qualifications when compared to national averages, meaning residents are unable to take up available skilled jobs;
- Poor inward investment – a lack of investment in South East Northumberland means that it continues to face challenges of social and environmental deprivation as it tries to emerge from the post-industrial, coal mining legacy into sustained and sustainable growth. The closures of the RioTinto Alcan smelter at Lynemouth and Northumberland Foods in Amble have also had an impact upon supply chains locally and productivity in the area.

3.2.2 Affecting Employment

Section 2 of this report has identified an expected impact on employment in the study area from the increased accessibility to/from employment locations in and around South East Northumberland, and the subsequent increase in the potential number of people employed. It is expected that the increased employment the scheme will generate is additional and will not be displaced from elsewhere.

In accordance with TAG Unit A2.3, the key issue for the study area that means user benefit appraisal may not fully capture the impact of changes in employment, is taxation. TAG states that 'taxation acts to distort the functioning of the labour market, as it drives a wedge between the value of the output and the remuneration received by employees and businesses.' Simplistically this means that both individuals and businesses make decisions on the basis of the private gain, in the form of wages and profits respectively. As the tax revenue associated with changes in the labour market is external to employees' and businesses' decision-making process, it represents a source of welfare, additional to that captured by user-benefits.

The Northumberland Line scheme will address issues of market failure through de-risking vacant or derelict land to create development opportunities, through access to key sites identified in the Northumberland Local Plan for South East Northumberland.

4. Identification of the Proportionate Level of Analysis to Quantify and Value the Impacts.

4.1 Guidance on Identification of Method to Quantify and Value Impacts

TAG Unit A2.1 recommends that “having identified the expected impacts, causal factors and the market failures, the scheme promoter should be clear about the highest desired level of analysis to be conducted (i.e. Levels 1, 2 or 3) and attention should be directed to the identification of appropriate and proportionate methods by which impacts are to be quantified and valued.”

TAG Unit A2.1 goes on to state that “all Transport Business Cases should at a minimum conduct Level 1 analysis of user benefits and non-economic impacts. A decision to progress beyond this should be based on the expected economic impacts and market failures. The impacts assessed in Levels 1 and 2 should be informed by a transport model, in which the model scenarios assume fixed land use. This will form the basis of the core scenario presented in the appraisal summary table. The model outputs may be used to estimate the wider economic impacts associated with fixed land use or where land use change does not need to be explicitly quantified “

TAG Unit A2.1 also states that “Level 3 analysis should be considered if land use change is explicitly quantified, supplementary modelling is deemed appropriate or economic impacts are dependent on complementary interventions.”

However, balancing against need for detailed analysis the approach should be proportionate – “the complexity, time and financial cost of developing and running complex analysis should be balanced against the potential effect the analysis will have on the value for money conclusion or our understanding of the impacts. Judgements on proportionality will differ depending on if a model already exists or if a model needs to be developed. In most instances, user benefits and wider economic impacts (Level 1 and Level 2 analysis) will be sufficient to inform the Transport Business Case.”

4.2 Method to Quantify and Value Impacts

Having identified, through this narrative, the range of wider economic impacts expected to be associated with the scheme (agglomeration impact and labour supply impacts), a Level 1 and 2 analysis only is considered appropriate. Level 1 analysis was already undertaken at Strategic Outline Business Case and therefore the Level 2 analysis at Outline Business Case builds on this work.

4.2.1 Method to Quantify and Value Level 1 Impacts

Level 1 impacts, which form part of the standard cost benefit analysis, have been estimated using outputs from the mode choice spreadsheet and appraisal model, developed in accordance with TAG guidance. A detailed description of the methods adopted in quantifying the Level 1 impacts is included in the Economic Appraisal Report, which forms Appendix C of the Outline Business Case for the Northumberland Line scheme.

4.2.2 Method to Quantify and Value Level 2 Impacts

The Level 2 impacts, identified as relevant for the Northumberland Line scheme earlier in this economic narrative, and that need to be quantified and valued in a proportionate manner are:

- Labour supply impacts through making jobs more accessible to residents of South East Northumberland; and
- Productivity impacts through increasing the accessibility of firms and increasing the available labour pool for current employers within the North East region.

The method used to calculate both the labour supply impacts and the productivity impacts follows TAG guidance and the WITA (Wider Impacts in Transport Appraisal) software methodology as summarised overleaf.

4.2.2.1 Labour Supply Impacts

Labour supply impacts relate to the employment effects derived from supplying improved accessibility on a region poorly connected to employment centres. Changes in the number of potential employees result in GDP impacts due to productivity increases.

Do-Minimum (without scheme) and Do-Something (with scheme) average round-trip generalised travel costs were estimated for commuting trips, following TAG guidance (TAG Unit A2.3, Equation 1) and aggregated at Local Authority District (LAD) level, weighted by origin destination trips and mode. Journey times and costs were derived from the mode-choice spreadsheet model.

The estimation of employment impacts followed TAG guidance (TAG Unit A2.3, Equation 2). The valuation of the labour supply impacts was calculated in terms of GDP impacts (TAG Unit A2.3, Equation 3). Tax revenue impact has been estimated as 40% of the estimated GDP impact (TAG Unit A2.3, Equation 4).

Figure 4-1: Measurement of Labour Supply Impacts



Changes in labour supply impacts between Do-Minimum and Do-Something scenarios have been interpolated between both modelling years and ramp-up was applied. After the final modelled year, welfare impacts have been estimated to grow at the same rate of the non-work value of time, following TAG guidance.

4.2.2.2 Productivity Impacts (Agglomeration)

A new transport scheme can lead to higher density of economic activity ultimately increasing social welfare. This effect derives from improved transport links and thus closer perceived proximity between individuals and businesses resulting from changes (decreases) in the generalised travel cost between each origin-destination pair.

Agglomeration is not directly observable, thus a measure of 'Effective Density' is used as a proxy to estimate the resulting productivity impacts.

Do-Minimum and Do-Something generalised travel costs for car and public transport modes were estimated following TAG guidance (TAG Unit A2.4, Equation 2.1) and aggregated by LAD, weighted by origin-destination trips, journey purpose and mode. All journey times and cost inputs were derived from the mode-choice spreadsheet model.

Variations in the average generalised travel costs lead to changes in the effective density of the region (i.e. increased proximity), thus generating productivity impacts. The change in the productivity impacts has been estimated by comparing effective densities before and after the introduction of the scheme.

The welfare impact of agglomeration has been converted to monetary terms through the calculation of the overall productivity impact, in pounds, following equations 2.3 and 2.3a from the same TAG Unit A2.4.

Figure 4.2 briefly summarises the estimation of agglomeration impacts.

Figure 4-2: Measurement of Agglomeration



Changes in productivity between DM and DS scenarios have been interpolated between both modelling years and the ramp-up factors were applied. After the final modelled year, productivity impacts are assumed to continue to grow in line with the annual forecast growth rate of real GDP per capita, following TAG guidance.

Appendix A: Study Area

Northumberland is the northernmost county in England and acts as a gateway between England and Scotland, sitting between the competitive city economies of Newcastle and Edinburgh. It borders Scotland to the north, Cumbria to the west and Durham and Tyne and Wear to the south.

Geographically, Northumberland is one of the largest counties nationally with a surface area of approximately 5000km². Demographically however, it is one of the smallest counties in England with a population in 2011 of 316,000 inhabitants. This has led to a low population density across much of Northumberland, causing issue for commercial viability of key services and facilities.

Northumberland is predominantly rural in nature with an urban concentration in the south east corner of the county. The problems Northumberland is facing stem from its large spatial area and vary between the sections of the county being analysed. The rural areas are characterised by low population densities, remote communities and accessibility issues. In contrast, South East Northumberland is the most populated area of Northumberland, with its main priorities being economic and social exclusion.

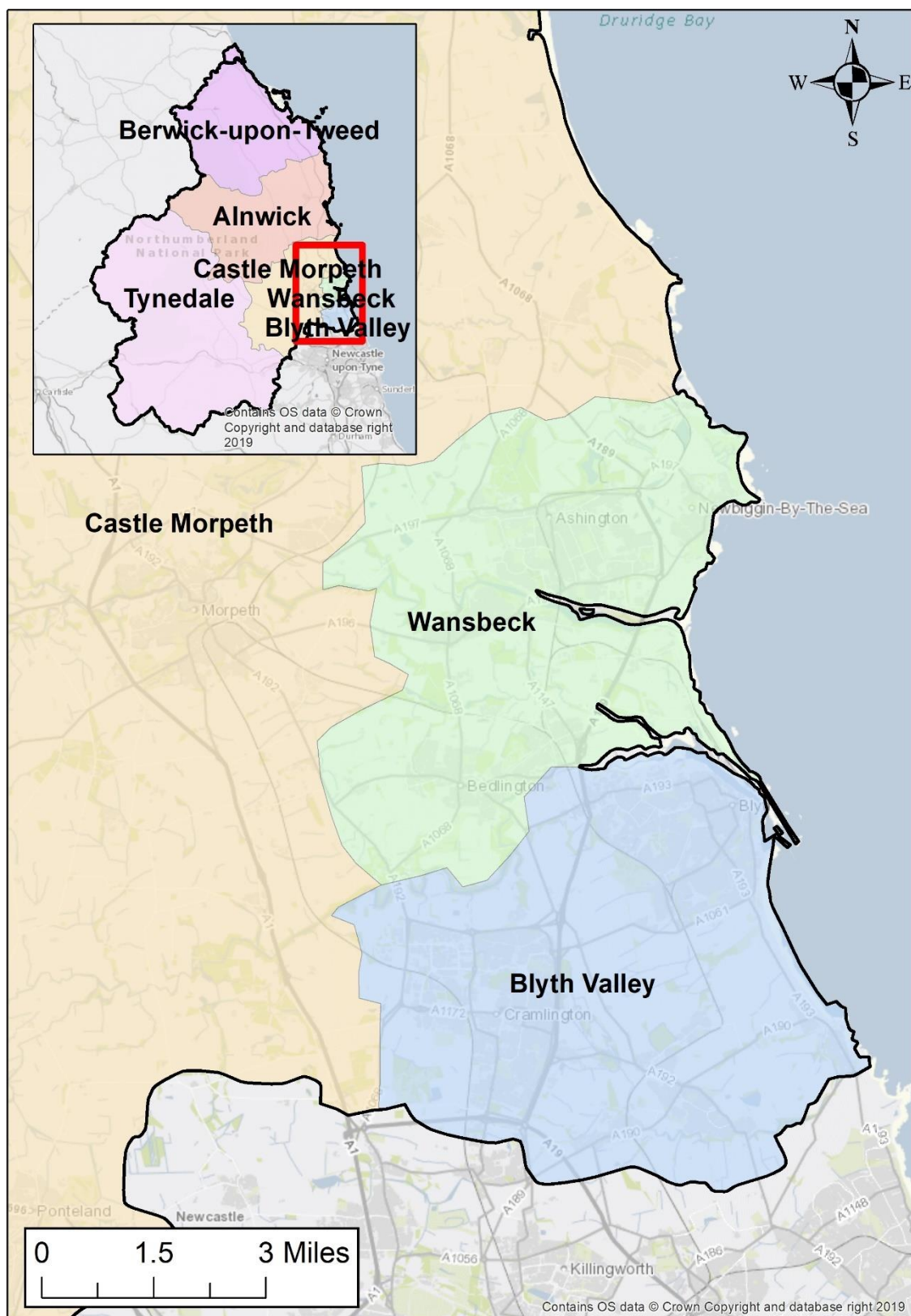
The economy of Northumberland has undergone significant changes since the national decline in the agricultural and manufacturing sectors in the 1980's and 90s. Whilst these sectors still form an integral part of the local economy, the area is now heavily dependent on service industries. Tourism and the heritage industries are particularly important to Northumberland, with tourism accounting for 13% of employment in the area. Whilst the economy of Northumberland remained relatively resilient during the recession of the 2000's, economic growth since the upturn in the economy has been slower than regional and national levels. Increased investment is now needed to ensure the county can maximise the assets it has to offer, with growth in the energy sector seen as a key priority.

Inextricably linked to the economic problems in Northumberland are the social issues facing the area. Northumberland has a very diverse society characterised by both areas of significant deprivation and areas of considerable wealth. Some areas of Northumberland are quantified as being the most deprived in England with high unemployment, poor levels of health and low educational attainment. Contrastingly, there are other areas within the county, which are considered to be the least deprived in England, providing attractive environments for people to live and invest. That said, they still suffer from problems including accessibility issues and barriers to housing. Transport has a role to play in tackling these problems by addressing accessibility issues and facilitating social inclusion.

Different parts of Northumberland have distinct characteristics, functions and needs. The strategic approach to the distribution of development within the Local Plan is based around four delivery areas; North, Central, West and South East Northumberland. The Northumberland Line scheme sits within the South East Northumberland Delivery area, which incorporates the former districts of Blyth Valley and Wansbeck, which are illustrated in the figure overleaf

To understand the economic situation within South East Northumberland, data has been extracted from national statistics at a lower super output area (LSOA) and compared to regional and national values. To ensure the data is easily presentable and interpretable, the LSOA data has been combined to present data at a former district level.

Figure A1: Former Districts of Blyth Valley and Wansbeck



Appendix B: Economic Portrait

Appendix C: Consultation