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# A9 Dualling Case for Investment

## Main Report 2016

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# Glossary of Terms

| | |
|---|---|
| A9DTM(b) | A9 Dualling Traffic Model (Version b) |
| AADT | Annual Average Daily Traffic |
| AAWDT | Annual Average Weekday Daily Traffic |
| ANPR | Automatic Number Plate Recognition |
| AST | Appraisal Summary Table |
| ATC | Automatic Traffic Count |
| BCR | Benefit Cost Ratio |
| BRES | Business Register and Employment Survey |
| CfI | Case for Investment |
| DfT | Department for Transport |
| DM | Do Minimum |
| DMRB | Design Manual for Roads and Bridges |
| DS | Do Something |
| DTDV | Day To Day Variability |
| GRIP | Governance for Railway Investment Projects |
| GV | Good Vehicles |
| GVA | Gross Value Added |
| HGVs | Heavy Goods Vehicle |
| IDM | Investment Decision Makers |
| IIP | Infrastructure Investment Plan |
| IP | Inter Peak |
| KSI | Killed and Serious Injured |
| LCEGS | Low Carbon and Environmental Goods and Services |
| NMU | Non-Motorised Users |
| LGV | Light Goods Vehicle |
| NPF3 | National Planning Framework 3 |
| NPV | Net Present Value |
| PEARS | Programme for the Economic Assessment of Road Schemes |
| PEP | Project Execution Plan |
| PES | Preliminary Engineering Services |
| PV | Present Value |
| PVB | Present Value of Benefits |
| PVC | Present Value of Costs |
| RR | Risk Register |
| RSI | Road Side Interview [Surveys] |
| S2 | Single 7.3m carriageway |
| SBC | Strategic Business Case |
| SCDI | Scottish Council for Development Industry |
| SGVC | Specialized Goods Vehicle Count |
| SD | Standard Deviation |
| SEA | Strategic Environmental Assessment |

| | |
|---|---|
| SEC | Socio-Economic Case |
| SMART | Specific Measurable Attainable Relevant and Timed |
| STAG | Scottish Transport Appraisal Guidance |
| STPR | Strategic Transport Projects Review |
| STRIPE | Scottish Trunk Road Improvement Project Evaluation |
| TEE | Transport Economy Efficiency |
| TELMoS | Transport Economic and Land-use Model of Scotland |
| TMfS | Transport Model for Scotland |
| TS | Transport Scotland |
| TUBA | Transport User Benefit Appraisal |
| VOCs | Volatile Organic Compounds |
| WEBs | Wider Economic Benefits |
| WS2+1 | A wide single carriageway road with two lanes of travel in one direction and a single lane in the opposite direction. |

### 1.1 Introduction

# 1 Introduction

On the 6th December 2011, the Cabinet Secretary for Infrastructure and Capital Investment launched the Infrastructure Investment Plan (IIP). The plan provides an overview of the Scottish Government's proposals for infrastructure investment over the coming decades, including a commitment to complete the dualling of the A9 between Perth and Inverness by 2025. The IIP commitment builds on work undertaken in the 2008 Strategic Transport Projects Review (STPR) which is the Strategic Business Case for the A9 Dualling Programme.

Since 2011, there has been a renewed focus on developing and promoting economic growth through Scotland's cities and their regions. This is reflected in current thinking for planned development along and at either end of the A9 corridor, with a series of Local Development Plans containing ambitious growth aspirations. Connectivity to the central belt of Scotland, the rest of the UK markets, and access to labour force is critical to the success of these plans and the economic development of the wider region.

It is in this context that the Investment Case for the A9 Dualling Programme from Perth to Inverness has been developed. This builds upon the evidence base of the STPR and seeks opportunities to address the growing economic and transport demands along the corridor.

### 1.2 The A9 Dualling Programme

The A9 Trunk Road provides a strategic link between the Scottish Highlands and Central Scotland. It is the longest trunk road in Scotland, with the Perth to Inverness section totalling 177 km (110 miles) in length, of which 48 km (30 miles) are already dualled.

The A9 Dualling Programme is designed to deliver economic growth through improvement to journey times, reliability, road safety and driver stress. Dualling the A9 will provide greater connectivity to communities, businesses and tourists along the corridor and beyond. The programme will be divided into 12 projects during the planning phase. These independent projects will keep common objectives, ensuring that the statutory process is as efficient as possible, whilst at the same time achieving the overall programme objectives.

The scale of the programme makes the A9 Dualling one of the biggest infrastructure projects undertaken in Scotland's history. As a result of the anticipated multi-modal and economic synergies along the corridor and the resulting wider benefits, the Investment Case is being developed at a whole corridor programme level.

This Investment Case has been taken forward in parallel with the DMRB Stage 1 Assessment[1] framework and the Strategic Environmental Assessment (SEA)[2] work streams. As a result, the engineering, environmental and traffic and economic problems and issues for the predominantly on line corridor option have been captured and assessed.

[1] *DMRB Stage 1 Report produced as part of the PES framework*, *Transport Scotland*, *March 2014*
[2] *Strategic Environmental Assessment (SEA) Environmental Report, Transport Scotland, June 2013*

## 1.3 The Investment Decision Making Process within Transport Scotland

Transport Scotland has clear investment decision and business case requirements in place, which apply to all major capital projects. As set out in Transport Scotland's Investment Decision Making (IDM) Guidance, there are three main decision points before the construction phase of any project[3]. At each of these three decision points, Scottish Ministers review and approve Business Case stages as follows:

- The **Strategic Business Case**: this provides the strategic context for the proposal. By approving the Strategic Business Case (SBC), Scottish Ministers give Transport Scotland the authority to invest in further developing project proposals. The STPR forms the SBC for the A9 Dualling Programme.
- The **Outline Business Case**: this stage identifies the preferred option for getting the best value for the money available, affordability and feasibility of the project. The Outline Business Case also includes details of the delivery strategy, the approval of which provides Transport Scotland with the authority to further invest in the development of the preferred option and to begin procurement.
- The **Full Business Case**: this provides the opportunity to review the Case for Investment, and approval of this Case provides the basis for entering into a contract with a preferred supplier.

## 1.4 Structure of this Document

The sections below outline how the key evidence relating to the Investment Case for the A9 Perth to Inverness Dualling Programme has been structured in this report. This covers:

- Chapter 2 - Description of A9 Dualling Programme;
- Chapter 3 - The strategic rationale for intervention in the A9 corridor;
- Chapter 4 - An assessment of current transport related problems and opportunities;
- Chapter 5 - Changes in travel patterns as a result of the A9 Dualling Programme;
- Chapter 6 - Programme Appraisal: Economy;
- Chapter 7 - Programme Appraisal: Safety;
- Chapter 8 - Programme Appraisal: Environment;
- Chapter 9 - Programme Appraisal: Integration;
- Chapter 10 - Programme Appraisal: Accessibility and Social Inclusion;
- Chapter 11 - Programme Appraisal: Planning Objectives;
- Chapter 12 - Deliverability and Risks;
- Chapter 13 - Monitoring and Evaluation, and
- Chapter 14 – Conclusions.

[3] *Governance Procedures for Investment Decision Making and Monitoring and Review, Transport Scotland, December 2013*

### 2.1 The A9 from Perth to Inverness

# 2 The A9 Dualling Programme

The A9 between Perth and Inverness is 177km long of which 48km is of dual carriageway standard. The route is largely rural in nature and the population is concentrated in several towns and villages. A map of the route and the twelve individual projects that make up the programme during the planning phase is presented in Figure 2.1.


**Figure 2.1: The A9 Dualling Programme between Perth and Inverness**

## 2.2 The A9 Dualling Programme

In September 2012, Transport Scotland commissioned a Preliminary Engineering Services (PES) study for the dualling of the A9 between Perth and Inverness. The scope of the commission included undertaking a preliminary engineering assessment equivalent to a DMRB Stage 1 Assessment. The commission covered the initial development and assessment of proposed corridor options and strategies for the improvement of the A9 to dual carriageway standard. The DMRB Stage 1 Assessment report was published in March 2014[4].

In tandem with the PES study, a Strategic Environmental Assessment (SEA) has been undertaken for the study area. This document was published in June 2013[5]. As part of ongoing work to meet the environmental challenges of the A9 Dualling Programme, Transport Scotland has prepared an Addendum to the SEA. The Addendum responds to a number of issues raised in the consultation responses to the June 2013 SEA Environmental Report and considers issues such as the potential impact of the dualling on flood risk and sites designated under the European Habitats Directive.

Based on the technical work undertaken to date, the A9 Dualling Programme will be designed to deliver a Category 7A All Purpose Dual Carriageway road standard. DMRB describes a Category 7A road as a D2AP with no access except for isolated existing accesses with left turns only. No minor junctions are allowed at grade and no gaps are permitted in the central reserve. All major junctions are fully grade separated. Where possible, the following design strategy will be applied:

- No gaps in the central reserve, to prevent right turns across carriageways;
- Full 'grade separation' of junctions to remove 'at grade' junctions, based on the following design principles:
  - Junctions will be provided with all A and B class roads unless junction locations can be combined.
  - All junctions with C class roads, unclassified roads and accesses are to be rationalised and an alternative connection provided unless particular site specific considerations can be demonstrated.
- Grade separated junctions to provide direct links, over or under, the A9 for non-motorised user crossing/access;
- Hard shoulder strips at least 1m width;
- Underpasses preferable to over-bridges, where possible, to minimise visual impact; and
- Route signage and lighting design to minimise overall visual impact.

The DMRB Stage 1 Assessment report considered a range of options both online and offline along the corridor to meet the above design strategy. Due to the strategic nature of DMRB Stage 1 process, a definitive route option has not been determined for all sections of the A9 that require to be upgraded and a number of options remain to be assessed as part of the DMRB Stage 2 process. However, due to a combination of environmental, topographical and geometric standard constraints the Stage 1 work was able to conclude that the preferred route option will be predominantly online. As such, the evidence and appraisal work contained within this Investment Case considers a predominately online option.

[4] *DMRB Stage 1 Report produced as part of the PES framework, , Transport Scotland, March 2014*
[5] *Strategic Environmental Assessment (SEA) Environmental Report, Transport Scotland, June 2013*

As illustrated in Figure 2.1, the A9 Dualling Programme is made up of twelve separate projects during the planning phase as follows:

- A9 Luncarty to Pass of Birnam
- A9 Birnam to Tay Crossing
- A9 Tay Crossing to Ballinluig
- A9 Pitlochry to Killiecrankie
- A9 Killiecrankie to Pitagowan
- A9 Pitagowan to Glen Garry
- A9 Glen Garry to Dalwhinnie
- A9 Dalwhinnie to Crubenmore
- A9 Crubenmore to Kincraig
- A9 Kincraig to Dalraddy
- A9 Dalraddy to Slochd
- A9 Tomatin to Moy

Since publication of the DMRB Stage 1 Assessment report in March 2014, Scottish Ministers have announced the appointment of three design consultancies to take forward the design work to identify preferred options for each project. The design work will be developed following the Design Manual for Roads and Bridges (DMRB), ensuring a robust and fit for purpose design. Statutory (planning) permissions must also be gained through the Roads (Scotland) Act 1984. The design development stages for the A9 Dualling Programme will cover:

- DMRB Stage 2 (Route Options Assessment)
- DMRB Stage 3 (Detailed Design and Assessment)
- Statutory Process (Publication of Environmental Statement and Orders)
- Procurement (Tender process to appoint a works contractor), and
- Construction and Site Supervision

In taking forward the project, Transport Scotland will work collaboratively with the key agencies, authorities and local communities to address such challenges as:

- new bridges and major bridge widening,
- improving accessibility for local communities,
- addressing accident clusters,
- managing the impact on the many environmental designations,
- improving access to tourist and recreation sites including the Cairngorms National Park, and
- minimising the impact of construction.

A comprehensive public and key stakeholder engagement exercise has been initiated and will continue throughout the A9 Dualling Programme development.

## 2.3 Phasing of the A9 Dualling Programme

There is a commitment to dual the full length of the A9 between Perth and Inverness by 2025. Phasing is currently being considered and will continue to be assessed at the various design stages. The project level programme for design and development work[6] is illustrated overleaf. Two sections of the route have already been subject to advance works, these are:

- *Kincraig to Dalraddy*: The statutory process was concluded in November 2014 with construction started in September 2015; and
- *Luncarty to Pass of Birnam*: Orders were published in March 2014 with construction scheduled to start in 2017.

Works to bring forward further sections of the route for early delivery were announced in March 2014. The following three sections are expected to complete statutory processes during 2017:

- 10.5 km Pitagowan to Glen Garry,
- 8.3 km Dalwhinnie to Crubenmore, and
- 9.3 km Tomatin to Moy stretches

[6] *Project Level programme for design and development work, Transport Scotland*

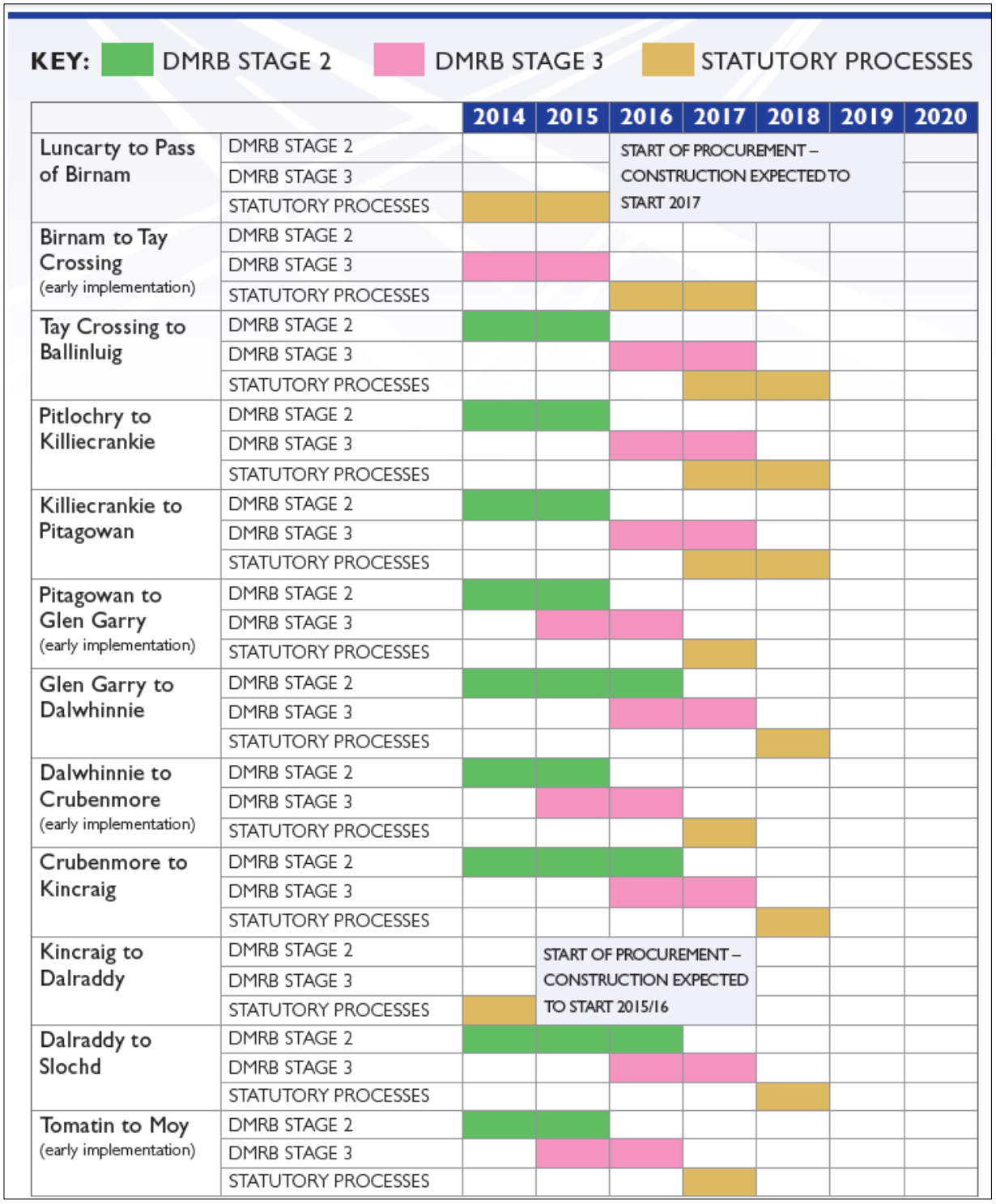



**Figure 2.2 - Project level programme for design and development work (March 2014)**

## 2.4 Programme Objectives

Since publication of STPR in 2008, further assessment of problems and opportunities along the A9 corridor has led to the development of A9 Dualling Programme objectives, as follows:

*1. To improve the operational performance of the A9 by:*

- *(i) Reducing journey times;*
- *(ii) Improving journey time reliability;*

*2. To improve safety for motorised and non-motorised users by:*

- *(i) Reducing accident severity;*
- *(ii) Reducing driver stress.*

*3. Facilitate active travel in the corridor.*

*4. To improve integration with Public Transport Facilities.*

A mapping exercise looking at the problems and opportunities along the corridor relative to the above objectives is contained within AECOM File Note 1[7]. Later, in Chapter Four, the problems and opportunities identified along the A9 corridor are presented.

[7] *Objective Mapping, AECOM File Note 01, September 2015*

# 3 Rationale for Intervention

## 3.1 Introduction

In this section, the strategic rationale for intervention in the A9 corridor, as developed in STPR is outlined. In addition, the chapter presents an updated analysis of the strategic fit of the A9 Dualling Programme, demonstrating the role of the project in helping to deliver key national policy objectives.

## 3.2 Strategic Transport Projects Review

### Overview

The Strategic Case for the A9 Dualling Programme was established by the Scottish Government's Strategic Transport Projects Review. STPR presented both the upgrading of the A9 between Dunblane and Inverness and rail enhancements on the Highland Main Line between Perth and Inverness as strategic transport investments to support the delivery of the Government's Purpose. STPR provides the rationale for the inclusion of both the A9 Dualling Programme and the upgrade to the Highland Mainline in the Infrastructure Investment Plan (IIP)[8] with a commitment for both projects to be delivered by 2025.

### STPR Process

STPR was completed using the Scottish Transport Appraisal Guidance (STAG). STAG advocates an evidence-based, objective-led appraisal framework which allows the identification and appraisal of interventions most likely to address identified issues. Importantly, STAG is a multi-modal appraisal framework (allowing rail and road based interventions to be considered on a common basis), and has multiple appraisal criteria (covering environmental, safety, social and policy issues as well as economic performance).

STPR was a comprehensive, multi-modal assessment of the transport network across Scotland, taking into account current and future problems and opportunities. It was developed over the course of five distinct work packages as illustrated in Figure 3.1.

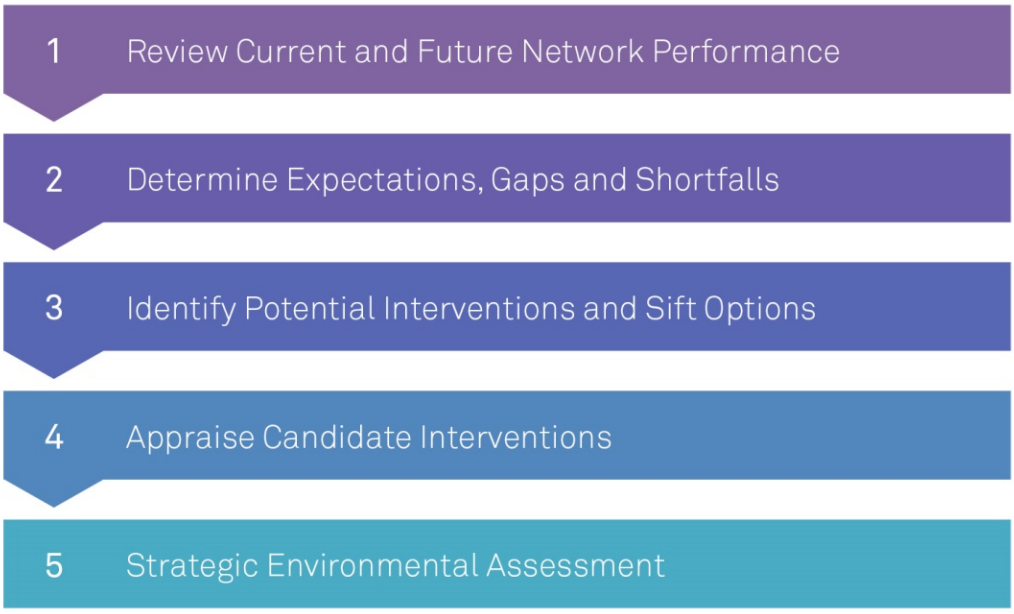



**Figure 3.1: Strategic Transport Projects Review Work Packages**

In applying the above work packages STPR was able to identify the prevalent problems and opportunities, set objectives and appraise a long list of multi-modal transport interventions.

[8] *Infrastructure Investment Plan, The Scottish Government, 2011*

**Review of Current and Future Network Performance**

In reviewing network performance in the Perth to Inverness Corridor, STPR identified that the corridor performs three key roles:

- It provides a strategic link connecting Inverness and the Highlands to Perth and onwards to the Central Belt;
- It serves settlements within the corridor providing access to local services, employment and tourism; and
- It caters for commuting to the nodes at either end of the corridor.

Key problems and issues identified on the Perth to Inverness corridor included:

- Socio-economic and environmental context:
    - Population levels, and numbers of households, are expected to increase in the future.
    - The corridor has higher than average car ownership levels and high levels of dependency on the private car.
    - Income levels are slightly lower than the Scottish average.
    - Transport networks are constrained in parts by geographical features.
- Travel patterns:
    - There are a relatively high proportion of trips travelling the entire length of the transport corridor, highlighting the importance of the transport networks on this corridor as linkages between northern and southern Scotland. Modal share by public transport for these longer distance trips is relatively low, and not forecast to change substantially.
- Performance of the corridor:
    - Whilst the A9 accident rate is lower than the Scottish average, the proportion of fatal and serious accidents is significantly higher.
    - The capacity and quality of the transport network (road and rail) are variable.
    - The nature of the A9, with mixed carriageway provision and vehicle composition, leads to platooning of vehicles. Temporary impediments to traffic flow and journey times are common during summer months and holiday periods, while congestion is common near Perth and Inverness.
    - Both the A9 and the rail route in the corridor are subject to closures during bad weather and landslips. There are few reasonable alternative routes.
- Accessibility:
    - Accessibility levels are low, with infrequent bus services. Car users out with the main settlements have long journeys to access social and employment opportunities.

**Expectations, Gaps and Shortfalls**

Following a review of network performance, STPR sought to:

- Define the policy expectations and national objectives that will provide the framework for determining the future required performance of the strategic networks;
- Identify, based on the evidence from the network performance review, a series of objectives at urban network, strategic node and corridor level that will target and facilitate the delivery of policy expectations and national objectives; and
- Identify the significance of issues to determine those that may require a step change approach to option generation to meet national objectives.

Following an extensive review of the existing and future transport network performance, a number of problems, issues and opportunities were identified. This informed the development of a set of SMART (Specific, Measurable, Attainable, Relevant and Timed) objectives for the strategic nodes of Inverness and Perth and the strategic transport corridor between the two cities. Specifically, the following corridor objectives were identified for the route between Perth and Inverness:

- To reduce journey time and increase opportunities to travel between Inverness and Perth (and hence onwards to the Central Belt);
- To improve the operational effectiveness of the A9 as it approaches Perth and Inverness;
- To address issues of driver frustration relating to inconsistent road standard, with attention to reducing accident severity; and
- To promote journey time reductions, particularly by public transport, between the Central Belt and Inverness primarily to allow business to achieve an effective working day when travelling between these centres.

Interventions were developed in progressive stages, with a series of iterative refinements to improve their focus and effectiveness. Further recognition of the investment hierarchy was considered when identifying appropriate levels of interventions. The hierarchy applied was:

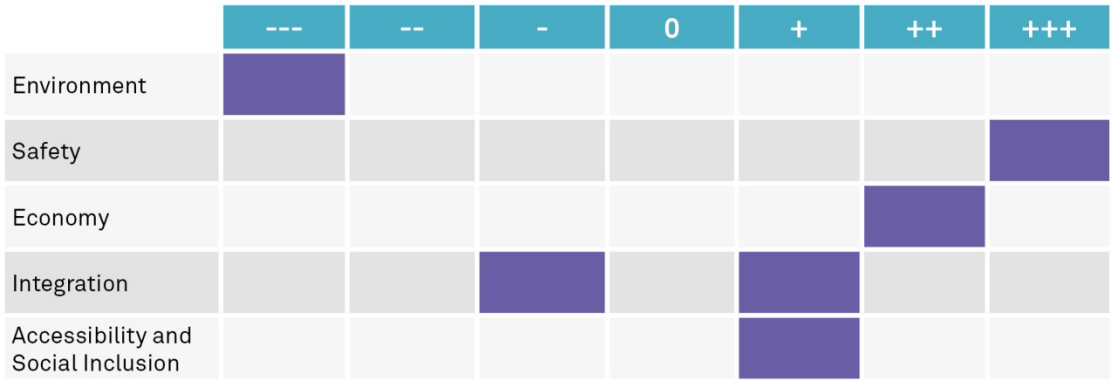
- Firstly, maintain and safely operate existing assets;
- Secondly, promote a range of measures, including innovative solutions, to make better use of existing capacity (interventions may include technology based, fiscal and 'soft measures' in addition to engineering solutions); and
- Thirdly, promote targeted infrastructure improvements.

In relation to the Perth to Inverness corridor, this led to the development of the following list of multi-modal options:

- A9 Upgrading
- Rail Enhancements on the Highland Mainline between Perth and Inverness
- Rail Freight Enhancements between Mossend, Grangemouth and Inverness

The STPR appraisal summary for the A9 upgrade is provided in Table 3.1. It should be noted that the Benefit to Cost Ration (BCR) reported within STPR was for the first phase of the A9 Upgrading, namely the upgrade of the A9 from Dunblane to Blair Atholl.

## Table 3.1: Strategic Business Case (STPR) Appraisal Summary Table – A9 Upgrading




*Judgement based on available information against a 7pt. scale*

| | |
|---|---|
| Reduced Accident Severity | Many of the accidents on the A9 in recent years have occurred at the at-grade junctions. These accidents are often serious or fatal. A consistent carriageway standard with grade separated junctions will greatly assist in reducing accident severity on the A9. |
| Reduced Journey Times between Inverness and the Central Belt | Dualling the A9 will have a significant impact on reducing journey times and improving journey time reliability. |
| Improve the Operational Effectiveness of the A9 trunk road | The operational effectiveness and resilience of the trunk road between Perth and Inverness would be significantly improved following dualling. |
| Reduced Driver Stress | Dualling the A9 will have a significant impact on reducing vehicle platoons, improving journey time reliability and increasing the real and perceived safety of the route. |

Benefit to Cost Ratio (First Phase): 0.75 - 1.25

## STPR Recommendations

The Transport Model for Scotland (TMfS) was used to quantify the transport impact of the proposals, providing a consistent appraisal tool within the STAG framework. The outputs of this work package provided the basis for the recommendations presented in the Final STPR Report.[9]

In total, STPR recommended a series of 29 transport investment priorities. With regards to the Perth to Inverness to corridor, two key project priorities were identified. These projects were viewed as complementary, and required to address the wide range of complex problems and issues on this key economic and lifeline corridor between north and south Scotland.

The two key projects were:

**Project 16: A9 upgrading from Dunblane to Inverness**. "The Scottish Government is committed to the dualling of the A9 between Dunblane and Inverness. This intervention considers the full dualling and wider improvement of the A9 between Dunblane and Inverness. The intervention supports the objectives to promote journey time reductions between Inverness and the Central Belt, improve the operational effectiveness of the A9, reduce the severity of accidents and address driver frustration." The performance of the intervention against the Scottish Governments five strategic objectives is outlined below.


**Project 17: Rail enhancements on the Highland Main Line between Perth and Inverness**. "This intervention supports objectives to reduce journey time and increase travel opportunities between Inverness and Perth, more effectively linking Inverness to the Central Belt." The performance of the intervention against the Scottish Governments five strategic objectives is outlined below.


The A9 upgrading from Dunblane to Inverness was expected to have the specific benefits of:

- Tackling the high proportion of severe accidents on the A9 occurring at at-grade junctions, and reducing accident rates overall, a national objective;
- Relieving congestion at northern and southern sections, including the heavily trafficked section between Perth and Blair Atholl;
- Improving journey times between the Central Belt of Scotland and Inverness, a national objective;
- Improving the operational effectiveness of the corridor and address issues of driver frustration, and
- Make a significant contribution to the Scottish Government's Purpose of increasing sustainable economic growth.

The rail enhancements on the Highland Mainline between Perth and Inverness were expected to provide journey time improvements between Inverness and Perth and onwards to the Central Belt, contributing to national objectives. Increasing the frequency of services would provide further benefits through additional opportunities to travel.

The reduction in journey times would make the rail service more competitive with the current car journey. The proposed freight improvements would make it more attractive for freight hauliers to move containers and other goods by rail, by reducing journey times.

[9] *Strategic Transport Projects Review Final Report, Transport Scotland, October 2009*

## 3.3 National Policy Priorities

Since the publication of STPR, a number of important policy frameworks have been strengthened and updated. The following sections provide an assessment of the role of the A9 Dualling Programme within this policy framework.

## Government Purpose and the National Performance Framework [10]

The Scottish Government's purpose is defined as:

> ***"Creating a more successful country, with opportunities for all of Scotland to flourish, through increasing sustainable economic growth."***

The National Performance Framework underpins delivery of the Scottish Government's agenda. It recognises the positive contribution transport can make to maximising opportunities for economic growth and how it contributes to the prosperity and quality of life of every person in Scotland. The Government's Purpose is underpinned by five Strategic objectives, as outlined in Figure 3.2.

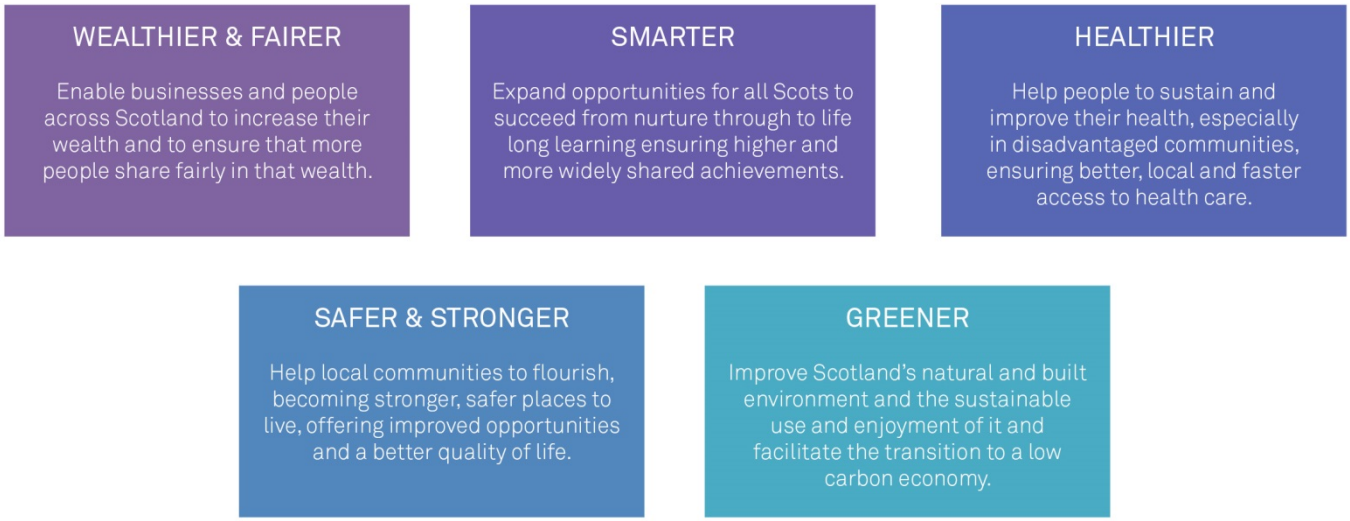



**Figure 3.2: The Scottish Government's Five Strategic Objectives**

Amongst the 12 new national indicators added to the National Performance Framework in 2011, the following are directly relevant to the A9 Dualling Programme:

- Reduce deaths on Scotland's roads, and
- Increase physical activity.

The A9 Dualling Programme has a transport planning objective related to improved safety for road users, designed to tackle the severity of accidents along the route. Furthermore, Transport Scotland is committed to enhancing the infrastructure available to all non-motorised users as an integral part of the dualling programme.

## Scotland's Economic Strategy [11]

Scotland's Economic Strategy reaffirms the Scottish Government's commitment to creating a more successful country, with opportunities for all of Scotland to flourish, through increasing sustainable economic growth. The Strategy presents an overarching framework based on two key pillars: increasing competitiveness and tackling inequality.

[10] *The National Performance Framework, The Scottish Government, December 2011*
[11] *Scotland's Economic Strategy, The Scottish Government, March 2015*

Boosting competiveness involves supporting Scottish businesses to exploit new commercial opportunities and helping business to grow and expand both at home and overseas. The Strategy recognises that increasing Scotland's economic performance requires development of the human capital and productivity of the workforce, to invest in Scotland's infrastructure and to increase the ability of people to participate in the labour market. In addition to increasing competitiveness, the Strategy outlines the importance of addressing inequality to create the conditions to deliver sustainable economic growth over the long term.

The approach to delivering sustainable economic growth is characterised by four key priorities:

- An economy where growth is underpinned by long-term sustainable **investment** in people, infrastructure and assets;
- An economy where growth is based on **innovation**, change and openness to new ways of doing things;
- A society that promotes **inclusive growth** and creates opportunity through a fair and inclusive jobs market and regional cohesion to provide economic opportunities across all of Scotland; and
- A country with an **international** outlook and focus, open to trade, migration and new ideas

A central feature of the Strategy is the approach to supporting investment. As set out in the Strategy, infrastructure investment attracts business investment, stimulates economic activity and deepens access to the labour market. Physical and digital infrastructure improves connectivity between cities, towns and regions, helping to drive growth and competitiveness. It is in this context that the Strategy outlines the Government's commitment to investment in transport and the benefits that major projects will deliver, including the A9 Dualling.

### Scotland's Cities: Delivering for Scotland[12]

"Scotland's Cities: Delivering for Scotland" was published in 2011 to complement the Government Economic Strategy. It highlights that successful cities are "connected cities, with strong digital and transport infrastructure". Connectivity, both within and between cities, and reduced journey times between them is of particular significance. The strategy recognises the need for collaborative working between cities to maximise growth to benefit Scotland as a whole. It is highlighted that infrastructure investment "is a key driver of both short term and long-term economic growth and performance".

Scotland's cities comprise Aberdeen, Dundee, Edinburgh, Glasgow, Inverness, Perth and Stirling. All of these cities are connected by continuous dual carriageway with the notable exception of Inverness. As the only Scottish city not connected by continuous dual carriageway, there are opportunities to improve the connectivity of Inverness and Perth (and Inverness and Aberdeen on the A96 corridor) and to provide better linkages between the settlements along the A9 corridor.

### National Planning Framework 3 [13]

Scotland's Third National Planning Framework (NPF3) presents the Scottish Government's spatial strategy. It is the spatial expression of the Scottish Governments Economic Strategy, and sets out national priorities for development and infrastructure investment. NPF3 clearly identifies the role of the A9 in the context of connecting Scotland's cities – resulting in cities which are better connected to each other and better connected within their regions. Rail enhancements to

[12] *Scotland's Cities: Delivering for Scotland, The Scottish Government, December 2011*
[13] *Scotland's Third National Planning Framework, The Scottish Government, June 2014*

reduce journey times between the Central Belt and Inverness are also an important part of this package to improve nationwide connectivity.

NPF3 identifies the economic importance of the A9. Together, the dualling of the A9 between Perth and Inverness and improvements to the Highland Mainline will provide a "step change in accessibility across the rural north", supporting investment and promoting business confidence.

### Infrastructure Investment Plan [14]

The Infrastructure Investment Plan provides an overview of the Scottish Government's plans for infrastructure investment over the coming decades. It sets out why the Scottish Government invests, how it invests and what it intends to invest in up to 2030, as outlined below.

*Why the Scottish Government invests?*

Investment in infrastructure has been identified as a key driver of both short and long term economic growth performance and makes a vital contribution to delivering the ambitions set out in the Scottish Government's Economic Strategy.

*How the Scottish Government will invest?*

The Scottish Government will make decisions on the final balance of funding used within a sustainable financial framework. Traditional capital finance is the most common method of financing public sector capital projects, with funding infrastructure investment through public capital generally ensuring the lowest cost of finance for a typical project.

*What the Scottish Government will invest in?*

The Scottish Government highlights two key areas which they invest in; economic infrastructure, which encompasses the assets and networks which support the movement of goods, people, information, energy, waste and water around the economy, and social infrastructure, which covers the assets that support health, education, housing and regeneration, justice, sports and cultural services. Transport is highlighted as an enabler for enhancing productivity and delivering sustainable economic growth.

The IIP, and subsequent updates, commits the Scottish Government to dualling the A9 between Perth and Inverness by 2025, with a phased programme of projects delivered from 2015/16 onwards[15]. The IIP also reiterates the Scottish Government's commitment to rail infrastructure investment on the Highland Mainline within a similar timeframe.

[14] *Infrastructure Investment Plan, The Scottish Government, 2011*
[15] *Infrastructure Investment Plan 2011, Updated Programme Pipeline, The Scottish Government, January 2015*

# 4 The A9 Context, Problems and Opportunities

## 4.1 The Demographic Context

The A9 between Perth and Inverness performs three fundamental roles:

- It provides a strategic link connecting Inverness and the Highlands (and Islands) to Perth and onwards to the Central Belt and the rest of the UK
  - For freight
  - For business users
  - For visitors and leisure users
- It serves settlements within the corridor providing access to local services, employment and tourism; and
- Locally, it acts as a commuter route to Perth and Inverness.

Key settlements in the corridor between Perth and Inverness include Luncarty, Dunkeld, Birnam, Pitlochry, Blair Atholl, Dalwhinnie, Newtonmore, Kingussie, Aviemore, and Carrbridge. The population of the main settlements along the corridor is shown in Figure 4.1.

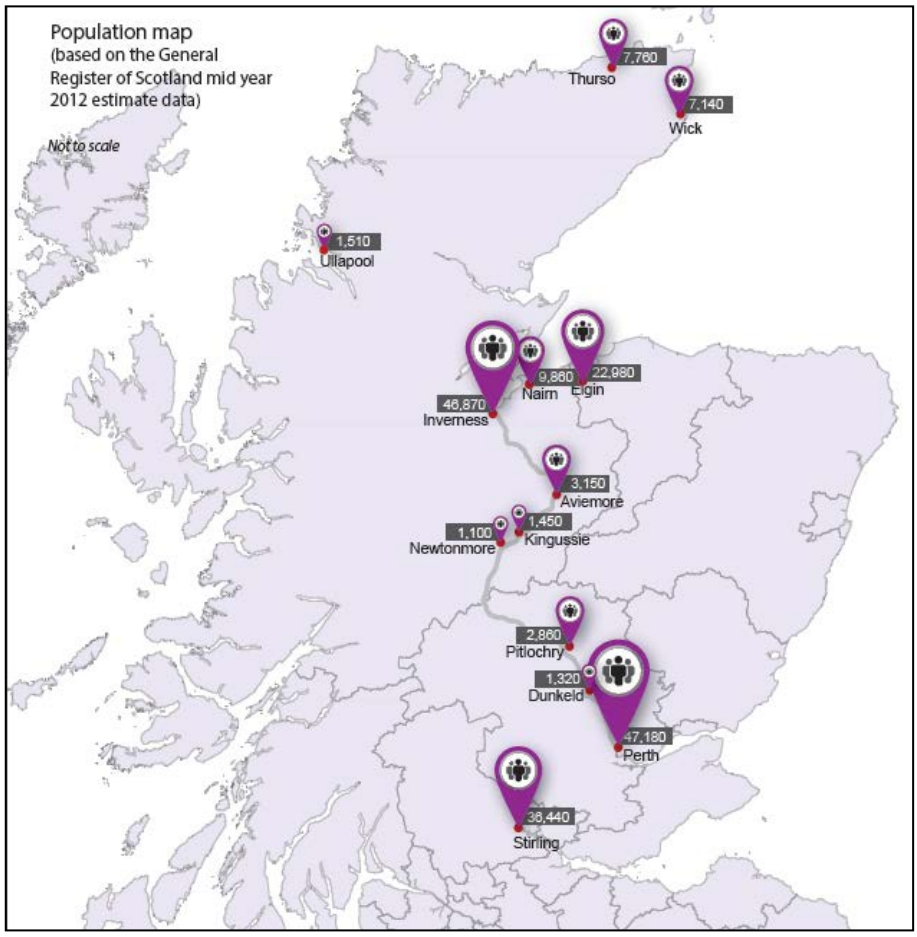



**Figure 4.1: Population along the A9 corridor and main catchments**

The population trends on the A9 corridor at the local authority level are detailed in Table 4.1. As outlined the population growth between 2001 and 2011 in both Perth & Kinross and The Highlands has been significantly above the Scottish average. In terms of forecast population growth the latest (published in 2014) projections indicate a significant growth (24.2%) in the Perth & Kinross area over the twenty-five year period from 2012 to 2037. This growth is almost three times the growth of Scotland as a whole. Over the corresponding period The Highlands are forecast to grow by 4.5%.

**Table 4.1: Population Trends on the A9 Corridor**

| Authority | Population Growth 2001-2011[16] | Projected Population Growth 2012-2037[17] |
|---|---|---|
| Perth and Kinross | 8.7% | 24.2% |
| Highland | 11.1% | 4.5% |
| Scotland (Average) | 4.6% | 8.8% |

As Figure 4.2 demonstrates, car ownership in both Perth & Kinross (78.9%) and the Highlands and Islands (79.4%) continues to be well above the national average (69.5%).[18]

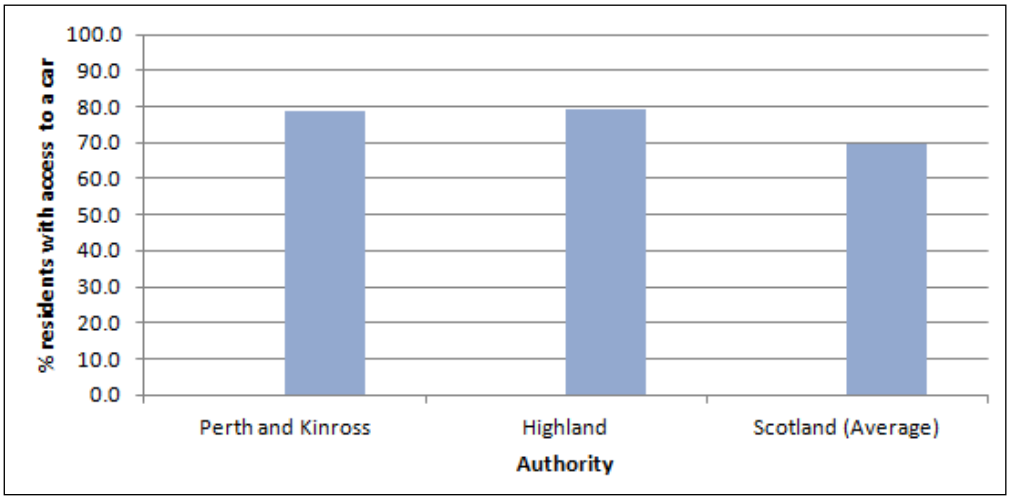



**Figure 4.2: A9 Corridor: Residents with access to a car**

[16] *2001 Census, National Records of Scotland, 2001; 2011 Census, National Records of Scotland, 2011*
[17] *Population Projections for Scottish Areas 2012 based, Table A Projected population for Council areas (2012-2037) National Records of Scotland, 2012*
[18] *2011 Census, National Records of Scotland, 2011*

## 4.2 The Environmental Context

The A9 and the Highland Main Line are constrained geographically in parts by physical terrain and the environment they pass through. Approximately 50% of the corridor passes through the Cairngorms National Park, with a number of national and internationally protected sites such as Insh Marshes and the Drumochter Hills. The corridor's natural environment and beauty, whilst a potential constraint in engineering terms, is also one of the region's strongest assets. Figure 4.3 provides an overview of the main environmental and physical characteristics of the route. Further details of the environmental and physical character of the A9 corridor are provided within the DMRB Stage 1 Assessment report and the Strategic Environmental Assessment (SEA).

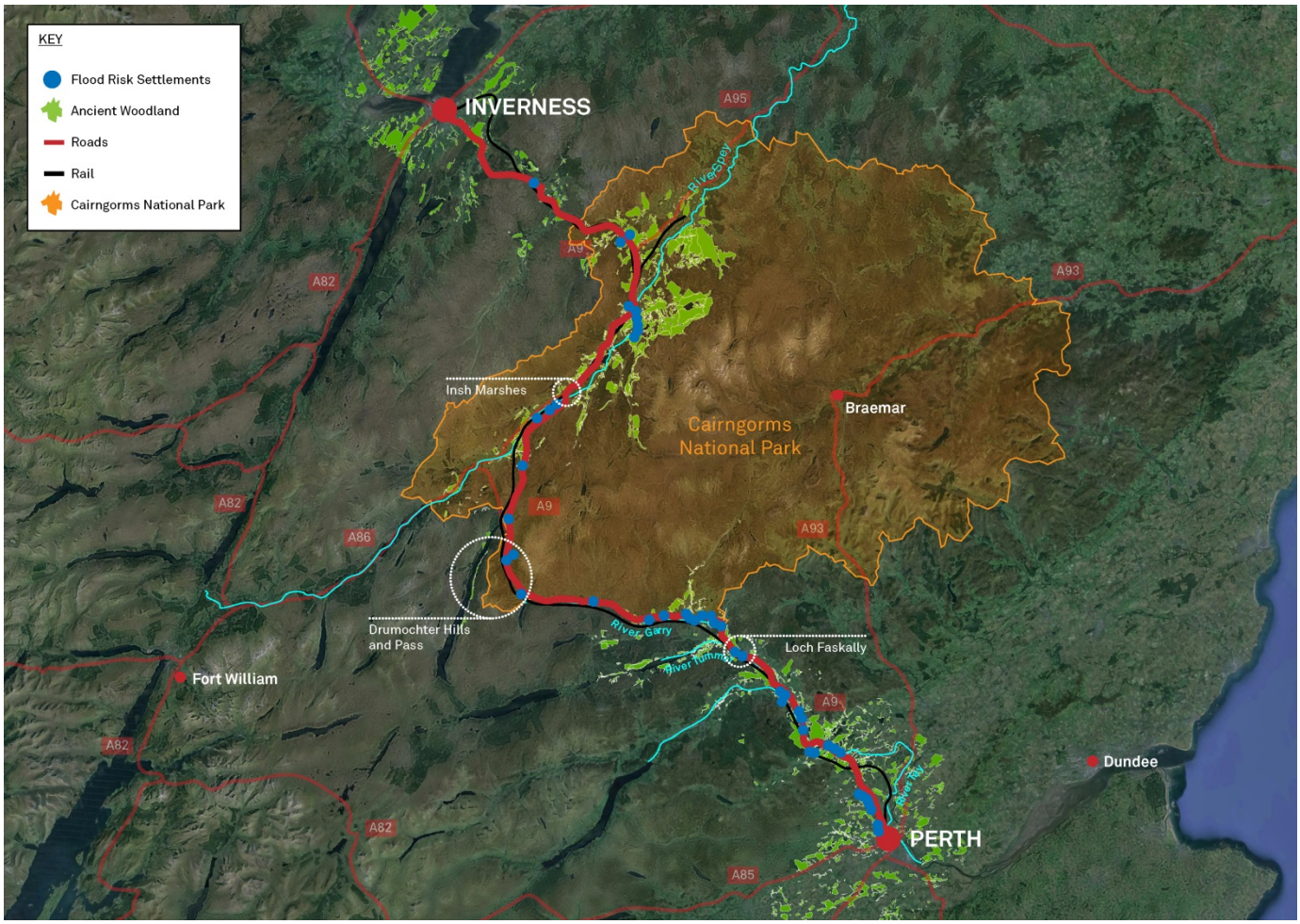
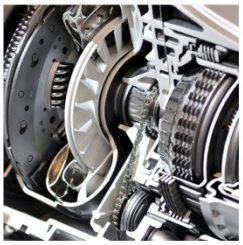



**Figure 4.3: A9 Corridor - Environmental and Physical Character**

## 4.3 The Economic Context

The A9 route is important for business and industry across the region. Data collected on the corridor shows that there is a large amount of freight traffic which utilises the A9 regularly, and reinforces the importance of the route to the agricultural and manufacturing industry, as shown in Table 4.2.

**Table 4.2: Industries using the A9 Corridor[19]**

| Foodstuffs & Animal Fodder | Minerals & Building Materials | Leather / Textile / Manufactured Articles | Machinery / Transport Products | Metal Products |
|---|---|---|---|---|
|  |  |  |  |  |
| 25% | 20% | 14% | 11% | 8% |

| Ores & Mineral Waste | Petroleum Products | Chemicals | Agricultural Products & Live Animals | Fertilisers |
|---|---|---|---|---|
|  |  |  |  |  |
| 7% | 7% | 4% | 3% | 1% |

The main land uses along the A9 corridor include the existing towns and villages, forestry, recreation/tourism and agriculture. Furthermore, the A9 acts as a key strategic route linking the Highlands and Islands, and Moray, to the south of Scotland and the rest of the UK and Europe. A snapshot of the economies in the region is shown in Figure 4.4.

[19] *Analysis of 2012 Roadside Interviews (RSIs)*

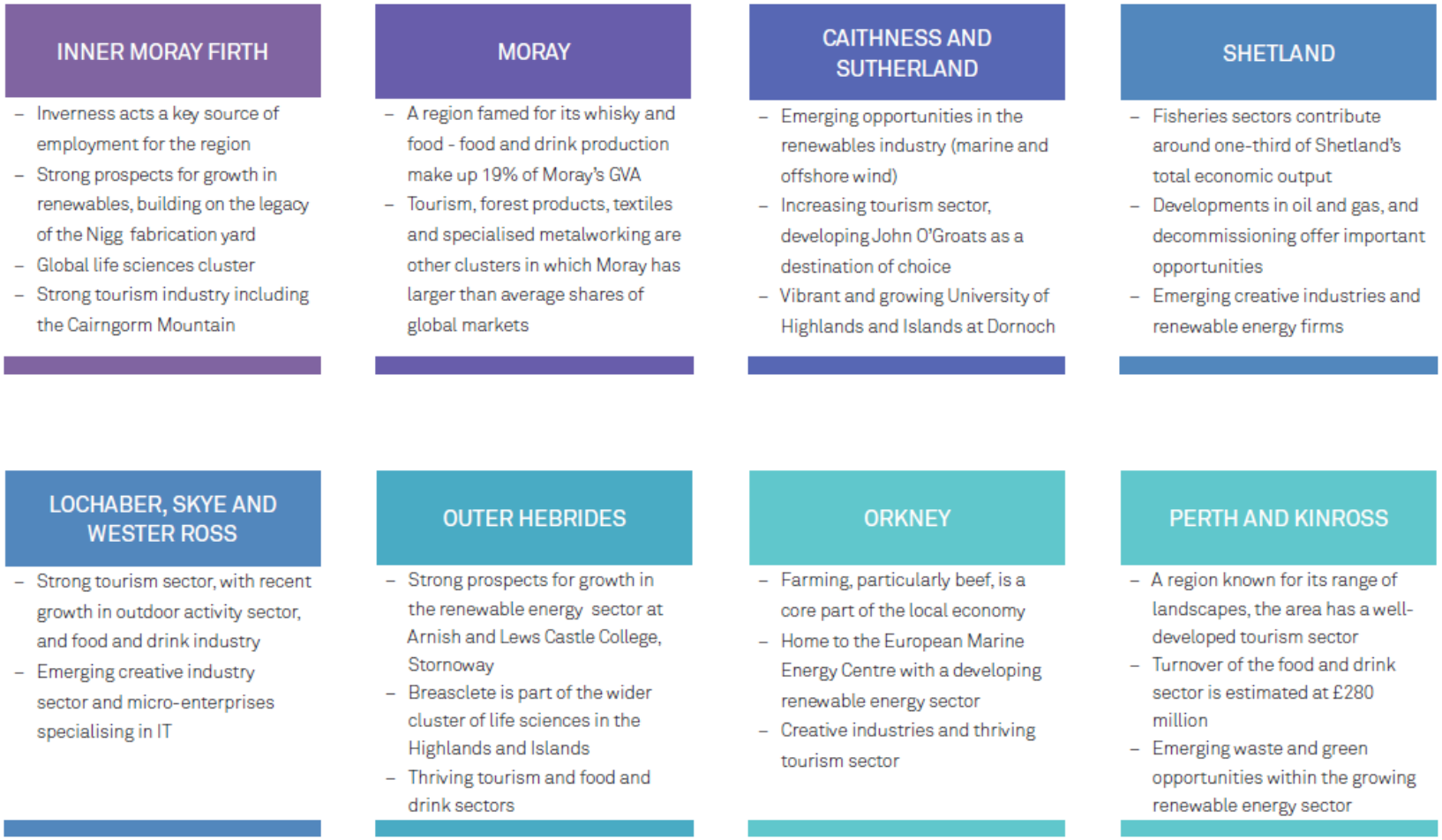
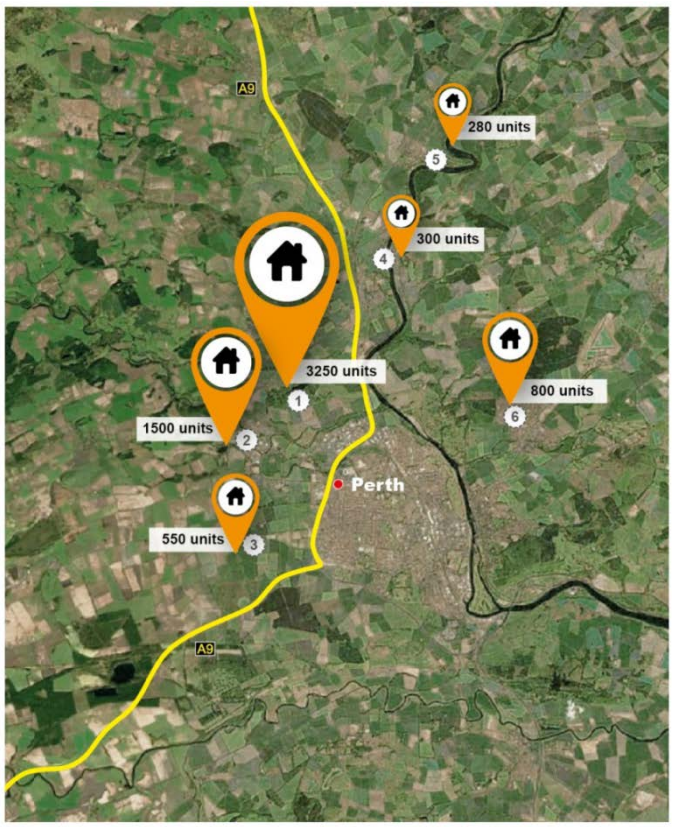



**Figure 4.4: Economic profiles of areas connected by the A9 to the rest of Scotland, the UK and Europe[20]**

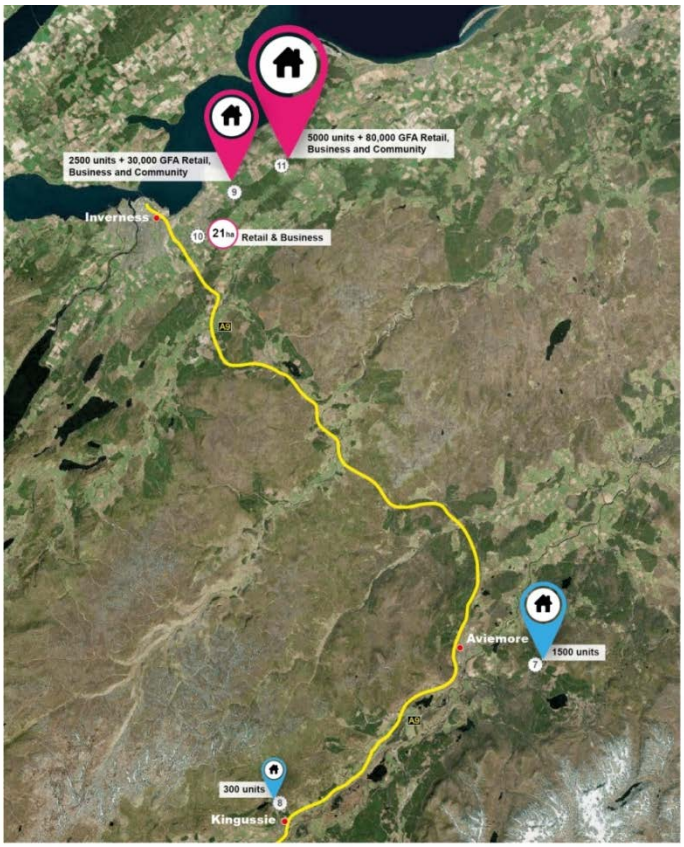
[20] *Regional Information profiles, Highlands and Islands Enterprise*

## 4.4 Development Plan Proposals

There are a number of major development proposals along the route of the A9 as shown in Figure 4.5. Once fully built, the developments will increase travel demand in the vicinity of the A9 corridor.




| Planning Authority Area | | Development Name |
|---|---|---|
| Perth & Kinross Council | 1 | Bertha Park (Housing) |
| | 2 | Almond Valley Village (Housing) |
| | 3 | Perth West (Housing) |
| | 4 | Luncarty (Housing) |
| | 5 | Stanley (Housing) |
| | 6 | Scone (Housing) |




| Planning Authority Area | | Development Name |
|---|---|---|
| Cairngorms National Park | 7 | An Camas Mor (Mixed Use / New Village) |
| | 8 | Kingussie (Housing) |
| The Highland Council | 9 | Stratton (Mixed Use) |
| | 10 | Inverness Retail and Business Park |
| | 11 | Tornagrain (Mixed Use) |

**Figure 4.5: Major Development Proposals (Not to Scale)[21]**

Inverness is currently the fastest growing city in Scotland and to service this growth has major housing, employment and retail developments allocated in the local development plan. Notably there are plans for a new community at Tornagrain (site 11) with up to 5,000 homes and associated business and community facilities. The area to the East of Inverness sandwiched between the A9 and A96 corridors (sites 9 and 10) is also earmarked for significant retail, business and educational growth associated with the University of the Highlands and Islands Beechwood campus.

Within the Cairngorms National Park there are also development plans for a new village with 1,500 homes and community facilities at An Camas Mor. At Perth[22], there is development pressures to the west and north of the city associated with the need for housing supply to serve the significant population growth forecasts. At present there are plans for over 6,000 new homes.

[21] *Perth & Kinross Council Local Development Plan, Perth & Kinross Council, 2014; Cairngorms Local Development Plan, Cairngorms National Park Authority, 2015; Highland-wide Local Development Plan, 2012*
[22] *Perth was granted city status again in 2012 as part of the Queens Diamond Jubilee*

## 4.5 Current Travel Patterns

The A9 is regarded by many as the spine of the Scottish road network providing a vital strategic link in Scotland, carrying over 40,000[23] vehicles per day (over 65,000 people) along the Perth to Inverness section. This includes commuters, business travellers, tourists and Goods Vehicles. The A9 plays a significant role in the economy of Scotland with a higher than average rate of business trips, a high proportion of tourists and a substantial volume of goods transported with an estimated value of £19 billion annually. Figure 4.6 outlines a number of key facts relating to the existing A9 between Perth and Inverness.

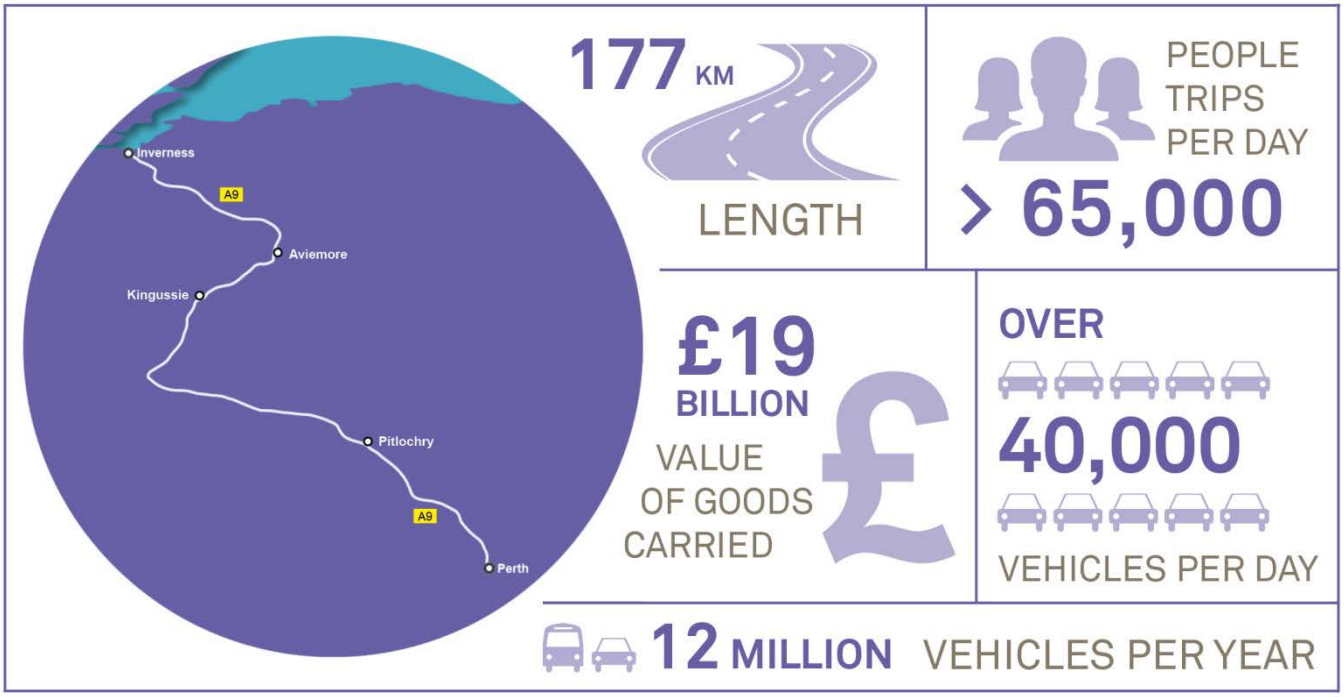



**Figure 4.6: A9 Perth to Inverness Key Facts**

The strategic nature of the A9 is graphically illustrated in Figure 4.7, with journeys from across Scotland and the UK making use of the A9 on a daily basis. As indicated, high levels of demand originate from within the Central Belt of Scotland (via the M80, A9 and A90) and from Moray and the North East (via the A96 and A95).

[23] *Based on TMfS12 analysis*

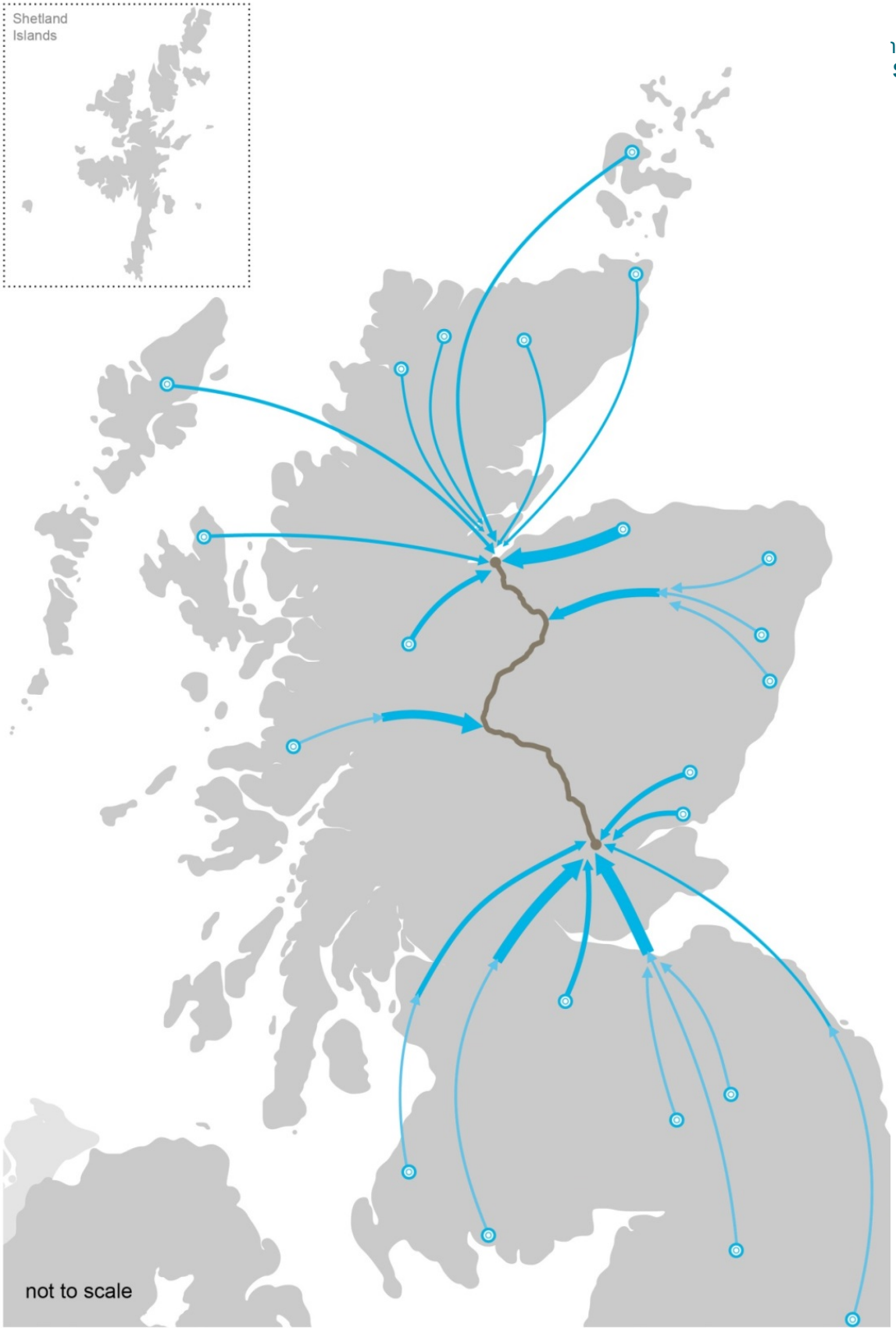



**Figure 4.7 – Origins and Destinations of Journeys using the A9 based on 2012 Roadside Interviews**

Figure 4.8 provides an indication of the main car trip purposes surveyed on the A9 at a point just north of Aviemore for a weekday in 2012. As expected, during the typical working week 'commute' trips dominate the results especially during the morning peak period up to 10.00 hours with 'other'[24] trip purposes increasing thereafter.

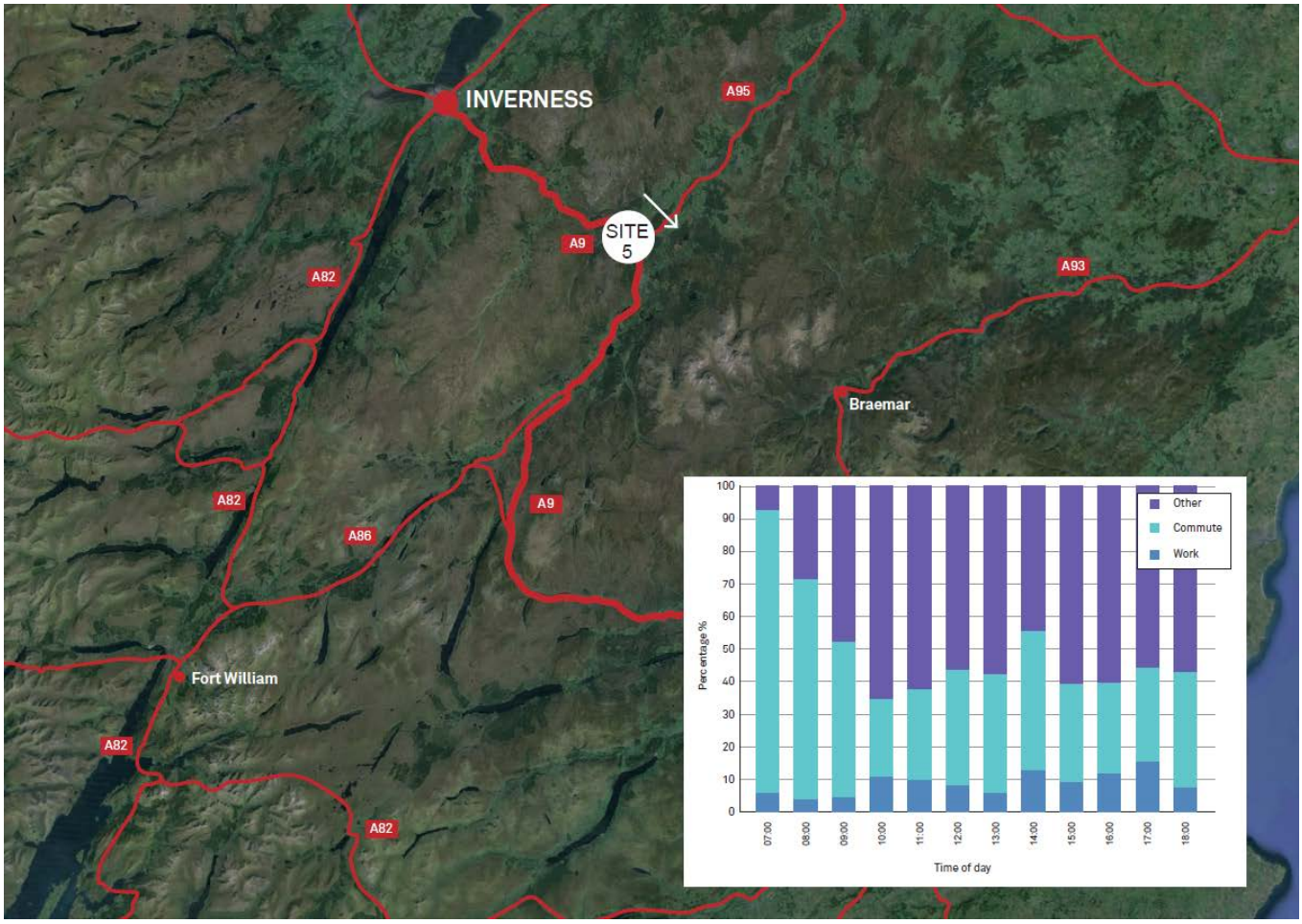



**Figure 4.8 – Weekday Trip Purpose Splits by Car South of Inverness (RSI, 2012)**

[24] *'Other' trip purposes include Holiday, Day Trip, Shopping, Visiting Friends & Family, Leisure, Education and Personal*

During the weekend, Figure 4.9 indicates that for the same location just to the north of Aviemore that the main trip purpose of car users is dominated by 'other' trip purposes with typically 70-80% of all trips having a predominately leisure related purpose.

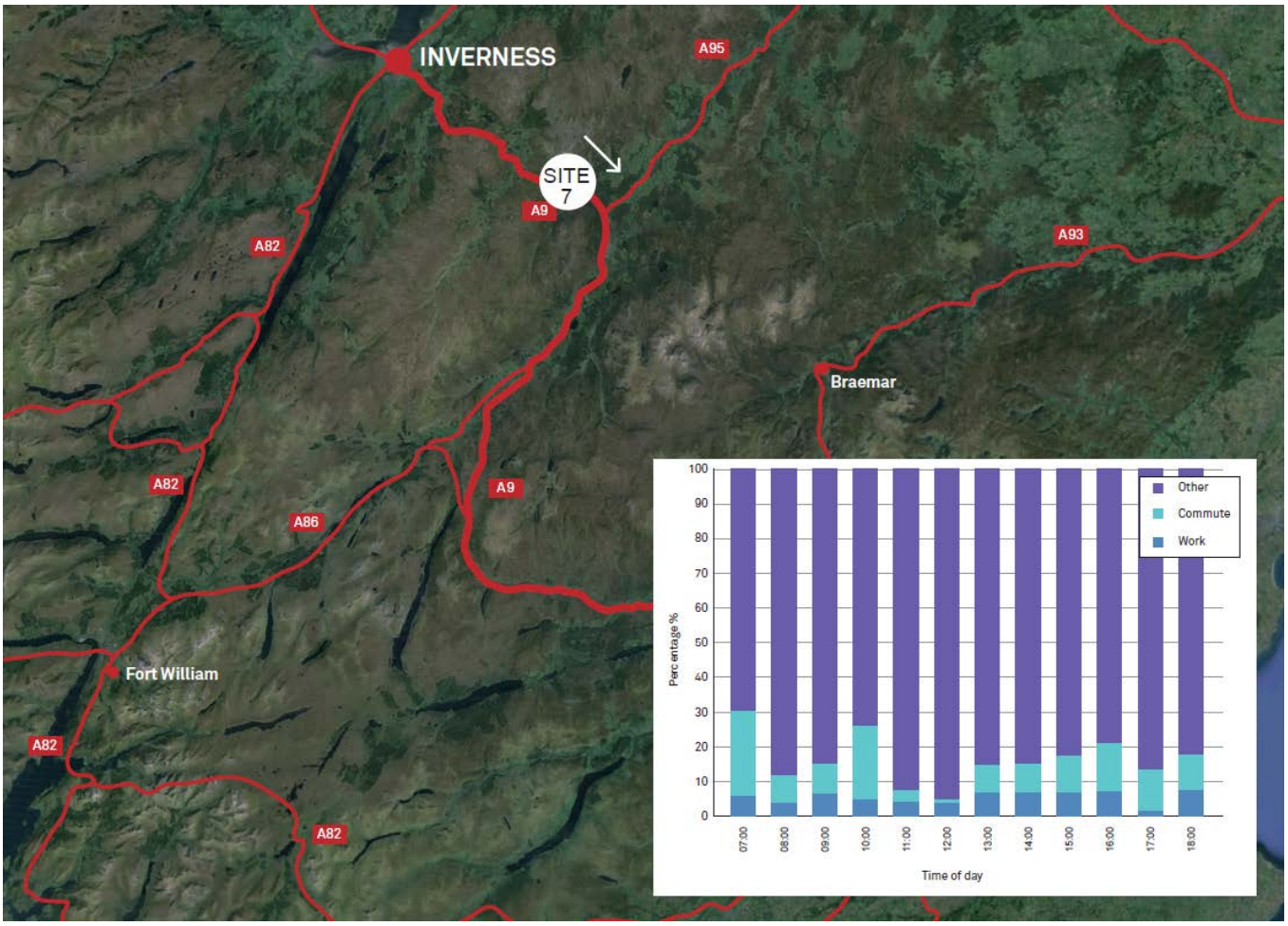



**Figure 4.9 – Weekend Trip Purpose Splits by Car South of Inverness (RSI, 2012)**

As indicated overleaf, the 'other' trip purpose covers those people on holiday, day trippers, shopping, visiting friends & family, leisure, education and personal trips. Analysis of the 2012 RSI data indicates that during both the weekday and weekend approximately three quarters of all 'other' trips for the site immediately north of Aviemore are related to those people on holiday, day tripping or visiting friends and family.

## 4.6 Traffic Volumes

Figure 4.10 illustrates that traffic levels along the corridor vary between circa 24,000 AADT on approach to Perth and Inverness to circa 7,000 AADT on the more rural sections.

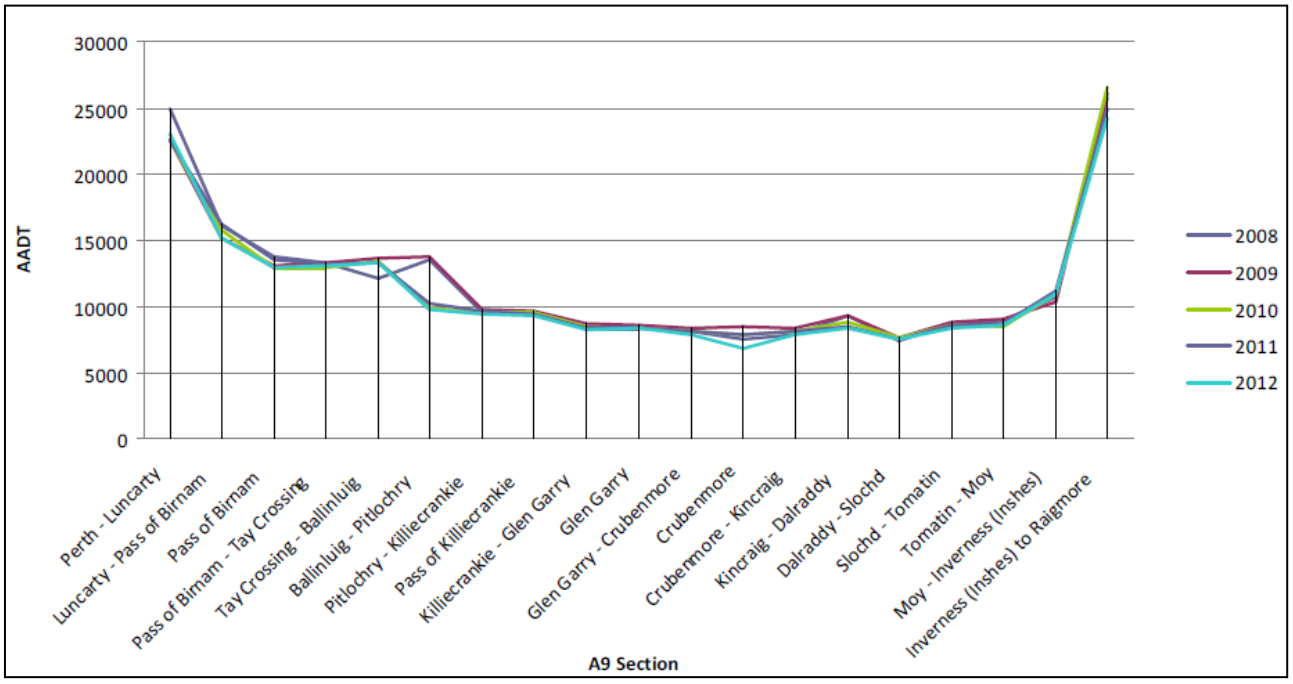



**Figure 4.10: Annual Average Daily Traffic along the A9 (Perth to Inverness) between 2008 and 2012**

Figures 4.11 and 4.12 overleaf show the seasonal fluctuations of traffic volumes and the proportion of goods vehicles for a section of the A9 at Blair Atholl. Traffic levels can fluctuate by up to 50% between winter and summer months reflecting the high volumes of tourist and leisure related traffic. Depending on the time of year and location, goods vehicles can account for between 10% and 40% of total daily traffic. As Figure 4.12 shows, there is a considerable fluctuation in all goods vehicles between the winter and summer months. However, the seasonal fluctuation in larger articulated vehicles is less pronounced with a relatively flat profile at this location between February and November 2014.

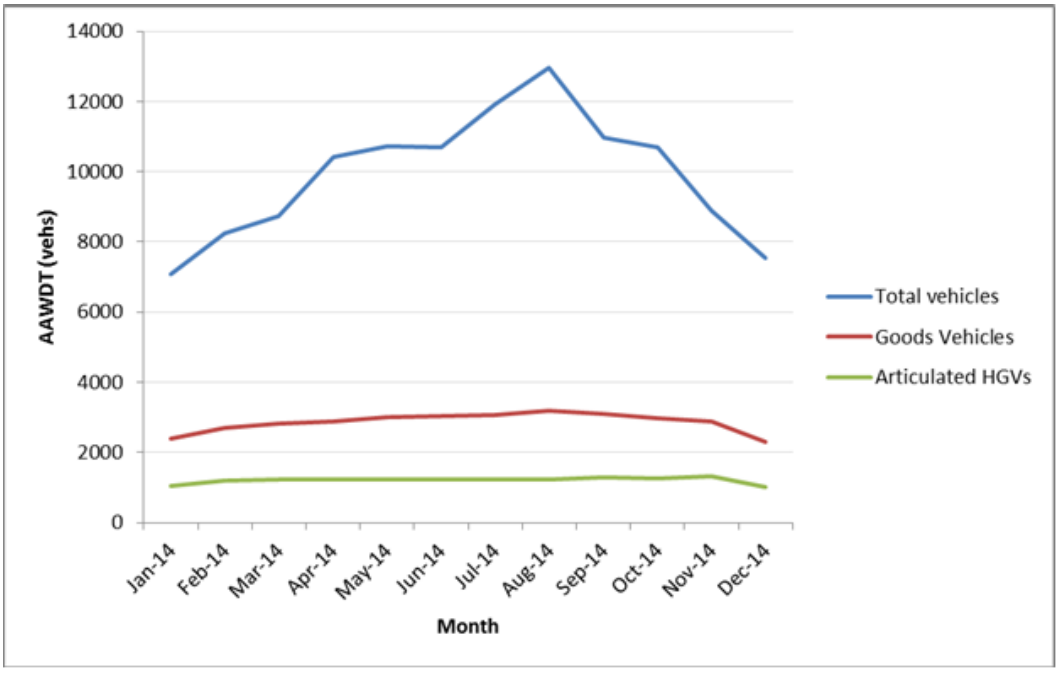



**Figure 4.11: Total traffic flows by month at Blair Atholl (2014)**

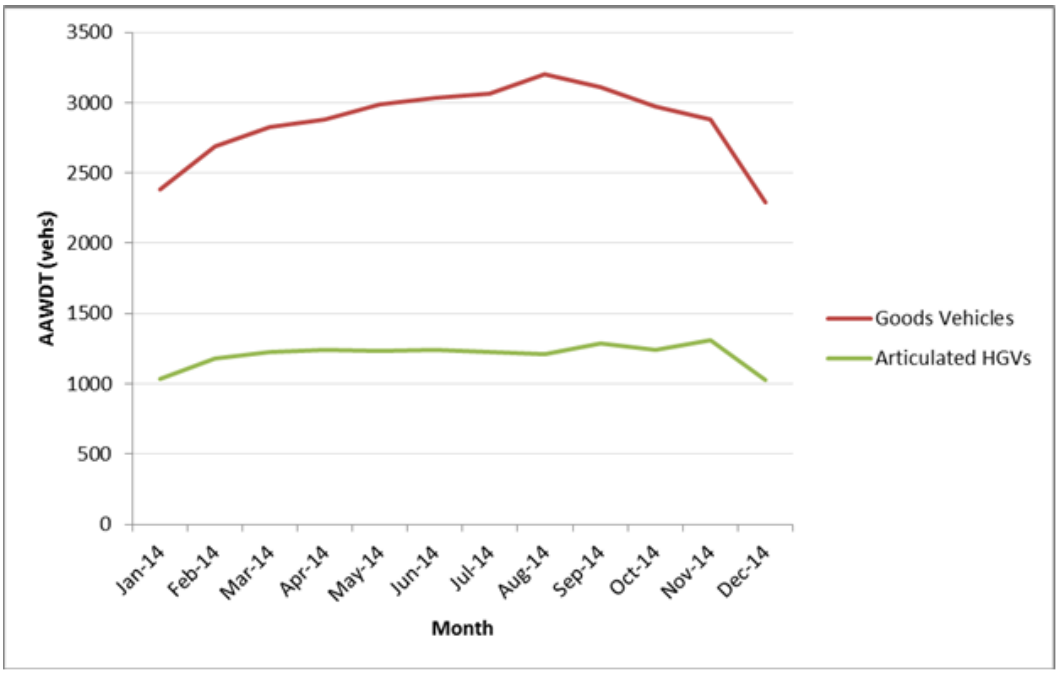



**Figure 4.12: Total goods vehicles and articulated vehicle traffic flows by month at Blair Atholl (2014)**

As indicated in Figure 4.13, at the southern end of the A9 Dualling Programme at Bankfoot, there is a significant variation in the forecast length of trips with a cluster of short local trips typically less than 80km (50 miles) in length another cluster in the 240-300km (150-190 mile) range and a further cluster in excess of 460km (290 miles) in length. The longer distance trips are often associated with business or freight trip purposes.

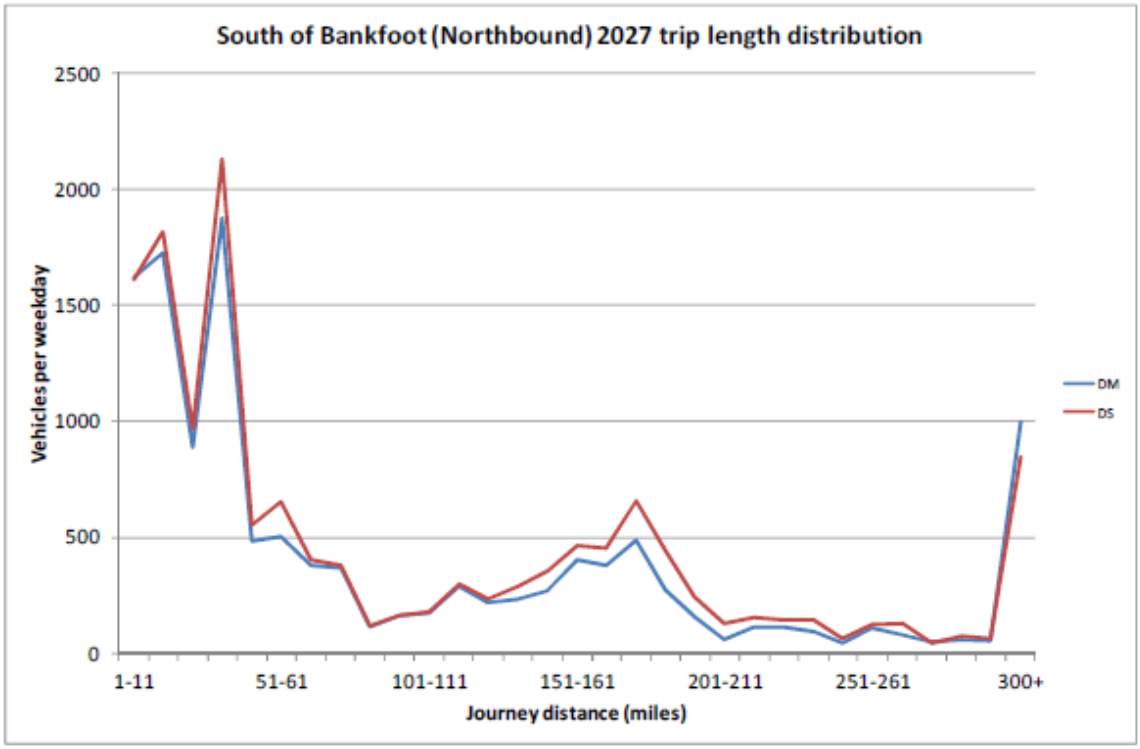



**Figure 4.13: TMfS Trip Length Distribution (South of Bankfoot)**

## 4.7 Bus and Coach

The A9 is used by a number of bus and coach services which serve local communities, inter-urban travel, school travel and organised tours. Only a limited number of services have timetabled stops located on the A9 itself, on bus bays or lay-bys next to the main road, with the remainder generally having stops at both ends of the route (at Perth and Inverness) or within villages along the route. Figure 4.14 illustrates the existing bus services that operate on the A9 corridor alongside train stations, Park & Ride and Cycle & Ride opportunities.

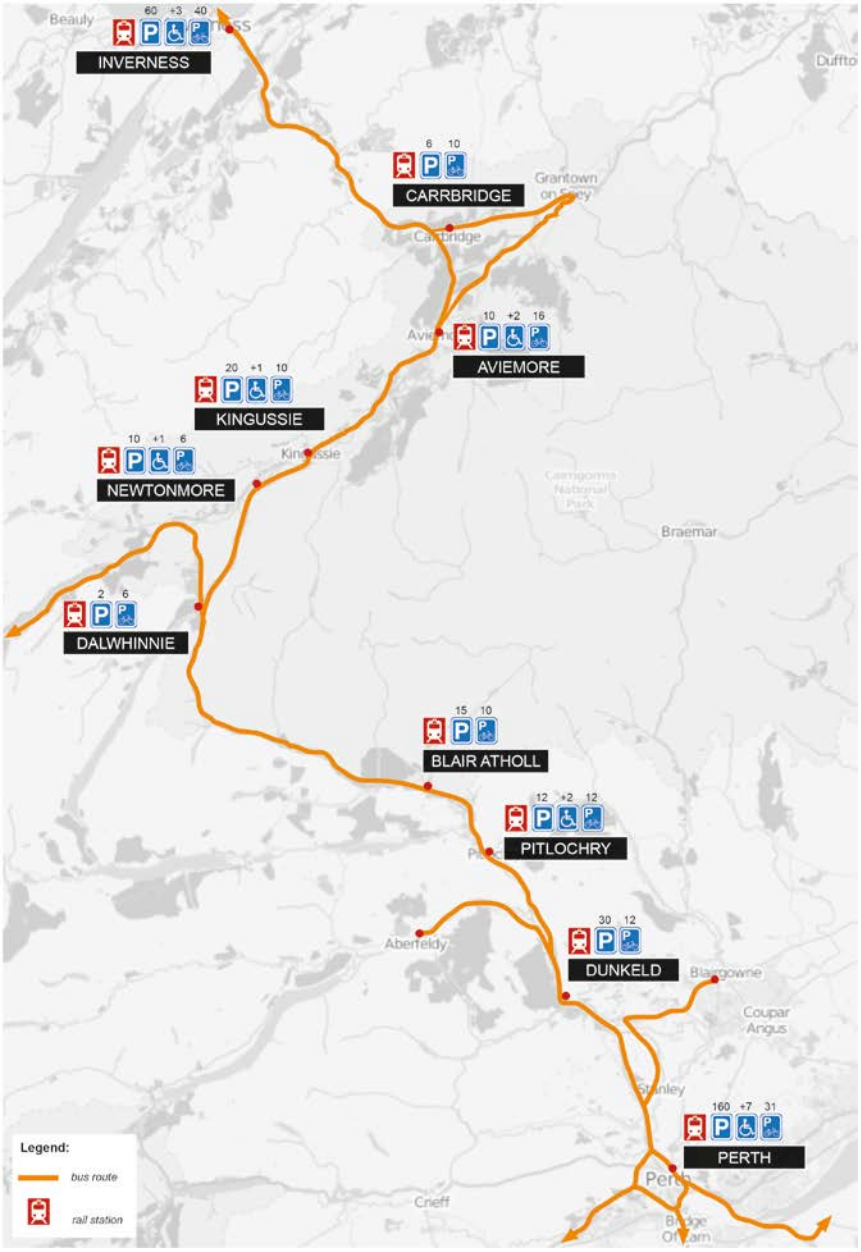



**Figure 4.14: Existing Sustainable Transport Services and Infrastructure**

## 4.8 Freight

The A9 is a key corridor in Scotland for the transportation of goods. In order to help quantify the volume and value of goods transported along the A9 a Specialised Goods Vehicle Count (SGVC) was undertaken in February and September 2014. The data collected has been used to estimate the volume and value of freight moving by road on the A9 between Perth and Inverness. The estimated tonnage of goods transported on the A9 per year is shown in Table 4.3 by load type.

**Table 4.3: Estimated Annual Tonnage (Rounded) of Goods Transported on the A9**

| Goods Transported | Northbound | Southbound | Total |
|---|---|---|---|
| Automotive | 155,000 | 37,000 | 192,000 |
| Grain | 884,000 | 702,000 | 1,586,000 |
| Aggregates | 451,000 | 101,000 | 552,000 |
| Retail | 163,000 | 68,000 | 231,000 |
| General & Container | 2,559,000 | 1,878,000 | 4,437,000 |
| Waste | 23,000 | 145,000 | 168,000 |
| Parcels | 402,000 | 94,000 | 496,000 |
| Logs | 59,000 | 58,000 | 117,000 |
| Whisky | 0 | 197,000 | 197,000 |
| Oil | 186,000 | 19,000 | 205,000 |
| Biomass | 0 | 206,000 | 206,000 |
| Timber | 24,000 | 270,000 | 294,000 |
| Other | 536,000 | 521,000 | 1,057,000 |
| **Total (Rounded)** | **5,442,000** | **4,296,000** | **9,738,000** |

As indicated in Table 4.3, there is a slight bias towards goods (by volume) being transported northbound (56%) on the A9 compared to southbound (44%). This is reflective of the fact that certain goods vehicles travel northbound from the Central Belt fully laden e.g. Retail, Parcels and Oil but often return south empty or partially loaded. Conversely, whisky and biomass transported all goods southbound on the A9 to markets in the Central Belt and further afield.

Factoring up the survey data collected to a full year indicates that there is almost 10 Million tonnes of goods transported along the A9 per annum. With the anticipated growth in housing and employment in the A9 corridor the volume of goods transported is forecast to exceed 10 Million tonnes within the next five years.

Converting the volume of goods transported using estimated values by load type indicates that goods with a value of £19 Billion are transported along the A9 per year as shown in Table 4.4. The top three most valuable loads types (by total value) on the A9 were found to be general container traffic, automotive and whisky.

**Table 4.4: Estimated Annual Value of Goods Transported on the A9**

| Goods Transported | Northbound | Southbound | Total |
|---|---|---|---|

| | | | |
|---|---|---|---|
| Automotive | £2,326,000,000 | £561,000,000 | £2,887,000,000 |
| Grain | £177,000,000 | £140,000,000 | £317,000,000 |
| Aggregates | £9,000,000 | £2,000,000 | £11,000,000 |
| Retail | £488,000,000 | £205,000,000 | £693,000,000 |
| General & Container | £7,678,000,000 | £5,635,000,000 | £13,313,000,000 |
| Waste | £500,000 | £3,000,000 | £3,500,000 |
| Parcels | £402,000,000 | £94,000,000 | £496,000,000 |
| Logs | £2,000,000 | £2,000,000 | £4,000,000 |
| Whisky | £0 | £790,000,000 | £790,000,000 |
| Oil | £247,000,000 | £26,000,000 | £273,000,000 |
| Biomass | £0 | £6,000,000 | £6,000,000 |
| Timber | £17,000,000 | £189,000,000 | £206,000,000 |
| Other | £54,000,000 | £52,000,000 | £106,000,000 |
| **Total (Rounded)** | **£11,400,500,000** | **£7,705,000,000** | **£19,105,500,000** |

The above table clearly demonstrates that there is a significant value of goods moving up and down the A9 in a given year and that the route is a key artery in the Scottish Economy. The A9 Dualling Programme will ensure that this key artery facilitates greater connectivity between the Highlands, Moray and the Central Belt.

Further findings from an assessment of freight movements within the corridor are outlined below:

1. In freight terms, the A9 does not operate in isolation and is often used in conjunction with the A95, A96 and A90;
2. Analysis of freight travel patterns indicates a slight, but noticeable imbalance consistent with a number of vehicles operating an anti-clockwise circuit from the Central Belt to Aberdeen then returning southbound via the A9;
3. There are typically 1,300 lorry movements daily on the A9 with more freight traffic on the southern section of the A9;
4. The amount of freight traffic utilising the A9 declines steadily as the route heads north;
5. Half of all freight vehicles observed during the SGVC at Pitlochry were seen again at Aviemore;
6. Whilst 70% of all freight vehicles observed at Aviemore were seen at Pitlochry;
7. A large number of trunking operations (i.e. long distance movements of primary goods) were observed which is consistent with the estimated value of different industry sectors on the A9, and
8. A large number of hauliers were regionally based, with a relatively low number of national hauliers. Less than 1% of freight vehicles were foreign registered.

## 4.9 Observed Vehicle Speeds

Traffic speeds were gathered during 2014 (prior to the introduction of average speed cameras) for the twelve project sections that make up the A9 Dualling Programme. The variation in observed travel speeds by location is outlined in Figures 4.15 and 4.16 respectively[25]. Further traffic speed data with average speed cameras in place has been gathered during 2015.

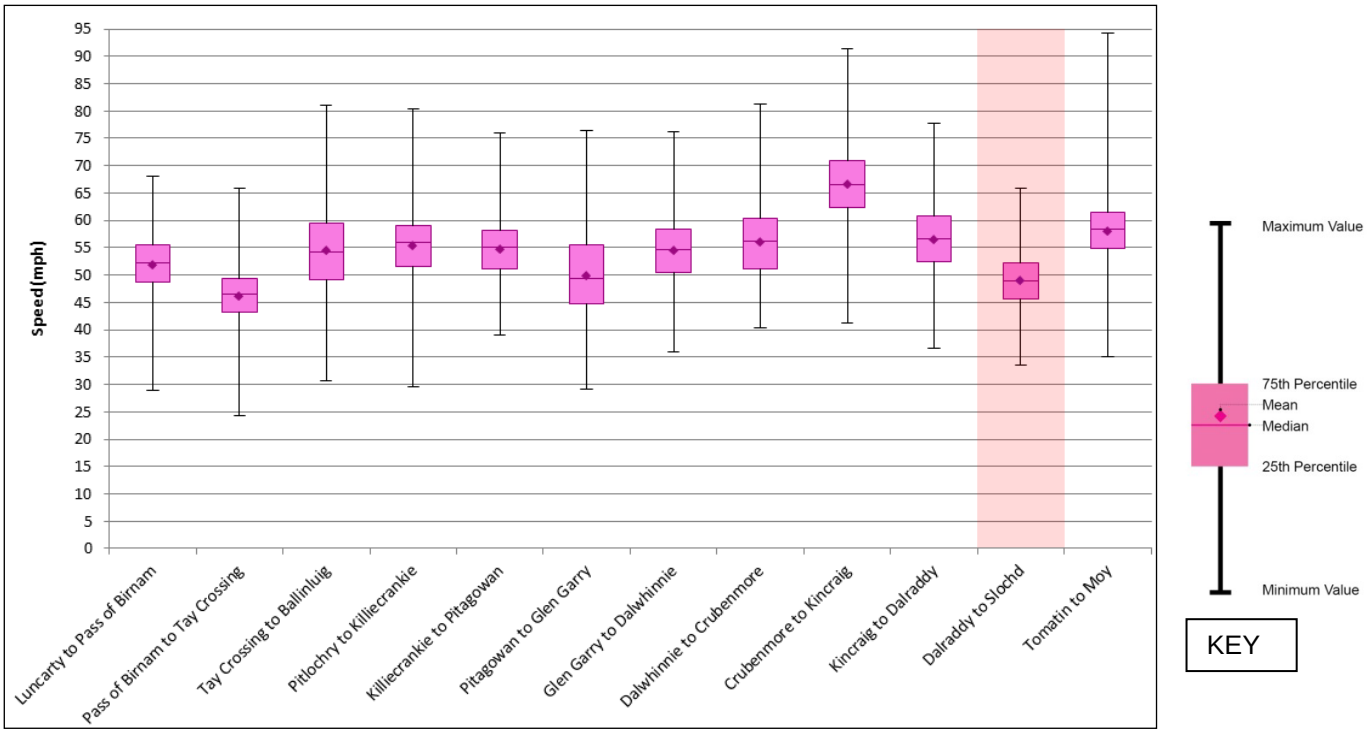



**Figure 4.15: Observed Northbound light vehicle speeds (2014) – Pre-ASC**

As Figure 4.15 indicates, there is a degree of variability along the route in terms of observed speeds which could be attributable to a range of factors. For example the southern sections at Luncarty and Dunkeld are generally slower than the sections further north which may in part be a result of the higher traffic flows on this part of the A9. The numerous at grade junctions in and around Birnam and Dunkeld are also likely to contribute to the lower speed characteristics on this section of the A9. In contrast, the observed speeds on the Crubenmore to Kincraig section are noticeably higher than for the rest of the route and is likely to be attributable to the geometric standard (WS2+1 sections, bendiness, forward visibility and overtaking opportunities) of this section of single carriageway. It should be noted that in excess of fifty percent of drivers were observed to be breaking the speed limit on the Crubenmore to Kincraig section of A9. Over the central part of the A9 there is a degree of consistency across the six project sections between the Tay Crossing at Dunkeld and Crubenmore.

[25] *Note – parts of the enabling infrastructure for the Average Speed Cameras had been installed at the section between Dalraddy and Slochd and may have affected the survey observations. Average Speed Cameras went live in October 2014.*

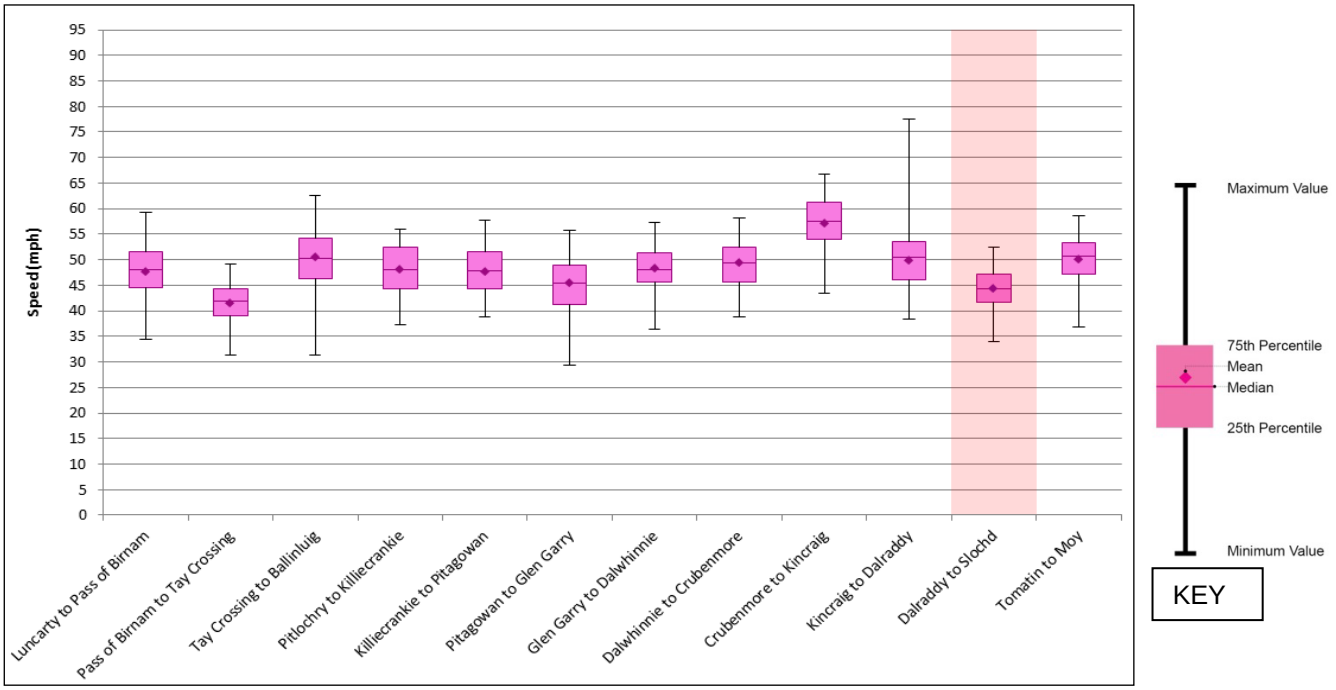



**Figure 4.16: Observed Northbound heavy vehicle speeds (2014) – Pre-ASC**

Figure 4.16 shows that observed northbound speeds for HGVs followed a similar pattern to light vehicles. Again the section between Birnam and the Tay Crossing at Dunkeld is slower than the projects further north whilst the observed speeds on the Crubenmore to Kincraig section are noticeably higher than for the rest of the route. As the 50mph speed limit pilot had not been introduced when the journey time surveys were undertaken, it can be observed that for almost all sections of the A9 surveyed over fifty percent of HGVs were travelling at speeds in excess of the national speed limit (40mph).

## 4.10 Journey Times, Journey Time Variability and Route Resilience

Forecast journey times for a range of origins and destinations in the year 2027 have been extracted from the Transport Model for Scotland for the existing (Do-Minimum) A9 between Perth and Inverness. The modelled journey times are outlined within Table 4.5.

**Table 4.5: Forecast 2027 A9 (Do-Minimum) Journey Times from TMfS:12**

| Origin - Destination | Journey Time (h:mm) | Origin - Destination | Journey Time (h:mm) |
|---|---|---|---|
| Perth - Inverness | 2:07 | Perth - Pitlochry | 0:40 |
| Inverness - Perth | 2:09 | Pitlochry - Perth | 0:41 |
| Glasgow - Inverness | 3:05 | Aviemore - Inverness | 0:41 |
| Inverness - Glasgow | 3:06 | Inverness - Aviemore | 0:43 |
| Edinburgh - Inverness | 2:57 | Aviemore - Edinburgh | 2:28 |
| Inverness - Edinburgh | 2:56 | Edinburgh - Aviemore | 2:29 |

*Note: Forecast journey times without Average Speed Cameras.*

Business consultations[26] undertaken as part of the investment case have revealed that journey time variability (or in other words, the inability to rely on the A9 for a consistent journey time) has significant impacts on business costs and operations. Extra time is allocated for trips on the A9 to cover anticipated delays, which manifests itself in extra costs such as overtime for drivers. It can also impact upon operations. Haulage drivers have maximum limits for hours on the road, and deliveries can sometimes not be made within a single shift, resulting in extra costs.

Observed data highlights congestion on the A9 close to Perth and Inverness at peak times, but also significant platooning along the entire corridor with higher traffic flows and slower speeds during the summer months. The combination of buses, agricultural, HGVs and tourist vehicles (i.e. slow moving vehicles such as caravans and camper vans) means there is a wide range of vehicle speeds. Due to the rural nature of the route, agricultural traffic crosses the carriageway and travels along the road, often at low speeds, in order to access land or property. This mix of vehicles and range of vehicle speeds, coupled with the existing alignment and lack of overtaking opportunities can cause journey times to be unreliable and contribute to driver frustration.

In addition to the variation in speeds and journey times along the A9, the corridor is susceptible to winter weather impacts such as flooding and snow. Of all the accidents occurring on the A9 between Perth and Inverness from 2007 to 2011, approximately 20% (1 in every 5) were winter weather related. The impact of such incidents is magnified on the A9 due to the lack of diversion routes and the predominately single carriageway standard between Perth and Inverness. Depending on where an incident occurs along the A9 corridor, road users can be diverted by anything from 2 to 69 miles in length[27]. At some locations, no diversion is available, and in others a diversion is only available in one direction of travel.

[26] *Analysis of Key Growth Sectors, AECOM Technical Note 15, September 2015*
[27] *DMRB Stage 1 Report, Section 2.5.3 and Appendix C, Transport Scotland, March 2014*

Incidents can have a major impact on journeys along the A9 and can lead to complete or partial closure of the route. Incident data was extracted from Traffic Scotland's Incident Management System for the A9 trunk road. Incidents include breakdowns, accidents, weather–related closures and other hazards. Analysis of the data recorded for the period 2011 to 2014 is summarised in Figure 4.17. The analysis reveals the following:

- there are on average 23 recorded incidents per year on the A9 between Perth and Inverness;
- as to be expected there is some fluctuation year on year in the frequency of each type of incident recorded along the A9;
- 30% of incidents were recorded as closures with the remaining 70% likely to incur at least partial lane closures (Breakdown, Weather, Accidents, Hazard);
- recorded incidents occuring on dual carriageway links are noticeable shorter in duration than those on single carriageway links, and
- there were 0.54 incidents per km of single carriageway compared to 0.33 incidents per km of dual carriageway over the three and a half year period.

The predominately single carriageway standard of the A9 between Perth and Inverness impacts adversely on the number and duration of incidents. This increases the variability of journey times and reduces the resilience of the route. This is further exacerbated by the limited alternative routing options available along the corridor. Currently the combination of the factors outlined in this section results in the A9 between Perth and Inverness having a poor level of resilience.

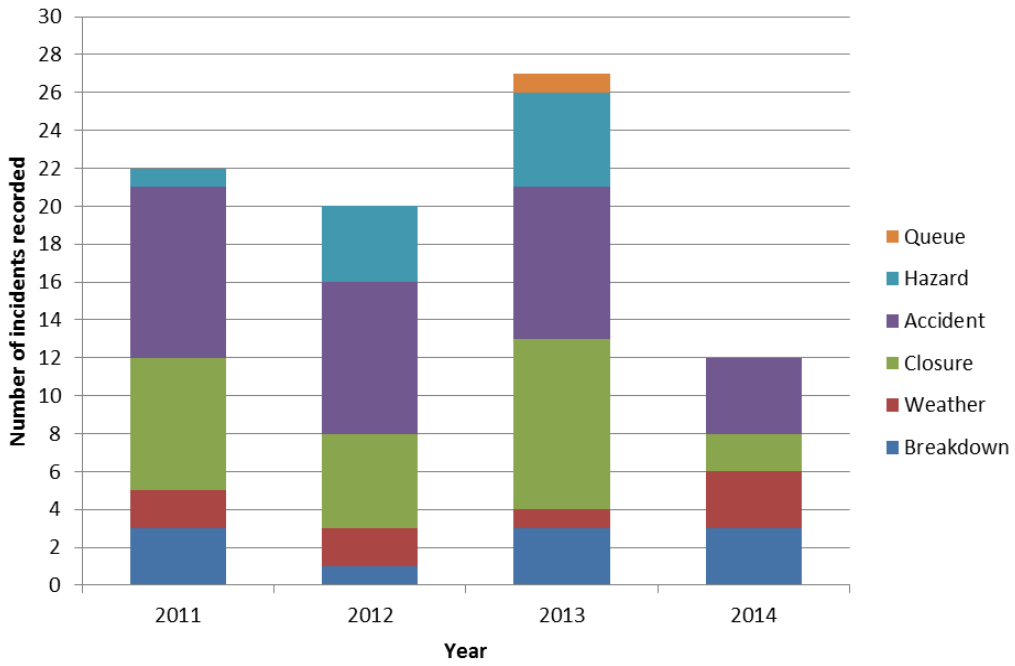



**Figure 4.17 : Total Recorded Incidents by category per year (2011-2014[28])**

[28] *2014 data included the six month period from January to June only.*

## 4.11 Road Safety

Average speed cameras became operational on the single carriageway sections of the A9 between Perth and Inverness and on the dual carriageway sections between Perth and Dunblane on October 28th 2014. The new system is an interim safety measure until the entire A9 is upgraded to dual carriageway. At the same time, the speed limit for heavy goods vehicles (HGVs) on the A9 was raised from 40mph to 50mph. The speed limit pilot project will operate alongside safe driving campaigns involving both speeding and overtaking. The speed limits for all other categories of vehicles remain the same on the A9. It should be noted that the data sources within this section of the report include data collected 'before' and 'after' the implementation of the average speed cameras. Whether the data is before or after implementation of the speed cameras is identified within the relevant section.

### 4.11.1 Accident Rates – Before Average Speed Cameras

The A9 has a lower than national average accident rate when compared with other Scottish Trunk Roads, however, when accidents do occur they tend to be more serious in nature, as shown in Figure 4.18.

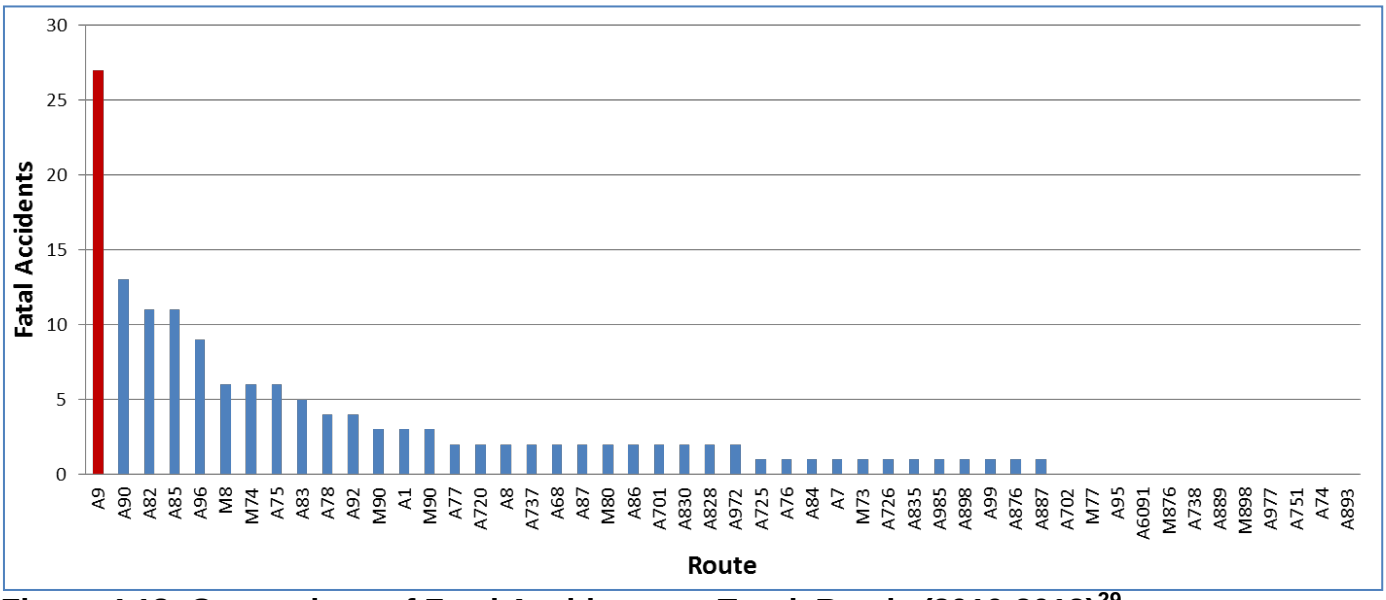



**Figure 4.18: Comparison of Fatal Accidents on Trunk Roads (2010-2012)[29]**

A large proportion of the fatal accidents that occur on the A9, take place between Perth and Inverness. Taking accident data between 2007 and 2011, 74% of all fatal accidents on the A9 between Perth and Scrabster were on the Perth to Tore (6 miles north of Inverness) section[30]. Further analysis of accidents on the Perth to Tore section has shown:

- 77% of all Killed or Seriously Injured (KSI) accidents occurred on single carriageways;
- The single carriageway KSI ratio (0.32) is above the trunk road national average (0.24);
- HGVs above 7.5 Tonnes are nearly 3 times more likely to be involved in an injury accident on single carriageways than they are on other Scottish trunk road single carriageways;
- Loss of control, failing to look properly, failing to judge other people's speed, careless/reckless in a hurry and travelling too fast for conditions are common recorded contributory factors.

[29] *A9Road.Info, (available at www.A9Road.Info), 2015. Note all data is reported for the period prior to the installation of average speed cameras.*
[30] *A9 Perth to Thurso Route Review: Accident Analysis, Scotland Transerv, March 2013*

As indicated in Table 4.6 the accident rate on the A9 between Perth and Inverness (before average speed cameras were implemented) is relatively low when compared to the Scottish trunk road average[31].

**Table 4.6: Accident rates (before average speed cameras), personal injury accidents per million vehicle kilometres (pia/mvkm) (2000 Base)**

| Carriageway Type | A9 Rates | NESA Rates |
|---|---|---|
| **S2 Carriageway** | 0.173 | 0.293 |
| **D2 Carriageway** | 0.086 | 0.174 |

However, as indicated in Table 4.7 the casualty rate per accident for fatal and seriously injured is significantly higher than the national average[32].

**Table 4.7: Casualty rates (before average speed cameras), per accident**

| Carriageway Type | A9 Rates | | | NESA Rates | | |
|---|---|---|---|---|---|---|
| | Fatal | Serious | Slight | Fatal | Serious | Slight |
| **S2 Carriageway** | 0.1135 | 0.3608 | 1.3436 | 0.0436 | 0.2855 | 1.2860 |
| **D2 Carriageway** | 0.0892 | 0.2179 | 1.2174 | 0.0286 | 0.1861 | 1.3140 |

Accident data for the trunk road network in North West Scotland[33] collected before average speed cameras were implemented shows that HGVs are more likely to be involved in accidents on the A9 Perth to Inverness section than elsewhere on the North West of Scotland trunk road network. Figure 4.19 shows that HGVs over 7.5 tonnes were involved in 12.4% of accidents between 2007 and 2011 (compared to the North West Scotland average of 6.1%). This same category of HGV were involved in 23% of (all) accidents on single carriageways, significantly higher than the North West Scotland average of 6%.

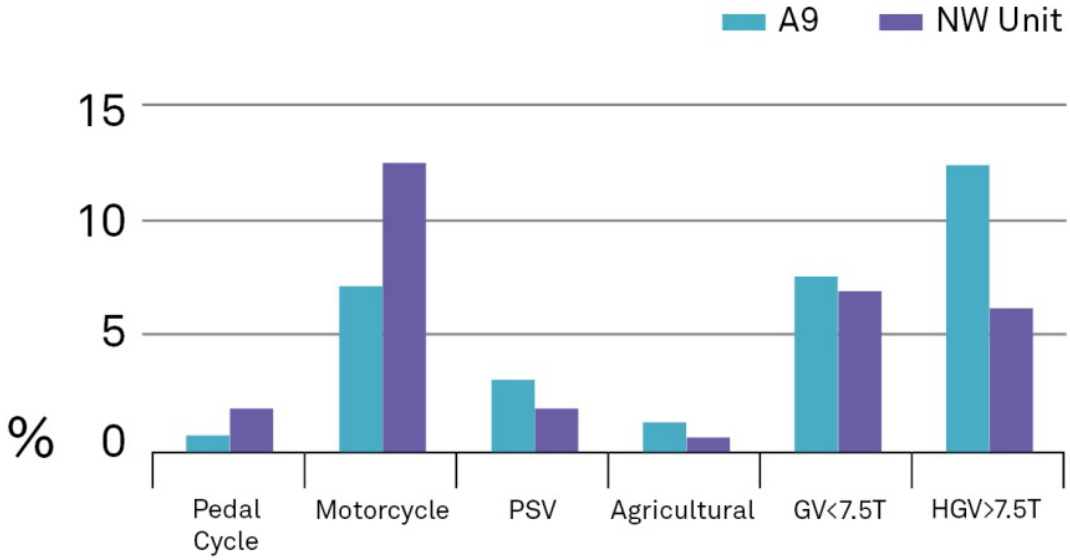



**Figure 4.19: Vehicle type per accident on A9 Perth-Inverness relative to the North West Unit**

[31] *NESA Table 6/5/2, July 2014*
[32] *Accidents Benefits Summary, AECOM Technical Note 09, September 2015*
[33] *Accident and Speed Analysis - Evidence Base Presentation,Transport Scotland, 2013 (available at www.a9road.info)*

### 4.11.2 User Perceptions

As well as having a problem in terms of the severity of accidents, the A9 currently has a perceived safety problem with many users (and potentially non-users) considering it to be a dangerous road.

Research undertaken by SCDI before average speed cameras were implemented highlighted perceived safety concerns related to the A9, with 70% of business respondents rating the standard of the road as either 'very poor' or poor' in relation to safety. The main reason that businesses gave for this poor safety perception of the route related to frustration, caused by traffic convoying behind slower moving vehicles with limited overtaking opportunities, as well as confusion – particularly amongst visitors – related to the mix of dual carriageway, 2+1 lanes and single carriageway.

Business consultations undertaken before average speed cameras were implemented to inform the investment case also suggested there is a concern that the safety record of the A9 may be deterring visitors and customers to the region. As a result, there may be a level of suppressed demand for travel to the region by visitors and business travelers, which may be impacting upon economic performance.

Market research carried out for the A9 Average Speed Camera pilot in May 2014 found that over half of respondents (55%) frequently or occasionally said they felt unsafe due to the actions of other road users whilst 46% frequently or occasionally said they felt frustrated due to being stuck behind traffic travelling slower than the speed they wanted to drive. Furthermore, the research found that the majority of drivers (94-98%) surveyed had witnessed "risky driving behavior" during their most recent journey on the A9[34], with a wide range of dangerous driving behaviours identified as show in Figure 4.20.

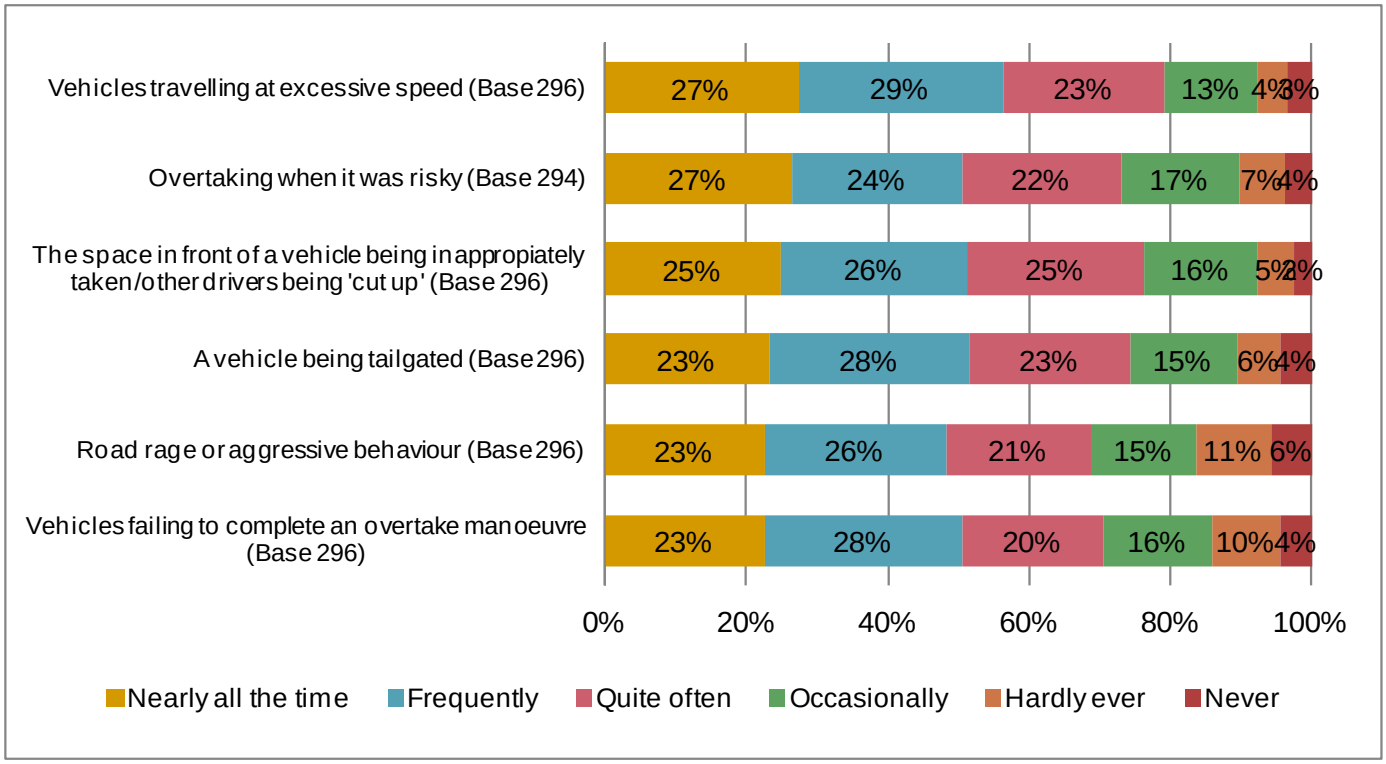



**Figure 4.20: Witnessed risky driving behaviour during their last journey on A9 – Before Survey**

[34] *A9 Average Speed Cameras and HGV 50mph Pilot Monitoring – "Before" Market Research, AECOM, July 2014*

The market research carried out before the implementation of the A9 Average Speed Cameras was repeated in spring 2015 and is known as the 'after' survey. As indicated in Figure 4.21, the 'after' survey research found that the majority of drivers (81% to 89%) surveyed had witnessed to some extent "risky driving behavior" during their most recent journey on the A9[35]. However, the 'after' survey shows a statistically significant decrease in the witnessing of all risky driving behaviours. These results suggest that the changes on the A9 from the implementation of the Average Speed Cameras have resulted in a reduction in a variety of undesirable and unsafe behaviours on the A9.

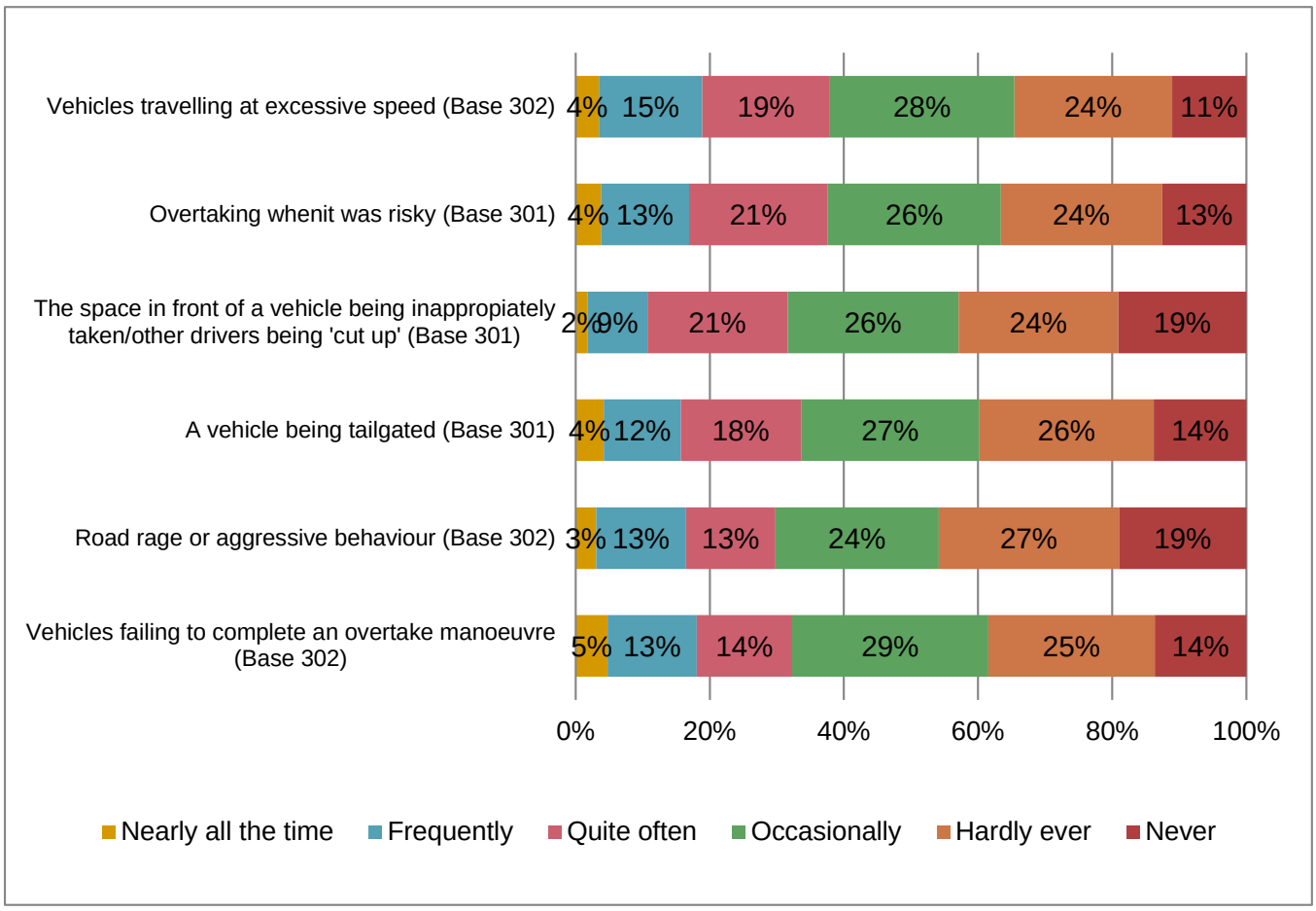



**Figure 4.21: Witnessed risky driving behaviour during their last journey on A9 – After Survey**

[35] *A9 Average Speed Cameras and HGV 50mph Pilot Monitoring – "After" Market Research, AECOM, March 2015*

## 4.12 Driver Stress and Frustration

The DMRB [36] has identified that the three main components contributing to driver stress levels are:

- Fear of accidents;
- driver frustration (often linked to travelling below desired speed) and
- uncertainty about the route being followed


Due to the nature of the existing route between Perth and Inverness, a route which is mainly single carriageway with some localised overtaking sections, drivers have limited opportunities to overtake slower vehicles. Platooning occurs regularly as a result of the lack of overtaking opportunities. The results of platoon length surveys (undertaken before average speed cameras were implemented) are shown in Figures 4.22 and 4.23[37]. The data reveals that a high proportion of vehicles travel in platoons with platoon sizes typically between 2 and 10 vehicles in a northbound and southbound direction. Platoons are a direct indicator of vehicles travelling below their desired speed which as stated above is a key component in creating driver stress.

[36] *Design Manual for Roads and Bridges, Volume 11, Section 3 , UK Government Department for Transport*
[37] *A9 platoon surveys 2013 (graphs show platoons "in" to the surveyed area).*

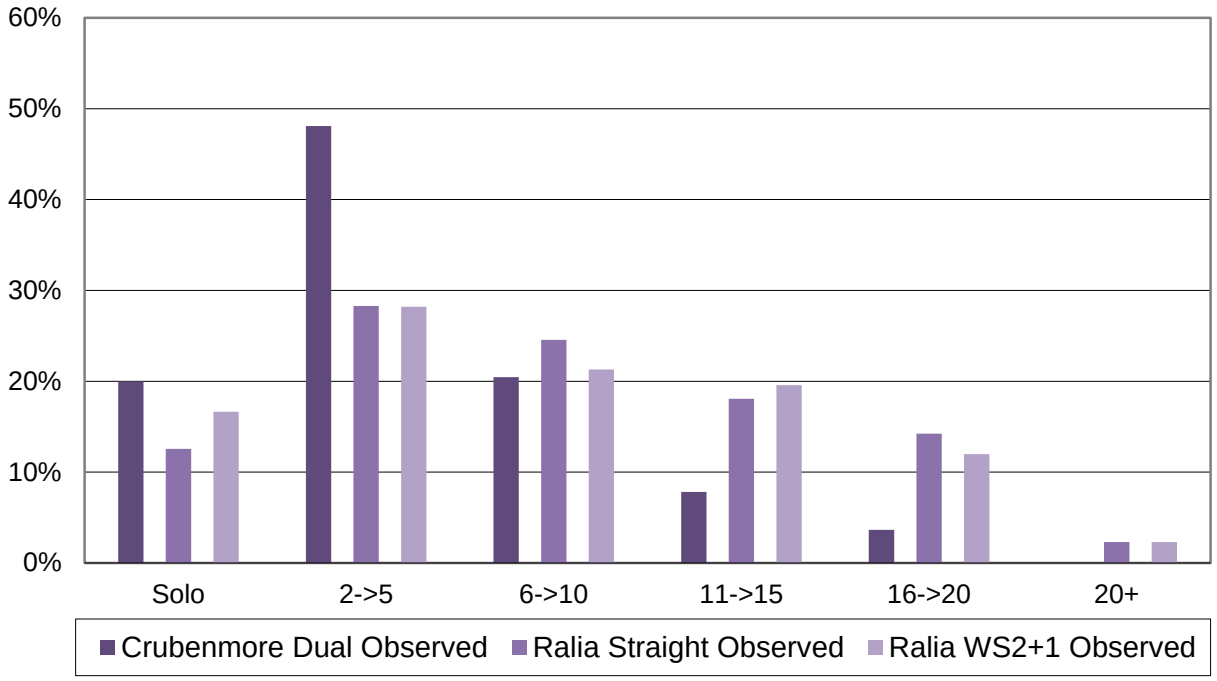



**Figure 4.22: Observed 2013 Platoon Lengths on A9 Southbound at selected locations (Before ASC)**

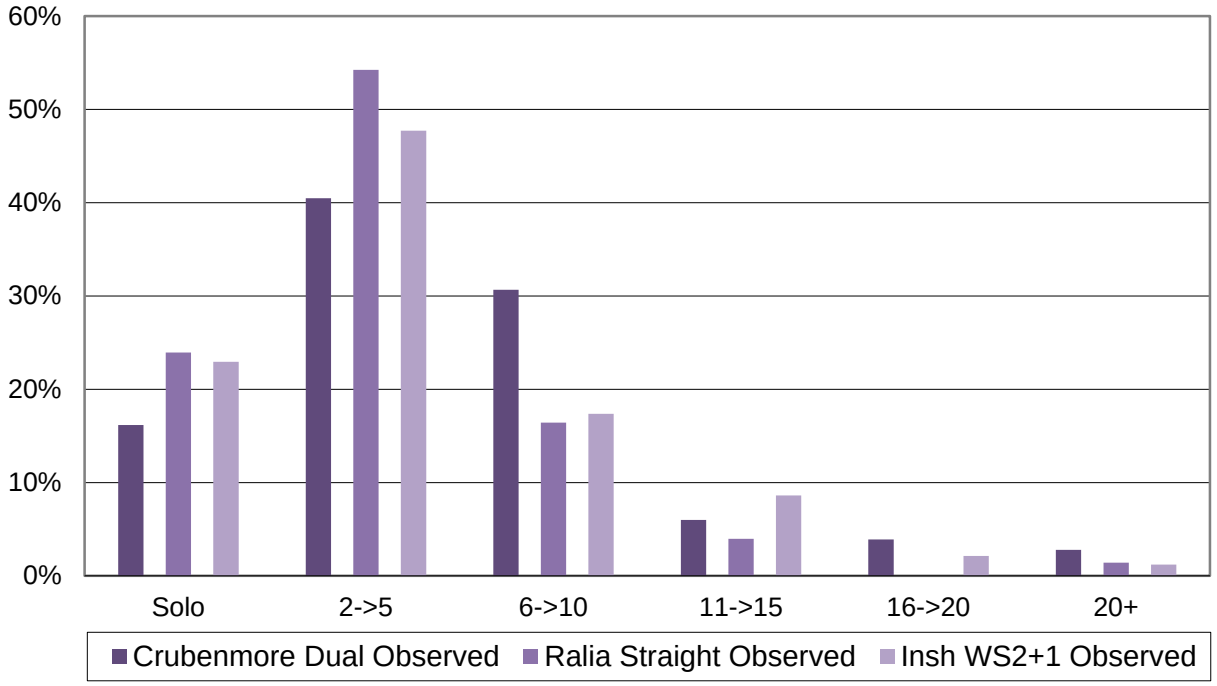



**Figure 4.23: Observed 2013 Platoon Lengths on A9 Northbound at selected locations (Before ASC)**

Primary research has been undertaken to gain a better understanding of the factors that influence frustration, and by so doing quantify the levels of frustration on the A9. The key factors affecting frustration were found to be:

- **Travel speed** – the greater the difference between desired speed (taken to mean the speed limit in the primary research conducted) and actual speed, the greater the frustration;
- **Platoons ahead** – in particular, the number of HGVs in the platoon ahead, more HGVs led to higher frustration;
- **Oncoming traffic** – limiting the opportunity to overtake adds to frustration.

Stated preference research[38] was used to establish value of time uplifts (i.e. the value or cost each person attributes to each of the above variables) which have subsequently been used to monetise driver frustration (Ref. Chapter Six).

## 4.13 Business User Views

Business consultations[39], conducted in 2013 and 2014, have highlighted the various ways in which transport can impact upon economic performance. Consultations have included interviews with a cross section of businesses and interviews with freight industry representatives and hauliers[40].

Figure 4.24 overleaf presents a snapshot of views of businesses that regularly make use of the A9 for transporting goods, business travel or for commuting. In summary, the consultations with businesses have illustrated that:

- Many products delivered via the A9, such as fishery products and whisky, are time critical and can be impacted severely by slow journey times and road closures;
- Staff on business journeys have noted the need to factor in additional unproductive travel time to account for current journey time variability;
- Hauliers have noted the difficulty in completing return trips to Glasgow in one day within daytime hours;
- Tourism can suffer from road closures and note that visitors are less likely to return following bad driving experiences on the A9; and
- For forestry, haulage time can be critical and delays on the A9 can significantly increase costs.

[38] *Driver Frustration, AECOM Technical Note 07 , September 2015*
[39] *Analysis of Key Growth Sectors, AECOM Technical Note 15, September 2015*
[40] *A9 Corridor Freight Assessment, AECOM Technical Note 12, September 2015*

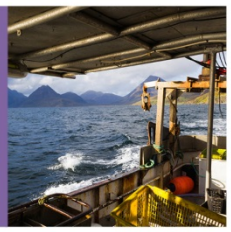
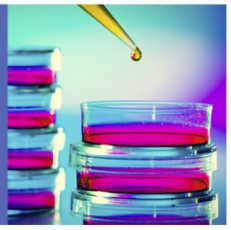
| | | |
|---|---|---|
| A FRESH FISH PRODUCER AND EXPORTER IN THE H&I |  | - Business makes / receives 6-10 deliveries per week on the A9<br>- Fresh seafood at a value of £40k-£60k per load.<br>- Deliveries are time-critical - a delay of as little as 30 minutes can have a major impact on quality<br>- Perishable seafood, so deliveries must reach Glasgow by 0730 hours for onward delivery to customers<br>- Additional travel time always factored in for journeys on the A9 to meet this timescale |
| A WHISKY PRODUCER IN THE H&I |  | - Business transports sprit from operations plant to processing plants and bottling halls in Central Scotland<br>- Al deliveries made by road, high value products<br>- Mature spirit can be time critical to meet bottling timetables<br>- Trips on the A9 made on a daily basis<br>- Hauliers struggle to make the return trip to Glasgow in one day during daytime hours - drivers operate a nine-hour shift<br>- Overtime payments sometimes required if journeys delayed on the A9 |
| A LIFE SCIENCES BUSINESS IN THE H&I |  | - Business works in IT and research development, with NHS as a key client<br>- Weekly travel on A9 to clients by car<br>- Journey times and variability a key issue - staff factor in extra unproductive travel time to account for journey time variability on A9<br>- Client meetings take a long time to set up, and sometimes have to be cancelled if A9 closed or major delays during busy summer months or incidents in winter |
| A VISITOR ATTRACTION IN THE H&I |  | - Business with the key aim of attracting visitors<br>- Customers from across Scotland, UK and beyond - many come via A9<br>- Journey time unreliability and occasional closures is a key issue<br>- If delays, or even closures, have to offer refunds<br>- Visitors less likely to return if journey has had problems the first time, and accident reputation of the A9 may even discourage visitors |
| A FORESTRY COMPANY IN THE H&I |  | - Timber harvesting and extraction business<br>- Customers across Scotland and UK, use A9 up to 15 times a week<br>- Freight is time-critical and often additional transport costs due to congestion and delays<br>- Drivers suffer from stress / tiredness as the A9 is perceived as a difficult road to drive<br>- Stop-start nature of driving on the A9 wastes fuel in heavily-loaded vehicles |

**Figure 4.24: Business Stakeholder views on constraints and problems on the A9**

## 4.14 Key Sector Analysis

Agriculture, fishing and forestry, manufacturing (with particular emphasis on food and drink), accommodation, food services and energy are all key employment sectors of the economy along the A9. As identified in the A9 Dualling Assessment of Advance Wider Economic Benefits Study[41] the five key sectors most likely to be affected by the dualling of the A9 are considered to be:

- Food and Drink;

[41] *A9 Dualling Assessment of Advance Wider Economic Benefits Final Report, Optimal Economics, September 2013*

- Tourism;
- Energy;
- Life Sciences; and
- Forestry

The Advanced Economics Study identified these sectors as being significant employers in the area that have a high dependency on strategic transport links. The significance of these sectors in the area as employers is shown in Table 4.9.

**Table 4.9: Key Employment Sectors within Perth & Kinross, Moray and Highland relative to Scotland**

| Sector | Employment | | | |
|---|---|---|---|---|
| | Perth & Kinross, Moray and Highland | | Scotland | |
| | Number | % | Number | % |
| Food and Drink | 8,400 | 4.5% | 49,200 | 2.1% |
| Energy | 1,900 | 1.0% | 47,900 | 2.1% |
| Life Sciences | 1,800 | 0.9% | 15,800 | 0.7% |
| Sustainable Tourism | 21,000 | 11.2% | 159,200 | 7.0% |
| Forestry | 900 | 0.5% | 2,700 | 0.1% |
| **Key Sectors** | **34,000** | **18.1%** | **274,800** | **12.0%** |
| **Whole economy** | **187,500** | **100.0%** | **2,288,300** | **100.0%** |

At present the energy sector is proportionality lower in the study area when compared to Scotland as a whole. However there are short to medium term aspirations for renewable energy to increase rapidly in the Highlands in particular. Transport links will have a vital role to play in supporting this aspiration.

## 4.15 Overview of Problems and Issues

The current problems and opportunities along the A9 corridor are summarised in Table 4.10 alongside the key problems and issues identified as part of the Strategic Transport Projects Review in 2007/08[42]. The assessment indicates that all key issues and problems identified within the SBC remain valid. The original rationale for investment, established in 2008, is considered to be robust and, indeed, has been strengthened by the further project assessment work completed in the period 2013/14. This more recent assessment work has highlighted:

- The continuing high incidence of serious and fatal road accidents, with evidence that this is linked to the current single carriageway road standard and overtaking manoeuvres;
- High levels of driver frustration, with new research indicating that this frustration is linked to slow moving vehicles, the build-up of platoons and the restriction of travel speed to well below desired levels;
- Current Journey times to Inverness from the cities of Perth, Edinburgh and Glasgow are 10-15% slower than with a 'connected cities' policy in place.
- The problems caused by incidents on the A9 which, due to the lack of convenient alternative routes, causes lengthy diversions and delay impacting on both businesses and private vehicle users;
- The high levels of dependency of local, regional and national businesses on efficient transport for the movement of goods, access to markets and access to workforce.

[42] *Objective Mapping, AECOM File Note 01, September 2015*

**Table 4.10: Problems and Issues along the A9 corridor**

| STPR Problem/Issue 2007/08 | Business Case Review 2013/14 | Is the Problem/Issue still relevant? |
|---|---|---|
| | | |
| Increasing population/households | The Highland Council area had the highest population growth (in % terms) between 2001 and 2011. Above average growth forecast in Perth & Kinross to 2037 | YES |
| High car ownership/dependency | Car ownership continues to be higher than the national average with 79.4% of residents in the Highlands and 78.9% in Perth& Kinross having access to a car compared with 69.5% for Scotland as a whole | YES |
| Lower income levels | Lower rates of employment in the higher income band sectors relative to Scotland as a whole | YES |
| Geographical/Topographical constraints | No material changes in geographical/topographical constraints since 2007 | YES |
| Strategic corridor – high levels of long distance trips | 2012 Roadside Interview Data indicates that over 4,000 vehicles travel between Perth/Inverness per weekday (both directions combined) between 7am and 7pm | YES |
| Low current and forecast modal share by Public Transport | TMfS12 modelling indicates that Public Transport modes are not currently competitive with the car. Forecasts indicate little modal shift with full dualling in place. | YES |
| Lower accident rate but higher severity | Accident analysis from 2007-2011 (5 years) confirms that whilst there is a lower accident rate on the A9 corridor, when accidents do occur they tend to have a higher severity rate than the Scottish average. | YES |
| Capacity and quality issues on the transport networks | No material changes in the capacity and quality of the transport networks along the A9 corridor since 2007 | YES |
| Mixed carriageway standards along the A9 trunk road | No material changes in the carriageway standards along the A9 corridor since 2007 (Localised improvements implemented at Bankfoot (2009) and Crubenmore (2011)) | YES |
| Mix of vehicle types and speeds leading to significant platooning | Micro-simulation traffic modelling combined with survey data confirms that a mix of vehicle types and speeds occur along the corridor with significant platoon formations | YES |
| Poor resilience of the transport networks during adverse weather – lack of alternative diversion routes | No material changes in resilience and diversionary routes since 2007 | YES |
| Low accessibility levels along the corridor | Some localised walking and cycling improvements implemented but overall accessibility by bus and rail not materially changed since 2007 | YES |
| | | |

## 5.1 Introduction

# 5 The Travel Impacts of Dualling the A9

The A9 Dualling Programme will deliver a high quality; grade separated connection along the complete Perth to Inverness corridor – delivering reduced journey times, improved safety and reliability, greater driver comfort and increased resilience to incidents. This chapter presents information on the forecast travel impacts following the dualling of the A9 from Perth to Inverness. The impact assessment has been based on TMfS12 outputs for scenarios with and without the full A9 dualling between Perth and Inverness.

## 5.2 Traffic Flow and Speed Impact

Figure 5.1 provides an overview of the traffic impacts of the A9 Dualling Programme.

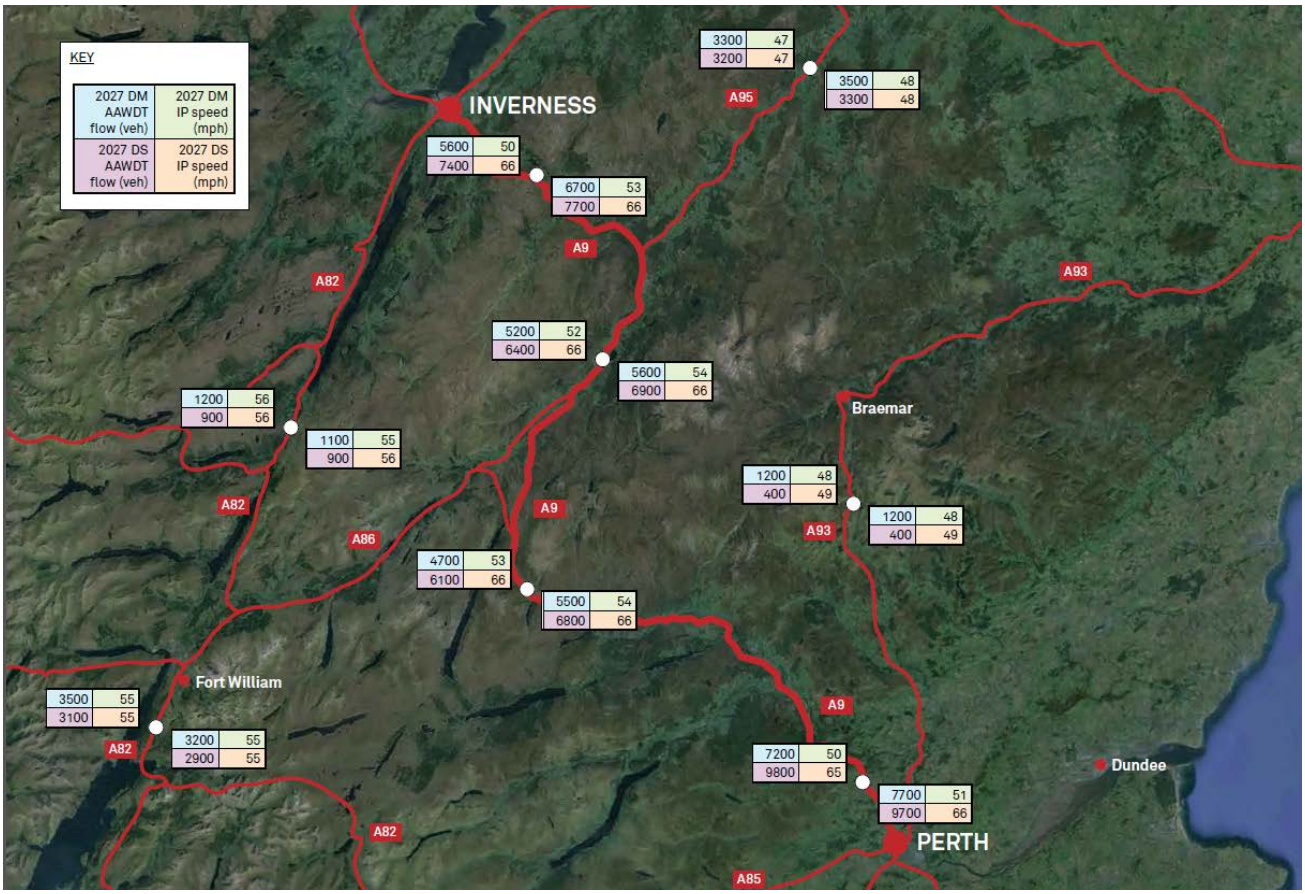



**Figure 5.1: Forecast Traffic Flows and Speeds with (DS) and without (DM) the A9 Dualling Programme (Excluding Average Speed Cameras)**

Due to journey time savings on the A9, traffic flows are forecast to increase by between 2500 and 4600 AAWDT, with a corresponding reduction on other roads on the strategic road network. Traffic flows on the A82 are forecast to reduce by 500-700 AAWDT and the A93 by 1600 AAWDT. Depending on the location selected, anywhere between 70-95% of the forecast traffic increase on the A9 is the result of re-routing from the A82 and A93 corridors i.e. existing trips already on the road network. Average vehicle speeds are forecast (prior to the introduction of average speed cameras) to increase by approximately 15 mph along the A9.

The increase in traffic flows with the introduction of the A9 Dualling Programme varies by location and forecast year as illustrated in Figure 5.2. The do-something (DS) data relates to the 'with A9 dualling' and the do-minimum (DM) data relates to the 'without A9 dualling' in place situation.

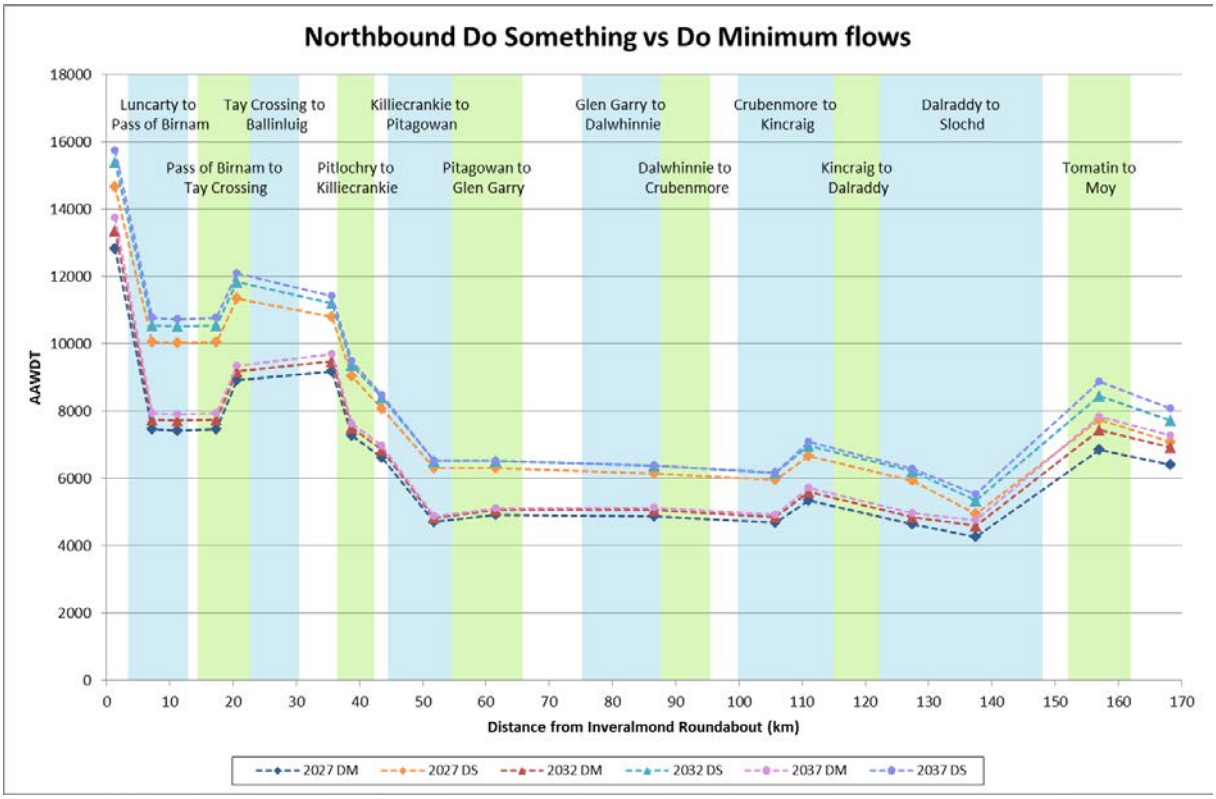



**Figure 5.2: Forecast Traffic Flows with (Do-Something) and without (Do-Minimum) the A9 Dualling Programme**

## 5.3 Journey Time Impacts

Journey times for the year 2027 have been extracted from TMfS:12 for the inter peak period for a range of origins and destinations, with and without the A9 Dualling Programme in place. The forecast journey times and reduction in travel times are outlined within Table 5.1. The 'current' route journeys times are before the implementation of average speed cameras.

**Table 5.1: Forecast 2027 TMfS:12 Journey Times for selected Origins and Destinations (h:mm)**

| Journey Description | Current Route | A9 Dualling Programme | Time Saving (Mins) | Time Reduction % Change |
|---|---|---|---|---|
| Perth - Inverness | 2:07 | 1:49 | 18 | 14% |
| Inverness - Perth | 2:09 | 1:49 | 20 | 16% |
| Glasgow - Inverness | 3:05 | 2:47 | 18 | 10% |
| Inverness - Glasgow | 3:06 | 2:46 | 20 | 11% |
| Edinburgh - Inverness | 2:57 | 2:39 | 18 | 10% |
| Inverness - Edinburgh | 2:56 | 2:36 | 20 | 12% |
| Perth - Pitlochry | 0:40 | 0:35 | 5 | 13% |
| Pitlochry - Perth | 0:41 | 0:35 | 6 | 15% |
| Aviemore - Inverness | 0:41 | 0:38 | 3 | 7% |
| Inverness - Aviemore | 0:43 | 0:39 | 4 | 8% |
| Aviemore - Edinburgh | 2:28 | 2:12 | 16 | 11% |
| Edinburgh - Aviemore | 2:29 | 2:15 | 14 | 9% |

*Note: Journey Times Exclude Impacts of Average Speed Cameras.*

As indicated, typical journey time savings of the order of 7% to 16% are forecast with the A9 Dualling Programme in place.

## 5.4 Origin and Destination Impacts

Figure 5.3 shows the forecast origins and destinations of trips on the A9 at Blair Atholl in the year 2027 without the A9 Dualling. As indicated below, the Perth & Kinross area is the largest source of trip origins with 24%, followed by England/Wales (18%) and Edinburgh (13%). In terms of the forecast destinations of trips, the wider Inverness area accounts for 39% followed by Strathspey (18%) and then Moray (16%).

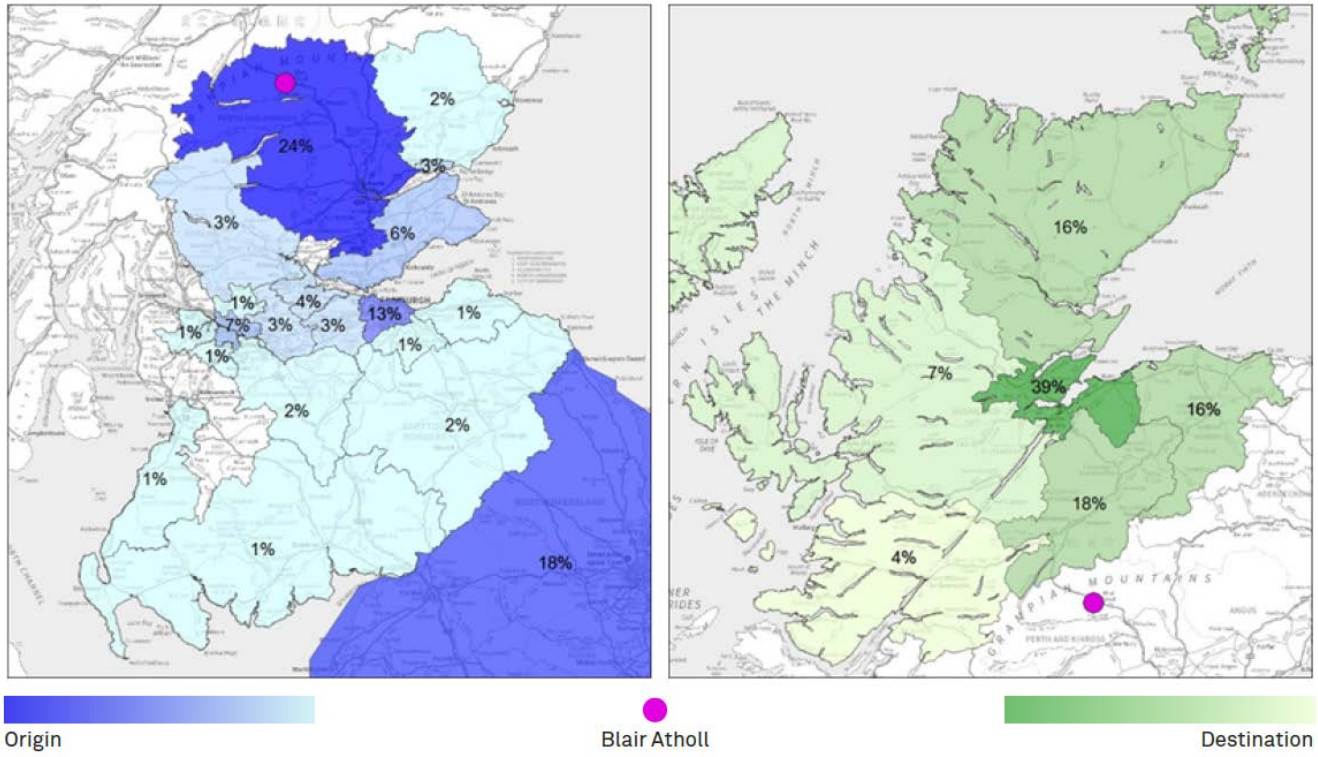



**Figure 5.3: Forecast 2027 Origins and Destinations without the A9 Dualling Programme**

Figure 5.4 shows the forecast origins and destinations of trips on the A9 at Blair Atholl in the year 2027 with the full A9 Dualling in place. As indicated, the Perth & Kinross area continues to be the largest – albeit slightly reduced - source of trip origins with 21%, followed by England/Wales (18%) and Edinburgh (14%). In terms of the forecast destinations of trips, the wider Inverness area still accounts for the largest share at 34% with Moray accounting for a noticeably higher 24% and Strathspey 15%. As such, at Blair Atholl the main forecast impact of the A9 Dualling Programme on trip origins and destinations is to increase the number of trips on the A9 with a destination in the Moray Council area. This impact is a direct result of traffic re-routing off the A93 onto the higher standard A9.

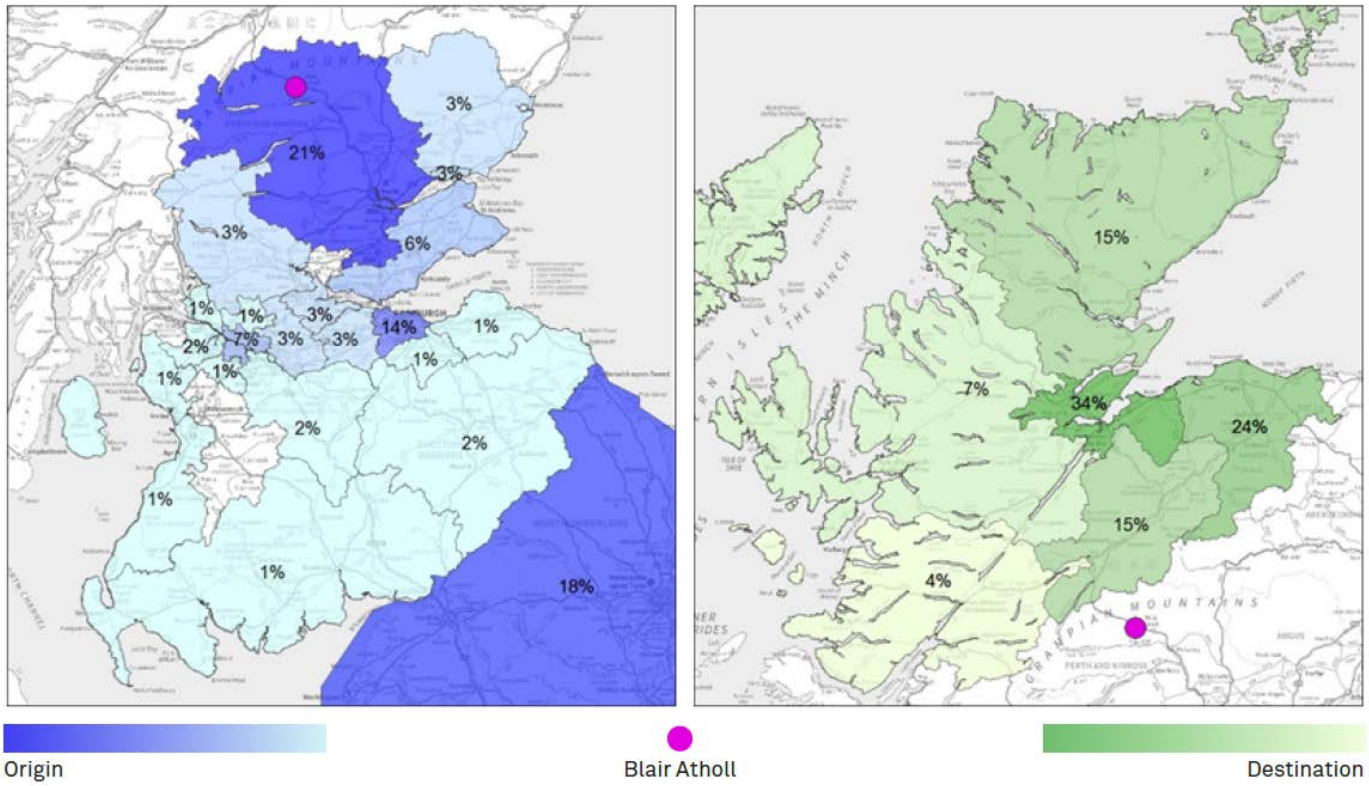



**Figure 5.4: Forecast 2027 Origins and Destinations with the A9 Dualling Programme**

## 5.5 Mode of Travel Impacts

A comparison of TMfS12 forecast bus and rail passengers at a number of key locations along the A9 corridor with and without the A9 Dualling Programme in place is outlined within Table 5.2. The table shows the change in bus and rail passengers in the year 2027 for the morning (AM), off-peak (IP) and evening (PM) peak hours and in the last three columns the net change in public transport trips along the corridor.

**Table 5.2: TMfS12 Forecast Public Transport Patronage, Do Minimum versus Do Something, 2027**

| Section | Direction | Change in Bus passengers | | | Change in Rail passengers | | | Net Change in Public Transport Trips | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | AM | IP | PM | AM | IP | PM | AM | IP | PM |
| Inshes to Carrbridge | NB | 33 | 4 | 27 | -32 | -4 | -24 | 1 | 0 | 3 |
| | SB | 39 | 12 | 13 | -38 | -11 | -12 | 1 | 1 | 1 |
| Carrbridge to Aviemore | NB | 32 | 2 | 27 | -32 | -2 | -24 | 0 | 0 | 3 |
| | SB | 38 | 12 | 12 | -38 | -11 | -12 | 0 | 1 | 0 |
| Aviemore to Kingussie | NB | 39 | 2 | 31 | -33 | -2 | -26 | 6 | 0 | 5 |
| | SB | 44 | 12 | 18 | -42 | -11 | -13 | 3 | 1 | 5 |
| Kingussie to Dalwhinnie | NB | 29 | 1 | 28 | -29 | -1 | -25 | 1 | 0 | 3 |
| | SB | 40 | 11 | 11 | -40 | -10 | -10 | 1 | 1 | 0 |
| Dalwhinnie to Pitlochry | NB | 33 | 2 | 27 | -32 | -1 | -24 | 1 | 0 | 3 |
| | SB | 43 | 12 | 13 | -42 | -11 | -13 | 1 | 1 | 1 |
| Pitlochry Bypass | NB | 33 | 5 | 28 | | | | | | |
| | SB | 0 | 0 | 0 | | | | | | |
| Pitlochry to Ballinluig | NB | 34 | 4 | 26 | -32 | -3 | -22 | 2 | 1 | 4 |
| | SB | 46 | 16 | 17 | -44 | -14 | -15 | 1 | 2 | 2 |
| Ballinluig to Dunkeld | NB | 35 | 4 | 27 | | | | | | |
| | SB | 46 | 16 | 17 | | | | | | |
| Dunkeld to Luncarty | NB | 33 | 6 | 30 | -30 | -4 | -24 | 3 | 2 | 5 |
| | SB | 48 | 16 | 18 | -46 | -13 | -15 | 2 | 2 | 3 |
| Luncarty to Perth | NB | 33 | 6 | 29 | | | | | | |
| | SB | 48 | 15 | 17 | | | | | | |

The modelled forecasts indicate little change in overall public transport usage in the A9 corridor following construction of the A9 Dualling Programme. There is however a sub-mode switch from rail to bus as a result of the reduced journey times by bus.

## 5.6 Safety Impacts

The proposed Category 7A road design standard of the A9 Dualling Programme and the associated high levels of vehicle segregation will deliver significant safety benefits by reducing casualty severity. The change in casualties, by severity, is presented in Table 5.3.[43]

**Table 5.3 - Change in casualties, by severity**

| Year | Fatal | Serious | Slight | Damage Only |
|---|---|---|---|---|
| 2027 | -6.0 | -3.8 | 58.0 | 101.6 |
| 2032 | -6.1 | -3.8 | 60.2 | 100.7 |
| 2037 | -6.2 | -3.3 | 65.8 | 148.0 |

Implementation of the A9 Dualling Programme results in approximately six fewer fatalities per year, with a noticeable drop in serious casualties and an increase in casualties classified as 'slight'.

[43] *Accidents Benefits Summary, AECOM Technical Note 09, September 2015 and Timeline of Safety Benefits (Addendum), AECOM File Note 08,* September 2015

# 6 Programme Appraisal - Economy

## 6.1 Introduction

This Chapter provides an assessment of the impact of the A9 Dualling Programme on the Economy and considers the role the investment would make to supporting sustainable economic growth and delivering value for money. Figure 6.1 outlines the economic criteria assessed. A number of the forecast benefits of the project can be monetised and are included in the value for money assessment presented.

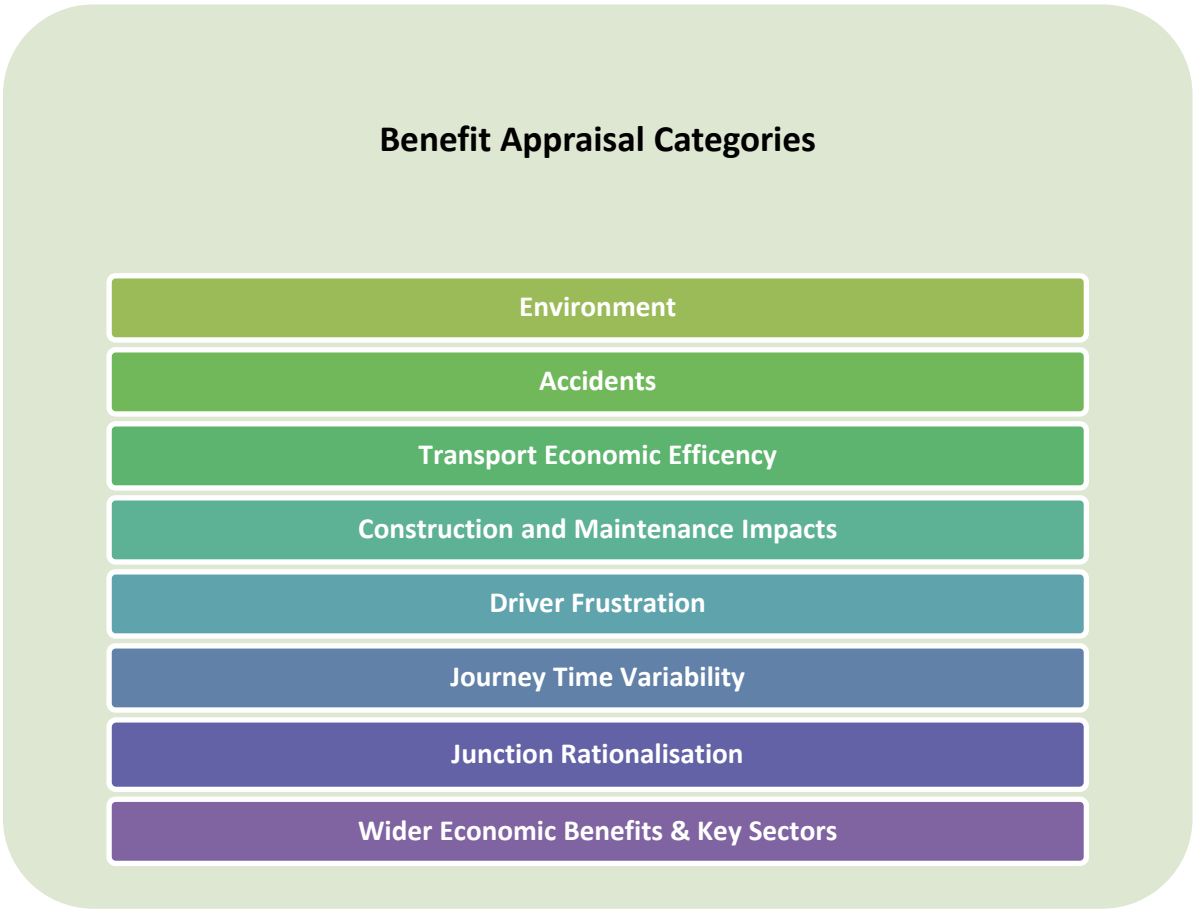



**Figure 6.1: Benefits Appraisal Categories**

The economic appraisal has been undertaken based on Scottish Transport Appraisal Guidance (STAG) and where relevant WebTAG. The Department for Transport's (DfT) Transport User Benefits Appraisal software (TUBA) version 1.9.3 was adopted. A summary of the key appraisal criteria and standards adopted as part of the economic appraisal are outlined in Table 6.1.

**Table 6.1: Key Economic Appraisal Criteria and Standards**

| Item | Criteria Applied |
|---|---|
| Appraisal Period | To 2085, no residual value |
| Inflation | Forecasts of future construction price inflation |
| Discount Rates | STAG standard rates - 3.5% per annum in the first 30 years from 2014 and 3.0% per annum thereafter |
| Base Year/Price Base | 2010 |
| Forecasts | TMfS12: 2027, 2032 and 2037 |
| Project Opening | 2018 (first project opens) with phased implementation till 2026, the first full year of operation for all projects (using TMfS models for 2027) |
| Forecast Year | 2037 (last year available) |
| Vehicle Occupancies and Journey Purpose Splits | Locally derived from 2007 and 2012 RSI |
| Annualisation Factors | Locally derived from analysis of SRTDb |
| Extrapolation Beyond Forecast Year | Extrapolate the changes in delay benefits between 2032 and 2037 to the period after 2037 |

For the purposes of the A9 Dualling Programme, the 'Do Minimum' has been defined as including all committed strategic trunk road and public transport interventions as at July 2013. This reflects the transport infrastructure projects included in the TMfS12 Do-Minimum forecasts. This covers nine committed road projects and nine committed public transport projects, all forecasted to be in place by 2017. The Do-Minimum also includes the average speed camera system that went live along the A9 from Dunblane to Inverness in October 2014. The 'Do-Something' scenario considers the full A9 Dualling Programme in place.

The order of the following sections are based on the STAG present value (PV) numbering system starting with environment related present values (PV1 and PV2) then accidents (PV3) and so on.

## 6.2 Environment

In terms of the economy STAG criteria, the Global Air Quality impacts of the A9 Dualling Programme are monetised and reported in Table 6.2. It should be noted that as part of the SEA process, air quality and noise were scoped out. As such the following monetisation of global air quality is for investment case purposes only and does not reflect any assessment of impact at receptors.

**Table 6.2: Environment Monetised Benefits (£m, 2010 values and prices)**

| Indicator | Index | Value |
|---|---|---|
| Global air quality - CO2 | PV1 | -49.96 |
| Physical fitness | PV2 | n/a |
| Monetised summary | PV1 + PV2 | -49.96 |
| Monetary impact ratio | (PV1+PV2)/(PVC x -1) | -0.03 |

The increase in fuel use due to the A9 Dualling Programme results in higher CO2 emissions over the appraisal period. Disbenefits of £50m, calculated using the central valuation of carbon, result in a reduction in the overall BCR of 3%.

## 6.3 Accidents

The application and inclusion of monetary valuations on casualties and accidents of differing severity is standard in UK cost-benefit analysis. In transport appraisal, accidents can impose a wide range of impacts on people and organisations including medical and healthcare costs, losses in economic output, material damage, emergency services costs, insurance and legal costs and an allowance for the pain, grief and suffering incurred.

The A9 has a lower than national average Scottish Trunk Road rate of accidents, but these accidents tend to be more serious in nature (and hence more costly in economic terms) when they do occur. Analysis of A9 accident data was used to calculate local accident rates and severity rates[44]. Standard accident costs alongside local rates were applied as shown in Table 6.3.

**Table 6.3: Application of local/national accident and severity rates**

| Scenario | Location/Type | Accident Rates | Accident Severity |
|---|---|---|---|
| Do Minimum | A9 (Perth-Inverness) | Local | Local |
| | A9 (Inverness to Scrabster) | Local | Local |
| | Non A9 | National | National |
| Do Something | A9 (dualled) | National | National |
| | A9 (already dualled) | National | National |
| | Non A9 | National | National |

[44] *Accidents Benefits Summary, AECOM Technical Note 09 ,September 2015*

The benefit assessment was undertaken using vehicle-kilometres forecasts, by link type, extracted from TMfS12. The calculation resulted in a PVB of £344m (2010 values and prices) offsetting 18% of the PVC of the project.

**Table 6.4 – Accident Monetised Benefits (£m, 2010 values and prices)**

| Indicator | Index | Value |
|---|---|---|
| Total discounted savings | PV3 | 343.84 |
| Monetary impact ratio | PV3 / (PVC x -1) | 0.18 |

The above demonstrates that the proposed Category 7A road design standard of the A9 Dualling Programme and the associated high levels of vehicle segregation will deliver significant safety benefits.

## 6.4 Transport Economic Efficiency

The central principle of Transport Economic Efficiency (TEE) analysis is to estimate the welfare gain which results from transport investment, as measured by the individual's willingness to pay for such an improvement and the financial impact on private sector transport operators. TEE analysis presents the key effects disaggregated by particular groups, mode of transport and by impact (journey time, vehicle operating costs, and user costs).

Tables 6.5 and 6.6 present the User Benefits and Private Sector Operator Impacts respectively.

**Table 6.5 - TEE User Benefits (£m, 2010 values and prices)**

| | Commute | Other | Business | Freight | PT | Total |
|---|---|---|---|---|---|---|
| Travel Time | 114.8 | 473.2 | 214.1 | 343.8 | 14.9 | 1160.9 |
| User Charges | 0.0 | 0.0 | 0.0 | 0.0 | 13.8 | 13.8 |
| VOCs | -26.4 | -90.0 | -2.1 | -92.3 | 0.0 | -210.7 |
| Total | 88.4 | 383.2 | 212.1 | 251.6 | 28.7 | 964.0 |

The project is forecast to deliver significant user benefits through journey time savings, primarily to non-public transport modes, as the increase in road class allows higher speeds on the corridor. These higher speeds, however, result in increased vehicle operating costs, resulting in user dis-benefits that somewhat offset the time benefits.

**Table 6.6 - TEE Private Sector Operator Impacts (£m, 2010 values and prices)**

| | Road | PT | Total |
|---|---|---|---|
| Investment Costs | 0.0 | 0.0 | 0.0 |
| Operating & Maintenance | 0.0 | 0.0 | 0.0 |
| Revenues | 0.0 | -16.0 | -16.0 |
| Grant/Subsidy | 0.0 | 0.0 | 0.0 |
| Total | 0.0 | -16.0 | -16.0 |

The user benefits outlined in Table 6.5 have been mapped geographically to illustrate the origins that will gain most from the travel time savings forecast as part of the A9 Dualling Programme.

Figure 6.2 illustrates the origins that will benefit from business related trip purposes. This identifies that Inverness, Perth and Moray are the three areas forecast to gain the most economic benefit in terms of improved journey times for business trips.

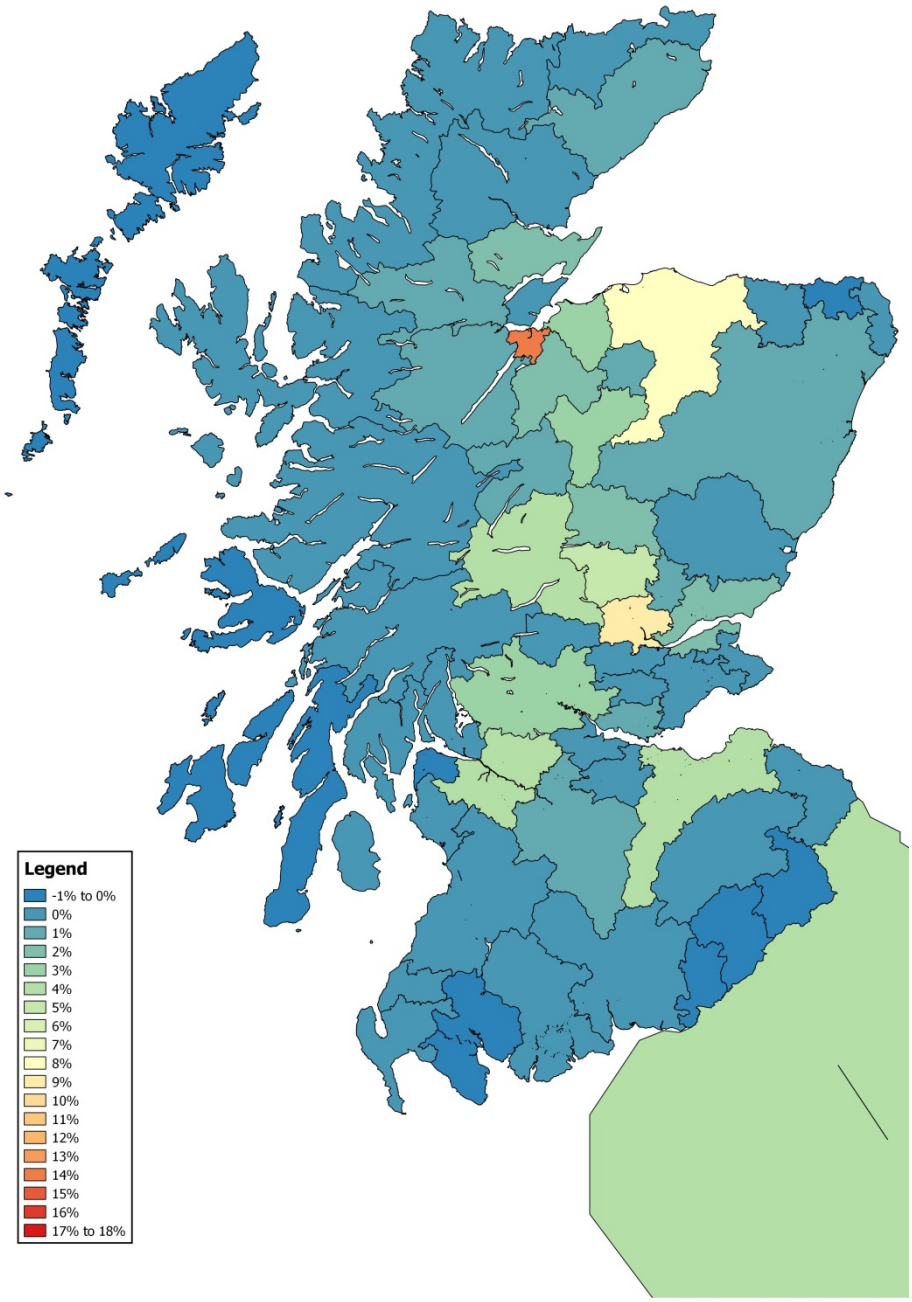



**Figure 6.2: Distribution of journey time benefits (excluding public transport) for business trips by journey origin, 2037**

Figure 6.3 illustrates the origins that will benefit from freight related trip purposes. This identifies that Inverness, England & Wales, the Inner Moray Firth and South Lanarkshire are the areas forecast to gain the most economic benefit in terms of improved journey times for freight related trips.

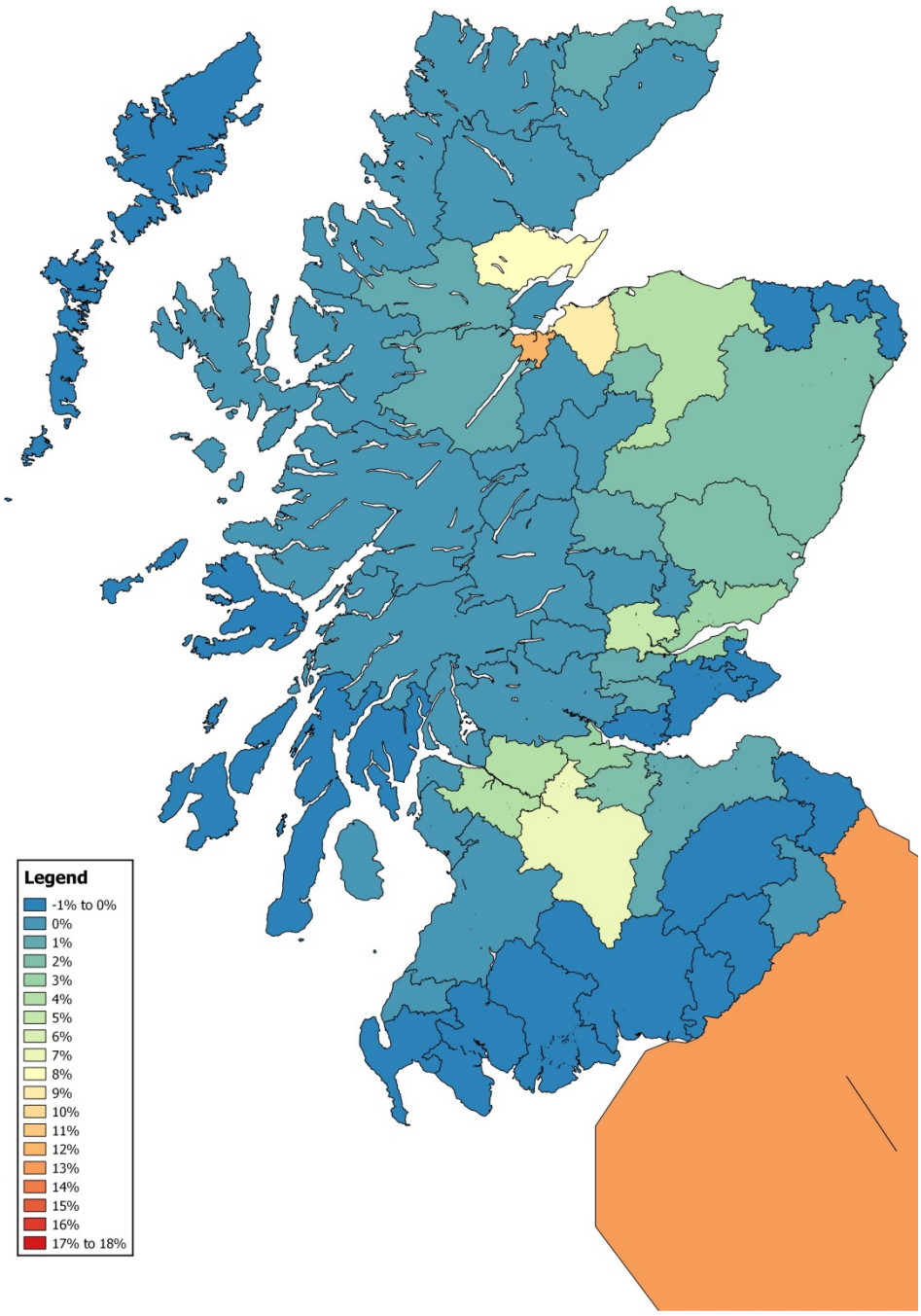



**Figure 6.3: Distribution of journey time benefits for freight trips by journey origin, 2037**

Figure 6.4 illustrates the origins that will benefit from commuter related trip purposes. This identifies that Inverness and Perth are the areas forecast to gain the most economic benefit in terms of improved journey times for commuter related trips.

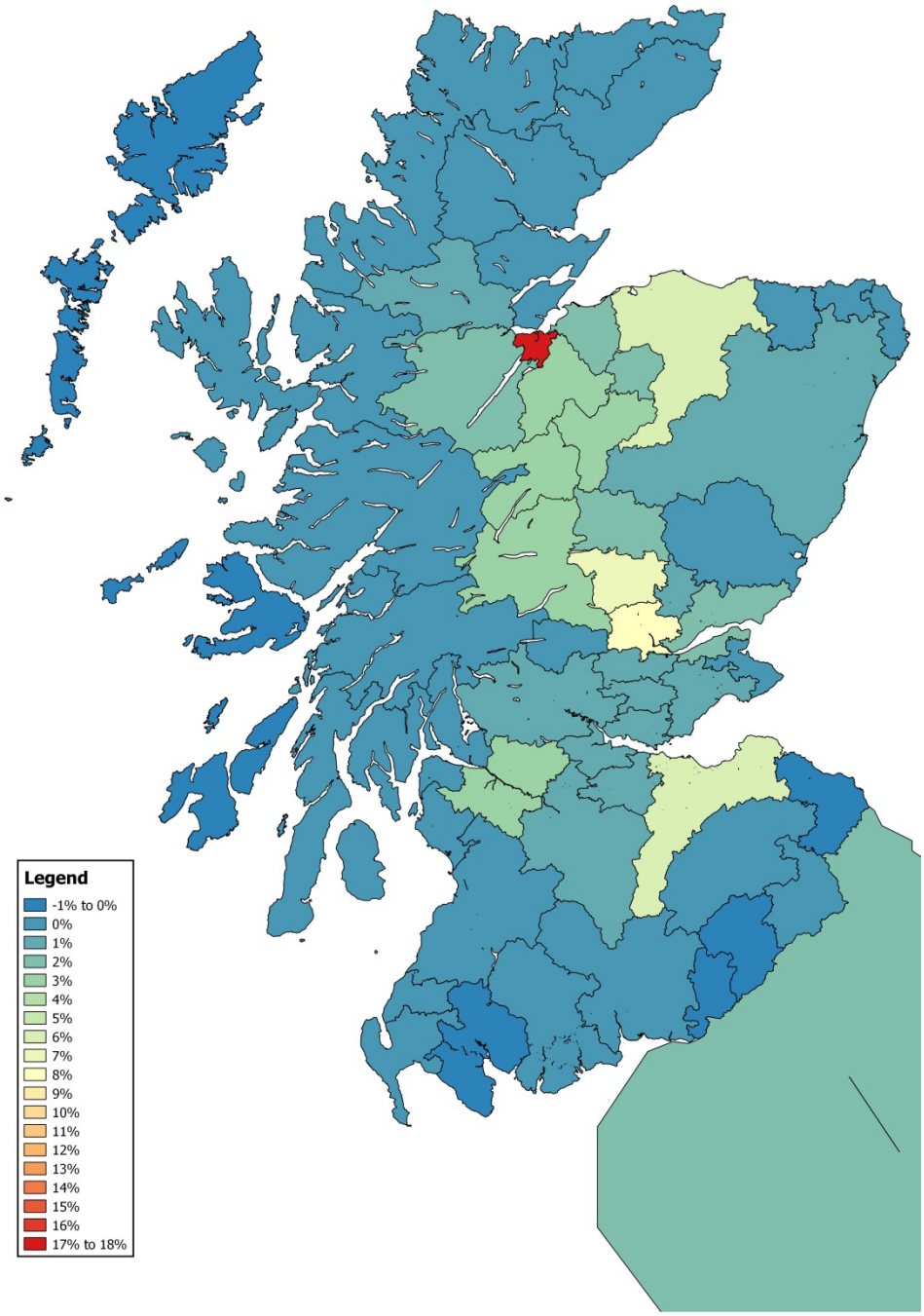



**Figure 6.4: Distribution of journey time benefits (excluding public transport) for commuter journeys by journey origin, 2037**

Figure 6.5 illustrates the origins that will benefit from shopping and leisure related trip purposes. This identifies that Inverness, Perth and Moray are the areas forecast to gain the most economic benefit in terms of improved journey times for shopping and leisure related trips.

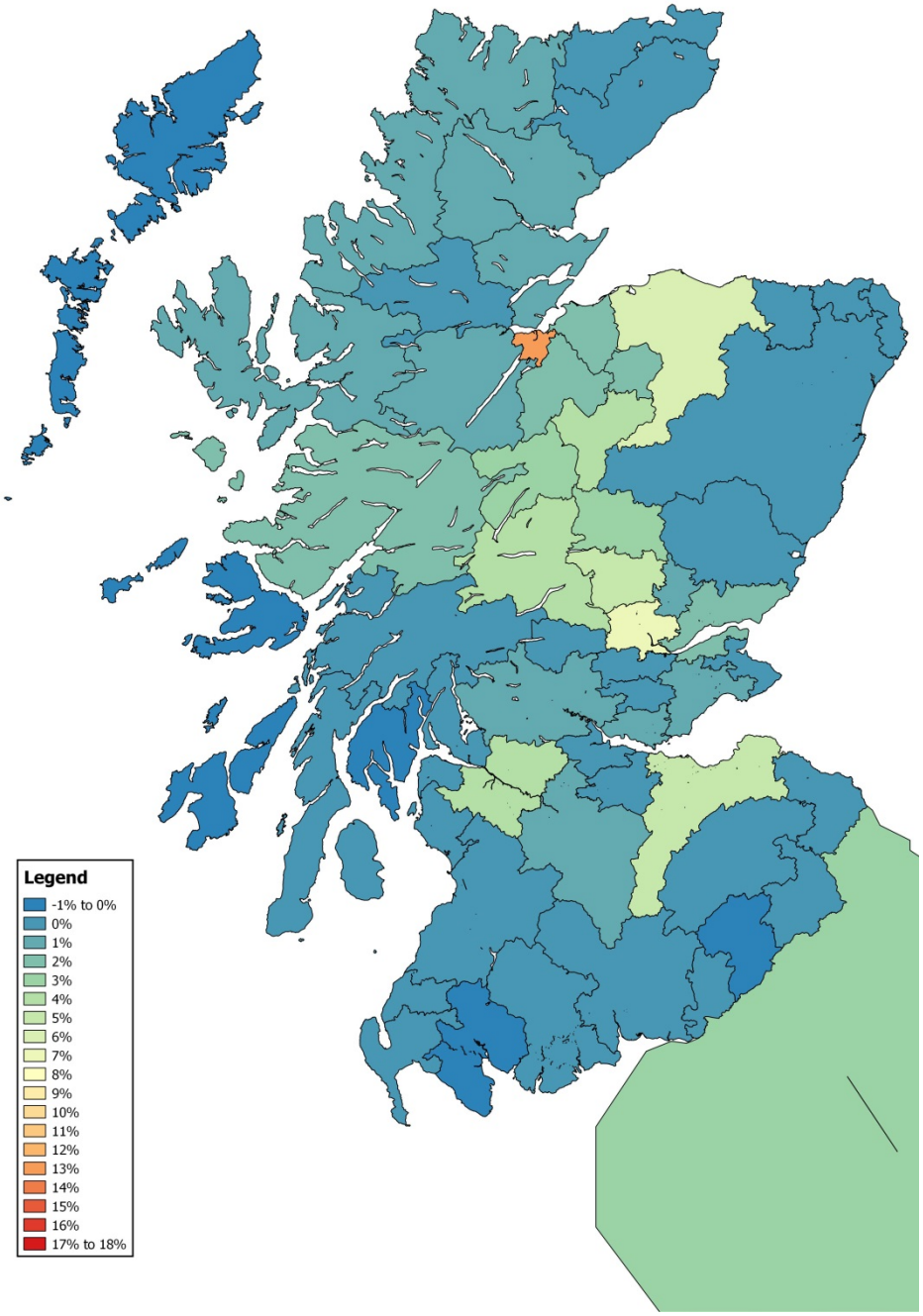



**Figure 6.5: Distribution of journey time benefits (excluding public transport) for other journeys by journey origin, 2037**

Table 6.7 presents the total monetised journey time savings by scale of time saving, for the first full year of operation for all projects in 2026. It should be noted that the table includes journey time savings (benefits) as well as journey time increases (disbenefits).

**Table 6.7: 2026 Total Monetised Journey Time Savings (£000s, 2010 values and prices)**

| Scale of time saving | Work Trips | % | Non-work trips | % |
|---|---|---|---|---|
| <-5 mins | -3 | -0.30 | -79 | -3.15 |
| -5 to -2 mins | -1 | -0.12 | -11 | -0.42 |
| -2 to 0 mins | -17 | -1.99 | -53 | -2.14 |
| 0 to 2 mins | 33 | 3.86 | 150 | 5.99 |
| 2 to 5 mins | 86 | 10.20 | 347 | 13.86 |
| >5 mins | 748 | 88.34 | 2148 | 85.85 |

The table illustrates that the majority of the benefits accrue to travellers in amounts greater than five minutes (over 85% for work and for non-work), while offsetting disbenefits are relatively minor (approximately 2.4% for work and 5.7% for non-work). Results for 2037 show a similar pattern with the majority of the benefits accruing to travellers in amounts greater than five minutes (over 83% for work and for non-work), while offsetting disbenefits are relatively minor (approximately 2.6% for work and 6.4% for non-work).

### 6.4.1 Construction and Maintenance Impacts

An assessment of the potential traffic delays, and hence costs to road users, anticipated to occur as a result of the construction and maintenance of the A9 Dualling Programme [45] has been undertaken using the A9DTM(b).

During the phased construction period (2017 to 2025), the working assumption that has been assessed has been to retain one lane in both directions with a 40mph speed limit enforced.

During the maintenance phases, the working assumption that has been assessed to maintain the existing single carriageway sections (Do Minimum scenario) has been to adopt shuttle working. At the majority of sites a 500m works length has been assessed. However, due to higher traffic volumes at southern sections of the A9 a works length of 250m was assessed. Once the A9 Dualling Programme is constructed, the Do-something maintenance regime would adopt a similar operational regime as per the construction period i.e. one lane in both directions with a 40mph speed limit enforced.

The maintenance impacts have been assessed for major reconstruction events only. No account of delay impacts due to routine and cyclic maintenance has been appraised. The time benefits due to construction and maintenance impacts are presented in Table 6.8.

[45] *Methodology for Initial Assessment of Delays During Scheme Construction and Maintenance, AECOM Technical Note 02 , September 2015*

**Table 6.8: Construction and Maintenance User Journey Time Costs (£m, 2010 values and prices)**

| | Do Minimum | Do Something | Programme benefit |
|---|---|---|---|
| Construction | 0.0 | 5.4 | -5.4 |
| Maintenance | 174.3 | 6.9 | 167.4 |
| Total | 174.3 | 12.3 | 162.0 |

The construction of the A9 Dualling Programme, results in a £5.4m disbenefit. The shuttle working required for the maintenance of the Do Minimum results in a significant time disbenefit, when compared with the more efficient maintenance regime that can be operated under a fully dualled configuration. Over the 60 year appraisal period this results in £167.4m benefit.

### 6.4.2 Junction Rationalisation

The design approach for the A9 Dualling Programme provides for grade separated junctions with limited left in / left out junction provision along the route. The works will close central reserve gaps and rationalise the number of junctions along the route. In order to assess the impact of the junction rationalisation[46] on travel times and distances, the A9DTM(b) has been used.

Using the junction strategy outlined within the A9 Dualling Design Manual for Roads & Bridges (DMRB) Stage 1 Report[47], scenarios were created in the A9DTM(b) with and without the proposed junction strategy along the A9. This resulted in a number of minor junctions being removed or upgraded which in turn required rerouting of side road traffic. The analysis considered two scenarios:

- A9 Dualling Programme, with junctions rationalised as per the A9 Dualling Design Manual for Roads & Bridges (DMRB) Stage 1 Report; and
- A9 Dualling Programme retaining the existing junction arrangements.

An example of the junction coding applied for the Dalguise junction is indicated in Figure 6.6.

[46] *Junction Rationalisation, AECOM Technical Note 03, September 2015*
[47] *DMRB Stage 1 Report produced as part of the PES framework*, *Transport Scotland*, *March 2014*

The layout on the left is the existing junction as coded within the A9DTM(b), whilst the layout on the right is a potential grade separated arrangement with A9 dualling that is consistent with the DMRB Stage One Assessment.

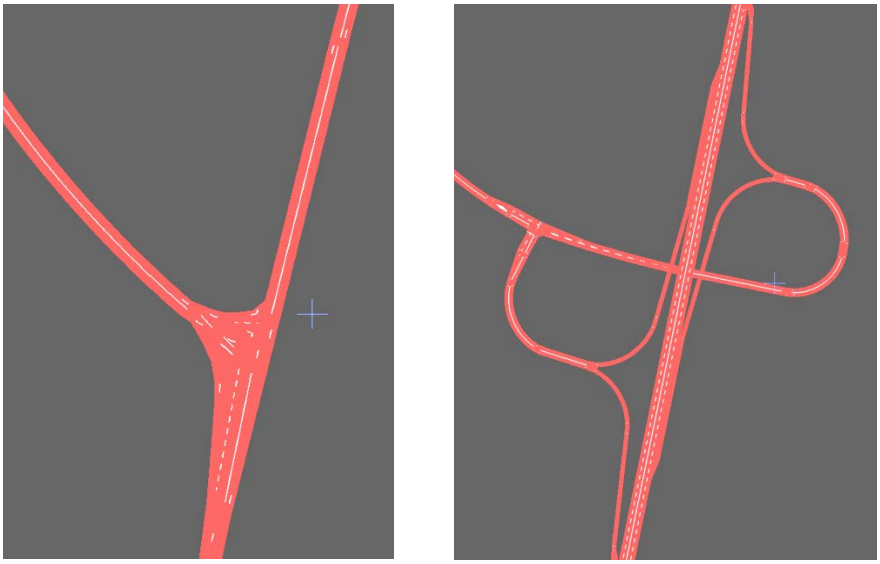


**Figure 6.6 - Dalguise Junction Rationalisation (A9DTM(b))**

Forecast models for 2027 and 2037 were created by applying growth factors derived from TMfS12. A present value of benefits (PVB) was then calculated using the Program for the Economic Assessment of Road Projects (PEARS) version 14.1. Local vehicle occupancies, annualisation factors and adjustments to the modelled purpose proportions were applied. The results are shown in Table 6.9.

**Table 6.9 – Outline Junction Rationalisation Benefits (£m, 2010 values and prices)**

| | Commute | Other | Business | Freight | Total |
|---|---|---|---|---|---|
| Travel Time | -6.3 | -34.0 | -46.3 | 1.1 | -85.5 |
| User Charges | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| VOCs | 1.0 | 3.9 | 5.8 | 9.5 | 20.2 |
| Summary | -5.3 | -30.1 | -40.6 | 10.6 | -65.3 |

As indicated above, applying the proposed junction strategy for the A9 Dualling Programme is assessed to have time disbenefits and vehicle operating cost increases that total £65.3m.

## 6.5 Driver Frustration

Building on the primary research discussed earlier in Chapter Four, the A9DTM(b) was used to estimate the amount of time that drivers would experience driving conditions that cause driver frustration. Further details on the Stated Preference surveys including uplift factors are provided in the A9 Driver Frustration Stated Preference Report[48] and Technical Note 07[49]. The following assumptions were adopted:

- Business travellers were attributed commuter values of time for the purposes of valuing 'frustrated time';
- Passengers were considered to experience no frustration for the purpose of monetisation; and
- No 'frustration' was deemed to occur in the full A9 Dualling Programme scenario.

In order to include this monetised benefit in the economic case it is necessary to establish that 'frustration' is not included in the standard journey time savings. Further research was therefore undertaken into how the standard values of time were derived. It was established that these include at least some element of congested time. The data underpinning the values of time was then analysed in order to isolate the effects of congestion, and an adjustment factor calculated.

Table 6.10 presents the calculated benefits due to the relief of driver frustration by implementing the A9 Dualling Programme. For the purposes of the investment case the value of benefits derived by the A9 Dualling Programme in relation to Driver Frustration is itemised separately from the TEE analysis.

[48] *A9 Driver Frustration Stated Preference Research Final Report, AECOM, September 2014*
[49] *Driver Frustration, AECOM Technical Note 07, September 2015*

**Table 6.10 - Driver Frustration Benefits (£m, 2010 values and prices)**

| Vehicle Type | Purpose | Present Value of Benefit |
|---|---|---|
| Car | In Work | 19.3 |
| Car | Commute | 82.7 |
| Car | Other | 241.1 |
| LGV | In Work | 77.3 |
| LGV | Other | 9.4 |
| **All** | **All** | **429.8** |

The above results indicate that the A9 Dualling Programme will provide a significant benefit (£430m) to road users by reducing conditions related to frustrated driving environments. This benefit would offset 23% of the PVC of the project.

## 6.6 Journey Time Variability

Incident related journey time variability is concerned with events such as weather related problems, roadworks, or accidents. Any incident occurring on a carriageway will give rise to delays for motorists. Breakdowns cause brief blockages of at least one traffic lane, while serious incidents involving personal injuries or fatalities can result in extended road closures on one or more lanes.

The implementation of a high quality Category 7A dual carriageway road project will have the effect of both reducing the occurrence of incidents (through safer driving and improved resilience to weather conditions) and reducing the delay impact of each incident, thus delivering road user time savings from both primary and secondary incidents.

The impact of incidents on journey time variability is not routinely captured within traditional modelling tools and is not captured by TMfS12 or the A9DTM. As a result, the quantification of the benefits resulting from the reduction of incidents (or reduction of incident impacts) as a result of the A9 Dualling Programme has been undertaken. The assessment has concentrated on the potential reduction in delays related to full road closures as a result of accidents and due to severe weather events, using assumptions of occurrence and impact. No account has been undertaken of partial lane closures. The potential benefit generated by a reduction in the impact of incidents is outlined in Table 6.11.

**Table 6.11 – Potential Scale of Benefits from a reduction in Incident Related Delays (£m, 2010 values and prices)**

| Incident Type | Present Value of Benefit |
|---|---|
| Accidents | 15.9 |
| Weather | 5.4 |
| **Total Estimated Benefit** | **21.3** |

The scale of benefits calculated is of the order of £21m over the sixty year appraisal period. The relatively modest scale of benefit estimated meant no further detailed assessment was undertaken. The potential benefits from a reduction in incidents have not been included in the overall monetised benefits presented later in Section 6.10 and 6.11.

## 6.7 Wider Economic Benefits

WEBs are monetised economic impacts of transport changes that occur in the wider economy rather than to transport users. These are additional to the other monetised impacts (such as time savings) and non-users (such as safety and decongestion impacts) which are included in the economic case. WEBs arise because of imperfect markets in the business sectors that use the transport system. For example, improved connectivity between businesses provides spin-off benefits through effectively clustering businesses closer together and fostering more specialised supply chains, wider labour markets and improved diffusion of knowledge and best practice.

Guidance on the calculation of WEBs is provided by both DfT through WebTAG and by Transport Scotland through STAG. In appraising the A9 project the more detailed WebTAG guidance has been adopted for two reasons:

- WebTAG guidance has evolved following greater use and further academic input on appropriate parameter values; and
- the TELMoS12 model has been developed to implement this more detailed representation of WEBs.

The terminology used by WebTAG and STAG differs slightly and we have adopted the STAG nomenclature. This categorises impacts with a 'WB' prefix as defined below.

There are four main types of WEB:

- WB1 Agglomeration: By improving patterns of accessibility, transport investment can effectively bring businesses closer together and support specialisation of labour within supply chains and the diffusion of best practice.
- WB2 Competition effects: Changes in transport can expose businesses to new competitors or can widen the reach of already large firms enabling them to grow larger and dominate smaller firms through cost advantages from economies of scale. No guidance is available from either STAG or WebTAG to guide the quantification of this impact and it is usually considered to be neutral. It has therefore not been calculated.
- WB3 Imperfect competition: Where businesses do not operate under competitive conditions, they are able to charge more than their production costs for the goods and services that they produce. Following WebTAG and STAG guidance, it is assumed that, on average, businesses set their price based on a 10% mark-up over costs. Thus if transport improvements reduce business costs, it is assumed that these cost savings will be passed on to consumers with a 10% reduction.
- WB4 Labour market impacts: By reducing the difficulty of commuting journeys, transport interventions can change the net returns from working and encourage more people to enter the labour market. The benefits to individuals are captured though user time savings. However, personal decisions are assumed to be made based on post tax income. Any additional tax generated by people entering employment will accrue to government and constitutes an additional benefit of transport improvements. This impact is known as WB4a.

The calculation of WEBs[50] has been undertaken within the TELMoS12 model. Generalised cost data has been drawn from transport modelling using TMfS12.

Socioeconomic data used in the WEBs calculations (such as the size and distribution of workplace employment) is contained within TELMoS12. The 'whole of Scotland' results are

[50] *A9 Dualling Wider Economic Benefits- Methodology and Results, AECOM Technical Note 08, September 2015*

presented in Table 6.12 below. The impacts reflected here are impacts on welfare and should be considered as additional to the other user and non-user benefits in the economic case.

**Table 6.12: Forecast WEB impacts (£m, 2010 values and prices)**

| | 2027 | 2032 | 2037 | PVB |
|---|---|---|---|---|
| **WB1 Agglomeration** | 5.9 | 6.5 | 7.7 | 148.7 |
| **WB3 Imperfect competition** | 0.9 | 0.9 | 0.8 | 51.4 |
| **WB4a Labour supply impact** | 0.4 | 0.4 | 0.5 | 10.3 |
| **Total** | 7.2 | 7.8 | 9.0 | 210.4 |

*Source: TELMoS12, David Simmonds Consultancy analysis.*

The modelled total value of WEBs is £210.4m. This assumes no land use change. The agglomeration benefit dominates the impacts of attracting people into the labour market. Both agglomeration benefits and the benefits of attracting people into work grow consistently over the modelled period in all areas reflecting generalised cost benefits that also grow over time. Agglomeration benefits are dominated by impacts in the Highlands with further significant impacts in Perth and Kinross and Moray.

## 6.8 Key Sector Analysis

As identified in Chapter Four, the five key sectors most likely to be affected by the dualling of the A9 are considered to be:

- Food and Drink;
- Tourism;
- Energy;
- Life Sciences; and
- Forestry

To analyse the distribution of the key growth sectors within the A9 corridor[51], data from business surveys has been used which provided information about detailed employment patterns by location and business sector. The current version of this survey is the Business Register and Employment Survey (BRES)[52] which has been running since 2008. This survey asks businesses for detailed information about their sites, the nature of work undertaken there and the number of employees at each site.

Growth over the 10 years for the key sectors has been considered and compared against growth in Scotland as a whole for the sectors. The findings are presented in Table 6.13.

[51] *Analysis of Key Growth Sectors, AECOM Technical Note 15, September 2015*
[52] *Data obtained from NOMIS under agreement reference: NTC/BRES12-P0474*

**Table 6.13: Key sector growth in Perth & Kinross, Moray and Highland relative to Scottish growth**

| Sector | Employment growth rate, 2003 to 2012 inclusive | | Key sector targets* |
|---|---|---|---|
| | Perth & Kinross, Moray and Highland | Scotland | |
| Food and Drink | 10.8% | -0.7% | In 2010 the Scottish industry was worth £10bn. The Food and Drink Industry Strategy[53] was revised in October 2013 (having met 2017 targets ahead of schedule) and now seeks to grow the industry to £16.5bn by 2017. |
| Energy | -32.0% | 15.2% | **Energy – Oil and Gas** The Oil and Gas Strategy 2012 – 2020[54] produced by the Oil and Gas Industry Leader Group concentrates targets more on efficiencies to maximise returns. In 2010/11 domestic sales were worth £9bn, international sales were worth £7.6 billion. The strategy aims to increase this to £12bn for domestic sales and £18bn for international sales by 2020.<br><br>**Energy – Renewables** The Scottish Government has set out ambitious targets for renewable energy in the coming years. The Scottish Government's 2020 Renewable Energy Routemap[55] estimates that working towards those targets will generate £30bn investment in Scotland by 2020. |
| Life Sciences | 174.4% | 16.1% | The aim set out in the Life Sciences Strategy[56] produced by Life Science Scotland is to double turnover to £6.2bn by 2020 from a base of £3.1bn in 2010. The 2020 target would see life sciences contributing £3bn to GVA. |
| Sustainable Tourism | 10.6% | 3.0% | Tourism Scotland 2020[57] produced by the Scottish Tourism Alliance sets out 2011 figures of £4.5bn from overnight visitors and £6.2bn from day visitors. The strategy seeks to increase overnight visitor spend to between £5.5bn and £6.5bn by 2020. |
| Forestry | 12.7% | 6.9% | The Scottish Forestry Strategy 2006[58] produced by the Scottish Executive identifies forestry's contribution to the forestry figures. It also notes that there has been private sector investment in the industry of £60 million per year and that forestry and wood processing contribute £650million per year to the Scottish economy. Targets in the industry include an increase in woodland from 17% of Scottish land in 2006 to 25% by 2050. |

** Key sector targets are not consistent in presentation as the information comes from a range of different sources.*

Businesses consultations within the key sectors have been undertaken to better understand their current use of the A9 between Perth and Inverness for staff, business trips, customers and deliveries and how they considered the A9 dualling would impact on their business. A number of common themes arose in these interviews which are captured in Table 6.14.

[53] *Scotland – A Land of Food and Drink, Scotland Food & Drink*
[54] *Oil and Gas Strategy 2012 – 2020, maximising our Future, Oil & Gas Industry Leadership Group, 2012*
[55] *2020 Routemap for Renewable Energy in Scotland, The Scottish Government, 2011*
[56] *Scottish Life Sciences Strategy 2011 Creating Wealth, Promoting Health, Life Sciences Scotland, 2011*
[57] *Tourism Scotland 2020 The future of our industry, in our hands, The Scottish Tourism Alliance, 2012*
[58] *The Scottish Forestry Strategy, Scottish Executive, 2006*

**Table 6.14: Key Sector Consultation Responses**

| Issue | Details |
|---|---|
| **Stockpiling** | All sectors currently hold additional stock and raw materials on site to compensate for unreliability on the A9 route. In some cases, this was reported to be up to three weeks' worth of stock. Improvements to the A9 would reduce the need for inefficient stockpiling practices. |
| **High cost of haulage** | Haulage costs would be anticipated to reduce in the full dualling scenario due to reduced journey times and improved journey time reliability. |
| **Time critical** | The transport of goods for certain sectors is time critical and incidents on the network can have serious consequences. A more reliable and resilient route would be beneficial to most key sectors. |
| **Staff retention & recruitment** | It is considered that opportunities for staff recruitment (increased catchment areas) and retention would improve with the full A9 dualling in place. |
| **Inward Investment** | Upgrades to the A9 are considered to attract inward investment along the A9 corridor. |
| **High value of goods in transit** | Some of the sectors transport high value products. Reduced journey times following the A9 dualling would allow supplies/exports to reach market quicker. |
| **Reducing perceptions of peripherality** | Inverness is considered to be 'far away' and an improved A9 trunk road is considered to be an important step in opening up Inverness and the wider hinterland to tourism. It is considered that all communities along the route would benefit from improved accessibility. |
| **Junction access impacts** | The forestry industry has strict controls in place that regulate the haul routes that can be used for the transport of logs. Changes resulting from the A9 dualling junction strategy will have impacts (beneficial and/or adverse) on the industry. |

In addition to business consultations, a survey of over 200 companies by SCDI[59] sought to understand the use of the A9 and the A96 and the constraints and issues currently faced. The key findings of this work echo many of the consultation findings above. The existing A9 is generally considered to provide a poor link between Perth and Inverness due to unreliability, road closures and safety concerns. The dualling of the A9 is anticipated to help provide improved access for visitors and customers, productivity gains from reduced journey times and less stressful and safer journeys. The survey indicated that increased attractiveness of the area for investment, reduced transport costs and improved business confidence were the principal benefits of dualling the A9. Figure 6.7 overleaf illustrates the importance the A9 dualling will have relative to a range of criteria.

[59] *Connecting Scotland's Cities – Business Survey on Dualling the A9 and A96, SCDI, September 2013*

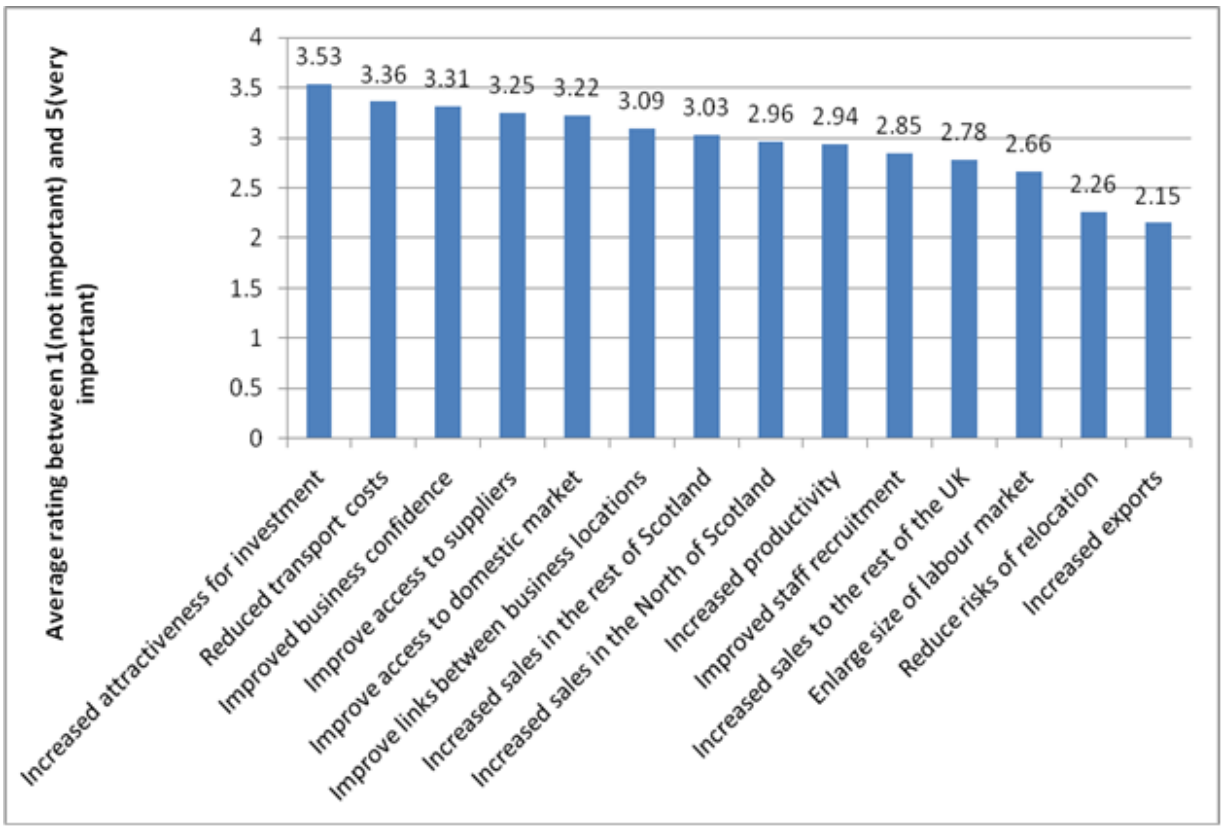



**Figure 6.7: SCDI Survey Results**

## 6.9 A9 Dualling Programme Costs

### 6.9.1 Capital Costs

Construction costs have been estimated for the complete A9 Dualling Programme. The assessment includes costs due to design and preparation, land acquisition, construction and other costs (such as supervision, statutory undertakers and authorities etc.). Costs are provided in Q2 2013 prices. The costing has taken the following factors into account:

- Quantified risk assessment (where the level of design has made this possible);
- An indicative construction programme has been adopted for the purposes of the Case for Investment costing exercise. Further work will be undertaken to consider the construction programme and procurement route;
- Optimism bias assessment (where the level of design is not yet mature enough for a bottom up assessment of risk and opportunities); and
- Inflation in excess of general inflation using an assumed profile through to 2025.

The profile of spend by year is presented in Figure 6.8 below.

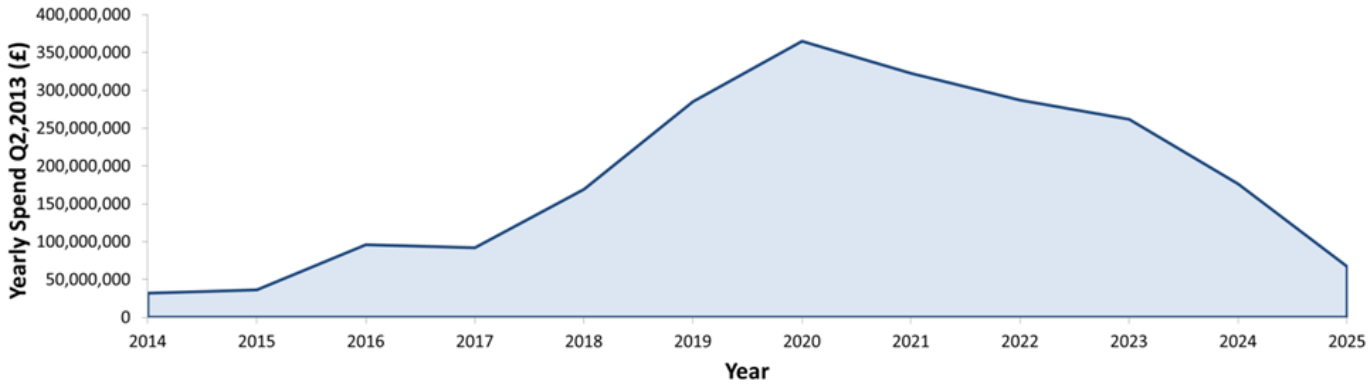



**Figure 6.8: A9 Dualling Programme - Planned Expenditure Profile (including risk, excluding inflation)[60]**

The present value of (capital) costs (PVC) adjusted for risk and inflation is £1892m, expressed in 2010 values and prices.

[60] *A9 Dualling Programme Outline Business Case – Basis of Cost Estimate Report, Benchmark Estimating, May 2014*

### 6.9.2 Operating and Maintenance Costs

The operating and maintenance (O&M) costs of the A9 Dualling Programme will be developed in more detail as part of the DMRB Project Assessment process. For the purposes of the investment case a high level estimate of the potential scale and profile of O&M costs associated with the existing (Do-Minimum) and full dualling (Do-Something) scenarios has been undertaken as outlined in Table 6.15. At present the forecast costs (when discounted back to 2010 prices) are broadly comparable as indicated below and therefore have not been directly included within the economic assessment. Once the O&M cost model is more fully developed as part of the DMRB Stage 2 and 3 project assessment process a further review of the economic impacts will be required.

**Table 6.15: Total Maintenance Costs between 2018 and 2085, in 2010 prices and values (£m)**

| | Do Minimum | Do Something |
|---|---|---|
| Total | 71.39 | 71.38 |

## 6.10 Value for Money Appraisal

The monetary appraisal used to prepare the value for money assessments is conducted over a 60 year period from the first full year of opening in 2026 to 2085. The monetary appraisal also takes account of the phased implementation of projects from 2018 when Kincraig to Dalraddy opens. All monetary values are expressed in present value terms in 2010 values and prices and in millions of pounds, unless otherwise stated. Non-monetised impacts, where discussed, are not factored into any numeric measures. It should also be noted that where revenues are discussed, these represent incremental changes in revenue over a case with no dualling, not total revenue.

A number of metrics are requested by transport appraisal guidance to present measures of a project's value for money:

- ***Net Present Value (NPV):*** a measure of the total impact of the project upon society, in monetary terms, including everything that can be monetised. A positive value means that the monetised return on the investment is greater than the cost.
- ***Present Value of Costs (PVC):*** a measure of the monetary cost to the government's transport budget. In the context of the assessment of the A9 Dualling Programme it includes upfront capital costs, grant/subsidy payments, and revenues. Currently operating and maintenance costs are excluded, as the difference between the costs relating to the Do Minimum and Do Something programmes are not material. Sensitivity testing of O&M costs will be undertaken.
- ***Present Value of Benefits (PVB):*** this is NPV minus PVC; that is, the impact on society exclusive of the government's transport budget. It includes the monetised benefits accruing to users (in terms of travel time, vehicle operating costs, and user charges), those falling on the private sector (operating costs and revenues), monetised environmental and safety impacts, and the change in indirect taxation receipts.
- ***The Benefit-Cost to Government Ratio (BCR)*** is used to assess value for money. This is PVB divided by PVC, and presents the return on each pound spent.

### A9 Dualling Programme Economics

Table 6.16 summarises the cost benefit appraisal for the A9 Dualling Programme based on the following assumptions:

- Average Speed Cameras are included in the Do-Minimum;
- The work undertaken to quantify driver frustration has been itemised separately, and
- As per current STAG guidance, WEBs are itemised separately.

**Table 6.16: A9 Dualling Programme Cost Benefit Summary (£m, 2010 values and prices)**

| Indicator | Index | Value |
|---|---|---|
| Present Value of Transport Benefits | PVB = PV1+PV2+PV3+PV11+PV20 | 1472.9 |
| Present Value of Cost to Government | PVC = PV16+PV17+PV18+PV19 | -1891.6 |
| Net Present Value | NPV = PVB + PVC | -418.7 |
| Benefit-Cost to Government Ratio | Ratio = PVB / (PVC x -1) | 0.78 |
| Benefit-Cost to Government Ratio (including Driver Frustration) | Ratio = (PVB + Driver Frustration) / (PVC x -1) | 1.01 |
| Benefit-Cost to Government Ratio (including WEBs) | Ratio = (PVB + PV15) / (PVC x -1) | 0.89 |
| Benefit-Cost to Government Ratio (including WEBs and Driver Frustration) | Ratio = (PVB + PV15 + Driver Frustration) / (PVC x -1) | 1.12 |

The A9 Dualling Programme has a Net Present Value of -£419m and a BCR of 0.78. For clarity driver frustration has been itemised separately and increases the BCR to 1.01. Including WEBs as a sensitivity in accordance with STAG guidance increases the BCR to 1.12.

Table 6.17 overleaf itemises in full the present value of costs and benefits as per STAG.

**Table 6.17 – A9 Dualling Programme Monetised Summary (£m, 2010 values and prices)**

| Environment | Index | Value |
|---|---|---|
| Global air quality - CO2 | PV1 | -49.96 |
| Monetised summary | PV1 + PV2 | -49.96 |
| Monetary impact ratio | (PV1+PV2)/(PVC x -1) | -0.03 |
| **Accidents** | | |
| Total discounted savings | PV3 | 343.84 |
| Monetised summary | PV3 | 343.84 |
| Monetary impact ratio | PV3 / (PVC x -1) | 0.18 |
| **Economic (TEE)** | | |
| Travel Time | PV4a | 1160.94 |
| Travel Time: Construction & Maintenance | PV4b | 161.99 |
| Travel Time: Junction Rationalisation | PV4c | -85.50 |
| User charges | PV5 | 13.82 |
| Vehicle operating costs | PV6 | -190.55 |
| Investment costs | PV7 | 0 |
| Operating and maintenance costs | PV8 | 0 |
| Revenues | PV9 | -16.02 |
| Grant/subsidy | PV10 | 0 |
| Monetised summary | PV11 = PV4a-c+PV5+PV6+PV7+PV8+PV9+PV10 | 1044.68 |
| Monetary impact ratio | PV11 / (PVC x -1) | 0.55 |
| **Driver Frustration** | | |
| Driver Frustration | PVDF | 429.76 |
| Monetised summary | PVDF | 429.76 |
| Monetary impact ratio | (PV11 + PVDF)/(PVC x -1) | 0.78 |
| **WEBs** | | |
| Agglomeration economies | PV12 | 148.70 |
| Increased output in competitive markets | PV13 | 51.43 |
| Wider benefits - labour supply | PV14 | 10.30 |
| Monetised summary | PV15 = PV12+PV13+PV14 | 210.43 |
| Monetary impact ratio | (PV11 + PV15)/(PVC x -1) | 0.66 |
| **Cost to Public Sector** | | |
| Public sector investment costs | PV16 | -1891.58 |
| Public sector O&M costs | PV17 | 0.0 |
| Grant/subsidy payments | PV18 | 0.0 |
| Revenues | PV19 | 0.0 |
| Taxation impacts | PV20 | 134.31 |

## 6.11 Reference Case – (When Scottish Ministers made the IIP Decision)

A reference case scenario has been assessed as part of the Case for Investment that considers the situation when Scottish Ministers originally made the commitment in 2011 to dual the A9 from Perth to Inverness. Specifically the reference case does not include the Average Speed Camera system. Table 6.18 below summarises the cost benefit appraisal for the A9 Dualling Programme Reference Case scenario.

**Table 6.18: A9 Dualling Programme Reference Case Cost Benefit Summary (£m, 2010 values and prices)**

| Indicator | Index | Value |
|---|---|---|
| Present Value of Transport Benefits | PVB = PV1+PV2+PV3+PV11+PV20 | 1400.2 |
| Present Value of Cost to Government | PVC = PV16+PV17+PV18+PV19 | -1891.6 |
| Net Present Value | NPV = PVB + PVC | -491.4 |
| Benefit-Cost to Government Ratio | Ratio = PVB / (PVC x -1) | 0.74 |
| Benefit-Cost to Government Ratio (including Driver Frustration) | Ratio = (PVB + Driver Frustration) / (PVC x -1) | 0.94 |
| Benefit-Cost to Government Ratio (including WEBs) | Ratio = (PVB + PV15) / (PVC x -1) | 0.85 |
| Benefit-Cost to Government Ratio (including WEBs and Driver Frustration) | Ratio = (PVB + PV15 + Driver Frustration) / (PVC x -1) | 1.04 |

The A9 Dualling Programme reference case has a net present value of -£491m and a BCR of 0.74. For clarity driver frustration has been itemised separately and increases the BCR to 0.94. Including WEBs as a sensitivity in accordance with STAG guidance increases the BCR to 1.04.

Table 6.19 overleaf itemises in full the present value of costs and benefits as per STAG. As indicated overleaf, the main impacts of the reference case on the A9 Dualling Programme economic case are to increase the level of benefits associated with accident savings by the order of £117m but to decrease the level of travel time and operating cost benefits by the order of £173m.

**Table 6.19: A9 Dualling Programme Reference Case Monetised Summary (£m, 2010 values and prices)**

| Environment | Index | Value |
|---|---|---|
| Global air quality - CO2 | PV1 | -38.82 |
| Monetised summary | PV1 + PV2 | -38.82 |
| Monetary impact ratio | (PV1+PV2)/(PVC x -1) | -0.02 |
| **Accidents** | | |
| Total discounted savings | PV3 | 461.08 |
| Monetised summary | PV3 | 461.08 |
| Monetary impact ratio | PV3 / (PVC x -1) | 0.24 |
| **Economic (TEE)** | | |
| Travel Time | PV4a | 940.88 |
| Travel Time: Construction & Maintenance | PV4b | 161.99 |
| Travel Time: Junction Rationalisation | PV4c | -85.50 |
| User charges | PV5 | 11.33 |
| Vehicle operating costs | PV6 | -143.17 |
| Investment costs | PV7 | 0 |
| Operating and maintenance costs | PV8 | 0 |
| Revenues | PV9 | -13.40 |
| Grant/subsidy | PV10 | 0 |
| Monetised summary | PV11 = PV4a-c+PV5+PV6+PV7+PV8+PV9+PV10 | 872.14 |
| Monetary impact ratio | PV11 / (PVC x -1) | 0.46 |
| **Driver Frustration** | | |
| Driver Frustration | PVDF | 369.26 |
| Monetised summary | PVDF | 369.26 |
| Monetary impact ratio | (PV11 + PVDF)/(PVC x -1) | 0.66 |
| **WEBs** | | |
| Agglomeration economies | PV12 | 148.70 |
| Increased output in competitive markets | PV13 | 40.81 |
| Wider benefits - labour supply | PV14 | 10.30 |
| Monetised summary | PV15 = PV12+PV13+PV14 | 199.81 |
| Monetary impact ratio | (PV11 + PV15)/(PVC x -1) | 0.57 |
| **Cost to Public Sector** | | |
| Public sector investment costs | PV16 | -1891.58 |
| Public sector O&M costs | PV17 | 0 |
| Grant/subsidy payments | PV18 | 0 |
| Revenues | PV19 | 0 |
| Taxation impacts | PV20 | 105.30 |

## 6.12 Sensitivity Tests

At present Transport Scotland is developing alternative transport and economic forecasts that will be available to test all major transport projects in Scotland. It is recommended that the A9 Dualling Programme Case for Investment is updated to take on board the alternative forecast scenarios. In addition, the potential O&M costs will require to be subject to sensitivity tests as the design development and procurement model of the A9 Dualling Programme progresses.

# 7 Programme Appraisal - Safety

## 7.1 Introduction

Improving road safety is a key objective of the A9 Dualling Programme. Whilst the accident rate on sections of the route is below the national average, the severity of accidents is significantly greater than the national average. Alongside this, the A9 has a perception of being a dangerous route, a perception that is potentially damaging to the economy of the North of Scotland. A substantial amount of road safety data/evidence has already been presented in Chapters Four, Five and Six. This Chapter presents an appraisal of the A9 Dualling Programme intervention against the STAG criteria of safety.

## 7.2 Impact of the A9 Dualling Programme

Transport modelling has been carried out as part of the A9 Dualling Programme case for investement. This work has forecast the impact of the Programme on the operational performance of the route, and accidents levels.

The analysis has shown that:

- Implementation of the programme is forecast to save 6 lives per year;
- When accidents do occur they are likely to be less severe; and
- Safety benefits arising from the dualling are valued at £340m (2010 values and prices) over the appraisal period.

Driver stress is attributed to frustration, fear of accidents and uncertainty relating to the route being followed. Safety improvements on the route would therefore help to address and reduce driver stress along the route. A further benefit in safety terms of providing a Category 7A route would be improved access for emergency vehicles through provision of two running lanes and greater resilience of the route. A causalities chance of survival increases significantly when medical assistance is available in a timely manner. As such the improvements brought about by the A9 Dualling Programme could contribute in helping to prevent some casualties from becoming more serious.

Surveys of business[61] and visitors[62] alongside consultation with stakeholders[63] undertaken during the investment case development highlighted a wide range of anticipated benefits linked to improved road safety as a result of the dualling, as summarised overleaf in Figure 7.1.

[61] *Connecting Scotland's Cities – Business Survey on Dualling the A9 and A96, SCDI, September 2013*
[62] *A9 Rest Area Strategy - Visitor Survey Results , AECOM File Note 07, September 2015*
[63] *Analysis of Key Growth Sectors, AECOM Technical Note 15, September 2015*

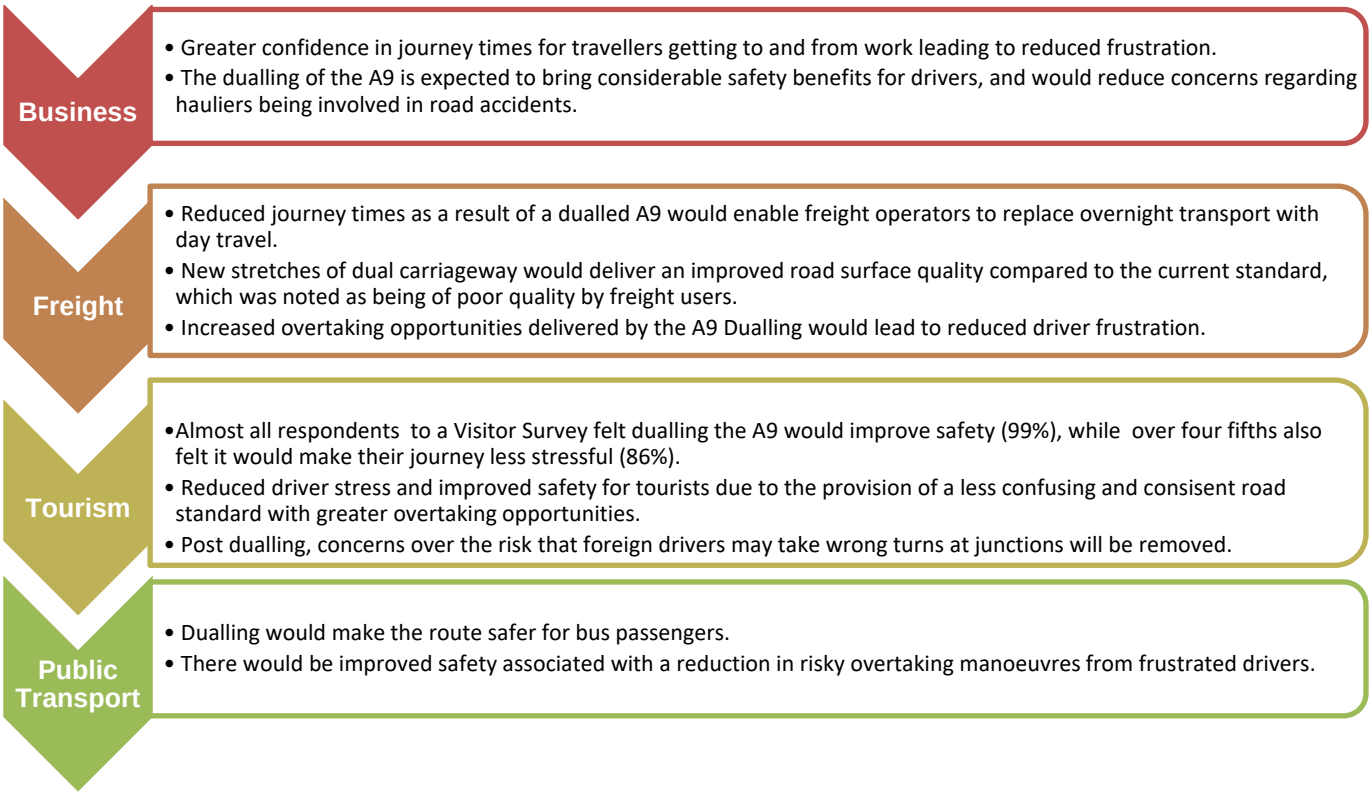



**Figure 7.1: Stakeholder Anticipated Benefits linked to improved road safety as a result of the dualling**

## 7.3 Security

The A9 Perth to Inverness is by its very nature a remote rural road. It travels through sparsely populated areas. The security of travellers on the route will be enhanced through improvements to rest areas and layby provision. Transport Scotland is developing separate Rest Area and Layby Strategies as part of the A9 Dualling Programme. The strategies aim to improve the standard of layby and rest area facilities along the route, for all users.

# 8 Programme Appraisal - Environment

## 8.1 Introduction

The A9 runs through a remote and rural landscape, renowned internationally for its natural beauty and diversity of habitat. The landscape is subject to a number of environmental designations, with a significant proportion running through the Cairngorms National Park. This Chapter summarises the appraisal of the intervention against the STAG criteria of Environment and should be read alongside the Strategic Environmental Assessment (SEA) [64] [65]of the route.

## 8.2 Environment

A Strategic Environmental Assessment has been undertaken on the A9 Dualling Programme. The SEA assessed a predominately online project alongside four near offline options. As part of the design process, further, more detailed assessments will be undertaken to identify impacts and any mitigation required. The table below provides a high level summary of the key findings of the SEA report at a programme level:

**Table 8.1 - Strategic Environmental Assessment Summary**

| | |
|---|---|
| **Landscape** | |
| **National Scenic Areas (NSA)** | Potential for impact of dualling works on NSAs at a number of locations on the A9 corridor. |
| **Cairngorms National Park (CNP)** | Much of the A9 Dualling works is within or alongside the boundary of the CNP. |
| **Historic Environment** | |
| **Scheduled Monuments (SM)** | There are a number of scheduled monuments along the extents of the A9 corridor, some of which could potentially be impacted by the dualling works, either directly or in terms of setting. |
| **Listed Buildings** | There are a number of listed buildings along the extents of the A9 corridor, some of which may be impacted by the dualling works, either directly or in terms of setting. |
| **Battlefields** | Potential for impacts on the Killiecrankie Battlefield Site, either directly or in terms of setting. |

[64] *Strategic Environmental Assessment (SEA) Environmental Report, Transport Scotland, June 2013*
[65] *Strategic Environmental Assessment (SEA) Environmental Report Addendum, Transport Scotland, March 2014*

| | |
|---|---|
| **Ancient Woodland** | There is extensive woodland along the extents of the corridor, including areas designated as Ancient Woodland, which could potentially be impacted by the dualling. |
| **Soil & Water** | |
| **SEPA 1:200 year Flood Zone** | Potential for loss of functional flood plain. |
| **Agricultural Soils** | Potential for loss or disturbance of productive agricultural land. |
| **Peat Soils** | Potential for impact on peat soils which are present at a number of locations along the extents of the existing A9 corridor. |
| **A9 Infrastructure** | |
| **Highland Mainline (HML)** | HML is a significant physical constraint, running in proximity to the west of the A9 between Guay and Kindallachan. |
| **Beauly Denny Power Line** | The Beauly Denny Power Line follows the existing A9 at a number of locations and presents a fixed infrastructure constraint to the dualling works. |
| **Population & Human Health** | |
| **Non-Motorised Users (NMU)** | Potential for impact on Core Paths and the NCN77 which run in proximity and/ or parallel to the A9 in this section. |

| Biodiversity | |
|---|---|
| **Special Area of Conservation (SAC) Special Protection Area (SPA) Site of Specific Scientific Interest (SSSI) Ramsar Sites** | There are a number of SAC, SPA, Ramsar and SSSI's located along the extents of the existing A9 corridor which could potentially be impacted through direct encroachment or disturbance of habitats or species. |
| **National Nature Reserve (NNR)** | The dualling could potentially impact on the Insh Marshes and Craigellachie National Nature Reserve's through direct encroachment or disturbance of habitats and species. |

As part of the DMRB process, a detailed assessment of the environmental impacts of the proposed projects - during construction and operation - will be undertaken. Details of potential impacts, mitigation and residual impacts will be presented within an Environmental Statement for each project. Where practicable, mitigation to avoid or reduce impacts will be identified and implemented as part of the project(s).

# 9 Programme Appraisal - Integration

## 9.1 Introduction

In this Chapter, an appraisal of the A9 Dualling Programme from Perth to Inverness is presented against the STAG criteria of Integration. The three STAG sub-criteria of transport integration, transport and land use integration and policy integration are discussed.

## 9.2 Transport Integration

An integrated transport system aids accessibility by connecting people to opportunities and goods to markets[66]. Within transport appraisal, the criterion of transport integration focuses on the impacts of an intervention on services, ticketing, infrastructure and information. The following sections describe existing multi-modal opportunities across the route; identified issues raised during consultation and predicted impacts that the A9 Dualling will have on all modes of travel.

### 9.2.1 Walking and Cycling

The A9 corridor has an extensive and well established Core Path Network as well as other existing non-motorised user (NMU) routes and facilities, including rights of way and the National Cycle Network (Routes 1, 7 and 77). Routes are used by numerous users including recreational walkers, cyclists and equestrians as well as commuters, with the latter predominantly on the approaches to Perth and Inverness.

To support the potential for improved infrastructure for pedestrians and cyclists, an NMU context and objectives report has been developed to influence the design of the dualling. As set out in the DMRB Stage 1 scheme assessment report [67], the NMU approach will cater for both recreational and commuting trip purposes and will outline a number of objectives to ensure a consistent approach is taken toward the proposed provision of NMU facilities along the route and ensure that the needs of NMUs are fully considered. In terms of infrastructure, for example, this would be developed with consideration of the most vulnerable users and be fully compliant with the requirements of the Equality Act 2010.

The principles around which the NMU approach will be developed include:

- there should be no surface crossings of the dualled A9,
- NMU routes will be combined where possible, and
- grade-separated crossings solely for NMUs will be provided where site specific consideration can be demonstrated.

[66] *STAG, Section 10.1.1 Transport Integration, Transport Scotland, December 2013*
[67] *DMRB Stage 1 Report produced as part of the PES framework*, *Transport Scotland*, *March 2014*

As part of the DMRB Stage 1 scheme assessment, over 140 existing NMU crossing points, primarily connecting core paths, have been identified across the route comprising both grade separated and at-grade crossings. The review of crossing opportunities also identified a number of areas along the corridor where there is a considerable gap between NMU crossing points; some exceeding 5km, which will be further assessed as part of the DMRB assessment process to determine if additional NMU crossing points are required.

Enabling access to walking and cycling routes is also noted as a key consideration in the identification and design of laybys and rest areas along the A9. During consultation, it was highlighted that a number of laybys used by hill-walkers operate above capacity during busy periods. Improved provision at popular locations will open up opportunities for increased levels of active travel and improved access to recreational opportunities along the route.

### 9.2.2 Bus and Coach

The A9 is used by a number of bus and coach services which serve local communities, inter-urban travel, school travel and organised tours. To assist in the planning and design of the A9 dualling in terms of public transport integration, Transport Scotland has prepared a Public Transport Strategy[68] which considers in further detail the possible impacts of the dualling on bus operations and sets out key principles to ensure that the project is designed to fully integrate with existing and planned public transport facilities along the corridor. A key principle of the Strategy is to where possible maintain the current levels of access to bus and rail services.

As part of the Strategy's development, consultation has been undertaken with the bus industry. Overall feedback on the A9 Dualling Programme with operators has been positive. In general, the bus industry is very responsive to road conditions and assess their services on a regular basis. Bus services are timetabled to respond to local road conditions. All operators recognise that the full dualling would offer improved reliability, flexibility, safety and resilience for bus operations along the A9. A summary of the main impacts is outlined below with explicit reference to findings from the operator consultation.

#### (i) Improved bus journey times and reliability

The A9 Dualling programme will bring journey time savings and reliability. As a result, bus operators will have the opportunity to review their services in terms of frequency and the number of stops/communities served. The forecast journey time savings of up to 40 minutes round trip may also translate into more efficient operations and potentially the need for fewer vehicles either directly due to scheduling benefits or from avoiding the need to deploy spare vehicles along the route. For example, some inter-urban bus operators report that they plan for disruption

[68] *A9 Dualling Programme Public Transport Strategy, AECOM, June 2015*

by retaining spare vehicles at strategic locations along the route for use when regular services are disrupted.

Incidents on the A9 between Perth and Inverness can lead to road closures and diversions. In many cases the diversionary route for all vehicles may be over 60 miles in length. At some points on the route, there is simply no alternative route and road users may have to wait or cancel their journey completely. The improved resilience resulting from a fully dualled A9 will significantly reduce the variability in bus journey times and the likelihood of full closures.

**(ii) Improved road safety**

Feedback from operators highlighted the beneficial impact dualling would bring from improved road safety and a reduction in dangerous overtaking. In addition to the obvious reduction in accidents, there will be a health and welfare benefit to bus drivers as the frequency of risky driving manoeuvres and behaviours will be greatly reduced.

**(iii)Integration opportunities**

A review of the DMRB Stage 1 junction strategy indicated minimal impact on existing bus routes as a result of the rationalisation of junctions. However, in order that this is reviewed as the junction strategy develops; the Public Transport Strategy includes the guiding principle that the development of the junction strategy incorporates public transport accessibility into the assessment criteria as part of the design process.

A lack of suitable rest areas for coach stops was raised by operators during the consultation. A Rest Area baseline review has been developed to inform the Dualling Programme and will examine opportunities for enhanced rest areas along the route, for all users, including coach operators. Consultation with transport authorities also highlighted potential opportunity to develop mini Park & Ride sites whereby parking sites could be accommodated at key locations along the A9 adjacent to bus stops, enabling car drivers the opportunities to use the bus for part of their journey. The A9 dualling is not expected to have any material impact on the perception of a seamless public transport journey, as interchange and ticketing will not be affected to any great extent. However interchange with A9 bus services due to the journey time improvements discussed above will be more reliable.

**(iv)Construction impacts**

Bus operators identified potential delays during the construction period as a source of some concern. Transport Scotland is aware of the potential impacts on road users and local communities as a result of the A9 dualling and will work in partnership with all stakeholders including bus operators to ensure the impact of construction activities are mitigated.

### 9.2.3 Rail

The Highland Main Line corridor provides rail services between Glasgow/Edinburgh and Inverness. There is a mix of direct journeys and those that would require an interchange at

Perth. The frequency of train services from Perth to Inverness varies with typically two trains every two to three hours with reduced frequency off-peak. Current journey times of rail services between Glasgow /Edinburgh and Inverness are a minimum of 3hours and an average of 3hours 20 minutes. The rail corridor is important for leisure and business related travel. The rail line is sometimes subject to delay and disruption due to incidents such as severe weather and landslips.

The Infrastructure Investment Plan (IIP) provides an overview of the Scottish Government's plans for infrastructure investment over the coming decades. The IIP, and subsequent updates, commits the Scottish Government to deliver rail infrastructure investment on the Highland Main Line by 2025.

An initial phase of improvements has been implemented and there will be incremental improvements over the period to 2025 when the full journey time savings (15 to 20 minutes) will be realised. Increasing the frequency of services on the route will provide benefits through additional opportunities to travel. The reduction in journey time could potentially make the rail service more competitive with the current car and bus journeys. Proposed improvements for rail freight transport would make the line more attractive for freight hauliers to move containers and other goods by rail, by reducing journey times.

The rail enhancements on the Highland Main Line between Perth and Inverness are currently being taken forward by Transport Scotland in partnership with the rail industry in accordance with the GRIP process.

Abellio ScotRail (ASR) has a committed obligation to work closely with Transport Scotland and the A9 Dualling Team to develop and implement a marketing strategy designed to promote the use of passenger rail services as an alternative mode of transport during the A9 dualling construction phase. Consultations with stakeholders also highlighted the potential for rail to help mitigate the impacts during construction.

### 9.2.4 Rail Freight

An assessment of rail freight movements along the A9 corridor has been undertaken, with the main findings outlined below:

- The Highland Main Line is currently taking the equivalent of c. 40 HGVs a day off the A9 (in each direction);
- Rail currently has an estimated modal share of approximately 3% on the corridor;
- There is potential for growth in rail freight provided certain key operational barriers can be overcome;
- The "Lifting the Spirit" trial has demonstrated that some of the operational issues can be overcome without the need to improve the current infrastructure;

- Whisky, logging, timber and parcels are all industries that may be able to utilise rail freight more intensively;
- 70% of the current freight tonnage on the Highland Main Line is related to intermodal use.

Should existing ‘barriers’ to rail freight continue into the future, the dualling of the A9 is not forecast to have a material impact on current rail freight utilisation.

### 9.2.5 Summary

A summary of the main transport integration issues is presented in Figure 9.2.

## Walking & Cycling

- The A9 Dualling Programme provides the opportunity to enhance linkages to walking and cycling routes and core paths. Work is underway to capture this opportunity fully.
- There is the potential for severance along the corridor if not designed in a sensitivite manner. This will be mitigated through consideration of NMU access across the route, including crossing opportunities.
- High quality, grade seperated crossings of the A9 will improve NMU safety.
- Delivery of improved NMU facilities associated with dualling will improve access to recreational and active travel opportunities along the route.

## Bus & Coach

- Reduced journey times and improved reliability will provide bus operators with increased operational flexibility. This may deliver revised service frequencies, stopping patters or destinations.
- Improved reliability and resillence will reduce the requirement for operators to maintain spare vehicles for periods of perturbation.
- Consultation revealed concerns over the impact that construction of the dualling will have on bus journey times.
- The Programme is being designed to fully integrate with existing and planned public transport facilities along the corridor.
- On-going consultation will be required with the bus industry to maximise the opportunites afforded by the A9 Dualling Programme whilst minimising any adverse impacts.

## Freight

- Improved journey times, reliability and resillence afforded by dualling will provide more efficient opportunities for freight transport.
- Improved layby and rest area provision will provide enhanced parking for HGV drivers who require to take a rest.
- The A9 Dualling Programme will facilitate more efficent and effective transportation of goods worth over £60million to the Scottish Economy per annum.

## Rail

- Marginal bus passenger modal shift is forecast from rail to bus post A9 dualling.
- Maintaining and where possible improving access to rail stations is being considered as part of the design process.
- Existing collaborative working arrangements between road and rail design teams will continue to explore integrated design solutions as both the A9 and HML schemes develop.
- Various consultees highlighted the potential for rail improvements to alleviate the impacts of any travel delays during construction of the A9.

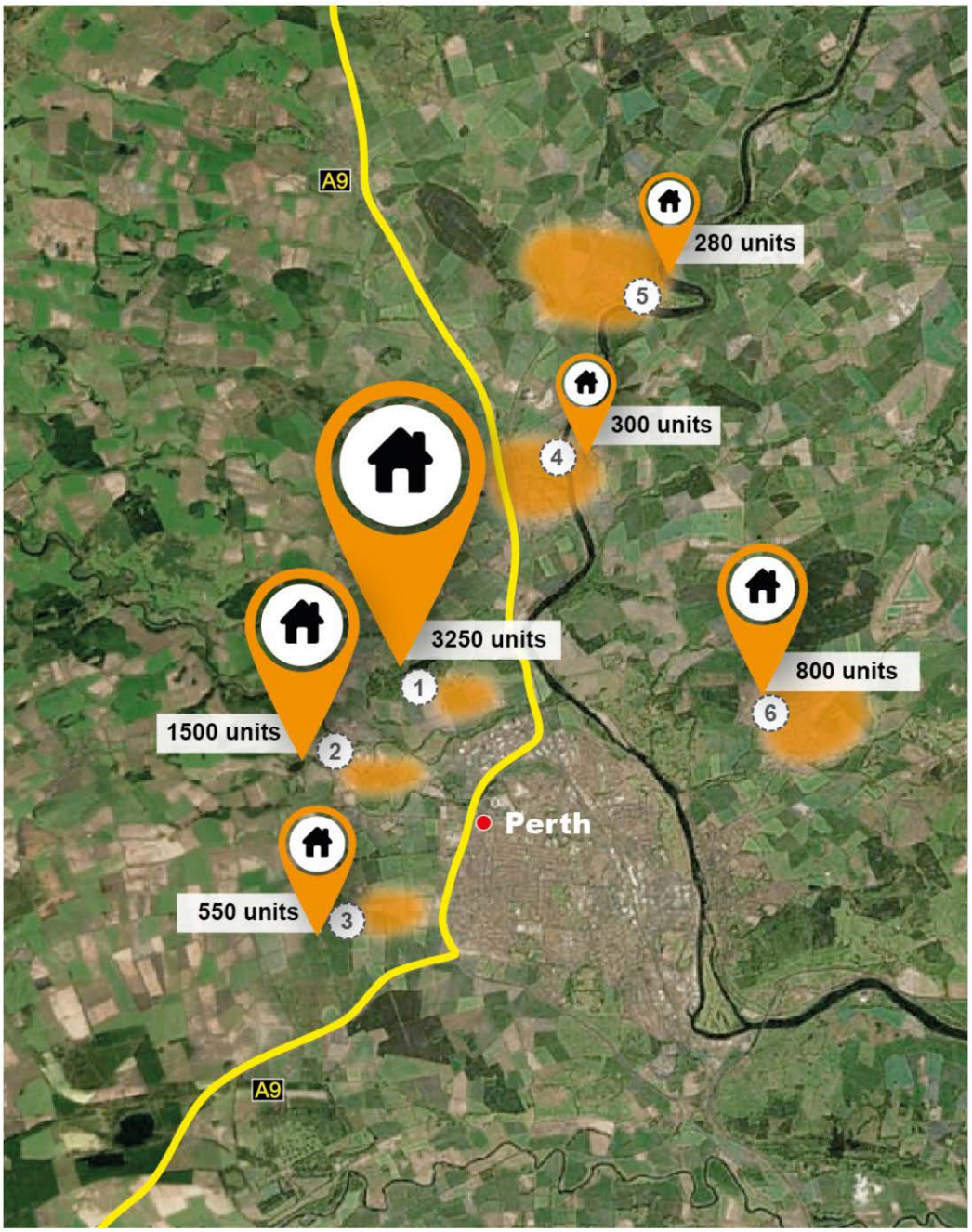
**Figure 9.2: Transport Integration Summary Table**

## 9.3 Transport and Land-Use Integration

The main aspect of appraisal within the transport and land-use integration criteria is identifying and mitigating any conflicts between the intervention and land-use planning policy and environmental designations.

The corridor for the A9 Dualling Programme, as established by the DMRB Stage 1 Assessment, lies within a 200 metre online corridor. A strategic assessment of the impact of the A9 Dualling Programme on the environment across a range of potential route corridors has been carried out in the Strategic Environmental Assessment (SEA). More detailed Environmental Impact Assessment will be carried out as part of the DMRB Assessment Process. In addition, a strategic Habitats Regulations Assessment has been carried out at the Programme level. This Investment Case should therefore be read in conjunction with these documents.

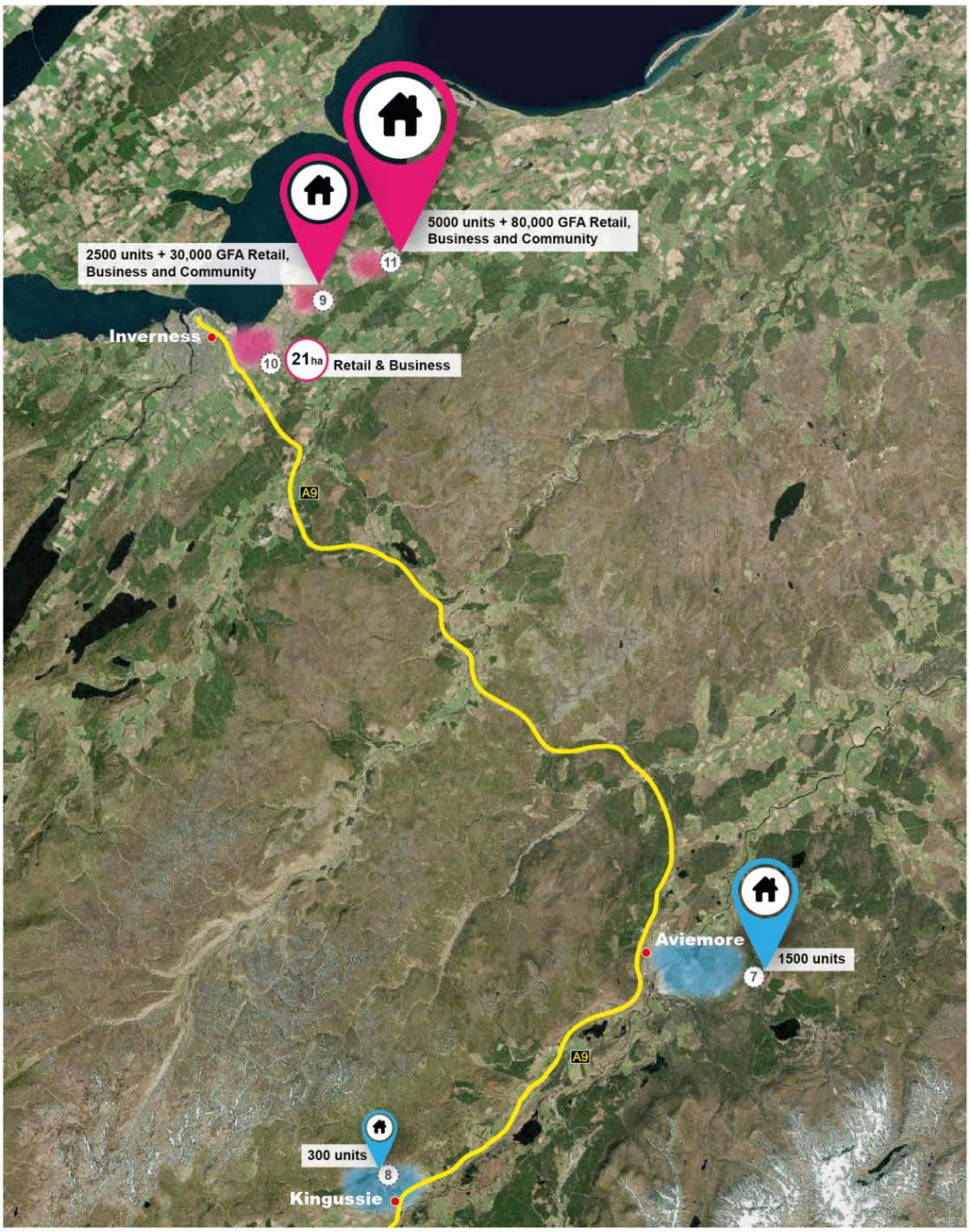
As outlined in Chapter Four, there are a number of major development proposals along the route of the A9 as shown in Figures 9.3 and 9.4. Once fully built, the developments will contribute to travel demand along the A9 corridor.




| Planning Authority Area | Development Name | |
|---|---|---|
| Perth & Kinross Council | 1 | Bertha Park (Housing) |
| | 2 | Almond Valley Village (Housing) |
| | 3 | Perth West (Housing) |
| | 4 | Luncarty (Housing) |
| | 5 | Stanley (Housing) |
| | 6 | Scone (Housing) |

**Figure 9.3: Major Development Proposals – A9 Southern Section**[69]

[69] *Perth & Kinross Council Local Development Plan, Perth & Kinross Council. 2014*




| Planning Authority Area | | Development Name |
|---|---|---|
| Cairngorms National Park | 7 | An Camas Mor (Mixed Use / New Village) |
| | 8 | Kingussie (Housing) |
| The Highland Council | 9 | Stratton (Mixed Use) |
| | 10 | Inverness Retail and Business Park |
| | 11 | Tornagrain (Mixed Use) |

**Figure 9.4: Major Development Proposals – A9 Northern Section**[70]

[70] *Cairngorms Local Development Plan, Cairngorms National Park Authority, 2015; Highland-wide Local Development Plan, 2012*

The A9 Dualling Programme will positively contribute to these developments by providing enhanced capacity on the route. The Programme is also expected to support enhanced accessibility to and from the developments, and support investment decisions in the North of Scotland in general.

## 9.4 Policy Integration

As outlined in Chapter Three, the A9 Dualling Programme contributes to strategic policy objectives set by the Scottish Government and Transport Scotland. The A9 Dualling Programme has also been assessed within Transport Scotland's Policy Assessment Framework (PAF) as presented within Table 9.1 overleaf. The PAF scoring system uses a seven point scale is outlined below.

| -3 | -2 | -1 | 0 | +1 | +2 | +3 |
|---|---|---|---|---|---|---|
| Strong Negative Impact | Moderate Negative Impact | Slight Negative Impact | Neutral Impact | Slight Positive Impact | Moderate Positive Impact | Strong Positive Impact |

## Table 9.1 - A9 Dualling Programme Policy Assessment Framework

| NTS High Level Strategic Outcomes | | | A9 Dualling Programme Perth to Inverness | Rationale behind scoring |
|---|---|---|---|---|
| **Lower Level Policy Objective** | | **Question to be scored** | | |
| **Promote Economic Growth** | | | | |
| 1 | Promote 'competitive' inter-urban journey times | To what extent does the intervention reduce inter-urban journey times? | **+3** | Journey times reduced between Perth and Inverness. |
| 2 | Reduce inter-urban journey time on public transport | To what extent does the intervention reduce inter-urban journey time on public transport? | **+3** | Journey times reduced between Perth and Inverness for buses. |
| 3 | Reduce the proportion of driver journeys delayed due to traffic | To what extent does the intervention reduce the proportion of driver journeys delayed due to traffic? | **+3** | Journey time variability reduced and increased overtaking opportunities. |
| 4 | Maximise the labour catchment area in city regions | To what extent does the intervention help maximise the labour catchment area in city regions where economic evidence demonstrates that this is required? | **+3** | Accessibility to Inverness and Perth increased. |
| 5 | Support the development and implementation of relevant proposed national developments identified in the National Planning Framework | To what extent does the intervention support the development and implementation of relevant proposed national developments identified in the National Planning Framework? | **+2** | Supports NPF3 Developments 3, 4 and 14 by improving road infrastructure and accessibility to north of Scotland to support construction projects; Supports NPF3 8 by enhancing active travel network connectivity along the route. |
| **Improve Integration** | | | | |
| 6 | Promote seamless travel | To what extent does the intervention improve the integration of journeys made by public transport or via Park and Ride by reducing interchanges and interchange times? | **+1** | Improves the efficiency of public transport journeys and reduces variability of journey time. |
| 7 | Policy Integration | To what extent does the intervention support or constrain the potential achievement of policy objectives within other sectors or delivery agencies? | **+3** | Supports Scotland's Economic Strategy and Low Carbon Economy |
| 8 | Access to amenities and services | To what extent does the intervention improve accessibility? | **+1** | Improves accessibility for all road users on the A9 by reducing journey times and variability |
| **Protect the environment and improve Health** | | | | |
| 9 | Reduce CO2 emissions per person | To what extent does the intervention reduce CO2 emissions per person? | **-1** | Increased travel speeds. |
| 10 | Meet the targets set out in the Climate Change (Scotland) Act 2010 | To what extent does the intervention help meet the targets set out in the Climate Change (Scotland) Act 2010? | **-1** | Increased traffic levels on A9. Enables growth of the Low Carbon Economy through better accessibility of the Highlands and Islands. |

| NTS High Level Strategic Outcomes | | | A9 Dualling Programme Perth to Inverness | Rationale behind scoring |
|---|---|---|---|---|
| 11 | Improve air quality | To what extent does the intervention affect air quality? Is the intervention located in an Air Quality Management Area? | **0** | SEA states neutral impact on air quality. |
| 12 | Improve health | To what extent does the intervention enable the population of Scotland to live longer healthier lives? | **0** | No significant impact although the programme will support improved access to active travel networks. |
| 13 | Well designed, sustainable places | To what extent does the intervention improve landscape, streetscape and the local environment? | **0** | Any impacts on landscape and the local environment will be mitigated as far as possible. |
| 14 | Reduce the overall ecological footprint | To what extent does this intervention reduce overall ecological footprint? | **-2** | Increased footprint. |
| **Improve safety of journeys** | | | | |
| 15 | Promote continuing reduction in accident rates and severity rates across the strategic transport network recognising the need to continue the work of the Strategic Road Safety Plan through the STPR period | To what extent does the intervention promote continuing reduction in accident rates and severity rates across the strategic transport network? | **+3** | Will support the reduction of severity rates on the A9 by removing the need to overtake on single carriageway, and removing at-grade junctions. |
| 16 | To reduce the accident and severity rate to the national average | Does the intervention have the potential to reduce accident rates? | **+1** | Accident rates are low across most of the route but the programme will support the reduction of accidents generally. |
| **Promote social inclusion** | | | | |
| 17 | Improve the competitiveness of public transport relative to the car | To what extent does the intervention improve the competitiveness of public transport relative to the car? | **0** | Neutral impact. Improved conditions for both private car users and bus users. |
| 18 | | To what extent does the intervention improve the choice of modes or routes facing public transport users? | **+1** | Improves journey times and reliability for bus services. |
| 19 | | To what extent does the intervention reduce the relative costs of public transport? | **0** | No significant impact, although some efficiencies in bus operation may be passed on to users. |
| 20 | Reduce Inequality | To what extent does the intervention tackle the significant inequalities in Scottish society? | **+1** | Improved accessibility to rural and lower income households. |
| 21 | Improve overall perceptions of public transport | To what extent does the intervention Improve overall perceptions of public transport? | **0** | Improves journey times and reliability for bus services, and attractiveness of bus as an option. |

| STAG |
|---|
| STPR National Objectives |
| National Performance Framework |

# 10 Programme Appraisal – Accessibility and Social Inclusion

## 10.1 Introduction

Accessibility defines the ability of people and businesses to access goods, services, people and opportunities. In transport appraisal, two sub-criterion are considered within the overarching concept of accessibility – community and comparative accessibility. This Chapter discusses the impact of the A9 Dualling Programme on these criteria.

## 10.2 Community Accessibility

Assessment of community accessibility involves consideration of public transport network coverage and access to local services. As the A9 Dualling Programme is not expected to result in any material changes to public transport services, it is not forecast to have any significant impacts on public transport network coverage. The key impacts will therefore be on local accessibility for non-motorised users.

### 10.2.1 Non-Motorised Users

Walking, cycling and equestrian activities are important along the A9. The route itself links many communities and it is important that the A9 dualling does not contribute to severance but creates opportunities to open up wider access. Additionally there are a number of recreational activities that take place along the A9 corridor which in turn support tourism in the area and it is important that opportunities to promote walking, cycling and horse riding facilities are safeguarded.

To support these aspirations, a Non-Motorised User workstream is being developed alongside the A9 Dualling Programme, which aims to ensure the needs of NMUs are fully considered in the development of the project and that accessibility for cyclists, pedestrians and horse riders is maximised through enhancing linkages with core paths and existing cycling networks, such as National Cycle Network routes.

The A9 upgrade will result in a higher standard road, with higher national speed limits and associated faster moving traffic. Clearly this has the potential to make access across the road for pedestrians and other non-motorised users more difficult. To address concerns, the DMRB Stage 1 Assessment outlines a strategy that will result in no at-grade crossings of the dual carriageway and proposes that all crossings will be grade separated, where appropriate, for safety reasons. While this strategy will result in significant safety benefits for non-motorised users, there is the potential that some NMUs will experience a reduction in accessibility across the route at certain locations. For example, a review of crossing opportunities as part of the DMRB Stage 1 Assessment highlighted a number of areas within the project where there is a considerable gap between NMU crossing points. As the DMRB scheme assessment process is taken forward, further work will be undertaken to determine the requirement of additional crossing points, ensuring the provision of safe access for non-motorised users.

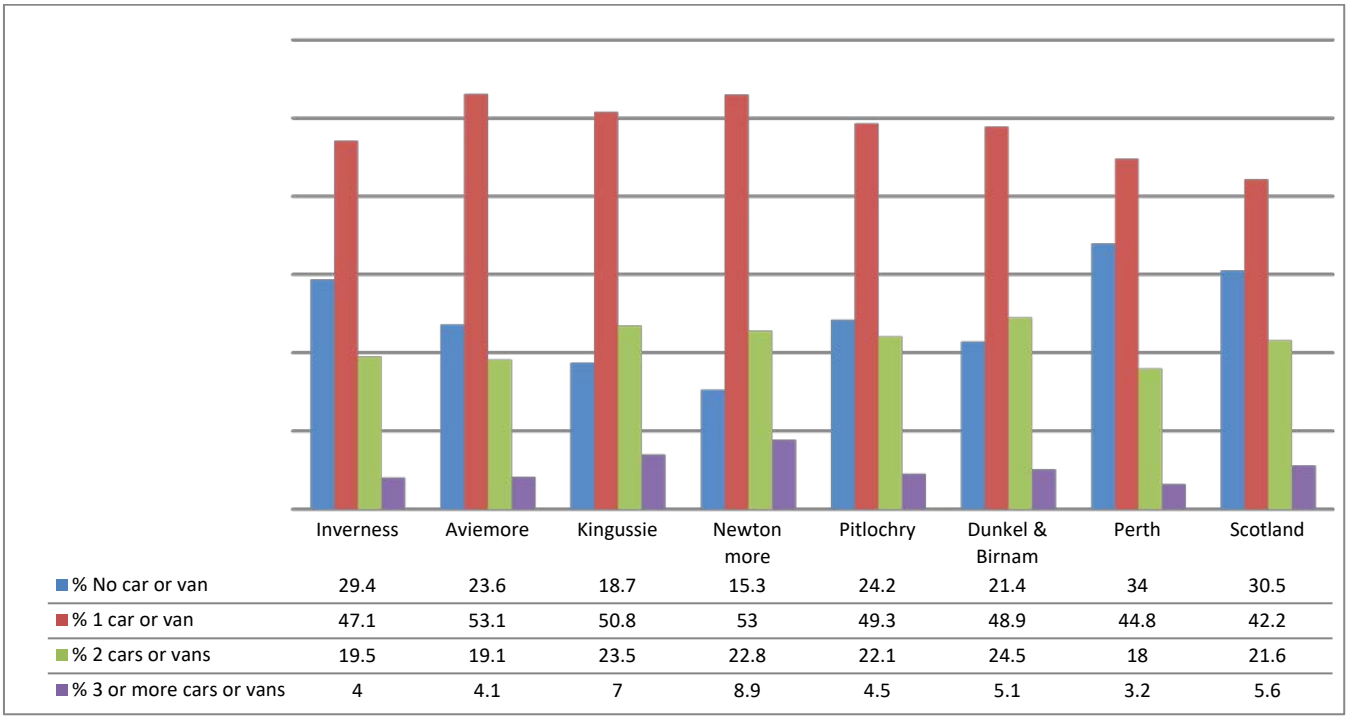
A theme running through consultation has been the potential opportunities that the provision of laybys can have on improving access to scenic areas along the route. Specifically, it has been stated that the provision of enhanced laybys proposed as part of the dualling project, including at locations of scenic value and access points for hillwalkers, will support enhanced access to the natural environment along the route for those wishing to park and proceed on foot/cycle.

## 10.3 Comparative Accessibility

This sub-criterion is focused on understanding the distribution of accessibility impacts from a transport intervention, by people group and by geographical area. Consideration of potential impacts by user group is presented below.

### 10.3.1 Motorists

A review of car ownership trends along the A9 confirms the high car dependency of settlements between Perth and Inverness. As shown in Figure 10.1, the proportion of residents who do not have access to a car/van is 31% nationally, 29% in Inverness and 34% in Perth. This rate drops to between 15-25% for communities located along the A9 corridor. This indicates the high dependency for travel by car and as such the scale of accessibility benefits that would be delivered to this main user group through delivery of an enhanced A9, including shorter journey times to employment, recreation and health services located, for example, in Perth and Inverness.



| | Inverness | Aviemore | Kingussie | Newton more | Pitlochry | Dunkel & Birnam | Perth | Scotland |
|---|---|---|---|---|---|---|---|---|
| % No car or van | 29.4 | 23.6 | 18.7 | 15.3 | 24.2 | 21.4 | 34 | 30.5 |
| % 1 car or van | 47.1 | 53.1 | 50.8 | 53 | 49.3 | 48.9 | 44.8 | 42.2 |
| % 2 cars or vans | 19.5 | 19.1 | 23.5 | 22.8 | 22.1 | 24.5 | 18 | 21.6 |
| % 3 or more cars or vans | 4 | 4.1 | 7 | 8.9 | 4.5 | 5.1 | 3.2 | 5.6 |

**Figure 10.1: Car/Van Availability by Settlement on the A9**

While the A9 Dualling Programme will undoubtedly deliver increased accessibility for motorists, there will be some reduction in accessibility associated with junction rationalisation. The A9 Dualling Programme will close gaps in the central reservation and rationalise the number of junctions along the route improving both the operation and safety of the trunk road. The result of this rationalisation will be that for some trips, the route to and from the A9 will be longer. The additional costs associated with junction rationalisation are presented within Chapter Six.

### 10.3.2 Leisure Users, Local Communities and Disabled Users

A particular people group who are likely to benefit from the A9 Dualling Programme are visitors and leisure users. An opportunity has been identified for the provision of 'enhanced laybys' along the route. These laybys would provide facilities beyond standard laybys. Consideration of how to incorporate these enhanced laybys is underway, and an A9 Layby design guide is under development. Links to core paths, outdoor activities, viewpoints will all be considered, as well as mechanisms to ensure local communities benefit from these facilities (e.g. through involvement in the provision of services and goods at enhanced laybys).

A key element of the NMU workstream previously discussed is to ensure that design work considers the needs of the most vulnerable users and that any NMU facilities are fully compliant with the requirements of the Equality Act 2010 through the application of Transport Scotland's "Roads for All, A Good Practice Guide for Roads". This sets out guidance on the construction, design and maintenance of roads infrastructure to create environments which can be used by everyone regardless of age or disability. For instance, in accordance with the guidance, bus shelters provided across the route should be designed in accordance with 'Inclusive Mobility'.

The provision of toilets (incl. disabled toilet provision) is currently being explored as part of the layby design work stream. Based on the 'Changing-places' campaign[71], it is acknowledged that certain people with severe disabilities cannot travel the A9 currently as there are no suitable facilities. Provision of just one enhanced disabled toilet along the route in each direction could open up the area to this part of the community.

### 10.3.3 Freight Users

The A9 Dualling Programme DMRB Stage 1 scheme assessment report notes that, based on a DMRB definition, there are insufficient dedicated rest areas directly accessed off the A9. Rest areas provide an opportunity for a longer break than laybys with greater provision of facilities. The Rest Area Baseline Review and Research study has considered both freight and non-freight requirements.

Surveys undertaken in 2013 revealed that visitors consider that there is sufficient rest area provision available along the route. Facilities within local communities were found to satisfy the majority of visitor needs. By contrast, freight consultations revealed that there is not sufficient choice of facilities for freight vehicles along the route and this is a particular problem during periods of adverse weather. Consideration is currently being given to the operational advantages of providing additional freight rest areas along the route.

[71] *Changing Places, (available at http://www.changing-places.org/)*

# 11 Programme Appraisal – Transport Planning Objectives

## 11.1 Performance Against Transport Planning Objectives

The A9 Dualling Programme has a number of transport planning objectives that have been established to help facilitate specific outcomes. The evidence presented in the preceding chapters has been used to assess the performance of the A9 Dualling Programme against objectives. In summary, the appraisal outputs indicate that:

(i) Reducing Journey Times

The A9 Dualling Programme would provide a grade-separated dual carriageway with forecast average speeds increasing to 66 mph (almost a 30% increase in average speed when compared with the before average speed camera situation on the A9). This will significantly improve overtaking opportunities and allow drivers to travel much closer to their desired travel speeds. It is forecast that average travel times for the journey between Perth and Inverness would reduce from 131 minutes (before average speed camera implementation) to 111 minutes – a 20 minute reduction. On average, taking account of the typical mix of journeys, car drivers using the A9 are forecast to reduce their journey time by between 10 and 15% when compared with the before average speed camera situation on the A9.

(ii) Improving Journey Time Reliability

The A9 Dualling Programme will introduce a dual carriageway standard road between Perth and Inverness that will remove a number of the constraints (slower moving vehicles, lack of safe overtaking opportunities, having to slow down due to turning traffic ahead, reduced incidents leading to full or partial road closures) that prevent drivers from travelling at their desired speed. As drivers are heterogeneous with varying desired speeds, the removal of these constraints will at an individual level allow drivers to better predict their own travel time and schedule departure and arrival times with a greater degree of certainty. This improved level of journey time reliability will benefit all users of the A9 including commuters, business travellers, tourists, bus operators and the haulage industry.

(iii) Reducing Accident Severity

The A9 Dualling Programme will provide a high degree of segregation of traffic and grade separation at junctions. This, allied to the horizontal and vertical design standards of the project, would provide a material increase in road safety.

The programme is forecast to reduce fatalities by six causalities per annum and reduce those seriously injured by three to four casualties per annum.

(iv) Reducing Driver Stress

Driver stress has three components[72].

[72] *Design Manual for Roads and Bridges, Volume 11, Section 3 , UK Government Department for Transport*

- Fear of accidents;
- Driver frustration (often linked to travelling below desired speed); and
- Uncertainty about the route being followed.

Primary research undertaken on the A9 has shown that the main factors associated with driver frustration are:

- the presence of oncoming traffic,
- the degree to which travel speed was below desired speed, and
- the number of HGV's in the platoon ahead.

The appraisal of the A9 Dualling Programme has shown that the severity of accidents will reduce significantly and this will greatly reduce the fear of accidents on the A9. Modelling has shown that the main factors contributing to driver frustration on the A9 will be significantly reduced and in some situations removed with the A9 Dualling Programme in place. Finally, a category 7A dual carriageway standard from Perth to Inverness will provide drivers with a continuous and consistent carriageway standard thus reducing driver uncertainty.

(v) Facilitating Active Travel

The potential provision of enhanced laybys and rest areas, as part of the project design, will increase opportunities for walking and cycling, particularly at popular locations. This will support greater opportunities for increasing active travel levels along the route, through improved access to recreational amenities.

The programme provides the opportunity to enhance linkages to existing and new walking and cycling routes. With an ingrained Core Path Network established on the A9 corridor, there is opportunity to improve infrastructure for pedestrians and cyclists. The A9 Dualling Programme will take cognisance of Non-Motorised Users and will ensure consistency in the provision of NMU facilities along the A9 corridor, including safe grade-separated crossing opportunities.

(vi) Improving Integration with Public Transport

The programme will have a minor positive impact on integration with public transport. There will be direct benefits to bus operators and users from reduced journey times and better reliability. The A9 Dualling Programme is being designed to integrate with existing and planned public transport facilities along the corridor with further opportunities for integration with the Highland Mainline explored collaboratively as both projects move forward. The Public Transport Strategy for the programme sets out the key principle of maintaining the current level of bus and rail accessibility to and from local settlements.

# 12 Deliverability and Risks

## 12.1 Introduction

As with any major infrastructure project comprising significant investment costs and delivery over multiple years, risk and uncertainty are key factors which must be considered. This section presents a summary of deliverability issues associated with the A9 dualling and outlines the governance structures that are in place to manage risk.

## 12.2 Deliverability

Through the development of Preliminary Engineering Services (PES) and Strategic Environmental Assessment (SEA) studies, work has been undertaken to assess the deliverability of the A9 Dualling between Perth and Inverness. The PES study involves a preliminary assessment equivalent to a DMRB Stage 1 Assessment for the initial development and assessment of proposed corridor options and strategies for the improvement of the A9 to dual carriageway standard. The SEA involves a study to identify the potential environmental constraints, advantages and disadvantages associated with the corridor options.

Transport Scotland is taking forward the design development based on the Design Manual for Roads and Bridges, ensuring a robust and fit for purpose design. Statutory (planning) permissions must also be gained through the Roads (Scotland) Act 1984. The design development stages for the A9 Dualling Programme will cover:

- DMRB Stage 2 (Route Options Assessment)
- DMRB Stage 3 (Detailed Design and Assessment)
- Statutory Process (Publication of Environmental Statement and Orders)
- Procurement (Tender process to appoint a works contractor), and
- Construction and Site Supervision

In taking forward the project, Transport Scotland will work collaboratively with the key agencies, statutory undertakers and local communities to address risk to delivery.

## 12.3 Risk Strategy

There are a variety of issues that could impact upon the delivery of the A9 Dualling Programme by 2025. As part of an assessment of the technical risks to delivery, the design consultants taking forward the DMRB scheme assessments have identified a range of technical risks and uncertainties categorised under three headings; environmental constraints, promotional issues and construction issues. In addition to technical risks, political, procurement and funding risks all have the potential to impact the programme. Further details on general and more specific risks are outlined within the DMRB Stage 1 scheme assessment report.

Transport Scotland recognises that a robust approach to risk management is essential to the successful delivery of the Project. As such, strong governance structures have been established which set out clear responsibilities for risk management to ensure that all potential risks are identified at an early stage and risk strategies developed which set out appropriate mitigation to reduce the potential impacts.

At the Programme level, a Programme Risk Register has been prepared which sets out the identified risks associated with the A9 Dualling and mitigation measures. In addition, a Cost and Risk Management Working Group has been established with responsibility for maintaining the risk register, ensuring that cost estimating and reporting is undertaken in a robust and consistent manner, and ensuring that there is clear interface between the project and programme level cost and risk reporting.

# 13 Monitoring and Evaluation

## 13.1 Monitoring and Evaluation

The benefits realisation process for the A9 Dualling Programme is delivered through the Scottish Trunk Road Improvement Project Evaluation (STRIPE) process, Transport Scotland's formal guidance on the evaluation of trunk road projects[73].

A summary of the STRIPE Plan indicators for the A9 Dualling Programme is contained within Table 13.1. Baseline information has been gathered for each of these indicators, and change will be monitored and evaluated as per STRIPE guidance.

The STRIPE process also monitors the A9 Dualling Programme impact against the five STAG criteria (and related sub-criteria) of Environment, Integration, Economy, Accessibility and Safety. Furthermore, the STRIPE process records and monitors programme and cost (recorded at the pre-feasibility, pre-order publication, pre-tender and post-tender stages).

Finally, the STRIPE process sets out a monitoring and evaluation programme, including updates of the STRIPE Plan as the programme progresses, and post-delivery evaluation at one, three and five year after intervals.

- The initial evaluation 1-year after provides Transport Scotland with an early indication that the project is operating as planned and is on-track for objectives achievement. It also provides a process evaluation including an assessment of actual vs. forecast cost, and programme together with reasons for variance.

- The 3-year after and/or 5-year after detailed evaluations, consider impacts in the context of data gathered over a longer post-opening timescale, offering a greater focus on whether a programme has achieved its objectives.

[73] *Scottish Trunk Road Infrastructure Project Evaluation (STRIPE). Transport Scotland, August 2013*

| A9 DUALLING PROGRAMME TRANSPORT PLANNING OBJECTIVES | STRIPE INDICATORS | SOURCE OF DATA |
|---|---|---|
| **1a.** To improve the operational performance of the A9 by: reducing journey times | Core indicator: Average journey time by all vehicles along length of Programme only, lights and heavies (ANPR April /May 2014). | ANPR Surveys on the A9, 2014 |
| | Potential sub-indicator: Average journey time by all vehicles along length of Programme by time of day | |
| **1b.** To improve the operational performance of the A9 by: improving journey time reliability | Core indicator: Number of incidents and delays associated | Traffic Scotland incident data or equivalent |
| | Potential sub-indicator: Qualitative assessment based on user surveys/consultation | Baseline based on key stakeholder consultations/surveys e.g. A9 Average Speed Camera System "Before" Market Research, Transport Scotland (AECOM), 2014 |
| **2a.** To improve safety for motorised and non-motorised users by: reducing accident severity | Core indicator: Number of accidents and casualties by severity. | STATS 19 data, Transport Scotland (where the construction start date does not permit 3 years of data, all data available post Average Speed Camera will be used) |
| | Potential sub-indicator: Number of accidents / casualties by type of manoeuvre (e.g. overtaking) | |
| **2b.** To improve safety for motorised and non-motorised users by: reducing driver stress | Driver frustration indicator to be developed based on the presence of oncoming traffic, the degree to which travel speeds are below desired speed, and the number of HGV's in the platoon ahead. | SRTDb VbV data using post Average Speed Camera installation data. This data would be assessed for speed, headway (and hence presence of platoon) and presence of HGVs in any platoon. An assumed desired speed would then be used to quantify driver frustration. |
| | Qualitative assessment based on user surveys/consultation | Qualitative surveys to be undertaken pre-and post-programme to evaluate driver perceptions of stress. e.g. A9 Average Speed Camera System "Before" Market Research, Transport Scotland (AECOM), 2014 |
| **3.** Facilitate active travel in the corridor | Core indicator: Description of strategic cycling and walking infrastructure in the corridor – NCN routes, Core Path Network, number of crossing points. | A9 Dualling Programme Preliminary Engineering Services DMRB Stage 1 Assessment report, 2014 |
| | Core indicator: Key stakeholder and user consultations | NMU Strategy formulation |
| **4.** To improve integration with Public Transport Facilities | Core indicator: Qualitative and quantitative description of all public transport infrastructure e.g. bus stops. | A9 Dualling Programme Preliminary Engineering Services DMRB Stage 1 Assessment report, 2014 and A9 Public Transport Strategy, 2015 |
| | Core indicator: Description of all public transport services using the A9 – timetable details (assume timetables act as a proxy for analysis of journey time for public transport and journey time variability). | |
| **OPERATIONAL INDICATORS** | **DESCRIPTION OF DATA** | |
| **1.** Traffic Volumes | Traffic flow data at each traffic counter on A9 Perth to Inverness up to end 2014. | |
| **2.** Vehicle Speeds | A9 ANPR data, 2014 and SRTDb VbV data. | |
| **3.** Journey Times | A9 ANPR data, 2014 | |
| **4.** Journey Time Reliability | Number of incidents and delays associated | |

**Table 13.1: A9 Dualling Programme Draft STRIPE Plan Indicators**

### 14.1 Key Findings

# 14 Conclusions

In this report the investment case for the A9 Dualling Programme is set out in accordance with the investment decision making guidance of Transport Scotland. The case for investment revisits the original strategic business case, ensuring that the identified problems still exist and that the options assessed still offer value for money solutions. An assessment of the 'softer' benefits of the A9 Dualling Programme has also been outlined.

The main findings of the investment case are as follows:

| **Problems & Opportunities** |
|---|
| The problems and opportunities identified within the strategic business case in 2008 have been reviewed and found to still be relevant to the A9 corridor in 2015. |
| **Strategic Fit** |
| The strategic fit of the A9 Dualling Programme has strengthened since the original strategic business case in 2008. This has been confirmed through a Policy Assessment Framework as set out within STAG guidance. Furthermore, the case for investment reinforces the role of the A9 Dualling Programme as a vital piece of infrastructure to support sustainable economic growth. |
| **Economy** |
| The A9 Dualling Programme has a net present value of -£419m and a BCR of 0.78. Including Driver Frustration increases the BCR to 1.01. The inclusion of WEBs which is often considered as standard within major project appraisals increases the BCR to 1.12.<br><br>Transport appraisal guidance acknowledges that a number of softer aspects of transport interventions are not able to be monetised in terms of their economic benefit. The softer aspects of the A9 Dualling Programme are outlined within this document and include strong road user, community, business and planning authority support for the intervention. In particular, the business community are strongly in favour of the A9 Dualling Programme and the associated transformational economic impacts that the project will have on new and well established businesses along the corridor. |
| **Safety** |
| The A9 Dualling Programme will make a significant contribution to reducing the severity and rate of accidents along the A9 and on the Scottish trunk road network as a whole. Analysis has shown that:<br><br>• Implementation of the programme is forecast to save 6 lives per year;<br>• When accidents do occur they are likely to be less severe; and<br>• Safety benefits arising from the dualling are valued at over £340m.<br><br>The investment case has also shown that the levels of driver stress along the A9 corridor will be significantly improved through a reduction in driver frustration and a reduction in the fear of accidents. |

| **Environment** |
| --- |
| A Strategic Environmental Assessment has been undertaken on the A9 Dualling Programme. The SEA assessed a predominately online project alongside four near offline options. Since completion of the environmental assessment in the original strategic business case in 2008, the design development and refinement of the A9 Dualling Programme has resulted in a reduced footprint for the road project with an associated reduced environmental impact. As such, the reported major negative environmental impact of the A9 Dualling in 2008 will, with appropriate mitigation, be reduced to a major/moderate negative environmental impact. |
| **Integration** |
| The A9 Dualling Programme provides the opportunity to enhance linkages to walking and cycling routes to help increase active travel and improve access to recreational activities. Bus and coach travel will benefit from reduced and more reliable journey times that will allow more efficient and flexible bus service provision. Freight will similarly benefit from reduced and more reliable journey times. There will be limited impact on rail services as a result of the A9 dualling. |
| **Accessibility and Social Inclusion** |
| The twenty minute reduction in end to end journey times resulting from the A9 Dualling Programme will make a material contribution to connecting the cities of Perth and Inverness and the wider north to the central belt. This will improve access to goods, people, employment opportunities and services along the entire corridor. Consultations have shown that with appropriate mitigation and sympathetic design the intervention will be able to minimise any adverse impacts such as severance or increased travel distances to access towns and villages. |

## 14.2 Contribution to Government Objectives

This investment case addresses the following key questions as set out within Transport Scotland's investment decision making guidance:

***a) What is the performance of the project against the National Performance Indicators and Transport Scotland's corporate plan delivery priorities?***

The National Performance Framework underpins delivery of the Scottish Government's agenda. It recognises the positive contribution transport can make to maximising opportunities for economic growth and how it contributes to the prosperity and quality of life of every person in Scotland. The A9 Dualling Programme will positively contribute to the following national performance indicators:

- Reduce deaths on Scotland's roads
- Reduce traffic congestion
- Improve Scotland's reputation
- Increase the number of businesses
- Increase research and development spending
- Increase physical activity
- Increase people's use of Scotland's outdoors
- Increase renewable electricity production

Transport Scotland's Corporate Plan 2012 – 2015 sets out how Transport Scotland intends to help deliver the Government's purpose. Through the A9 Dualling Programme's direct contribution to improved journey times, connectivity across Scotland and road safety, it is clear that the Programme supports Transport Scotland's Corporate Plan and subsequent Delivery Priorities.

**b) Does the project fit with the overall strategic transport aims and the hierarchy of investment?**

The A9 Dualling Programme is expected to provide a significant contribution to the Government's Purpose of increasing sustainable economic growth. In addition, the A9 Dualling Programme contributes to the national objectives of promoting journey time reductions between the Central Belt and Inverness alongside a significant reduction in the rate and severity of accidents. The A9 Dualling Programme is also assessed to address the issues of driver frustration and fear of accidents along the A9 corridor and thus will reduce driver stress.

The A9 Dualling Programme is embedded within the Infrastructure Investment Plan, National Planning Framework 3 and the Scottish Economic Strategy and hence fully accords with the Scottish Governments hierarchy of investment.

**c) How good is the fit with the 5 Government Objectives?**

The A9 Dualling Programmes contribution to the five Government Objectives is outlined as follows:

| | - - - | - - | - | *0* | + | ++ | +++ |
|---|---|---|---|---|---|---|---|
| **Safer and Stronger** | | | | | | | |
| **Smarter** | | | | | | | |
| **Wealthier and Fairer** | | | | | | | |
| **Greener** | | | | | | | |
| **Healthier** | | | | | | | |

Overall, the project performs strongly against the five Government objectives. The greatest positive contributions are anticipated to be in terms of reduced road casualties and sustainable economic growth by improving connectivity between Scotland's main cities.

The A9 Dualling Programme sets out to meet the following objectives

- *1.* To improve the operational performance of the A9 by:
    - (i) Reducing journey times;
    - (ii) Improving journey time reliability;
- *2.* To improve safety for motorised and non-motorised users by:
    - (i) Reducing accident severity;
    - (ii) Reducing driver stress.
- *3.* Facilitate active travel in the corridor.
- *4.* To improve integration with Public Transport Facilities.

The evidence presented in this investment case demonstrates that the programme will deliver on all of these objectives. This together with plans to upgrade the Highland Mainline will help secure delivery against the wider corridor and national objectives set out in STPR.

In accordance with Transport Scotland's investment decision making guidance and based on the evidence and appraisal documented in this report, there is a case for investment in the A9 Dualling Programme.

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