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A1 North of Newcastle Feasibility Study

Stage 1 Report

February 2015

HIGHWAYS AGENCY

Executive Summary

The A1 north of Newcastle through Northumberland forms an important route between England and Scotland, especially for long distance traffic on the eastern side of the country. The route also caters for local commuters and agricultural traffic. This section of the A1 provides a link between England and Edinburgh, and as such has been recognised by the DfT as a route of strategic national importance.

Other key routes in Northumberland include the A1068 coastal route and the A697 towards Coldstream in Scotland. Other than these routes, roads in Northumberland are characterised as narrow rural links that connect a number of small settlements. The A1 therefore also acts as a key distributor for more localised trips, as it often provides the most direct route.

Public transport along the route is limited, although a small number of bus services do operate.

In 2002, the case for dualling the remaining sections of single carriageway was reviewed. At that time the capital cost of the upgrade was estimated to be £271m – which is equivalent to approximately £450m in today's construction prices. It was concluded that there was not an adequate justification on economic grounds to dual the whole of the remaining A1 north of Newcastle, but that this should be reviewed if the surrounding sections of A1 were significantly upgraded or there were changes in traffic flows and accident rates.

Over the last decade the surrounding sections of the A1 have been improved. There have been significant upgrades to the A1 south of Newcastle, with many sections upgraded to motorway standard, and there are further plans to improve the section of the A1 around Newcastle itself. In Scotland the A1 has also now been dualled between Edinburgh and Dunbar. However, 36 miles of single carriageway in Northumberland and 8 miles in Scotland remain.

Although the review in 2002 found that there was not an adequate justification for dualling all of the remaining single-carriageway sections, it concluded that there was a need to dual the 8 mile section of road between Morpeth and Felton, and the 2.5 mile section between Adderstone to Belford to reduce the number of accidents at these locations. Schemes were developed at both locations. In 2006 the then interim Regional Transport Board for the North East did not identify either of the schemes for the A1 as a funding priority for the period up to 2016. The Government of the time accepted the recommendations of the interim Regional Transport Board. Neither scheme was therefore progressed.

In 2013 the case for dualling the A1 between Morpeth and Felton and Adderstone and Belford was revisited. This revealed that the proposed dualling scheme between Morpeth and Felton could potentially deliver Value for Money based upon estimated journey time and accident savings, but that the proposed dualling scheme between Adderstone and Belford was unlikely to. However, the study work recognised that there may be opportunities to broaden the scope to identify potential Value for Money solutions on the wider route.

This study therefore considers potential opportunities to improve some or all of the A1 between its junction with the A19 at Seaton Burn and the Scottish border, beginning with updated analysis of the problems and issues on the route.

The report builds upon previous studies, and also undertakes a fresh assessment of the current and future situation on the route. A series of problems and issues on the route have been identified, as summarised below:

- *Lack of alternative routes;*
- *Inconsistent carriageway standards on the route;*
- *Poor junction standards / layout;*
- *Large number of at-grade junctions / Private Means of Access;*
- *Average speeds on the single carriageway sections of the route are significantly lower than sections that have been upgraded to dual carriageway.*
- *Relatively high proportion of HGVs (and agricultural vehicles) resulting in reduced speeds for following vehicles and potential for driver frustration;*
- *Lack of overtaking opportunities; and*
- *Peak hour traffic speeds significantly below free flow speeds - analysis of Trafficmaster data shows that peak hour traffic speeds are significantly lower than average off-peak speeds.*

These problems and issues are likely to be exacerbated in the future as a result of forecast traffic growth.

Given that traffic volumes reduce considerably on northern sections of the route it is clear that investment (from an operational perspective) is a higher priority on the southern sections. However, given the data presented it is evident that there is still some rationale for investment on the wider route.

Based on these identified problems and issues, a series of route objectives have been identified. These are:

- *Improve journey times on this route of strategic national importance;*
- *Improve network resilience and journey time reliability;*
- *Improve safety;*
- *Maintain access for local traffic whilst improving the conditions for strategic traffic;*
- *Facilitate future economic growth; and*
- *Avoid, mitigate and compensate for potential impacts upon the built and natural environment.*

The route objectives and identified problems, as endorsed by the Stakeholder Reference Group, were used as the basis for the identification and appraisal of potential interventions in Stage 2 of the Feasibility Study.

Contents

1 Introduction

1.1 Background

Following the 2013 Spending Review, the Government announced its plans for the biggest ever upgrade of the strategic national roads network. The HM Treasury document, Investing in Britain's Future (July 2013) set out details of the programmes of infrastructure investment, which included the tripling of annual investment on Highways Agency major roads enhancements from today's levels to over £3bn by 2020/21.

As part of that investment programme, the Government announced that it will identify and fund solutions, initially through feasibility studies to look at problems and identify potential solutions to tackle some of the most notorious and long-standing road hot spots in the country. The locations identified were as follows:

- *The A303/A30/A358 corridor;*
- *The A1 North of Newcastle;*
- *The A1 Newcastle-Gateshead Western Bypass;*
- *The A27 Corridor (inc. Arundel and Worthing);*
- *Trans-Pennine routes; and*
- *The A47 corridor.*

These studies are being progressed alongside the Highways Agency's Route Based Strategy programme, which is considering the current and future performance of the entire network, to inform future investment decisions.

In July 2013, the Highways Agency (HA) commissioned Jacobs to examine issues on the A1 north of Newcastle, beginning with the refresh of the business cases for the two previously considered dualling schemes between Morpeth and Felton and Adderstone and Belford.

In February 2014, the HA commissioned Jacobs to undertake this feasibility study considering the full route of the A1 North of Newcastle between its junction with the A19 at Seaton Burn and the Scottish border.

The key objectives of the study are summarised below:

- *Identify and assess the economic business case, deliverability and timing of proposals to complete the dualling of the A1 North of Newcastle;*
- *Identify and assess the economic business case, deliverability and timing of potential specific road infrastructure investments along the A1 corridor north of Newcastle;*
- *To understand the comparative balance of benefits and impacts from individual investment proposals and any additional benefits or impacts from an investment on a corridor basis; and*
- *To evidence where possible, the wider economic impacts from the potential road infrastructure investment in the A1 corridor.*

This document represents the output of Stage 1 (Data Collection, Analysis and Problem Identification) of the A1 North of Newcastle Feasibility Study.

1.2 Approach

The study area under consideration as part of the A1 North of Newcastle Feasibility Study is illustrated in Figure 1-A. The route extends from the A1 junction with the A19 at Seaton Burn through Northumberland passing Morpeth, Alnwick and Berwick-upon-Tweed to the border with Scotland.

Given the length of the A1 being investigated and to aid the data collection/analysis and the presentation of problems and issues the route has been split up into 11 sections based on road type and geography. These route sections are shown in Figure 1-A and listed in Table 1-A.

Figure 1-A Study Area

Section	Description	Length (miles)		Speed Limit
		Dual Carriageway	Single Carriageway	
1	Dual Carriageway South of Morpeth	5.3		70
2	Dual Carriageway at Morpeth	4.6		70
3	Single Carriageway between Morpeth and Felton		8	60
4	Dual Carriageway at Alnwick	9.9		70
5	Single Carriageway North of Alnwick		5	60
6	Dual Carriageway North of Alnwick	1.4		70
7	Single Carriageway between Ellingham and Fenwick		11.4	60
8	Single Carriageway South of Berwick		7.5	60
9	Berwick Bypass South of the River Tweed		2.1	60
10	Berwick Bypass North of the River Tweed		2.2	60
11	Dual Carriageway North of Berwick	2.1		70
	Total	23.3	36.2	

Table 1-A A1 North of Newcastle Route Sections

The methodology adopted as part of the development of the A1 North of Newcastle Feasibility Study is based upon the key principles set out within the Department for Transport's best practice Transport Analysis Guidance (TAG). The key stages of the feasibility study are illustrated in Figure 1-B.

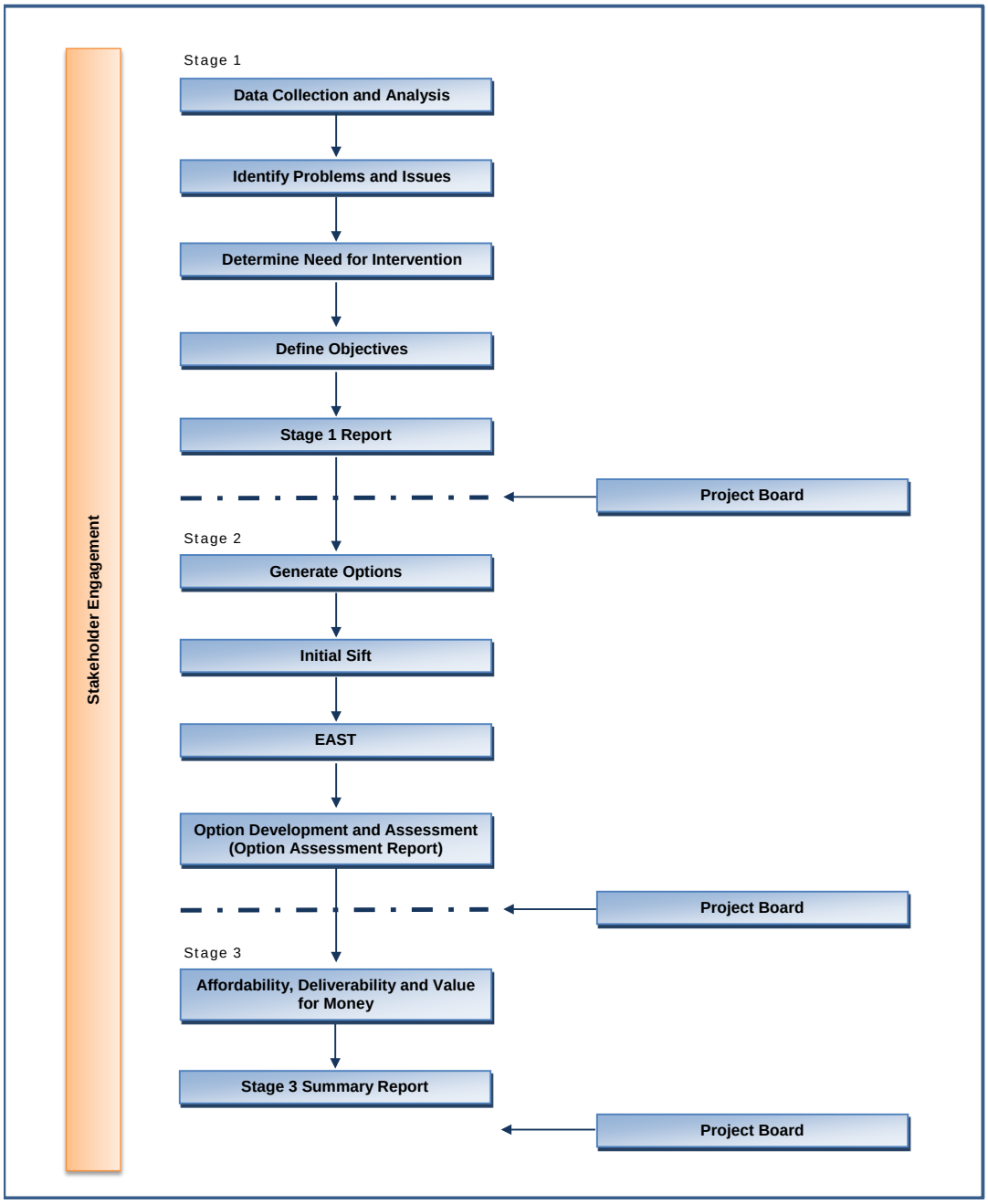


Figure 1-B Methodology Key Stages

This Stage 1 report represents the culmination of a broad ranging data collection and analysis exercise used to identify the problems and issues on the A1 between its junction with the A19 at Seaton Burn and the Scottish border. The identified problems and issues define the need for investment in the route and inform the derivation of a set of specific route objectives that will be used as the basis to generate potential improvements (options) and appraise their merits within Stage 2.

1.3 Stakeholder Engagement

Stakeholder Engagement forms an important part of the study process. It has been undertaken at different stages throughout the process. Table 1-B provides a summary of the stakeholder engagement undertaken in Stage 1 of the Feasibility Study. The outcomes of the Stakeholder Workshop are discussed in Chapter 8.

Engagement Stage	Method	Purpose
Study Inception	DfT presentation followed by a discussion and a Questions and Answers session.	• to inform key Stakeholders of the DfT programme of feasibility studies • to inform key Stakeholders of the process / method to be adopted • to enable key Stakeholders to inform the process at an early stage • to gain 'buy-in' from the key Stakeholders
Data Collection and Analysis	Informal engagement with key stakeholders, undertaken via telephone.	• to confirm that the Local Authorities recognise the evidence base / data sources utilised as part of Stage 1 • to identify any further data sources / evidence that should be considered
Stage 1 Findings	Stakeholder Workshop	• to present the findings of the Stage 1 Data Collection and Analysis • to invite comments from key Stakeholders • to agree study objectives going forward.
Stage 1 Stakeholders Northumberland County Council Newcastle City Council Gateshead Council North Tyneside Council North East Local Enterprise Partnership Dual the A1 Campaign North East Combined Authority Parliamentary Office for Berwick upon Tweed Natural England		

Table 1-B Stakeholder Engagement

2 Historical Work

2.1 Introduction

Where relevant the A1 North of Newcastle Feasibility study makes use of information obtained from previous studies. This ensures that best use is made of available data and that the study does not replicate existing work undertaken as part of other recent relevant studies.

Table 2-A provides a summary of historical work and available modelling tools that are considered pertinent to the A1 north of Newcastle Feasibility Study.

Each document has been reviewed in detail and best use made of relevant findings to support the evidence gathered as part of this study. The key findings of each document and the review of available modelling tools are summarised below. Full details of historic work are shown in Appendix A.

Study Area	Studies
A1 North of Newcastle	A1 North of Newcastle Multi Modal Study (Scott Wilson/Arup, 2002)
	A1 North of Newcastle Study (AECOM, 2011)
Morpeth to Felton Dualling	Environmental Assessment Report (Bullen Consultants, 2004)
	Economics Report (Bullen Consultants, December 2004)
	Scheme Assessment Report (Bullen Consultants, December 2004)
	Traffic Survey Report (Laing O'Rourke/White Young Green, December 2005)
	Environmental Scoping Report (Laing O'Rourke/White Young Green, January 2006)
	Local Model Validation Report (Laing O'Rourke/White Young Green, June 2006)
	Traffic Forecasting Report (Laing O'Rourke/White Young Green, July 2006)
	Economic Assessment Report (Laing O'Rourke/White Young Green, August 2006)
	Scheme Close Out Report (Laing O'Rourke/White Young Green, August 2006)
	Strategic Outline Business Case (Jacobs, October 2013)
Adderstone to Belford Dualling	Stage 2 Scheme assessment Report (Mouchel Parkman, March 2005)
	Adderstone Garage Junction Report (Mouchel Parkman, December 2006)
	Scheme Close Down Report (Mouchel Parkman, January 2006)
	Strategic Outline Business Case (Jacobs, October 2013)
Other Documents	Tyneside Area Multi-Modal Study (Scott Wilson/Arup, November 2002)
	Regional Finding Advice: North East England 2009 (One North East/North East Assembly, February 2009)
	Access to Tyne and Wear City Region Study (AECOM, September 2010)
	The North East's Missing Link (Dual the A1, June 2012)
	North East Business Transport Priorities (North East Chamber of Commerce, January 2013)
	North East Independent Economic Review Report (North East Local Enterprise Partnership, April 2013)
	Northumberland Infrastructure Study (Highways Agency, May 2013)
	London to Scotland East Route-Based Strategy (Highways Agency, 2014)

Study Area	Studies
Available Modelling tools	The Tyne and Wear Transport Planning Model
	The Morpeth Traffic Model
	Tyne and Wear Mesoscopic Model
	Morpeth to Felton SATURN Model

Table 2-A Historical studies and available modelling tools

2.2 A1 North of Newcastle Multi Modal Study (Scott Wilson/Arup, 2002)

This study considered the safety, operation and the wider potential for economic development resulting from improved transport links within the study corridor.

The following problems and issues were identified within the study corridor:

- *Dispersed population;*
- *Low car ownership;*
- *Need to protect the environment, in particular the effect on the Northumbria Heritage Coast Line and an Area of Outstanding Natural Beauty;*
- *Importance of tourism to the regional economy;*
- *Need to encourage inward investment in the North East;*
- *Concerns over the accident rate on the A1 in Northumberland;*
- *Lack of overtaking opportunities and consequent poor journey times;*
- *Restricted capacity on the East Coast Main Line railway; and*
- *Limited rail, coach and bus services between main county towns.*

Based on these problems and issues, a series of measures were initially assessed, and a Hybrid Scenario comprising the following measures was identified:

- *Upgrade the A1 between Morpeth and Felton to dual carriageway;*
- *Junction improvements and dualling between Adderstone and Belford;*
- *Junction improvements and dualling between West Mains and Bridge Mill;*
- *Introduce local safety schemes;*
- *Improve traffic management/signing;*
- *Regular stopping pattern for long distance rail;*
- *Increase rail service between Berwick and Newcastle;*
- *Integration of public transport timetabling and ticketing;*
- *Improve public transport between Northumberland towns; and*
- *Restore passenger services on the Blythe and Tyne railway.*

A full appraisal was undertaken to compare the Hybrid Scenario with Full Dualling of the A1 from Newcastle to the Scottish Border. This appraisal examined the two scenarios against each of the five primary transport objectives set out by the Government – environment, safety, economy, integration and accessibility.

The study found that the Hybrid Scenario and Full Dualling Scenario had similar appraisal results in terms of environment, integration and accessibility. It found that the Full Dualling scenario offered additional safety benefits compared to the Hybrid Scenario; however, in terms of the economy the Hybrid Scenario produced a benefit to cost ratio (BCR) of 1.2 while the Full Dualling Scenario produced a BCR of less than 1 (i.e. benefits did not outweigh the costs). The report found no firm evidence to link either scenario with wider economic benefits to the region.

In light of these findings, the report proposed that the Hybrid Scenario formed the recommended strategy to address the study objectives and to ameliorate problems on the A1 corridor north of Newcastle. The study did not however rule out further dualling along the route – potentially including completion of dualling between Newcastle and the Scottish Border or even to Edinburgh.

2.3 A1 North of Newcastle Study (AECOM, 2011)

The aim of this study was to consider the evidence that could support options to tackle transport challenges in the A1 corridor between Morpeth and the Scottish border.

Several issues were identified covering a range of different transport modes. Infrequent services and long journey times were found to limit journey opportunities by bus, while poor interconnectivity and irregular service intervals were found to hamper journeys by rail. In addition, poor connections between Alnmouth Station and Alnwick were found to limit the effectiveness of rail for accessing Alnwick, with crowding on peak hour services into and out of Newcastle and car parking capacity problems at certain stations also identified as problems. It was identified that a low proportion of journeys to work are made using bus and train services.

The report highlights that the mixture of highway standards affects the operation of the route. Analysis of journey times indicated that the route generally had good journey time reliability. However delays of up to 39 seconds were found at points on the network. Above average numbers of HGVs were found to limit overtaking opportunities.

The rate of fatal accidents was found to be higher than the national average on several sections of the route and clusters of accidents were observed at several junctions. It was also noted that accidents involving overtaking manoeuvres are more prevalent on the A1 compared to national averages.

The study suggested that a combination of forecast traffic growth, future land use and car ownership trends suggested an increase in traffic volumes, putting more pressure on the network and also increasing the number of train passengers.

Stakeholders also voiced their concerns about the A1 North of Newcastle corridor, namely:

- *Concerns about the lack of overtaking opportunities;*
- *The belief that there is an opportunity to improve regional connectivity and to deliver regeneration opportunities in the North East by improving the A1;*
- *The belief that the A1 does not adequately cater for the region's needs and is a barrier to employment and investment in the North East of England; and*
- *That any improvement to the A1 would need to maintain access to Northumberland's key tourist sites whilst maintaining local environmental qualities.*

Overall road safety, ECML overcrowding, slow speeds on the A1, the road network layout and environmental issues such as potential impacts on Areas of outstanding Natural Beauty and Sites of Special Scientific Interest were recognised as the most pressing issues to be brought forward for examination. Road safety was recognised as the most severe problem to be addressed while the current road network was recognised as the biggest barrier to regeneration in the area.

A set of study specific objectives were developed based upon the identified problems. These objectives were used to assess the potential impact of a range of transport interventions. From an assessment of performance against objectives and deliverability, a balanced set of interventions were developed into three packages:

- *Supply Management Measures – to promote the safe and efficient use of the existing transport network;*
- *Demand Management Measures – to upgrade the public transport network to try and encourage modal shift away from heavy car usage; and*
- *Network Enhancement Measures – highway improvements including the previously identified Morpeth to Felton and Adderstone to Belford dualling schemes, as well as provision of overtaking lanes and other junction improvements or small sections of dualling.*

Further work was recommended to model the impact of these favoured packages, understand their benefits and costs in more detail and to refine them into more detailed packages.

2.4 Morpeth to Felton Studies

The A1 between Morpeth and Felton is the last section of the A1 south of Alnwick that remains at single carriageway standard. The A1 Multi-Modal Study of 2002 recommended its upgrade to dual carriageway, and the scheme was subsequently developed as outlined below.

Different route options were identified and assessed in a series of environmental and economic reports produced in 2004. Following Public Consultation, a Preferred Route was announced in March 2005. The scheme was then developed further with a SATURN traffic model being produced and economic assessment subsequently being undertaken. At this point the scheme had a Benefit to Cost Ratio of 3.86, representing High Value for Money.

In 2006 Secretary of State accepted the recommendation of the interim Regional Transport Board for the North East which had not identified the dualling scheme as a spending priority in the period up to 2016. A ‘Close Out Report’ was produced in December 2006 which summarised the work undertaken to date and suggested priorities for work should the scheme be restarted.

In July 2013 Jacobs were commissioned by the Highways Agency (HA) to examine issues on the A1 North of Newcastle, including a refresh of the business case for the Morpeth and Felton dualling scheme. A Strategic Outline Business Case was produced which looked at the Morpeth to Felton scheme and its suitability to meet the aims and objectives now mandated by the DfT’s Transport Business Case guidance.

The following conclusions were made in this Business Case:

- *There remains a clear rationale for dualling improvements to the A1 between Morpeth and Felton;*
- *Proposed dualling improvements to the A1 north of Newcastle are well supported by local and regional policy aspirations. At a national level the government is committed to improving the performance of the strategic road network;*
- *There is strong support from the business community who believe the single carriageway sections of the A1 are a barrier to economic growth;*
- *The scheme is predicted to deliver high Value for Money;*
- *The scheme is deliverable from an engineering perspective; and*
- *There is a robust procurement route available for scheme development and delivery.*

It was concluded that, subject to a positive outcome at the 2013 Autumn Statement, the scheme could re-enter the HA Major Scheme Programme at PCF Stage 1 / Stage 2 and begin with the development of a traffic simulation model to allow detailed scheme appraisal running in parallel to environmental surveys and consultation on the preferred option.

2.5 Adderstone to Belford Studies

The A1 between Adderstone and Belford is a 3 mile section of the A1 between Alnwick and Berwick at single carriageway standard. The A1 Multi-Modal Study of 2002 recommended its upgrade to dual carriageway, and the scheme was subsequently developed as outlined below.

Following a stakeholder workshop, four route options were proposed for further study; three of these options were then taken forward to Public Consultation. Economic and environmental assessments were undertaken on each route as summarised in the Stage 2 Scheme Assessment Report of 2005. Following Public Consultation, a preferred route was identified.

In 2006 Secretary of State accepted the recommendation of the interim Regional Transport Board for the North East which had not identified the dualling scheme as a spending priority in the period up to 2016. A ‘Close Out Report’ was produced in January 2007 which summarised the work undertaken to date and suggested priorities for work should the scheme be restarted. At this point the scheme had a BCR of 1.81.

In December 2006 a report was produced which examined the junction of the A1/B1341 at Adderstone Garage (a junction experiencing above average accident numbers), and assessed the engineering, economic, safety and environmental impact of improving the junction.

Five options were considered: the current situation, single lane dualling, use of a roundabout, the creation of a compact grade separated junction or using the preferred route specified in the Scheme Appraisal Report. The following recommendations were made:

- *Single Lane Dualling or a compact grade separated junction give the best NPV and BCR; and*
- *Roundabout option should not be taken forward.*

In July 2013 Jacobs were commissioned by the HA to examine issues on the A1 North of Newcastle, including a refresh of the business case for the Adderstone and Belford dualling scheme. A Strategic Outline Business Case was produced which looked at the Adderstone to Belford scheme and its suitability to meet the aims and objectives now mandated by the DfT's Transport Business Case guidance.

The following conclusions were made in this Business Case:

- *There remains some rationale for dualling improvements to the A1 between Adderstone and Belford;*
- *Proposed dualling improvements to the A1 North of Newcastle are well supported by local, regional and national policy aspirations;*
- *There is strong support from the business community who believe the single carriageway sections of the A1 are a barrier to economic growth;*
- *The Scheme is unlikely to deliver Value for Money;*
- *The scheme is deliverable from an engineering perspective; and*
- *There is a robust procurement route available for scheme development and delivery.*

2.6 The North East's Missing Link (Dual the A1, June 2012)

The Dual the A1 Campaign, led by Anne-Marie Trevelyan, have been vocal in their belief that the A1 needs to be fully dualled between Newcastle and the Scottish border. This report aimed to highlight the need for the government to develop a transport business case of the A1 north of Morpeth to the Scottish border and provided evidence they believed highlighted the necessity of an upgraded A1.

The report summarises the results of a previous survey undertaken by Dual the A1 where over 400 businesses responded and 97% indicated that the lack of a dualled A1 was a key barrier to growth for their business; further to this a second, more detailed, survey was being undertaken at the time of the report's production where the campaign aimed to survey at least 1,000 businesses from across the North East and Scotland. At the time of the report 40% of responses currently received indicated that they would be able to take on more staff if the A1 was fully dualled. The report also contains quotes from respondents covering a wide range of industries and fields.

The report called upon the DfT to set in motion the Transport business case in order to:

- *Calculate up-to-date costings for the total dualling of the remaining 37 miles of undualled road between Morpeth & the Scottish Border;*
- *Provide Local Authorities & stakeholders (including Chambers of Commerce, CBI, FSB, the new LEPs, UKTI & wider business users) with a formal method to consult with Government on the urgency of dualling the A1;*
- *Pull together the economic evidence, gathered by the Dual the A1 Campaign, and other business networks invited to consult on the economic impact, from the North East & Scotland, as well as across the UK from freight transporters and wider business;*
- *Answer the Treasury Green Book information needs on the impacts of such an investment for the North East in terms of wider public policy objectives, from rebalancing the economy to stimulating investment in private sector growth;*
- *Protect the preferred route identified in the A1 Multi Modal Study of 2002 from development risks;*

- *Invest urgently in the two worst black spot sections of the remaining single carriageway (between Morpeth and Felton and between Adderstone and Belford) for the reduction of deaths and serious accidents; and*
- *Prepare a planned roll-out, section-by-section, of A1 dualling in line with Government financial resources over the medium term.*

The report discussed the potential benefits and impacts on the North East that the Dual the A1 campaign believed would occur as a consequence of improving the A1. These are:

- *Creating jobs through increased investment;*
- *Rebalancing the economy;*
- *Creating better wage rates;*
- *Widening Markets in the North East; and*
- *Improving Health.*

The report also reported that none of the recommendations for urgent improvement mentioned in the A1 North of Newcastle Multi Modal Study (2002) have been addressed in the 10 years previous.

Changes since the 2002 A1MMS study were also examined, and comments were provided as to how these changes affect the recommendations and conclusions made in that study. An extract of the text highlighting the changes from the 2002 report is shown below.

> *"In the 2002 ARUP Report, three key justifications against economic benefit arising from dualling were given to support the conclusion that full dualling was not considered economically necessary:*
>
> 1. "Maritime freight does not comprise a significant proportion of traffic between the North East and Scotland and is not expected to do so in the future". (Scott Wilson ARUP A1 Multi Modal Study May 2002: p.27)
>
> *In recent discussions with Port of Tyne (which has changed out of all recognition from the business which it was in 2002), the Dual the A1 Campaign has discovered that the A1's limitations going North are an active challenge for their logistics teams in terms of freight movements, and for the sales teams looking to find new markets, access into Scotland being unpredictable is proving to be a limiting factor for providing European businesses with the confidence they need to move goods through Tyneside.*
>
> 2. "There is no expectation of substantial industrial development adjacent to the A1 North of Newcastle that would justify upgrading the road" (2002, ARUP Report p.27)
>
> *The budget 2012 has created Enterprise Zones in North Tyneside and Blyth, both North of Newcastle, with the hope of bringing in thousands of new jobs and growing the North East economy. Both of these areas will be disadvantaged by poor interconnectivity with Scotland, and this is a risk factor to successfully gaining inward investment into this deprived and high unemployment area of the North East.*

3. "The A1 is not the preferred route for hauliers between the North East and Scotland" (2002, ARUP Report p.27)

The Dual the A1 Campaign is in discussions with haulage firms across the North East and is starting to meet with national haulage business leaders. Hauliers tell us that the reason for the reason given in ARUP's report is in large part due to the unpredictability of traffic movements from Newcastle to Edinburgh on the A1."

The report highlights the perceptions that the A1 north of Newcastle is unsafe in drivers' opinions and concluded (with the support of the emergency services) that driver frustration and dangerous overtaking caused by the road layout lead to excessive numbers of serious and fatal accidents.

Also highlighted was the belief that any assessment made by the DfT needs to consider the loss of economic growth potential and the effects on employment in the North East for future generations.

2.7 London to Scotland East Route-Based Strategy (Highways Agency, 2014)

Route-based Strategies (RBS) are used by the HA to inform the investment strategy for the wider strategic road network. This RBS looks at the strategic travel corridor from London to the East of Scotland using the M1 between London and Leeds and the A1(M) and A1 thereafter.

The report found that "the A1, from its junction with the A19 near Seaton Burn to the Scottish Border…performs well in terms of delay, reliability and average speeds at peak times" but does note stakeholder's concerns about the safety on single carriageway sections of the A1 due to the dangers of associated with overtaking. They also note a number of queries about the safety of right turns on rural single and dual carriageway sections, such as those on the A1 North of Newcastle.

The RBS also shows that the majority of the A1 North of Newcastle (excluding the dual carriageway sections to the south of Morpeth) are in the worst 45% in terms of accident rate on the Strategic Road Network (SRN) and in particular from Alnwick northwards the route is in the worst 25%.

Also discussed was the problem with vulnerable users crossing the road; there are several places on the A1 North of Newcastle where road crossings for pedestrians and cyclists are at-grade, on both single and dual carriageway sections. The route has three crossings with the National Cycling Network, where traffic islands have been installed to minimise risk when crossing.

2.8 Other Documents

The A1 corridor is also referred to in several other documents. A summary of these documents is provided below.

- ***Tyneside Area Multi-Modal Study (Scott Wilson/Arup, November 2002)*** *– This Tyneside Area Multi-Modal Study (TAMMS) was undertaken at a similar time to the A1MMS. The Tyneside area is to the south of the A1 North of Newcastle corridor. The study did not identify any problems or issues on the A1 North of Newcastle but highlighted some problems elsewhere on the A1 such as congestion on the A1 through Gateshead and Newcastle. The study also identified a forecasted increase in traffic volumes in the North East due to increased car ownership and increase in both trip rates and trip lengths between 2000 and 2030.*

- ***Regional Funding Advice: North East England 2009 (One North East/North East Assembly, February 2009)*** *– This identified dualling part of the A1 north of Newcastle as a provisional priority with an estimated cost of £40m in order to "create and integrated an effective transport network" as part of work on Delivering a Sustainable Transport System (DaSTS) beyond 2019.*

- ***Access to Tyne and Wear City Region Study (AECOM, September 2010)*** *– The Access to Tyne and Wear City Region Study (A2TW) was commissioned jointly by the DfT and the City Region Partners to examine how the current and future network can be developed and managed in future years. Congestion on the A1 in peak periods was recognised as a priority challenge. Increasing car ownership in the study area was also noted as a source of additional strain on the network. The report also recognises the poor public transport facilities on this corridor.*

- ***North East Business Transport Priorities (North East Chamber of Commerce, January 2013)*** *– This document presents the collective view of a board of North East businesses on a single list of transport priorities for the region and sets out the most important issues that they believe need addressed to help the private sector economy in the North East achieve its potential for growth. Dualling the A1 north to the Scottish border was identified as a long-term goal.*

- ***North East Independent Economic Review Report (North East Local Enterprise Partnership, April 2013)*** *– intended as a manifesto for business, public service and political leaders across the LEP region, this report documents the need to further develop and update the business case to support improvements of the A1 between Morpeth and Alnwick/Berwick/Scotland. This was recognised as a long term goal where appropriate improvements should be funded nationally as would befit a route of strategic national importance.*

- ***Northumberland Infrastructure Study (Highways Agency, May 2013)*** *– This study uses the mesoscopic simulation model developed for the Seaton Burn Pinch Point Programme to investigate the issues on the network, mainly focussing on issues on the A19 but also looks at the impact on the Strategic Road Network (SRN) from the delivery of the Northumberland Local Plan, and the extent to which any potential schemes may mitigate these impacts. The Headline of the report is "The HA supports the LDF aspirations of Northumberland Council. This equates to the potential release of approximately*

280 hectares of employment land and approx. 8,300 additional homes in Northumberland over the period of the LDF."

2.9 Available Traffic Modelling tools

As part of the development of the feasibility study it is considered important to understand whether there are any traffic modelling tools available that could be used to inform scheme assessment within later stages of the study.

There are four traffic models in existence that have been considered. These are:

- *The Tyne and Wear Transport Planning Model (TPM)*
- *The Morpeth Traffic Model*
- *The HA Tyne and Wear Mesoscopic Model*
- *Morpeth to Felton SATURN Model*

The following sections provide a summary of each of these models covering the following key points:

- *Geographical coverage and zoning*
- *Data Quality*
- *Suitability for A1 North of Newcastle scheme appraisal*

2.10 The Tyne and Wear Transport Planning Model

TPM is an integrated multi-stage demand and multi-mode assignment model focussing on the Tyne and Wear journey to work area. Its general purpose was to represent and assess the main travel behavioural responses to transport interventions within Tyne and Wear. The latest version of the model was developed for the DaSTS Regional Study for Tyne and Wear in 2010. The extent of model coverage is illustrated in Figure 2-A.

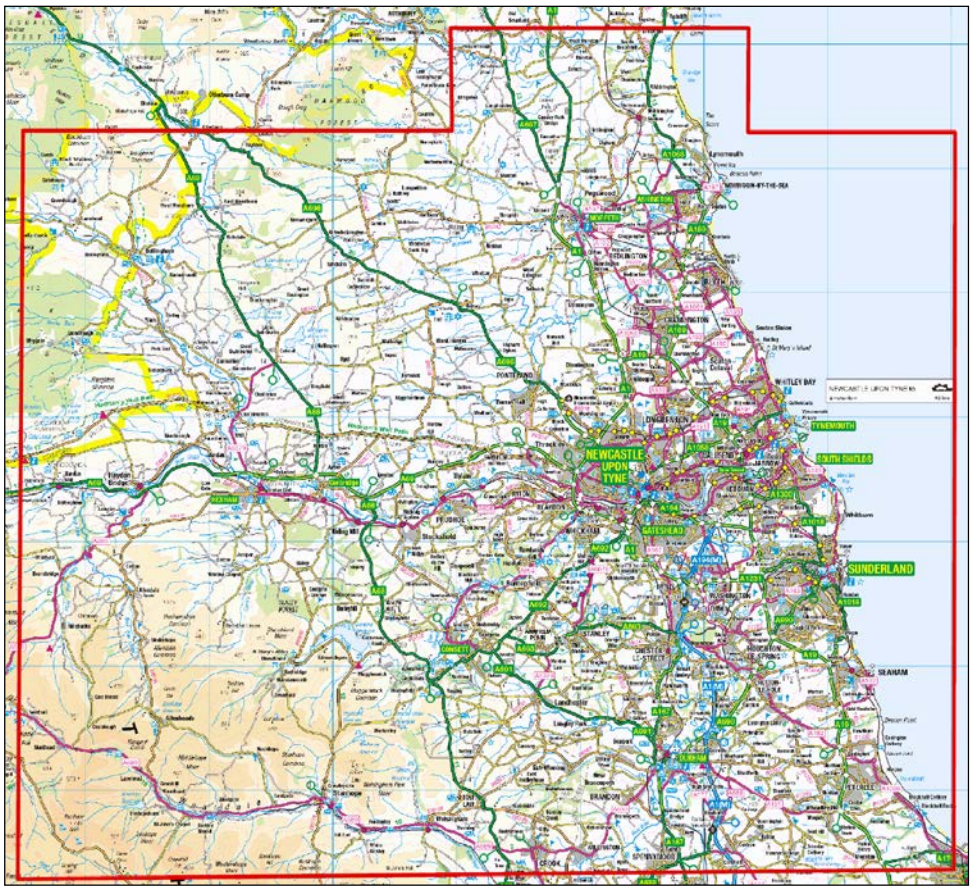


Figure 2-A TPM Coverage

The greatest spatial disaggregation of zoning is closest to the urban centres of Newcastle, Gateshead and Sunderland. Further away from these areas, the model's suitability for use is limited.

Although the most recent versions of the model incorporate recent traffic data (up to 2011), the model's base year assumptions and underlying trip distribution is based on data which is 10 years or older and so well beyond the normally accepted 6 years old threshold.

Given that the modelled area does not extend beyond Felton, it is considered that TPM in its current form would be of limited use in the appraisal of potential schemes identified through the A1 North of Newcastle Feasibility Study.

2.11 The Morpeth Traffic Model

The Morpeth Traffic Model was developed by AECOM between 2007 and 2011 to provide a means of testing road schemes in the vicinity of Morpeth, primarily the A1 South East Northumberland Link Road – Morpeth Northern Bypass. The model is a SATURN assignment model with a base year of 2007 with a variable demand forecasting model add-on. The geographic extent of the model is shown in Figure 2-B.

Figure 2-B   Morpeth Traffic Model Coverage

The detailed model area is focussed around Morpeth town centre. Given that the modelled area does not extend beyond Alnmouth it is considered that the Morpeth Traffic Model in its current form would be of limited use in the appraisal of potential schemes identified through the A1 North of Newcastle Feasibility Study.

2.12 The HA Tyne and Wear Mesoscopic Model

The Tyne and Wear Mesoscopic Model has been developed for the Highways Agency as an assignment tool covering the strategic road network in Newcastle and Gateshead using DynameQ software. The roads included, in effect, form an unofficial orbital route around Newcastle and Gateshead.

A mesoscopic model was chosen on the basis that a model was required with similar capabilities to microsimulation models in terms of modelling individual vehicle behaviour, but capable of dealing with a size of network normally handled in macromodel software such a SATURN. The model is not a substitute for a demand model or a model that can capture the full costs of congestion in a transport system, and as such is unsuitable for economic appraisal.

The geographic extent of the model is shown in Figure 2-C.

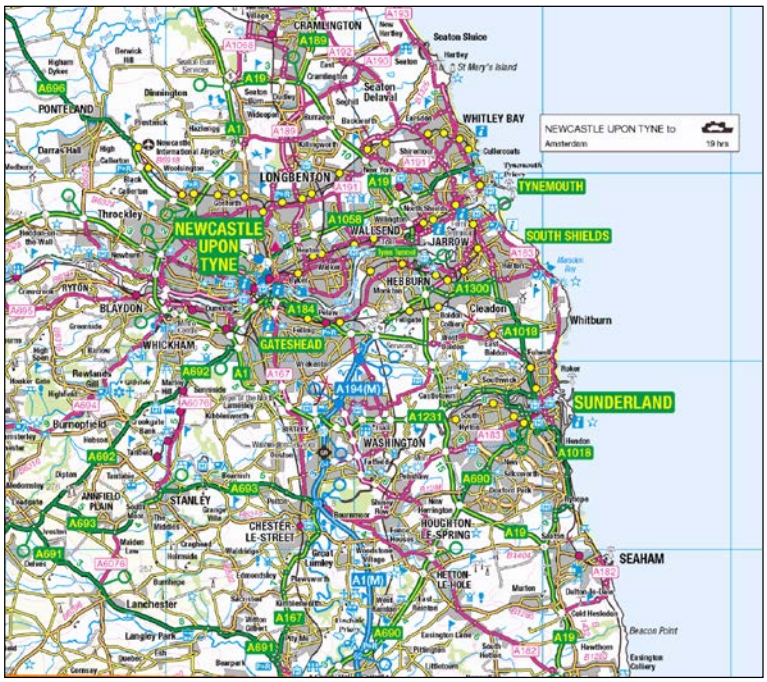


Figure 2-C HA Mesoscopic Model Coverage

Through discussion with HA NDD it is understood that the Mesoscopic model has been updated using traffic surveys that were undertaken in March 2014 with the updated model completed at the end of April 2014. In due course there are also proposals to extend the model to the Scottish border. The timing of model extension is likely to preclude its use to inform the feasibility study.

Given the geographic extents of the existing model and its current functionality, it is considered that the Tyne and Wear Mesoscopic Model in its current form would be of limited use in the appraisal of potential schemes identified through the A1 North of Newcastle Feasibility Study. However, the data collection undertaken in March 2014 will provide a useful evidence base to inform the development of a bespoke Value for Money appraisal tool.

2.13 Morpeth to Felton SATURN Model

This SATURN model was produced in 2006 to appraise A1 Morpeth to Felton Dualling scheme. As such it covers the A1 between Morpeth and Felton and its side roads; the network extents are shown in Figure 2-D.

The model was built with a Base Year of 2005, based on traffic surveys undertaken in October 2005 (including some data from 2003 surveys). Three models were produced covering the AM peak, interpeak and PM peak periods with forecast years of 2011 and 2026 and intermediate years of 2018 and 2031 where future growth was forecast using TEMPRO growth factors. Variable Demand Modelling was not considered in this case, a simple elastic assignment test showed that the scheme had limited propensity for induced/suppressed traffic.

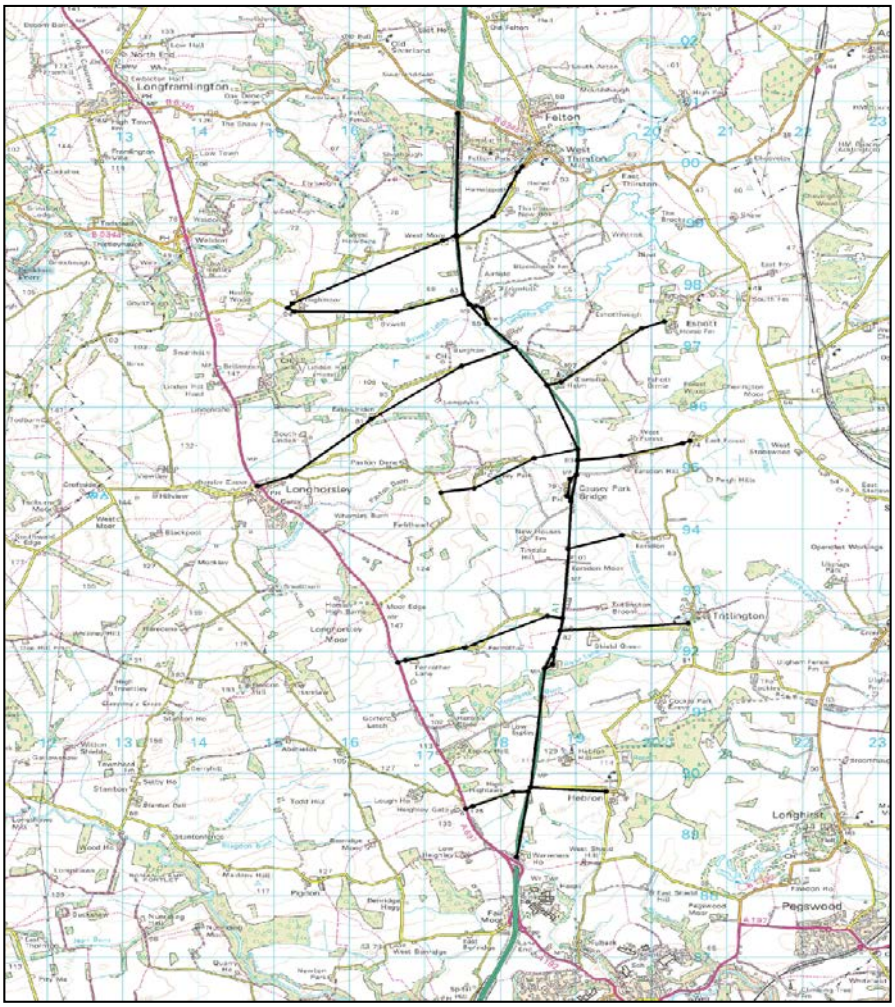


Figure 2-D Morpeth to Felton SATURN Model

Given the age of the model and the model coverage it is considered that in its current form it will be of limited use in the appraisal of potential schemes identified as part of the A1 North of Newcastle Feasibility Study.

2.14 Traffic Modelling Summary

There are four traffic models currently in existence that have been reviewed in order to understand whether they are capable of informing potential scheme assessment as part of Stage 3 of the A1 North of Newcastle Feasibility Study. These are:

- *The Tyne and Wear Transport Planning Model (TPM)*
- *The Morpeth Traffic Model*
- *The HA Tyne and Wear Mesoscopic Model*
- *Morpeth to Felton SATURN Model*

Each of these models have been developed for specific purposes and as such have differing levels of coverage and functionality.

In their current form none of these models provide the spatial coverage to inform the appraisal of potential schemes identified as part of the A1 North of Newcastle Feasibility Study. Further work is therefore required to develop an appropriate tool to assess the likely Value for Money of any schemes identified for further consideration.

3 Understanding the Current Situation

3.1 Introduction

This chapter of the report provides an understanding of the current situation in the study area. It considers the policy context, the current travel demand and levels of service, and the current opportunities and constraints which would affect any transport interventions.

The data presented builds upon the strategic information gathered as part of the Highways Agency's London to East Scotland Route-Based Strategy and provides more detailed information and analysis focused on the A1 between Seaton Burn and the Scottish border.

The chapter is structured under the following sub-headings:

- *Current Policy Context;*
- *Highway Standards / Layout;*
- *Traffic Flow Analysis;*
- *Traffic Speed Analysis;*
- *Congestion;*
- *Accident Analysis;*
- *Rail Network Usage; and*
- *Environmental Constraints.*

3.2 Current Policy Context

A detailed review of pertinent local, regional and national policy documents has been undertaken to establish the current policy context for potential investment in the A1 North of Newcastle. Table 3-A provides a summary of relevant policy that directly supports investment in the corridor.

Policy	Key Extracts
National Policy	
DfT Strategic Vision	*"Invest in the strategic road network to promote growth and address the congestion that affects people and businesses, and continue to improve road safety"*
DfT Business Plan 2012 to 2015	*"Tackle congestion to improve performance on the strategic road network (SRN) and promote growth…Introduce reforms to make our roads safer"*
HA Goals for the Strategic Road Network	*"Improving the reliability of journey times…Reducing deaths and injuries in line with Government targets"*
Strategic Framework for Road Safety (March 2011)	*"There have been impressive improvements over previous decades and in recent years. We are committed to ensuring this trend is maintained."*
National Planning Policy Framework (March 2012)	• *Building a strong, competitive economy* • *Ensuring the vitality of town centres* • *Supporting a prosperous rural economy* • *Supporting high quality communications infrastructure*
Investing in Britain's Future (June 2013)	*"Upgrade the national non-motorway network managed by the Highways Agency with a large proportion moved to dual-lane and grade-separated road standard to ensure free-flowing traffic nationwide"*

Policy	Key Extracts
Action for Roads, A Network for the 21st Century (July 2013)	*"Some strategic roads, including some of the most notorious hot-spots in the country, have long been recognised as being in need of a comprehensive solution"*
National Infrastructure Plan (December 2013)	• *Addressing road quality, increasing capacity and tackling congestions, and ensuring the network provides critical connections* • *Securing the network by fixing the instability and institutional problems that have led to 20 years of underinvestment* • *Adapting to, and taking advantage of, technological change and meeting the governments environmental and climate change targets* *"…new legislation to provide funding certainty for committed upgrades through a new Roads Investment Strategy…This means contractors can have confidence to start expanding their capacity by investing in new techniques, training staff and increasing employment."* *"The government is taking steps to ensure that investment in infrastructure across the country is targeted where it is most needed to generate growth, create jobs and rebalance the economy"*
Regional Policy	
North East, Independent Economic Review (April 2013)	*"Big improvements in transport infrastructure and services to overcome the relative national and international isolation of the North East and to improve connections within the North East so that people can get to and from work more easily and cheaply."*
North East Local transport Body	*"ensure capacity and speed of transport links to and within the North East LEP area are maintained and enhanced in order to increase the attractiveness of the North East LEP area as a place to do business, boosting inward investment and improving competitiveness of indigenous firms"*
North East Chamber of Commerce Transport Priorities	*"Road access to Scotland – a key market for North East businesses – is not fit for purpose."*
North East Strategic Economic Plan (SEP)	*"Congestion on the North East's road network occurs mainly on the A1 and A19, river crossing points and their approaches, and radial routes into the main urban centres on the local network (particularly Newcastle, Sunderland and Durham). Existing congestion on the strategic road network is expected to increase and currently the severe congestion on some links is spreading the congestion on to other strategic and local links. Without intervention, congestion and delays will worsen."* *"…road constraints acting as a barrier to a number of key locations with considerable housing and commercial development potential"*
Local Policy	
Northumberland Local Transport Plan 3	*"The A1 is a key route for freight being transported through Northumberland. This route is predominantly single carriageway. This will have implications on journey time reliability for other road users."* *"Single carriageway sections of the A1 north of Morpeth causing delays and unreliable Journeys"* *"Car ownership in Northumberland is forecast to increase, particularly in rural areas. This has implications for the commercial viability of public transport and modal share in the future."* *"Due to the rural nature of the county people in Northumberland travel longer distances to work compared to regional and national figures. There is often no alternative to the private car for these trips."*

Policy	Key Extracts
Northumberland Local Transport Plan 3 Strategic Environmental Assessment	*"The A1 is a key route for freight transport originating in and travelling within Northumberland. For much of this route, the A1 is single carriageway and slow HGV speeds can cause delay to other drivers. Operational and capacity issues with the road, rail and shipping freight networks restrict the potential for modal shift."*
Northumberland Local Transport Plan 3 Health Impact Assessment	*"Dual carriageways tend to have increased levels of traffic flow but a reduced risk of traffic accidents because of reduced and improved junctions. There will also be a better flow of traffic leading to improved access to goods and services. However the road dualling will require additional, likely agricultural, land and increase community severance along the dualled route."*
Northumberland Local Plan (January 2013)	*"We want to help to improve the transport network with new roads, motorways, railways, cycle paths and footpaths. We will support improvements to roads that we know are very busy at the minute."*
Northumberland Core Strategy (May 2012)	*"The Council supports the full dualling of the A1...[it] would support improvements in locations where there is a need to address road safety issues, where improvements would contribute to the local and wider economy, and where the road is not designed to current standards."*
One Core Strategy (December 2013)	*"The Strategic Road Network serving the area (A1, A69, A194(M) and A696) is essential for … economic growth and prosperity for Gateshead and Newcastle. We will work with the Highways Agency to facilitate enhancements to these strategic corridors, giving better access to other major towns and cities and to international gateways. These enhancements will include road widening and junction improvements within and outside of the plan area"*

Table 3-A Policy Context

Policy Context Summary: There are a number of policies at a local, regional and national level that directly support investment in the A1 North of Newcastle.

3.3 Highway Standards / Layout

The A1 north of Newcastle through Northumberland forms an important route between England and Scotland. It provides a strategic link between the key economic centres within the North East and Scotland and is recognised by the DfT as a Route of Strategic National Importance.

The route caters for strategic traffic, local traffic, tourist traffic, heavy goods traffic and agricultural traffic.

Other key routes in Northumberland include the A1068 coastal route and the A697 towards Coldstream in Scotland. However, these routes do not provide alternatives for many of the trips on the A1 North of Newcastle.

Other than these routes, roads in Northumberland are characterised as narrow rural links that connect a number of small settlements and do not lend themselves for use as an alternative to the A1 north-south route. The A1 therefore also acts as a key distributor for more localised trips, as it is often provides the most direct route. Local routes in Northumberland have therefore not been considered in detail as part of this feasibility study.

The A1 north of Newcastle consists of a mix of highways standards, with sections at both single carriageway and dual carriageway standard. There are a total of 7 changes in carriageway between dual carriageway, single carriageway and two sections with climbing lanes ('wide single 2+1') in the vicinity of the River Tweed.

The route also has numerous other highway constraints / features which include:

- *lack of overtaking opportunities on single carriageway sections*
- *bus stops*
- *large numbers of at-grade junctions of varying standards and layout*
- *large numbers of Private Means of Access (PMA)*
- *laybys*
- *bridges*

AECOM's 2011 A1 North of Newcastle study stated that evidence provided by Northumberland County Council highlighted that two recent inquests into fatal accidents (at the time of the study) had cited the mix of carriageway standards on the A1 as a contributing factor along with the unfamiliarity of the road by drivers from outside the region. Also, the coroner is said to have noted that the mixed standard of the A1 can result in driver confusion on the route.

Highway Standards / Layout Summary

Issue / Challenge	Route Sections Affected										
	1	2	3	4	5	6	7	8	9	10	11
Lack of alternative routes	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Inconsistent carriageway standards						✓					
Poor junction standards / layout	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓
Large numbers of at-grade junctions and PMA's	✓		✓	✓	✓	✓	✓	✓			
Lack of overtaking opportunities			✓		✓		✓	✓	✓	✓	

3.4 Traffic Flow Analysis

Available traffic flow data has been analysed to gain a greater understanding of the existing traffic conditions on the A1 between the A19 at Seaton Burn and the Scottish border.

As discussed earlier the A1 corridor is the key focus of this study considering north south movements between Newcastle and Scotland. Other roads within this corridor are generally characterised as narrow rural links that connect a number of small settlements and as such do not provide an alternative to the A1. These narrow rural links have not been considered in any detail.

3.4.1 Data Source

Traffic flow data has been sourced from TRADS sites located on each section of the A1 North of Newcastle identified previously. TRADS is the Highways Agency's (HA) **TRA**ffic **D**atabase **S**ystem that provides continuous data on traffic volumes, vehicle

type and vehicle speeds across approximately 11,000 inductive loops (TRADS sites) installed on the HA's network of strategic roads. Section 6 of the A1 North of Newcastle has no TRADS sites on its length; this is a short 2.2km length of Dual Carriageway to the North of Alnwick. Due to the lack of data and the fact it is already a section of dual carriageway no traffic flow analysis has been carried out on this section.

Analysis has considered traffic count data only. Origin and destination information is not currently available. As such it is not possible to distinguish local and long distance traffic.

3.4.2 Traffic Volumes

Figure 3-A shows the two-way Annual Average Daily Traffic (AADT) volume on each section of the A1 in 2010. 2010 was used as all the sites have full data for this year and this allowed for consistency in any comparisons made.

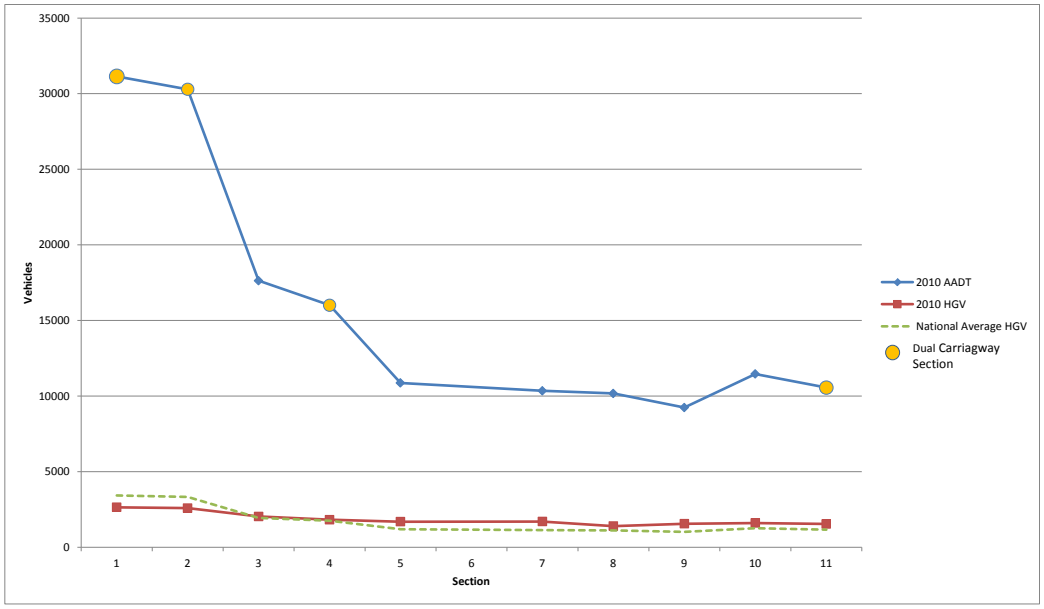


Figure 3-A Two-way 2010 Average Daily Traffic

Also shown is the average number of HGVs on each section of the route and the national average for this type of road (taken from Road Traffic Forecasts 2013).

In general, traffic volumes on the A1 decrease as the route heads north. However, the number of HGVs remains fairly constant thus making up a larger proportion of traffic on the northern sections of the route.

Whilst traffic volumes are not excessive for this type of road in comparison to other single carriageway roads in the Strategic Road Network (SRN), anecdotal evidence suggests that the relatively high numbers of HGVs and agricultural vehicles, combined with a lack of overtaking opportunities, results in vehicle 'platooning', driver frustration, reduced vehicle speeds and potential safety issues resulting from vehicles overtaking slower moving traffic.

3.4.3 Heavy Goods Vehicles

On single carriage way roads HGVs (>7.5 tonne) are limited to 40mph and on dual carriageways they are limited to 50mph. The percentage of HGVs on a road can

therefore have a significant impact on route speeds, especially on single carriageway 60mph roads where overtaking opportunities are also limited.

The percentage of HGVs on each route section is shown in Figure 3-B. For comparative purposes the national average percentage of HGVs for this road type (as presented in the Road Traffic Forecasts 2013) is also presented.

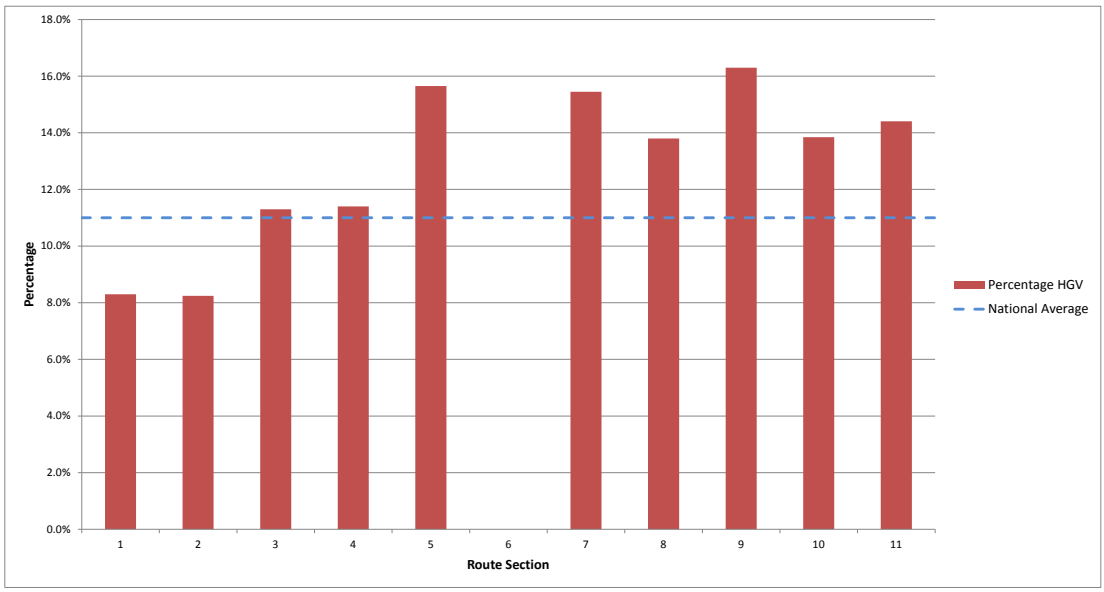


Figure 3-B Two-way 2012 Percentage HGV on Route

The data shows that the percentage of HGVs on the route significantly increases once the route passes Alnwick (Section 5 onwards). This is because HGV numbers remain relatively constant along the full route whilst overall traffic volumes decrease significantly north of Alnwick.

Traffic Flow Analysis Summary

Analysis of readily available traffic flow data from HA TRADS sites located on the A1 between the A19 and the Scottish border highlights the following key points:

- *Overall traffic volumes are not excessive for a road of this type;*
- *Flows on the A1 decrease significantly north of Alnwick;*
- *The A1 north of Alnwick experiences relatively high proportions of HGVs;*
- *The number of HGVs (and agricultural vehicles) combined with a lack of overtaking opportunities on single carriageway sections of the route can result in vehicle 'platooning' and reduced average speeds.*

3.5 Traffic Speed Analysis

Available traffic speed data has been analysed to gain a greater understanding of the performance of the A1 between the A19 and the Scottish border.

3.5.1 Data Source

Traffic speed data has been obtained from the following sources:

- *TRADS: The same TRADS sites used in the analysis of traffic flows has been used to analyse average vehicle speeds over the course a day; and*
- *Trafficmaster: Historical journey time data has been obtained from Trafficmaster Ltd via the DfT's Congestion Statistics Branch. The Trafficmaster data provides individual vehicle speeds obtained via GPS devices fitted to both private and commercial vehicles. Trafficmaster data is able to provide a large sample of vehicle speeds and can be analysed over any route.*

3.5.2 Average Route Speeds

Average vehicle speeds obtained from TRADS on the A1 in 2010 (the most recent full year of data for speeds) are presented in Figure 3-C.

Hour Ending	(1) Dual Carriageway South of Morpeth	(2) Dual Carriageway at Morpeth	(3) Single Carriageway between Morpeth and Felton	(4) Dual Carriageway at Alnwick	(5) Single Carriageway North of Alnwick	(7) Single Carriageway between Ellingham and Fenwick	(8) Single Carriageway South of Berwick	(9) Berwick Bypass South of the River Tweed	(10) Berwick Bypass North of the River Tweed	(11) Dual Carriageway North of Berwick
01:00	66.1	61.85	56.55	62.8	59.6	59.6	56.95	53.4	56.95	61.55
02:00	64.4	60.55	56.6	62.15	59.25	59.45	56.95	53.55	56.8	59.8
03:00	64.8	60.5	56.55	61.05	58.9	59.3	56.9	53.5	56.4	59.1
04:00	63.3	60.35	56.15	60.95	58.8	58.9	56.9	52.9	55.65	58.25
05:00	63.7	61.4	56.6	61.45	59.1	59.3	57.55	54.35	55.6	58.75
06:00	66.3	62.65	56.5	62.65	60.2	60.55	58.15	55.45	56.7	61.6
07:00	68.1	64.35	54.9	64.15	60.15	60	57.5	55	56.25	63.55
08:00	68.5	63.7	52.15	64.8	58.45	57.95	55.5	53.1	54.65	63.85
09:00	68.1	62.8	50.3	64.45	57.15	56.3	54.6	52.25	53.4	63.8
10:00	66.4	62.15	49.6	64	56.2	54.95	54	51.5	52.35	63.1
11:00	65.8	61.05	48.2	63.5	54.7	53.15	52.7	50.45	51.4	62.7
12:00	65.8	60.55	47.85	63.5	54.4	53.35	52.45	50.1	50.75	62.65
13:00	66	61.25	48.6	63.9	55.2	53.7	53	50.15	51.1	63
14:00	66	62.15	48.5	63.9	55.5	53.85	53.05	50.2	51.35	63.2
15:00	65.7	62.35	48.75	64.15	55.8	54.2	53.4	50.7	51.3	63.5
16:00	65.9	62.9	48.8	64.75	55.85	54.6	53.85	50.95	51.7	63.9
17:00	66.2	63.6	48.8	65.15	56.05	55.05	54.2	51.45	52.05	64.4
18:00	67.2	64.2	50.25	65.7	57.1	55.9	54.85	52.4	53.1	65.25
19:00	68.7	65	52.2	66.2	58.75	58.25	56.25	53.55	54.85	65.6
20:00	69.5	65.65	53.85	66.25	60.2	59.45	56.65	54.65	55.85	65.7
21:00	69.6	65.5	55.1	65.95	60.85	60.15	56.9	54.95	56.65	65.1
22:00	67.9	64.25	54.95	65.2	60.85	60.5	56.9	54.35	56.75	64.2
23:00	66.7	63.15	55.3	64.5	60.25	60.25	56.95	53.8	56.85	63.3
00:00	66.8	62.6	56.1	63.8	60.5	60.35	57.15	53.8	57.3	62.35
12 Hour Average	66.7	62.6	49.5	64.5	56.3	55.1	54.0	51.4	52.3	63.7

Figure 3-C Average Vehicle Speeds (mph, 2010)

Analysis of TrafficMaster data has enabled further detailed investigation of average speeds along each section of the route. TrafficMaster provides journey times along each link of the Ordnance Survey's Integrated Transport Network (ITN) for 15 minute intervals through the entire year; the DfT maintains the ITN network and updates it yearly for use in their major roads database. This data was aggregated to give an average journey time across the year for each 15 minute period of the day. Using the link lengths from the DfT's ITN network it was possible to calculate average speeds on each ITN link.

Average 12 hour speeds (07:00 – 19:00) between September 2012 and August 2013 are shown in Figure 3-D. Also shown are the average speeds on other key routes in the area to give a comparison. The data clearly shows that the average speeds on the single carriageway sections of the route are significantly lower than average speeds on the dual carriageway sections of the route.

Traffic Speed Analysis Summary

Analysis of traffic speed data, both from TRADS and TrafficMaster, shows that speeds on the single carriageway sections of the A1 are significantly slower than those on dual carriageway sections.

The slowest section of this route is Section 3 (between Morpeth and Felton), with 12 hour average speeds of less than 50 mph on this section. Sections 9 and 10 (the Berwick Bypass) also perform very poorly with only marginally higher average speeds.

Issue / Challenge	*Route Sections Affected*										
	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*
Average speeds on the single carriageway sections of the route are significantly lower than sections that have been upgraded to dual carriageway.			✓		✓		✓	✓		✓	

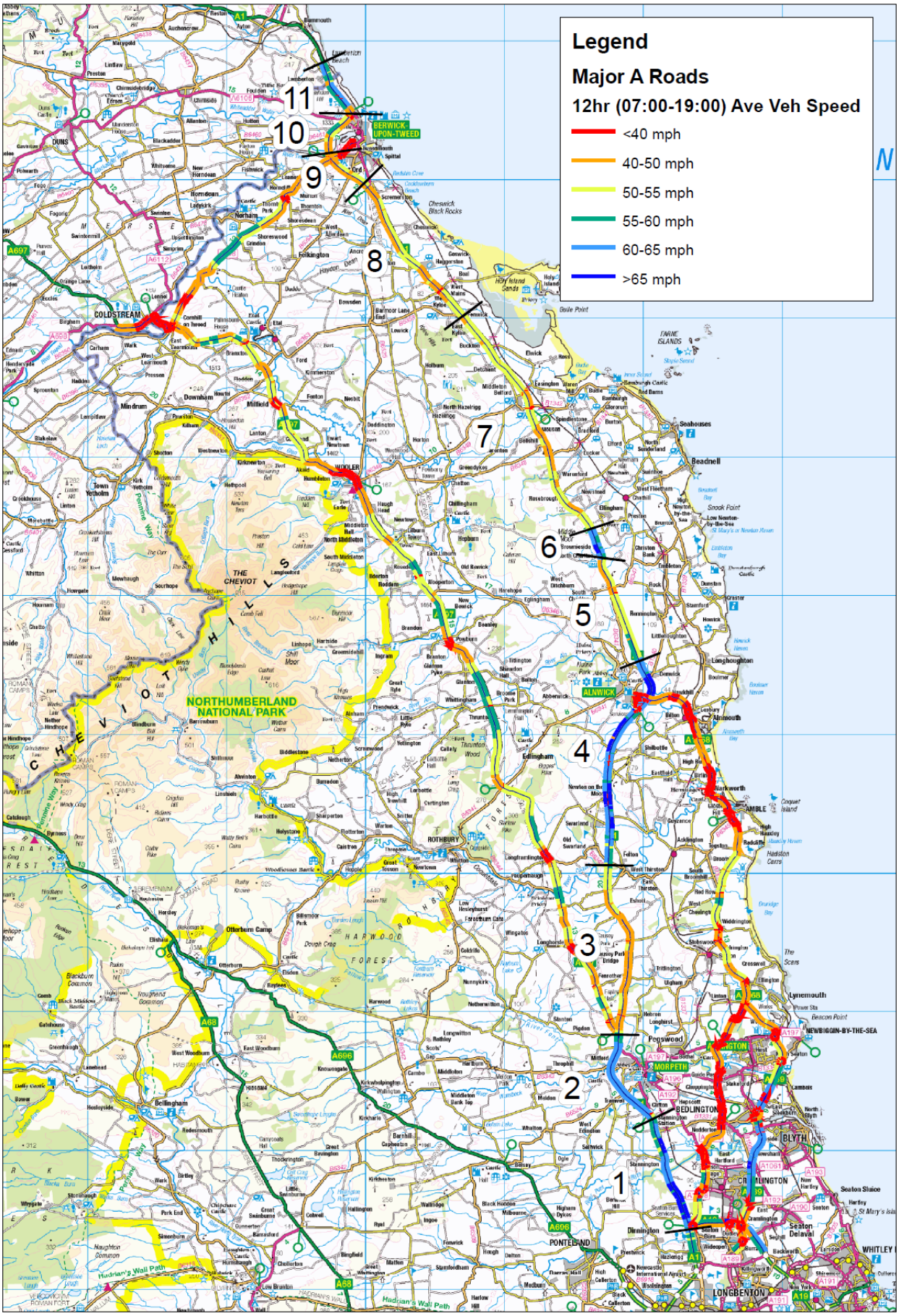


Figure 3-D 12 Hour Average Route Speeds (Averaged over September 2012-August 2013)

3.6 Congestion

Available journey time data has been analysed to gain a greater understanding of any congestion issues on the A1 north of Newcastle. Congestion has been estimated by comparing journey times in peak hours against journey times in an off peak period when traffic will be travelling at near its fastest possible speed, i.e. Free Flow Speed. From visual inspection of the daily flow / speed profiles an off-peak period of 22:00 to 03:00 was considered representative of free flow conditions Journey time information was based on TrafficMaster information.

Figure 3-E shows the percentage delay experienced in the PM peak on both the A1 and other major roads in the surrounding network.

The data shows that section 3 of the route (between Morpeth and Felton) suffers the most delay over its length with the majority of the links experiencing 10-20% delay. Section 7 (between Ellingham and Fenwick) and section 8 (the single carriageway south of Berwick) also contain a larger number of links experiencing greater than 10% of their journeys spent in delay than is witnessed elsewhere on the network. It can also be seen that, in general, dual carriageway sections of the A1 North of Newcastle do not experience delay.

3.6.1 Causes of Congestion

While it is not possible to determine the cause of congestion definitively from available data, suggestions for the causes of congestion on the A1 North of Newcastle are listed blow with their reasoning:

- ***High percentage of HGVs*** *– The A1 North of Newcastle has several sections of single carriageway and suffers from an above average percentage of HGVs. HGVs are limited to 40mph on single carriageway roads and 50mph on dual carriageways. A lack of overtaking opportunities on single carriageway sections of the route can therefore lead to vehicles 'platooning' behind HGVs.*

- ***Agricultural vehicles*** *– The A1 North of Newcastle is a rural road with many farm and field accesses directly off the route. Anecdotal evidence suggests that these vehicles cause of delays to other traffic, particularly at Harvest times.*

Congestion Analysis Summary

Issue / Challenge	Route Sections Affected										
	1	2	3	4	5	6	7	8	9	10	11
Peak hour traffic speeds significantly below free flow conditions.			✓				✓	✓			

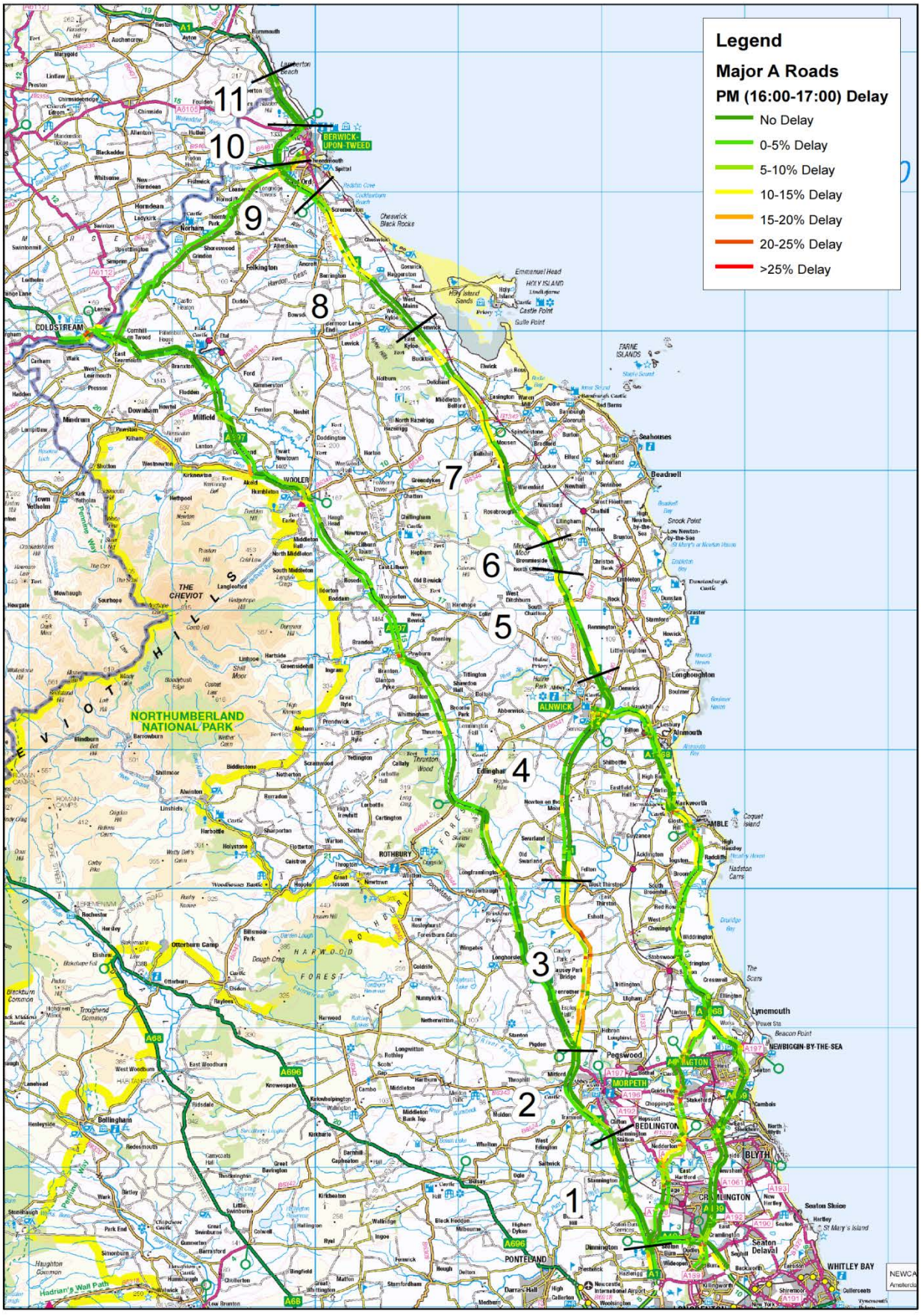


Figure 3-E Percentage Journey Time spent in delay (PM peak, averaged over September 2012-August 2013)

3.7 Accident Analysis

Available accident data has been analysed to gain a greater understanding of any safety issues on the A1 north of Newcastle.

The accident analysis is discussed under the following headings:

- *Data Source;*
- *Accident Summary;*
- *Comparison Against COBA National Accident Rates; and*
- *Accident Analysis Summary*

3.7.1 Data Source

Accident data has been obtained from the following sources:

- *DfT: Observed accident data has been obtained from the DfT via http://data.gov.uk/dataset/road-accidents-safety-data*
- *COBA: The calculation of link and junction accident rates (combined) has been undertaken in line with the methodology prescribed within Table 4/1 of the COBA manual.*

3.7.2 Accident Summary

Table 5-A provides a summary of all reported accidents on the A1 north of Newcastle between the junction with the A19 at Seaton Burn and the Scottish border for the five year period 2008 to 2012 (the most recent complete five year period available).

Year	Fatal	Serious	Slight	Total
2008	2	9	43	54
2009	2	14	58	74
2010	0	6	46	52
2011	3	5	45	53
2012	3	8	46	57
Total	**10**	**42**	**238**	**290**

Table 3-B A1 north of Newcastle Accident Summary

Table 3-C provides a summary of the contributory factors for all accidents in the five year period 2008-2012. It should be noted that accidents can have more than one contributing factor.

Contributory Factor	Percentage composition		
	Total Accidents	KSI accidents	Fatal Accidents
Road Environment Contribution	23%	8%	0%
Vehicle Defects	2%	2%	0%
Driver/Rider Injudicious	17%	12%	0%
Driver/Rider Error	64%	68%	73%
Driver/Rider Impairment	16%	33%	36%
Driver/Rider behaviour	17%	15%	9%
Driver/Rider Vision Affected	6%	2%	0%
Pedestrian	1%	3%	0%
Overtaking	10%	10%	18%
Weather	21%	12%	0%

Table 3-C Contributory Factors for Accidents (2008-2012)

The data shows that 18% of fatal accidents are recorded with overtaking as a contributory factor. 10% of KSI accidents and 10% of total accidents are recorded with overtaking as a contributory factor.

The data shows that 73% of fatal accidents are recorded with Driver/Rider Error as a contributory factor. 68% of KSI accidents and 64% of total accidents are recorded with Driver/Rider Error as a contributory factor

The data shows that 36% of fatal accidents are recorded with Driver/Rider Impairment as a contributory factor. 33% of KSI accidents and 16% of total accidents are recorded with Driver/Rider Impairment as a contributory factor

3.7.3 Comparison against National Accident Rates

Accident rates published in the COBA manual (reproduced below) for links and junctions combined have been used to compare the number of observed accidents over the 5 year period 2008 to 2012 against the expected number of accidents that would occur assuming COBA accident rates. COBA accident rates have been used to inform this analysis as the software is nationally recognised as the standard for the appraisal of accident savings on major highway schemes. The accident rates published within COBA are based upon many years of research and are representative of national averages for different road types.

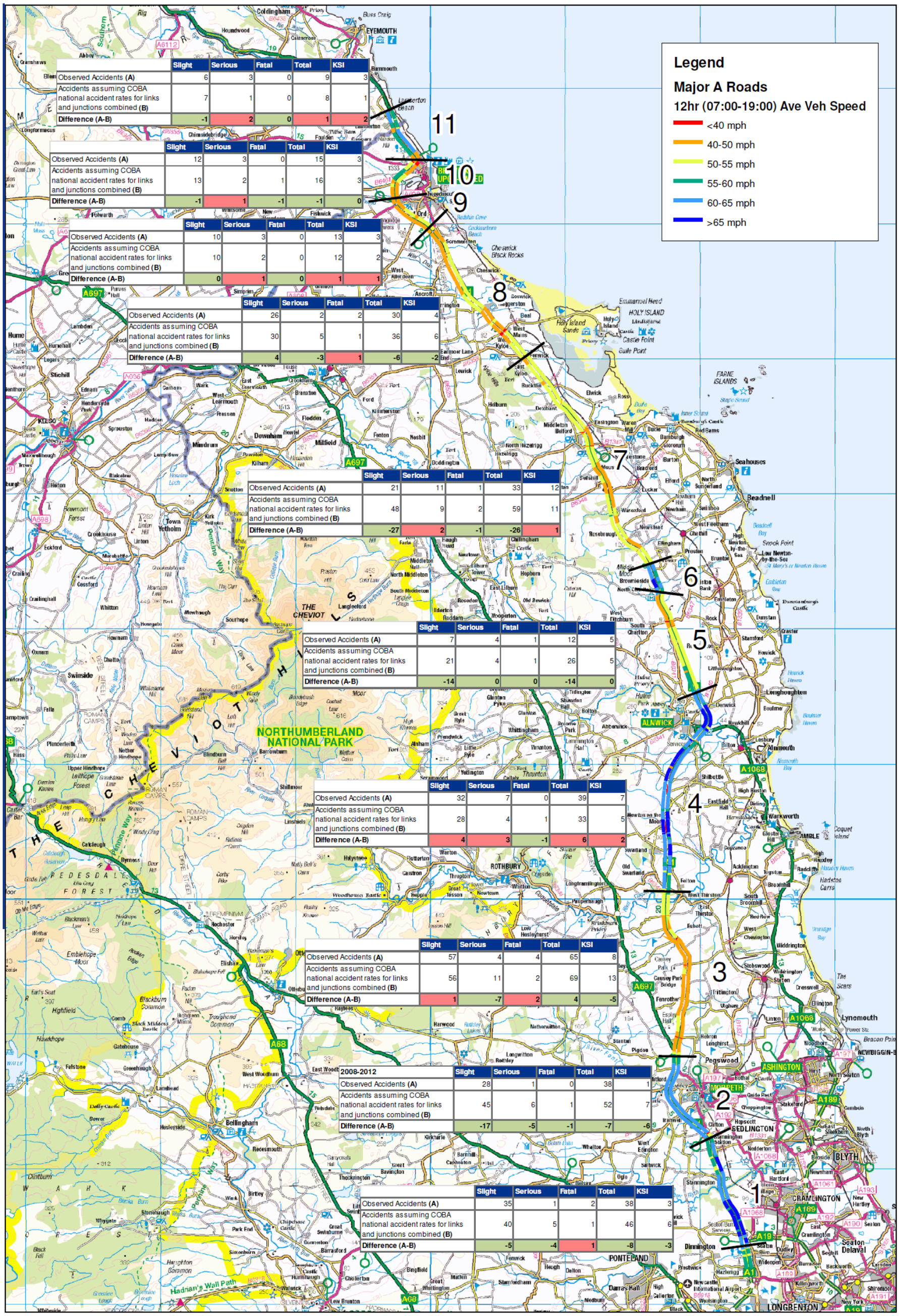
LINK AND JUNCTION COMBINED (2000 Base)					
ACCIDENT TYPE	ROAD TYPE	Accident Rate (Pia/mvkm)		β	
1	D2 Motorway	0.098 **		1.001	
2	D3 Motorway	0.098 **		1.001	
3	D4 Motorway	0.098 **		1.001	
		30/40 mph		50/60/70 mph	
		Pia/mvkm	β	Pia/mvkm	β
4	Modern S2 Roads	0.844	0.984	0.293	0.973
5	Modern S2 Roads with HS	0.844	0.984	0.232	0.973
6	Modern WS2 Roads	0.844	0.984	0.190	0.973
7	Modern WS2 Roads with HS	0.844	0.984	0.171	0.973
8	Older S2 A Roads	0.844	0.984	0.381	0.973
9	Other S2 Roads	0.844	0.983	0.404	0.998
10	Modern D2 Roads	1.004	0.984	0.174	0.973
11	Modern D2 Roads with HS	1.004	0.984	0.131	0.973
12	Older D2 Roads	1.004	0.984	0.226	0.973
13	Modern D3+ Roads	1.004	0.984	0.174	0.973
14	Modern D3+ Roads with HS	1.004	0.984	0.131	0.973
15	Older D3+ Roads	1.004	0.984	0.226	0.973

Notes: HS refers to the one metre wide hard strip provided both sides of the carriageway;
* this rate includes accidents at merge/diverge areas and on slip roads;
** this rate includes accidents at the ends of the slip roads, for example, at roundabout, traffic signals etc.

Table 4/1: Default Accident Rates and Accident Rate Reduction Factor (β) (personal injury accidents per million vehicle kilometres - 2000 Base)

Note: Analysis presented has considered links and junctions combined because traffic flow data is not available for side roads which would be required to analyse junctions separately.

A summary of the analysis for Slight, Serious, Fatal and Killed and Seriously Injured (KSI) accidents is provided in Figure 3-F for the five year period 2008 to 2012.



	Slight	Serious	Fatal	Total	KSI
Observed Accidents (A)	6	3	0	9	3
Accidents assuming COBA national accident rates for links and junctions combined (B)	7	1	0	8	1
Difference (A-B)	-1	2	0	1	2

	Slight	Serious	Fatal	Total	KSI
Observed Accidents (A)	12	3	0	15	3
Accidents assuming COBA national accident rates for links and junctions combined (B)	13	2	1	16	3
Difference (A-B)	-1	1	-1	-1	0

	Slight	Serious	Fatal	Total	KSI
Observed Accidents (A)	10	3	0	13	3
Accidents assuming COBA national accident rates for links and junctions combined (B)	10	2	0	12	2
Difference (A-B)	0	1	0	1	1

	Slight	Serious	Fatal	Total	KSI
Observed Accidents (A)	26	2	2	30	4
Accidents assuming COBA national accident rates for links and junctions combined (B)	30	5	1	36	6
Difference (A-B)	4	-3	1	-6	-2

	Slight	Serious	Fatal	Total	KSI
Observed Accidents (A)	21	11	1	33	12
Accidents assuming COBA national accident rates for links and junctions combined (B)	48	9	2	59	11
Difference (A-B)	-27	2	-1	-26	1

	Slight	Serious	Fatal	Total	KSI
Observed Accidents (A)	7	4	1	12	5
Accidents assuming COBA national accident rates for links and junctions combined (B)	21	4	1	26	5
Difference (A-B)	-14	0	0	-14	0

	Slight	Serious	Fatal	Total	KSI
Observed Accidents (A)	32	7	0	39	7
Accidents assuming COBA national accident rates for links and junctions combined (B)	28	4	1	33	5
Difference (A-B)	4	3	-1	6	2

	Slight	Serious	Fatal	Total	KSI
Observed Accidents (A)	57	4	4	65	8
Accidents assuming COBA national accident rates for links and junctions combined (B)	56	11	2	69	13
Difference (A-B)	1	-7	2	4	-5

2008-2012	Slight	Serious	Fatal	Total	KSI
Observed Accidents (A)	28	1	0	38	1
Accidents assuming COBA national accident rates for links and junctions combined (B)	45	6	1	52	7
Difference (A-B)	-17	-5	-1	-7	-6

	Slight	Serious	Fatal	Total	KSI
Observed Accidents (A)	35	1	2	38	3
Accidents assuming COBA national accident rates for links and junctions combined (B)	40	5	1	46	6
Difference (A-B)	-5	-4	1	-8	-3

Figure 3-F 2008-2012 Observed Accidents vs. COBA Estimates (Links and Junctions Combined)

Accident Analysis Summary

In general, the A1 between its junction with the A19 and the Scottish border does not appear to have a significant accident problem when compared against national averages (for links and junctions combined) published within the COBA manual.

However, it is recognised that the presence of the following add to safety concerns on the route:

- *Inconsistent carriageway and junction standards;*
- *Large number of at-grade junctions and Private Means of Access; and*
- *Lack of overtaking opportunities.*

Comparison of longer term accident trends shows that the number of accidents on the A1 have not changed significantly between 2005 and 2012.

3.8 Rail Network Usage

The East Coast Main Line (ECML) runs approximately parallel to the route of the A1 north of Newcastle.

Rail freight services operate in Northumberland; traffic includes heavy coal trains, minerals, steel products and multi modal containers. Rail freight is centred on the ECML, the Tyne Valley line, and the freight-only Ashington, Blythe and Tyne railway.

Passenger rail usage in Northumberland on the whole is low, with 2011 census data showing that just 1% of people in the county commute daily using the rail network. A similar pattern is observed when looking more locally at an area in the immediate vicinity of the A1 north of Newcastle.

There are seven ECML stations along the route, these stations and the total numbers of entries/exits in 2012/13 are provided in Table 3-D below.

Station	2012/13 Station Entries and Exits (per year)
Morpeth	285,052
Pegswood	1,650
Widdrington	3,630
Acklington	184
Alnmouth	257,702
Chathill	2,794
Berwick-Upon-Tweed	501,670

Table 3-D Northumberland ECML Station Usage

The data shows that the three main urban areas in the study area have stations with the highest usage, while stations serving smaller areas are used infrequently. The low usage of the smaller stations reflects the infrequent nature of train services servicing them: Widdrington, Pegswood, Acklington and Chathill are all only serviced by only one train service which runs twice a day Southbound and once a day Northbound. By comparison, there are 31 Southbound and 35 Northbound services stopping at Morpeth daily.

It can be concluded that although the East Coast Main Line runs parallel to the A1, the modal share of rail is extremely low.

3.9 Environmental Constraints

The A1 North of Newcastle, between Morpeth and Berwick-upon-Tweed, largely passes through a rural landscape that contains a number of sensitive environmental features. These need to be considered as part of the option identification and development stage. A comprehensive process to identify all environmental features on the A1 corridor has been undertaken, this includes features such as:

- *Ramsar Sites;*
- *Special Areas of Conservation;*
- *Special Protection Areas;*
- *Sites of Special Scientific Interest;*
- *National Nature Reserves;*
- *Local Wildlife Sites;*
- *Local Nature Reserves;*
- *Ancient Woodlands;*
- *Important Bird Areas;*
- *BAP Priority Habitats;*
- *RSPB Reserves;*
- *AONBs;*
- *Heritage Coasts;*
- *National Parks;*
- *Country Parks;*
- *Green Belt;*
- *Registered Battlefields;*
- *Registered Parks and Gardens;*
- *Scheduled Monuments;*
- *World Heritage Sites;*
- *Listed Buildings;*
- *Conservation Areas;*
- *Noise Important Areas;*
- *Flood Zones;*
- *Main Rivers;*
- *Ordinary Watercourses;*
- *Groundwater Source Protection Zones;*
- *Public Rights of Way;*
- *Long Distance Footpaths;*
- *National and Regional cycle routes;*
- *Residential properties; and*
- *Schools, hospitals, care homes and places of worship.*

This exercise was undertaken using the data sources identified in Table 3-E.

Title	Source
Magic	Defra's MAGIC Map Application, available from: http://magic.defra.gov.uk/
Environment Agency	http://maps.environment-agency.gov.uk/
Google Maps	Google Maps (2014), available at https://maps.google.com/
Northumberland County Council (1)	Northumberland County Council's Public Right of Way Map, available from http://prowmaps.northumberland.gov.uk/
Castle Morpeth Local Plan	Castle Morpeth Local Plan Proposals Map, available from: http://cmlocalplan.co.uk/frset.html
Berwick-upon-Tweed Borough Local Plan	Berwick-upon-Tweed Borough Local Plan Proposals Map, available from: http://www.northumberland.gov.uk/default.aspx?page=1579
Northumberland County Council (2)	Northumberland County Council's Interactive map, available from: http://inormaps.northumberland.gov.uk/map.asp
Pastmap	Available from: (http://pastmap.org.uk/)
ENVIS data	Highways Agency ENVIS data received in February 2014

Table 3-E Baseline Data Sources

Environmental constraints were mapped to inform the development of potential options identified as part of the Feasibility Study. This exercise has been desk based and has made use of readily available data sets that have been discussed and agreed with the wider HA project team. It is important to note that this is a preliminary feasibility study and does not constitute an environmental impact assessment. The study area used for the identification of environmental constraints has been determined by the importance of the constraint or the nature of the perceived impact.

A summary of the environmental constraints on the A1 corridor is provided below. Each of the environmental features have differing levels of sensitivity and have the potential to impact upon the option identification and development process in different ways.

Numerous nationally and locally designated heritage assets lie within close proximity to the A1. Particularly sensitive areas include: Alnwick Castle Registered Park and Garden, which is crossed by the A1; Blagdon Registered Park and Garden and associated Listed Buildings, located approximately 60m to the west of the A1; and Belford Hall Registered Park and Garden, its associated Listed Buildings and Belford Conservation Area, adjacent to the existing A1. The 'North Charlton medieval village and open field system' Scheduled Monument also lies adjacent to the A1, at North Charlton. In addition, there are a number of Grade II Listed Buildings located along the existing A1. These are largely mileposts, which may need relocating to accommodate any intervention; however, Ellingham Lodge and

'The pillars at junction with B6348' also lie adjacent to the A1. There are some areas of unscheduled archaeology / cultural heritage within the surrounding landscape, some of which are crossed by the A1. Any intervention should be designed to avoid the need to demolish / damage heritage assets and, where possible, it should avoid moving the A1 closer to these heritage assets.

The A1 crosses a number of floodplains and watercourses and these are numerous within the surrounding landscape. Parts of the existing A1 also lie within Groundwater Source Protection Zones, between Clifton and Northgate and to the west of Tweedmouth. The A1 passes within an identified flooding hot spot (ENVIS data) between Morpeth and the River Coquet. Therefore, any intervention could have an impact on flood risk and on surface water and groundwater quality.

There are a number of designated ecological conservation areas located adjacent to, or within close proximity to, the existing A1, including international, European, national and local designations. There are also numerous areas of Ancient Woodland and Biodiversity Action Plan (BAP) Priority Habitat. These areas are not designated but they are recognised as important at a national level. Particularly sensitive areas that are crossed by the A1 include: the River Tweed, designated as both a Site of Special Scientific Interest (SSSI) and a Special Area of Conservation (SAC); and the River Coquet and Coquet Valley Woodlands SSSI. Borough Woods Local Nature Reserve also lies adjacent to the A1, to the west of Morpeth.

The Northumberland Coast also has a number of international and national designations. Lindisfarne, which lies approximately 1.5km to the east, is designated as a National Nature Reserve (NNR), Ramsar Site, SSSI, SAC and Special Protection Area (SPA). Any intervention to the A1 may require land take from, and increase noise disturbance and the deposition of air pollutants within, these habitats. The adjacent habitats also include agricultural land, woodland, trees and hedgerows, which would also be adversely affected by land take.

A large proportion of the Northumberland coastline is designated as an Area of Outstanding Natural Beauty (AONB). This designation follows the coastline between Amble and Redshin Cove (just south of Berwick-upon-Tweed). It also extends inland and, at its closest point, it lies approximately 600m to the east of the existing A1. This is close to Easington. There are also a number of Special Landscape Areas (SLAs) within the vicinity of the existing A1. Some extents of the A1 lie adjacent to these SLAs. The A1 passes through SLAs: to the south of Stannington; to the west of Felton; to the east of Morpeth; and to the west of Tweedmouth and Berwick-upon-Tweed.

There are a number of properties (both residential and commercial) that lie immediately adjacent to the existing A1. There are also a number of properties within close proximity to the A1 (including residential, commercial, educational, medical, places of worship and recreational). These are largely concentrated within the surrounding settlements.

In addition, numerous public rights of way and a small number of long distance footpaths and cycle routes (including National Cycle Network routes) are crossed by, or run in the vicinity of, the A1.

Noise important areas (ENVIS data) have been identified along the A1 in various locations between Morpeth and Northgate.

Environmental Constraints Summary

The Northumberland Coast is designated as an Area of Outstanding Natural Beauty.

There are a number of environmentally sensitive features within close proximity to the A1 that would require consideration as part of any future intervention.

4 Understanding the Future Situation

4.1 Introduction

This chapter aims to develop an understanding of the future transport situation in the study area. Policy documents and government travel demand forecasts have been reviewed to identify any changes that are likely to occur in the study area, in terms of future land-use and policies, future changes to the transport system, and future travel demands and levels of service.

At the time of writing the Northumberland Local Plan is not yet fully adopted and is still in the consultation phase of development. The Full Draft Plan is currently under consultation with adoption programmed for Summer 2016. As such, detailed information on proposed developments in Northumberland is not readily available. However, the Northumberland Core Strategy, the Northumberland Strategic Housing Land Availability Assessment (SHLAA), and the Northumberland Local Development Scheme documents are available and these have been reviewed to identify potential sites that may impact upon the A1 North of Newcastle. However, it should be noted that these documents are subject to change.

4.2 Future Housing

The Northumberland SHLAA sets out the targeted numbers of additional houses to be built between 2011 and 2031 and has been the main source of information on housing development.

The Northumberland SHLAA splits Northumberland into four delivery areas, as shown in Figure 4-A; the Western Delivery Area is not likely to affect the A1 north of Newcastle corridor and as such the numbers of forecast houses to be built will not be considered.

Figure 4-A Northumberland Delivery Areas

Each of these areas contains a number of main towns and service centres; the SHLAA specifies how many houses are set to be built in these towns and service areas as well as a total number of houses to be built in the Delivery Area outside of the recognised main towns and service centres. While the SHLAA sets out an aspirational number of houses to be built by 2031 the Local Plan is not yet finalised and as such potential impact on the A1 north of Newcastle has not been quantified.

4.3 Future Employment

Due to the status of the Northumberland Local Plan prioritised employment sites are not yet fully confirmed. However the HA's London to South East Scotland RBS makes note of development based at Newcastle Airport set to provide 10,000 jobs to the area. Newcastle Airport already provides 3,200 jobs on site, 500 off site and a further 4,100 throughout the North East through indirect and induced effects. The Newcastle Airport Masterplan 2013 outlines the scope of the proposed developments, the airport itself expects to directly support 10,000 jobs regionally while developments are set to contribute an additional 2,150 jobs. NELEP's Strategic Economic Plan (SEP)(NELEP, March 2014), states that it a 40,000 additional jobs are expected to be created in the North East by 2024 with the implementation of the SEP adding 20,000 extra jobs to take the total to 60,000 throughout the North East.

4.4 Future Highways Improvements

Various future Highways Agency schemes have been identified which could affect traffic on the A1 north of Newcastle:

- *The A1 Lobley Hill to Dunston Improvement is programmed to be open traffic in Spring 2016. This scheme will increase the number of lanes on this section of the A1 near Gateshead, increasing capacity. However, the impact of this scheme on the A1 north of Newcastle has not been quantified.*
- *The Gateshead Western Bypass study is investigating potential improvements to the A1 between Birtley and the A1/A19 junction at Seaton Burn. Any improvements to this section of the A1 could affect traffic volumes on the A1 north of Newcastle, but as no interventions have been recommended or finalised at this point in time, this effect has not been quantified.*
- *The A1/A19 Seaton Burn Pinch Point scheme which will involve improvements to the A1/A19 junction. Seaton Burn junction experiences a high number of accidents and experiences high levels of congestion. Improving the slip roads and the adjacent roundabout should address these issues. The scheme is programmed to be completed in early 2015.*

In addition, the following local authority scheme has been identified:

- *The Morpeth Northern Bypass is a 3.8km bypass to the north of Morpeth, running from Whorral Bank roundabout to the A1 between Fairmoor and Lancaster Park. This scheme includes the removal of the existing A1/A192 junction and creating a new junction further south. The proximity of the existing A1/A192 junction and the A1/A697 junction currently leads to a problem with weaving traffic and has been identified as an area experiencing a high number of accidents. The Morpeth Northern Bypass scheme will address this issue. Construction is due to begin in Spring 2015.*

No other schemes that could impact the A1 north of Newcastle have been prioritised in the North East Local Enterprise Partnership Review 2011-2013. Several local schemes are mentioned in the 2011-2026 Strategy Document within the Northumberland Local Transport Plan, but these are unlikely to affect the A1 north of Newcastle. These are:

- *A19 Junction improvements;*
- *A193 Blythe improvement;*
- *A189 improvement; and*
- *Morpeth Telford Bridge improvement.*

4.5 Future Traffic Growth

The DfT's National Transport Model's (NTM) Road Traffic Forecasts (RTF, 2013) predicts that traffic along the A1 will increase by up to 34.2% by 2040, this is illustrated in Figure 4-B where NTM growth is shown on three sections considered representative of the route.

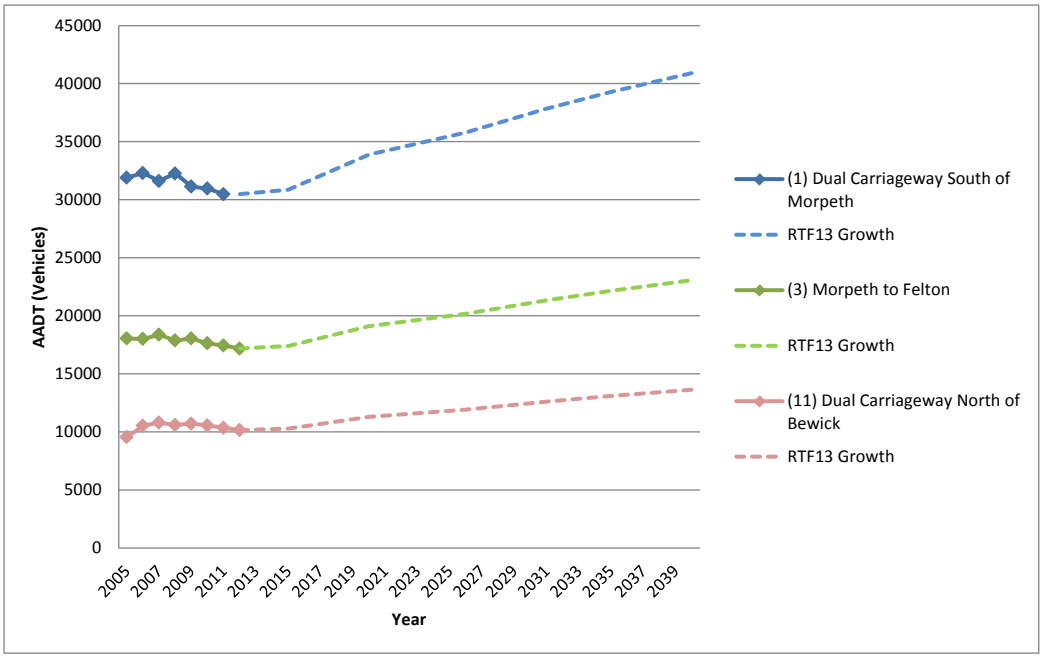


Figure 4-B Forecast Growth on the A1 (RTF13)

Existing problems on the A1 are therefore likely to be exacerbated in the future as a result of forecast growth in traffic levels.

The Newcastle Airport Masterplan 2013 provides an estimate for expected increase of daily movements due to the airport by 2030 from 9,000 currently to 16,250. Development sites at the airport are expected to generate an additional 5,000 daily traffic movements. However, Newcastle airport is to the South of the scheme and it has not yet been identified how the development of Newcastle Airport will affect the A1 north of Newcastle between Seaton Burn and the Scottish border.

4.6 Future Rail Network Proposals

The Northumberland Local Transport Plan (2011-2026) recognises the importance of rail travel in the region. It sets out a number of aspirations to address the issues with the current rail services, which include:

- *Re-opening of the ECML station at Belford which originally closed in 1969. Located between the existing ECML stations at Chathill and Berwick-upon-Tweed, it would serve local communities and improve access for tourists. Although no firm date has been provided for these proposals, the Local Transport Plan identifies the re-opening as a long-term goal.*
- *Northumberland County Council's Public Transport Strategy sets out some goals for increased services to Northumberland's ECML stations, increasing the frequency of local services at the likes of Acklington and Widdrington from three trains daily to eight trains daily. Although no firm date has been provided for*

these proposals, the Public Transport Strategy identifies campaigning for more frequent stopping services as a short-term goal.

Neither of the schemes mentioned above are prioritised in the North East Local Enterprise Partnership Review 2011-2013. Following a review of planned Network Rail improvements, no additional schemes were identified which are likely to significantly affect future rail use in the study area.

Northumberland County Council is a member of the Tyne & Wear Freight Quality Partnership, which aims to encourage modal shift of freight from road to rail. The Northumberland Public Transport Strategy also identifies a short-term aim of promoting greater use of rail freight in Northumberland.

Although the rail improvements outlined above are likely to result in some modal shift away from roads, the lack of confirmed proposals and the low level of existing rail use make it unlikely that traffic levels on the A1 will be significantly affected. The existing issues on the A1 identified in the previous chapter, such as high accident rates, low speeds and lack of overtaking opportunities, therefore remain unchanged.

5 Establishing the Need for Intervention

5.1 Introduction

This chapter aims to establish the need for intervention in the study area. It summarises the current and future transport-related problems and their underlying causes. The identification of problems and issues builds upon the evidence presented in previous chapters, both from previous studies and from recent analysis.

5.2 Identified Problems and Issues

The A1 between the A19 at Seaton Burn and the Scottish border comprises a mixture of carriageway standards along its length with a large number of at grade junctions and Private Means of Access.

The traffic flows on the A1 in Northumberland are not considered particularly high for a strategic route. The highest traffic volumes are seen on the southern sections of the route reducing quickly up to Alnwick and remaining relatively constant to the Scottish border. Average two-way traffic flows on the route range from between approximately 30,000 vehicles per day on the dual carriageway to the south of Morpeth to 10,000 vehicles per day on sections north of Alnwick up to the Scottish border.

In recent years traffic volumes have shown little sign of growing. However, the DfT's National Transport Model's Road Traffic Forecasts predicts notable traffic growth over the next 15-20 years.

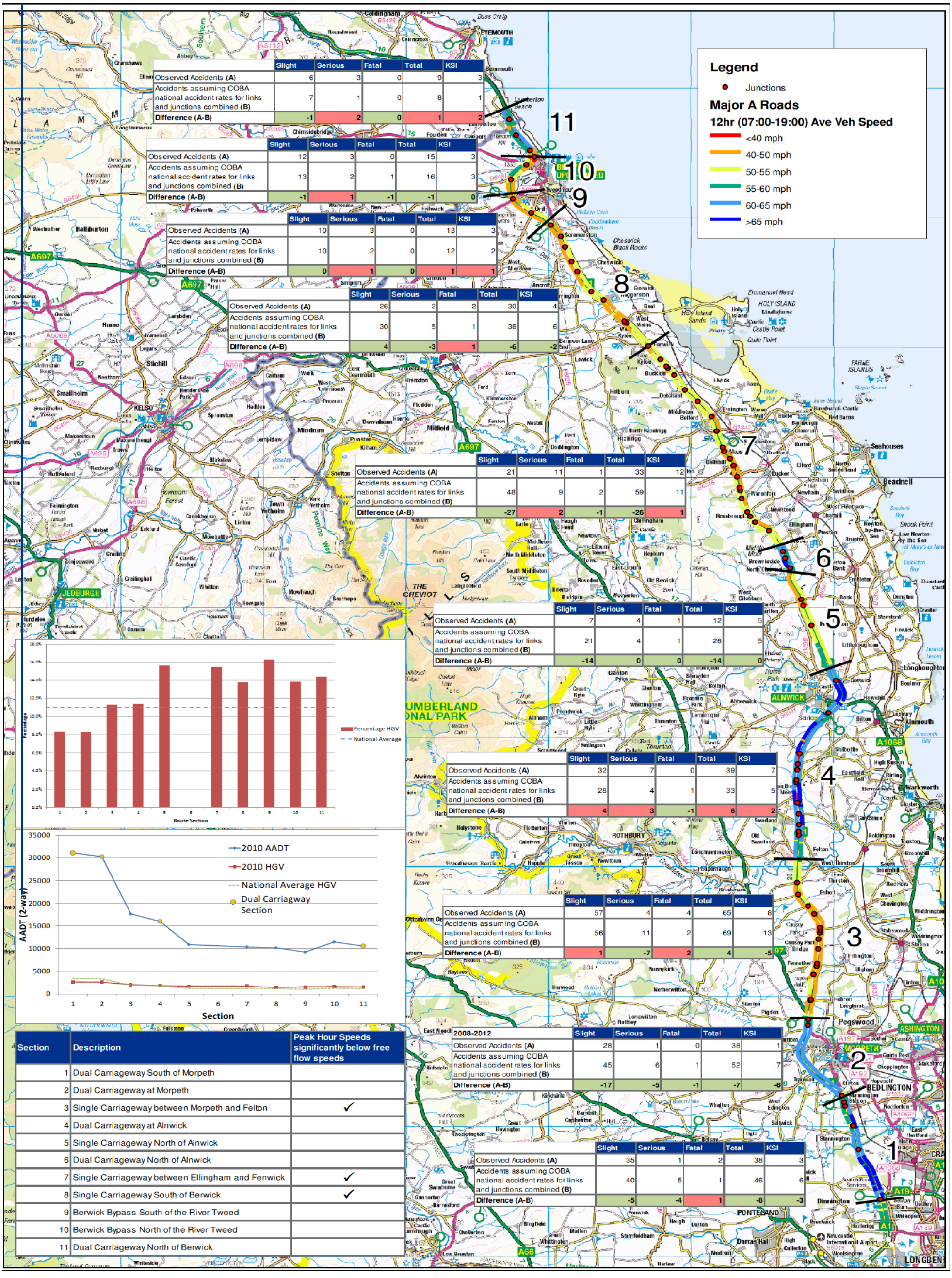
Journey times by road between destinations in Northumberland and between Edinburgh and cities in northern England are considerably longer than they would be if the A1 north of Newcastle were of a higher standard. Average journey speeds between destinations along this section of the A1 are approximately 55mph. This partly reflects the lack of opportunities to overtake slower vehicles. Although these speeds are not unusual for rural roads this is much slower than the 65+mph experienced on an uncongested dual carriageway.

A number of route sections experience slightly higher than expected numbers of accidents and / or higher than expected severity i.e. Fatal or KSI when compared to COBA national averages. Inquests into two fatal accidents have cited the mixture of standards of the road at certain locations as contributory factors.

Identified problems and issues on each section of the route are summarised in Table 5-A and illustrated in Figure 5-A. Detailed section by section presentation of the problems and issues are provided in Appendix B. It should be noted that these problems and issues generally align with those presented within previous studies.

	Route Section										
Problem	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
Lack of alternative routes.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Inconsistent carriageway standards on the route.						✓					
Poor junctions standards / layout.	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓
Large number of at-grade junctions / Private Means of Access. This can result in delays to following vehicles and potential for accidents when vehicles slow down to exit the main carriageway or are entering the main carriageway.	✓		✓	✓	✓	✓	✓	✓			
Traffic speeds - Average speeds on the single carriageway sections of the route are significantly lower than sections that have been upgraded to dual carriageway.			✓		✓		✓	✓	✓	✓	
Relatively high proportion of HGVs (and agricultural vehicles) resulting in reduced speeds for following vehicles and potential for driver frustration.			✓	✓	✓	✓	✓	✓	✓	✓	✓
Lack of overtaking opportunities.			✓		✓		✓	✓	✓	✓	
Peak hour traffic speeds significantly below free flow speeds - analysis of Trafficmaster data shows that peak hour traffic speeds are significantly lower than average off-peak speeds.			✓				✓	✓			
Section 1 – Dual Carriageway A1/A19 Seaton Burn to Clifton Junction Section 2 – Dual Carriageway Clifton Junction to A1/A697 Section 3 – Single Carriageway Morpeth to Felton Section 4 – Dual Carriageway Felton to Alnwick Section 5 – Single Carriageway north of Alnwick Section 6 – Dual Carriageway north of Alnwick Section 7 – Single Carriageway between Ellingham and Fenwick Section 8 – Fenwick to A1/A1667 South of Berwick Section 9 – Berwick Bypass to the south of River Tweed Section 10 – Berwick Bypass north of River Tweed Section 11 – Dual Carriageway north of Berwick											

Table 5-A Identified Problems and Issues



	Slight	Serious	Fatal	Total	KSI
Observed Accidents (A)	6	3	0	9	3
Accidents assuming COBA national accident rates for links and junctions combined (B)	7	1	0	8	1
Difference (A-B)	-1	2	0	1	2

	Slight	Serious	Fatal	Total	KSI
Observed Accidents (A)	12	3	0	15	3
Accidents assuming COBA national accident rates for links and junctions combined (B)	13	2	1	16	3
Difference (A-B)	-1	1	-1	-1	0

	Slight	Serious	Fatal	Total	KSI
Observed Accidents (A)	10	3	0	13	3
Accidents assuming COBA national accident rates for links and junctions combined (B)	10	2	0	12	2
Difference (A-B)	0	1	0	1	1

	Slight	Serious	Fatal	Total	KSI
Observed Accidents (A)	26	2	2	30	4
Accidents assuming COBA national accident rates for links and junctions combined (B)	30	5	1	36	6
Difference (A-B)	4	-3	1	-6	-2

	Slight	Serious	Fatal	Total	KSI
Observed Accidents (A)	21	11	1	33	12
Accidents assuming COBA national accident rates for links and junctions combined (B)	48	9	2	59	11
Difference (A-B)	-27	2	-1	-26	1

	Slight	Serious	Fatal	Total	KSI
Observed Accidents (A)	7	4	1	12	5
Accidents assuming COBA national accident rates for links and junctions combined (B)	21	4	1	26	5
Difference (A-B)	-14	0	0	-14	0

	Slight	Serious	Fatal	Total	KSI
Observed Accidents (A)	32	7	0	39	7
Accidents assuming COBA national accident rates for links and junctions combined (B)	28	4	1	33	5
Difference (A-B)	4	3	-1	6	2

	Slight	Serious	Fatal	Total	KSI
Observed Accidents (A)	57	4	4	65	8
Accidents assuming COBA national accident rates for links and junctions combined (B)	56	11	2	69	13
Difference (A-B)	1	-7	2	4	-5

2008-2012	Slight	Serious	Fatal	Total	KSI
Observed Accidents (A)	28	1	0	38	1
Accidents assuming COBA national accident rates for links and junctions combined (B)	45	6	1	52	7
Difference (A-B)	-17	-5	-1	-7	-6

	Slight	Serious	Fatal	Total	KSI
Observed Accidents (A)	35	1	2	38	3
Accidents assuming COBA national accident rates for links and junctions combined (B)	40	5	1	46	6
Difference (A-B)	-5	-4	1	-8	-3

Section	Description	Peak Hour Speeds significantly below free flow speeds
1	Dual Carriageway South of Morpeth	
2	Dual Carriageway at Morpeth	
3	Single Carriageway between Morpeth and Felton	✓
4	Dual Carriageway at Alnwick	
5	Single Carriageway North of Alnwick	
6	Dual Carriageway North of Alnwick	
7	Single Carriageway between Ellingham and Fenwick	✓
8	Single Carriageway South of Berwick	✓
9	Berwick Bypass South of the River Tweed	
10	Berwick Bypass North of the River Tweed	
11	Dual Carriageway North of Berwick	

Figure 5-A Identified Problems and Issues

5.3 Future Problems

Table 5-B provides a summary of the future problems expected on the route.

Future Problems	
Lack of alternative routes.	
Inconsistent carriageway standards on the route.	
Poor junctions standards / layout.	
Large number of at-grade junctions / Private Means of Access. This can result in delays to following vehicles and potential for accidents when vehicles slow down to exit the main carriageway or are entering the main carriageway.	
Traffic speeds - Average speeds on the single carriageway sections of the route are significantly lower than sections that have been upgraded to dual carriageway.	
Relatively high proportion of HGVs (and agricultural vehicles) resulting in reduced speeds for following vehicles and potential for driver frustration.	
Lack of overtaking opportunities.	
Peak hour traffic speeds significantly below free flow speeds - analysis of Trafficmaster data shows that peak hour traffic speeds are significantly lower than average off-peak speeds.	
	Problem likely to be alleviated in the future (assuming currently proposed highway / land use development)
	Problem unlikely to change in the future (assuming currently proposed highway / land use development)
	Problem likely to be a exacerbated in the future (assuming currently proposed highway / land use development)

Table 5-B Future Problems

5.4 Synergy with Historic Studies

As shown in Section 2 of this report previous studies on the A1 north of Newcastle have identified problems and issues. A comparison of previously identified problems and issues and the problems and issues identified in this report is shown in Table 5-C.

Previous Study	Problems Identified										
	Accident Rate on the A1 in Northumberland	Lack of overtaking opportunities	Poor Journey Times	Restricted Capacity of the ECML	Limited rail, coach and bus services	Low proportion of travel on public transport	Inconsistent Carriageway Standards	Large numbers of HGVs	Poor Junction Standard or Layout	Large Numbers of at-grade junctions/PMAs	Peak hour traffic speeds significantly lower than off-peak
A1 North of Newcastle Multi modal Study (Scott Wilson/Arup, 2002)	✓	✓	✓	✓	✓	✓			✓		
Morpeth to Felton Dualling (Bullen Consultants/White Young Green/Laing O'Rourke/Jacobs)											
Adderstone to Belford Dualling (Mouchel Parkman/Jacobs)											
Access to the Tyne and Wear City Region Study (AECOM, September 2010)						✓					✓
A1 North of Newcastle Study (AECOM, 2011)	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓
The North East's Missing Link (Dual the A1, June 2012)	✓	✓						✓			
London to Scotland East Route-Based Strategy (Highways Agency, February 2014)	✓										
A1 North of Newcastle Feasibility Study (Jacobs, April 2014)	✓	✓	✓	N/A	N/A	N/A	✓	✓	✓	✓	✓
Regional Funding Advice: North East England 2009 (One North East/North East Assembly, February 2009)											
North East Business Transport Priorities											
Northumberland Infrastructure Study (Highways Agency, May 2013)											
North East Independent Economic Review Report (North East Local Enterprise Partnership)											

	Document details to solutions to problems rather than the problems themselves.

Table 5-C Synergy with Historic Studies

5.5 The Need for Intervention

The analysis of available traffic data suggests that there are a number of problems and issues on the A1 that impact upon the efficient and safe movement of people and goods. These problems are likely to be exacerbated in the future as a result of forecast traffic growth on the route.

It is clear that the dual carriageway sections of the route perform much better in terms of speed (and thus journey times), resilience and safety. Given that traffic volumes reduce considerably on northern sections of the route it is clear that investment (from an operational perspective) is a higher priority on the southern sections. However, given the data presented it evident that there is rationale for investment on the whole route.

There is also a clear policy rationale for investment in the route.

6 Identifying Objectives for the Study

The data collection / analysis and identified problems and issues presented in the previous chapters have been used to define a set of study objectives that will be used to identify and appraise potential options within Stage 2 of the Feasibility Study. The study objectives are summarised in Table 6-A.

Proposed Objectives	Justification
Improve journey times on this route of strategic national importance.	Available traffic data suggests that average speeds on the single carriageway sections of the A1 are significantly lower than sections that have been upgraded to dual carriageway.
Improve network resilience and journey time reliability	Some sections of the route experience relatively high proportions of HGVs (and agricultural vehicles) which, when combined with a lack of overtaking opportunities, results in vehicles being delayed behind slower moving traffic, thus leading to unreliable journey times. This can also lead to driver frustration and the potential for accidents. Given the lack of alternative routes, when incidents occur delays can be significant.
Improve safety.	The route does not appear to have an above average accident problem for this type of road. However, it is recognised that the presence of the following add to safety concerns on the route: • Inconsistent carriageway and junction standards • Large number of at-grade junctions and Private Means of Access • Lack of overtaking opportunities
Maintain access for local traffic whilst improving the conditions for strategic traffic.	The existing route contains a large number of at grade junctions that serve local traffic. The A1 also provides a long distance route between the North East and Scotland.
Facilitate future economic growth.	The A1 is the key north south highway corridor within Northumberland for which tourism / farming represents a significant proportion of existing economic activity. It is a key strategic route between economic centres within the North East and Scotland. The 'Dual the A1 Campaign' have gathered evidence that suggests that the lack of a fully dualled A1 is a barrier to economic growth both for existing businesses and potential new investment in the area.
Avoid, mitigate and compensate for potential impacts upon the build and natural environment.	The Northumberland Coastline is a designated Area of Outstanding Natural Beauty. The route of the A1 passes close to a number of sensitive environmental features, as well as a number of villages, small settlements and isolated properties.

Table 6-A Route Objectives

The synergy of these objectives with national, regional and local policy is shown in Table 6-B.

Policy	A1 North of Newcastle Objectives					
	1	2	3	4	5	6
National Policy						
DfT Strategic Vision	✓	✓	✓		✓	
DfT Business Plan 2012 to 2015	✓	✓	✓		✓	
HA Goals for the Strategic Road Network		✓	✓			
Strategic Framework for Road Safety (March 2011)			✓			
National Planning Policy Framework (March 2012)				✓	✓	
Investing in Britain's Future (June 2013)			✓			
Action for Roads, A Network for the 21st Century (July 2013)						
National Infrastructure Plan (December 2013)		✓		✓	✓	✓
Regional Policy						
North East, Independent Economic Review (April 2013)				✓	✓	
North East Local transport Body					✓	
North East Chamber of Commerce Transport Priorities					✓	
North East Strategic Economic Plan (SEP)	✓	✓			✓	
Local Policy						
Northumberland Local Transport Plan 3		✓		✓		
Northumberland Local Transport Plan 3 Strategic Environmental Assessment	✓	✓				✓
Northumberland Local Transport Plan 3 Health Impact Assessment			✓	✓		
Northumberland Local Plan (January 2013)		✓		✓		
Northumberland Core Strategy (May 2012)			✓		✓	
One Core Strategy (December 2013)				✓	✓	
Objective 1 – Improve journey times **Objective 2 – Improve network resilience and journey time reliability** **Objective 3 – Improve Safety** **Objective 4 – Maintain access for local traffic while improving conditions for strategic traffic** **Objective 5 – Facilitate future economic growth** **Objective 6 – Reduce potential impacts upon the built and natural environment**						

Table 6-B Synergy between Study Objectives and National, Regional and Local Policy

The study objectives were presented to, and subsequently endorsed by, the Stakeholder Reference Group on 21st May 2014 – this is discussed in further detail in Chapter 8.

7 Identifying the Geographic Area of Impact

Identifying the geographic area of impact for any intervention is an important part of the option identification process as it sets bounds on what corridor or study area the objectives will apply to.

The objectives derived in chapter six were identified based on the problems and issues outlined in chapter five. These objectives are relevant the entire route of the A1 between its junction with the A19 to the Scottish border. As such the geographic area of impact to be addressed for any intervention has not been reduced and would be that identified in Figure 1-A.

8 Stakeholder Engagement

The outcomes of Stage 1 of the Feasibility Study were presented to the Stakeholder Reference Group (SRG) on the 21st May 2014.

This was attended by representatives from the following organisations:

- *Dual the A1 Campaign;*
- *North East Combined Authority;*
- *Parliamentary Office for Berwick Upon Tweed;*
- *Northumberland County Council;*
- *Natural England;*
- *Highways Agency;*
- *Department for Transport; and*
- *Jacobs.*

The workshop was structured around a presentation summarising Stage 1 of the study, with clear break points to allow for open discussion and debate on findings of the work.

The presentation began with a recap of the study aims and objectives as outlined in the study scope and the governance arrangements under which the study was being undertaken.

The approach to Stage 1 was presented including examples of data sources used in the data collection process and then moved into outlining what analysis had been undertaken on this data. The SRG agreed that this was in line with how they felt the study should approach this stage.

A summary of the analysis of available data was then presented, highlighting key problems and issues on the route that the analysis had identified. Following this, the set of proposed objectives for Stage 2 of the study were presented for approval by the SRG. These objectives were developed from the identified problems and issues on the route. The SRG broadly agreed with the proposed objectives, however, a small amendment was requested to the wording of the environmental objective. This wording change has been incorporated into the objectives listed in this Stage 1 report.

The aims of the workshop and outcomes are summarised in Table 8-A.

Workshop Aims	Outcomes
Review and agree the 'Terms of Reference' for the Stakeholder Reference Group	Agreed / endorsed
Review / agree the data collection / analysis methodology	Agreed/ endorsed
Review / agree the identified problems on the route	Agreed/ endorsed
Review / agree the route objectives	Agreed/ endorsed
Present the next steps	NA

Table 8-A Stakeholder Engagement (Need for Intervention)

9 Conclusions and Recommendations

The A1 north of Newcastle through Northumberland forms an important route between England and Scotland especially for long distance traffic on the eastern side of the country. The route also caters for local commuters and agricultural traffic. This section of the A1 provides a link between England and Edinburgh, and as such has been recognised by the DfT as a route of strategic national importance.

Various previous studies have been undertaken to address the transport issues in the area of the A1 north of Newcastle. This report builds upon those studies, and undertakes a fresh assessment of the current and future situation on the route.

Based on this updated analysis and information from previous studies, a series of problems and issues on the route have been identified. These are outlined in Table 5-A and can be summarised as:

- *Lack of alternative routes;*
- *Inconsistent carriageway standards on the route;*
- *Poor junction standards / layout;*
- *Large number of at-grade junctions / Private Means of Access;*
- *Average speeds on the single carriageway sections of the route are significantly lower than sections that have been upgraded to dual carriageway.*
- *Relatively high proportion of HGVs (and agricultural vehicles) resulting in reduced speeds for following vehicles and potential for driver frustration;*
- *Lack of overtaking opportunities; and*
- *Peak hour traffic speeds significantly below free flow speeds - analysis of Trafficmaster data shows that peak hour traffic speeds are significantly lower than average off-peak speeds.*

These problems and issues are likely to be exacerbated in the future as a result of forecast traffic growth.

Given that traffic volumes reduce considerably on northern sections of the route it is clear that investment (from an operational perspective) is a higher priority on the southern sections. However, given the data presented it is evident that there is some rationale for investment on the wider route.

Based on these identified problems and issues, a series of route objectives have been identified. These are:

- *Improve journey times on this route of strategic national importance;*
- *Improve network resilience and journey time reliability;*
- *Improve safety;*
- *Maintain access for local traffic whilst improving the conditions for strategic traffic;*
- *Facilitate future economic growth; and*
- *Avoid, mitigate and compensate for potential impacts upon the built and natural environment.*

Justification for each of these objectives is provided in Table 6-A.

The route objectives and identified problems, as endorsed by the Stakeholder Reference Group, were used as the basis for the identification and appraisal of potential interventions in Stage 2 of the Feasibility Study.

Appendix A Review of Previous Studies

A.1 Introduction

Where relevant the A1 North of Newcastle Feasibility study makes use of information obtained from previous studies. This ensures that best use is made of available data and that the study does not replicate existing work undertaken as part of other recent relevant studies.

Table A-1 provides a summary of historical work that is considered pertinent to the A1 North of Newcastle Feasibility Study.

Each document has been reviewed in detail and best use made of relevant findings to support the evidence gathered as part of this study. Each document is discussed in detail in the following sections.

Study Area	Studies
A1 North of Newcastle	A1 North of Newcastle Multi Modal Study (Scott Wilson/Arup, 2002)
	A1 North of Newcastle Study (AECOM, 2011)
Morpeth to Felton Dualling	Environmental Assessment Report (Bullen Consultants, 2004)
	Economics Report (Bullen Consultants, December 2004)
	Scheme Assessment Report (Bullen Consultants, December 2004)
	Traffic Survey Report (Laing O'Rourke/White Young Green, December 2005)
	Environmental Scoping Report (Laing O'Rourke/White Young Green, January 2006)
	Local Model Validation Report (Laing O'Rourke/White Young Green, June 2006)
	Traffic Forecasting Report (Laing O'Rourke/White Young Green, July 2006)
	Economic Assessment Report (Laing O'Rourke/White Young Green, August 2006)
	Scheme Close Out Report (Laing O'Rourke/White Young Green, August 2006)
	Strategic Outline Business Case (Jacobs, October 2013)
Adderstone to Belford Dualling	Stage 2 Scheme assessment Report (Mouchel Parkman, March 2005)
	Adderstone Garage Junction Report (Mouchel Parkman, December 2006)
	Scheme Close Down Report (Mouchel Parkman, January 2006)
	Strategic Outline Business Case (Jacobs, October 2013)
Other Documents	Tyneside Area Multi-Modal Study (Scott Wilson/Arup, November 2002)
	Regional Finding Advice: North East England 2009 (One North East/North East Assembly, February 2009)
	Access to Tyne and Wear City Region Study (AECOM, September 2010)
	The North East's Missing Link (Dual the A1, June 2012)
	North East Business Transport Priorities (North East Chamber of Commerce, January 2013)
	North East Independent Economic Review Report (North East Local Enterprise Partnership, April 2013)
	Northumberland Infrastructure Study (Highways Agency, May 2013)
	London to Scotland East Route-Based Strategy (Highways Agency, 2014)

Table A-1 Historical studies

A.2 A1 North of Newcastle Multi Modal Study (Scott Wilson/Arup, 2002)

A.2.1 Summary and Recommendations Report

This study investigated the safety, operation and the wider potential for economic development resulting from improved transport links within the study corridor.

The following problems and issues were identified within the study corridor:

- *Dispersed population;*
- *Low car ownership;*
- *Need to protect the environment, in particular the effect on the Northumbria Heritage Coast Line and an Area of Outstanding Natural Beauty;*
- *Importance of tourism to the regional economy;*
- *Need to encourage inward investment in the North East;*
- *Concerns over the accident rate on the A1 in Northumberland;*
- *Lack of overtaking opportunities and consequent poor journey times;*
- *Restricted capacity on the East Coast Main Line railway; and*
- *Limited rail, coach and bus services between main county towns.*

The conclusions drawn from the study are listed below:

- *"The A1 through Northumberland is perceived by many, in particular the local media, as being a dangerous section of road. This study, however, highlighted that its accident record was no worse than the national average for rural trunk roads. Its severity ratio (the number of fatal and serious accidents over the total number of injury accidents) is only slightly above the national average.";*
- *"Current and predicted average daily traffic flows on the A1 north of Alnwick were within the operational capacity of a single carriageway road.";*
- *"No evidence had been found to suggest wider economic development benefits would arise from completing the dualling of the A1 in Northumberland.";*
- *"The Scottish Executive has no current plans to complete the dualling of the A1 between Dunbar and the English border."; an*
- *"The recommended strategy addresses the identified issues and represents value for money."*

The following recommendations were made to improve the connectivity of Northumberland and the rest of the UK:

- *Upgrade the A1 between Morpeth and Felton to dual carriageway;*
- *Junction improvements and dualling between Adderstone and Belford;*
- *Junction improvements and dualling between West Mains and Bridge Mill;*
- *Introduce local safety schemes;*
- *Improve traffic management/signing;*
- *Regular stopping pattern for long distance rail;*
- *Increase rail service between Berwick and Newcastle;*
- *Integration of public transport timetabling and ticketing;*
- *Improve public transport between Northumberland towns; and*
- *Restore passenger services on the Blythe and Tyne railway.*

A.2.2 Option Appraisal Report

This report built upon the Summary and Recommendations Report. It initially appraised four possible future scenarios. These were:

1) Making best use of the existing transport system
2) Development of the public transport system
3) Selective improvements to highway infrastructure
4) Major improvements to highway infrastructure

During the appraisal a hybrid scenario incorporating key options from scenarios 1 to 3 was introduced and was taken further to be the main alternative to scenario 4.

The modelling and appraisal work was undertaken in line with the Guidance on the Methodology for Multi-Modal Studies (GOMMMS). Each scenario was appraised against the government's key objectives, the environment, safety, economy, integration and accessibility.

Both schemes were deemed to have a similar impact on the environment (largely due to the common sections of dualling). However, the Full Dualling Scenario was deemed to have a more adverse impact overall on the environment, although through mitigation many of these adverse effects could be minimised.

When tested against safety the Full Dualling Scenario offers additional benefits comparedto the Hybrid Scenario (£16.35m over a five year period in comparison to £10.47m for the Hybrid scenario).

Despite targeted consultation with key partners, no firm evidence was found to link either the Hybrid or Full Dualling Scenarios with significant wider economic benefits to the region. However, it was considered that some benefits were likely to result, but not to the extent perceived by many. In financial terms the Hybrid Scenario produced a positive benefits to costs ratio of 1.2, with the Full Dualling being negative.

On Integration both scenarios showed very close similarities in the appraisal and the consultants were unable to distinguish between the two.

The consultants suggested that both scenarios offered positive benefits through improved Access to the Transport System and in terms of Option Values for accessibility. However, the Hybrid Scenario was forecast to have negative impacts with respect to severance, such impacts are less for the Full Dualling Scenario.

In conclusion, the report found it likely that neither scenario would lead to significant benefits to the economies of Newcastle or Edinburgh, nor would any improvements be likely to divert traffic away from the M6 corridor. The report also concluded that Berwick was too far from major population and economic centres to be significantly affected by either scenario. Also the absence of significant congestion observed on the A1 suggested that the A1 was not an inhibitor to the economic growth of Northumberland.

A.3 A1 North of Newcastle Study (AECOM, 2011)

The aim of this study was to consider the evidence that may support options to tackle transport challenges in the A1 corridor between Morpeth and the Scottish border.

Several issues were identified covering a range of different transport modes, as outlined below.

A.3.1 Public Transport Issues

Infrequent bus services, especially to Berwick, and long journeys times on other services connecting Newcastle, Morpeth, Alnwick and Berwick limit journey opportunities by bus. The cost of long distance travel by bus is also high.

Poor interconnectivity between stations on the East Coast Mainline and irregular service intervals, particularly in the evening through all stations, hampers some journey opportunities via train. Poor connections from Alnmouth Station to Alnwick limit the effectiveness of rail travel for passengers accessing Alnwick. There is also crowding on peak hour rail services into and out of Newcastle Central Station and car parking capacity problems at Morpeth, Alnmouth and Berwick Stations, this could put potential train users off using these services. Increasing passenger numbers on rail services could lead to crowding on certain services.

Overall there is dominance of travel by car for travel to work movements with a low proportion of journeys using bus and train services.

A.3.2 Road Network Problems

There is a range of different highway standards in place along the A1 corridor. At the northern and southern limits the route is dual carriageway all purpose, while in the central section north of Alnwick the route is for the most part single carriageway. Between Morpeth and Alnwick the route has sections of both single and dual carriageway. In total there are seven changes of standard on the A1 which does not lend itself to an efficient transport network.

Analysis of journey times and speeds on the A1 suggested that average speeds do not change vastly over the course of a day which would indicate that the route has good journey time reliability. However there were delays of up to 39 seconds on sections through the day.

There is above average numbers of HGVs using this section of the A1 and the volume of these freight vehicles on the A1 coupled with their restricted speed limits and the limited number of overtaking opportunities can be detrimental to the movement of other vehicles.

The rate of fatal accidents is higher than the national average than for several sections of the route and clusters of accidents are observed at and in the proximity of several delays suggesting that there is an accident problem on parts of this route. It was also noted that accidents involving overtaking manoeuvres are more prevalent on the A1 compared to national averages.

In the future a combination of forecast traffic growth, future land use and car ownership trends suggest an increase in traffic volumes, putting more pressure on the network and also increasing the number of train passengers.

A.3.3 Stakeholder Concerns

Stakeholders consulted as part of the study voiced the following concerns about the A1 North of Newcastle corridor, namely:

- *Concerns about the lack of overtaking availability;*
- *The belief that there is an opportunity to improve regional connectivity and to deliver regeneration opportunities in the North East by improving the A1;*
- *The belief that the A1 does not adequately cater for the region's needs and is a barrier to employment and investment in the North East of England; and*
- *That any improvement to the A1 would need to maintain access to Northumberland's key tourist sites whilst maintaining local environmental qualities.*

A.3.4 Key Problems

Road safety was recognised as the most severe problem on the network that needed addressing while the current road network was recognised as the biggest barrier to regeneration in the area.

ECML overcrowding, slow speeds on the A1, the road network layout and environmental issues such as potential impacts on Areas of outstanding Natural Beauty and Sites of Special Scientific Interest were also recognised as pressing issues to be taken forward for examination.

A.3.5 Possible Interventions

The upgrading of all single carriageway sections of the A1 to dual carriageway was investigated as a possible solution to some of the key problems above. The report suggests that by dualling the whole of the A1 there would be an average saving of 28 minutes between Gosforth (North of Newcastle) and Edinburgh and this would benefit a number of districts in the centre of England between the A1 and the M6 where journey times using the upgraded A1 route would become favourable and give potential for route change.

Also considered were two packages addressing supply management and demand management respectively. The supply management package of interventions would promote the safe and efficient use of the existing transport network while the demand management package of interventions would upgrade the public transport network to try and encourage modal shift away from heavy car use.

A.3.6 Conclusions

A further phase of work was recommended to model the impact of these favoured packages, understand their benefits and costs in more detail and refine them into more detailed packages of interventions that can be recommended for future funding.

A.4 Morpeth to Felton

The A1 between Morpeth and Felton is the last section of the A1 south of Alnwick that remains at single carriageway standard. Several consultancies have been involved in the analysis of the benefits and effects of upgrading this section to dual carriageway; a review of available documents has been made below.

A.4.1 Environmental Assessment Report (Bullen Consultants, January 2004)

The Environmental Assessment Report aimed to collate information about the environment of the study area and identify environmental constraints within the area which may be affected by the proposed scheme; the report also aimed to identify and assess predicted environmental impacts, possible mitigation of these impacts and to identify a preferred route in terms of environmental impact.

Two route options were considered, the Blue route which mostly followed the line of the existing A1 but deviated so as to minimise the effects on properties located adjacent to the road while the Green route shared the southern and northern sections of widening but deviated to the west of existing properties so as to minimise disruption.

Each route's impact a number of environmental factors (Air Quality, Noise and Vibration, Cultural Heritage, Ecology and Nature Conservation, Landscape and Visual assessment, Land Use, Water Quality and Drainage, Geology and Soils Disruption due to Construction, Vehicle Travellers, Effect on Non-Motorised users and the community, and the Impact of Road Schemes Policies and Plans) to determine their overall environmental impact and to give a preferred environmental route option.

Both route options were forecast to have an overall adverse impact upon the following:

- *Cultural Heritage;*
- *Ecology and Nature Conservation;*
- *Landscape and Visual Assessment;*
- *Land Use;*
- *Water Quality and Drainage;*
- *Geology and Soils; and*
- *Disruption due to Construction.*

And a beneficial impact upon:

- *Air Quality;*
- *Traffic Noise and Vibration;*
- *Vehicle Travellers; and*
- *Pedestrians, Cyclists, Equestrians and Community Effects.*

The route options were deemed to have a neutral impact as regards the Impact of Road Schemes on Policies and Plans.

The Green option was preferred by seven of the subject areas and the Blue option preferred by two of the subject areas with three subject areas having no preference. Therefore in terms of environmental impact the Green route was selected as the preferred route option.

A.4.2 Economics Report (Bullen Consultants, December 2004)

This report discussed the results of economic assessments carried out using industry standard economics tools COBA and QUADRO for the same two route options as mentioned in the Environmental Assessment Report. For COBA analysis simple models were built based on the A1 while for QUADRO analysis the default

maintenance profiles in the QUADRO manual were assumed for the Do Minimum and Do Something situations.

The report gave the results of the calculated costs and benefits broken down by consumer benefits, business benefits, private sector provider benefits and accident benefits. The Blue route had higher accident benefits from COBA but would cost more to construct and gave less user benefits than the Green route. Both schemes had very similar QUADRO results and ultimately very similar Benefit to Cost Ratios (BCR), however, the Green option gave the best results overall as shown below in Table A-2.

	Green Option	Blue Option
Low Growth	1.30	1.24
High Growth	1.80	1.72

Table A-2 Scheme BCRs

A.4.3 Scheme Assessment Report (Bullen Consultants, December 2004)

The Scheme assessment report built upon work previously seen in the Economics Report and Environmental Assessment Report, the same two potential routes were investigated.

The green route would have less impact on existing private accesses and reduced disruption during construction.

Both routes affect ten existing structures that would need demolished or re-located, however, the Green route would require seven new structures whereas the Blue route would only need six.

Both schemes have a slight adverse overall for environmental impacts but some of these impacts could be mitigated through design. The Blue route was awarded a score of slight beneficial for noise and air quality whereas the Green route was awarded a score of moderate beneficial.

The Scheme Assessment Report concluded that both the Green and Blue route options should be developed for the purpose of public consultation.

A.4.4 Traffic Survey Report (Laing O'Rourke/White Young Green, December 2005)

This reported presented the results for traffic surveys carried out within the area and the conclusions drawn from the data.

Data taken from a permanent ATC located in the north of the scheme at Felton shows that traffic on the A1 has risen by 20% between 2002 and 2005 and October 2005 was chosen as a representative month to undertake more detailed surveys

Traffic counts undertaken at 2 Automated Traffic Counts (ATCs) over 24 hours between 04/10/05 and 17/10/05 show that on this section of the A1 the AM peak was between 08:00 and 09:00 while the PM peak was between 16:00 and 17:00, the interpeak hour was chosen as 13:00 to 14:00. These sites also showed that weekday traffic levels are relatively consistent with the exception of Friday which experiences heavier flows and that weekend flows were marginally lower than weekday flows but comparable. Manual classified counts (MCCs) taken over 12

hours on all side roads in the section on 04/10/05, only 3 side roads have vehicle movements in excess of 100 during peak hours.

Origin-destination surveys were carried out on 11/10/05 on the Northbound side of the A1 using Road Side Interviews (RSIs) with 1234 samples taken. In support of these RSIs a manual classified link count was undertaken on the same day.

Journey time surveys were undertaken on 3-5/10/05, to show average speeds along the section, the average speed northbound was shown to be 53.2mph and 52.5mph in the southbound direction with little variation throughout the day.

Accident data for the five years 2000-2004 (inclusive) was also collected, these showed two fatal accidents and clusters of accidents at the High Highlaws/Hebron Lane junction and the Chevington Moor Lane junction. No personal injury accidents were recorded involving NMUs.

A.4.5 Environmental Scoping Report (Laing O'Rourke/White Young Green, January 2006)

In March 2005 the Roads Minister at the time, David Jamieson, made the announcement that the Green Route mentioned previously as the preferred route in the Environmental Assessment Report (Bullen Consultants, Jan 2004) identify a new preferred route known as the yellow route, which is shown in Figure A-1 below.

Figure A-1 The Yellow Route

This scoping report described likely significant environmental effects of the scheme, the proposals for further environmental survey, consultation and assessment and

the approach to mitigating adverse effects on the environment. It would used as the basis for the consultation and discussion with consultees regarding the scope of the Environmental Impact Assessment. The EIA would consider temporary and permanent construction effects as well as the operational effects on the environment. This report set out the proposed methodology to be followed for the EIA and how it would be reported.

A.4.6 Local Model Validation Report (Laing O'Rourke/White Young Green, June 2006)

A traffic model was built using the SATURN suite of software in agreement with HA TAME and examined the effect of variable demand modelling. This report details the traffic modelling methodology and the results of model calibration and validation.

The model area covers the A1 between Morpeth and Felton and its side roads equating to 73 zones and was designed to allow accurate assessment of junction delay and show that congestion on the A1 is not considered severe enough to displace traffic to parallel routes.

Matrices were derived from RSI data and from recent count data using 2003 registration plate data and a gravity spatial interaction, two vehicle types were modelled, with five trip purposes across three time periods.

All three models calibrate well against MCC turning count data and meet DMRB validation criteria, considered robust for use in future year traffic forecasting.

A.4.7 Traffic Forecasting Report (Laing O'Rourke/White Young Green, July 2006)

This report details the development of the forecast year traffic model and presents the future year traffic forecasting results.

Four forecast years were used, an opening year of 2011, a design year of 2026 and additional forecast years of 2018 and 2031 for analysis.

Two scenarios were developed, an optimistic scenario based on high TEMPRO growth based on national uncertainty and a pessimistic scenario based on low growth.

The Do Minimum scenario was unchanged from base year conditions while the Do Something scenario consisted of dual carriageway, four compact grade separated junctions, one underbridge and the stopping up of one side road.

Variable demand was examined using elastic assignment as advised in webTAG using the "power" formulation within SATURN. However the modelled network showed that it is unlikely to experience material traffic effects using elastic assignment so fixed matrices were used for forecast.

The model showed a high level of convergence and was therefore considered a reliable and stable basis for producing traffic forecasts. For the forecast matrices a growth of 13% between 2005 and 2011 and a growth of 37% between 2005 and 2026 were used.

The model showed significant time savings in the Do Something compared to the Do Minimum

A.4.8 Economic Assessment Report (Laing O'Rourke/White Young Green, August 2006)

Further to the Bullen Consultants report of December 2004 this report investigated the economic outcome of the scheme. The results are detailed below.

- *Consumer benefits £89.2m*
- *Business Benefits – £96.6m*
- *Safety benefits – £18.2m*
- *Maintenance savings – £35.6m*
- *Construction delay costs – £10.5m*
- *PVB – £229m*
- *PVC – £59m*
- *NPV – £170m*
- *BCR – 3.86*

This meant that the scheme represented High Value for Money.

A.4.9 Scheme Close Out Report (Laing O'Rourke/White Young Green, December 2006)

This report summarised the progress made on scheme development, including reports produced, survey work completed, summaries or work in progress, main issues, location of records and suggested priorities for work should the scheme be restarted.

A.4.10 Strategic Outline Business Case (Jacobs, October 2013)

In July 2013 Jacobs were commissioned by the Highways Agency (HA) to examine issues on the A1 North of Newcastle, beginning with the refresh of the business cases for two previously considered dualling schemes between Morpeth and Felton and Adderstone and Belford.

This report looks at the Morpeth to Felton scheme and it's suitability to meet the aims and objectives now mandated by the DfT's Transport Business Case guidance.

The following conclusions were made in this Business Case:

- *There remains a clear rationale for dualling improvements to the A1 between Morpeth and Felton*
- *Proposed dualling improvements to the A1 north of Newcastle are well supported by local and regional policy aspirations. At a national level the government is committed to improving the performance of the strategic road network*
- *There is strong support from the business community who believe the single carriageway sections of the A1 are a barrier to economic growth*
- *The scheme is predicted to deliver high Value for Money*
- *The scheme is deliverable from an engineering perspective*
- *There is a robust procurement route available for scheme development and delivery*

It was recommended that, subject to a positive outcome at the Autumn Statement, the scheme should re-enter the HA Major Scheme Programme at PCF Stage 1 / Stage 2 and begin with the development of a traffic simulation model to allow detailed scheme appraisal running in parallel to environmental surveys and consultation on the preferred option.

A.5 Adderstone to Belford

The A1 between Adderstone and Belford is a section of the A1 between Alnwick and Berwick at single carriageway standard. Several consultancies have been involved in the analysis of the benefits and effects of upgrading this section to dual carriageway; a review of available documents has been made below.

A.5.1 Stage 2 Scheme Assessment Report (Mouchel Parkman, March 2005)

This report details the 10 scheme options that were taken forward to stakeholder workshop and the four route options that were carried forward from that. These four options are shown below.

Option	Description
1	Offline northbound carriageway keeping close to existing A1. On line improvements to existing A1, to form southbound carriageway.
2	As Option 1 but with offline southbound carriageway improvement between Mousen and the B6348 Wooler Road.
3	Offline northbound carriageway to the west of Mousen Farm. Adjacent offline southbound carriageway from 700m south of the B6349/B1342 to the B6348 Wooler Road.
4	Offline northbound carriageway to the east of Mousen Hall. Adjacent offline southbound carriageway from 600m south of the B6349/B1342 to the B6348 Wooler Road.

Table A-3 Adderstone to Belford Scheme Appraisal Report: Selected schemes

However when considered form a Value Engineering perspective it became clear that option 1 was impractical in comparison to the others as the substandard horizontal and vertical alignment of the existing A1 was unacceptable. The three remaining route options were renamed the Red (Option 2), Green (Option 3) and Blue (Option 4) routes. These three routes were taken forward to public consultation.

Economic and Environmental assessments were carried out on each route with the Blue Route giving both the best economic results in terms of benefits and the best environmental results as it is assessed to result in least impact on ecology (in particular badgers), landscape and cultural heritage. In addition this option is predicted to provide potential benefit to more properties in terms of views and noise.

The report recommended that the Blue Route be taken forward as the preferred route but that further analysis of the effects of freight and agricultural vehicles be examined in greater detail.

A.5.2 Adderstone Garage Junction Options Report (Mouchel Parkman, December 2006)

This report examined the junction of the A1/B1341 at Adderstone Garage, a junction experiencing above average accident numbers, and assess the engineering, economic, safety and environmental impact of improving the junction.

Five options were considered, the current situation, single lane dualling, use of a roundabout, the creation of a compact grade separated junction or using the preferred route specific in the Scheme Appraisal Report.

The economic and environmental assessments of these junctions are shown in Table A-4 and Table A-5 below.

	Existing ghost island	Single Lane Dual	Roundabout	Compact Grade	Preferred Route
Land cost	£0	£2.5k	£5k	£40k	£536k
Works cost	£0	£830k	£1,075k	£4,207k	£9,290k
NPV	0	£703k	£-3,694k	£1,441k	£9,538k
BCR	0	1.862	-2.118	1.420	1.811
No. accidents saved	0	39.2	83.0	54.2	79.5
Accident benefits	0	£2,015k	£5,245k	£4,936k	£7,854k
RFC	0.127	0.115	0.205	0.023	N/A

Table A-4 Adderstone Garage Junction Economic Assessment

	Existing ghost island	Single Lane Dual	Roundabout	Compact Grade	Preferred Route
Noise & air quality	0	0	0	-1	1
Drainage/water		1	1	1	1
Ecology	0	-1	-1	-1	-1/-2
Landscape	0	0	-1	-1/-2	-1
Cultural heritage	0	-1	-1	-1	-2
Land use	0	0/-1	0/-1	-1	-1
Non-motorised users	0	0	0	1	1
Vehicle travellers	0	0	0	0	0
Policies & plans	0	0	-1	-1	1
Disruption due to construction	0	0/-1	-1	-1	-1
Summary score	0	-2	-4.5	-5.5	-3
Scoring: 0 = neutral, 1 = slight beneficial, 2 =moderate beneficial, 3 = large beneficial, -1 = slight adverse, -2 = moderate adverse, -3 = large adverse					

Table A-5 Environmental Assessment

From this the following recommendations were made:

- *Single Lane Dualling or a compact grade separated junction give the best NPV and BCR*
- *Roundabout option should not be taken forward.*

A.5.3 Scheme Close Down Report (Mouchel Parkman, January 2007)

This report provided a detailed review of work done by Mouchel Parkman up to the time the scheme was put on hold and a suggested task list of work that would need completed in the case of the scheme moving onwards.

A.5.4 Strategic Outline Business Case (Jacobs, October 2013)

In July 2013 Jacobs were commissioned by the Highways Agency (HA) to examine issues on the A1 North of Newcastle, beginning with the refresh of the business cases for two previously considered dualling schemes between Morpeth and Felton and Adderstone and Belford.

This report looks at the Adderstone to Belford scheme and it's suitability to meet sever the aims and objectives now mandated by the DfT's Transport Business Case guidance.

- *There remains some rationale for dualling improvements to the A1 between Adderstone and Belford*
- *Proposed dualling improvements to the A1 North of Newcastle are well supported by local, regional and national policy aspirations*
- *There is strong support from the business community who believe the single carriageway sections of the A1 are a barrier to economic growth*
- *The Scheme is unlikely to deliver Value for Money*
- *The scheme is deliverable from an engineering perspective*
- *The scheme is comparable in cost to other HA Major Schemes and thus is considered financially affordable*
- *There is a robust procurement route available for scheme development and delivery.*

As the scheme was unlikely to deliver Value for Money it was recommended that the scheme is not re-admitted into the HA Major Scheme Programme at this time. However, the study team believed that there were opportunities to broaden the scope of the scheme and explore more extensive opportunities further north and south (of the current proposed Adderstone to Belford dualling scheme) that would provide significant benefits and offer Value for Money.

A.6 Other Reference Documents

The A1 is referred to in several other documents as summarised below.

A.6.1 Tyneside Area Multi-Modal Study (Scott Wilson/Arup, November 2002)

This Tyneside Area Multi-Modal Study (TAMMS) was undertaken at a similar time to the A1MMS. The Tyneside area is to the south of the A1 North of Newcastle corridor. The study did not identify any problems or issues on the A1 North of Newcastle but highlighted some problems elsewhere on the A1 such as congestion on the A1 through Gateshead and Newcastle. The study also identified a forecasted increase in traffic volumes in the North East due to increased car ownership and increase in both trip rates and trip lengths between 2000 and 2030. Also noted was a forecast decrease in trips in the AM peak between 2000 and 2016.

The study found that the number of people using public transport, walking and cycling will experience a small decline in modal share by 2016.

The study brought forward several points that should be addressed as part of any future solution, examples of these are:

"The Strategic Rail Authority should be encouraged to address the issue of rail freight capacity on north-south routes such as the East Coast Main Line"

"*Tolling of river crossings is proposed in the longer term if increased trunk road capacities are not achieved through other policies"*

A.6.2 Regional Funding Advice: North East England 2009 (One North East/North East Assembly, February 2009)

This report on recommendations for funding in the North East mentions the A1 north of Newcastle part dualling as a provisional priority with an estimated cost of £40m in order to "create and integrated an effective transport network" as part of work on Delivering a Sustainable Transport System (DaSTS) beyond 2019.

A.6.3 Access to Tyne and Wear City Region Study (AECOM, September 2010)

The Access to Tyne and Wear City Region Study (A2TW) was commissioned jointly by the DfT and the City Region Partners to examined the current and future network can be developed and managed in future years to meet the following objectives:

- *To support National economic competitiveness and growth*
- *Reduce carbon emissions*
- *Improve safety*
- *Promote greater equality of opportunity for all citizens*
- *Improve quality of life.*

Congestion of the A1 in peak periods is recognised as a priority challenge to address due to the high economic value for the city region for internal and external connectivity and congestion affects important sector of the travel market. Increasing car ownership in the study area is also noted as a source of additional strain on the network. The report also recognises the poor public transport facilities on this corridor as mentioned in previous studies.

A.6.4 The North East's Missing Link (Dual the A1, June 2012)

The Dual the A1 Campaign, led by Anne-Marie Trevelyan, have been vocal in their belief that the A1 needs to be fully dualled between Newcastle and the Scottish border. This report aimed to highlight the need for the government to develop a transport business case of the A1 north of Morpeth to the Scottish border and provided evidence they believed highlighted the necessity of an upgraded A1.

The report summarises the results of a previous survey undertaken by Dual the A1 where over 400 businesses responded and 97% indicated that the lack of a dualled A1 was a key barrier to growth for their business; further to this a second, more detailed, survey was being undertaken at the time of the report's production where the campaign aimed to survey at least 1,000 businesses from across the North East and Scotland. At the time of the report 40% of responses currently received indicated that they would be able to take on more staff if the A1 was fully dualled. The report also contains quotes from respondents covering a wide range of industries and fields.

The report called upon the DfT to set in motion the Transport business case in order to:

- *Calculate up-to-date costings for the total dualling of the remaining 37 miles of undualled road between Morpeth & the Scottish Border;*
- *Provide Local Authorities & stakeholders (including Chambers of Commerce, CBI, FSB, the new LEPs, UKTI & wider business users) with a formal method to consult with Government on the urgency of dualling the A1;*

- *Pull together the economic evidence, gathered by the Dual the A1 Campaign, and other business networks invited to consult on the economic impact, from the North East & Scotland, as well as across the UK from freight transporters and wider business;*
- *Answer the Treasury Green Book information needs on the impacts of such an investment for the North East in terms of wider public policy objectives, from rebalancing the economy to stimulating investment in private sector growth;*
- *Protect the preferred route identified in the A1 Modal Study of 2002 from development risks;*
- *Invest urgently in the two worst black spot sections of the remaining single carriageway for the reduction of deaths and serious accidents;*
- *Prepare a planned roll-out, section-by-section, of A1 dualling in line with Government financial resources over the medium term.*

The report further established benefits and impacts on the North East that the Dual the A1 campaign believed would occur as a consequence of improving the A1, these are outlined below.

Strategically improving the A1 was thought to help:

- *Creating jobs through increased investment*
- *Rebalancing the economy*
- *Creating better wage rates*
- *Widening Markets in the North East*
- *Improving Health*

The report also addressed the fact that none of the recommendations for urgent improvement mentioned in the A1 North of Newcastle Multi Modal Study (Scott Wilson/Arup, 2002) have been addressed in the 10 years previous to this report's production.

Changes since the 2002 study were also examined and how these change recommendations and conclusions made in that study, examples of these changes are shown below.

- *The Port of Tyne has expanded and have informed the Dual the A1 campaign that the limitations for north moving traffic was an active challenge for their logistics teams, this is in contrast to the A1MMS which determined that "Maritime freight does not comprise a significant proportion of traffic between the North East and Scotland and in not expected to do so in the future".*
- *Enterprise zones created in North Tyneside and Blythe in the 2012 Budget, aim to create thousands of new jobs to the North of Newcastle, this is again in contrast to the A1MMS's conclusions.*
- *Discussions with haulage firms has said that the reason for the statement "Maritime freight does not comprise a significant proportion of traffic between the North East and Scotland and in not expected to do so in the future" is in large part due to the unpredictability of traffic movements on the A1 between Newcastle and Edinburgh, some haulage firms are diverting to use the A697 which has led to detrimental effects occurring along that road corridor.*

The report highlights the perceptions that the A1 north of Newcastle is unsafe in drivers' opinions and concluded (with the support of the emergency services) that

driver frustration and dangerous overtaking caused by the road layout lead to excessive numbers of serious and fatal accidents.

Also highlighted was the belief that any assessment made by the DfT needs to consider the loss of economic growth potential and the effects on employment in the North East for future generations.

A.6.5 North East Business Transport Priorities(North East Chamber of Commerce, January 2013)

This document presents the collective view of from a board of North East businesses on a single list of transport priorities for the region and sets out the most important issues that they believe need addressed to help the private sector economy in the North East achieve its potential for growth.

A.6.6 North East Independent Economic Review Report (North East Local Enterprise Partnership, April 2013)

This report was intended as a manifesto for business, public service and political leaders across the LEP region which highlighted 5 key priorities for the North East, these are outlined below.

- *Champion "North East International", promoting the region at home and abroad as a magnet for trade, talent, tourism and inward investment.*
- *A doubling in the number of youth apprenticeships to tackle the evil of low skills and high youth unemployment, alongside higher school standards and an increase in the proportion going on to higher education.*
- *The development of strong "innovation and growth clusters", stimulating universities and their graduates, and existing companies and public institutions, to create and finance new high growth enterprises and jobs.*
- *Big Improvements in transport infrastructure and services to overcome the relative national and international isolation of the North East and to improve connections within the North East so that people can get to and from work more easily and cheaply.*
- *The creation of stronger public institutions including the location of key national institutions – such as the new British Business bank – in the North East.*

In addressing the fourth key priority, with regards to improving transport infrastructure, the report specifically mentioned the need to further develop and update the business case to support improvements of the A1 between Morpeth and Alnwick/Berwick/Scotland. This was recognised as a long term goal where appropriate improvements should be funded nationally as would befit a route of strategic national importance.

A.6.7 Northumberland Infrastructure Study (Highways Agency, May 2013)

This study uses the Mesoscopic simulation model developed for the Seaton Burn Pinch Point Programme to investigate the issues on the network, mainly focussing on issues on the A19 but also looks at the impact on the Strategic Road Network (SRN) from the delivery of the Northumberland Local Plan, and the extent to which any potential schemes may mitigate these impacts. The Headline of the of the report is "The HA supports the LDF aspirations of Northumberland Council. This equates to the potential release of approximately 280 hectares of employment land and approx. 8,300 additional homes in Northumberland over the period of the LDF."

A.6.8 London to Scotland East Route-Based Strategy (Highways Agency, February 2014)

Route-based Strategies (RBS) are used by the HA to inform the investment strategy for the wider road network. This RBS looks at the strategic travel corridor from London to the East of Scotland using the M1 between London and Leeds and the A1(M) and A1 thereafter. This route connects London to the core cities of Nottingham, Sheffield, Leeds and Newcastle as well as serving the major international hub of the Port of Tees and the key national regional gateways at Luton Airport, Nottingham - East Midlands Airport and Newcastle Airport.

The A1 north of Newcastle is only one section of the study area covered in the RBS it finds that “The A1, from its junction with the A19 near Seaton Burn to the Scottish Border…performs well in terms of delay, reliability and average speeds at peak times” but does note stakeholder’s concerns about the safety on single carriageway sections of the A1 due to the dangers of associated with overtaking. They also note a number of queries about the safety of right turns on rural single and dual carriageway sections, such as those on the A1 North of Newcastle.

The RBS also shows that the majority of the A1 North of Newcastle (excluding the dual carriageway sections to the south of Morpeth) are in the top 45% in terms of accident rate and in particular from Alnwick northwards the route is in the top 25%.

The RBS also mentions a major geotechnical issue with part of the route where the cutting for the Morpeth Bypass was constructed too steeply and has led to a programme of remediation works being put in place, the first of three phases of this work was completed in April 2012.

Also introduced was the problem with vulnerable users crossing abilities, there are several places on the A1 North of Newcastle where road crossings for pedestrians and cyclists are at-grade, on both single and dual carriageway sections. The route has three crossings with the National Cycling Network, traffic islands have been installed to minimise risk when crossing in these locations.

Appendix B Identified Problems and Issues

Problems and issues have been identified throughout Stage 1. These are summarised in Table B-1 to Table B-12 and illustrated in Figure B-1 to Figure B-11.

Section	Problems and Issues	Evidence/ Commentary	Strength of Evidence
Whole Route	Inconsistent Carriageway Standards along the route.	AECOM's 2011 study stated that evidence provided to them from Northumberland County Council highlighted that two recent inquests into fatal accidents at the time of the study had cited the mix of standards on the A1 as a contributing factor in the accidents along with the unfamiliarity of the road by drivers from outside the region. The coroner is said to believe that in some instances the mixed standard of the A1 can result in a driver misapprehending the road is a continuous dual carriageway.	
Strength of Evidence			
	Good evidence		
	Some evidence		
	lack of evidence		

Table B-1 Whole Route Problems and Issues

Section	Problems and Issues	Evidence/ Commentary	Strength of Evidence
1	Safety	Analysis of accident records obtained via the DfT shows that the expected number of accidents over this section is marginally lower than national averages for this type of road. However, the proportion of Fatal accidents appears to be marginally higher than expected.	
	At-grade Junctions	There are several at grade junctions and residential accesses remaining on this stretch of dual carriageway, however right turns are prohibited.	
	Poor Junctions Standard / Layout	Junction standards and layouts vary significantly on this section	
Strength of Evidence			
	Good evidence		
	Some evidence		
	lack of evidence		

Table B-2 Section 1 Problems and Issues

Figure B-1 Section 1

Section	Problems and Issues	Evidence/ Commentary	Strength of Evidence
2	Poor Junctions Standard / Layout	Junction standards and layouts vary significantly on this section	
Strength of Evidence			
	Good evidence		
	Some evidence		
	lack of evidence		

Table B-3 Section 2 Problems and Issues

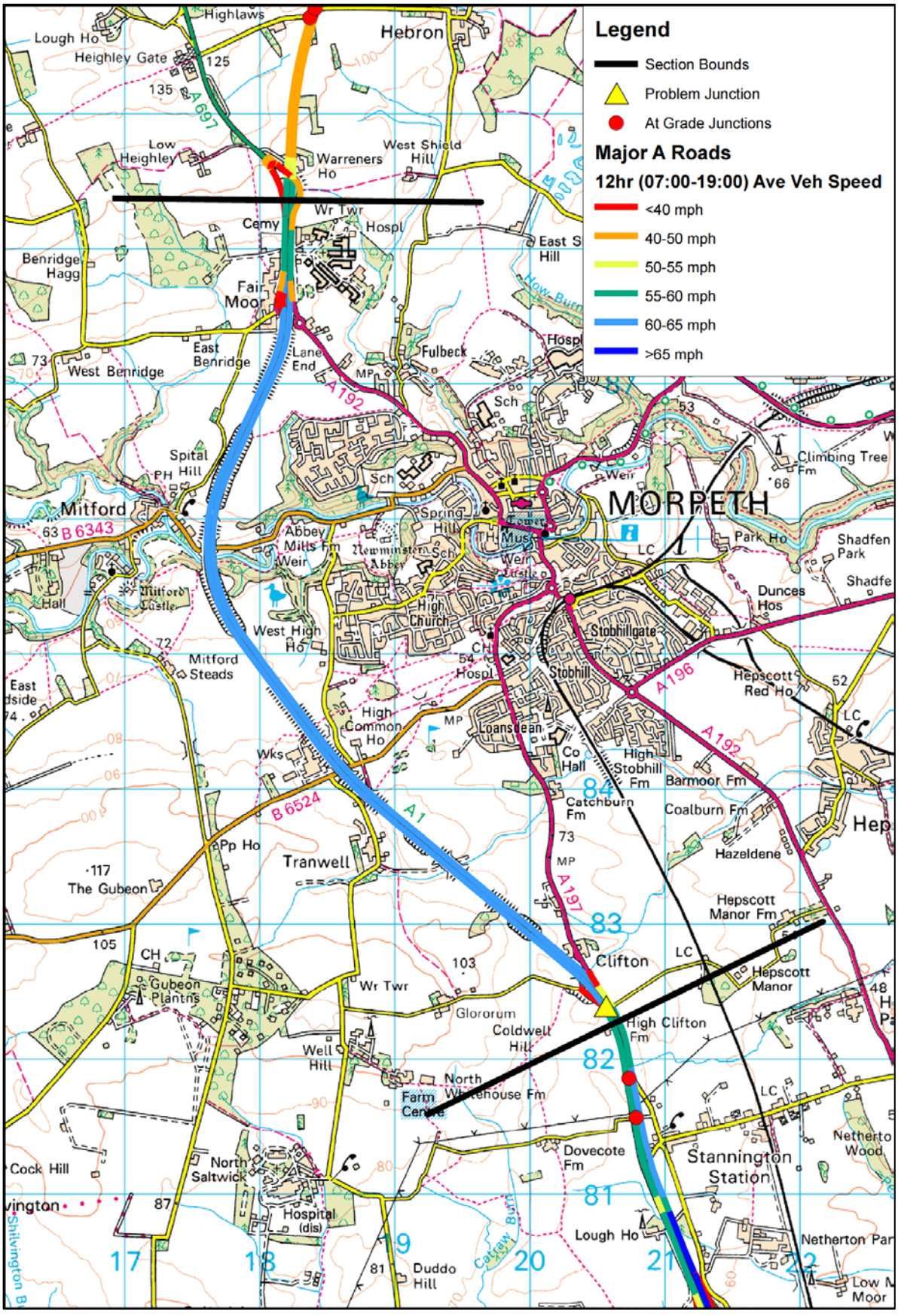


Figure B-2 Section 2

Section	Problems and Issues	Evidence/ Commentary	Strength of Evidence
3	Traffic Speeds – Low average traffic speeds relative to other sections of the route.	Traffic data from a TRADS site between Morpeth and Felton suggests average daily (07:00-19:00) traffic speeds of approximately 50mph compared to the average of 65mph on dual carriageway sections of this rout.	
	Higher than average proportion of HGVs	TRADS data suggests that the proportion of HGVs is slightly above the national average for this type of road. High proportions of HGVs on this type of road can affect both average traffic speeds and safety due to driver frustration due to lack of overtaking opportunities	
	Large number of at-grade junctions along the route resulting vehicle conflict	There are 20 at-grade junctions plus a number of residential and field accesses on this 8 mile section of the A1. These junctions are of varying standards resulting in numerous conflict points as vehicles access/exit side roads.	
	Lack of overtaking opportunities	Single Carriageway route section	
	Safety	Analysis of accident records obtained via the DfT shows that the expected number of accidents over this section is marginally lower than national averages for this type of road. However, the proportion of Fatal accidents appears to be marginally higher than expected. A 2011 Study also found that the A1 suffers more overtaking accidents than would be expected on a road of this type.	
	Peak hour traffic speeds significantly below free flow speeds	Analysis of Traffic Master data shows that the AM and PM peak average speeds are significantly lower than the average speeds in the offpeak (23:00 – 03:00).	
	Poor Junctions Standard / Layout	Junction standards and layouts vary significantly on this section	

Strength of Evidence	
	Good evidence
	Some evidence
	lack of evidence

Table B-4 Section 3 Problems and Issues

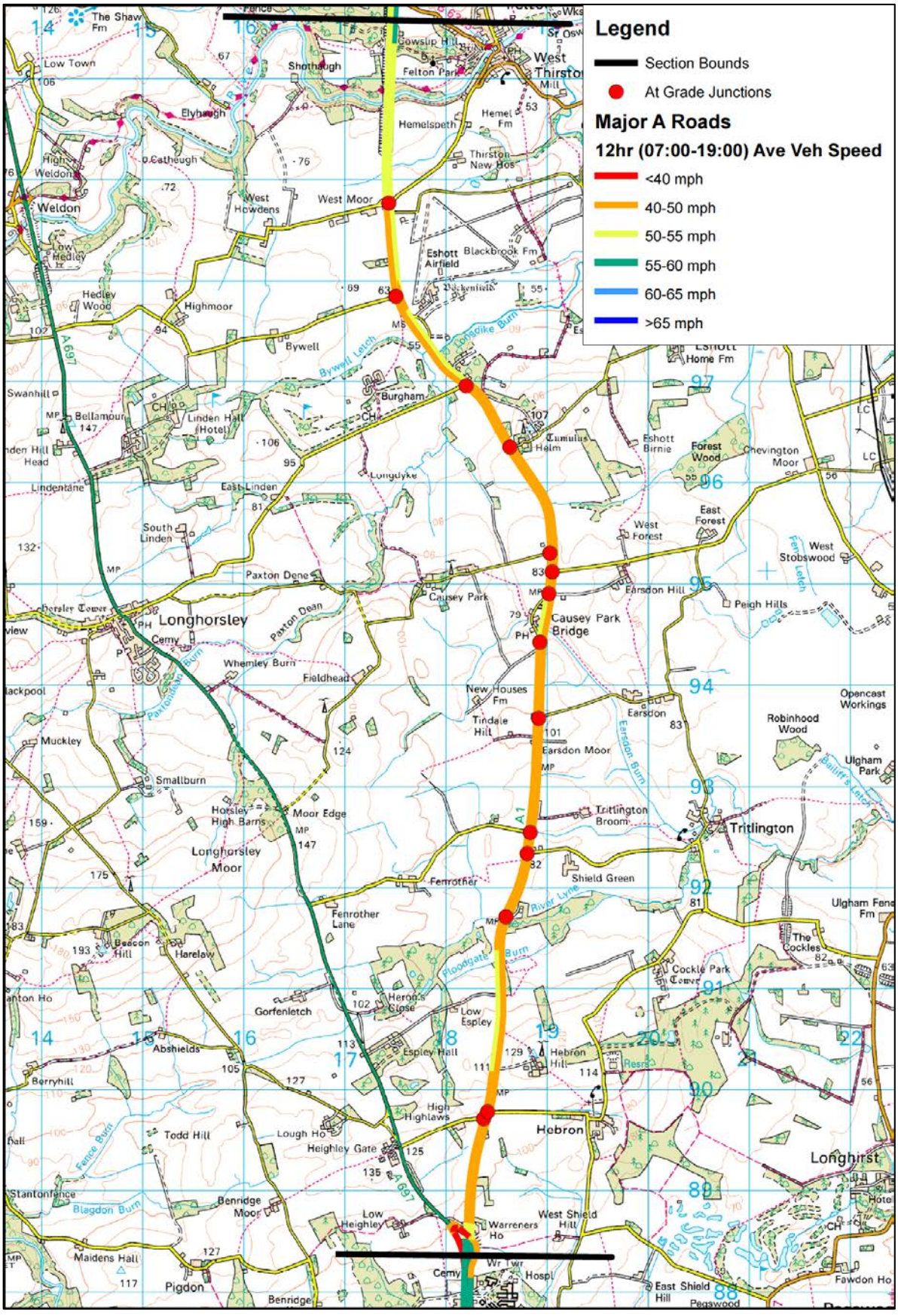


Figure B-3 Section 3

Section	Problems and Issues	Evidence/ Commentary	Strength of Evidence
4	Safety	Analysis of accident records obtained via the DfT shows that the expected number of accidents over this section is marginally above the national average for a road of this type.	
	Large number of at-grade junctions along the route resulting vehicle conflict	There are 18 at-grade junctions plus a number of residential and field accesses on this nearly 10 mile section of the A1. These junctions are of varying standards resulting in numerous conflict points as vehicles access/exit side roads.	
	Higher than average proportion of HGVs	TRADS data suggests that the proportion of HGVs is slightly above the national average for this type of road. High proportions of HGVs on this type of road can affect both average traffic speeds and safety due to driver frustration due to lack of overtaking opportunities	
	Poor Junctions Standard / Layout	Junction standards and layouts vary significantly on this section	
Strength of Evidence			
	Good evidence		
1	Some evidence		
	lack of evidence		

Table B-5 Section 4 Problems and Issues

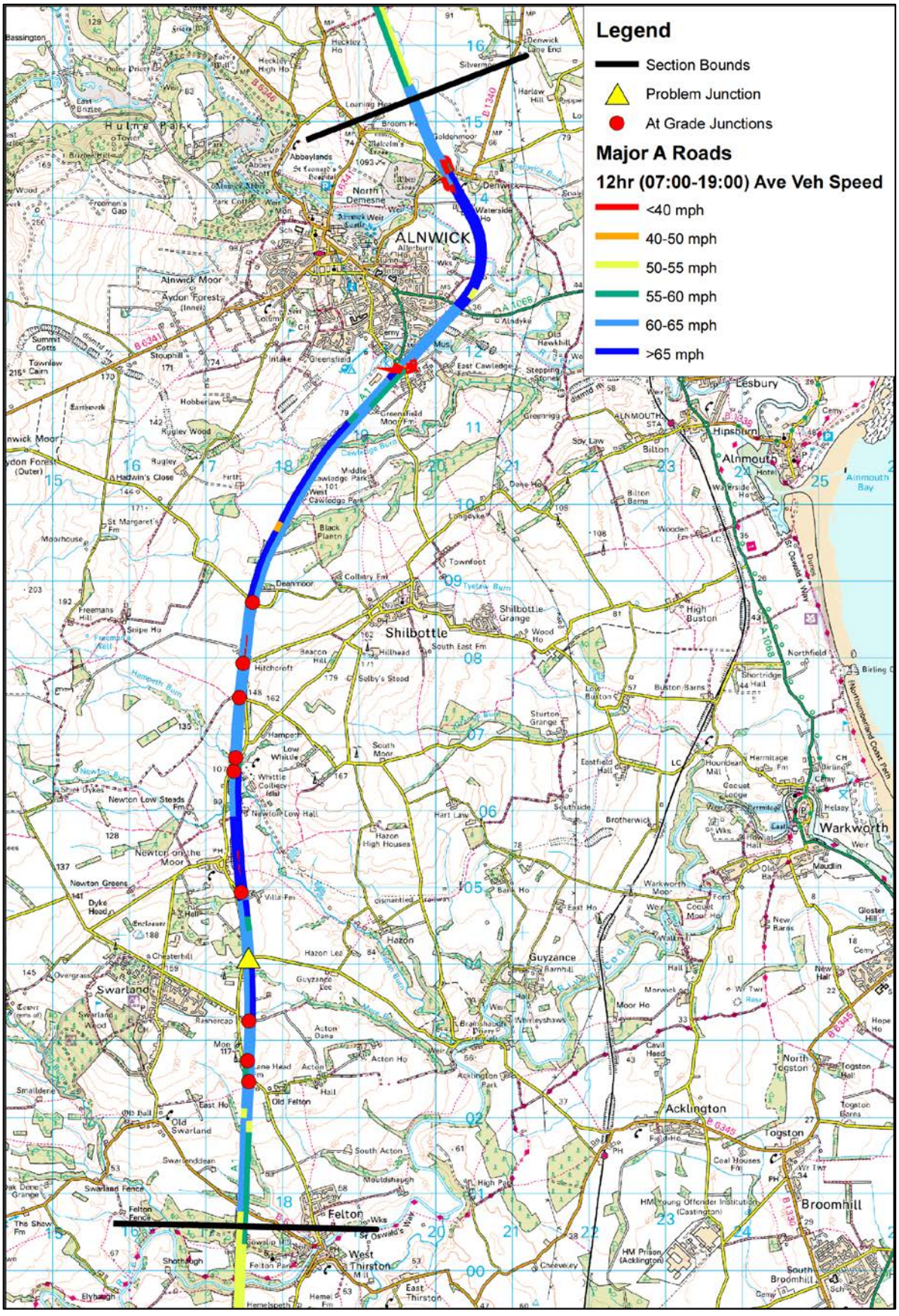


Figure B-4 Section 4

Section	Problems and Issues	Evidence/ Commentary	Strength of Evidence
5	Traffic Speeds – Low average traffic speeds relative to other sections of the route.	Traffic data from a TRADS site on this section suggests average daily (07:00-19:00) traffic speeds of approximately 56mph compared to the average of 65mph on dual carriageway sections of this route.	
	Higher than average proportion of HGVs	TRADS data suggests that the proportion of HGVs is significantly above the national average for this type of road. High proportions of HGVs on this type of road can affect both average traffic speeds and safety due to driver frustration due to lack of overtaking opportunities	
	Number of at-grade junctions along the route resulting vehicle conflict	There are 6 at-grade junctions plus a number of residential and field accesses on this nearly 5 mile section of the A1. These junctions are of varying standards resulting in numerous conflict points as vehicles access/exit side roads.	
	Safety	Analysis of accident records obtained via the DfT shows that the expected number of accidents over this section is lower than national averages for this type of road. However, the proportion of Serious and Fatal accidents appears to be higher than expected. A 2011 Study also found that the A1 suffers more overtaking accidents than would be expected on a road of this type.	
	Lack of overtaking opportunities	Single Carriageway route section	
	Poor Junctions Standard / Layout	Junction standards and layouts vary significantly on this section	

Strength of Evidence	
	Good evidence
1	Some evidence
1	lack of evidence

Table B-6 Section 5 Problems and Issues

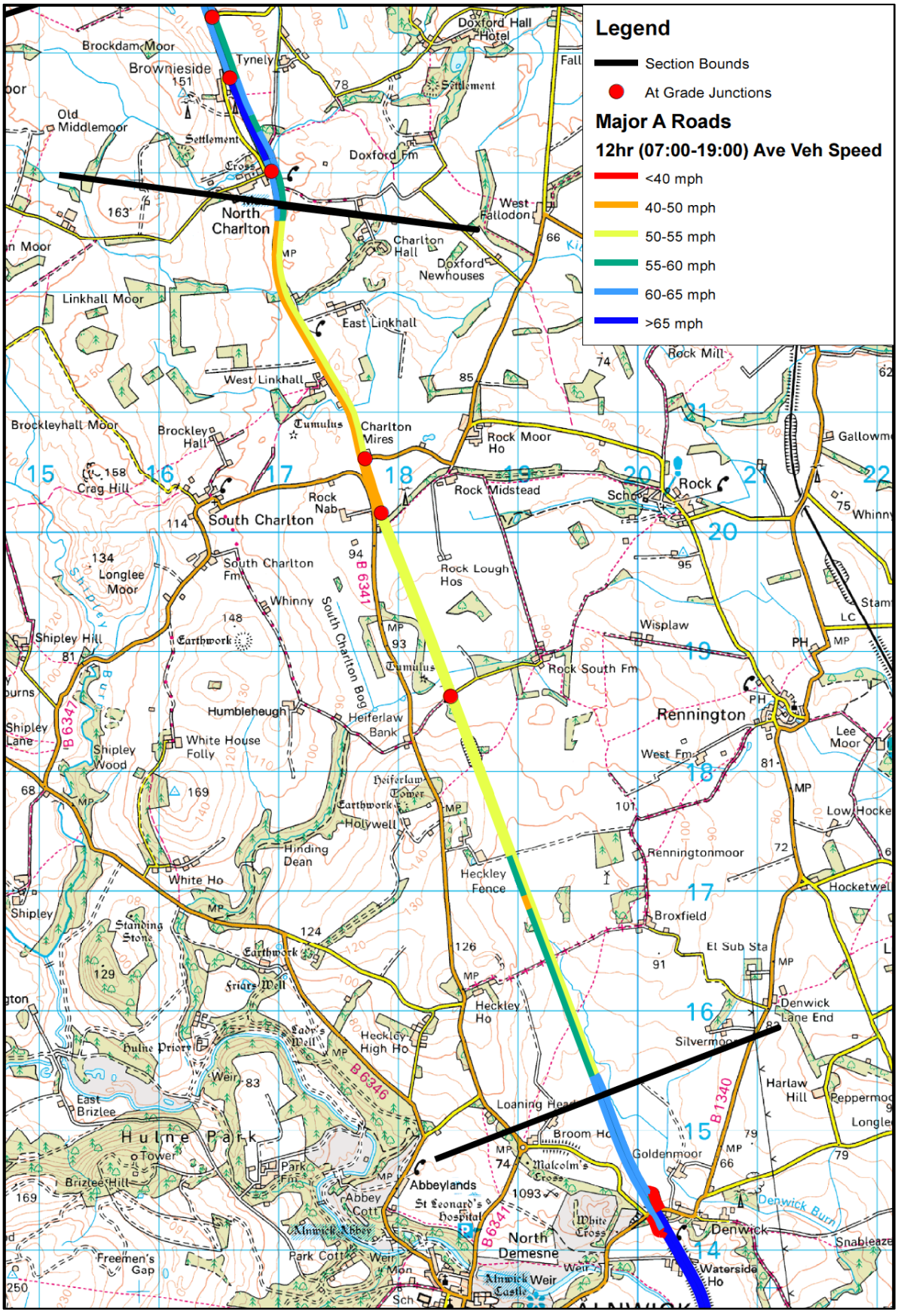


Figure B-5 Section 5

Section	Problems and Issues	Evidence/ Commentary	Strength of Evidence
6	Number of at-grade junctions along the route resulting vehicle conflict	There are 4 at-grade junctions plus a number of residential and field accesses on this 1.4 mile dual carriageway section of the A1. These junctions are of varying standards resulting in numerous conflict points as vehicles access/exit side roads.	
	Poor Junctions Standard / Layout	Junction standards and layouts vary significantly on this section	
Strength of Evidence			
	Good evidence		
	Some evidence		
	lack of evidence		

Table B-7 Section 6 Problems and Issues

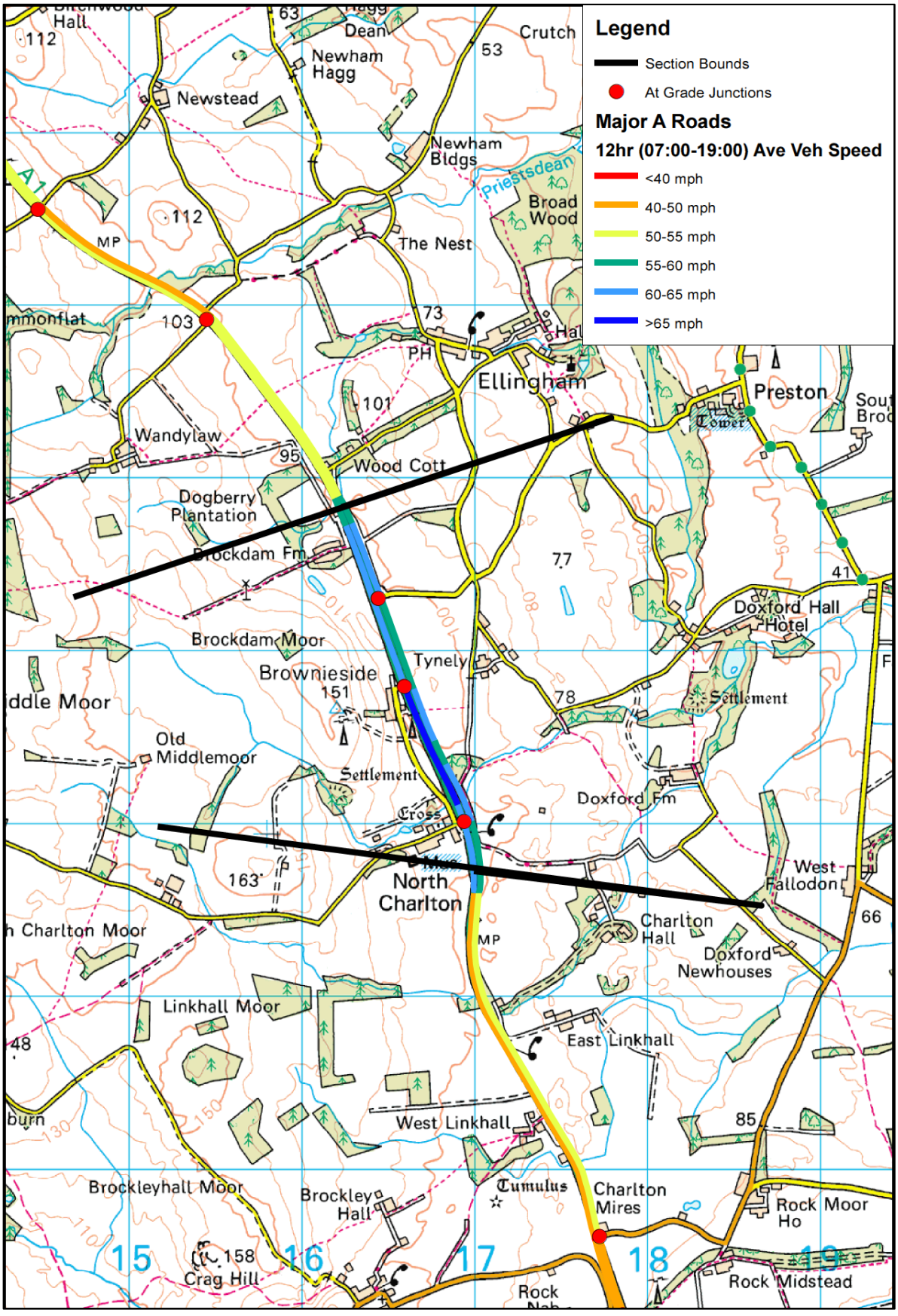


Figure B-6 Section 6

Section	Problems and Issues	Evidence/ Commentary	Strength of Evidence
7	Traffic Speeds – Low average traffic speeds relative to other sections of the route.	Traffic data from a TRADS site on this section suggests average daily (07:00-19:00) traffic speeds of approximately 55mph compared to the average of 65mph on dual carriageway sections of this route.	
	Higher than average proportion of HGVs.	TRADS data suggests that the proportion of HGVs is significantly above the national average for this type of road. High proportions of HGVs on this type of road can affect both average traffic speeds and safety due to driver frustration due to lack of overtaking opportunities	
	Large number of at-grade junctions along the route resulting vehicle conflict	There are 26 at-grade junctions plus a number of residential and field accesses on this 11.4 mile section of the A1. These junctions are of varying standards resulting in numerous conflict points as vehicles access/exit side roads.	
	Lack of overtaking opportunities	Single Carriageway route section	
	Peak hour traffic speeds significantly below free flow speeds	Analysis of Traffic Master data shows that the AM and PM peak average speeds are significantly lower than the average speeds in the offpeak (23:00 – 03:00).	
	Safety	Analysis of accident records obtained via the DfT shows that the expected number of accidents over this section is lower than national averages for this type of road. However, the proportion of Serious accidents appears to be higher than expected. A 2011 Study also found that the A1 suffers more overtaking accidents than would be expected on a road of this type.	
	Poor Junctions Standard / Layout	Junction standards and layouts vary significantly on this section	

Strength of Evidence	
	Good evidence
	Some evidence
	lack of evidence

Table B-8 Section 7 Problems and Issues

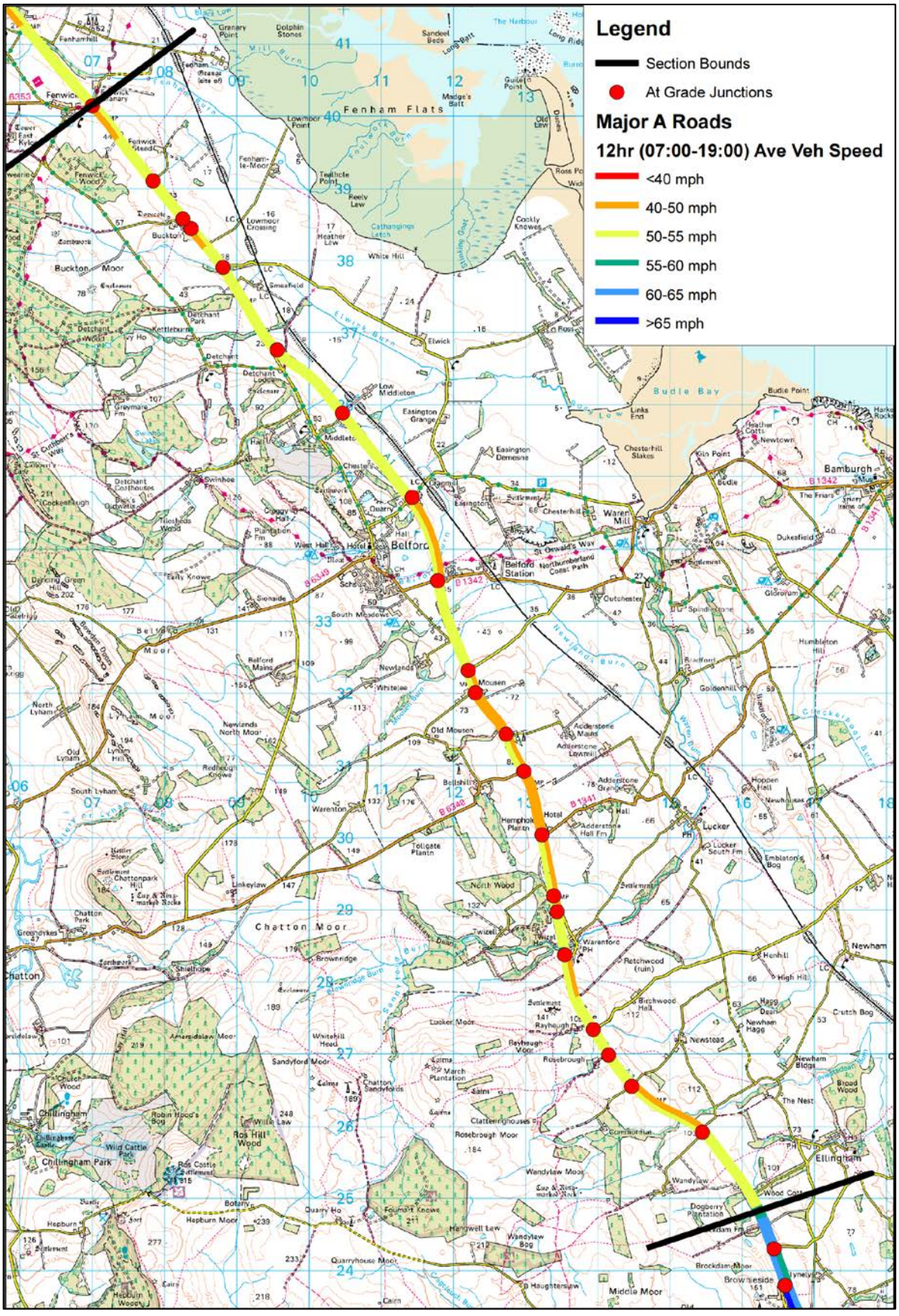


Figure B-7 Section 7

Section	Problems and Issues	Evidence/ Commentary	Strength of Evidence
8	Traffic Speeds – Low average traffic speeds relative to other sections of the route	Traffic data from a TRADS site on this section suggests average daily (07:00-19:00) traffic speeds of approximately 54mph compared to the average of 65mph on dual carriageway sections of this route.	
	Higher than average proportion of HGVs	TRADS data suggests that the proportion of HGVs is significantly above the national average for this type of road. High proportions of HGVs on this type of road can affect both average traffic speeds and safety due to driver frustration due to lack of overtaking opportunities	
	Large number of at-grade junctions along the route resulting vehicle conflict	There are 19 at-grade junctions plus a number of residential and field accesses on this 7.5mile section of the A1. These junctions are of varying standards (including one roundabout) resulting in numerous conflict points as vehicles access/exit side roads.	
	Peak hour traffic speeds significantly below free flow speeds	Analysis of Traffic Master data shows that the AM and PM peak average speeds are significantly lower than the average speeds in the offpeak (23:00 – 03:00).	
	Safety	Analysis of accident records obtained via the DfT shows that the expected number of accidents over this section is below the national average for a road of this type. However, this section experienced more Fatal accidents than would be expected. A 2011 Study also found that the A1 suffers more overtaking accidents than would be expected on a road of this type	
	Lack of overtaking opportunities	Single Carriageway route section	
	Poor Junctions Standard / Layout	Junction standards and layouts vary significantly on this section	

Strength of Evidence	
	Good evidence
	Some evidence
	lack of evidence

Table B-9 Section 8 Problems and Issues

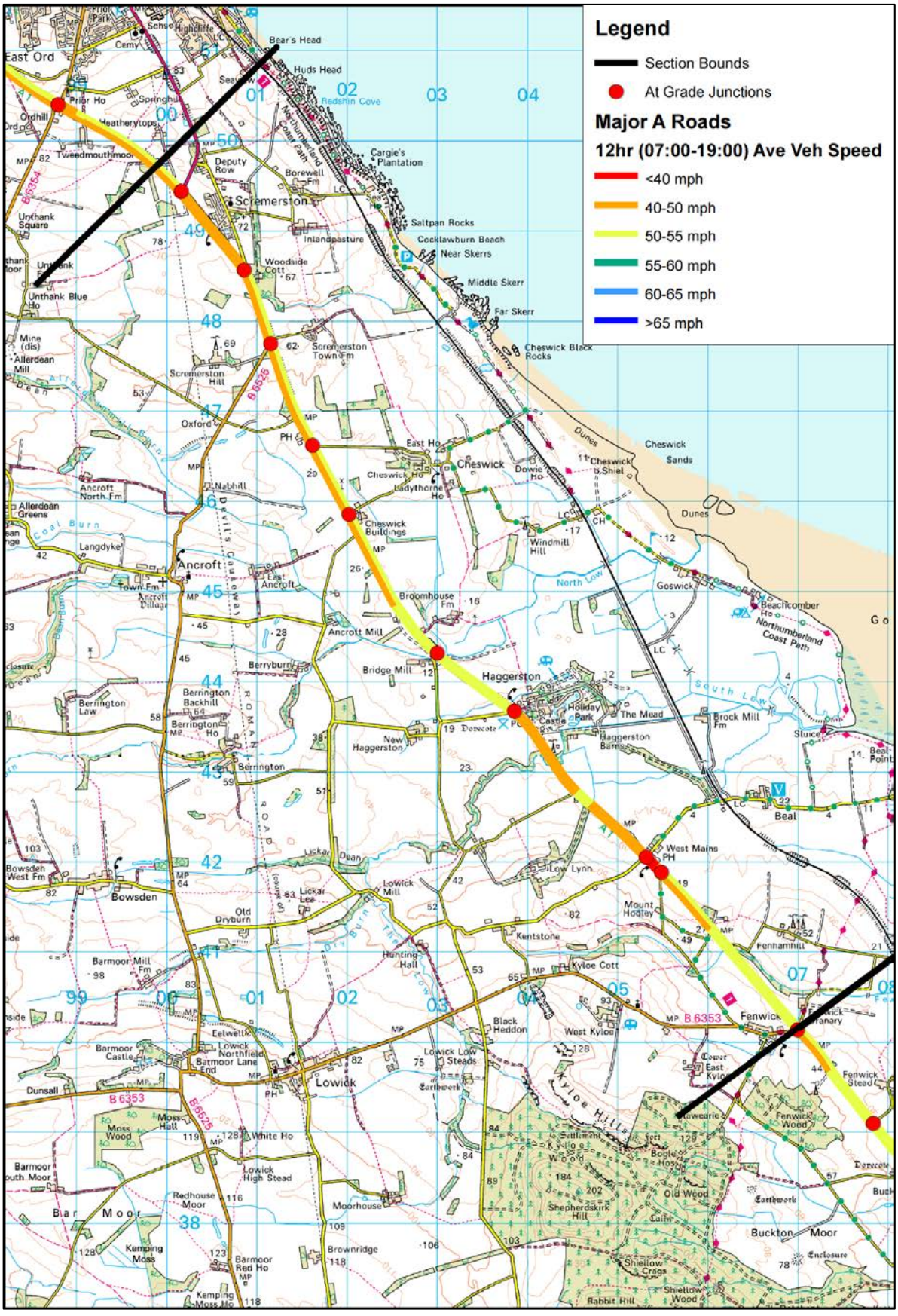


Figure B-8 Section 8

Section	Problems and Issues	Evidence/ Commentary	Strength of Evidence
9	Traffic Speeds – Low average traffic speeds relative to other sections of the route	Traffic data from a TRADS site on this section suggests average daily (07:00-19:00) traffic speeds of approximately 51mph compared to the average of 65mph on dual carriageway sections of this route.	
	Higher than average proportion of HGVs	TRADS data suggests that the proportion of HGVs is significantly above the national average for this type of road. High proportions of HGVs on this type of road can affect both average traffic speeds and safety due to driver frustration due to lack of overtaking opportunities	
	Lack of overtaking opportunities	Single Carriageway route section	
	Safety	Analysis of accident records obtained via the DfT shows that the expected number of accidents over this section is marginally above the national average for a road of this type. A 2011 Study also found that the A1 suffers more overtaking accidents than would be expected on a road of this type	

Strength of Evidence	
	Good evidence
	Some evidence
	lack of evidence

Table B-10 Section 9 Problems and Issues

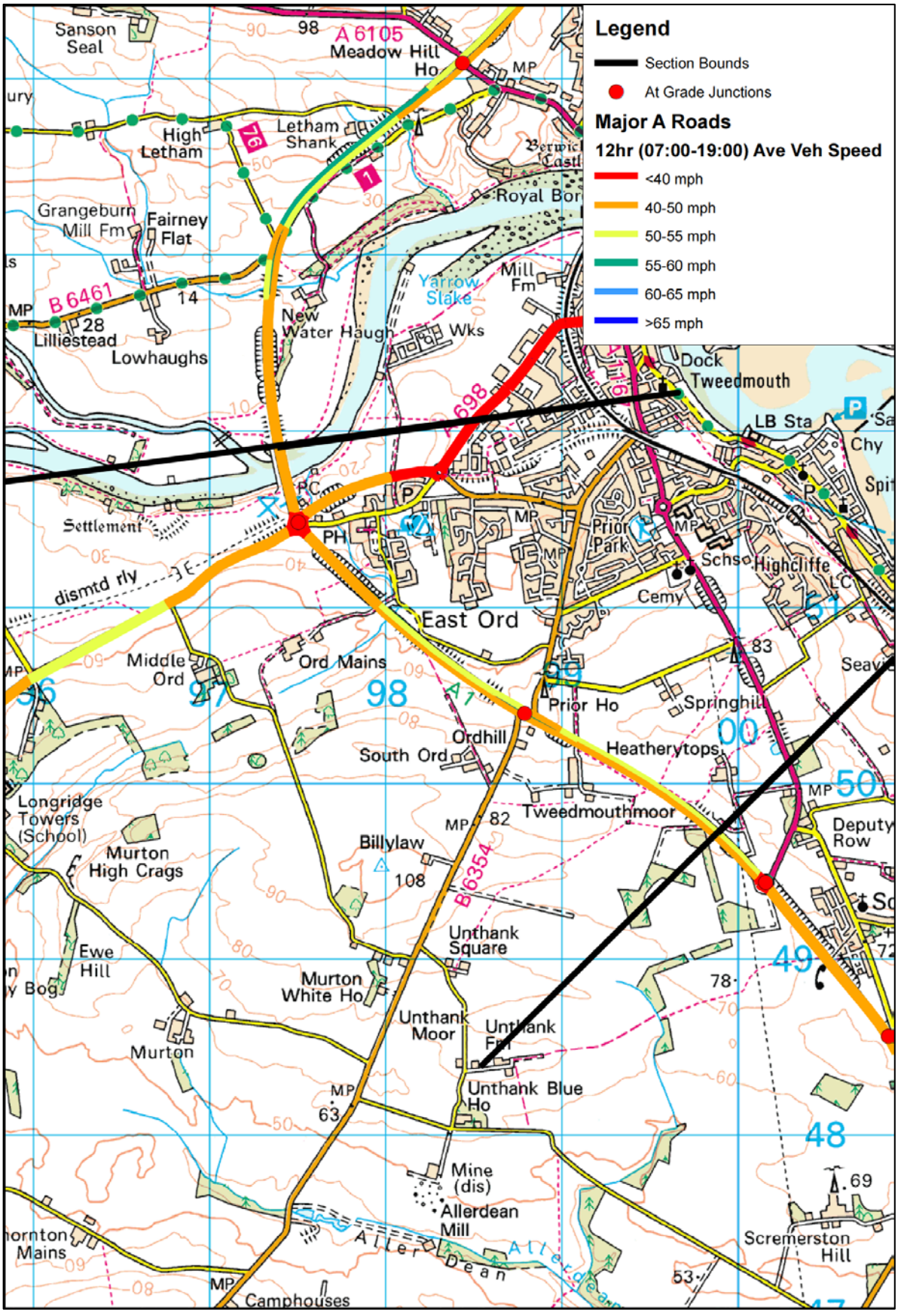


Figure B-9 Section 9

Section	Problems and Issues	Evidence/ Commentary	Strength of Evidence
10	Traffic Speeds – Low average traffic speeds relative to other sections of the route	Traffic data from a TRADS site on this section suggests average daily (07:00-19:00) traffic speeds of approximately 52mph compared to the average of 65mph on dual carriageway sections of this route.	
	Higher than average proportion of HGVs	TRADS data suggests that the proportion of HGVs is above the national average for this type of road. High proportions of HGVs on this type of road can affect both average traffic speeds and safety due to driver frustration due to lack of overtaking opportunities	
	Safety	Analysis of accident records obtained via the DfT shows that the expected number of accidents over this section is slightly lower than national averages for this type of road. A 2011 Study found that the A1 suffers more overtaking accidents than would be expected on a road of this type.	
	Poor Junctions Standard / Layout	Junction standards and layouts vary significantly on this section	
Strength of Evidence			
	Good evidence		
	Some evidence		
	lack of evidence		

Table B-11 Section 10 Problems and Issues

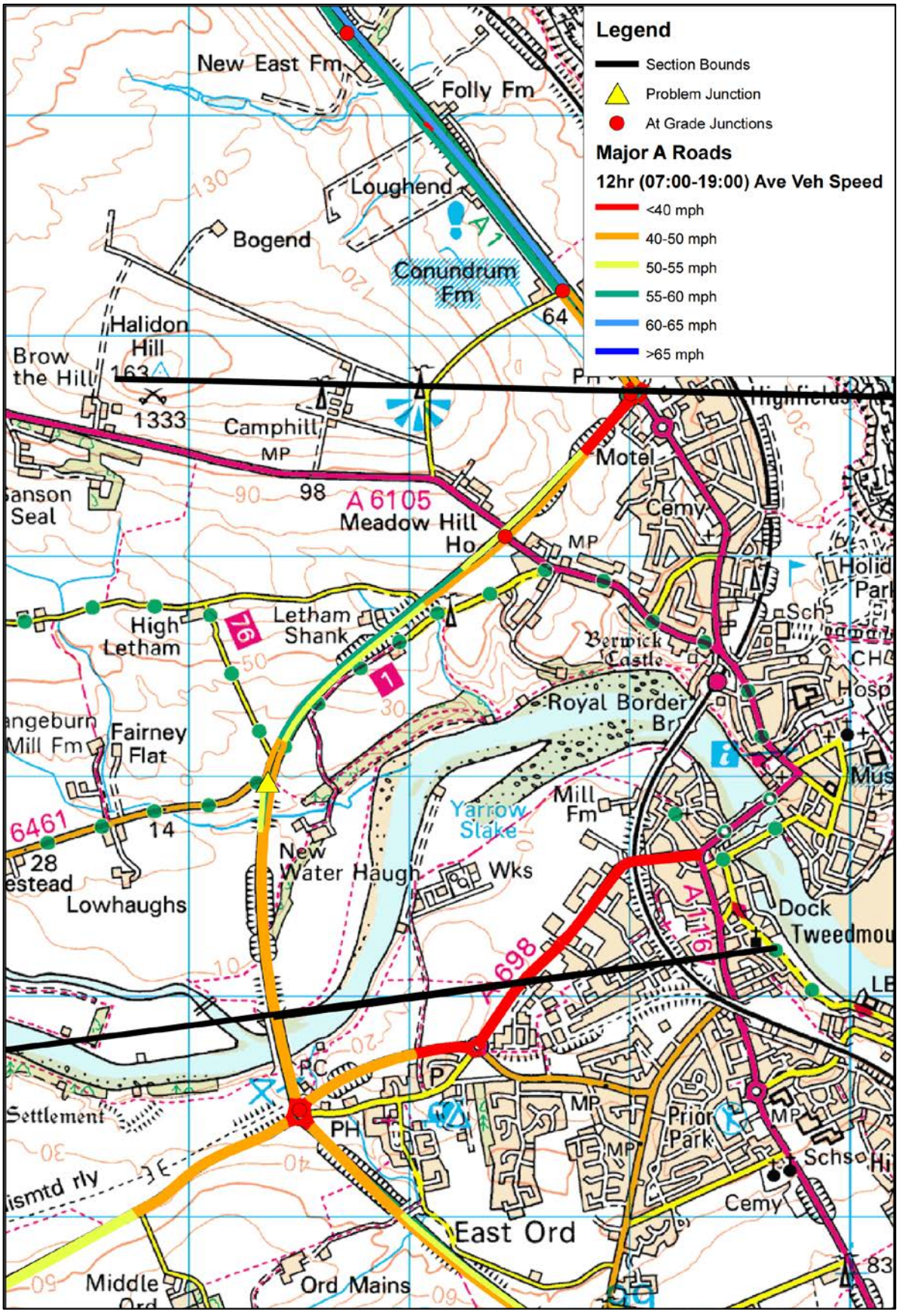


Figure B-10 Section 10

Section	Problems and Issues	Evidence/ Commentary	Strength of Evidence
11	Higher than average proportion of HGVs	TRADS data suggests that the proportion of HGVs is significantly above the national average for this type of road. High proportions of HGVs on this type of road can affect both average traffic speeds and safety due to driver frustration due to lack of overtaking opportunities	
	Safety	Analysis of accident records obtained via the DfT shows that the expected number of accidents over this section is marginally above the national average for a road of this type.	
	Poor Junctions Standard / Layout	Junction standards and layouts vary significantly on this section	
Strength of evidence			
	Good evidence		
	Some evidence		
	lack of evidence		

Table B-12 Section 11 Problems and Issues

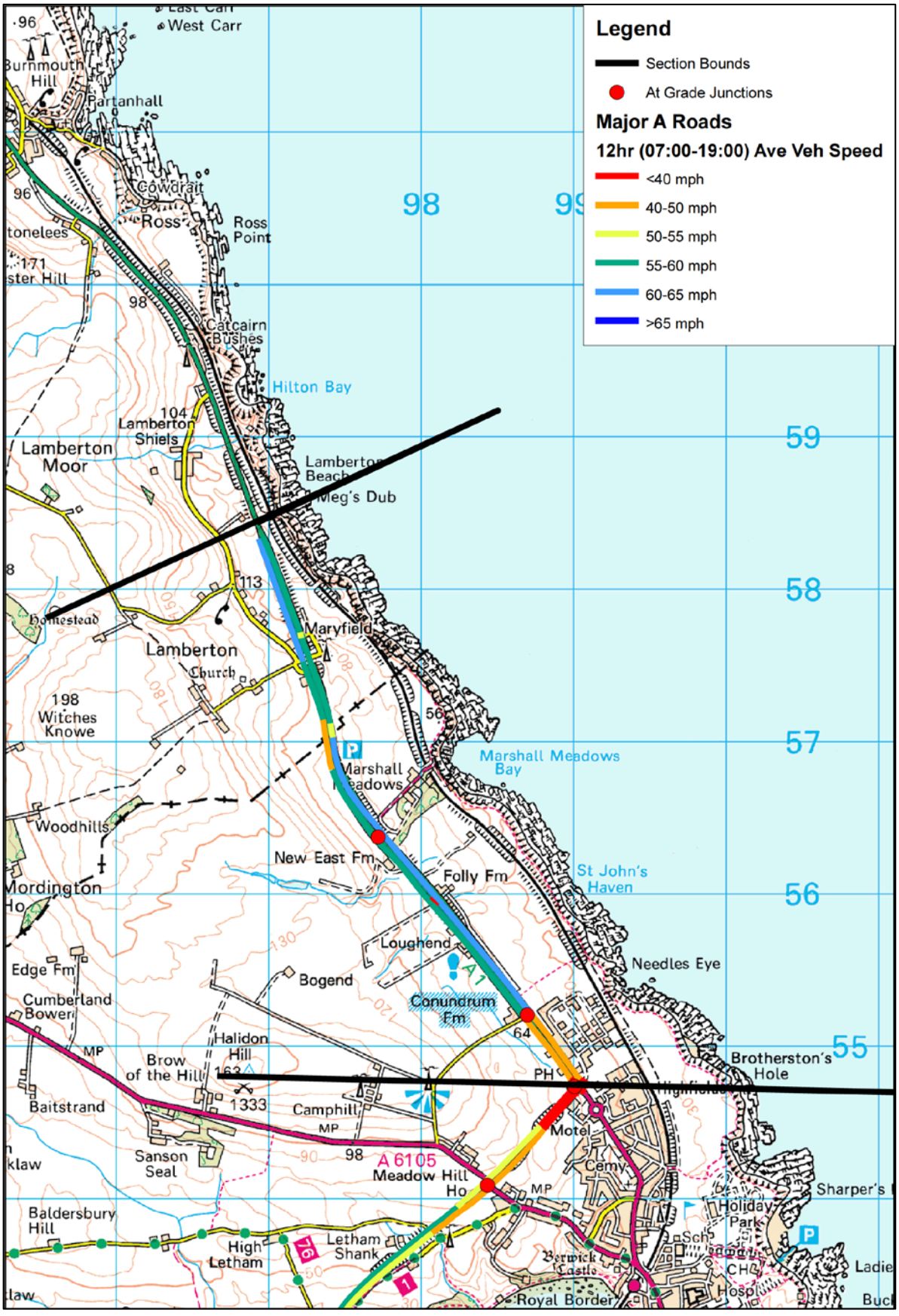


Figure B-11 Section 11