A96 DUALLING
INVERNESS TO ABERDEEN

A96 Dualling Inverness to Aberdeen

DMRB Stage 1 Assessment Report

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TRANSPORT SCOTLAND
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	Originated by	Checked by	Reviewed by
Original	NAME	NAME	NAME
	H Plummer	**G Houghton**	**D Burt**
Approved by	NAME	As Project Manager I confirm that the above document(s) have been subjected to Jacobs' Check and Review procedure and that I **approve them for issue**	INITIALS
	H Bradley		**HB**
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1 Introduction

1.1 Background to Dualling the A96

The Scottish Government's Strategic Transport Projects Review (STPR), published in 2008, set out a number of transport priorities for the Inverness to Aberdeen corridor to be met by 2032. These transport priorities included rail enhancements, new stations at Kintore and Dalcross, strategic park and ride at Dyce, upgrading the A96 to dual carriageway between Inverness and Nairn, a bypass of Nairn, a new bridge at Inveramsay, and a targeted programme of measures to reduce accident severity.

In December 2011, The Agenda for Cities, *"Scotland's Cities: Delivering for Scotland"*, was published by the Scottish Government. The Agenda identifies connecting cities with strong, reliable and resilient transport infrastructure as a key characteristic to support growth. Published alongside this was the Scottish Government's Infrastructure Investment Plan (IIP), providing an overview of plans for infrastructure investment over the coming decades. To complement the Agenda for Cities, the Infrastructure Investment Plan contains a commitment to complete the dual carriageway network between all Scotland's cities by 2030, including the upgrade of the A96 between Inverness and Aberdeen to dual carriageway.

This renewed focus on developing and promoting economic growth through Scotland's cities and their regions reflects current and future aspirations for planned development along the corridor. These have been revised since STPR and will consequently have potential implications for, and impact on, the performance of the corridor's strategic transport networks.

Within this context, an Inverness to Aberdeen Corridor Study Strategic Business Case (SBC) was published in 2014 by Transport Scotland to build upon the evidence base of the STPR and seeks opportunities to address the growing economic and transport demands along the corridor.

The SBC developed transport planning objectives for the Inverness to Aberdeen corridor taking cognisance of the national, region and local policies and plans and the problems and opportunities identified along the corridor.

A summary of the problems and opportunities identified on the corridor are summarised in **Figure 1.1.1** overleaf.

Summary of Problems and Opportunities

Economy

There has been a reduction in population in Moray in recent years, and there is a view amongst stakeholders and the business community that constraints on the transport network are potentially hindering planned developments. In addition, the business community highlighted problems relating to the existing carriageway provision of the A96 potentially hindering business travel. There are opportunities afforded by nationally important initiatives such as the National Renewables Infrastructure Plan, Enterprise Areas and Proposed National Developments on and adjacent to the Inverness to Aberdeen Corridor. Inverness and Aberdeen rely on immediate neighbours for access to labour, to house essential related economic activities and industries, and the competitive advantage that comes from cities being located near areas of outstanding natural beauty.

Demand for Travel

Only a very small percentage of travel on the corridor is between Inverness and Aberdeen. In addition to the heavy volumes of trips into Inverness and Aberdeen, the number of trips to and from Elgin is significantly higher than to the other towns on the corridor. There is heavy reliance on the use of the private car, reflected by the fact that car ownership is generally higher in the towns along the corridor than in Scotland as a whole. Traffic levels are forecast to increase on the route, by the order of 20-25% between 2012 and 2030.

Connectivity

Inverness to Aberdeen bus journey times (three hours 50 minutes) are not competitive with those for the car (two hours 40 minutes), however rail journey times (two hours 15 minutes) are competitive. Impacting on both bus and car based times is the level of delays experienced in the towns along the route, particularly when travelling though Elgin and Nairn.

Safety

The accidents rates through Nairn, Keith and Huntly are higher than the national rates. In addition, the fatal accident rate on sections of A96 between Fochabers Bypass and Keith, Keith and Huntly, and Huntly and Inverurie are higher than the national rate. On the A96, more than half of all accidents occurred at or near one of the 600+ junctions or accesses along the corridor. Business feedback has highlighted a lack of overtaking opportunities and increased driver stress when travelling on the A96, in addition to issues relating to journey time reliability along the route. Improvements to infrastructure provision could present the opportunity to reduce conflict between local and strategic trips, particularly with respect to the number of fatal accidents involving pedestrians.

Figure 1.1.1 SBC Summary of Problems and Opportunities on the Inverness to Aberdeen Corridor

The SBC identified the following transport planning objectives for the corridor:

- To improve the operation of the corridor and inter-urban connectivity between the cities of Aberdeen and Inverness and their city regions through:
  - Reduced journey times;
  - Improved journey time reliability; and
  - Reduced conflicts between local and strategic road based journeys.
- To improve safety for motorised and non-motorised users through:
  - Reduced accident rates and severity; and
  - Reduced driver stress.
- To provide opportunities to grow the regional economies on the corridor through:
  - Improved access to the wider strategic transport network; and
  - Enhanced access to jobs and services.

The SBC demonstrated that the proposal to dual the A96 provided the best infrastructure intervention for the corridor by providing drivers with a consistent road standard that provides the best connectivity for those using the route, either end to end or to the many destinations along the corridor. Dualling the A96 will also complement the planned upgrade to the A9 and the construction of the A90 Aberdeen Western Peripheral Route (AWPR), and will provide those people and businesses located along the corridor with the best possible access to Inverness and Aberdeen and onwards to the Central Belt. The appraisal concluded that the full dualling of the A96 would deliver significant wider economic and accessibility benefits.

1.2 A96 Dualling Inverness to Nairn (including Nairn Bypass)

As outlined in **Section 1.1** above, the STPR recommended specific trunk road interventions upgrading the A96 between Inverness and Nairn to dual carriageway (Intervention 18) and a bypass of Nairn (Intervention 22). In 2010, Transport Scotland commissioned Jacobs to undertake a Design Manual for Roads and Bridges (DMRB) Stage 2 Assessment study (i.e. route option assessment) in relation to upgrading the A96 between Inverness and Nairn to dual carriageway standard (with at-grade junctions) and a single carriageway bypass of Nairn.

Following the commitment outlined in the IIP to dual the A96 between Inverness and Aberdeen by 2030, the Minister for Transport and Veterans on the 9th May 2013 set out how the A96 Dualling Programme would be taken forward. The outline strategy identified packages of design and development work to be progressed over the next few years with the objective of completing full dualling between Inverness and Aberdeen by 2030. These packages of work included updating route option assessment work for the section of the A96 between Inverness and Nairn, including a Nairn Bypass, to reflect the commitment to dual the entire route.

Transport Scotland have now concluded the route option assessment work for the section of the A96 between Inverness and Nairn (including a Nairn Bypass), which has been carried out in accordance with the requirements of a Stage 2 Assessment as outlined in the Design Manual for Roads and Bridges (DMRB), and a preferred option has been identified for the project.

This project forms part of the wider A96 Dualling Programme between Inverness and Aberdeen albeit it is at a more advanced stage. As such, the sections between Inverness and Nairn and the Nairn Bypass have been assessed as part of the Inverness to Nairn (Including Nairn Bypass) DMRB Stage 2 Assessment published October 2014, but are also summarised in this report for completeness. For full details of the assessment of this section of the A96, please refer to the Inverness to Nairn (Including Nairn Bypass) DMRB Stage 2 Assessment report.

1.3 The A96 Trunk Road

The A96 Trunk Road, as shown in **Figure 1.3.1** below, is located in the north-east of Scotland and is of national strategic importance linking the major city of Aberdeen to the strategically significant transport node at the city of Inverness. This corridor is vital in supporting the future growth of the two cities and the various communities within, and connected to the corridor. The A96 Trunk Road runs between Raigmore Interchange at Inverness and Haudagain Roundabout at Aberdeen, is approximately 160km long and passes through, or close to, various towns and villages along the route including Nairn, Forres, Elgin, Fochabers, Keith, Huntly and Inverurie.

The majority of the route is rural single carriageway however, sections of the trunk road at the western and eastern limits have previously been upgraded to dual carriageway standard to improve the efficiency of the trunk road network. At Inverness, the dualling extends for some 0.75km from Raigmore Interchange to Seafield Roundabout at Inverness Retail and Business Park. At Aberdeen, the dualling extends for some 20km from Haudagain Roundabout to Port Elphinstone Roundabout at Inverurie.

Figure 1.3.1 Location Plan: A96 Corridor between Inverness and Aberdeen

A typical journey time for cars is approximately two hours 40 minutes. Analysis of journey time reliability on the route suggests that traffic travelling through Elgin and Nairn are most likely to experience delay, with the spread of journey times generally greater than in the other towns, due to these being the most heavily populated towns on the route with the highest number of pedestrians and junctions.

Agriculture, timber and whisky are key industries on the A96 and are some of the main generators of freight on the route with HGVs varying between just over 6% to almost 12% of traffic volumes along the route.

Analysis of recent accident data has indicated that although the number of accidents on the corridor has reduced in recent years since the publication of STPR, accident rates and fatal accident rates are above the corresponding national rates (Scotland) for the road types at several sections. In particular, the towns of Nairn, Keith and Huntly have accident rates that are higher than the national average and the sections of the A96 between Fochabers Bypass and Keith, Keith and Huntly, and Huntly and Inverurie have fatal accident rates higher than the national average for their corresponding road types. Approximately half of all personal injury accidents on the A96, in the five year period from 2008 to 2012, occurred at or near a junction. The A96 has approximately 600 existing junctions and accesses along the route, excluding those within the main urban centres of Nairn, Forres, Elgin and Keith.

Figure 1.3.2 to **Figure 1.3.12** inclusive illustrates the variety of carriageway types along the A96.

Figure 1.3.2 A96 single carriageway with no hardstrips and private access near Allanfearn (looking westbound)

Figure 1.3.3 A96 single carriageway west of Forres (looking eastbound)

Figure 1.3.4 A96 east of Fochabers (looking eastbound)

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Figure 1.3.9 A96 single carriageway at Colpy (looking eastbound)

Figure 1.3.10 A96 Single Carriageway adjacent to the Aberdeen to Inverness Railway Line at Pitcaple (looking eastbound)

Figure 1.3.11 A96 single carriageway Inverurie Bypass (looking eastbound)

Figure 1.3.12 A96 Dual Carriageway & Tavelty Grade Separated Junction at Kintore (looking westbound)

1.4 Preliminary Engineering Services (PES) Study

Transport Scotland commissioned a Preliminary Engineering Services (PES) study for the dualling of the A96 between Inverness and Aberdeen. The commission includes undertaking a Design Manual for Roads and Bridges (DMRB) Stage 1 Assessment for the initial development and assessment of broadly defined improvement strategies for the upgrade of the A96 to a Category 7A all-purpose dual carriageway.

The programme objectives established for the A96 Dualling Programme have been developed from Inverness to Aberdeen Corridor Study SBC objectives and are as follows:

- To improve the operation of the A96 and inter-urban connectivity between the cities of Inverness and Aberdeen and their city regions through:
  - Reduced journey times;
  - Improved journey time reliability; and
  - Reduced conflicts between local and strategic journeys.
- To improve safety for motorised and non-motorised users through:
  - Reduced accident rates and severity; and
  - Reduced driver stress.
- To provide opportunities to grow the regional economies on the corridor through:
  - Improved access to the wider strategic transport network; and
  - Enhanced access to jobs and services.
- To facilitate active travel in the corridor;
- To facilitate integration with Public Transport Facilities; and
- To reduce the environmental effect on the communities in the corridor.

The DMRB Stage 1 Assessment has been developed according to assessment reporting guidance in the DMRB. Typically this stage of reporting is the first element of a three-stage assessment process. A DMRB Stage 1 Assessment is a preliminary assessment and usually involves a broad, strategic approach to developing and assessing indicative improvement strategies to allow the identification and consideration of the environmental, engineering, economic and traffic advantages, disadvantages and constraints associated with the developed improvement strategies.

Following the Strategic Assessment (Stage 1) of dualling the A96, the dualling programme will be divided into sections (i.e. individual projects within the overall dualling programme) for further assessment at Stages 2 and 3.

During the DMRB Stage 2 Assessment route options will be developed and assessed for each section. This will include engineering, environmental, traffic and economic assessment of the potential impacts of each option to inform the preferred choice.

Stage 3 will assess the preferred scheme option in more detail, identify the land required for the scheme and prepare an Environmental Statement. On completion of Stage 3 Assessment the publication of the Environmental Statement, draft road Orders and draft Compulsory Purchase Orders will commence the statutory process to gain authorisation for the procurement of the scheme.

The scheme assessment process is shown graphically in **Figure 1.4.1** below:

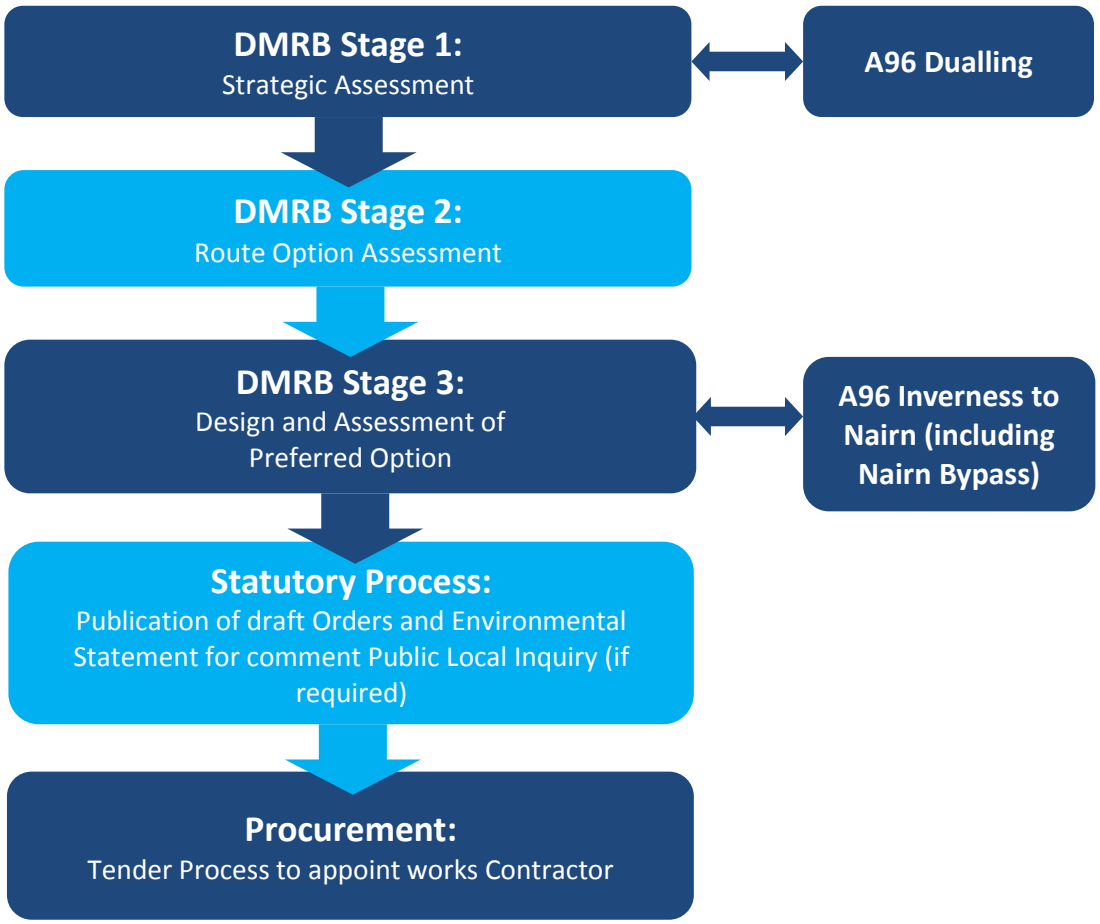

Figure 1.4.1 Scheme Assessment Process

1.5 Strategic Environmental Assessment (SEA)

In addition to the PES Study, Transport Scotland has appointed CH2M HILL to undertake a Strategic Environmental Assessment (SEA) to assess the route-wide constraints, issues and opportunities associated with A96 corridor transport intervention and improvement options, in accordance with the requirements of the Environmental Assessment (Scotland) Act 2005. A two-tier SEA approach is being delivered:

- Tier 1 SEA considered six strategic intervention options for the A96 transport corridor, covering both road and rail, to assess the potential for significant environmental effects at the 'plan/ policy' level; and
- Tier 2 SEA will go on to consider a range of road improvement strategy options at the more detailed 'programme' level.

The Tier 1 SEA was produced to inform the Inverness to Aberdeen Corridor Study Strategic Business Case with the Tier 1 SEA Environmental Report published for consultation on 25 September 2014. The Tier 2 SEA is considering a range of Improvement Strategies developed under the PES workstream, to consider alternative ways of providing dual carriageway connectivity between Inverness and Aberdeen. The Tier 2 SEA outputs will also inform future, more detailed design, development and assessment of route options, as well as project level Environmental Impact Assessments which will be delivered under the DMRB assessment processes.

The Tier 2 SEA Environmental Report has been prepared and the main findings of the report relevant to the consideration of improvement strategies, and the recommendations made within, are summarised in this DMRB Stage 1 Assessment Report.

1.6 Stakeholders

There are numerous stakeholders with interests in the proposed A96 dualling between Inverness and Aberdeen. The A96 Dualling Programme is of particular importance to the following key stakeholders who have been consulted as part of this study:

- Transport Scotland;
- Scottish Environment Protection Agency (SEPA);
- Scottish Natural Heritage (SNH);
- Historic Scotland;
- The Highland Council;
- The Moray Council;
- Aberdeenshire Council;
- Aberdeen City Council;
- Highlands and Islands Transport Partnership (HITRANS); and
- North-East of Scotland Transport Partnership (Nestrans).

In addition to the key stakeholders, numerous local and community organisations and other special interest groups have been consulted regarding the proposals. Further details are provided in **Section 2.10**.

1.7 Overview of Previous Work

A number of studies regarding the A96 corridor have previously been commissioned and are summarised below.

Aberdeen to Inverness Transport Corridor Study, Scott Wilson (2007). This report was published by a working group which looked at the corridor in accordance with the Scottish Transport Appraisal Guidelines (STAG). This identified problems and opportunities along the corridor, as well as improvement options for the corridor. 58 options were appraised during this process with 28 identified for further consideration, 11 of which were road projects.

A96 Fochabers and Mosstodloch Bypass Access Road to Gordon Castle Farm Options Assessment Report, Scott Wilson (November 2007)

The Options Assessment Report sets out the initial assessment undertaken in re-examining and evaluating alternative route options for the Gordon Castle Farm access. The Options Assessment Report identified and assessed three options. In addition to the option proposed at the Public Local Inquiry (PLI) (Option 1), two options have been assessed which consider the provision of a new access from Lennox Crescent.

Following a Public Consultation in Fochabers on 13-15 December, 2007, Transport Scotland announced (22nd February 2008) that Option 1 would be taken forward.

A96 Fochabers and Mosstodloch Bypass Mitigation Strategy for the Bypass between the Gordon Castle Main Estate Driveway and the Realigned Gordon Castle Farm Road Options Assessment Report, Scott Wilson (November 2007)

This Options Assessment Report sets out the initial assessment undertaken in re-examining and evaluating an optimum mitigation strategy. The Options Assessment Report sets out the initial assessment of twelve options which were derived for the mitigation strategy. Option L, a false crest with 1.9m to 3m noise barrier at the back of the verge was assessed as providing the best overall balance of mitigation measures demonstrating beneficial impacts across the range of criteria.

Following a Public Consultation in Fochabers on 13-15 December, 2007, Transport Scotland announced (22nd February 2008) that Option L would be taken forward.

A96 Dualling to the Airport, DMRB Stage 2 Assessment, Atkins (2008). This report details the findings of a DMRB Stage 2 assessment of options to dual the A96 between Raigmore Interchange and Inverness Airport. The report is presented in three sections: the Engineering Assessment, the Environmental Assessment, and the Traffic and Economic Assessment. The individual sections of this report present an assessment of each of the options considered against a range of criteria. The report does not make a final recommendation of a preferred route option.

Aberdeen Western Peripheral Route Stage 3 Scheme Assessment Report, Jacobs (2008). This report summaries the outcomes of the Stage 3 development work undertaken in respect of the Aberdeen Western Peripheral Route (AWPR). The report is published in two parts; the Aberdeen Western Peripheral Route (AWPR) Environmental Statement (ES) as published in September 2007 forms Part 1 of the Stage 3 Scheme Assessment Report with Part 2 detailing the assessment work in relation to the engineering, traffic and economics. The Northern Leg section of the AWPR includes a junction with the A96 at Dyce.

A new grade separated junction will be provided to cater for all traffic movements between the AWPR and the A96 Trunk Road. The grade separated junction will be located to the south of the A96 and a dual-carriageway link road will connect the junction to a large roundabout to be constructed on the A96. Slip roads are to be provided at the AWPR to connect to the link road which continues below the AWPR to connect to the Chapel of Stoneywood to Fairley Road to the west. The junction between the Chapel of Stoneywood to Fairley Road and the A96 will be closed under the AWPR scheme.

A96 Threapland Junction Improvement Environmental Statement, Scott Wilson (2008). This Environmental Statement (ES) assesses the proposed upgrade of Threapland Junction which is located between Lhanbryde and Fochabers on the A96 adjacent to Loch Oire. The improvements were proposed due to the relatively high level of traffic which combined with the sub-standard road geometry has led to a poor accident record at the junction.

The Scheme incorporates improvements to the vertical geometry of the A96 with no alteration to the current horizontal alignment. The existing Threapland junction arrangements will be upgraded to comply with current standards, and Loch Oire Road junction would be closed to vehicles. The new Threapland south junction would be situated 85m west of the existing north junction, which introduces a more favourable right-left junction and the substandard crest to the east would be removed. Further junction improvements at Threapland will be gained with the introduction of a ghost island to assist right turning traffic movements. The visibility splays will be vastly improved and the existing carriageway cross section would be amended to meet the appropriate carriageway standards.

A9, A96 Inverness, Nairn Strategic Corridor Options Study Stage 1 DMRB Route Options Assessment – Existing Conditions Report, Atkins (2010). This report provides information relating to the engineering condition of the existing road network between the A9 at Inshes and the A96 east of Nairn. As the report focuses on the existing network it does not include any discussion of transport improvement options.

A9, A96 Inverness, Nairn Strategic Corridor Options Study Environmental and Planning Constraints – Preliminary Assessment, Atkins, (2010). This report was prepared broadly in parallel with the Existing Conditions Report, and presents an assessment of the existing environment and environmental constraints within the study area. As with the Existing Conditions Report, it does not include any discussion of transport improvement options.

A9, A96 Inverness, Nairn Strategic Corridor Options Study Geotechnical Preliminary Sources Study Report, Atkins (2010). This report was again prepared broadly in parallel with the two reports discussed above, and presents the findings of an assessment of the existing ground conditions. While this report discusses transport improvement options, it does so in a superficial manner, focussing on the implications of these options in terms of existing ground conditions. Recommendations are limited to the extent of ground investigation potentially required for different options.

Strategic Transport Projects Review, Transport Scotland (2008). The review identifies a programme of transport interventions to be met by 2032. The A96 performance was reviewed in the STPR with the majority of traffic demand seen at either end of the corridor at Inverness and Aberdeen, and between settlements along the route.

The STPR noted that the vehicle speed is largely constrained by the HGVs present along the route, currently at 11% of the traffic volume. These vehicles are restricted to 40mph, and also conflict with local trips.

From the STPR, corridor objectives were drawn up as follows:

- To improve connectivity, particularly by public transport between Inverness city centre and the growth area to the east including Inverness Airport;
- To improve journey time and increase opportunities to travel, particularly by public transport, between Aberdeen and Inverness; and
- To reduce the accident rate and severity rate to current national average.

Within the STPR, nine interventions were considered on the Inverness to Aberdeen corridor, five of which related to road projects. These are listed below:

- 3) Upgrade A96 to Dual Carriageway between Inverness and Nairn;
- 4) New Bypasses on the A96;
- 5) Speed Enforcement Measures on the A96;
- 6) A96 Road Safety Improvement; and
- 8) A96 Dual Carriageway between Inverness and Aberdeen.

The STPR set out 29 investment priorities within an investment hierarchy. It recommended a number of road and rail based interventions to take forward on the Inverness to Aberdeen corridor.

A96 Inveramsay Bridge Improvement Environmental Statement, URS (2013). This Environmental Statement (ES) assesses the proposed upgrade to the A96 comprising approximately 1.5km of new single carriageway road, including a new road overbridge that enables the A96 Trunk road to be realigned over the Aberdeen to Inverness Railway Line. The existing Inveramsay Bridge is located north-west of Inverurie and carries the Aberdeen to Inverness Railway Line over the existing A96 Trunk Road. The masonry arch structure has a 4.4m height restriction and traffic under the structure is restricted to a single lane controlled by traffic signals, due to the arch and span of the bridge.

The project will be constructed mainly offline, and will bypass the existing road where the existing Inveramsay Bridge is located, which enables the removal of the traffic signals. From the north, the project commences on the existing A96 approximately 300 metres west of Inveramsay Bridge. The alignment then moves towards the River Urie before crossing the railway and running parallel to the existing road before re-joining the existing A96 just south of the junction with the U18C unclassified road.

A dual carriageway was also considered at the initial stages of DMRB Stage 2 but it was stated in the report that it was not possible to incorporate a dual carriageway into the existing trunk road alignment in the vicinity of Inveramsay Bridge due to site constraints. In addition, the report stated that the estimated cost of such a project would be in the region of £60m and therefore was not investigated further as part of the A96 Inveramsay Bridge project.

Following completion of the statutory process a contract for construction of the improvement was awarded in October 2014.

A96 Dualling Inverness to Nairn (including Nairn Bypass) DMRB Stage 2 Scheme Assessment Report, Jacobs (2014). This report summarises the assessment that was undertaken for potential options for dualling the A96 between Inverness and east of Nairn. The scheme was split into two sections: Inverness to Gollanfield and the Nairn Bypass. The assessment considered eight options for Inverness to Gollanfield and nine options for the Nairn Bypass. These options were assessed, commenting on engineering, environmental, traffic modelling and cost. A preferred option for each section is recommended within this report and will be taken forward as part of a DMRB Stage 3 Assessment.

Inverness to Aberdeen Corridor Study Strategic Business Case, Jacobs (2014). This report looks at the Strategic Business Case for the Inverness to Aberdeen Corridor looking at growing economic and transport demands along the corridor, in line with the Scottish Transport Appraisal Guidance (STAG). It covers the strategic case, identifying key problems, issues, and opportunities for the corridor, developing transport planning objectives as well as identifying options to be taken forward and the results of the appraisal process. It considers rail enhancements and improvements, as well as road improvements and dualling. The report recommends full dualling of the A96 between Inverness and Aberdeen on the basis of the best performing option in terms of the transport planning objectives and the STAG criteria.

A9 / A96 Connections Study, Jacobs (2014). The STPR recommended that the A96 should be upgraded from Inverness to Nairn (including a Nairn Bypass) and include an A9/A96 Link Road at Inverness as a potential trunk road. Transport Scotland presented initial proposals for a dual carriageway trunk road between the A9 at Inshes and the A96 at Smithton at public exhibitions held in February 2012. Following significant feedback from the public exhibition, Transport Scotland commissioned the A9 / A96 Connections Study to investigate wider traffic issues associated with the Inshes, Raigmore and Longman junctions on the A9, A96 and A82.

The A9 / A96 Connections Study has been undertaken in line with the principles of Scottish Transport Appraisal Guidance (STAG) to investigate the problems, opportunities and issues concerning traffic travelling between Inshes, Raigmore and Longman junctions in Inverness in an effort to develop a potential solution to the congestion and journey time reliability issues that exist at these key junctions. As part of the study, Transport Scotland presented options for junction improvements, and a new link road from the A9 at Inshes to the A96 at Smithton, at public exhibitions in May and June 2014 to seek views from the public on the potential options.

1.8 Structure of this DMRB Stage 1 Assessment Report

This DMRB Stage 1 Scheme Assessment Report has been prepared in accordance with the DMRB, Volume 5, Section 1 Part 2, TD 37/93 '*Scheme Assessment Reporting'*.

The report is structured as follows:

- **Section 1 Introduction:** Background to the A96 Dualling Programme and the Stage 1 Assessment;
- **Section 2 Existing Conditions:** General description of the existing conditions along the A96 corridor;

- **Section 3 Description of Improvement Strategies:** Description of the improvement strategy development and sifting process, and the alternative improvement strategy options;
- **Section 4 Engineering Assessment:** Engineering assessment, including constraints, advantages and disadvantages associated with the: road alignment, geotechnical, pavement, structures, junctions, parking/bus lay-bys/rest areas, provision for non-motorised users, roadside features and public utilities for each of the improvement strategies;
- **Section 5 Environmental Assessment:** Summary of findings from the Tier 2 SEA for the improvement strategies in relation to environmental issues, potential impacts and sustainability measures;
- **Section 6 Traffic and Economic Assessment:** Summary of traffic and economic conditions and the effects of improvement strategies; and
- **Section 7 Key Findings and Recommendations:** Recommendations for Stage 2 corridor options and the related delivery of the A96 Dualling Programme.

2 Existing Conditions

2.1 Introduction

A review of the existing A96 corridor has been undertaken to determine the present engineering, environmental, traffic and economic characteristics of the route. These key features are considered as part of the DMRB Stage 1 Assessment to provide a background of the current conditions and an understanding of how the dualling programme may impact or improve these features in various ways. The information presented in this section is intended to provide a high level overview of present conditions along the route. Existing features discussed in this section are also illustrated in the Key Constraints Plans in **Appendix B**.

2.2 Topography and Land Use Overview

2.2.1 Topographical Features

The existing A96 route lies within generally flat terrain with occasional high points along the route. The corridor encompasses a varied topography of rock formations, forest, lowlands, rolling hills and river valleys. The A96 crosses six hydrological catchment areas which includes river crossings of the Nairn, Findhorn, Lossie, Spey, Deveron and Urie/Don which are the main rivers for each of these catchments. The Nairn, Findhorn, Lossie, Spey and Deveron generally flow in a north-easterly direction to discharge into the Moray Firth while the Urie/Don catchment flows easterly to discharge into the North Sea at Aberdeen.

Travelling east from Inverness, the A96 passes through a long stretch of flat or gently undulating topography of the Moray lowlands characterised by the farming landscape and interspersed with forests and urban settlements including Nairn, Forres and Elgin. The route crosses three key hydrological catchment areas in this section related to the rivers Nairn, Findhorn and Lossie.

From Elgin, the A96 heads in a south-easterly direction and crosses the River Spey, the largest hydrological catchment along the route. The land starts to rise steadily out of the floodplain to pass between two densely forested hills to a localised high point of 190mAOD before starting to fall again as the road approaches Keith. Continuing south-east from Keith, the topography features shallow rolling hills and glens as it rises through upland agricultural lands past the densely wooded Meikle Balloch Hill, reaching an elevation of approximately 225mAOD in the Glen of Coachford.

The route passes over the densely forested slopes of the Bin Hill, before descending into the wide river valleys of the Deveron and Bogie Rivers as part of the Deveron hydrological catchment area. The town of Huntly is situated to the south of the confluence of the two rivers at the foot of the Clashmach Hills which separate the two river valleys.

Continuing south-east from Huntly, the topography generally rises through undulating rounded hills and farmland to the peak elevation along the route of approximately 275mAOD at Hillhead. The route then passes into the Glens of Foudland between the Hill of Bainshole and the Hill of Tillymorgan to the north and north-east and the Hill of Foudland and the Hill of Skares to the south.

Leaving the Glen, the route continues to fall through gently rolling farmland to meet the River Urie, which in combination with the River Don, form the second largest hydrological catchment area along the route. As the route approaches Pitcaple, the landscape character transforms into a rolling landscape of low hills and wide valleys with the settlements of Inverurie and Port Elphinstone located on the lower slopes of the river valley at the confluence of the River Urie and River Don.

The topography slightly flattens at Kintore and Blackburn before rising up from 75mAOD elevation to 150mAOD across the forested slopes of Tyrebagger Hill.

2.2.2 Existing Land Use

The land use along the corridor varies widely, often in accordance with the surrounding topography. The A96 connects diverse areas for use by local and long-distance commuters, tourists, agricultural transport and other commercial services. The road network is supplemented by the Aberdeen to Inverness Railway Line, which generally follows the A96 route between Inverness and Elgin and then again between Oyne and Kintore. The A96 and the Aberdeen to Inverness Railway Line cross at six locations with road bridges passing over the railway at Gollanfield, Nairn, Alves, Keith and the railway crossing above the A96 at Huntly and Inveramsay. The main land uses surrounding the A96 corridor are listed in the following broad categories:

- Settlements with varied residential and commercial components;
- Forestry areas; and
- Arable and mixed agriculture.

The route currently travels through, or close to, the major settlements of Nairn, Forres, Elgin, Fochabers, Keith, Huntly and Inverurie. These settlements are separated by sparsely populated areas with natural features such as rivers and forests as well as agricultural areas. Regular travel between settlements is common for local residents to access employment, commercial areas and schools.

Farmland is located along the entire corridor, where population is generally sparse. While the A96 is used as a transport connection to outside destinations, the carriageway itself forms a physical barrier between some agricultural properties. Farm vehicles often use the A96 to access various fields along the route, which can attribute to traffic congestion, delays and road safety hazards.

Natural areas which are sparsely populated comprise a portion of the surrounding land served by the A96. These areas include hills, dense forests and woodland, and river valleys.

The tourism industry is important to the area's economy. The Castle Trail and the Malt Whisky Trail are two of the key attractions of the area.

2.3 Non-Motorised User (NMU) Provision

2.3.1 NMU

Drawings B1557621/1100/001 to 037 inclusive as shown in **Appendix C** illustrate the existing recorded NMU routes throughout the length of the A96 between Inverness and Aberdeen. NMUs include pedestrians, cyclists and equestrians.

The availability of NMU routes varies throughout the A96 corridor. There is generally an increase in the NMU provisions on the approach to, and within, populated areas i.e. Inverness, Nairn, Elgin and Aberdeen. Between these centres of population, there are considerably less NMU facilities. The location of the NMU routes, in relation to the A96, varies considerably within the unpopulated areas.

Throughout the length of the A96 corridor, there are various NMU provisions comprising the following:

- Core paths, which can be used by pedestrians, cyclists and equestrians;
- National Cycle Network (NCN) Route 1;
- Scotland's Great Trails of The Dava Way, Moray Coast Tail and the Speyside Way;
- Other long distance paths including The Isla Way and The Fishwives Route;
- Rights of way routes that are not designated as core paths; and
- Informal NMU routes.

There are four Active Travel Plans that are relevant to the A96 corridor which have been produced by the Local Authorities and Regional Transport Partnerships for Elgin; Inverness; Forres, Kinloss and Findhorn; as well as for Aberdeen City and Aberdeenshire. The purpose of these plans is to help establish a network for walking and cycling along with access to public transport. They identify core active travel networks and prioritise action plans for development.

2.3.2 Core paths

Under the Land Reform Act of 2003, every Local Authority in Scotland is required to draw up a plan for a system of core paths. The gathered research indicates where new routes and improvements might be needed, while the plan assists landowners and land managers with managing public access to their property. The existing A96 corridor passes through four core path networks overseen by The Highland Council, the Moray Council, Aberdeenshire Council and Aberdeen City Council.

The development of a Core Path Network is based on information gathered through various methods about where people enjoy walking, cycling, horse riding and other outdoor activities. A Core Path Network is comprised of multiple core paths, which individually are of no particular standard type and may not be suitable for all potential user activities. Rather, a single path is sufficient for the purpose of giving the public reasonable access throughout the countryside across varied terrain and user functions. A core path is commonly identified according to the following general criteria:

- The path is fit for multi-use;
- The path creates a route in and around settlements and centres of population;
- The path helps people travel to and enjoy visitor attractions and historic or natural heritage sites;
- The path contributes to the overall network of routes around settlements and attractions; and
- The path creates links between settlements, facilities (e.g. shops, banks, schools), transport links and attractions.

The core paths within the extents of the dualling programme also include walks within Woods and Forests. These are predominantly located within the Moray boundary.

2.4 Environmental Conditions

This section summarises the purpose of the Tier 2 SEA Environmental Report, along with the environmental conditions identified within the Inverness to Aberdeen corridor.

The A96 Dualling Programme SEA adopted a two-tier approach to ensure that effective environmental assessment was being integrated throughout programme development. A more detailed summary of the SEA approach is provided, along with the findings of the SEA Environmental Report, in **Section 5** of this DMRB report.

- Tier 1 SEA informed the early Strategic Business Case work associated with the Inverness to Aberdeen strategic corridor study. The Tier 1 SEA Environmental Report and its NTS were published in September 2014.
- Tier 2 SEA considers a range of alternative 'Improvement Strategy Options' for A96 Dualling, which have been developed via a separate Preliminary Engineering Services (PES) workstream, to consider alternative means of providing dual carriageway connectivity between Inverness and Aberdeen.

The purpose of the Tier 2 SEA was to provide an increased understanding of environmental constraints for each 'Improvement Strategy Option' identified through the PES workstream, identify any potential for significant effects and input into the 'Sifting Out' process. It was not the objective of the Tier 2 SEA assessment to identify a clear option 'preference' in overall environmental terms.

Through the SEA scoping process (carried out in December 2014) and in discussion with the SEA Consultation Authorities (Scottish Natural Heritage, Scottish Environment Protection Agency and Historic Scotland) the SEA topics included in assessment were:

- Biodiversity, Flora and Fauna;
- Soil and Geodiversity;
- Water and Flooding;
- Air;

- Population and Human Health;
- Historic Environment; and
- Landscape.

In order to effectively identify, collate and assess key environmental issues and constraints along the route, the SEA adopted a GIS (Geographical Information Systems) mapping approach. This focused on designations and constraints for a 15km-wide corridor between Inverness and Aberdeen, broadly following the route of the existing A96 trunk road and the rail line between the cities. The complete environmental baseline for the 15km-wide corridor is presented in a series of maps within the SEA Tier 2 Environmental Report.

Key environmental constraints are shown on the Key Constraints Plans in **Appendix B** in this report and, encompass the following designations:

- **Ecological**; Ramsar Sites, Special Areas of Conservation (SACs), Special Protection Areas (SPAs), Sites of Special Scientific Interest (SSSIs), and Ancient Woodland Inventory Sites
- **Historic Environment**; Gardens and Designed Landscapes (GDL), Conservation Areas, Inventory Battlefields, Scheduled Monuments and Listed Buildings
- **Soils and Geodiversity**; Geological Conservation Review (GCR) sites, Geological Sites of Special Scientific Interest (SSSIs)
- **Water and Flooding;** 1:200 SEPA flood maps (fluvial, coastal and surface water)

2.5 Carriageway Features

This section of the report provides a brief overview of existing carriageway features, including alignment and cross section variations, pavement conditions and structural characteristics. Junctions, accesses, lay-bys and rest areas are also described. Beyond the general aspects highlighted below, further information on these topics are presented in **Section 4**.

2.5.1 Alignment and Cross Section

The A96 has undergone numerous upgrades and alternations but still largely follows the route of the original road with the exception of where bypasses are constructed including bypasses of Forres, Huntly, Inverurie and Kintore. As such, the alignment and cross section along the route varies and has been designed to the engineering standards that were relevant at the time of construction. Since its original construction discrete sections of the A96 have been upgraded to either dual two-lane all-purpose (D2AP) carriageway, include provision of climbing lanes or wide single 2+1 (WS2+1) carriageway. Consequently, there are numerous changes in the cross section between Inverness and Aberdeen. There are currently six single carriageway sections interspersed within two dual carriageway sections, and approximately one tenth of the approximate 160km length of road is dual carriageway.

The existing alignment and the comparison with current DMRB standards is discussed in detail within **Section 4.2.4** of this report and applicable information on

horizontal and vertical geometry, stopping sight distance (SSD) and Departures from Standards are included for each subsection of the route. At present, approximately 60% of the existing A96 dual carriageway section for a 120Akph Design Speed, and approximately 31% of the existing A96 single carriageway for a 100Akph Design Speed are not in accordance with current DMRB standards based upon sub-standard Horizontal and/or Vertical Alignment, Stopping Sight Distances, Junction Approaches, or combinations thereof.

The cross section varies along the length of the A96 but is predominantly as follows:

- For the dual carriageway sections: two carriageways of 7.3m width travelling in opposing directions (each containing two 3.65m wide lanes); a 2.5m wide central reservation separating the two carriageways; a 1.0m wide hardstrip adjacent to both sides of each carriageway (sections have reduced 0.7m wide hardstrip); and a 2.5m wide verge adjacent to each offside hardstrip;
- For the single carriageway sections: one 7.3m wide carriageway, with two 3.65m wide lanes travelling in opposing directions; an intermittent hardstrip, with a varying width up to 1.0m is adjacent to both sides of the carriageway on sections throughout the A96; and a verge with varying width is adjacent to each hardstrip; and
- For the WS2+1 carriageway sections: an 11.5m wide carriageway with three 3.5m wide lanes and a 1m wide separator zone; a 1.0m wide hardstrip adjacent to both sides of the carriageway; and a 2.5m wide verge adjacent to each hardstrip.

2.5.2 Pavement

The current A96 pavement is constructed as a fully flexible pavement. The thickness of bituminous material ranges greatly from 40mm to 475mm across the varying sections of the route. There is currently limited information regarding granular range for the majority of the route, with some sections ranging between 100mm – 250mm.

As discussed in **Section 4.2.6**, the composition of the existing carriageway was obtained from the Scottish Executive Roads Improvement System (SERIS) database which includes details of materials, thickness and structural properties. Preliminary residual life analysis was carried out using deflectograph surveys, summarising that 76% of the route has more than 10 years of life remaining. However, 11% of the route has an estimate of 5 to 10 years remaining with 13% having less than 5 years residual life remaining. This equates to approximately 22km of the route, throughout all subsections.

2.5.3 Structures

There are approximately 124 structures located on the A96 between Inverness and Aberdeen. These consist of overbridges (where the road, railway or pedestrian structure passes over the existing A96), underbridges (where the road, railway or pedestrian structure passes under the existing A96), retaining walls and watercourse crossings.

A detailed assessment of the structures can be found in **Section 4.2.7** of this report. The majority of the structures have cross sections that are not to current standard

and several existing structure locations are constrained by watercourses, railways and residential areas.

There are a number of significant structures on the route, located on both single and dual carriageway sections. A list of these structures is provided overleaf.

- **A96 590 Stoneyfield 2 Rail:** Total span length of 43.7m, carrying the A96 dual carriageway over single railway tracks.
- **A96 540 Nairn River:** Total span length of 37.1m, carrying A96 single carriageway over Nairn River.
- **A96 500 Findhorn:** Total span length of 90m, carrying A96 single carriageway over Findhorn River.
- **A96 470 Sheriffmill:** Total span length of 43.3m, carrying A96 single carriageway over River Lossie.
- **A96 410 Fochabers New:** Total span length of 119.9m, carrying A96 over River Spey.
- **A96 150 Don Inverurie New:** Total span length of 140m, carrying A96 over Don River.

2.5.4 Junctions and Accesses

Along the length of the existing A96 between Inverness and Aberdeen, there are approximately 600 junctions and accesses, excluding junctions and accesses on the approach to, and within, the main urban centres of Nairn, Elgin, Forres and Keith. These provide connections to other trunk roads, local roads, towns, villages, community facilities as well as property and farm accesses. Ten of these junctions connect to A class roads, including one Trunk Road (A95), and they generally interface with the A96 at or in the vicinity of the main population centres along the route. The exception is the A920 which joins the A96 between Huntly and Inverurie. In addition, there are 20 B class roads and 72 C class roads connecting to the A96. The remaining connections to the A96 are to junctions with unclassified roads (33) or private/agricultural accesses (465). A detailed assessment of existing junctions and accesses is contained within **Section 4.2.8** of this report.

As the existing A96 is predominantly single carriageway, the junctions and accesses are generally at-grade with the exception of the two grade separated junctions on the dual carriageway sections at Kintore (Tavelty Junction and Gauchhill Junction) and at the A9 Raigmore Interchange. At-grade junctions involve two or more roads converging at the same level; typically, the major road has priority over minor road(s). Conversely, grade separated junctions are designed to segregate the minor road and major road at different levels, eliminating the conflict with the major road caused by right turning movements or straight ahead crossing movements from the minor road.

The existing dual carriageway section between Raigmore Interchange at Inverness and the Seafield Roundabout, has a left in/left out junction to provide access to the Stoneyfield Business Park. No central reserve openings are present over this section.

The dual carriageway section between Port Elphinstone Roundabout south of Inverurie and the proposed junction with the AWPR at Aberdeen contains both grade separated and at-grade junctions of a variety of forms, some of which include

central reserve openings. In this section there are two grade separated junctions, four roundabouts, one staggered junction, four T-junctions and five left in/left out junctions. In addition, there are 10 direct accesses (one farm and nine field), eight of which are opposite openings in the central reserve.

2.5.5 Lay-bys and Rest Areas

The existing lay-bys on the A96 between Inverness and Aberdeen include both parking lay-bys and bus lay-bys and vary depending on their usage and the standards of the single or dual carriageway they serve. These are described fully in **Section 4.2.9**. There are a total of 120 lay-bys which can be summarised as follows using the layouts specified in TD 69/07 *The Location and Layout of Lay-bys and Rest Areas* of the DMRB:

- Type A – 25;
- Type A with Merge Taper – 8;
- Type B – 37; and
- Bus – 50.

These lay-by totals exclude those within the main urban centres of Nairn, Forres, Elgin and Keith.

Type B lay-bys, which are the most common type currently on the A96, excluding bus stops, are acceptable for a single carriageway road, however are not suitable for dual carriageway roads.

There are currently no recognised publically owned rest areas along the existing A96 route. As an alternative, HGVs have been utilising public car parks at Lossie Green in Elgin and Edindiach Road in Keith[1]. Both of these towns are located within adjacent communities on the A96 route. There are a further two locations, at Pinefield and Moycroft Industrial Estate, Elgin and Greshop Industrial Estate Forres, where lorries are known to park. Details of the locations used and facilities provided are included in **Section 4.2.10**.

2.6 Traffic and Safety Overview

2.6.1 Traffic Conditions

The current traffic flows observed on the A96 between Inverness and Aberdeen are between 6,400 and 33,000 vehicles per day (refer to **Figure 2.6.1** overleaf). Traffic levels vary along the route, with greater commuter traffic demands approaching Inverness and Aberdeen and lower demand in the central section of the route between Fochabers and Huntly. The proportion of Heavy Goods Vehicles varies along the route between 6% and 12% of the total traffic volume.

[1] Lorry Parking Strategy, The Highlands and Islands Transport Partnership, May 2011

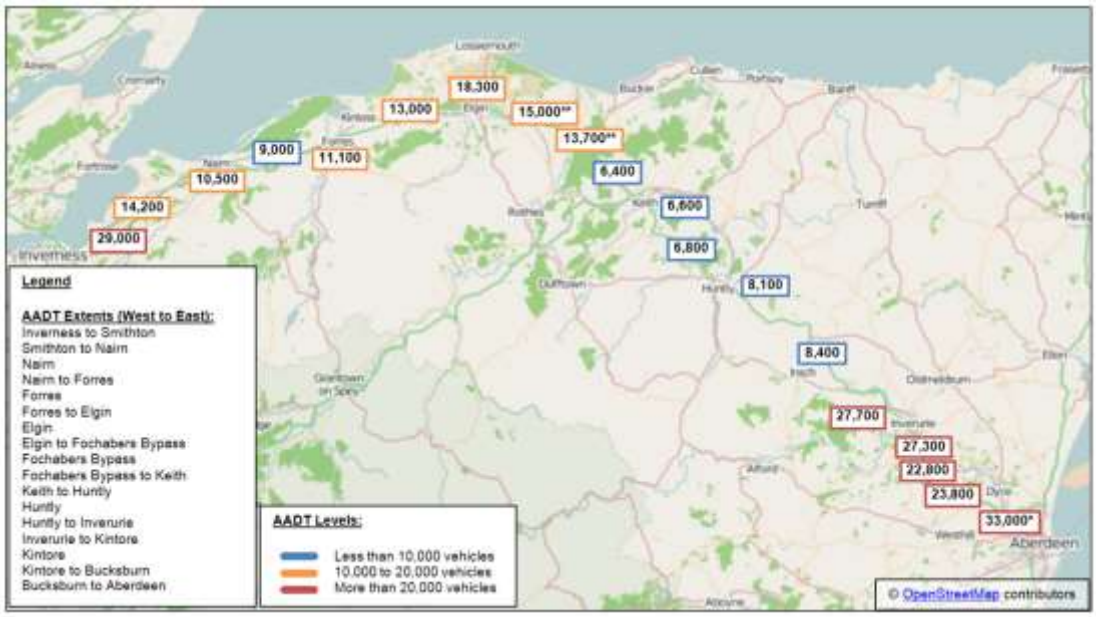

Figure 2.6.1 Annual Average Daily Traffic by Section in 2012 (2011*) (2010**) from Scottish Road Traffic Database, Transport Scotland

The traffic information shows some seasonal variation in traffic flows along the route. Traffic levels increase by approximately 5-10% in July in the sections between Inverness and Elgin and from Fochabers to Inverurie. This seasonal variation reflects the importance of tourist traffic on these areas of the route while sections of the route where commuting is more pronounced, such as the immediate approach to Aberdeen, there is no noticeable seasonal variation.

Further details on the traffic baseline are included within **Section 6** of this report.

2.6.2 Safety Issues / Accident History

Analysis of the STATS19 data[2] for the five year period from 2008 to 2012, indicated that the sections of the A96 through the towns of Nairn, Keith and Huntly all had accident rates higher than the corresponding rate for a Built-up Trunk A road in Scotland for the same time period. The rural single carriageway sections of the A96 between Fochabers Bypass and Keith, Keith and Huntly, and Huntly and Inverurie also had accident rates higher than the corresponding national rate (Scotland). The sections of the route which have higher accident rates above the national average for the road type are presented in **Figure 2.6.2** overleaf.

[2] Road accident statistics from personal injury road accidents in Scotland

Figure 2.6.2 Sections of the A96 where the Total Accident Rates Exceed National Average for the Road Type

Approximately half of all personal injury accidents on the A96, in the five year period from 2008 to 2012, occurred at or near a junction compared to the national average for Non Built-up Trunk Roads of less than 30 per cent. There are approximately 600 junctions on the A96, excluding those within the main urban centres of Nairn, Forres, Elgin and Keith, and it is therefore likely that the turning manoeuvres along the route may cause conflicts.

The towns of Nairn, Forres, Keith and Huntly and the sections of A96 between Fochabers and Keith, Keith and Huntly, Huntly and Kintore and Bucksburn and Aberdeen all have higher than national serious accident rates.

The sections between Nairn and Forres, Keith and Huntly, and Huntly and Inverurie are identified as having fatal accident rates which are higher than the corresponding national rate for a Non Built-up Trunk A road[3].

The fatal accident rates are also higher at Forres, Keith and between Bucksburn and Aberdeen; however the rates are based on one fatal accident on each section, therefore not considered suitable basis for identifying an accident trend.

Detailed accident analysis can be found in **Section 6.2.7**.

2.6.3 Journey Time Reliability

The current journey time between Inverness and Aberdeen is approximately 2 hours 40 minutes by car. Bus journey times are significantly longer with city centre to city centre travel time approximately 3 hours 50 minutes, equating to an average speed of just over 40km/hr. Using a simple distance, speed relationship, the free flow journey time by road, from Inverness city centre to Aberdeen city centre, would be approximately 1 hour 55 minutes. Although a relatively crude method, the difference between these two journey times provides an indication of the general delay on the route, through a combination of cumulative junction delay through the towns, the impact of slower moving vehicles, and any constraints caused by road alignment.

[3] Reported Road Casualties Scotland 2012

Analysis of journey time reliability on the route for trips travelling through the towns on the A96 suggest that traffic travelling through Elgin and Nairn are most likely to experience delays in excess of five minutes, with the spread of journey times generally greater than in the other towns. Further details regarding journey time reliability can be found in **Section 6.2.6**.

2.7 Social and Economic Context

The population in the immediate vicinity of the corridor, and served by the corridor (Aberdeen City, Aberdeenshire, Moray, Inverness and Nairn) is 642,600 (2011 figures), around 12% of the total Scottish population. This population is growing at around 2.9% (from 2008 to 2011), well above the Scottish average (1.7%) and includes some of the fastest growing populations in the country[4]. The highest percentage growth has occurred in the pensionable age group, however growth in the working age population and Under 16 age group are also higher than the corresponding increase at a national level. The proportion of the population which is of working age varies from 61.8% in Inverness and Nairn to 69.6% in Aberdeen City. The Scottish average is 65.9%. Population is expected to increase over the foreseeable future, particularly within Aberdeen and Aberdeenshire.

The corridor itself does not pass through or lie in close proximity to any datazone areas that are ranked in the top 15% (most deprived) of the Scottish Index of Multiple Deprivation (SIMD) 2012. The majority of the datazone areas along the route have an SIMD in the range 60% to 80%, however the datazone areas around Inverurie and Aberdeen have an SIMD of 80% to 100% (least deprived areas). The datazone area at Forres Central East and seaward has an SIMD rank of 20% to 40%, with the Keith and Fife Keith datazone area ranking in between 40% and 60%. There are datazone areas in both Aberdeen and Inverness that are ranked as being in the most deprived 15% of the SIMD, including the Heathryfold and Middlefield datazone area in Aberdeen and the Inverness Central, Raigmore and Longman datazone area.

Inverness is an important centre for trade and commerce as well as being an important transport hub for the wider Highlands and Islands region. New industries have been developing in the city in key economic sectors including energy, tourism and life sciences. Aberdeen also performs well, and is recognised worldwide as a centre for off-shore energy, as well as supporting two renowned universities. Extending from Aberdeen northwards to Peterhead is the 'Energetica' corridor, where a key hub for energy infrastructure and related development is planned. Outwith the cities, rural areas support a number of economic sectors, including tourism, food and drink and other primary industries. There has also been a significant growth recently in the renewables sector, particularly in the Moray Firth area.

Gross Value Added (GVA) for Aberdeen and Aberdeenshire has grown by 7.6% (from 2008 to 2011) and decreased by 0.2% for Inverness, Nairn, Moray, Badenoch and Strathspey. In the same period the GVA across Scotland has fallen by 2.6% and therefore both areas have performed well. A similar pattern exists for GVA per head, where Aberdeen and Aberdeenshire have increased ahead of the national average but the other areas have seen a decrease. The number employed has fallen by 1% (from 2008 to 2011, Scottish average = 5.4%) with gains in

[4] National Planning Framework 3, Transport Scotland, 2014

Aberdeenshire offsetting losses elsewhere. Unemployment rates are below the Scottish average, particularly in Aberdeen and Aberdeenshire.

2.8 Public Transport Facilities

Improving integration with public transportation facilities is an objective of the A96 Dualling Programme. Locations of train and bus facilities have been evaluated to determine their existing distribution across the A96 corridor.

2.8.1 Bus Facilities

The majority of bus services in Scotland are operated on a commercial basis by private bus companies. The bus/coach operators on the Inverness to Aberdeen route are Megabus (Stagecoach group), Stagecoach Bluebird, Stagecoach Highlands and Bains Coaches.

In general, the route between Inverness and Aberdeen consists of an hourly bus service seven days a week, in both eastbound and westbound directions of travel.

Within the corridor limits, 50 online bus stop locations (25 bus stops eastbound and 25 bus stops westbound) were identified, excluding those bus stops in the centre of Nairn, Forres, Elgin and Keith as these towns are likely to be bypassed as part of the A96 Dualling Programme. In addition, the local bus services anecdotally operate a stop on demand service in remote rural locations, picking up and dropping off passengers at locations with no formal bus stops.

A list of the bus facilities is provided in **Appendix E**.

2.8.2 Train Facilities

Trains between Inverness and Aberdeen are operated by ScotRail stopping at eight intermediate stations along the route as shown in **Figure 2.8.1** below. The journey time between Aberdeen and Inverness is approximately 2 hours 15 minutes by train.

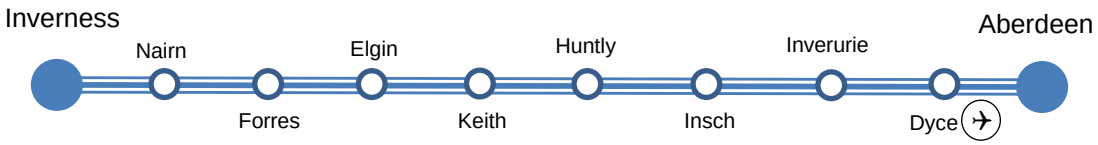

Figure 2.8.1 Stations for Inverness to Aberdeen train Service

The majority of these stations lie within the main urban centres with two of the stations at Forres and Keith accessed directly from the existing A96. The existing train station information for the stations in the vicinity of the A96 corridor are shown in **Table 2.8.1** overleaf.

The Scottish Government in partnership with the rail industry is also taking forward the Aberdeen to Inverness Rail Improvements Project. The project will: deliver greater connectivity by providing an hourly service between the two cities and enhanced commuter services at either end of the route; reduce journey times to around 2 hours between the two cities; and improve access to the rail network through the delivery of new stations at Kintore and Dalcross. The Scottish Government has confirmed that the project will be delivered in phases to provide incremental benefits through the life of the scheme, with the whole project delivered

by 2030. Phase One of the project will deliver enhanced commuter services into each city and new stations at Kintore and Dalcross by 2019.

Station Name	Chainage	Proximity to Existing A96	Direct Access to Existing A96
Nairn	22,500	0.5km south-east of A96; Accessed from Cawdor Road	No
Forres	38,800	North of A96; Direct access from A96	Yes
Elgin	58,500	0.85km south of A96; Accessed from A941	No
Keith	85,150	North of A96; Direct Access from the A96	Yes
Huntly	103,300	0.65km north of A96; Accessed from A97	No
Inverurie	137,500	1.7km north-east of A96; Accessed from B9170	No

Table 2.8.1 Existing Train Station Facilities within the A96 Corridor

The current daily timetable[5] comprises of 29 passenger trains towards Aberdeen and 27 trains towards Inverness as follows:

- Aberdeen to Inverness – 11 trains per day
- Inverness to Aberdeen – 11 trains per day
- Aberdeen to Dyce or Inverurie – 15 additional trains per day
- Inverurie or Dyce to Aberdeen – 15 additional trains per day
- Elgin to Inverness – 1 additional train per day
- Inverness to Elgin – 2 additional trains per day
- Huntly to Aberdeen – 1 additional train per day

The current passenger journey times and irregular service between Aberdeen and Inverness means that the railway line does not offer an attractive alternative to road travel[6].

2.9 Public Utilities

The collation of public utility information for the A96, in accordance with the C2 Preliminary Inquiries stage of the New Roads and Street Works Act 1991, Measures Necessary where Apparatus is Affected by Major Works (Diversionary Works), A Code of Practice, is ongoing, with further utilities information to be gathered at the next stage of design development.

Information has been requested from the following companies:

- Airwave Solutions*;
- BP;

[5] Aberdeen to Inverness Rail Improvements Project GRIP 3 – Phase 1 Enhancements Summary, Transport Scotland, 2014

[6] Aberdeen to Inverness Rail Improvements Project GRIP 3 – Phase 1 Enhancements Summary, Transport Scotland, 2014

- BT Openreach*;
- Everything Everywhere;
- Geo Networks*;
- Government Pipeline and Storage Systems (GPSS);
- National Grid;
- Network Rail;
- O2*;
- Scottish Gas;
- Scottish Water*;
- Shell;
- Scottish and Southern Energy (SSE);
- Three Mobile;
- Trafficmaster;
- Virgin Media*; and
- Vodafone.

Public utility information was not provided by the companies denote by an asterisk above.

All available public utility information can be found on the drawings contained within **Appendix D** with further discussion in **Section 4.2.14**.

2.10 Stakeholder Consultation

As part of the A96 Dualling Programme, there is ongoing communication and consultation with a wide range of stakeholders. In addition, the consultation process will follow the guidelines set out in the National Standards for Community Engagement.

Since July 2013, Transport Scotland has consulted with stakeholders and other interested parties to identify the risks and opportunities which need to be considered as part of the project delivery.

This consultation has assisted with the development of the constraints plans by identifying key constraints such as locations of environmental sites, Listed Buildings, Battlefields, areas of flooding, public utilities and other physical features of the existing route.

Affected stakeholders have been grouped into Statutory and Non-Statutory Stakeholders. Statutory Stakeholders include: The Highland Council, The Moray Council, Aberdeenshire Council, Aberdeen City Council, as well as organisations such as Scottish Natural Heritage (SNH), Historic Scotland (HS) and Scottish Environment Protection Agency (SEPA).

Non-Statutory Stakeholders include, but are not limited to, regional transport providers such as ScotRail, FirstGroup and Stagecoach, public utilities providers and emergency services. Consultation with others including the general public,

community councils, interest groups and landowners will be ongoing as individual schemes within the overall programme are developed.

In November 2013, community consultation commenced through a series of exhibitions along the route corridor between Inverness and Aberdeen. The purpose of the exhibitions was to explain the process for the examination of the strategic aspects of dualling the A96 and to highlight the process for the planning, design and statutory process that Transport Scotland follow during the development of a trunk road scheme. The exhibitions also provided the opportunity for the communities located close to the A96 to comment on the early stages of the dualling programme.

In recent months, meetings have been held with the Local Authorities and Regional Transport Partnerships, SEPA, Historic Scotland and SNH to understand their own aspirations as part of the A96 Dualling Programme and to outline the PES and SEA progress to date.

In addition, a Non-Motorised User Forum has been established to provide regular updates to forum members on the emerging design proposals for the A96 dualling and provide a platform where forum members can provide advice and highlight relevant issues regarding NMU access. A selected group of stakeholders has been invited to participate in the forum including SNH, Local Authorities, Regional Transport Partnerships and NMU interest groups and organisations.

As part of the Inverness to Nairn (including Nairn Bypass) scheme, a Community Council Forum has been established. Further Community Council Forums will be established for individual schemes, as the programme progresses to the next stages in the design process.

2.11 Flooding

Recent experiences and consequences of flooding have highlighted the importance of flood prevention measures and the need for roads authorities to plan for and respond to extreme weather conditions.

The A96 traverses six major hydrological catchments, namely, Nairn, Findhorn, Lossie, Spey, Deveron and Urie/Don. The SEA team obtained flood incident records through information requests to SEPA, The Highland Council, The Moray Council, Aberdeenshire Council and Transport Scotland's trunk road management and maintenance organisation for the north-east, BEAR Scotland.

In addition, several flood alleviation schemes have been identified in the vicinity of the route which have either been proposed, recently completed or are currently under construction. These are noted in **Table 2.11.1** overleaf. The Forres (River Findhorn & Pilmuir) Flood Alleviation Scheme includes raising the vertical alignment of the A96 near the Greshop Industrial Estate, Forres, to allow new drainage channels to be installed underneath the road.

The latest SEPA Flood Maps (2014) have been obtained from SEPA which show flooding from rivers, sea and surface water for the high (1:10 year return period), medium (1:200 year return period) and low (1:1000 year return period or 200 year plus climate change for surface water) likelihood of flooding. The updated flood maps present the flood extents of individual sources of flooding independently, but do not account for the possible interactions between sources of flooding and any resulting combined impact.

Scheme	Local Authority	Description
Elgin Flood Alleviation Scheme	Moray Council	**In construction** Designed to 1 in 200 year return period flood To protect ~650 properties and 180 commercial properties Majority of defences in the town of Elgin Watercourses: Tyock Burn, Linkwood Burn, River Lossie
Forres (River Findhorn & Pilmuir) Flood Alleviation Scheme	Moray Council	**In construction** Designed to 1 in 200 year return period flood To protect 1,000 homes and businesses Scheme involve raising vertical alignment of existing A96 Watercourses: River Findhorn
Forres (Burn of Mosset) Flood Alleviation Scheme	Moray Council	**Completed in 2009** Designed to 1 in 100 year plus climate change To protect over 800 properties Watercourse: Burn of Mosset
Lhanbryde Flood Alleviation Scheme	Moray Council	**Completed in 2005** To protect 44 properties (residential & business) Scheme involved flood storage, flood walls and channel improvement Watercourse: Lhanbryde Burn
Proposed Huntly Flood Protection Scheme	Aberdeenshire Council	**Proposed** Design to 1 in 200 year plus climate change Scheme involve embankment, 2 flood attenuation areas Watercourse: River Deveron

Table 2.11.1 Flood alleviation schemes along the A96 corridor

The A96 route is currently at risk of flooding from surface water and a number of watercourses in some locations. Following an initial review of the SEPA flood maps, stretches of the A96 that are presently at risk of flooding from rivers are shown in the Key Constraint Plans shown in **Appendix B**.

An assessment of the flood risk has been undertaken by CH2M HILL under the Strategic Flood Risk Assessment (SFRA).

2.12 Winter Resilience

2.12.1 Introduction

The topography of the A96 varies along the route from the flat coastal zone between Inverness and Elgin before rising into rolling hills and valleys as the route travels south-east towards Aberdeen. The route reaches a peak elevation of approximately 275mAOD at Hillhead before passing into the Glens of Foudland. The Glens of Foudland can experience severe adverse winter weather between November and March due to snow drifting over the road as a result of a lack of shelter and high elevation. In addition, several other areas along the route are susceptible to winter weather due to steep inclines.

Winter resilience considerations include the planning and safety features, management approach and strategic issues of the existing corridor. Existing roadside features related to winter resilience are also presented in detail in **Section 4.2.12**.

2.12.2 Winter Service Planning and Safety Features

During prolonged periods of severe weather, road closures have been necessary at the Glens of Foudland. Hidden fold-down signs are currently used in this location for the purpose of closing the road. In addition, virtual snow gates are currently being trialled at the same location. The purpose of the signs is to allow rapid notification of a closure of the A96 between the gates.

The early notification will allow vehicles approaching the closed area the opportunity to turnaround and use an alternative route, or alternatively wait at a safer location until the road reopens.

Snow poles are positioned on the verge of the road to demarcate the edge of the carriageway during snow and wintery conditions. Along the A96 there are 10 locations where snow poles are installed. There is currently no snow fencing or shelter belts located on the A96.

2.12.3 Decision and Information Management

The forecasting of weather conditions across climatic zones and decision making responsibilities for winter maintenance operations lie with the Trunk Road Operating Companies, albeit with defined obligations and specifications set out in terms of a maintenance contract.

There are a total of three weather stations which generate domain specific forecasts between Inverness and Aberdeen on the A96 located at Brodie, Foudland and Tyrebagger. Furthermore, ice sensors are installed at Fochabers, Keith and Delnies to model the temperature characteristics of the road pavement.

The Scottish Government and Transport Scotland annually engage the public with winter travel advice and education. Furthermore, Traffic Scotland provides daily journey time reliability and road condition updates to the public.

Several Areas Requiring Special Attention (ARSAs) have been identified along the route by Transport Scotland and the A96 Trunk Road Operating Company. An ARSA is an area identified as problematic through past experience or local knowledge due to criteria including water runoff, steep gradients and susceptibility to frost. Fifteen ARSAs have been identified between Inverness and Aberdeen including the following ARSA for which specific mitigation plans have been developed for each site:

- **Glens of Foudland –** Snow drifting over the road as a result of a lack of shelter and high elevation; and
- **Tyrebagger Hill** – High volumes of traffic at peak periods combined with HGVs struggling to climb the steep incline can result in the vehicles losing traction & sliding across the carriageway blocking the road.

2.12.4 Resources

Winter service activities involving salting and ploughing on the A96 are delivered from depots at either end of the route at Aberdeen and Inverness with an intermediate depot located near Keith.

2.13 Key Issues

The Stage 1 Assessment has identified a number of key issues with the existing corridor which are summarised below:

- Topography and land use constraints are common in areas where the A96 is in close proximity to settlements, railway lines, structures and steep topography;
- Environmental constraints include battlefield sites, designated sites and flood risk areas;
- Existing carriageway features to be addressed are numerous and include alignment, cross section, pavement, structures, junctions, accesses, lay-bys, rest areas and NMU facilities;
- Traffic demand, safety concerns and accident history;
- The single carriageway cross section contributes to safety and operational issues, including unreliable journey times;
- Existing utility locations may impact construction management aspects and final corridor alignments;
- Stakeholder involvement is an ongoing element vital to success of the programme; and
- Significant environmental challenges involve winter weather impacts and flooding.

3 Description of Improvement Strategies

3.1 Introduction

As an initial step in the assessment process for dualling of the A96, multiple improvement strategies were identified and investigated. These were subject to a sifting exercise to determine those which merited DMRB Stage 1 Assessment. The sifting process is described below, along with the improvement strategies taken forward to DMRB Stage 1 Assessment.

3.2 Sifting Process

A sifting exercise was undertaken as the initial approach to the identification and assessment of indicative improvement strategy options. This process involved a two-part study of the alternative improvement strategies with varied advantages and disadvantages.

The process of generating improvement strategy options primarily focused on identifying broadly different strategies which could meet the dualling programme objectives.

It is important to note that each improvement strategy should be considered as a high level approach to providing a dual carriageway between Inverness and Aberdeen and not as a specific improvement corridor or route. Sixteen alternative improvement strategies were identified which included both near online and offline strategies and part route and whole route strategies as shown in Drawing B1557621/0000/001 (Appendix A).

In Sifting Part 1, sixteen improvement strategies were assessed against the six programme objectives identified in **Section 1.4**. Those improvement strategies which satisfied all, or in some cases most, of the six programme objectives continued through the process to Sifting Part 2. In Sifting Part 2, the improvement strategies were assessed at a high level against both DMRB criteria (engineering, environmental and cost) and a general assessment of deliverability. Sifting Part 2 comprised a negative assessment of the improvement strategies to identify options which were significantly less advantageous than others and therefore removed from further consideration. The sifting process is outlined in **Figure 3.2.1** overleaf.

It was agreed that Options B, C, D E, N and P satisfied all the A96 Programme Objectives and as such should proceed to Part 2 of the sifting process. As a result of the findings of Sifting Part 2, it was agreed that Options B, C, D and N should proceed to the DMRB Stage 1 Assessment. Options E and P were not recommended to proceed due to the significant engineering and cost disadvantages associated with the tunnelling required for both of these options.

Further details of the sifting process and outcome can be found in the Sifting of Improvement Strategies Report (June 2014).

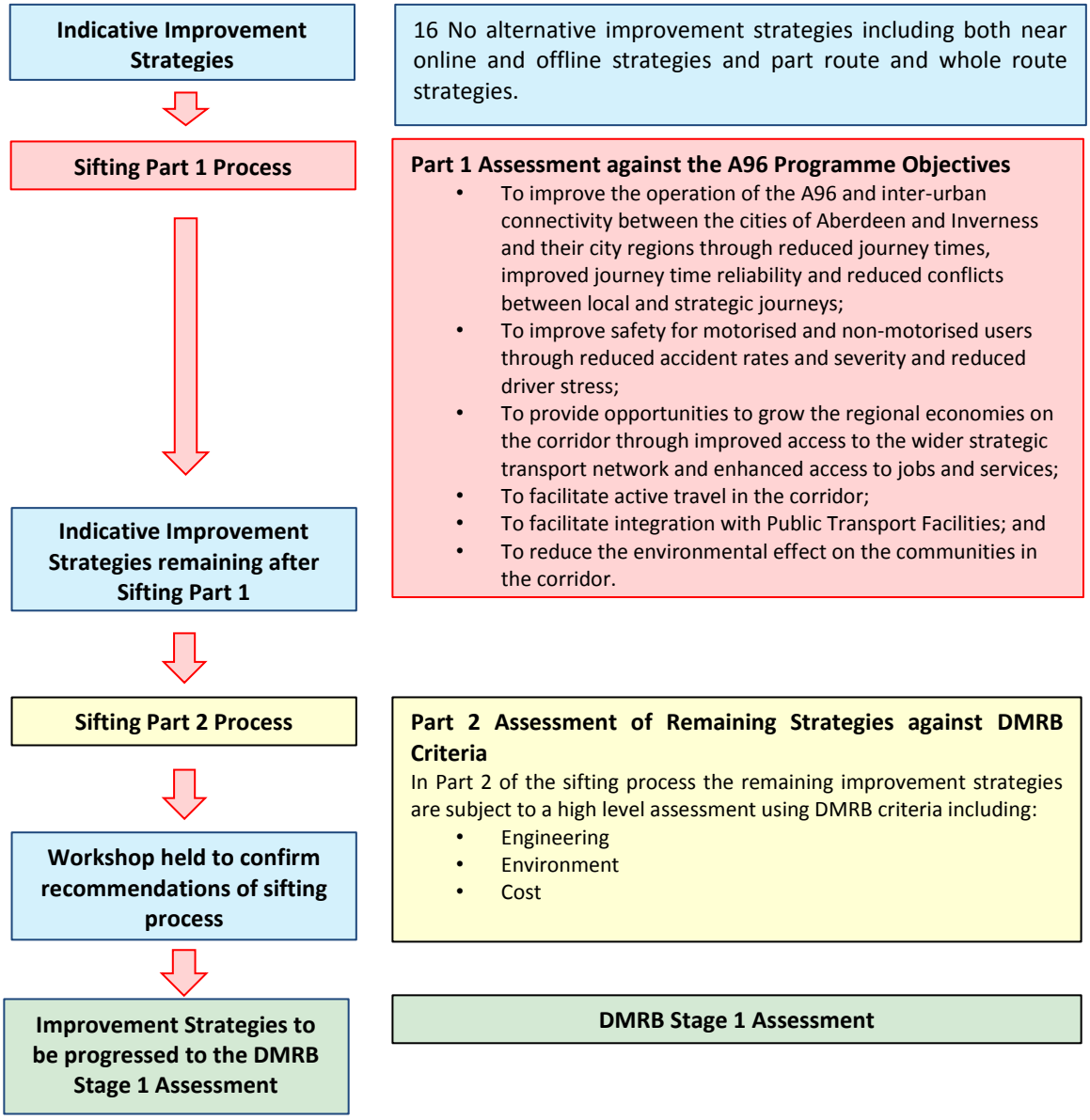

Figure 3.2.1 Sifting Process

3.3 DMRB Stage 1 Improvement Strategies

The following improvement strategies that progressed from the sifting process to be assessed as part of this report, are shown on Drawing B1557621/0000/102 contained within **Appendix A**:

- Option B: Existing A96 Corridor with offline bypasses

  The principle of this improvement strategy option is an upgrade generally located along the route of the existing A96 corridor, with the exception of offline bypasses of settlements along the existing A96.

- Option C: Offline from Huntly to Blackburn

  This option was developed, irrespective of any constraints, to provide a more direct line from Huntly to Blackburn, bypass Inverurie to the south and avoid a number of sections of poor road alignment on the existing A96.

- Option D: Offline from Glens of Foudland to north-west of Inverurie

  This option was developed to provide a more direct line between a section of the A96 from the Glens of Foudland to north-west of Inverurie.

- Option N: Offline from the east of Nairn to the south of Fochabers

  This option was developed to provide a more direct line from the east of Nairn to the south of Fochabers and removes the need to travel the longer length of existing A96 via Forres and Elgin. Option N was developed irrespective of constraints with the exception that the strategy avoids the Natura sites at the western end of this strategy.

Of the four options to be assessed as part of this report, Option B is the only option which provides a strategy for the full extents of the A96 dual carriageway upgrade between Raigmore Interchange at Inverness and the junction with the AWPR at Aberdeen. The remaining three options only cover part of the extent of the upgrade and therefore would need to be delivered in combination with Option B. In these cases, the section of Option B that coincides with the part scheme Option, is replaced with the part scheme Option.

3.4 Option B: Existing A96 Corridor with offline bypasses

In general, Option B follows the route of the existing A96 corridor from Inverness to Aberdeen, with the exception of where the A96 passes through settlements where the strategy will bypass the settlement. For the smaller villages and communities, the bypasses will likely be within the existing A96 corridor. Due to the length of the strategy, Option B has been divided into ten geographical subsections as outlined in **Table 3.4.1** below and shown in drawing B1557621/0000/101 in **Appendix A**.

Section	Location	Description
B1	Raigmore Interchange to Gollanfield	Existing A96 corridor between A96 Raigmore Interchange and the bypass of Nairn
B2	Gollanfield to Hardmuir Wood	Offline bypass to the south of Nairn
B3 (North)	Hardmuir Wood to Alves	Offline bypass to the north of Forres
B3 (South)		Offline bypass to the south of Forres
B4 (North)	Alves to Lhanbryde	Offline bypass to the north of Elgin
B4 (South)		Offline bypass to the south of Elgin
B5	Lhanbryde to west of Keith	Existing A96 corridor between Lhanbryde and Keith
B6	West of Keith to west of Huntly	Offline bypass to the south of Keith
B7	West of Huntly to east of Huntly	Existing A96 corridor between the west of Huntly and the east of Huntly
B8	East of Huntly to Old Rayne	Existing A96 corridor between Adamstown and Old Rayne
B9 (North)	Old Rayne to Kintore	Offline bypass to the north of Inverurie
B9 (Inner)		Existing A96 bypass of Inverurie
B9 (South)		Offline bypass to the south of Inverurie
B10	Kintore to proposed junction with the AWPR	Existing dual carriageway between Inverurie and the proposed junction with the AWPR

Table 3.4.1 Option B subsections

3.4.1 Improvement Strategy Description

Option B follows the general route of the existing A96 corridor, with sections offline around towns. Offline sections will be required to bypass the towns of Nairn, Forres, Elgin, and Keith. The settlements of Mosstodloch, Fochabers, Huntly and Inverurie are currently bypassed with single carriageway roads and additional studies shall be required to determine the appropriateness of upgrading these to dual carriageway cross section or whether fully offline or partially offline alignments are required at these towns. As noted in **Section 1.2** Inverness to Nairn (including Nairn Bypass) is being developed separately to this commission.

Beginning at Inverness, the existing A96 commences with a short dual carriageway section for approximately 0.75km between Raigmore Interchange and Seafield Roundabout and thereafter continues as a single carriageway cross section with intermediate sections of climbing lanes and WS2+1 carriageway cross section. At Port Elphinstone Roundabout near Inverurie, the carriageway reverts to dual carriageway cross section to the proposed junction at the AWPR.

Within the existing single carriageway sections, proposed corridor dualling will require widening, reconstruction and new construction. For lengths of the route, constraints such as sections of existing A96 with poor alignment, high junction and access density, roadside properties or environmental constraints may result in the road alignment being constructed offline, parallel to the existing A96. In such cases, the existing A96 is likely to be retained as part of the local road network.

The works to dual carriageway sections will include, where appropriate, the closure of central reserve openings and the upgrade of at-grade junctions to grade separated junctions.

The existing road pavement comprises fully flexible construction road pavement with approximately 50% of the existing A96 corridor having a residual pavement life of greater than 20 years and around 33% of the route having less than 15 years life remaining. Different approaches and timeframes for pavement treatment will be considered following detailed analysis.

There are numerous bridges along the existing corridor between Inverness and Aberdeen, spanning roads, railways and watercourses. Depending on the alignment of the strategy, new structures will be required or existing structures widened or replaced to accommodate the dual carriageway cross section.

As outlined in **Section 1** there are approximately 600 junctions on the A96, excluding those within the main urban centres of Nairn, Forres, Elgin and Keith connecting the A96 to roads, of varying classes, as well as private accesses. The impact on these junctions and accesses will be assessed in accordance with the junction strategy developed for the A96 Dualling Programme.

Lay-by and rest area strategies have also been developed, similar to the proposed junction strategy. Specific decisions will be coordinated with Transport Scotland and local authorities. Lay-bys are important to traveller safety and accessibility along the route. Type B lay-bys, which make up approximately 45% of the facilities along the A96, will be modified or replaced as they are not compliant with standards for dual carriageways. Proposed rest areas are also under consideration for traveller safety and convenience; there are currently no formal rest areas on the A96.

NMU facilities along the existing A96 corridor include access to core paths and crossing points, National Cycle Network (NCN), Scotland's Great Trails of the Dava Way, Moray Coast Trail and the Speyside Way, Rights of Way routes and informal NMU routes. Coordination with stakeholders will continue throughout each future assessment stage to ensure NMU safety and accessibility is considered appropriately.

The collation of public utility information, in accordance with the C2 Preliminary Inquiries stage of the New Roads and Street Works Act 1991, is ongoing, with further utilities information to be gathered at the next stage of design development.

Utility impacts will be important factors in corridor option selection and future alignment development, due to both community and economic risk factors. These impacts will be avoided whenever feasible. However, if unavoidable utility impacts arise, strong consideration will be given to construction methods for either protection or relocation, depending upon which option is most effective in terms of cost, programme and safety.

The following paragraphs highlight the general approach to the improvement strategy for each subsection of Option B. Notable details of the existing conditions along the subsections are also provided.

3.4.2 Section B1: Raigmore Interchange to Gollanfield

This section of the A96 Trunk Road commences at Raigmore Interchange in Inverness and heads in a generally north-easterly direction. The first 0.75km of the existing A96 is dual carriageway to Seafield Roundabout after which the road continues as a single carriageway. Dualling improvements to the single carriageway section have been assessed as part of the A96 Dualling Inverness to Nairn (including Nairn Bypass) DMRB Stage 2 Assessment, with the preferred option for the scheme announced in October 2014.

There are three junctions on the existing A96 dual carriageway comprising a graded separated junction with the A96, a left in/left out simple T-junction for access to Stoneyfield Business Centre & Hotels and an at-grade roundabout providing access to Inverness Retail and Business Park. The primary junctions along the existing A96 single carriageway section are the B9039, B9006/B9090 and B9092 as well as the Smithton Roundabout and Inverness Airport Roundabout. At the eastern extent of the section, the A96 crosses the Highland Main Line Railway Line at Raigmore.

3.4.3 Section B2: Gollanfield to Hardmuir Wood (Nairn Bypass)

The strategy for the proposed offline section to bypass Nairn is a southern offline bypass of the town. Proposals for this section have been assessed as part of the A96 Dualling Inverness to Nairn (including Nairn Bypass) DMRB Stage 2 Assessment, with the preferred option for the scheme announced in October 2014.

There are a number of radial routes from Nairn which the bypass intersects with, including the A939, B9091, B9090 and B9111. The route also crosses the River Nairn to the south of Nairn and the Aberdeen to Inverness Railway Line at Gollanfield.

3.4.4 Section B3: Hardmuir Wood to Alves (Forres Bypass)

Option B considers two potential strategies for bypassing Forres comprising a bypass to the north or south of the town.
This section of the A96 is a single carriageway, with a section of climbing lane for 0.7km at Alves, which passes through the small community of Brodie on the western approach to Forres. At Brodie, the Aberdeen to Inverness Railway Line meets the A96 where they run approximately parallel before diverging at the River Findhorn.

The primary junctions between Hardmuir Wood and Alves, excluding those within the town of Forres, include Findhorn Roundabout at the B9011 and the Tarras Roundabout providing access to Forres Enterprise Park.

In addition to the Bypass of Forres, it is likely that Brodie will be bypassed offline, but within the current A96 corridor.

Notable details of the existing conditions pertaining to the northern and southern offline bypasses of Forres are outlined below.

(a) Offline bypass to the north of Forres

Flooding is a primary concern to the north of Forres, with both the River Findhorn and the Burn of Mosset located close to the town. At least one crossing of the Aberdeen to Inverness Railway Line will be required as well as potential crossings of the SSE high voltage overhead transmission lines that traverse the area from east to west, crossing the existing A96 at Tarras Roundabout.

There is a network of C class roads and unclassified roads to the north of Forres with the B9011 linking Forres to Kinloss.

(b) Offline bypass to the south of Forres

To the south of Forres there are a number of forests (Altyres Woods, and Burgie Woods) as well as The Forres (Burn of Mosset) Flood Alleviation Scheme which was constructed in 2009 on the southern edge of Forres which includes a large flood storage reservoir in the natural basin upstream of Forres at Chapelton Dam across the Burn of Mosset. A bypass to the south of Forres would cross the River Findhorn floodplain.

There are several smaller communities to the south of Forres as well as the larger settlement at Rafford. The Dallas Dhu Distillery, which is a scheduled monument, and the Newforres Quarry are also located in the study area.

The primary roads to the south of Forres are the A940 and B9010.

3.4.5 Section B4: Alves to Lhanbryde (Elgin Bypass)

Option B considers two potential strategies for bypassing Elgin comprising a bypass to the north or south of the town.

The existing A96 in this section is single carriageway with a single 700m long westbound overtaking lane provided to the east of Alves. The A96 passes through Alves on the western approach to Elgin, passing through the town centre before bypassing Lhanbryde at the eastern extent of this section. In addition, the road

passes adjacent to some small communities including Newton, with several other individual properties directly adjacent to the A96.

The A96 between Alves and Elgin has numerous direct accesses associated with adjacent properties and agricultural activities in addition to junctions with the local road network. To the east of Elgin, the junction and access density is lower with junctions restricted to the local road network.

The primary junctions along this section, excluding those within Elgin are with the B9013, B9103 and two roundabouts either side of Lhanbryde which provide access to the settlement.

The Aberdeen to Inverness Railway Line generally travels in an east-west direction across the section, crossing under the A96 near the western extent of the section near Alves. To the east of Elgin, the railway line runs generally parallel to the A96 on embankment. The existing single carriageway A96 at Lhanbryde is physically constrained between the railway embankment and the properties on the edge of Lhanbryde including two retaining walls to retain the rail earthworks.

SSE high voltage overhead transmission lines traverse the area from east to west, crossing the A96 to the east of Alves and then again to the eastern edge of Elgin. The line then runs generally parallel to the A96 for approximately 1.0km before heading south-east.

Notable details of the existing conditions pertaining to the northern and southern offline bypasses of Elgin are discussed in the following sections.

(a) Offline bypass to the north of Elgin

In addition to the River Lossie and its floodplain, Loch Spynie and the Spynie Canal are also located to the north of Elgin, which also has a large floodplain associated with it. Loch Spynie is designated as a Site of Special Scientific Interest (SSSI), Special Protection Area (SPA) and a Ramsar site.

There are two main radial routes heading out of Elgin to the north with the A941 and B9012 as well as the B9013 and B9103 which meet the A96 to the west and east of Elgin respectively.

SSE high voltage overhead transmission lines traverse to the north of Elgin from Alves to the eastern edge of the town. These are likely to be intersected by this strategy.

(b) Offline bypass to the south of Elgin

The southern offline option also crosses the River Lossie and its floodplain which is narrower than the section north of the town. However, there is an additional large floodplain to the south-west of Elgin associated with the Mosstowie Canal which is a tributary of the River Lossie.

An offline bypass to the south of Elgin would intersect the A941 and the B9010 as well as other local roads which serve a number of settlements including Miltonduff and Fogwatt in addition to Longmorn, Miltonduff, Benriach, Glenlossie, Glen Elgin and Linkwood Distilleries. Cloddach Quarry is located on the west bank of the River Lossie with access from the B9010 and Elgin Golf Course is located on the southern

edge of the town. The Aberdeen to Inverness Railway line also lies to the south of Elgin within this section, which may be crossed by this strategy.

3.4.6 Section B5: Lhanbryde to west of Keith

This section considers a single strategy comprising the existing A96 corridor between Lhanbryde and west of Keith, which includes bypasses of Mosstodloch and Fochabers. The A96 commences as a single carriageway until Mosstodloch Bypass which was constructed as a WS2+1 scheme. The road returns to single carriageway between Coul Brae Roundabout and Spey Bay Roundabout and includes a crossing of the River Spey before returning to a WS2+1 cross section for Fochabers Bypass. From Fochabers East Roundabout, the A96 returns to a single carriageway construction albeit with a 1.9km eastbound climbing lane (Dramlachs Overtaking Lane) immediately south of the roundabout.

The River Spey flows northwards though this section passing between Mosstodloch and Fochabers to discharge in to the Moray Firth. There is a wide floodplain associated with the river which is also designated as a SSSI and a SAC and also a SPA and Ramsar site between Mosstodloch and the coast. The other water features in this section are Loch Na Bo and Loch Oire both of which are located at the western extent of the section and the latter of which is designated as a SSSI.

There are numerous direct accesses on to the A96 from Douglasshiel Moss to Keith comprising field accesses and other direct accesses to farms and properties, some of which are set-back from the A96 and other properties which are directly adjacent to the A96. The A96 between Lhanbryde and Mosstodloch is similar in this regard, but with less roadside properties.

At Mosstodloch, the existing single carriageway alignment is constrained between the Baxters factory to the north and the Old Toll House and electricity substation to the south, crossing the River Spey on a 120m long structure. The Fochabers Bypass is adjacent to the Gordon Castle Estate Designed Landscape including a lake within the estate. The Gordon Castle Estate Main Driveway Bridge, which passes over the A96, constrains the road cross section due to the full height abutments adjacent to the road.

The primary junctions along this section include roundabouts with the B9015, B9104 and the A98/B9014.

3.4.7 Section B6: West of Keith to west of Huntly

Option B considers a single strategy for bypassing Keith comprising a bypass to the south of the town.

The existing A96 over the extents of this section is single carriageway with two overtaking lanes. The Coachford Overtaking Lane provides 1.5km of overtaking lane in the westbound direction, while the Ashgrove Overtaking Lane provides 0.7km eastbound.

The primary junctions along this section, excluding those in Keith, include the B9016, B9017 and B9115. In addition, there are numerous field accesses and direct access to adjacent or roadside properties on both approaches to Keith with the exception of the two climbing lane sections.

The strategy for the offline bypass to the south of the town will cross the River Isla, the Aberdeen to Inverness Railway Line, the Keith to Dufftown scenic railway line and intersects with the A95 and B9014.

An SSE high voltage transmission line is located to the south of Keith running in a north-west to south-east direction where it meets a second line running south-west to north-east near the SSE Blackhillock high voltage transmission substation. There are four existing crossing points of high voltage lines which cross over the A96, south of Keith. In addition, a corridor for an offshore underground high voltage cable which runs from Moray Firth to the west of Keith is currently in planning which would continue south-east to a proposed substation and convertor station also at Blackhillock.

3.4.8 Section B7: West of Huntly to east of Huntly

This section considers a single strategy comprising the existing A96 corridor between the west and east of Huntly. The existing A96 for this section, including the current Huntly Bypass, is a single carriageway road with the exception of the 1.3km long westbound Bin Hill Overtaking Lane. The existing bypass is locally constrained between the Huntly Auction Market and the town to the north. In addition, the existing railway bridge carrying the Aberdeen to Inverness Railway Line crosses above the Huntly Bypass. The bridge has reduced headroom of 5.1m with retaining walls adjacent to the back of the road verge retaining the side slopes of the structure.

The primary junctions along this section include three separate junctions with the A97 as well as junctions with the A920 and B9022. In addition, there are numerous field accesses and direct access to adjacent or roadside properties between the Bin Hill and Huntly Bypass and then again between the A97 Banff junction and the eastern extent of this section.

There are two river crossings on this section of the A96, crossing the River Deveron and the River Bogie.

3.4.9 Section B8: East of Huntly to Old Rayne

This section considers a single strategy comprising the existing A96 corridor from east of Huntly to Old Rayne. The A96 reaches its peak elevation through this section rising to approximately 275mAOD before passing into the Glens of Foudland. This section is single carriageway with a 1.3km eastbound overtaking lane at Newtongarry and a 1.5km westbound overtaking lane at Whinbrae. This section is largely rural with a number of adjacent or roadside properties along the A96 with direct accesses. In addition, the A96 passes adjacent to several smaller communities including Colpy and Pitmachie. The River Urie runs parallel to the existing A96 for a large section of this corridor. Environmental constraints in this section include two Garden and Designed Landscape (GDL) designations at Williamston House and Newton House, adjacent to the east side of the existing A96.

The primary junctions along this section include junctions with the A920 and B992.

3.4.10 Section B9: Old Rayne to Kintore

Option B considers three potential strategies for bypassing Inverurie, comprising an upgrade to the existing Inverurie bypass and offline bypasses to the north or south of the town.

(a) Inverurie Bypass (Inner)

The Inverurie Bypass (Inner) strategy comprises the existing A96 corridor Old Rayne to Kintore including the existing Inverurie Bypass. The A96 in this section is a single carriageway cross section between Old Rayne and Port Elphinstone Roundabout south of Inverurie where the A96 continues as dual carriageway. At Pitcaple, to the north-west of Inverurie, the existing single carriageway is constrained by the Aberdeen to Inverness Railway Line, which runs parallel to the A96, as well as roadside developments and the River Urie. At Inveramsay, the railway crosses over the A96 on a masonry arch bridge which has a 4.4m height restriction and the traffic under the structure is restricted to a single lane controlled by traffic signals, due to the arch and span of the bridge. The replacement of this structure is currently planned under the A96 Inveramsay Bridge Improvement project (refer to **Section 1.7**). The proposed bridge and road realignment is a single carriageway scheme.

The existing Inverurie Bypass is constrained along the north-east boundary by the residential and commercial properties of Inverurie and Port Elphinstone. In addition, the south-west boundary of the A96 is constrained with residential developments and a golf club at Inverurie. An existing local road overbridge crosses over the Inverurie Bypass on a three span structure which constrains the road cross section due to the leaf piers adjacent to the road.

The A96 crosses the River Don and its floodplain on a 140m long 4-span bridge.

The primary junctions along the single carriageway include the B9002 and B9170. In addition, the dual carriageway section of the A96 includes two at-grade roundabouts with the B993 and a local road at Thainstone as well as two left in/left out simple T-junction at Clovenstone and Kintore Business Park. In addition, to these junctions, the existing dual carriageway section contains a left in/left out direct access and a left in/left out field access, both of which are located between the Port Elphinstone Roundabout south of Inverurie and Thainstone Roundabout.

(b) Inverurie Bypass (North)

The strategy for the proposed bypass to the north of Inverurie crosses the River Urie and the River Don and their associated floodplains as well as the Aberdeen to Inverness Railway Line.

In addition to the floodplains, the environmental constraints to the north of Inverurie include a scheduled monument (a Roman temporary camp) at Durno to the north-west of Inverurie, Harlaw Battlefield to the north of Inverurie as well as Keith Hall Designed Landscape to the east.

The primary roads to the north of Inverurie are the B9001, B9170 and B993.

(c) Inverurie Bypass (South)

The southern strategy at Inverurie would also cross the River Don and its floodplain, albeit the floodplain is narrower in this section of the river compared to the northern strategy. The topography to the south of Inverurie is undulating with numerous hills and valleys as the land starts to rise towards to Bennachie Mountains to the west of Inverurie.

The southern strategy would likely cross the Aberdeen to Inverness Railway Line near the north-western extent of the strategy. In addition, two SSE high voltage overhead transmission lines run approximately parallel in a north-west to south-east direction.

The primary roads to the south of Inverurie are the B9002 and B993.

3.4.11 Section B10: Kintore to proposed junction with the AWPR

This section considers a single strategy comprising the existing A96 between Kintore to proposed junction with the AWPR. The A96 in this section is dual carriageway with two grade separated junctions with the Tavelty (B987) and Gauchhill (B977) with three at-grade roundabouts at Broomhill (B987), Kinellar (B973), Clinterty (B973) and at-grade junctions with the B979 and a local road at the Chapel of Stoneywood.

In addition, a direct left in/left out accesses to Marshall's Farm and shop are provided on the both carriageways between Broomhill and Kinellar Roundabout.

Under the AWPR scheme (refer to **Section 1.7**), a new grade separated junction will be provided to cater for all traffic movements between the AWPR and the A96 Trunk Road. The grade separated junction will be located to the south of the A96 and a dual-carriageway link road will connect the junction to a large roundabout to be constructed on the A96.

3.5 Offline Improvement Strategies

In addition to Option B Existing A96 Corridor, the sifting assessment identified three offline improvement strategies to be progressed to Stage 1 assessment.

The three offline options only cover part of the full dualling length and need to be combined with Option B to cover the full extents of the upgrade.

The proposed offline strategies will comprise new carriageway construction.

3.5.1 Option C

Option C is a fully offline alternative to the Option B strategy between Huntly and Blackburn. The option would likely tie-into the existing A96 between Huntly and the Glens of Foudland at the northern extent and between Blackburn and Kintore on the existing dual carriageway at the southern extent of the strategy.

The topography is the primary constraint for this strategy due to the undulating topography with high spots at Winds Eye (314mAOD), Wishach Hill (419mAOD) and the Hill of Foudland (467mAOD). The Bennachie Mountains (528mAOD) are located to the west of Inverurie. The strategy would likely have to pass in the gap between Wishach Hill and the Hill of Foudland. In addition, the strategy would require structures to cross the River Don, River Bogie, and a number of smaller watercourses as well as the Aberdeen to Inverness Railway Line near Insch.

3.5.2 Option D

Option D is a fully offline alternative to the Option B strategy between the Glens of Foudland and Pitcaple. This strategy could be delivered in combination with either the Inverurie Bypass (Inner) or Inverurie Bypass (Northern) Option B strategies.

Depending on which strategy Option D is combined with, a bridge may be required to cross the River Urie. Two SSE high voltage overhead transmission lines run through the area in an approximately north to south direction and a north-west to south-east direction.

Environmental constraints within this section include two GDL designations at Williamston House and Newton House as well as a scheduled monument (a Roman temporary camp) at Durno.

The main local roads within this corridor are the A920 and B992.

3.5.3 Option N

Option N is a fully offline alternative to the Option B strategy between Forres and Fochabers removing the need to travel the longer length of existing A96 through Forres and Elgin.

This offline strategy travels to the south of Elgin and Forres, intersecting with a number of local roads including the A940, B9010, A941, B9103, and B9015 and crossing the River Findhorn, the Blackie Burn, the River Lossie and the River Spey. The River Spey is a designated SAC. There are a number of villages along the strategy including Rafford, Fogwatt and Inchberry.

Option N shall be developed to avoid the Natura sites at the western end of this strategy.

4 Engineering Assessment

4.1 Introduction

A broad assessment of the engineering issues associated with dualling the A96 has been undertaken taking into account the following topics:

- Topography and Land Use;
- Geotechnical Considerations;
- Water Environment, Hydrology and Drainage;
- Alignment;
- Cross Section;
- Pavement;
- Structures;
- Junctions and Accesses;
- Parking and Bus Lay-bys;
- Rest Areas;
- Non-motorised User (NMU) Provision;
- Roadside Features;
- Intelligent Transport Systems (ITS); and
- Public Utilities.

The engineering assessment carried out for the existing A96 corridor improvement strategy with offline bypasses (Option B) is presented in **Section 4.2**. This is followed by assessment of the varying offline improvement strategy options (Options C, D and N) in **Sections 4.3 to 4.6**. Improvement strategy summary tables have been produced for both, Option B: Existing A96 corridor with offline bypasses, and the offline improvement strategies Options C, D and N which can be found in **Appendix H**.

Option B is a full scheme improvement strategy, whereas Options C, D and N are part scheme only. These part scheme options would need to be constructed in conjunction with Option B to complete the A96 Dualling Programme.

Constraint mapping was undertaken for the varying corridor improvement strategy options, identifying existing constraints including, for example, Aberdeen to Inverness Railway Line, watercourses, buildings, structures and environmental features. The drawings produced from the constraint mapping can be found in **Appendix B**.

4.2 Option B: Existing A96 Corridor with offline bypasses

Option B: Existing A96 Corridor improvement strategy with offline bypasses, largely follows the route corridor of the existing A96, between Inverness and Aberdeen. The corridor has been split into 10 subsections to allow further analysis as outlined in **Section 3.4**.

4.2.1 Topography and Land Use

(a) Overview

The A96 from Inverness to Aberdeen passes through numerous hills and glens, and is particularly constrained by the Glens of Foudland. In addition, the corridor encompasses many river valleys and forest lands, as well as some varied topography and land use.

The A96 elevation varies between Inverness and Aberdeen with areas of particularly steep terrain including the Bin Forest and Glens of Foudland. The Glens of Foudland is currently highlighted as an area that requires attention during winter months due to severe weather.

In addition to the terrain constraints, the A96 lies in the vicinity of numerous watercourses for the majority of the route, including the River Nairn, River Findhorn, River Lossie, River Spey, River Isla, River Deveron, River Bogie, River Urie and the River Don. The carriageway often runs parallel to these watercourses with multiple crossings as the road extends through various river valleys and associated floodplains. The significant number of watercourses is an important consideration for any proposed road alignment.

The land use along the route corridor is a mixture of settlements, agricultural land and sparsely populated natural areas. The A96 connects these areas for use by local and long distance commuters, tourists, agricultural transport and other commercial services. In addition, the Aberdeen to Inverness Railway Line follows a similar path to the A96 for the majority of the route. The railway line has a number of structures for crossing rivers and roads and part of the line lies in close proximity to the road, especially in areas restricted by watercourses and steep terrain.

The existing A96 currently passes through or close to major settlements which include Nairn, Forres, Elgin, Keith, Huntly and Inverurie. Regular travel between settlements is common for local residents to access employment, commercial areas and schools. Potential construction impacts to private properties and businesses are key considerations.

Option B follows the general route corridor of the existing A96, with some bypasses of towns, and has a varying topography and land use. As outlined earlier, Option B has been split into 10 subsections for assessment purposes. Section B1 and B2 have been described below for completeness, however as noted in **Section 3.4.2** and **3.4.3**, these two sections have been assessed as part of the A96 Dualling Inverness to Nairn (including Nairn Bypass) DMRB Stage 2 Assessment, with a preferred option for the scheme announced in October 2014.

(b) Section B1: Raigmore Interchange to Gollanfield

Section B1 is between Raigmore Interchange and Gollanfield, east of Inverness Airport, and consists of a short section of dual carriageway followed by single carriageway. The topography is generally flat, low-lying, open ground. To the north, the land gently drops towards the Moray Firth. To the south, the land gradually rises towards Drummosie Muir.

The landscape surrounding the existing A96 is predominately farmland, interspersed with forestry areas. There are several industrial estates, communities and settlements located within this section.

At the western extent of this section, Culloden, Smithton and Balloch are located to the south of the A96 and there are several other small communities, settlements or individual residential properties within the section. In addition, several residential and agricultural properties are situated immediately adjacent to the A96. Inverness Retail Park and Stoneyfield Business Park are commercial developments located at the western end of the section. There is also a timber processing plant at Morayston and Inverness Airport and industrial estate lie north of the existing A96. Finally, there are number of minor watercourses that cross the A96 in this section.

The Aberdeen to Inverness Railway Line runs approximately parallel to the north of the existing A96 with the road crossing over the railway line at Gollanfield before the railway continues approximately parallel to the south of the A96.

(c) Section B2: Gollanfield to Hardmuir Wood

Section B2 is between Gollanfield, to the east of Inverness Airport and Hardmuir Wood, to the east of Auldearn and includes an offline bypass to the south of Nairn. The topography is primarily flat, low-lying, open ground to the west of the River Nairn, and becomes increasingly rolling and hilly to the east.

The landscape surrounding the existing A96 south of Nairn, is a mixture of grazing and arable farmland, interspersed with areas of woodland. To the east of Nairn, the village of Auldearn lies to the south of the existing A96.

The section crosses both the River Nairn and its associated floodplain. The river travels in a generally northerly direction towards the coast. In addition, the Aberdeen to Inverness Railway Line travels south from Gollanfield, and continues approximately parallel to the A96 towards Nairn. At Nairn the railway line crosses to the north of the A96 and continues eastwards.

(d) Section B3 (north): Hardmuir Wood to Alves

Section B3 (north) is between Hardmuir Wood, to the east of Auldearn and Alves, to the east of Forres, and includes an offline bypass to the north of Forres. The topography is relatively flat and low-lying adjacent to Findhorn Bay on the Moray Firth. The section crosses both the River Findhorn and the Burn of Mosset and their large floodplains.

Land use in this section is predominantly agricultural with settlements at Brodie, Dyke and Forres. Brodie Castle is located to the west of the section along with the village of Dyke, as well as Benromach Distillery and a waste water treatment works located to the northern edge of Forres. To the east of Forres, land use includes The Enterprise Park (business park), agricultural land and the Glenburgie Distillery. In addition to Forres, Dyke and Brodie, there are residential and agricultural properties situated immediately adjacent to the A96 along this section.

The Aberdeen to Inverness Railway Line re-joins the existing A96 corridor at Brodie and continues in close proximity to the A96 until Forres. At Forres, the railway line travels north-eastwards towards Kinloss before turning eastwards towards the A96 at the eastern extent of the section.

The topography of the section is unlikely to present a significant constraint during the development of route options in this section. However, as the topography is generally low-lying and flat, it is unlikely there will be many significant areas of earthwork cuts which would provide the opportunity to reclaim earthworks materials for embankments during construction. As such, this may result in an earthworks imbalance for the section requiring material to be imported to site. To the north of Forres, the significant floodplain may require extensive sections of the route to be elevated above the flood level.

In developing route options, the settlement of Brodie will require a bypass and access, and potential construction impacts to the other settlements, farms and residential properties will require consideration, in particular where the offline section to the north of Forres re-joins the existing A96 corridor. The proximity of the railway line to the A96 west of Forres, may restrict opportunities for improvement works in this area.

(e) Section B3 (south): Hardmuir Wood to Alves

Section B3 (south) covers the same areas as B3 (north) however includes an offline bypass to the south of Forres rather than to the north. The topography of the offline southern bypass section is generally flat to the south-west and south of Forres, however starts to rise steadily from 30mAOD to 234mAOD at Heldon Hill which continues in a north-easterly direction towards Elgin. This section crosses the River Findhorn and its associated floodplain as well as several other smaller watercourses.

To the west of Forres, land use is predominantly agricultural with settlements at Brodie and Dyke. The land to the south-west and south of Forres is largely covered in forestry with Darnaway Forest extending to the south of the A96 and continuing south of Forres at Altyre Woods. The Burn of Mosset Flood Alleviation Scheme, which includes a large flood storage reservoir at Chapelton Dam, extends from the southern boundary of Forres.

Located to the south of Forres, there are a number of smaller settlements including Mundole, Rafford and Califer as well as the former Dallas Dhu Distillery and Newforres Quarry. To the east of Forres, land use includes The Enterprise Park (business park), agricultural land and the Glenburgie Distillery. In addition to Forres, Dyke, Brodie and the smaller settlements previously mentioned, there are residential and agricultural properties situated immediately adjacent to the A96 along this section.

The topography of the section is unlikely to present a significant constraint during the development of route options in this section. However, as the topography is generally low-lying and flat, it is unlikely there will be many significant areas of earthwork cuts which would provide the opportunity to reclaim earthworks materials for embankments during construction. As such, this may result in an earthworks imbalance for the section requiring material to be imported to site. In developing route options, the settlement of Brodie will require a bypass and access, and potential construction impacts to the other settlements, farms and residential properties will require consideration, in particular, the properties directly adjacent to the A96 where the offline section to the south of Forres re-joins the existing A96 corridor. The Burn of Mosset Flood Alleviation Scheme flood storage reservoir may constrain route options to the south. Similarly, the proximity of the railway line to the A96 west of Forres may restrict opportunities for improvement works to the existing A96 at this location.

(f) Section B4 (north): Alves to Lhanbryde

Section B4 (north) is between Alves, east of Auldearn, and Lhanbryde, to the east of Elgin, and includes an offline bypass to the north of Elgin. The topography of the offline strategy to the north of Elgin is generally flat and low-lying with the exception of local high spots at Carden Hill (102mAOD) and Quarrywood Hill (127mAOD) to the west and north-west of Elgin. To the north of Elgin there is the River Lossie and the Spynie Canal, each of which has a large associated floodplain.

Land use in this section is predominantly agricultural interspersed with areas of forestry including Alves Wood, Quarrel Wood, Findrassie Wood, Crooked Wood and Sleepieshill Wood. The Forestry Commission operate a large forest nursery at Newton.

Settlements in this section include Alves to the west and Lhanbryde and Urquhart to the east. Lhanbryde is currently bypassed by the existing A96, however the A96 passes through Alves. There is also Elgin which is located to the south of this corridor, including the suburb of Bishopmill. In addition, there are residential and agricultural properties situated immediately adjacent to the A96 along this section, particularly to the west of Elgin.

The Aberdeen to Inverness Railway Line runs in close proximity to the A96 at Alves Wood before passing underneath the A96 as it continues east to Elgin. To the east of Elgin, the railway continues parallel to the south of the A96. The existing single carriageway A96 at Lhanbryde is physically constrained between the railway embankment and the properties on the edge of Lhanbryde, including two retaining walls to retain the road earthworks.

The topography of the section is unlikely to present a significant constraint during the development of route options in this section. However, as the topography is generally low-lying and flat, it is unlikely there will be many significant areas of earthwork cuts which would provide the opportunity to reclaim earthworks materials for embankments during construction. As such, this may result in an earthworks imbalance for the section requiring material to be imported to site. To the north of Elgin, the River Lossie floodplain may require sections of the route to be elevated above the flood level.

In developing route options, the settlement of Alves will require a bypass and access, and potential construction impacts to the other settlements, farms and residential properties will require consideration, in particular for properties immediately adjacent to the A96. The proximity of the railway line to the existing A96, in combination with the settlement at Lhanbryde, may restrict opportunities for improvement works in this area.

(g) Section B4 (south): Alves to Lhanbryde

Section B4 covers the same areas as B3 (north) however includes an offline bypass to the south of Elgin rather than to the north. The topography of the offline strategy to the south of Elgin is generally flat at the A96, rising to a local high spot at Heldon Hill (234mAOD) to the south of Alves. To the east of the River Lossie the topography rises to the south towards Hart Hill (275mAOD) and Brown Muir Hill (339mAOD). The River Lossie is located to the west of Elgin and has a large associated floodplain, as well as numerous tributaries.

Settlements to the south of Elgin include Miltonduff, Longmorn and Fogwatt. There are also a number of distilleries including Miltonduff, Longmorn, Benriach, Glenlossie, Glen Elgin and Linkwood as well as Cloddach Quarry which is adjacent to the River Lossie. The surrounding land is open fields for agricultural use. In addition, the slopes of Heldon Hill are heavily forested with other smaller sections of wooded area interspersed between the communities and fields.

The Aberdeen to Inverness Railway Line runs in close proximity to the A96 at Alves Wood before passing underneath the A96 as it continues east to Elgin. To the east of Elgin, the railway continues parallel to the south of the A96. The existing single carriageway A96 at Lhanbryde is physically constrained between the railway embankment and the properties on the edge of Lhanbryde, including two retaining walls to retain the road earthworks.

The topography of the section is unlikely to present a significant constraint during the development of route options in this section. However, as the topography is generally low-lying and flat, it is unlikely there will be many significant areas of earthwork cuts which would provide the opportunity to reclaim earthworks materials for embankments during construction. As such, this may result in an earthworks imbalance for the section requiring material to be imported to site. To the south of Elgin, the River Lossie floodplain may require sections of the route to be elevated above the flood level.

In developing route options, the settlement of Alves will require a bypass and access, and potential construction impacts to the other settlements, businesses, farms and residential properties will require consideration, in particular for properties immediately adjacent to the A96. The proximity of the railway line to the existing A96 in combination with the settlement at Lhanbryde, may restrict opportunities for improvement works in this area.

(h) Section B5: Lhanbryde to west of Keith

Section B5 is between Lhanbryde, to the east of Elgin, and the A96 to the west of Keith. The topography falls slightly from Lhanbryde to the River Spey before rising steeply after crossing the river and its associated large floodplain from approximately 20mAOD to Whiteash Hill (265mAOD) and Thief's Hill (250mAOD), to the north and south of Section B5 respectively. From this high point, the topography falls back towards Keith.

This section is largely covered by forested areas, in particular Whiteash Hill Wood and the Wood of Ordiequish on the slopes of Whiteash Hill and Thief's Hill, located to the east of Fochabers and which the A96 passes in between. The approach to Keith is largely agricultural land use, with the section between Lhanbryde and Fochabers a mixture of agriculture and forestry.

The main settlements in this section are Fochabers and Mosstodloch, which are bypassed by the A96, as well as Aultmore village which is to the west of Keith. In addition, there are residential and agricultural properties situated immediately adjacent to the A96 between Lhanbryde and Mosstodloch as well as to the west of Keith. At Mosstodloch, the A96 is physically constrained between the Baxters factory and the Old Toll house/electricity substation. There is also Gordon Castle Estate which is located directly adjacent to the north of the A96 Fochabers Bypass.

The steep topography in this section is likely to limit options for the route of the A96 as it passes between Whiteash Hill and Thief's Hill. Careful consideration of the

alignment will be required which may result in increased gradients or significant cut and embankment slopes due to the topography. In addition, the A96 is constrained at the crossing of the River Spey (single carriageway cross section) and at the A96 Fochabers Bypass which has a WS2+1 cross section. These may restrict opportunities for improvement works over the length of this section.

Potential construction impacts and access to the other settlements, businesses, farms and residential properties will require consideration and, in particular, for properties immediately adjacent to the A96.

(i) Section B6: West of Keith to west of Huntly

Section B6 covers the area from the west of Keith to the west of Huntly including an offline bypass to the south of Keith. The topography in this section rises steadily towards Blackhill Wood at 190mAOD, before descending towards the River Isla valley before rising again to Cairds Hill (301mAOD), south of Keith. The topography then descend towards the A96 and into the Glen of Coachford with hills of 365mAOD and 215mAOD high to the north of the A96, and peaks of 291mAOD and 264mAOD to the south. The topography continues to rise to the Bin Hill (313mAOD) before falling back towards the River Deveron valley at the eastern extent of the section. The A96 passes between the Bin Hill and another of its peaks (230mAOD) reaching an elevation of 170mAOD. The A96 route also crosses a large number of smaller watercourses as well as the River Isla.

The population in this section is concentrated in Keith, as well as interspersed settlements such as Cairnie, to the north of the A96. The Aberdeen to Inverness Railway Line crosses the A96 to the west of Keith and continues on to Huntly, albeit outwith this section. In addition, the Keith to Dufftown tourist railway crosses the A96 in the centre of Keith and continues southwards to Dufftown. The land use within this section is primarily agricultural with some forestry at Cairds Wood and in particular, the Bin Forest. At the eastern extent of this section, the village of Carnie is to the north of the A96, as well as a small number of properties and a petrol station immediately adjacent to the A96, south of Cairnie.

The topography of this section may impose constraints on potential route options, in particular, the area around the Bin Hill and to the south of Keith at Cairds Hill and Blackhill Wood. At the Bin Hill, the topography is likely to constrain the route of the A96 as it passes between the two hills. To the south of Keith, careful consideration of the alignment will be required, which may result in increased gradients or significant cut and embankment slopes where an alignment may cut through the side of a hill or pass over valleys in between hills.

Potential construction impacts and access to the other settlements, businesses, farms and residential properties will require consideration and, in particular, for properties immediately adjacent to the A96.

(j) Section B7: West of Huntly to east of Huntly

Section B7 covers the area from the west of Huntly to the east of Huntly. The topography at the western extent of this section descends from the Bin Hill towards Huntly which lies in a relatively flat depression at the confluence of the River Deveron and River Bogie.

Travelling from the south-west of Huntly, through to the east of Huntly there are a number of hills including Clashmach Hills (375mAOD), Hill of Greenhaug

(179mAOD), Ba Hill (238mAOD), Cairn Hill (190mAOD) and Battle Hill (179mAOD) respectively. The land continues to rise to the Hill of Dummuies (282mAOD) which is located to the south of the A96, and south-east of Huntly. Over this section, the existing A96 rises from 125mAOD at Huntly to 220mAOD at Adamston.

The strategy passes to the south-west of Huntly, crossing the River Deveron and the River Bogie, located to the west and south of Huntly respectively. To the east of Huntly, the strategy also crosses the Aberdeen to Inverness Railway Line, which is perpendicular to the A96. The land use within this section is primarily agricultural, with forestry also located to the north-west of Huntly at the Bin. The A96 is constrained at Huntly, with the town to the north and Huntly Auctions and an agricultural machinery business to the south. To the east of Huntly, a petrol station and a number of residential properties are located adjacent to the A96. In addition, the western approach to Huntly has a number of farm and residential properties in the vicinity of the A96, some of which are directly adjacent to the road. Similarly, there are two farm complexes directly adjacent to the A96 at the eastern extent of this section.

The topography of this section may impose constraints on potential route options, in particular, the area around the Bin Hill and to the south-east of Huntly where the topography rises towards Cairn Hill. At the Bin Hill, the topography is likely to constrain the route of the A96 as it passes between the two hills. Careful consideration of the alignment will be required, which may result in increased gradients or significant cut and embankment slopes.

Potential construction impacts and access considerations to the settlements, businesses, farms and residential properties will require consideration and in particular for properties immediately adjacent to the A96.

(k) Section B8: East of Huntly to Old Rayne

Section B8 covers the area from the east of Huntly to Old Rayne. The topography continues to rise from the previous section, with the A96 passing between Wind's Eye (314mAOD) and Cot Hill (311mAOD) to the south and the Hill of Thomastown (241mAOD) and the Hill of Chapelton (296mAOD) to the north to reach the peak elevation of 275mAOD. The A96 passes between Broom Hill (274mAOD) and Saddle Hill (294mAOD) to enter the Glens of Foudland, which is situated between Foudland Hill (467mAOD) and the Hill of Skares (329mAOD) to the south and the Hill of Bainshole (326mAOD) and the Hill of Tillymorgan (381mAOD) to the north and east respectively. Leaving the Glens of Foudland, the topography flattens out, with some local undulations, and the A96 descends to an approximate level of 95mAOD at Old Rayne.

The land use is primarily agricultural, with some areas of forestry on the Wind's Eye, the Hill of Skares and the Hill of Tillymorgan. There are a number of small settlements along the route including Bainshole and Colpy, as well as other individual residential and farm properties, many of which are directly adjacent to the A96. In addition, there are a number of businesses within the vicinity of the A96 including a fishery, a country food, clothing and café retail outlet near Colpy and a garden centre, gift shop and café outlet north of Old Rayne.

Glen Water is within the section and meets the River Urie at Hill of Skares before continuing to run parallel to the A96 towards Old Rayne.

The topography is a significant constraint in this section due to the elevation of parts of the section which will require consideration for the winter resilience of the route in combination with the steep slopes of the Glens of Foudland as well as the parallel watercourses which may constrain any future route alignments in this section. Careful consideration of the alignment will be required, which may result in increased gradients or significant cut and embankment slopes where an alignment may cut through the side of a hill or pass over valleys in between hills.

Potential construction impacts and access to the settlements, businesses, farms and residential properties will require consideration and, in particular, for properties and settlements immediately adjacent to the A96.

(l) Section B9 (inner): Old Rayne to Kintore

Section B9 (inner) is between Old Rayne, to the east of Insch and Kintore, to the south of Inverurie. The section follows the A96 which generally runs parallel to the River Urie in the base of a river valley with an undulating landscape. The topography in this section rises from the River Urie towards the Bennachie Mountains to the south of the river, including a localised hill, Gallows Hill (177mAOD), which rises steeply to the south of the A96 near Pitcaple. To the north of the A96, the land is undulating and generally rises to the east in the direction of the Hill of Bara (193mAOD), Lawel Hill (236mAOD) and the Hill of Selbie (190mAOD), which are located in an approximate north-south line between Inverurie and Oldmeldrum. Inverurie is located to the north of the confluence of the River Don and River Urie. The existing A96 Inverurie Bypass is located on the western extent of the town on the slopes of Dilly Hill (140mAOD) and the Hill of Ardtannes (159mAOD). The existing A96 crosses the River Don towards Port Elphinstone where it traverses the base of Shaw Hill (174mAOD), parallel to the River Don, towards Kintore.

Inverurie is the main settlement in this section with Port Elphinstone adjacent to Inverurie on the south bank of the River Don. The single carriageway section of the A96 at Inverurie is constrained between the main town centre, directly adjacent to the north-west of the road, and an additional housing development, business park and golf course located to the south-west of the road. Similarly, the single carriageway section of the A96 is constrained at Port Elphinstone, with the town adjacent to the north-west edge of the road. Kintore Business Park is also located to the north-east, and has direct access from the dual carriageway section of the A96, with Thainstone Events Centre and Auction House, and the Inverurie Paper Mills, located to the south-east and north-west respectively of the existing A96 dual carriageway.

Outside of the main urban areas, the land use is predominantly agricultural with smaller communities adjacent to the A96 on the northern approach to Inverurie at Pitmachie and Pitcaple. In addition, there other individual residential and farm properties along the section, many of which are directly adjacent to the A96.

The Aberdeen to Inverness Railway Line re-joins the A96 near Kirkton of Oyne, where it runs parallel and directly adjacent to the A96 to Inveramsay where it crosses over the A96 and passes to the north of Inverurie and Port Elphinstone. To the south of Port Elphinstone, the railway line runs approximately parallel to the A96 but at a distance of approximately 250m.

In developing route options, the settlements at Pitmachie and Pitcaple will require a bypass and access, and potential construction impacts to the other settlements,

businesses, farms and residential properties will require consideration, in particular for properties immediately adjacent to the A96. The proximity of the railway line to the existing A96, in combination with the settlement at Pitcaple, may restrict opportunities for improvement works in this area. In addition, the proximity of Inverurie to the existing single carriageway bypass, along with the development to the south-west of the bypass, will require careful consideration for upgrading the bypass to dual carriageway. Earthworks solutions in the form of retaining walls or steepened earth slopes may be required to avoid impacts to properties along the bypass as well as consideration of traffic management on the A96 during construction.

Current access arrangements and junction configurations on the existing dual carriageway section will be assessed in line with the A96 Junction Strategy as discussed in **Section 4.2.8**.

(m) Section B9 (north): Old Rayne to Kintore

Section B9 (north) is between Old Rayne, to the east of Insch and Kintore, to the south of Inverurie and includes an offline bypass to the north of Inverurie. The topography of the northern strategy is undulating and generally rises away from the River Urie floodplain towards the east, in the direction of the Hill of Bara (193mAOD), Lawel Hill (236mAOD) and the Hill of Selbie (190mAOD) which are located in an approximate north-south line between Inverurie and Oldmeldrum. To the east of Port Elphinstone, the land rises steeply out of the floodplain at the confluence of the River Urie and River Don to local high spots at Upper Kinkell and Hogholm.

Land use to the north-east of Inverurie is predominantly agricultural with open fields and farm buildings along with isolated areas of woodland, Pitcaple Quarry and the settlements at Pitcaple, Whiteford and Old Rayne. The town of Inverurie has expanded beyond the River Urie with the recent Uryside development located adjacent to the B9170.

The Aberdeen to Inverness Railway Line passes to the north edge of Inverurie and Port Elphinstone where it runs approximately parallel to the A96 at a distance of approximately 250m.

The topography to the east of Inverurie and Port Elphinstone will require consideration as the slopes rising out the River Urie and River Don floodplains may give rise to significant cut and earthworks slopes. The northern strategy will also require crossings of the River Don and River Urie as well as the Aberdeen to Inverness Railway Line. The constraints on the A96 at Pitcaple, identified in **Section 4.2.1(l)**, may restrict opportunities for a northern bypass to tie back into the A96, resulting in the northern strategy bypassing this section. Similarly, the southern tie-in to the A96 will require careful consideration due to the combination and proximity of the Aberdeen to Inverness Railway Line, the River Don and its floodplain, Inverurie Paper Mills, Kintore Business Park and the other developments between Port Elphinstone and Kintore.

(n) Section B9 (south): Old Rayne to Kintore

Section B9 (north) is between Old Rayne, to the east of Insch and Kintore, to the south of Inverurie and includes an offline bypass to the south of Inverurie. The topography of the southern strategy rises southwards from the River Urie towards the Bennachie Mountains and includes a localised hill, Gallows Hill (177mAOD),

which rises steeply to the south of the A96 near Pitcaple. To the west of Inverurie, the undulating topography continues with several hills with valleys in between, including high spots at Knockinglews (238mAOD), Hill of Ardtanes (159mAOD) and Corsman Hill (120mAOD) to the north of the River Don. The river flows generally in an easterly direction across this section towards Inverurie and Port Elphinstone to where it meets the River Urie and continues south, where the land steeply rises from approximately 60mAOD at the river to Roquharold Hill (140mAOD) and Shaw Hill (174mAOD).

The land use in this section is mainly agricultural with settlements at Oyne, Kirkton of Oyne and Chapel of Garioch in addition to numerous smaller communities and individual residential and farm properties. The agricultural land is interspersed with areas of forest which are generally located on the slopes of the hills in the area.

The Aberdeen to Inverness Railway Line travels east from Insch, passing to the north of Oyne before re-joining the A96 near Kirkton of Oyne, where it sits parallel and directly adjacent to the A96 until Inveramsay, where it crosses the road.

The undulating topography in this section, with its numerous hills and valleys, will require careful consideration of the alignment to avoid increased gradients or significant cut and embankment slopes where an alignment cuts through the side of a hill or passes over valleys in between hills.

The southern strategy will also require a crossing of the River Don as well as the Aberdeen to Inverness Railway Line. The constraints on the existing A96 at Pitcaple, identified in **Section 4.2.1(l)**, may restrict opportunities for a southern bypass to tie back into the A96, resulting in the southern strategy bypassing this section.

(o) Section B10: Kintore to proposed junction with the AWPR

Section B10 is between Kintore, to the south of Inverurie, and the proposed A96 junction with the AWPR, south-west of Aberdeen Airport. The section includes existing A96 dual carriageway between Kintore and the proposed junction with the AWPR, which is the eastern extent of the A96 Dualling Programme. The topography of the section rises from Kintore towards Kinellar, with a steeper rise as it crosses the slopes of Tyrebagger Hill (250mAOD) before descending towards Aberdeen. The existing dual carriageway bypasses the settlements of Kintore and Blackburn.

The land use around in this section is mainly agricultural along with Kirkhill Forest which is located on Tyrebagger Hill. There are a large number of farm buildings and residential properties in close proximity to the A96, with Aberdeen Airport located to the north-east of this section.

Current access arrangements and junction configurations on the existing dual carriageway section will be assessed in line with the A96 Junction Strategy as discussed in **Section 4.2.8**. The existing properties and businesses adjacent to the A96 are a constraint on the land available to upgrade existing junctions to grade separated junctions, or to provide new parallel link roads for rationalisation of accesses. In addition, the topography at Tyrebagger Hill is a contributing factor to the winter maintenance issues (**Section 2.12.3**) which should be reviewed in combination with the junction strategy.

4.2.2 Geotechnical Considerations

(a) Overview

A desk study review of available geotechnical information has been undertaken to give a general overview of the ground conditions anticipated in the vicinity of improvement strategy Option B: Existing A96 corridor with offline bypasses, along with separate details of each subsection of Option B.

The superficial deposits in the vicinity of Option B have been identified as Recent and Quaternary Deposits, comprising mainly of the following (with increasing depth):

- Alluvial and River Terrace Deposits associated with the frequent watercourses in the vicinity of the existing A96;
- Glaciofluvial sand and gravel (similarly associated with watercourses); and
- Cohesive and Granular Glacial Deposits.

The above sequence of deposits is generally formed by the following processes. Lower valleys are formed by former outwash channels from glaciers, infilled with Glaciofluvial Deposits that now accommodate present watercourses which have seen recent Alluvium and River Terrace Deposits.

Peat may also be encountered locally. Peat tends to be typically <1m thick but can be thicker (3m to 4m) locally. Made Ground is present within the existing road earthworks, particularly embankments, and in the vicinity of existing structures/towns/roads. There are also numerous disused quarries/sand pits scattered throughout the A96 extents. Some of the pits and quarries may have been fully or partially infilled, the infill material is unknown and may be potentially contaminated.

The solid geology in the western part of the existing A96 between Inverness and Fochabers is indicated to be underlain by a sedimentary sequence of sandstones, mudstones, conglomerates and siltstones belonging to the Lower and Middle Old Red Sandstone Formation of Devonian Age.

To the east of Fochabers the route is largely underlain by metamorphic rocks (e.g. quartzose, mica-schists, slate and phyllites) of Dalradian Age with localised gabbroic and granitic igneous intrusions, which become more extensive and common east of Huntly.

There are areas along Option B, particularly east of Inverurie, where rock is expected to be at or close to ground level. There are several major faults in the section lying south-west to north-east, most notably the Keith Shear Zone present at and around Keith. Many smaller faults can also be expected throughout the section.

Historical maps give an indication of the local industries that were present and which may be a potential source of contamination. These include quarrying, sand and gravel pits, smithies, saw mills and scrap yards. In addition, current land uses include various agricultural and forestry activities, fuel stations/garages, sewage treatment works, railways, distilleries and associated works.

The desktop study indicates that the potential to encounter weak and compressible ground is associated with Alluvial, Peat and Glaciofluvial Deposits. There is also

indicated to be a risk of localised landslides along the banks of present watercourses.

Sections B1 and B2 have been described below for completeness, however as noted in **Sections 3.4.2** and **3.4.3**, these two sections have been assessed as part of the A96 Dualling Inverness to Nairn (including Nairn Bypass) DMRB Stage 2 Assessment, with the preferred option for the scheme announced in October 2014.

(b) Section B1: Raigmore Interchange to Gollanfield

A considerable variety of superficial deposits exist in in this section and, in particular, at either end of the section. Raised Tidal Flat Deposits (clay, silt and sand) and Raised Glaciomarine Deposits, both Ardersier Silt Formation (silt and sand) and Alturlie Gravels Formation (sand and gravel), are indicated. In addition, Hummocky Glacial Till (diamicton, sand and gravel) and Glacial Till (diamicton) Deposits are indicated to be present in this section along with localised outcrops of Peat and Alluvium also noted within the section.

The solid geology of this section is indicated to belong entirely to the Hillhead Sandstone Formation. No faults are present within this section.

(c) Section B2: Gollanfield to Hardmuir Wood

Raised Tidal Flat Deposits including both Ardersier Silt Formation and Alturlie Gravels Formation, are indicated in this section. In addition, Alluvial Deposits (clay, silt, sand and gravel), Glacial Till and discrete pockets of Peat are also indicated throughout the section.

The solid geology underlying this section comprises predominantly of the Inverness Sandstone Group.

(d) Section B3: Hardmuir Wood to Alves

This section is predominantly underlain by Glaciofluvial Ice Contact Deposits (typically gravels, sands and silt). Localised areas of Alluvium are also noted around watercourses, which pass typically perpendicularly under the existing A96. Of note, and towards the centre of the section, is an extensive area of Alluvium, which forms part of the floodplain of the River Findhorn. The Alluvium is underlain by River Terrace Deposits (both deposits comprising a mix of clay, silt, sand and gravel). Raised Marine Deposits (consisting of gravel, sand and silt) are indicated to the north of the central area, north of Forres. The eastern half of the section comprises Glaciofluvial Ice Contact Deposits with Glacial Till Deposits indicated to the south of the existing A96. There are localised areas of Peat beneath the southern parts of the central section, to the south of Forres and at the eastern limit of the section, north of the existing A96.

The solid geology underlying this section comprises predominantly of sedimentary sandstone of Devonian Age, with deposits at Forres being a more diverse mix of sandstone, conglomerate, argillaceous rock and limestone. A number of faults are also indicated to the east and central areas of the section trending north-east/south-west.

Geotechnical constraints are likely to include:

- Potential to encounter weak, compressible ground associated with the Alluvial and Peat deposits;
- Localised landslides along the banks of the watercourses;
- Potential for flooding associated with the watercourses in the area, in particular the River Findhorn and the Burn of Mossett;
- A number of existing and disused quarries are located throughout the study area; the present condition of which is not currently known but if infilled, may have issues associated with weak, compressible and potentially contaminated infill. If not infilled, the condition and stability of the quarry faces will need assessed; and
- Potential for localised contamination associated with historic land use including quarrying, gravel and sand pits, saw mill and sewage treatment plant.

(e) Section B4: Alves to Lhanbryde

This section predominantly consists of Glaciofluvial Ice Contact and Till Deposits with Till largely found in the west of the section becoming discrete pockets to the east. There is also an extensive area of Alluvial Deposits associated with the River Lossie. Lacustrine Deposits (typically clay, sand and silt) are found to the west of Elgin, north of the existing A96. Localised outcrops of Peat and Alluvium are also noted within the section.

The solid geology underlying this section comprises predominantly of sandstone of various geological settings, becoming more gravelly and calcareous sandstone in the east of the section. A discrete area of interbedded sandstone and siltstone exists north of Elgin. A number of faults trending north/south are also indicated to the east of Elgin.

Geotechnical constraints are likely to include:

- Potential to encounter weak, compressible ground could be associated with Peat, Alluvium and Lacustrine Deposits;
- Potential for flooding associated with the watercourse in the area, in particular the River Lossie;
- A number of disused quarries and sandpits are located throughout the study area;
- Potential for localised contamination associated with historic land use including quarrying, sand pits, dismantled railway land and mills located throughout the study area; and
- A Bronze Age burial ground is located to the east of the section.

(f) Section B5: Lhanbryde to west of Keith

This section consists of Glaciofluvial Ice Contact and Sheet Deposits to the east of the River Spey. Alluvial Deposits are indicated to be associated with the River Spey which flows from south to north in this area. To the east of Fochabers, the superficial geology is mainly indicated to consist of Till Deposits with discrete

pockets of Alluvial and Glaciofluvial Ice Contact Deposits to the north and south of the existing A96. An extensive deposit of Peat is noted at Forgie, with smaller localised outcrops of Peat to the north of the current A96.

The solid geology consists of sandstone to the west of the section with subordinate conglomerate, siltstone and mudstone beds. The centre of the section consists of Spey Conglomerate Formation. The east of the section consists of calcareous psammite and calcareous semipelite (lower grade metamorphic rocks corresponding to the older Dalradian meta-sediments). The Mulderie Intrusion consisting of gneissose granite is indicated in the eastern limit of the section, south of the existing A96. A small number of faults run generally north/south along the eastern side of the River Spey with one other fault trending south-west/north-east to the north of the A96 from Lhanbryde.

Geotechnical constraints are likely to include:

- Potential to encounter weak, compressible ground to the west of the section associated with Alluvium and the Peat Deposits at Forgie;
- Potential for flooding associated with the watercourse in the area, in particular the River Spey;
- A number of disused quarries and sandpits are located throughout the study area;
- Potential for localised contamination associated with historic land use including quarrying, sand pits, dismantled railway land and mills located throughout the study area; and
- Sites of Special Scientific Interest (SSSI) including Loch Ordie located to the east of Lhanbryde and the River Spey.

(g) Section B6: West of Keith to west of Huntly

In this section the superficial geology consists predominantly of Glacial Till, although Alluvial and Glaciofluvial Sheet Deposits are associated with the watercourses present within this section. A small number of localised Peat deposits are identified scattered throughout the section. There are also discrete areas throughout the section where no superficial deposits are recorded (i.e. thin or absent).

The solid geology indicates that the majority of the site is underlain by late-Precambrian rocks of the Dalradian Supergroup (Lochaber and Ballachulish Subgroups). These comprise metasedimentary rocks including pelites, semi-pelites, psammites and quartzite, commonly described as schistose or phyllitic. Strata are typically recorded to dip to the east and south. The Keith Shear Zone is present in the vicinity of Keith and to the south-west, which is represented by a series of south-west/north-east trending thrust faults with hanging walls on the south-east side. This has resulted in rocks of the Caledonian Igneous Suite (gneissose granite) underlying this area.

Geotechnical constraints are likely to include:

- Open joints and cavities associated with the Cuthill Limestone Member;
- Potential to encounter weak, compressible ground throughout the section associated with the Alluvial and Peat Deposits;

- Localised landslides along the banks of the watercourses present;
- Potential for flooding associated with the watercourse in the area; and
- Potential for localised contamination associated with historic land use including quarrying, sand pits, mills and dismantled railway land located throughout the study area.

(h) Section B7: West of Huntly to east of Huntly

It is indicated that the superficial deposits at the section mainly consist of Glacial Till Deposits. River Terrace and Alluvial Deposits overlying the Glacial Till Deposits are indicated to be associated with the Rivers Bogie and Deveron at and around Huntly.

The solid geology underlying the north of the section is part of the Caledonian Igneous Supersuite. These are mainly described as gabbroic rocks including olivine gabbro, orthopyroxene gabbro and xenoliths of pelites, semi-pelites, quartzite and calc-silicate rocks. The Huntly-Knock Pluton located west of Huntly is marked on the geological map as 'contaminated'. Vertical foliations of unspecified origin are recorded within the xenolithic gabbroic rocks.

In the southern section of the study area the underlying geology changes to the Upper Proterozoic rocks of the Southern Highland Group. These are described as psammite and quartzite with intrusions of biotite granite and olivine gabbro. Steeply dipping foliation and cleavage is recorded within the psammite deposits. The main fault within the section trends north-west/south-east adjacent to the western side of the current A96, north-west of Huntly.

Geotechnical constraints are likely to include:

- Potential to encounter weak, compressible ground throughout the section associated with the Alluvial Deposits;
- Localised landslides along the banks of the watercourses present;
- Potential for flooding associated with the watercourse in the area, in particular the Rivers Bogie and Deveron;
- A number of disused quarries and sandpits are located throughout the study area; and
- Potential for localised contamination associated with historic land use including quarrying, sand pits and refuse tips located throughout the study area.

(i) Section B8: East of Huntly to Old Rayne

The superficial deposits consist mainly of Glacial Till Deposits. Thin lenses of Alluvial Deposits overlying the Glacial Till are indicated to be associated with the watercourses throughout the section. Small discrete pockets of Peat are identified in the western area of the section, north and south of the existing A96. Rock is recorded as being at or close to ground level on high ground (above 150mAOD).

The solid geology in the north-west of the section is indicated to be metasedimentary rocks of the Southern Highland Group. These are mainly described as psammites, semipelites, pelites and grit. Geological maps indicate that these deposits are dipping in a generally south-east direction. In the south-east of

the section the geology is dominated by rocks of the Caledonian Igneous Suite comprising of plutonic rocks. These are mainly described as olivine gabbro, norite and gabbronorite. The geological maps show a number of faults scattered throughout the section trending north-west/south-east.

Geotechnical constraints are likely to include:

- Potential to encounter weak, compressible ground throughout the section associated with the Alluvial Deposits;
- Localised landslides along the banks of the Glen Water and River Urie;
- Potential for flooding associated with the watercourse in the area, in particular the Glen Water and River Urie;
- A number of disused quarries and sandpits are located throughout the study area; and
- Potential for localised contamination associated with historic land use including quarrying, sandpit, mills and dismantled railway land.

(j) Section B9: Old Rayne to Kintore

The superficial geology beneath this section consists predominately of Glacial Till Deposits. Alluvial, Glaciofluvial Sheet and Glaciolacustrine Deposits are indicated to overlie the Glacial Till, in the vicinity of the Rivers Urie and Don. Localised deposits of Peat are noted throughout the section.

The solid geology in the north-west of the section is dominated by igneous rocks of the Caledonian Igneous Suite comprising of norite and gabbronorite. At and around Inverurie, the geology changes to become predominantly metasedimentary rocks of the Dalradian Supergroup. These deposits are generally described as psammite and semipelite with foliation dipping typically towards the north-west. To the south of Inverurie, the underlying geology is dominated by granite of the Aberdeen Formation. The geological maps show a number of faults crossing the north of the section (Westhall to Harlaw) generally trending north-east/south-west.

Geotechnical constraints are likely to include:

- Potential to encounter weak, compressible ground throughout the section associated with the Alluvial and Glaciolacustrine Deposits;
- Localised landslides along the banks of the watercourses, in particular the River Urie;
- Potential for flooding associated with the watercourses in the area, in particular the River Urie;
- A number of disused quarries and sandpits are located throughout the study area; and
- Potential for localised contamination associated with registered landfills and historic land use including quarrying, sandpits, mills and dismantled railway land are located throughout the study area.

(l) Section B10: Kintore to proposed junction with the AWPR

The superficial geology is indicated to consist predominantly of Glacial Till Deposits. Alluvial and Glaciofluvial Sheet Deposits are also indicated to underlie the section in the vicinity of watercourses and in particular the River Don. At Blackburn at the eastern end of the section, an outcrop of the Glen Dye Silt Formation is noted comprising of clay, silt and sand. Further east of this are deposits of the Blairdaff Moraine Formation, comprising diamicton, sand and gravel. Throughout the section, at higher topographic levels, there are discrete pockets where no superficial deposits are recorded indicating bedrock to be at or close to ground level.

Solid geology is indicated to consist predominately of metasedimentary psammite and semipelite rocks of the Aberdeen Formation. The Clinterty Pluton, consisting of granodiorite, is indicated to be present within the east of the section. Granite of the Aberdeen Pluton is noted at the most eastern extent of the section. The bedrock throughout the section is not indicated to be affected by faulting.

Geotechnical constraints are likely to include:

- Potential to encounter weak, compressible ground throughout the section associated with the Alluvial and Glen Dye Silt Formation Deposits;
- Localised landslides along the banks of the River Don;
- Potential for flooding associated with the watercourse in the area, in particular the River Don;
- A number of disused quarries and sandpits are located throughout the study area; and
- Potential for localised contamination associated with historic land use including quarrying, sandpit, mills and dismantled railway land and located throughout the study area.

4.2.3 Drainage and Flooding

(a) Drainage

(i) Existing Drainage

A number of surface water drainage facilities are present along the route. These include kerbs and gullies, over the edge drains, filter drains and ditches.

For any sections of the A96 which shall be widened to dual carriageway, the existing drainage facilities that comply with current standards will be retained where possible. A review will be undertaken to determine whether the existing surface/ sub-surface drainage in these sections can be improved or renewed to improve the resilience of the road. This may include the provision of new or additional storage and/or treatment. On the sections of the A96 already dualled where the carriageway has been altered permanently as part of the final scheme, the drainage systems will require a further assessment to determine if any improvement works are required.

(ii) Drainage Design Recommendations

HD 33/06 '*Surface and Sub-Surface Drainage Systems for Highways'* of the DMRB was updated to include an allowance for climate change, by including a sensitivity test on the design of the drainage system. The sensitivity test requires the rainfall

intensity of the design storm to be increased by 20%, where the rainfall data excludes such an allowance.

However, at flood sensitive areas consideration should be given to additional sensitivity tests with higher rainfall intensities. Typical areas which are sensitive to flooding include but are not limited to:

- sag curves within cuttings;
- inner areas of bends in road alignment where accumulation of flow can occur due to the adjacent catchment;
- connection with other roadways that can act as a drainage pathway;
- application of superelevation that cause crossfall to be locally zero; and
- areas where the road passes through flood risk areas.

The additional sensitivity test is recommended in the Scottish Road Network Climate Change Study: UKCOP09 update (2011)[7], due to the uncertainties in the assumption that the changes to the 2-year daily rainfall event can be used as surrogates for adjusting short duration low return period events in addition to the uncertainty associated with the projected changes for this variable itself.

The treatment of surface water runoff by Sustainable Drainage Systems (SUDS) is a legal requirement for most forms of development and as such should be considered at an early stage of the design. The SUDS requirements are regulated by the Controlled Activities Regulations (CAR) set out by SEPA. The level of SUDS required will be determined in consultation with SEPA.

A number of individual levels of SUDS facilities can be used such as filter drains, detention basins/retention ponds or swales as one level of treatment. The SUDS design will be developed in accordance with the CIRIA Sustainable Drainage Systems Design Manual for Scotland and consultation with SEPA, SNH and other stakeholders.

The surface and subsurface drainage design will be developed in accordance with the standards for surface and subsurface drainage set out in the DMRB, Volume 4, Section 2, Part 3 of HD 33/06 and through consultation with SEPA. HD 33/06 provides guidance on the type of surface and subsurface drainage appropriate to highway schemes.

(b) Flood Risk

(i) Introduction

CH2M HILL was commissioned by Transport Scotland under the SEA commission to produce a Strategic Flood Risk Assessment (SFRA), to identify and consider the range of flood risk sources and receptors for the dualling of the A96.

[7] Scottish Road Network Climate Change Study: UKCOP09 update (2011), Jacobs

The key aims of the Strategic Flood Risk Assessment (SFRA) are:

- High level identification of areas sensitive to flooding within the A96 study area;
- High level assessment of potential flood risk constraints likely to affect/ be affected by the proposed alternative improvement strategy options; and
- Development of preliminary, strategic mitigation advice to support later, more detailed DMRB assessment and design stages for the A96 Dualling Programme (which will include site specific flood risk assessments).

The SFRA strategically assessed all forms of flood risk:

- fluvial (rivers);
- tidal;
- surface water (pluvial);
- groundwater; and
- failure of infrastructure (e.g. reservoirs, aqueducts).

(ii) Surface Water Features

There are six hydrological catchment areas along the route of the A96, namely, Nairn, Findhorn, Lossie, Spey, Deveron and Urie/Don. The Nairn, Findhorn, Lossie, Spey and Deveron generally flow in a north-easterly direction to discharge into the Moray Firth while the Urie/Don catchment flows easterly to discharge into the North Sea at Aberdeen.

The A96 crosses the main rivers Nairn, Findhorn, Lossie, Spey, Deveron and Don as well as several tributaries and other smaller watercourses. A list of the major and minor watercourses in the study area is provided in **Table 4.2.1** below:

Section	Location	Major Watercourse	Minor Watercourse/ Other Water Bodies
B1	Raigmore Interchange to Gollanfield	-	Cairnlaw Burn Rough Burn
B2	Gollanfield to Hardmuir Wood	River Nairn	Balnagowan Burn Auldearn Burn
B3 (north)	Hardmuir Wood to Alves	River Findhorn	Burn of Feddan Muckle Burn Speedie Burn Burn of Mosset Kinloss Burn Burgie Burn
B3 (south)		River Findhorn	Burn of Feddan Muckle Burn Speedie Burn Manachy Burn Marcassie Burn Burn of Mosset Kinloss Burn Burgie Burn
B4 (north)	Alves to Lhanbryde	River Lossie	Millie Burn Terchick Burn Spynie Canal

			Spyine Burn Longhill Burn Loch Oire
B4 (south)		River Lossie	Black Burn Mosstowie Canal Burn of Linkwood Lhanbryde Burn Loch Oire Loch Na Bo
B5	Lhanbryde to west of Keith	River Spey	Black Burn River Spey Burn of Fochabers Meikle Dramlach
B6	West of Keith to west of Huntly	River Isla	Burn of Forgie Burn of Rumbuch Kitchen Burn Burn of Cooksmill Haughs Burn Dens Burn Burn of Tarnash Burn of Nethertown
B7	West of Huntly to east of Huntly	River Deveron	Cairnie Burn River Bogie Thanis Burn
B8	East of Huntly to Old Rayne	River Urie	Burn of Bogside Burn of Lipsden Glen Water Peterden Burn Jordan Burn The Kellock The Shevock
B9 (north)	Old Rayne to Kintore	River Urie River Don	Gadie Burn
B9 (inner)		River Urie River Don	Bridge of Durno Lochter Burn
B9 (south)		River Don	Gadie Burn Strathnaterick Burn Polinar Dam Woodend Burn
B10	Kintore to proposed junction with the AWPR		Bridgealehouse Burn Tuach Burn Black Burn

Table 4.2.1 Major and minor watercourses within the Study Area

There are numerous other unnamed and unclassified watercourses and lochs that exist within the study area that have not been detailed above.

(iii) Flood Risk

Flood risk is considered as the combination of the likelihood of a flood hazard occurring and the consequences of flooding on receptors. The SFRA considers a flood risk based on 0.5% annual probability (1 in 200 year return period) of river flooding utilising a functional floodplain for the flood extent of the same probability. The functional floodplain is defined by the probability of a flood event and are the areas of land which convey and store flood water during the times of flood.

Potential flood risk related effects of dualling the A96 include:

- Changes in hydrological catchment areas;
- Loss of functional floodplain;
- Increased flood level/ afflux at water-crossings; and
- Change of existing flood risk (e.g. frequency and magnitude of flooding) upstream and downstream of dualling works.

Dualling the A96 may also cause temporary effects on flood risk during the construction phase. Temporary works/compounds placed within the functional floodplain could potentially affect the local flood risk, and should therefore be avoided wherever possible.

(iv) Flood Mapping, Flood History and Flood Prevention

The SFRA has been informed through a desk study including obtaining the latest flood mapping from SEPA and obtaining historical flood history information from SEPA, the local authorities and BEAR Scotland. The SFRA contains a full baseline review of the study area and flood risk of which the main sections are summarised in the following paragraphs.

The SEPA flood maps present information on the extents of individual sources of flooding from rivers, sea and surface water, but do not account for the possible interactions between sources, flooding from small watercourses or influences from engineering structures.

The collated historical flooding incidents include both incidents within the study area as well as specifically for the A96 Trunk Road, which identified 70 separate flood incidents from February 2009 to May 2014, resulting from flooding from a variety of sources including snow melt, blocked gullies and surface water. It should be noted that all the data relating to historical flooding incidents relates to recorded events only and is not necessarily fully representative of all flood incidents.

The SFRA also noted existing and proposed flood prevention schemes which are present along the route of the A96. These are shown in **Table 4.2.2** below:

Section	Location	Flood Prevention Scheme
B1	Raigmore Interchange to Gollanfield	No flood prevention schemes identified.
B2	Gollanfield to Hardmuir Wood	No flood prevention schemes identified.
B3	Hardmuir Wood to Alves	Forres (River Findhorn & Pilmuir) Flood Alleviation Scheme - In construction - Designed to 1 in 200 year return period flood. - To protect 1,000 homes and businesses. - Scheme involves raising vertical alignment of existing A96. - Watercourse: River Findhorn
		Forres (Burn of Mosset) Flood Alleviation Scheme - Completed in 2009 - Designed to 1 in 100 year plus climate change - To protect over 800 properties - Watercourse: Burn of Mosset

B4	Alves to Lhanbryde	Elgin Flood Alleviation Scheme - In construction - Designed to 1 in 200 year return period flood - To protect ~650 properties and 180 commercial properties - Majority of defences in the town of Elgin - Watercourses: Tyock Burn, Linkwood Burn, River - Lossie
		Elgin Waterside Street Flood Protection Scheme - Completed in 1988 - Watercourse: River Lossie
		Tyock Burn Flood Prevention Scheme - Completed in 1967 - Scheme involved embankment & river widening - Watercourse: Tyock Burn
		Lhanbryde Flood Alleviation Scheme - Completed in 2005 - To protect 44 properties (residential & business) - Scheme involved flood storage, flood walls and channel improvement - Watercourse: Lhanbryde Burn
B5	Lhanbryde to west of Keith	No flood prevention schemes identified.
B6	West of Keith to west of Huntly	No flood prevention schemes identified.
B7	West of Huntly to east of Huntly	Proposed Huntly Flood Protection Scheme - Design to 1 in 200 year plus climate change - Scheme involves embankment, 2 flood attenuation areas - Watercourse: River Deveron
B8	East of Huntly to Old Rayne	No flood prevention schemes identified.
B9	Old Rayne to Kintore	Inverurie (Strathburn & Overburn) Flood Prevention Scheme - Completed in 1978 - Watercourses: Over Burn, Strath Burn
		Overburn Culvert, Inverurie Flood Prevention Scheme - Completed in 2001 - Scheme involved installation of new box culvert - Watercourse: Over Burn
B10	Kintore to proposed junction with the AWPR	No flood prevention schemes identified.

Table 4.2.2 Flood Prevention Schemes along the A96 corridor

(v) Summary of SFRA Findings

This section provides a summary of the SFRA flood risk constraints analysis for Option B comprising an assessment of both potential flood sources and potential flood receptors.

- There are extensive functional floodplains and numerous watercourse crossing requirements (major and minor watercourses) across Sections B3, B4 and B5, and all improvement strategy options will be constrained to some degree:

  - Bypass options to the north of Forres and Elgin (Sections B3 north and B4 north) are the most significantly constrained in terms of fluvial and coastal floodplain extents; and
  - Bypass options to the south of Forres and Elgin (Sections B3 south and B4 south) are also significantly constrained by fluvial floodplains, and will also likely to have to consider potential effects on local flood prevention/ alleviation schemes.
- In terms of properties within functional floodplain and improvement strategy option extents:
  - Option B North around Forres (Section B3) stands out as significantly constrained with a large number of properties located within the functional floodplain;
  - Option B South around Forres (Section B3) also has a number of properties located within the functional floodplain extent;
  - Option B North around Elgin (Section B4) has a number of properties located within the functional floodplain; and
  - Option B South around Elgin (Section B4) is less densely populated than to the north however it also has a number of properties located within the functional floodplain.
- Section B5 requires a major crossing for the River Spey. The location of the crossing would be a critical consideration under either option due to Natura (nature conservation sites designated at a European level) and the potential flood risk implications to surrounding (hydrologically influenced) properties.
- Section B6 is the least constrained area in flood risk terms; however, later DMRB stages of design development and route options assessment will need to carefully consider water crossings and property flood risk implications at the local level.
- Section B7 includes Huntly, which has proposals for a local flood alleviation/ prevention scheme. A number of properties in this section are located within the floodplain extent. There are also a number of major and minor watercourse crossing constraints to be considered.
- Section B8 has comparatively low levels of fluvial floodplain constraint, but does still contain a number of major and minor watercourse crossing constraints.
- Section B9 around Inverurie presents a range of issues in terms of floodplain extents and properties at risk:
  - Option B9 North and Option B9 inner are constrained by watercourse crossings (Urie and/ or Don), floodplain extents, a flood alleviation/ prevention scheme within the option extents and relatively high numbers of properties at risk of flooding; and
  - Section B9 South may present some constraint issues in terms of major/ minor watercourse crossings.
- Section B10 is already dualled between Inverurie and Aberdeen, and any upgrade works and unlikely to exacerbate existing flood risk.
- Surface water and groundwater flooding issues are not considered to present any significant differentiation between improvement strategy options at this level of assessment.

- Although the SFRA considered flood risk to arable agricultural land and to scheduled monuments; when considered within the context of floodplain extents and properties at risk, these issues do not present significant further differentiation between improvement strategy options at this level of assessment.

(vi) Design Recommendations

The SFRA recommends the following best practice guidance for future design consideration of flood risk issues which have been adapted from DMRB Vol. 11 Sec. 3 Pt. 10 HD 45/09 '*Road Drainage and the Water Environment'* and Scottish Planning Policy (SPP) to achieve the overarching flood risk design principle that the A96 Dualling Programme results in no change in overall levels of flood risk.

Functional Floodplain

- Avoid new infrastructure in the functional floodplain.

Where unavoidable:

- New infrastructure should be restricted to the shortest practical crossing, avoiding extensive construction within the functional floodplain.
- Road Alignment
  - The road level should be above the level of the 0.5% annual flood event (also referred to as the design flood event), to comply with SPP.
  - Sensitivity check against the 0.1% annual flood event should be undertaken at DMRB Stage 3.

Climate Change

- Potential for climate change impacts on the design flood event should be considered.

Water Crossings

- All water-crossings should be screened to determine the level of DMRB assessment required (i.e. simple, detailed or exempt).
- A flood risk assessment may not be required when:
  - There is no modification to the existing water-crossing.
  - Water-crossing modifications are like-for-like in terms of dimensions and/ or conveyance.
- New bridge/ culvert designs should achieve a no net afflux target; i.e. no increase in peak design flood level.
- Water-crossing designs should include an appropriate freeboard at locations that are sensitive to flooding.

Flood Mitigation Measures

- Before considering flood mitigation measures, route alignment options which avoid the floodplain should be fully investigated at DMRB Stage 2.
- Where unavoidable, a suitable range of flood mitigation design options should be assessed at DMRB Stage 2, and cost-benefit analysis undertaken to justify individual flood mitigation measure options in terms of value for money.
- All design mitigation, such as flood relief culverts, should be investigated before considering provision of compensatory storage as flood mitigation.
- Compensatory storage may reduce the potential impact of loss of floodplain storage, and should be designed to deliver no net change to floodplain capacity and catchment hydrology.
- In the event that a road embankment is designed as a barrier to store flood water on the floodplain upstream of a settlement, as part of flood mitigation measures, compensatory storage for the upstream floodplain will not be required.
- In this event, the new road embankment could cause significant afflux but reduce flood risk downstream. Where this is a design option (though considered unlikely for the A96 Dualling) there are two major considerations:
  - Check if the retaining volume will be regulated under the Reservoirs Act 1975; and
  - Consideration should include the failure scenario, if the embankment breaches or is overtopped.

Flood Protection Measures

- Where new road infrastructure/ crossings (following design mitigation measures) increase the risk of flooding to local communities, it will be necessary to include local flood protection measures as part of the road project to reduce risks to an acceptable level.
- These may include flood walls, flood protection embankments, flood storage areas and other measures.

(vii) Next Steps

The SFRA was undertaken within the context of a DMRB Stage 1 Assessment. Site specific flood risk assessments for individual A96 dualling schemes will be undertaken in accordance with DMRB guidance, as more localised detail becomes available at each relevant design stage. The SFRA sets out a process for the scoping and the assessment of flood risk assessments.

At DMRB Stage 2 a scoping exercise will be undertaken to determine the level of assessment required for the flood risk assessment or whether it can be scoped out.

At DMRB Stage 2 it is likely that a simple desk-based qualitative assessment will be sufficient, however at locations of sensitive receptors, or where the A96 Dualling is a potential source of change in flood risk, a detailed assessment may be required. A detailed assessment will be required at DMRB Stage 3.

The detailed assessment usually builds on desk-based DMRB Stage 2 exercises, supplemented with information collected on site, to enable a more detailed, site-specific quantitative assessment; potentially including specialist surveys.

Further information on the requirements for scoping and the simple and detailed assessments are provided in **Appendix F**.

4.2.4 Alignment

(a) Overview

This section presents an assessment of the existing alignment of the A96 between Inverness and Aberdeen. The road alignment has been assessed to determine the extent to which the road characteristics comply with the current design standards outlined within the DMRB for the A96 road's Design Speeds.

The assessment of the road geometry was undertaken using LiDAR survey information, which provides contour data at 5m intervals. However, there may be limitations to the accuracy with this survey information, and therefore it is recommended that more detailed survey data is used for the future assessment work at DMRB Stages 2 and 3.

Approximately 31% of the existing A96 single carriageway for a 100Akph Design Speed, and approximately 60% of the existing A96 dual carriageway section for a 120Akph Design Speed, contain geometry that would require a Departure from Standards based upon sub-standard Horizontal and/or Vertical Alignment, Stopping Sight Distances, Junction Approaches, or combinations thereof, from current DMRB standards.

The assessment undertaken has identified six single carriageway sections and two dual carriageway sections that are considerably below current standards as outlined below:

- Hardmuir Wood to Alves;
- West of Keith to west of Huntly;
- West of Huntly to east of Huntly;
- East of Huntly to Old Rayne;
- Old Rayne to Kintore; and
- Kintore to the proposed junction with the AWPR.

Further details of the assessment are contained in the following section along with considerations for improving or removing Departures from Standard within the improvement strategies.

(b) Engineering Design Standards

Trunk Roads in Scotland are designed to the requirements set out in the DMRB. These standards include desirable minimum requirements for each element of road geometry design whilst outlining the flexibility that a design organisation can apply at its discretion to the desirable minimum requirements (these are described as Relaxations). Varying degrees of Relaxations (identified by the number of steps below the desirable minimum benchmark) are permitted for different design aspects.

If Relaxations in excess of the number of steps permitted are present, or if combinations of Relaxations occur at the same location which are in excess of the number of steps permitted, a Departure from Standards is required. Departures from Standards must be approved by the Overseeing Organisation, which in this case is Transport Scotland. A detailed justification must be provided as to the requirement for the departure, and depending on the type of departure, mitigation features may be required. Justification would include an assessment of the safety implications and may also include any alternative options, cost and economics and environmental issues.

The geometric assessment of the existing route was undertaken to establish the extents of the corridor which are not in compliance with current standards for the existing road's Design Speeds (100Akph for single carriageway sections and 120Akph for dual carriageway sections).

A schedule identifying the existing road's Departures from Standard (assessed against current DMRB standards) is contained in **Appendix G**.

(i) Horizontal Alignment

The horizontal alignment of a road is how it would appear on a plan or map, for example, an aerial view of the road showing how a road is formed with curves and straight sections. The horizontal alignment of a trunk road is designed to Volume 6, Section 1, Part 1 of the DMRB: TD9/93 *Highway Link Design*.

It should be noted that one step Relaxations for both horizontal curvature and stopping sight distance (SSD) may be coincident without a Departure from Standards being required; a Relaxation in horizontal curvature that is coincident with a Relaxation in any other element of road geometry design (i.e. except SSD) is not permitted and must be considered as a Departure from Standards.

(ii) Vertical Alignment

The vertical alignment of a road is the crests (or hills), sags (or dips) and longitudinal gradient; this is effectively viewing the road as a long section or profile. The vertical alignment of a trunk road is also designed to Volume 6, Section 1, Part 1 of the DMRB: TD9/93 *Highway Link Design*.

It should be noted that a Relaxation in vertical alignment that is coincident with a Relaxation in any other element of road geometry design is not permitted and must be considered as a Departure from Standards.

(iii) Stopping Sight Distance (SSD)

SSD is the distance a driver needs to be able to see in order to stop safely; SSD is checked in both the horizontal and vertical planes. It must be assessed for both directions of travel on the A96 i.e. in eastbound and westbound directions. This distance should comply with Volume 6, Section 1, Part 1 of the DMRB: TD 9/93 *Highway Link Design*.

(iv) Combinations of Relaxations

With regard to horizontal curvature, vertical curvature and SSD, SSD Relaxations of up to one design speed step below desirable minimum may be coincident with

horizontal curvature Relaxations of up to one design speed step below desirable minimum; all other combinations of Relaxations are not permitted and where present are Departures from Standards. It should be noted that this is not an exhaustive list of restrictions in regards to relaxations and reference should be made to the DMRB.

(v) Departures on the Approaches to Junctions

Relaxations below desirable minimum for SSD and vertical crest curves, and absolute minimum for sag curves are not permitted on the immediate approaches to junctions. This assessment includes a review of alignment standards on the approach to junctions.

(c) Corridor Assessment

Each section of the route corridor has been assessed for compliance with the current geometric design standards for the section's existing Design Speed i.e. 100Akph for single carriageway sections and 120Akph for dual carriageway sections. The compliance of each section with current design standards is detailed below. Full details of all Departures from Standard (assessed against current DMRB standards) can be seen in **Appendix G**.

(i) Section B1: Raigmore Interchange to Gollanfield

This section of the A96 has 750m of dual carriageway, with a further 14.1km of single carriageway. The single carriageway section has been reviewed separately under the A96 Dualling Inverness to Nairn (including Nairn Bypass) DMRB Stage 2 Assessment.

(ii) Section B2: Gollanfield to Hardmuir Wood

This section is currently single carriageway, with an approximate length of 15.9km. This section has been reviewed separately under the A96 Dualling Inverness to Nairn (including Nairn Bypass) DMRB Stage 2 Assessment.

(iii) Section B3: Hardmuir Wood to Alves

This section is currently single carriageway, with an approximate length of 17.1km.

In total there are 66 Departures from Standard within this section, for 100Akph Design Speed. The majority of these departures are on the approach to a junction and relate to SSD or vertical alignment below the required desirable minimum standards. There are two departures for sub-standard horizontal alignment. The departures equate to 4,645m in length, which is approximately 27% of the total length of the section.

(iv) Section B4: Alves to Lhanbryde

This section is currently single carriageway with an approximate length of 19.2km.

In total there are 50 Departures from Standard within this section, for 100Akph Design Speed. 40 of these departures are as a result of a non-permitted combination of relaxations, with 25 of them on the approach to a junction. The departures equate to 2,330m in length, which is approximately 12% of the total length of the section.

It should be noted that the alignment through Elgin has not been included within the assessment as the town will be bypassed.

(v) Section B5: Lhanbryde to west of Keith

This section is currently single carriageway with an approximate length of 14.3km.

In total there are 33 Departures from Standard within this section, for 100Akph Design Speed. The majority of the departures are a combination of relaxations, with almost all including below minimum standard SSD. There are also departures for horizontal and vertical alignment, both on their own, and also as part of a combination. The departures equate to 2,490m in length, which is approximately 17% of the total length of the section.

(vi) Section B6: West of Keith to west of Huntly

This section consists of 13.4km of single carriageway, with an additional 2.1km of overtaking section, with a total length of 15.5km.

In total there are 108 Departures from Standard within this section, for 100Akph Design Speed. The departures cover a range of types including SSD, horizontal and vertical alignment as well as junction approaches. A large proportion of the departures include a below minimum SSD. The departures equate to 6,065m in length, which is approximately 39% of the total length of the section.

(vii) Section B7: West of Huntly to east of Huntly

This section is currently single carriageway with an approximate length of 10.7km.

In total there are 29 Departures from Standard within this section, for 100Akph Design Speed. The majority of departures include SSD whilst some departures are also for vertical and horizontal alignment. The departures equate to 5,295m in length, which is approximately 49% of the total length of the section.

(viii) Section B8: East of Huntly to Old Rayne

This section is currently single carriageway with an approximate length of 15.9km.

In total there are 103 Departures from Standard within this section, for 100Akph Design Speed. The majority of the departures are combinations of relaxations encompassing SSD, horizontal and vertical alignments. There are also 28 departures in relation to junction approach. SSD is included in almost all of the departures in this section. The departures equate to 7,432m in length, which is approximately 47% of the total length of the section.

(ix) Section B9: Old Rayne to Kintore

This section consists of 15.7km of single carriageway, with an additional 7km of dual carriageway. The total length is 22.7km.

In total there are 103 Departures from Standard within this section, for 100Akph Design Speed. The departures are in relation to SSD on approach to junctions. There are also horizontal departures within the section. These departures equate to 4,923m in length, which is approximately 31% of the single carriageway section.

For the dual carriageway section, there are 26 Departures from Standards for 120Akph design speed. The majority of the departures are in relation to weaving distance. These departures equate to 5,050m, which is approximately 72% of the dual carriageway section.

(x) Section B10: Kintore to the proposed junction with the AWPR

This section is currently dual carriageway with an approximate length of 8.1km.

In total there are 28 Departures from Standard within this section, for 120Akph Design Speed. The departures include combination of relaxations and junction approach visibility, as well as weaving distance, horizontal and vertical departures. The departures equate to 4,040m in length, which is approximately 50% of the total length of the section.

(d) Proposed Geometric Standards

The route is to be a Category 7A All-Purpose Dual Carriageway, with a 120Akph Design Speed, in accordance with the DMRB. In particular, the following sections of the DMRB (or subsequent revisions) will be referenced for a 120Akph Design Speed:

- TD 9/93 – *Highway Link Design*;
- TD 27/05 – *Cross Sections and Headrooms*;
- TD 22/06 – *Layout of Grade Separated Junctions*;
- TD 41/95 – *Vehicular Access to All-Purpose Trunk Roads*;
- TD 42/95 – *Geometric Design of Major/ Minor Priority Junctions*; and
- TD 69/07 – *The Location and Layout of Lay-bys and Rest Areas.*

The following outline the proposed horizontal, vertical, SSD and longitudinal gradient standards for a 120Akph Design Speed:

- Desirable minimum horizontal curvature for a 120Akph Design Speed is a radius of 1,020m;
- Desirable minimum radius for a vertical crest curve is 18,200m;
- Absolute minimum radius for a sag curve is a 3,700m radius curve;
- Desirable minimum SSD is 295m;
- Desirable maximum longitudinal gradient for an all-purpose dual carriageway road is 4%; and
- Although the DMRB does not state a minimum longitudinal gradient below which is considered a Departure, it does state that a minimum gradient of 0.5% should be maintained wherever possible to aid in effective drainage.

As discussed in **Section 4.2.4(c)**, all 10 sections have Departures from Standards when assessed against their Design Speed.

To attempt to remove (or reduce the severity) of the Departures from Standards when dualling the A96, the following measures should be considered at DMRB

Stage 2 when assessing the upgrade of these sections to the standards for a 120Akph Design Speed:

- Improving the horizontal alignment, where possible, when widening;
- Improving junction standards and reviewing junction locations to avoid coincidental Departure locations;
- Incorporating wide central reserves and/ or verges to improve SSD; and
- The adoption of alternative corridors.

4.2.5 Cross Section

(a) Overview

The proposed cross section will provide dual two-lane all-purpose (D2AP) standards for a rural road. The DMRB guidance provides standard dimensions for berm, slope, verge, hard strip and central reserve widths. Further assessment during the design stage will determine areas which may require widths greater than the specified minimum. These increased dimensions may be needed to accommodate visibility as well as drainage features. A split carriageway is an option to be considered in areas of challenging topography and elevation differences.

Road cross sections are designed in accordance with Volume 6, Section 1, Part 2 of the DMRB: TD 27/05 *Cross Sections and Headrooms*. The standards include the minimum cross sectional dimensions for each category of road, taking into account the route location. For example, the minimum cross section dimensions for a particular type of road can vary between urban and rural settings.

(b) Existing Cross Section

Existing single carriageway sections account for the majority of the length of the A96 corridor between Inverness and Aberdeen with the exception of approximately 0.75km of dual carriageway from Raigmore Interchange to Seafield Roundabout at Inverness Retail and Business Park and approximately 15km from the Port Elphinstone Roundabout to the proposed junction with the AWPR. The single carriageway cross section varies throughout the length of the corridor from sections of sub-standard widths and lack of hardstrip, to sections of fully compliant Wide Single 2+1 carriageway. The dual carriageway generally complies with the current minimum cross sectional dimensions for a rural dual two-lane all-purpose (D2AP). However, the hardstrips provided on the 3km section between Tyrebagger Hill and the proposed junction with the AWPR are narrower than currently required by the DMRB.

(c) Proposed Cross Section

The proposed cross section is illustrated in **Figure 4.2.1**. The components of the cross section are described below.

- **Berm / Slope width** – This value will vary significantly along the length of the route depending on whether the proposed road is being built above, below or at the same level as the existing ground. Given the steep terrain and landslip history along many parts of the route, route selection and detailed geotechnical design will dictate this width.

- **Verge width** – The minimum verge width should be 2.5m, however there may be a need to widen the verge beyond 2.5m, for example, to allow for driver visibility (refer to **Section 4.2.4**), drainage (particularly if swales are proposed), road furniture (traffic signs, road restraint systems, etc.), public utilities and environmental mitigation measures (noise bunds / fences).
- **Hard Strip width** – 1m standard width. The hard strip provides a number of functions including providing an area for surface water runoff to collect outwith the carriageway boundaries, pavement integrity, an overrun area to mitigate the risks of driver error and a separation from vegetation.
- **Lane width** – 3.65m is the standard lane width.
- **Central reserve width** – The minimum central reserve width should be 2.5m, however similar to the verge, the central reserve may need to be widened beyond 2.5m to accommodate driver visibility, drainage, street furniture or to suit the existing topographical, geotechnical and other constraints. The need to widen the central reserve can be particularly significant on horizontal curves where the position of the road restraint systems impact driver visibility.

It should be noted that split carriageways may be considered in particular areas of the route where topography or ground conditions are particularly challenging.

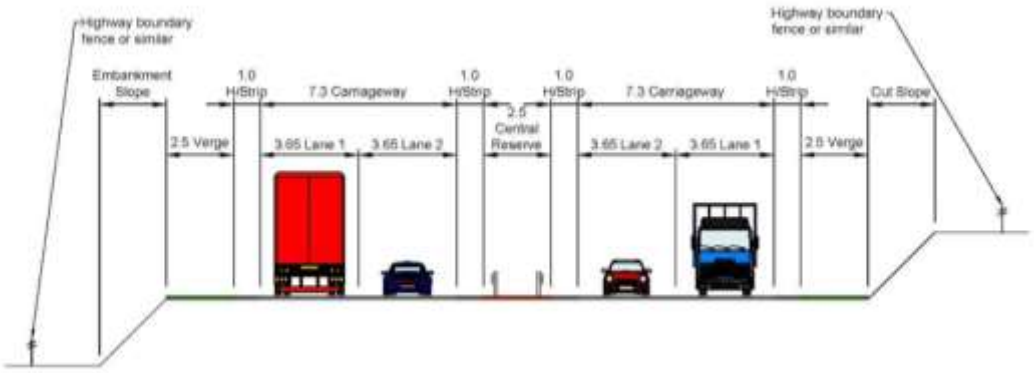

Figure 4.2.1 Cross Section Dimensions for a Rural Dual Carriageway. Note: All dimensions in metres.

4.2.6 Pavement

(a) Overview

Road pavement is a key element of carriageway safety and long-term durability. Existing pavement data has been obtained from SERIS to aid in the DMRB Stage 1 Assessment. The pavement along the existing A96 consists of a fully flexible material composition with a varied range of estimated remaining useful life, known as residual life. The fully flexible pavement has undergone areas of maintenance improvement throughout the route. Preliminary SERIS predictions show that 50% of the existing pavement has greater than 20 years of residual life.

Areas of particular concern have been identified within the general analysis summary. Locations with poor pavement conditions are included within the Alves to Lhanbryde and Lhanbryde to west of Keith sections. Potential treatment options for existing sections which require maintenance include a 100mm inlay and full reconstruction.

A thorough investigation in future DMRB assessment stages is required to verify preliminary SERIS results. To address the key issue of poor existing pavement condition, detailed analysis is needed to confirm critical sections with low residual life, followed by a targeted improvement strategy. Further assessment will also determine route-wide pavement condition and the optimum treatment approach required.

SERIS is used to log and predict the current condition of the trunk road network in Scotland and contains information on pavement conditions such as surface profile, skidding resistance, and deflectograph results. This information allows the system to predict the residual life of each part of the network and any maintenance interventions that may be required. It is also used to log any maintenance that has already been undertaken on the trunk road network.

The use of deflectograph data should not be used in isolation when considering the structural integrity of the pavement. Information from visual inspections, core data and any other available data should also be considered. The estimation of the residual life from deflectograph data is limited by the accuracy of the input data in SERIS and may result in incorrect prediction of residual life.

On occasion, there is no clear correlation between deflectograph data and other types of pavement condition indicators such as visual surveys or cores. This can occur from a number of factors, such as errors in measurement of road temperature, the presence of particularly strong pavement subgrade, or superficial surface course deterioration which does not result in higher than expected deflections.

(b) Existing Pavement Overview

Analysis of the SERIS data indicated that the pavement throughout the route consists of a fully flexible construction. A fully flexible pavement generally consists of a granular base with asphalt upper layers.

The existing A96 was constructed as a fully flexible pavement during the 1970's and 1980's. However, sections have had maintenance interventions over the years and fully flexible sections of varying depths have since been implemented. An indication of the bituminous and granular thickness range for each section is provided in **Table 4.2.4** overleaf. It should be noted that SERIS provides limited data on granular depth and this information is not available for all sections.

The deflectograph data from SERIS is used to determine the structural condition of the pavement. A loaded wheel is passed over the pavement, and the pavement deflects under the load and the size of the deflection is measured. The deflection along with the layer type and layer thickness is then used to calculate the residual life remaining in the pavement. Upon review of the deflectograph results provided by SERIS, the residual pavement life throughout the existing A96 for both eastbound and westbound carriageways was summarised and is presented in **Table 4.2.3** overleaf. These results indicate that 50% of the existing A96 has a residual life of greater than 20 years.

Residual Life (Years)	Percentage of Existing Carriageway Length (%)	Existing Carriageway Length (km)
<5	16	25
5 to 9	12	19
10 to 14	10	16
15 to 19	12	19
>19	50	80

Table 4.2.3 Estimated Residual Life throughout the existing A96

The information from SERIS indicates that half of the existing A96 corridor has a residual pavement life of greater than 20 years and around 38% of the route has less than 15 years life remaining.

The following table summarises the preliminary residual life, bituminous and granular thickness range for each subsection of the route from the data available on SERIS.

Section	Section Length (km)	Construction Type	Bituminous Range (mm)	Granular Range (mm)	Residual Life Average (Years)
Raigmore Interchange to Gollanfield	15	Fully Flexible	100 – 450	No Data	16
Gollanfield to Hardmuir Wood	16	Fully Flexible	140 – 295	225	19
Hardmuir Wood to Alves	17	Fully Flexible	190 – 360	No Data	16
Alves to Lhanbryde	19	Fully Flexible	105 – 475	100 - 250	11
Lhanbryde to west of Keith	14	Fully Flexible	100 – 360	No Data	15
West of Keith to west of Huntly*	15	Fully Flexible	40 – 360	200	23
West of Huntly to east of Huntly	11	Fully Flexible	100 – 320	180 - 200	24
East of Huntly to Old Rayne	16	Fully Flexible	120 – 240	210	30
Old Rayne to Kintore	23	Fully Flexible	45 – 270	No Data	25
Kintore to proposed junction with the AWPR	13	Fully Flexible	100 – 270	No Data	23

*Section 5 covers Fochabers Bypass, no SERIS data is available for Fochabers Bypass (Approx. 4km)

Table 4.2.4 Estimated Residual Life and Material Thickness for each subsection of the route

(c) Areas of Concern

A number of areas above have poor residual life and it would be advisable to undertake further intrusive analysis to confirm the condition of these sections. It should be noted that the 25km of route with less than 5 years residual life consists of areas throughout each of the subsections. If the further investigation confirms the condition of these areas to be poor, they should be considered as areas of priority when developing a structural maintenance design.

(d) Treatment Options

The existing pavement along the length of the existing A96 will require to be upgraded where the proposed route alignment overlaps the existing. A combination of various treatment options will be considered for such sections and new pavement construction will be required elsewhere.

Pavement upgrade and new design will be carried out in compliance with the following DMRB design standards:

- HD 26/06 (DMRB 7.2.3) – *'Pavement Design'*;
- HD 24/06 (DMRB 7.2.1) – *'Traffic Assessment'*;
- HD 29/08 (DMRB 7.3.1) – *'Data for Pavement Assessment'*;
- HD 30/08 (DMRB 7.3.3) – *'Maintenance Assessment'*; and
- TS2010 Surface Course Specification and Guidance.

Given that the SERIS deflectograph results indicate that a third of the existing A96 corridor has a residual life of less than 15 years it is inevitable that the majority of the existing route will need some form of treatment (where the proposed route alignment overlaps the existing). The following maintenance options have been identified as possible solutions for pavement interventions.

- **Inlay** – Involves removal of the surface and binder layers of the pavement and reinstatement of these layers with new material.
- **Full Reconstruction** – Full removal of all pavement layers with an appropriate new pavement constructed in its place.

Further detailed analysis of the existing route will be required in order to determine which type of treatment from the above list is suitable at a particular location. Furthermore, the options will apply to any future assessment of do-minimum options. For baseline assessment purposes, improving the residual life of the pavement could be considered along with other safety based interventions for the do-minimum options.

4.2.7 Structures

(a) Overview

The information on existing structures on the A96 has been taken from the Transport Scotland WebIRIS structures database. This section of the report summarises existing features of the major structures within the ten geographical subsections of improvement strategy Option B as outlined in **Table 3.4.1**.

The existing structures on the A96 between Inverness and Aberdeen are generally in good condition. The assessment results indicate that the major structures are generally capable of being upgraded to accommodate a second carriageway or are in a suitable location where a second parallel structure could be constructed.

However, five structures have been identified as potential constraints to the upgrade of the A96 to dual carriageway which either require demolition and reconstruction,

cross an environmentally designated river or could cause major disruption to the Aberdeen to Inverness Railway Line. Further assessment is required at DMRB Stage 2 Assessment to determine the appropriate method for each structure. However, in each case, consideration should also be given to bypassing these structures with an offline alignment if appropriate.

The High Load Grid is a collection of advisory routes (21 routes in total) covering Scotland which were developed by Transport Scotland to aid the movement of extremely high loads. They are aimed at assisting the haulage industry plan moves and ensuring routes are maintained to agreed capacities. The High Load Routes developed by Transport Scotland are classified as either 18ft (5.49m) or 20ft (6.10m) routes.

A review of the existing structures was undertaken to determine if they satisfy the headroom clearance required for a High Load Route. Seven structures were identified as having insufficient clearance for a High Load Route. Four of these structures are located on single carriageway or WS2+1 sections, but were also structures which were identified as having cross section constraints as discussed above. The three remaining structures are closely spaced on the dual carriageway section at Kintore and will require further assessment to determine whether a major intervention would be required to upgrade the available headroom at these structures or whether alternative options such as a local diversion route around these three structures may provide a more cost effective solution.

All new structures which pass over the A96 dual carriageway shall be designed with headroom to satisfy the requirements for a 20ft (6.10m) High Load Route as outlined in **Section 4.2.7(l)**.

Detailed information including description, condition and a comparison to standards is listed for both major and minor structures in **Appendix I**. The general approach of this review process for both dual and single carriageway sections are explained as follows:

- **Dual carriageway**: The available records have been reviewed to consider whether the existing structure provision is in accordance with current standards and a summary of the conclusions drawn for each structure is presented; and
- **Single carriageway**: Consideration has been given to the structure and its immediate location, with the objective of identifying any factors that may be significant in terms of dualling the A96; available records have also been reviewed to consider whether the existing structure provision is in accordance with current standards.

Sections B1 and B2 have been described below for completeness, however as noted in **Sections 3.4.2** and **3.4.3**, these two sections have been assessed as part of the A96 Dualling Inverness to Nairn (including Nairn Bypass) DMRB Stage 2 Assessment, with the preferred option for the scheme announced in October 2014.

It should be noted that, in the tables below, the dimensions given for 'Total Deck Width' are the dimensions between the inside faces of the parapets or other vehicle restraint systems where provided.

(b) Section B1: Raigmore Interchange to Gollanfield

In this section there are four bridges and seven culverts. Whilst the road in this section is primarily single carriageway, a short length of dual carriageway approximately 750m long extends eastwards from the A9 Raigmore Interchange to Seafield Roundabout on the A96. The major structures are summarised in **Table 4.2.5**.

(c) Section B2: Gollanfield to Hardmuir Wood

(i) Existing A96

In this section there are three bridges and two culverts (excluding structures on the A96 in Nairn). The road is single carriageway throughout. The major structures are summarised in **Table 4.2.6** overleaf.

(ii) Offline South of Nairn

This offline strategy to bypass Nairn requires a new bridge over the Aberdeen to Inverness Railway Line in addition to a river crossing of the River Nairn and several other smaller watercourses. Additional structures may also be required for side roads realigned as part of the scheme. The number and form of structure will be developed as part of the ongoing scheme development.

Structure	No. Spans	Span Lengths (m)			Total Span Length (m)	Total Deck Width (m)	Form of Construction	Review Summary
Stoneyfield 2 Rail (A96 590)	3	*10.9m skew*	*21.9m skew*	*10.9m skew*	43.7m skew	13.7m average	Integral weathering steel concrete composite deck	Designed for HA + 45HB.
Stoneyfield 1 Rail (A96 580)	1	*13m skew*	-	-	13m skew	14.9m	Filler joist slab deck	Designed for HA + 42.5HB. Assessed capacity HA + 45HB. Cross section width below single carriageway standard.
Screttan Burn (A96 570)	1	*3.1m clear*	-	-	3.1m clear	24.0m	Reinforced concrete slab deck	Design and assessed capacity HA + 45HB. Cross section width below single carriageway standard.
Morayston (A96 560)	1	*4.5m clear*	-	-	4.5m	15.2m	Concrete block arches either side of masonry arch	Assessed capacity BD21 ALL + 45HB. Cross section width below single carriageway standard.

Table 4.2.5 B1: Raigmore Interchange to Gollanfield Major Structures

Structure	No. Spans	Span Lengths (m)			Total Span Length (m)	Total Deck Width (m)	Form of Construction	Review Summary
Gollanfield Rail (A96 550)	1	*9.6m skew*	-	-	9.6m skew	64m	Precast pretensioned concrete beam and concrete infill deck	Designed for HA + 45HB. Assessed capacity BD21 ALL + 45HB. Cross section width below single carriageway standard.
Auchnacloich Burn (A96 528)	1	*3.2m*	-	-	3.2m	30m o/a length	Reinforced concrete box type structure	Designed for HA + 37.5HB. Assessed capacity BD21 ALL. Cross section width below single carriageway standard.
Auchnacloich Underpass (A96 526)	1	*3.9m*	-	-	3.9m	40m o/a length	Corrugated steel buried structure	Designed for HA + 45HB. Vehicle containment length below single carriageway standard.

Table 4.2.6 B2: Gollanfield to Hardmuir Wood Major Structures

(d) Section B3: Hardmuir Wood to Alves

(i) Existing A96

In this section there are three bridges and three culverts (excluding structures on the A96 in Forres). The road is single carriageway throughout. The major structures are summarised in **Table 4.2.7** overleaf.

(ii) Offline North

The offline strategy to bypass Forres to the north would potentially require two new bridges over the Aberdeen to Inverness Railway Line in addition to a large river crossing of the River Findhorn, a crossing of the Burn of Mosset and several other smaller watercourses. The strategy also intersects a number of existing roads and accesses. The requirement for bridges at these roads to maintain the existing connectivity or as part of grade separated junctions will be determined at DMRB Stage 2 through application of the junction strategy (**Section 4.2.8(l)**).

(iii) Offline South

The offline strategy to bypass Forres to the south would potentially require a large river crossing of the River Findhorn, a crossing of the Burn of Mosset and several other smaller watercourses. The strategy also intersects with a number of existing roads and accesses. The requirement for bridges at these roads to maintain the existing connectivity or as part of grade separated junctions will be determined at DMRB Stage 2 through application of the junction strategy (**Section 4.2.8(l)**).

(e) Section B4: Alves to Lhanbryde

(i) Existing A96

In this section there are two bridges, one culvert and two retaining walls (excluding structures on the A96 in Elgin). The road is single carriageway throughout. The major structures are summarised in **Table 4.2.8** overleaf.

(ii) Offline North

The offline strategy to the north of Elgin would potentially require a new bridge over the Aberdeen to Inverness Railway Line with a potential second crossing over the railway spur which heads north to Coltfield. The strategy to the north of Elgin would include a river crossing of the River Lossie and several other smaller watercourses. The strategy also intersects with a number of existing roads and accesses. The requirement for bridges at these roads to maintain the existing connectivity or as part of grade separated junctions will be determined at DMRB Stage 2 through application of the junction strategy (**Section 4.2.8(l)**).

(iii) Offline South

The offline strategy to the south of Elgin may also require a new bridge over the Aberdeen to Inverness Railway Line and a river crossing of the River Lossie and several other smaller watercourses. The strategy also intersects with a number of existing roads and accesses. The requirement for bridges at these roads to maintain the existing connectivity, or proposals to connect the roads to grade separated junctions will be determined at DMRB Stage 2 through application of the junction strategy (**Section 4.2.8(l)**).

Structure	No. Spans	Span Lengths (m)			Total Span Length (m)	Total Deck Width (m)	Form of Construction	Review Summary
Brodie (A96 520)	2	*15m skew*	*15m skew*	-	30m *skew*	10.9m	Precast pretensioned concrete beam and concrete infill deck	Designed for HA + 30HB. Assessed capacity BD21 ALL + 30HB. Cross section width below single carriageway standard.
Dalvie (A96 510)	1	*3.7m skew*	-	-	3.7m *skew*	15m	Reinforced concrete solid slab	Designed for HA + 45HB. Assessed capacity BD21 ALL + 30HB. Cross section width below single carriageway standard.
Findhorn (A96 500)	1	*90m skew*	-	-	90m *skew*	12.9m	Steel trussed open spandrel arch with reinforced concrete deck slab	Designed for HA + 45HB. Assessed capacity BD21 ALL + 30HB. Cross section width below single carriageway standard.

Table 4.2.7 B3: Hardmuir Wood to Alves Major Structures

Structure	No. Spans	Span Lengths (m)			Total Span Length (m)	Total Deck Width (m)	Form of Construction	Review Summary
Alves New Rail (A96 480)	1	*19.9m skew*	-	-	19.9m *skew*	12.3m	Precast prestressed concrete beam and slab	Designed for HA + 45HB. Cross section width below single carriageway standard.
Lhanbryde Farm Underpass (A96 430)	1	*5.3m*	-	-	5.3m	12.85m	Circular corrugated steel buried type structure	Designed for HA + 45HB. No verification of loading capacity.

Table 4.2.8 B4: Alves to Lhanbryde Major Structures

(f) Section B5: Lhanbryde to west of Keith

In this section there are eight bridges, six culverts and one retaining wall. The road is single carriageway throughout with the exception of a section of Mosstodloch Bypass and Fochabers Bypass both of which are WS2+1 cross section. The major structures are summarised in **Table 4.2.9** overleaf.

The main constraint in this section is Gordon Castle Main Driveway Bridge (**Figure 4.2.2** below) which the A96 passes underneath. The cross section of the A96 below this structure complies with current standards required for a WS2+1 carriageway, but there is insufficient width to accommodate a rural dual carriageway under the structure between abutments. Therefore, the structure would need to be demolished and replaced to accommodate an online upgrade of the A96.

Figure 4.2.2 Gordon Castle Main Driveway Bridge (looking westbound)

Structure	No. Spans	Span Lengths (m)			Total Span Length (m)	Total Deck Width (m)	Form of Construction	Review Summary
Rothes Road Underpass (A96 415)	1	*4m skew*	-	-	4m *skew*	20.9m	Reinforced concrete box type structure	Designed for HA + 45HB.
Inchberry Road Underpass (A96 412)	1	*5m clear*	-	-	5m *clear*	47.5m	Reinforced concrete box type structure	Designed for HA + 45HB.
Fochabers New (A96 410)	3	*46.7m*	*61m*	*12.2m*	119.9m	11.0m	2 spans of steel box girder + rc slab + 1 span of precast beam and concrete infill	Designed for HA + 45HB. Assessed capacity BD21 ALL + 40HB. Cross section width below single carriageway standard.
Gordon Castle Main Driveway Bridge (A96 408)	1	*18.5m clear*	-	-	18.5m *clear*	7.1m	Reinforced concrete deck	Designed for HA + 45HB.
Gordon Castle Farm Access and Bridge (A96 407)	3	*9.6m*	*9.6m*	*9.6m*	28.8m	18.5m	Solid slab construction	Designed for HA + 45HB.
Fochabers East Roundabout Underpass (A96 406)	1	*3m*	-	-	3m	21.1m	Reinforced concrete box type structure	Designed for HA + 45HB.
Drumlachs Underpass (A96 405)	1	*3m*	-	-	3m	20.7m	Reinforced concrete box type structure	Designed for HA + 45HB.
Rumbuch (A96 400)	1	*4.5m*	-	-	4.5m	12.6m	Masonry arch construction with reinforced concrete slab extensions	Strengthened for HA. Original masonry arch assessed for 35HB and new concrete extensions for 45HB. Cross section width below single carriageway standard.

Table 4.2.9 B5: Lhanbryde to west of Keith Major Structures

Figure 4.2.3 Fochabers New Bridge (south elevation)

The Fochabers New Bridge, shown in **Figure 4.2.3** above, is the most significant bridge in this section with an overall length of approximately 120m and carrying the A96 over the River Spey which is a SAC. Careful consideration is required for the optimum solution for accommodating a dual carriageway section in this highly constrained area including options to widen the existing deck and substructure and also a twin parallel deck solution which involves the construction of a new parallel but separate bridge to carry the second carriageway.

(g) Section B6: West of Keith to west of Huntly

(i) Existing A96

In this section there are four bridges and six culverts (excluding structures on the A96 in Keith). The road is single carriageway throughout. The major structures are summarised in **Table 4.2.10** overleaf.

(ii) Offline South

The offline section to bypass Keith to the south would potentially require a new bridge over the Aberdeen to Inverness Railway Line as well as a bridge over the Keith to Dufftown tourist railway. Bridges will be required where the strategy crosses the Loan Burn and the River Isla as well as at other minor watercourses. The strategy also intersects with a number of existing roads and accesses. The requirement for bridges at these roads to maintain the existing connectivity, or proposals to connect the roads to grade separated junctions will be determined at DMRB Stage 2 through application of the junction strategy (**Section 4.2.8(l)**).

Structure	No. Spans	Span Lengths (m)			Total Span Length (m)	Total Deck Width (m)	Form of Construction	Review Summary
Bogbain (A96 390)	1	*7.7m clear*	-	-	7.7m *clear*	11.5m	Reinforced concrete box type structure	Designed for HA + 30HB. Cross section width below single carriageway standard.
Coachford Underpass (A96 345)	1	*9m clear*	-	-	9m *clear*	17.6m	Reinforced concrete box type structure	Designed for HA + 45HB.
Cairnie (A96 340)	1	*4.9m clear*	-	-	4.9m *clear*	17.2m	Reinforced concrete box type structure	Designed for HA + 45HB. Assessed capacity BD21 ALL + 31HB. Cross section width below single carriageway standard.
Bogmoor (A96 330)	1	*3.2m skew*	-	-	3.2m *skew*	12.2m	Reinforced concrete slab deck	Designed for HA + 40HB. Assessed capacity BD21 ALL + 40HB. Cross section width below single carriageway standard.

Table 4.2.10 B6: West of Keith to west of Huntly Major Structures

(h) Section B7: West of Huntly to east of Huntly

In this section there are five bridges, one culvert and one retaining wall. The road is single carriageway throughout. The major structures are summarised in **Table 4.2.11** overleaf.

The Huntly Rail Overbridge (**Figure 4.2.4** below) carries the Aberdeen to Inverness Railway Line over the A96 with the structure owned and maintained by Network Rail. The cross section of the A96 through this structure does not meet the current standards required for a single carriageway. This structure could not be readily extended to accommodate a dual carriageway cross section due to the severe disruption this would cause to the railway. As such, this structure may restrict opportunities for online improvement works in this area.

Figure 4.2.4 Huntly Rail Overbridge (looking eastbound)

(i) Section B8: East of Huntly to Old Rayne

In this section there are five bridges and three culverts. The road is single carriageway throughout. The major structures are summarised in **Table 4.2.12**.

Structure	No. Spans	Span Lengths (m)			Total Span Length (m)	Total Deck Width (m)	Form of Construction	Review Summary
Deveron (A96 320)	1	*18.8m skew*	-	-	18.8m *skew*	12.2m	Steel concrete composite deck	Designed for HA + 45HB. Cross section width below single carriageway standard.
Meadowburn Underpass (A96 310)	1	*5.0m clear*	-	-	5.0m clear	20.6m	Reinforced concrete solid slab deck	Designed for HA + 45HB. Cross section width below single carriageway standard.
Bogie (A96 300)	1	*36.9m skew*	-	-	36.9m skew	11.0m	Steel concrete composite deck	Designed for HA + 45HB. Cross section width below single carriageway standard.
Huntly Rail Overbridge (A96 290)	1	*32m*	-	-	32m	14.6m	Steel plate through girder	No record of load carrying capacity. Cross section width below single carriageway standard.
Thaines Burn (A96 280)	1	*3.2m*	-	-	3.2m	13.2m	Corrugated steel buried structure	Designed for HA + 45HB. No verification of loading capacity.

Table 4.2.11 B7: West of Huntly to east of Huntly Major Structures

Structure	No. Spans	Span Lengths (m)			Total Span Length (m)	Total Deck Width (m)	Form of Construction	Review Summary
Agricultural Underpass (A96 275)	1	*5.3m clear*	-	-	5.3m *clear*	17m	Integral portal structure with a reinforced concrete deck	Designed for HA.
Whinbrae Underpass (A96 270)	1	*4.5m clear*	-	-	4.5m *clear*	17.6m	Reinforced concrete box type structure	Designed for HA + 45HB.
Bainshole (A96 260)	1	*6.1m clear*	-	-	6.1m *clear*	11.8m	Reinforced concrete slab deck	Designed for HA + 40HB. Assessed capacity BD21 ALL + 21HB. Cross section width below single carriageway standard.
Kellock (A96 250)	1	*3.8m clear*	-	-	3.8m *clear*	15.0m	Reinforced concrete portal type structure	Designed for HA + 45HB. Assessed capacity BD21 ALL + 45HB. Cross section width below single carriageway standard.
Shevock (A96 240)	1	*6.7m clear*	-	-	6.7m *clear*	14.9m	Reinforced concrete deck slab	Designed for HA + 45HB. Assessed capacity BD21 ALL + 45HB. Cross section width below single carriageway standard.

Table 4.2.12 B8: East of Huntly to Old Rayne Major Structures

(j) Section B9: Old Rayne to Kintore

(i) Inner (Existing A96)

In this section there are 15 bridges, six culverts and three retaining walls. The road is single carriageway north of the junction with the B993 and dual carriageway south of the junction with the B993. The major structures are summarised in **Table 4.2.13** overleaf.

Inveramsay Rail Overbridge (**Figure 4.2.5** below) carries the Aberdeen to Inverness Railway Line over the A96 with the structure owned and maintained by Network Rail. The structure is currently substandard both in terms of headroom and carriageway width, with the traffic restricted to a single lane controlled by traffic signals. The bridge will be superceded by a new single carriageway rail underbridge currently under construction carrying the A96 over the railway and includes a short offline realignment of the A96 (refer to **Section 1.7**). Constraints in this area (refer to **Section 4.2.1(l)** and **Section 4.2.4(c)(ix)**) are likely to restrict opportunities for online improvement works in this area including the new Inveramsay Bridge.

Figure 4.2.5 Inveramsay Bridge

Upperboat Overbridge (**Figure 4.2.6**) is located on the existing Inverurie Bypass and is a three-span structure carrying a local road over the A96. The cross section of this structure complies with current standards required for a single carriageway. However, the leaf piers adjacent to the back of the verge restrict the cross section which is insufficient to accommodate a rural dual carriageway cross section. This may restrict opportunities for online improvements in this section unless the structure is demolished and rebuilt or an alternative split carriageway arrangement is adopted with a second bridge built to the side of the existing structure, along the line of the existing local road.

Structure	No. Spans	Span Lengths (m)				Total Span Length (m)	Total Deck Width (m)	Form of Construction	Review Summary
Carden (A96 230)	2	*5.4m clear*	*5.4m*	-	-	10.8m *clear*	9.3m min	Masonry arch and concrete arch	Designed for HA + 45HB. Assessed capacity BD21 ALL + 45HB. Cross section width below single carriageway standard.
Inveramsay Rail Overbridge (A96 220)	1	*12m skew*	-	-	-	12m skew	9.6m	Masonry arch structure	No record of load carrying capacity. Cross section width below single carriageway standard.
Inveramsay Underpass (A96 210)	1	*3.8m clear*	-	-	-	3.8m *clear*	14.3m	Reinforced concrete box type structure	Designed for HA + 45HB.
Strathnaterick (A96 200)	1	*3.2m clear*	-	-	-	3.2m *clear*	13.9m	Circular corrugated steel buried type structure	Designed for HA + 45HB.
Drimmies Farm Underpass (A96 190)	1	*4.5m clear*	-	-	-	4.5m *clear*	12.4m	Reinforced concrete box type structure	Designed for HA + 45HB.
Conglas Cattle Underpass (A96 180)	1	*3.8m clear*	-	-	-	3.8m *clear*	21.2m	Reinforced concrete box type structure	Designed for HA + 45HB.
Inverurie Underpass (A96 175)	1	*5m clear*	-	-	-	5m *clear*	13.2m	Reinforced concrete box type structure	Designed for HA + 45HB. Cross section width below single carriageway standard.
Inverurie Golf Underpass (A96 170)	1	*4.5m clear*	-	-	-	4.5m *clear*	14.3m	Reinforced concrete box type structure	Designed for HA + 45HB.
Upperboat Overbridge (A96 160)	3	*11m*	*12.2m*	*8.9m*	-	32.1m	11.3m	Steel concrete composite deck type structure	Designed for HA + 30HB.
Don Inverurie New (A96 150)	4	*25m*	*42.5m*	*42.5m*	*30m*	140m	11.3m	Steel concrete composite deck type structure	Designed for HA + 45HB. Cross section width below single carriageway standard.
Quarry Road Interchange (A96 140)	1	*12.3m clear*	-	-	-	12.3m *clear*	26.1m	Reinforced concrete box type structure	Designed for HA + 45HB.

Structure	No. Spans	Span Lengths (m)				Total Span Length (m)	Total Deck Width (m)	Form of Construction	Review Summary
Forrest Road Overbridge (A96 130)	2	*16.2m*	*17.9m*	-	-	34.1m	12.3m	Reinforced concrete cast insitu solid slab deck type structure	Designed for HA + 45HB.
Castle Road Underpass (A96 120)	1	*4m clear*	-	-	-	4m *clear*	35m	Reinforced concrete box type structure	Designed for HA + 45HB.
Dunnecht Road Overbridge (A96 110)	2	*18.7m skew*	*18.7m skew*	-	-	37.4m *skew*	15.5m	Reinforced concrete cast insitu solid slab deck type structure	Designed for HA + 30HB.
Kemnay Road Overbridge (A96 100)	2	*23.3m*	*23.3m*	-	-	46.6m	11.3m	Reinforced concrete cast insitu voided deck type structure	Designed for HA + 30HB.

Table 4.2.13 B9: Old Rayne to Kintore Major Structures

Figure 4.2.6 Upperboat Overbridge on Inverurie Bypass (eastbound)

The Don Inverurie New Bridge (**Figure 4.2.7** below) is the longest bridge (140m) on the existing road and is a four span structure crossing the River Don carrying the single carriageway A96. It is considered that this structure could be readily extended to carry a second carriageway. The widening could be undertaken to the west due to the presence of local housing to the north-east.

Figure 4.2.7 Don Inverurie New Bridge on Inverurie Bypass (west elevation)

The existing dual carriageway contains five major structures in this section. A review of these structures indicates that the structures are generally in good condition and comply with current standards including cross section, loading and vehicle containment. The major structures include three overbridges which carry local roads over the A96. The typical form of these structures is shown in **Figure 4.2.8** overleaf. The headroom to the overbridges is discussed in **Section 4.2.7(l)**.

(ii) Offline North

The offline strategy to the north of Inverurie would potentially require two new bridges over the Aberdeen to Inverness Railway Line. The strategy to the north of Inverurie would include a river crossing of the River Urie, a large crossing of the River Don and its floodplain and several other smaller watercourses. The strategy also intersects with a number of existing roads and accesses. The requirement for bridges at these roads to maintain the existing connectivity or as part of grade separated junctions will be determined at DMRB Stage 2 through application of the junction strategy (**Section 4.2.8(l)**).

Figure 4.2.8 Kemnay Road Overbridge at Kintore

(iii) Offline South

The offline strategy to the south of Inverurie would potentially require a new bridge over the Aberdeen to Inverness Railway Line in addition to a large crossing of the River Don and several other smaller watercourses. The strategy also intersects with a number of existing roads and accesses. The requirement for bridges at these roads to maintain the existing connectivity or as part of grade separated junctions will be determined at DMRB Stage 2 through application of the junction strategy (**Section 4.2.8(l)**).

(k) Section B10: Kintore to the proposed junction with the AWPR

In this section there are four bridges. The road is dual carriageway throughout. The major structures are summarised in **Table 4.2.14** overleaf.

Structure	No. Spans	Span Lengths (m)			Total Span Length (m)	Total Deck Width (m)	Form of Construction	Review Summary
Boghead Farm Underpass (A96 90)	1	*4.6m clear*	-	-	4.6m *clear*	38m	Reinforced concrete box type structure	Designed for HA + 45HB.
Kinellar Road Overbridge (A96 80)	2	*17.5m*	*17.5m*	-	35m	10.0m	Reinforced concrete cast insitu solid slab deck type structure	Designed for HA + 30HB.
Black Burn New (A96 70)	1	*4.1m skew*	-	-	4.1m *skew*	28.3m	Corrugated steel pipe arch type structure	Designed for HA + 45HB.
Bishopston Farm Underpass (A96 60)	1	*5.7m clear*	-	-	5.7m *clear*	33.6m	Reinforced concrete box type structure	Designed for HA + 45HB.

Table 4.2.14 B10: Kintore to Proposed Junction with the AWPR Major Structures

(l) High Load Strategy

The High Load Grid is a collection of advisory routes (21 routes in total) covering Scotland which were developed by Transport Scotland to aid the movement of extremely high loads. They are aimed at assisting the haulage industry plan moves and ensuring routes are maintained to agreed capacities. The High Load Routes developed by Transport Scotland are classified as either 18ft (5.49m) or 20ft (6.10m) routes.

The A96 from Raigmore Interchange at Inverness to the junction with the A95 at Keith is part of the existing High Load Grid Route 19 which runs from Fraserburgh Harbour to Inverness and is classified as an 18ft route. The remainder of the A96 between Keith and Aberdeen does not form part of the High Load Grid. High Load Grid Route 19 terminates at Fraserburgh Harbour where it connects to High Load Grid Route 18 between Fraserburgh Harbour and Aberdeen Harbour, which is also an 18ft route. The grid continues south to the Central Belt via Route 17 from Aberdeen Harbour to Perth also as an 18ft route.

The proposed AWPR will link Routes 17 and 18. The section of the proposed AWPR between Charleston to the south of Aberdeen and Blackdog to the north has been designated as a 20ft High Load Route. The Fastlink section of the AWPR will not form part of the High Load Grid. At the Inverness end, the A96 connects to High Load Grid Route 16 between Perth and Inverness (18ft) to the south and High Load Grid Route 20 between Inverness and Invergordon (18ft) to the north. The grid continues north via Route 21 which has an unlimited height between Invergordon and Scrabster.

It is an aspiration that the entire length of the A96 Trunk Road is upgraded to a 20ft High Load Route as part of the A96 Dualling Programme. New construction headroom for overbridges on trunk roads is outlined in the DMRB standard TD 27/05 *Cross Sections and Headroom* and is noted in **Table 4.2.15** below.

Type of Structure	New Construction Headroom (m)	Maintained Headroom (m)
All Permanent Structures over High Load Routes	6.45 + S	6.18 + S

Where S = Sag Curve Compensation in accordance with Table 6-2 of TD 27/05

Table 4.2.15 Minimum Headroom for Structures over High Load Routes

Where the road passing under a structure is on a sag curve, the standard headroom in **Table 4.2.15** must be increased in accordance with the requirements of TD 27/05 to allow for Sag Curve Compensation. In addition, allowances must be made for the deflection of the structure. For existing structures which are to be incorporated into the upgrade to dual carriageway, the headroom requirements are governed by the maintained headroom which is also given in **Table 4.2.15** above.

A review of the existing structures within each of the subsections of Improvement Strategy Option B has been undertaken to determine the current headroom at structures which pass over the A96. The structures which have been identified as having less than the minimum maintained headroom for existing structures are noted in **Table 4.2.16** overleaf.

Section	A96 Cross Section	Structure	No. Spans	Current Headroom (m)
B5: Lhandbryde to west of Keith	WS2+1	Gordon Castle Main Driveway Bridge (A96 408)	1	5.7
B6: West of Huntly to East of Huntly	Single carriageway	Huntly Rail Overbridge (A96 290)	1	5.18
B9: Old Rayne to Kintore	Single carriageway	Inveramsay Rail Overbridge (A96 220)	1	4.75
B9: Old Rayne to Kintore	Single carriageway	Upperboat Overbridge (A96 160)	3	5.37
B9: Old Rayne to Kintore	Dual carriageway	Forrest Road Overbridge (A96 130)	2	5.62
B9: Old Rayne to Kintore	Dual carriageway	Dunnecht Road Overbridge (A96 110)	2	5.56
B9: Old Rayne to Kintore	Dual carriageway	Kemnay Road Overbridge (A96 100)	2	5.52

Table 4.2.16 Existing A96 Bridges within Option B which have less than the required High Load Route Maintained Headroom

Of the seven structures identified which have headroom less than the required for a high load route, three are located on single carriageway sections and another on a WS2+1 cross section, all of which the structural form will constrain the available cross section to accommodate a dual carriageway. As such, it is likely that a major intervention will be required at these structures to accommodate a rural dual carriageway cross section or alternatively an offline alignment will be required to bypass these structures (refer to **Sections 4.2.7(f)**, **4.2.7(h)** and **4.2.7(k)**). Inveramsay Rail Overbridge is due to be replaced with a new single carriageway rail underbridge carrying the A96 over the railway and includes a short offline realignment of the A96 (refer to **Section 1.7**).

The remaining three dual carriageway structures are all located within a 2km section of the A96 as it bypasses Kintore. Careful consideration will be required to determine whether a major intervention would be needed to upgrade the available headroom at these structures or whether alternative options such as a local diversion route around these three structures may provide a more cost effective solution.

4.2.8 Junctions and Accesses

(a) Overview

This section of the report considers the proposed junction strategy and junction locations when dualling the A96. A review of the existing A96 was undertaken to identify and classify the existing junctions and accesses along the route. The existing grade separated junctions were assessed to determine if they comply with the current DMRB design standards. The proposed standards of the junctions were also examined before a design strategy was created to assist in deciding on the proposed junction locations and to ensure a consistent approach is adopted for the A96 Dualling Programme.

An assessment of the existing grade separated junctions was undertaken, including assessment of design standards. This identified that some aspects of the existing

grade separated junctions do not comply with current design standards and additional investigatory work is required to determine if these aspects of the junctions require improvements as part of the A96 Dualling Programme.

A broad strategy has been developed for the treatment of existing junctions and accesses along the A96. The general principles of the strategy involve the creation of a Category 7A dual carriageway which includes grade separation of junctions where possible, rationalisation of the number of direct accesses and junctions, and no gaps in the central reserve. The proposed strategy provides a process to follow to determine the junction provision taking into account the existing A, B, C class and unclassified roads. This process takes into account the environmental effects of local road crossing or diversions.

The strategy considers the junction and accesses in four tiers as follows:

- Tier 1 – A Class roads;
- Tier 2 – B and C Class road;
- Tier 3 – Unclassified roads; and
- Tier 4 – Private and Agricultural access roads.

A decision process chart based on the four tiers has been produced for the strategy to set a framework for the decision process for the assessment of the provision of junctions. The strategy ensures that the engineering, stakeholder consultation and environmental impacts are considered as part of the junction decision process through the use of assessment matrices for each tier of road.

The proposed junction strategy shall be applied to the developing route options during the DMRB Stage 2 Assessment to determine the preliminary location of the grade separated junctions to achieve the aspiration for a Category 7A road standard. However, the strategy recognises that site specific constraints and environmental impacts may prohibit absolute Category 7A provision throughout the route and where constraints are significant it is proposed that route category and junction provision should be considered on a site specific basis, with due regard to the wider dualling programme strategy and provision.

In addition, the high number of junctions and accesses along the A96 may require long lengths of new parallel local roads or access tracks to retain access to the local roads, individual properties, farms and businesses while achieving the aim of the strategy to rationalise the number of junctions onto the proposed dual carriageway. In such cases, it may be preferable to develop the proposed dual carriageway alignment locally offline within the existing A96 corridor and retain the existing A96 as part of the local road network and maintain existing accesses.

Detailed traffic analysis and modelling of the network shall be required to appropriately assess the impact of the preliminary junction locations on mainline traffic flows and the surrounding network and determine the optimum location of junctions along the route.

The A96 between Inverness and Aberdeen has approximately 600 junctions and accesses along the route, excluding those within the main urban centres of Nairn, Forres, Elgin and Keith. Junctions include grade separated, left in/left out, at-grade major and minor junctions as well as field accesses. The junctions provide access to other road networks, private accesses and agricultural access. This section

describes the current provision and standard of junctions on the A96 route. A summary of the junction types on the existing A96 can be seen below in **Table 4.2.17** below.

Junction Type	No of Junctions
Grade Separated Junction	3
Roundabout	18
Left in/Left out Junction	6
Dualling T-Junction	4
Dualling Staggered Junction	1
Ghost Island Crossroads Junction	1
Ghost Island Staggered Junction	11
Ghost Island T-Junction	28
Simple Crossroads Junction	2
Simple Staggered Junction	1
Simple T-Junction	60
Direct Access (Excluding field access)	232
Direct Access (Field)	233
TOTAL	**600**

Table 4.2.17 Existing Junctions and Accesses by Type (excluding those within the main urban centres of Nairn, Forres, Elgin and Keith)

Two examples of junctions on the A96 can be seen below in **Figure 4.2.9** and **Figure 4.2.10** overleaf.

Figure 4.2.9 Ghost Island staggered junction at Saddle Hill

Figure 4.2.10 Grade separated junction at Kintore

A summary of the number of junctions and accesses within each section are presented in **Table 4.2.18** below.

Section		Road Classification					Comments
		A	B	C	Un	Access	
B1	Raigmore Interchange to Gollanfield	1	2	14	1	64	
B2	Gollanfield to Hardmuir Wood	0	3	5	3	45	Excludes junctions/accesses within Nairn.
B3	Hardmuir Wood to Alves	0	1	18	4	49	Excludes junctions/accesses within Forres
B4	Alves to Lhanbryde	0	1	9	2	24	Excludes junctions/accesses within Elgin
B5	Lhanbryde to west of Keith	1	3	3	2	53	
B6	West of Keith to west of Huntly	0	3	6	2	39	Excludes junctions/accesses within Keith
B7	West of Huntly to east of Huntly	4	1	5	3	53	
B8	East of Huntly to Old Rayne	1	1	4	0	92	
B9	Old Rayne to Kintore	0	3	7	2	46	
B10	Kintore to proposed junction with the AWPR	0	6	1	5	8	
Total per road classification		**7**	**24**	**72**	**24**	**473**	
TOTAL		**600**					

Table 4.2.18 Summary of Existing A96 Junctions and Accesses (excluding junctions in Nairn, Forres, Elgin and Keith)

The following sections provide details of the existing A96 junctions with A class and B class roads and for the purposes of this assessment are considered primary junctions. Furthermore, any additional roundabouts which are with C class or private accesses are also noted in the following tables. All existing dual carriageway junctions, regardless of class are included. In addition, sections B1 and B2 have been described below for completeness, however as noted in **Sections 3.4.2** and **3.4.3**, these two sections have been assessed as part of the A96 Dualling Inverness to Nairn (including Nairn Bypass) DMRB Stage 2 Assessment, with the preferred option for the scheme announced in October 2014.

(b) Section B1: Raigmore Interchange to Gollanfield

The primary junctions in this section are shown in **Table 4.2.19** and **Table 4.2.20** below.

Road	Name	Location	Junction Description
A9	Raigmore Interchange	Inverness	Grade Separated Junction
Commercial Access	Access to Stoneyfield Business Centre & Hotels	Stoneyfield	Left in/Left out simple T-junction
Commercial Access	Seafield Roundabout	Seafield	Roundabout

Table 4.2.19 Raigmore Interchange to Smithton: Existing A96 Dual Carriageway Primary Junctions

Road	Name	Location	Junction Description
C Road	Smithton Roundabout	Smithton	Roundabout
B9039	Castle Stuart Junction	Newton	Simple T-Junction
C Road	Inverness Airport Roundabout	Dalcross	Roundabout
B9006/ B9090	Ardersier – Cawder Staggered Junction	Gollanfield	Ghost Island Staggered Junction

Table 4.2.20 Smithton to Gollanfield: Existing A96 Single Carriageway Primary Junctions

(c) Section B2: Gollanfield to Hardmuir Wood

The primary junctions in this section are shown in **Table 4.2.21** below.

Road	Name	Location	Junction Description
B9092	Ardersier Junction	Delnies	Ghost Island T-Junction
B9111	Auldearn Junction (W)	Auldearn	Ghost Island Staggered Junction
B9101	Auldearn Junction (E)	Auldearn	Simple T-Junction

Table 4.2.21 Gollanfield to Hardmuir Wood: Existing A96 Primary Junctions

In addition, this section includes an offline bypass to the south of Nairn. There are a number of radial routes from Nairn which the bypass intersects, including the A939, B9091, B9090 and B9111.

(d) Section B3: Hardmuir Wood to Alves

The primary junctions in this section, excluding those within Forres are shown in **Table 4.2.22** below.

Road	Name	Location	Junction Description
B9011	Findhorn Roundabout	Forres	Roundabout
Commercial Access	Tarras Roundabout	Tarras	Roundabout

Table 4.2.22 Hardmuir Wood to Alves: Existing A96 Primary Junctions

The primary roads potentially interfacing with the offline bypass strategies to the north and south of Forres are discussed in the sections below.

Offline bypass to the north of Forres

The primary road to the north of Forres is the B9011 linking Forres to Kinloss.

Offline bypass to the south of Forres

The primary roads to the south of Forres are the A940 and B9010.

(e) Section B4: Alves to Lhanbryde

The primary junctions in this section, excluding those within Elgin are shown in **Table 4.2.23** below.

Road	Name	Location	Junction Description
B9013	Burghead Junction	Newton, Elgin	Ghost Island T-Junction
B9103	Sheriffston Junction	Sheriffston, Elgin	Ghost Island Staggered Junction
C Road	Lhanbryde Roundabout (W)	Lhanbryde	Roundabout
C Road	Lhanbryde Roundabout (E)	Lhanbryde	Roundabout

Table 4.2.23 Alves to Lhanbryde: Existing A96 Primary Junctions (excluding junctions within Elgin)

The description of the northern and southern offline bypasses of Elgin are discussed in the following sections.

Offline bypass to the north of Elgin

There are two radial routes heading out of Elgin to the north with the A941 and B9012 as well as the B9013 and B9103 which meet the A96 to the west and east of Elgin respectively.

Offline bypass to the south of Elgin

An offline strategy to the south of Elgin would intersect the A941 and the B9010.

(f) Section B5: Lhanbryde to west of Keith

The primary junctions in this section are shown in **Table 4.2.24** below.

Road	Name	Location	Junction Description
B9015	Cowfords Roundabout	Cowfords, Mosstodloch	Roundabout
B9015	Coul Brae Roundabout	Mosstodloch	Roundabout
B9104	Spey Bay Roundabout	Fochabers	Roundabout
A98/ B9104	Fochabers East Roundabout	Fochabers	Roundabout

Table 4.2.24 Lhanbryde to west of Keith: Existing A96 Primary Junctions

(g) Section B6: West of Keith to west of Huntly

The primary junctions in this section, excluding those in Keith, are shown in **Table 4.2.25** below. In addition, there are numerous field accesses and direct access to adjacent or roadside properties on both approaches to Keith with the exception of the two climbing lane sections.

Road	Name	Location	Junction Description
B9016	Buckie Junction	Crooksmill, Keith	Ghost Island T-Junction
B9017	Newmill Junction	Crooksmill, Keith	Simple T-Junction
B9115	Drummuir Junction	Newtack	Simple T-Junction

Table 4.2.25 West of Keith to west of Huntly: Existing A96 Primary Junctions (excluding junctions in Keith)

The strategy for the offline bypass to the south of the town is likely to intersect with the A95 and B9014.

(h) Section B7: West of Huntly to east of Huntly

The primary junctions in this section are shown in **Table 4.2.26** below. In addition, there are numerous field accesses and direct access to adjacent or roadside properties between the Bin Hill and Huntly Bypass and then again between the A97 Banff junction and the eastern extent of this section.

Road	Name	Location	Junction Description
B9022	Portsoy Junction	Huntly	Simple T-Junction
A920	Huntly Junction	Huntly	Ghost Island Staggered Junction
A97	Huntly Roundabout	Huntly	Roundabout
A97	Huntly Junction	Huntly	Ghost Island T-Junction
A97	Banff Junction	Huntly	Ghost Island T-Junction

Table 4.2.26 West of Huntly to east of Huntly: Existing A96 Primary Junctions

(i) Section B8: East of Huntly to Old Rayne

The primary junctions in this section are shown in **Table 4.2.27** below.

Road	Name	Location	Junction Description
A920	Colpy Junction	Colpy	Ghost Island T-Junction
B992	Insch/ Auchterless	Williamston	Ghost Island Staggered Junction

Table 4.2.27 East of Huntly to Old Rayne: Existing A96 Primary Junctions

(j) Section B9: Old Rayne to Kintore

Inverurie Bypass (Inner)

The primary junctions along this section are shown in **Table 4.2.28** and **Table 4.2.29** below.

Road	Name	Location	Junction Description
B9002	Oyne Fork	Oyne	Simple T-Junction
B9170	Blackhall Roundabout	Inverurie	Roundabout

Table 4.2.28 Old Rayne to Port Elphinston Roundabout south of Inverurie: Existing A96 Single Carriageway Primary Junctions

Road	Name	Location	Junction Description
B993	Port Elphinstone Roundabout	Port Elphinstone, Inverurie	Roundabout
C Road	Thainstone Roundabout	Thainstone	Roundabout
C Road	Clovenstone Junctions		Left in/Left out simple T-junction.
Private	Access to Kintore Business Park	Kintore	Left in/Left out simple T-junction.

Table 4.2.29 Port Elphinstone Roundabout south of Inverurie to Kintore: Existing A96 Dual Carriageway Primary Junctions

In addition to the junctions listed in **Table 4.2.29**, the existing dual carriageway section contains a left in/left out direct access and a left in/left out field access, both of which are located between the Port Elphinstone Roundabout south of Inverurie and Thainstone Roundabout.

Futhermore, the Inverurie South Development Framework[8] sets out the proposed development framework for development sites adjacent to the A96 to the south of Inverurie and specifically sites at Crichie, the Thainstone Auction Mart and Kirkwood Commercial Park. As part of this framework, a new grade separated junction is proposed on the A96 which will be located between the Thainstone and Port Elphinstone roundabouts. To facilitate the grade separated junction, the A96 Thainstone and Port Elphinstone roundabouts would be removed.

[8] Crichie Developments Ltd, Inverurie South, Development Framework, Wardell Armstrong 2012

Inverurie Bypass (North)

The primary roads to the north of Inverurie are the B9001, B9170 and B993.

Inverurie Bypass (South)

The primary roads to the south of Inverurie are the B9002 and B993.

(i) Section B10: Kintore to proposed junction with the AWPR

The existing A96 is dual carriageway in this section, with two grade separated junctions and further at-grade junctions as shown in **Table 4.2.30** below.

Road	Name	Location	Junction Description
B987	Tavelty Junction	Kintore	Grade Separated Junction
B977	Gauchhill Junction	Kintore	Grade Separated Junction
B987	Broomhill Roundabout	Kintore	Roundabout
B973	Kinellar Roundabout	Muir of Kinellar	Roundabout
B973	Clinterty Roundabout	Blackburn	Roundabout
B979	Kirkton of Skene Junction	Tyrebagger	Dualling T-Junction
C Class	Chapel of Stoneywood Junction,	Tyrebagger	Dualling Staggered Junction

Table 4.2.30 Kintore to proposed junction with the AWPR: Existing A96 Dual Carriageway Primary Junctions

In addition to the junctions listed in **Table 4.2.30**, direct left in/left out accesses to Marshall's Farm shops are provided on both carriageways between Broomhill and Kinellar Roundabout.

There are an additional eight direct farm or forestry accesses which include central reserve openings on the section between Tyrebagger Hill and the proposed junction with the AWPR.

Under the AWPR scheme (refer to **Section 1.7**), a new grade separated junction will be provided to cater for all traffic movements between the AWPR and the A96 Trunk Road. The grade separated junction will be located to the south of the A96 and a dual-carriageway link road will connect the junction to a large signal controlled roundabout to be constructed on the A96. Slip roads are to be provided at the AWPR to connect to the link road which will continue below the AWPR to connect to the Chapel of Stoneywood to Fairley Road to the west. The grade separated junction is a diamond layout in accordance with the DMRB guidance, TD 22/06 *Layout of Grade Separated Junctions*.

The Chapel of Stoneywood Junction is a staggered junction with an unclassified road to the north of the A96 and the C89C Chapel of Stoneywood to Fairley Road to the south of the A96. The junction between the Chapel of Stoneywood to Fairley Road and the A96 will be closed under the AWPR scheme. However, the unclassified road to the north of the A96 will remain open. The right turn movement out of the local road will be prohibited (side road to A96 westbound), with the central reserve remaining open to permit a right turn movement from the A96 westbound into the local road.

(k) Junction Standards

(i) Existing Grade Separated Junctions

As the proposed junction standard for the A96 Dualling Programme is grade separation, a junction assessment has only been carried out on the current dual sections of the route as no junctions or access on the existing single carriageway sections will be used in their current form. The assessment identified the types of existing junctions and the relevant DMRB design standards.

The assessment shown in **Table 4.2.31** overleaf, identified the types of existing junctions, the junction dimensions and whether the dimensions complied with current DMRB design standards. Further detailed analysis will take place as part of the DMRB Stage 2 Assessment.

The grade separated junctions along the dualled A96 sections were assessed to determine their compliance with DMRB standards. These can be seen in **Table 4.2.31** overleaf and will be reviewed further in DMRB Stage 2 Assessment.

The existing A9 Raigmore Interchange at Inverness and the proposed junction with the AWPR at Aberdeen are outside of the scope of the A96 Dualling Programme and have not been assessed as part of this commission.

Junction Name	Junction Layout	Slip Road	Loop Radius (m)	Merge / Diverge Details				
				Merge/ Diverge Taper (m)	Merge Nose Ratio	Diverge Nose Ratio	Merge Nose Length (m)	Diverge Nose Length (m)
			min. 50m diverge/min. 30m merge	min. 150m	min. 1:30	min. 1:15	min. 85m	min. 70m
Tavelty Junction	'Dumb-bell'	EB Merge	n/a	231.6	41.7	-	87.5	-
		EB Diverge	n/a	143.3	-	10.0	-	39.9
		WB Merge	n/a	307.3	78.9	-	90.7	-
		WB Diverge	n/a	295.9	-	29.0	-	81.2
Gauchhill Junction	Half Diamond	EB Merge	n/a	234	58.4	-	128.5	-
		EB Diverge	n/a	206.6	-	22.7	-	100

Table 4.2.31 Grade Separated Junction Assessment (non-compliance with current DMRB standards shown in red)

(ii) Proposed Standard

As outlined in **Section 4.2.4**, the A96 will be designed as a Category 7A All-Purpose Dual Carriageway, which in accordance with the DMRB requires the provision of grade separated junctions for major junctions to produce a high quality, strategic route. This category of road does not permit the use of at-grade minor junctions but does allow limited access via a left in/left out junction. It should also be noted that the adoption of a compact grade separated junction is not permitted for a Category 7A road.

The grade separated junctions proposed on the A96 will comply with the DMRB, TD 22/06 *Layout of Grade Separated Junctions*. A typical example of a grade separated junction with loops can be found below in **Figure 4.2.11**. This type of junction layout is generally considered to be suitable for constrained corridors such as the A96.

Figure 4.2.11 Typical Grade Separated Junction Arrangement with Loops

This is an indicative junction layout and further assessment will be required on a case by case basis to determine the most suitable junction location and layout. This should consider issues including, but not limited to, the mainline alignment, local road layout, topography and geotechnical conditions, traffic levels and any environmental constraints. This work should be progressed as part of the DMRB Stage 2 Assessment process.

For the layout shown above, the junction standards to be adopted would provide a minimum loop radii of 30m on the merge slip and 50m on the diverge. It is anticipated that both merge and diverge tapers would be designed to motorway standard, however this will be confirmed during Stage 2 Assessment. A summary of the junction standards to be adopted on the A96 are detailed in **Table 4.2.32**.

Slip Road/Design Standard	Minimum Loop Radii (m)	Length of Entry/Exit Taper (m)	Nose Ratio	Nose Length (m)
Merge Standards	30	205	1:30	85
Diverge Standards	50	170	1:15	

Table 4.2.32 Junction Design Standards Summary

It is acknowledged that site specific constraints and environmental impacts may prohibit absolute Category 7A provision throughout the A96 Dualling. Where constraints are significant it is proposed that route category and junction provision should be considered on a site specific basis, with due regard to the wider dualling programme strategy and provision. For such cases, full justification of the decision process shall be recorded for discussion and approval with Transport Scotland.

In addition, the existing dual carriageway section of the A96 between Inverurie and Aberdeen contains a series of at-grade minor priority junctions with at-grade roundabouts at major junctions with the exception of two grade separated junctions at Kintore. This is consistent with a Category 5 road. However, several at-grade accesses are also present along this section, many of which contain central reserve openings which is not in accordance with a Category 5 road.

It is desirable that a consistent and high standard of route is provided between Inverness and Aberdeen as part of a dual carriageway upgrading, therefore the application of junction improvement criteria shall be applied to the existing dual carriageway junctions and accesses as part of the overall junction strategy and aspiration for a Category 7A road.

(l) Junction and Access Strategy

A strategy was developed to provide a consistent approach with regard to the provision of access for the A96 Dualling Programme. The following list sets out the potential high level objectives for a strategy for dealing with the junctions on the A96:

- There should be no gaps in the central reserve;
- All junctions should be grade separated where possible;
- Number of direct accesses and junctions to be minimised including through rationalisation where possible;
- Any new crossings of the A96 as part of new grade separated junctions shall be made accessible to non-motorised users; and
- The landscape and visual impact of any new junction shall be minimised through sensitive design and environmental mitigation.

The strategy aims to establish the approximate location and junction type for the major junctions along the length of the route at an early stage in the design process.

The junction and access strategy is shown in **Appendix J**.

The strategy is split into three main elements including the junction and access strategy decision process chart, tiers/areas to consider and the strategy assessment matrix. Part of the assessment requires the junctions and accesses to be split into four tiers as follows:

- *Tier 1 – A Class Roads;*
- *Tier 2 – B and C Class Roads*
- *Tier 3 – Unclassified Roads; and*
- *Tier 4 – Private and Agricultural Access Roads.*

The proposed junction strategy is based on the assumption that where existing junctions are major at-grade and are an A class road, a new grade separated junction should be provided unless there is overriding site specific justification for not providing a new junction or unless it can be combined with another adjacent junction. For B and C class roads, an assessment of the junction shall be undertaken to determine if a junction should be provided or if it is appropriate to divert the road via a new connection, provide a structure across the A96 or close the road at that location. This process would take into account the environmental effects of local road crossing or diversions.

Unclassified road junctions and private and agricultural accesses are to be closed unless a strong case can be made to Transport Scotland to retain the junction or access. Closing these accesses or diverting them may influence the location of the new major junctions in order to minimise the length of diversion. In some cases accommodation structures may be required. It may also be necessary to improve existing local roads or provide new sections of local road to enable traffic to connect to a new grade separated junction.

Each stage of the junctions and access strategy decision process chart is described in greater detail below:

- A review is undertaken to identify all of the existing junctions and accesses and to determine the road's classification.
- Four options are available on the decision process chart dependant on the road classification as a Tier 1, Tier 2, Tier 3 or Tier 4 Junction and Access.

Tier 1

- Assess impact of providing a junction against engineering, cost and environmental issues.
- Review location to determine if the proposed junction can be combined with an adjacent junction.
- The proposed strategy is to provide a junction at Tier 1 roads. Therefore, if the outcome of the assessment is not to provide a junction, justification shall be recorded with regards to location specific constraints or reasons for not providing a grade separated junction.

Tier 2

- Assess impact of providing a junction against engineering, cost and environmental issues.
- Review proposed junction against alternative options including:

  - provision of a bridge over/under the proposed A96 to maintain the connectivity of the local road;
  - connection of the local road to an adjacent junction via an existing or new local road; or
  - Stop-up the existing road where it meets the proposed A96.
- Record outcome of the assessment and provide justification for the provision of a junction or alternative option as appropriate.

Tier 3

- Assess impact of providing alternative connections via adjacent roads or new local roads against engineering, cost and environmental issues.
- The proposed strategy is not to provide a junction at Tier 3 roads. Therefore, if the outcome of the assessment states that a junction is to be provided, justification shall be provided with regards to location specific reasons for providing a grade separated junction instead of an alternative connection to an adjacent junction.

Tier 4

- Assess impact of providing alternative connections via adjacent roads or new access tracks against engineering, cost and environmental issues.
- The proposed strategy is not to provide an access at Tier 4 roads. Therefore, if the outcome of the assessment states that an access is to be provided, justification shall be provided with regards to location specific reasons for providing an access instead of an alternative connection to an adjacent road. Alternatively, it may not be practicable to either provide an access or an alternative connection, in which case, the decision process chart permits the purchase of land to be considered with justification.

Due to the high number of junctions and accesses on the A96, the application of the strategy may require long lengths of new parallel local roads or access tracks to retain access to the local roads, individual properties, farms and businesses while rationalising the number of junctions onto the proposed dual carriageway. In such cases, it may be preferential to develop the proposed dual carriageway alignment locally offline within the existing A96 corridor and retain the existing A96 as part of the local road network to maintain existing accesses. In cases where the A96 has been retained, a section of it may be appropriate to combine the assessment of the accesses and junctions on that section collectively for any new junction proposals.

In addition, the positioning of junctions shall require consideration of key environmental constraints including the proximity to sensitive visual receptors and the proximity to (or within) other sensitive areas including designated sites and their setting.

This general strategy is appropriate for the preliminary location of junctions, however it is recognised that traffic flows and patterns along the route, particularly where bypasses are required at the major settlements, shall be critical to the location and optimisation of the number of junctions to be provided. Detailed traffic analysis and modelling of the network shall be required to appropriately assess the impact of junction location on mainline traffic flows and the surrounding network.

As such, this strategy recognises that the positioning of junctions around bypasses is an iterative process requiring consideration of engineering, economic and environmental issues in determining the final junction location.

The proposed strategy also has to consider the existing dual carriageway junctions and accesses along the route, many of which include central reserve openings. To ensure the existing dual carriageway sections satisfy the aspiration for a Category 7A road and the general principles set out above, these junctions shall be assessed using the junction strategy and assessnment matrices for online sections.

The removal of central reserve openings may be achieved through relocating crossing movements to a safer location such as an adjacent existing or proposed grade separated junction arrangement. Where this is not feasible, the strategy may consider the provision of left in/left out at-grade junctions.

Possible solutions to meet the proposed strategy for existing junctions are noted below:

- Upgrade certain junctions to provide safe access;
- Divert traffic from accesses/private accesses to the adjacent minor roads as local distributors;
- Divert traffic away from accesses/private accesses to the adjacent existing or new access tracks;
- Closure of accesses which can easily be diverted to a nearby junction by means of A road, B road or upgraded private access track;
- Retain “left in/left out” arrangements (with suitable upgrading) to those accesses and private accesses which cannot be diverted by the means noted above;
- Provision of offline routes and crossings for equestrians, pedestrians and cyclists which may include the use of grade separation where this is appropriate;
- Closure of all redundant accesses; and
- Reconfiguration of accesses where there is local grade separated provision.

However it should be recognised that it may not be practicable to upgrade or close all the existing junctions and accesses to meet the Category 7A standard.

In the case of existing dual carriageway major junctions comprising at-grade roundabouts, these junctions shall be assessed for upgrade to grade separation in accordance with the strategy and matrix. If a full grade separation is not considered practicable, then justification shall be provided to Transport Scotland for retention of the at-grade roundabout. These shall be considered on a case-by-case basis only.

4.2.9 Parking and Bus Lay-bys

(a) Overview

Lay-bys are paved areas adjacent to carriageways that are used for short-term or emergency stops while maintaining mainline traffic flows. On the A96 there are two different types of lay-bys currently available:

- **Parking lay-bys** – paved areas adjacent to the main carriageway for road users making short-term stops for both resting and emergency break-downs; and
- **Bus lay-bys** – similar to parking lay-bys allowing buses to stop and pick up or drop off patrons in relative safety.

A route wide strategy has been developed to ensure that a consistent approach is followed for the provision of lay-bys and should be implemented at the earliest possible stage in the DMRB Stage 2 and Stage 3 Assessment process to ensure the optimum locations are identified. This is particularly relevant for the Type A with Merge Taper lay-by that will be used along this dualling programme, given the land footprint required due to the separation island, the merge and diverge tapers and the length of lay-bys where there is a need for the maximum parking provision.

There are two important factors that will be addressed within the strategy to deliver a compliant route wide lay-by design:

- Access to NMU routes – Consideration needs to be given to lay-bys which could provide direct access to popular NMU routes; and
- Bus Stops – Consideration needs to be given to existing bus lay-by locations and their use as school pick up and drop off points.

With respect to bus stop provision there are a number of factors that must be considered before a decision is made to provide bus lay-bys on the A96 mainline. Where they are to be provided, consideration should be given to modifying the standard layout for a bus lay-by to provide the added safety of a separation island.

This section provides an overview of the current standards for lay-by design, an assessment of the current lay-by provision along the A96 and a strategy to deliver a compliant route wide lay-by design. Given the high severity rate associated with accidents at lay-bys, siting lay-bys in safe locations in accordance with current standards is particularly important. As such the strategy must be considered at an early stage in the DMRB Stage 2 and Stage 3 Assessment processes as appropriate to ensure that the optimum solution can be found.

(b) Design Standards – Layout

The primary standard used for lay-by design is TD 69/07 '*The Location and Layout of Lay-Bys and Rest Areas'* of the DMRB which then provides links to various other standards within the DMRB for specific design elements such as kerbs and traffic signs. Transport Scotland's *Roads for All: Good Practice Guide for Roads* must also be adhered to, a requirement for all trunk road works in Scotland. Where the guidance and design standards presented in the Good Practice Guide conflict with DMRB, the *Roads for All: Good Practice Guide for Roads* takes precedence.

TD 69/07 states that parking lay-by layout should be based on the speed limit, traffic volume and carriageway cross section. A standard design layout is also provided for bus lay-bys which is used on all road types. As outlined in **Section 4.2.4**, the A96 will be designed as a Category 7A All-Purpose Dual Carriageway and as such, the lay-by layouts proposed for the A96 are as follows:

- **Type A with Merge Taper:** Used only on dual carriageways with a speed limit greater than 40mph. This layout is the same as Type A with the addition of a merge taper to allow a safer entry to the main carriageway as shown in **Figure 4.2.12** below. Given the criteria, this layout shall be used for the A96 dualling;
- **Bus lay-by:** Consideration needs to be given to the use and location of bus lay-bys throughout the A96 and, where they are to be provided; consideration needs to be given to the appropriateness of the standard layout given that it does not contain a separation island. The typical key features for a bus lay-by are shown below in **Figure 4.2.13**.

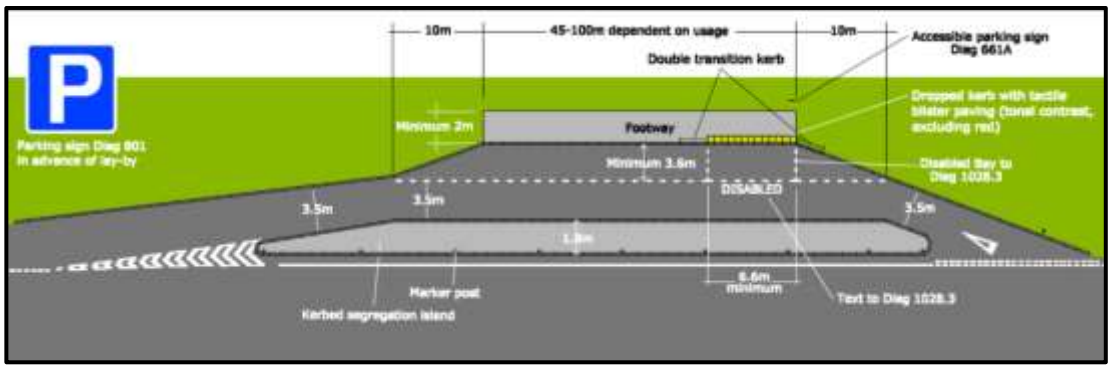

Figure 4.2.12 Type A with Merge Taper. Note: All dimensions are shown in metres.

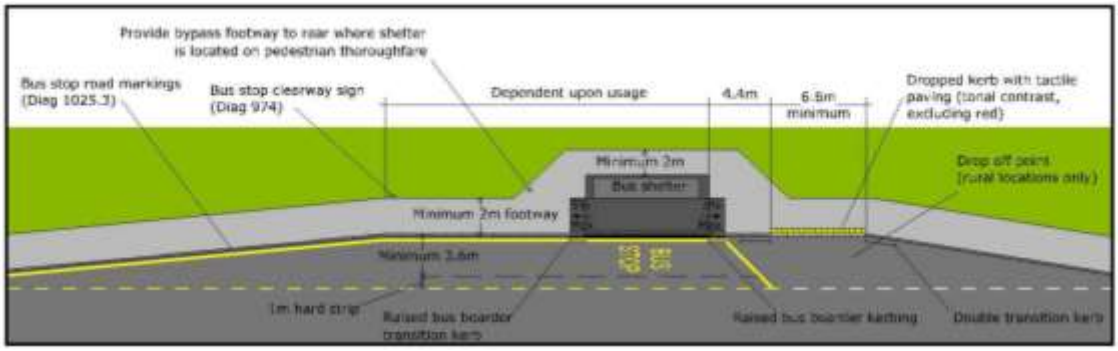

Figure 4.2.13 Bus lay-by. Note: All dimensions are shown in metres.

Transport Scotland's *Roads for All: Good Practice Guide for Roads* includes additional design requirements not specified within TD 69/07 that ensure safety and accessibility for disabled people. For example, the following key features are illustrated in **Figure 4.2.12** and **Figure 4.2.13** and are additional to the standard DMRB layouts:

Type A with Merge Taper Lay-by

- Increased width from 3.5m to 3.6m;
- Disabled bay included, with a minimum length of 6.6m;
- Dropped kerb with tactile blister paving; and
- Additional signage and markings.

Bus Lay-by

- Increased parking width from 3.5m to 3.6m;
- Dropped kerb with tactile blister paving;
- Raised bus boarder transition kerb; and
- Drop off point.

Importantly, there is a degree of flexibility common to both DMRB and Transport Scotland's *Roads for All: Good Practice Guide for Roads* whereby the length of each lay-by layout can be varied depending on usage. This will be of benefit to the lay-by strategy, for example, where the lay-by provides access to adjacent non-motorised user routes, is located at a particularly scenic viewpoint or where the forecast level of large goods vehicles use is high.

Additional lay-by features discussed in TD 69/07 that should be considered further in the DMRB Stage 2 and Stage 3 Assessment include:

- Diverge/merge tapers;
- Advance signing and pavement markings;
- Footway and kerbing;
- Bus Shelters;
- Trading facilities;
- Emergency telephones; and
- Lighting.

Consideration shall also be given to an increase of the segregation width at Type A with Merge Taper lay-by to enhance driver comfort from the buffeting effect of passing heavy goods vehicles. This potential enhancement will require further discussion with Transport Scotland due to the impact that this increased width will have on the set dimensions of the lay-by given in TD 69/07 and the resultant overall increase in the dimensions of the lay-by.

(c) Design Standards and Aspirations – Siting and Frequency

TD 69/07 specifies, either directly or by cross referencing other DMRB standards, the following requirements for siting lay-bys on dual carriageways:

- Sight distance for approaching and exiting vehicles
  - Conform to visibility standards for major/minor junction
  - Desirable Minimum Stopping Sight Distance: 295m (SSD as per the design speed of the major road)
- Proximity to upstream and downstream junction or access
  - Spacing between lay-by and grade separated junction: minimum 1km
  - Spacing between lay-by and other junctions/accesses: minimum 450m (3.75V where 'V' is the Design Speed of the road)

- Lay-bys must be treated as junctions in relation to DMRB TD 9/93 concerning limitations on relaxations on a junction approach, as well as the restriction on siting within one kilometre of the end of a section of dual carriageway.
- Spacing between lay-bys in one direction
  - Recommended maximum spacing: 2.5km
- Proximity to other features such as housing and rail or bus interchanges
  - Consider noise and visual impacts and safety
  - Consider long-term parking restrictions for large goods vehicles
- Location within a horizontal curve
  - Minimum curve radius: 2,040m

(d) Additional Design Considerations

In addition to the requirements of TD 69/07 and Transport Scotland's *Roads for All: Good Practice Guide for Roads*, there are a number of factors that will be considered in the strategy with regard to the siting of lay-bys. For example, consideration will be given to available land, environmental impacts and existing lay-by locations in addition to bus services, access to NMU routes and emergency considerations which are discussed in greater detail below:

- **Bus Services** – As discussed in **Section 2.8**, the existing bus facilities are distributed along the length of the existing A96 corridor. There are a total of 50 bus stop locations (25 bus stops eastbound and 25 bus stops westbound) along the carriageway excluding those within the main urban centres of Nairn, Forres, Elgin and Keith. Retaining or relocation of the bus stop locations should consider usage, availability of alternative locations off the trunk road, safe access, and their use as pick up or drop off points for school children.
- **Access to NMU Routes** – The siting assessment of lay-bys should consider demand resulting from access to existing NMU and recreational facilities adjacent to the A96. This would include areas such as, but not limited to, large forested areas such as the Bin Forest, Whiteash Hill Wood, the Wood of Ordiequish and Kirkhill Forest as well as locations adjacent to watercourses which could provide access for anglers or other users of the watercourse. Specific risk assessments on a case by case basis would need to consider the adequacy of their provision for parking and the risk of vehicles parking outwith the designated areas and impacting traffic flows on the A96 mainline.
- **Emergency Use** – The siting of lay-bys shall also be considered with respect to resilience of the proposed A96. Consideration should be given to the co-location of lay-bys with emergency crossovers to allow the lay-bys to be utilised as an Emergency Turnaround Area (ETA) providing they can be utilised in a safe and controlled manner. In addition, enhanced parking facilities may be considered in sections of the A96 that are identified as being at risk from road closures such as winter related closures or high winds.

(e) Existing Provision

The existing lay-bys on the A96 between Inverness and Aberdeen vary depending on their usage and the standards of the single or dual carriageway sections they serve.

A summary of the lay-by layouts found on the existing A96 are identified in **Table 4.2.33** below.

Layout	Total
Type A	25
Type A with Merge Taper	8
Type B	37
Bus Lay-by	50

Table 4.2.33 Summary of Existing Lay-by Types

The existing dual carriageway section between Inverurie and the proposed junction with the AWPR contains a total of 19 lay-bys with 10 located on the eastbound carriageway and nine located on the westbound carriageway. For the eastbound carriageway, three are Type A with Merge Taper and the remaining six are Bus lay-bys. On the westbound carriageway, there are also three Type A with Merge Taper with seven Bus lay-bys. Examples of the existing Type A with Merge Taper and Bus lay-by are shown in **Figure 4.2.14** below and **Figure 4.2.15** overleaf respectively.

Figure 4.2.14 Existing Type A Lay-by on dual carriageway section

Figure 4.2.15 Existing Bus Stop lay-by on dual carriageway section

The Type A with Merge Taper lay-by shown in **Figure 4.2.14** was constructed in accordance with the relevant standard at the time which was TA 57/87. The primary difference between the TA 57/87 and the current TD 69/07 layout relates to the merging length which is substantially shorter in TA 57/87 and the diverge taper length and nose length which are also shorter in TA 57/87. In addition, the parking area width and road width are 0.75m and 0.5m narrower than the TD 69/07 standard. The bus lay-bys are broadly similar between TA 57/87 and TD 69/07 although the TA 57/87 bus lay-by is 0.25m narrower in width.

The eastbound dual carriageway Type A with Merge Taper lay-bys are spaced at approximately 1.5km and 4.5km between the three lay-bys. Similarly, the spacing of the westbound Type A with Merge Taper lay-bys are approximately 4.9km and 1.25km between the three lay-bys. Therefore, the spacing for both lay-bys on both carriageways exceeds the recommended maximum spacing of 2.5km between the lay-by south of the Kemnay Road Overbridge at Kintore and the lay-bys at Blackburn.

There are currently no lay-bys on the short dual carriageway section between the A9 Raigmore Interchange at Inverness and Seafield Roundabout.

(f) Lay-By Strategy

A strategy has been developed to provide a consistent approach to lay-by design and location along the A96 Dualling Programme. Lay-bys should be designed in accordance with a Type A with Merge Taper layout, as discussed in **Section 4.2.9(b)** and illustrated in **Figure 4.2.12**.

The lay-by locations will be determined by using the lay-by decision process chart and assessment matrix provided in **Appendix K**, the main principles of which are as follows:

- Identify demand through assessment of user need including NMU and buses with particular respect to the proposed bypasses.
- Identify proposed locations of lay-bys based on demand and with respect to siting standards of TD 69/07 and with consideration of local environmental sensitivities.
- Assess spacing of these lay-bys in comparison with recommendations of TD 69/07 and:
  - Where spacing distance is greater than the recommended, identify additional locations to satisfy requirements or provide justification for increased spacing.
  - Where spacing distance is lower that the recommended, assess lay-bys using matrix to consider merits of combining lay-bys.
  - Identify any online sections and review existing lay-bys to determine if these can be retained or modified to satisfy the requirements or if they need to be removed.
  - Review existing lay-bys on sections of the existing A96 which shall be offline and retained as part of the local road network which may be utilised to satisfy demand with respect to buses in addition to the proposed lay-bys on the proposed A96.
- Review final proposed lay-by locations and revise if required.

The lay-by strategy requires an iterative process, the steps of which, are described below.

The first part of the strategy is to complete a baseline review to identify user needs and demand (including school pick up and drop off) for short-term stopping places along the route. This is likely to be completed in conjunction with the NMU assessment and include locations of key NMU routes such as Core Paths and how these potentially link with areas where there may be demand for bus services which could require lay-by provision on the trunk road. In addition, consultation will be required with the bus service providers to ascertain demand and discuss their likely bus routes. Reference shall also be made to the Scheme Resilience Strategy for any locations which may have been identified as part of that strategy.

Having identified the demand, the proposed lay-bys shall be located to meet the demand where practicable with respect to the requirements of the geometric standards outlined in TD 69/07 and Transport Scotland's *Roads for All: Good Practice Guide for Roads*. Redundant sections of the A96 may be considered for conversion to a lay-by subject to the siting, access and egress conforming to the requirements of TD 69/07 and Transport Scotland's *Roads for All: Good Practice Guide for Roads*. The spacing of the lay-bys shall be checked against the recommended spacing in TD 69/07.

In reviewing the spacing of the lay-bys, existing lay-bys on any online sections of the A96 should be reviewed to determine if these lay-bys should be retained as part of the strategy, including any necessary modifications, or if they should be removed. This should include consideration of using existing facilities for other potential opportunities such as bus stops. If the spacing between two consecutive lay-bys is less than the spacing distance recommended in TD 69/07, there is the potential to combine the locations into one.

The proposed location of the lay-by shall be tested using the Assessment Matrix included in **Appendix K** which also includes a test on whether the lay-by can be combined with another adjacent lay-by.

The matrix criteria includes an environmental assessment of the impacts for user demand, community assets, and landscape and visual. The engineering assessment portion of the matrix involves tests for compliance with DMRB standards such as visibility, spacing and junction proximity, along with Transport Scotland's *Roads for All: Good Practice Guide for Roads*. Combining lay-bys is deemed acceptable if there are no high impacts or unacceptable criteria identified within the matrix.

If there are no high impacts or unacceptable criteria identified within the matrix, the lay-by location is acceptable otherwise an alternative location shall be identified. The strategy recognises that the positioning of lay-bys is an iterative process. If a location cannot be identified without unacceptable or high impact criteria then further discussions with Transport Scotland will be required.

Where high impacts have been identified and there are no other reasonable alternative locations, emergency lay-bys may be considered for emergency use only. In such cases, justification shall be provided to Transport Scotland outlining why stopping for non-emergency purposes is undesirable for safety or operational reasons or where it is not reasonably practicable to construct a Type A with Merge Taper lay-by.

4.2.10 Rest Areas

(a) Overview

Rest areas can be provided on rural trunk roads as places where drivers can safely pull off the road and stop, mitigating the accident risk associated with driver fatigue. While lay-bys provide relatively safe stopping areas for short durations, rest areas are more suitable for longer stops. Rest areas often include toilets and picnic areas and can also include many of the facilities normally associated with a service area such as meals and refreshments.

The provision of rest areas is of particular importance to commercial vehicles travelling a route as they are more likely to require a safe area to make longer duration stops. The number of hours a goods vehicle driver can legally drive are stipulated by the European Union. Drivers must take:

- A 45 minute break after a driving period not exceeding 4.5 hours; and
- A rest break following a full driving day. This is typically a continuous 11 hour rest period (for example overnight). Daily rest breaks can also be split (into two separate periods of at least 3 and 9 hours) or reduced (when the rest period is at least 9 continuous hours but less than 11 hours).

The selection of parking locations for lorry drivers may also be enforced by unforeseen circumstances such as road accidents which cause delay to the driver, resulting in them having to find an appropriate stopping location to park before their driving time runs out.

A route wide strategy has been developed to ensure that a consistent approach is followed for the provision of rest areas. Unlike lay-bys, rest areas are designed for longer stops and although they are less frequent they do require more land for construction. Therefore, the strategy should be implemented at the earliest possible stage of the DMRB Stage 2 and 3 Assessment process to ensure that suitable locations for rest areas are identified.

This section summarises the existing rest area provision on the A96 and discusses the challenges associated with upgrading the route to current standards. Finding suitable locations for rest areas may be particularly problematic due to the large land footprint required for their construction.

(b) Existing Provision

There are currently no recognised publically owned rest areas along the existing A96 route.

Parking for goods vehicles is currently provided for at[9]:

- Privately owned Lorry Park locations;
- Public Car Parks with Lorry/Coach designation – with or without a parking fee;
- Parking in a lay-by at the side of a major road or trunk road; and
- Use of the road network within Industrial Estates (including illegal parking).

At the Inverness end of the A96, the Inverness City Lorry Park (Woody's Truckstop) in the Longman Industrial Estate is the only privately owned facility in the vicinity of the A96.

In Moray, there are no privately owned Lorry Parks, with the only provision for overnight parking provided at public car park sites at Lossie Green in Elgin and Edindiach Road in Keith.

Similarly, in Aberdeenshire and Aberdeen City areas, the lack of affordable, suitable and secure Lorry Parking facilities was raised as a concern in the North East of Scotland Transport Partnership (Nestrans) Freight Action Plan 2014. Within the Aberdeen City area, a Lorry Park operates within the Altens Industrial Estate. However, the plan reports that other towns in Aberdeenshire occasionally suffer from inappropriate on-street parking of HGVs. Nestrans are currently pursuing the development of plans to provide suitable overnight parking facilities for goods vehicle in north-east Scotland including the possible use of the proposed A90 Park and Choose site to the south of Aberdeen[10].

Freight movements along the A96 are discussed in **Section 6.2.2**.

(c) Proposed Standards

Rest areas will be designed in accordance with the following standards:

[9] Lorry Parking Strategy, The Highlands and Islands Transport Partnership, May 2011
[10] Nestrans Freight Action Plan 2014, North East of Scotland Transport Partnership, June 2014

- DMRB, Vol 6, Section 3, TD 69/07, '*The Location and Layout of Lay-bys and Rest Areas'*; and
- Transport Scotland, *'Roads for All: Good Practice Guide for Roads'*.

It is recommended within TD 69/07 of the DMRB that rest areas are provided, as a minimum, every 45km and no more than 30 minutes driving time apart.

(d) Strategy

Based on the recommended spacing from TD 69/07 alone, three rest areas would be required along the approximate 160km length of the A96 Trunk Road. To satisfy the 45km recommendation, rest areas would be required in the vicinity of Forres, in the Fochabers/Keith area and in the Huntly/Inverurie area.

However, the strategy for provision and spacing of rest areas should take into account bypassed towns, local amenities and possible provision of parking facilities in such towns. This shall be considered through consultation and agreement with the Local Authorities and communities. Signing for Local Services, Tourist Destinations and Truckstops is discussed in **Section 4.2.12**.

In addition, the following factors shall also be considered in the identification and design of rest areas and the level of provision within rest areas:

- Due to the constrained nature of many parts of the route and the land required to construct rest areas, early identification of suitable locations is recommended;
- Opportunities should be explored to locate rest areas on the adjacent local road network. If the rest area can be accessed via a grade separated junction facilitating both directions of traffic, this would minimise the total number of rest areas required. To be effective, the rest area would need to be located close to the junction so as not to discourage drivers from stopping when they are feeling fatigued;
- Close liaison will be required with the Local Authorities regarding both rest area locations and rest area provisions, to minimise the impact on the services currently provided or proposed within local communities. An assessment should be undertaken to determine if rest areas with minimal facilities and information boards may actually benefit local services;
- In complying with the minimum DMRB requirement regarding the frequency of rest areas, any proposed locations must also be acceptable in terms of user need, biodiversity impacts, visibility and proximity to junctions and lay-bys;
- Consultation with the Scottish Freight and Logistics Advisory Group (SCOTFLAG) and the Regional Transport Partnerships should be sought to ensure that the rest areas developed correlate well with commercial vehicle driver's requirements and demands along the route; and
- Provisions for bad weather parking should also be considered and their feasibility assessed regarding utilisation during severe weather events and at other times of the year.

4.2.11 Non-Motorised User (NMU) Provision

(a) Overview

This section covers an assessment of the existing NMU facilities within and around the A96 Trunk Road and describes the strategy for addressing NMU provision as part of the dualling programme.

Details of current NMU facilities have been obtained from various Local Authorities and stakeholders, allowing NMU baseline plans to be developed. The locations of NMU facilities within different sections of the A96 corridor vary considerably: within some sections NMU facilities are in close proximity to the existing A96, whilst in other sections NMU facilities are remote from the A96.

The NMU facilities comprise core paths, which include rights of passage by foot, horseback and cycle; Rights of Way; the National Cycle Network (NCN) Route 1; three of Scotland's Great Trails; the Isla Way and informal NMU routes.

Sixty-six NMU crossing points have been identified on the A96 within the route extents, excluding those within the main urban centres of Nairn, Forres, Elgin and Keith, taking the form of both grade separated and at-grade crossings.

The A96 Dualling Programme will be developed taking into account the programme objective of promoting active travel. Suitable provision for cyclists and other NMU's is therefore an important part of the A96 Dualling Programme.

NMU facilities will be developed as the dualling programme moves forward to more detailed stages of design development, in consultaion with local communities and interest groups.

An emerging NMU strategy for which consultations are ongoing is currently being developed..

The main principles of the strategy with respect to NMU crossings are:

- There will be no NMU at-grade crossings of the proposed A96 as all NMU crossing points will be grade separated;
- Where practicable, NMU crossing points in close proximity will be combined;
- Where practicable, NMU crossing points will make use of other grade separated crossing facilities such as junction overbridges/underpasses and accommodation works overbridges/underpasses; and
- Crossing points solely for the use of NMUs only will be provided where site specific requirements can be demonstrated.

(b) Existing NMU Routes

There are a number of NMU route networks near the A96 which sit within woods, forests and other rural areas. These forest paths are likely to be more popular with recreational users (enjoyment, health and fitness etc.). There are also many NMU routes near towns and settlements such as Nairn, Forres, Elgin, Keith, Huntly and Inverurie which may be used more so by utility users (commuting, visiting people or shopping etc.). It is important to note that any new or upgraded NMU paths should

be designed to fit the demands of its users which may differ depending on its location and purpose.

The majority of designated NMU routes identified are core paths, which, as explained in **Section 2.3**, provide rights of passage for walkers, cyclists and equestrians. These core paths form Core Path Networks, which have been developed by The Highland Council, The Moray Council, Aberdeenshire Council and Aberdeen City Council.

The NCN Route 1 is a continuous route between Aberdeen and Inverness, but does not follow the same path as the A96 as shown below in **Figure 4.2.16**. Instead it heads east from Inverness towards Elgin within the A96 corridor. From Elgin the path leaves the extents of the A96 corridor and continues north-east towards Buckie, continuing along the coastline until Banff where it heads inland towards Aberdeen via Dyce. The route has both on-road and traffic free sections, with the majority of the route on the rural road network.

Figure 4.2.16 NCN Route 1

Sixty-six NMU crossing points have been identified along the approximately 160km long route, excluding those within the main urban centres of Nairn, Forres, Elgin and Keith. The crossing points comprise a mixture of at-grade and grade separated crossings.

Table 4.2.34 overleaf provides a breakdown of the NMU crossing points on the existing A96. The information contained within this table is supplemented by the Existing NMU Provisions drawings, found within **Appendix C**.

From the drawings provided in **Appendix C** it can be seen that there are areas along the A96 where there is a considerable gap between NMU crossing points; some exceeding 5km. It is recommended that these areas in particular are further assessed in DMRB Stages 2 and 3 in conjunction with desire lines, to determine if any additional NMU crossing points are required.

Table 4.2.34 overleaf outlines the number of NMU crossing points within each of the 10 subsections.

Subsection		Length of subsection	No. NMU Crossing Points
1	Raigmore Interchange to Gollanfield	14,800m	9
2	Gollanfield to Hardmuir Wood	15,950m	7
3	Hardmuir Wood to Alves	17,000m	4
4	Alves to Lhanbryde	19,250m	6
5	Lhanbryde to west of Keith	14,375m	6
6	West of Keith to west of Huntly	15,500m	2
7	West of Huntly to east of Huntly	10,625m	3
8	East of Huntly to Old Rayne	16,000m	3
9	Old Rayne to Kintore	22,750m	20
10	Kintore to proposed junction with the AWPR	8,000m	6

Table 4.2.34 Summary of NMU Crossing Points, excluding those within the main urban centres of Nairn, Forres, Elgin and Keith

From **Table 4.2.34** it can be seen that, the length of each subsection approximately correlates with the number of NMU crossing points within each subsection i.e. there is a relatively equal spread of NMU crossing points throughout the length of the A96. However, for subsections 1, 9 and 10 there is a relatively high number of NMU crossing points for their section lengths. It is presumed that this is due to their proximity to larger urban areas, i.e. Inverness, Inverurie and Aberdeen respectively.

A summary of the identified NMU facilities along the existing A96 corridor is provided in the following sections. Sections B1 and B2 have been described below for completeness, however as noted in **Sections 3.4.2** and **3.4.3**, these two sections have been assessed as part of the A96 Dualling Inverness to Nairn (including Nairn Bypass) DMRB Stage 2 Assessment, with the preferred option for the scheme announced in October 2014.

(i) Section B1: Raigmore Interchange to Gollanfield

NMU facilities within this section consist of the following:

- A core path which runs parallel to the A96 near Raigmore and three others that run perpendicular between the A96 and Culloden; and
- Nine at-grade crossing points.

(ii) Section B2: Gollanfield to Hardmuir Wood

NMU facilities within this section consist of the following:

- A core path which crosses the A96 twice to the west of the town and another that runs parallel to the A96, connecting Nairn and Auldearn;
- NCN Route 1 which travels north along the River Nairn and crosses the A96 in the town of Nairn, before heading east; and
- Seven crossing points: six at-grade and one underpass.

(iii) Section B3: Hardmuir Wood to Alves

NMU facilities within this section consist of the following:

- A core path that runs parallel to the A96 to the west of Forres and another to the east. There are also a number of other core paths within the town environs;
- NCN Route 1 that lies to the north of the A96 from Auldearn to Alves;
- The Moray Coast Trail which heads north from Forres towards Kinloss and The Dava Way which heads south towards Granton-on-Spey; and
- Four at-grade crossing points.

(iv) Section B4: Alves to Lhanbryde

NMU facilities within this section consist of the following:

- A number of core paths within the town of Elgin;
- Quarry Wood on the east of Elgin contains a large amount of core paths and NMU paths;
- A number of NMU paths on the outskirts of Elgin and Lhanbryde;
- NCN route that lies to the north of the A96; and
- Six crossing points: one underpass, and five at-grade.

(v) Section B5: Lhanbryde to west of Keith

NMU facilities within this section consist of the following:

- Three core paths in and around Mosstodloch and three around Fochabers;
- A number of NMU routes within the Wood of Ordiequish and the Whiteash Hill Wood;
- The Speyside Way which runs from south to north, passing through Fochabers, approximately following the Spey river; and
- Six crossing points: two underpasses, one overpass and three at-grade.

(vi) Section B6: West of Keith to west of Huntly

NMU facilities within this section consist of the following:

- There are two core paths to the south of Keith, one to the north and one to the west. There is also a core path immediately south of Keith in Dunnyduff Wood and two within the Bin Forest;
- NMU paths that run from the Hill of Towie, Cairds Wood, Blackhillock and Balloch Hill to Keith;
- The Isla Way, which heads south from Keith, approximately following the Isla River;
- The Fivewives Path, which heads north from Keith to Buckie on a mixture of roads and off-road tracks; and

- Two crossing points: one underpass and one at-grade.

(vii) Section B7: West of Huntly to east of Huntly

NMU facilities within this section consist of the following:

- Core paths which encircle Ord Hill and Boddum Hill. There are also four others around the North of Huntly;
- An NMU path extends from Huntly in a south-easterly direction; and
- Three crossing points: one underpass and two at-grade.

(viii) Section B8: East of Huntly to Old Rayne

NMU facilities within this section consist of the following:

- A core path around Wishach Hill and another that runs from Old Rayne eastwards along the River Urie;
- An NMU path around the Hill of Knockenbaird, near Insch; and
- Three crossing points: two underpasses and one at-grade.

(ix) Section B9: Old Rayne to Kintore

NMU facilities within this section consist of the following:

- There are two core paths that follow the River Don westwards from Inverurie and another that runs from Inverurie to the Aquhorthies Stone Circle. In Kintore a core path crosses the A96 via the B977, continues west along the B994 and then returns to Kintore under the A96 via an underpass;
- An NMU path that crosses the A96 via St. James place. There is another that crosses the A96 from Kintore via Forest Road; and
- 20 crossing points: six underpasses, four overbridges and 10 at-grade.

(x) Section B10: Kintore to proposed junction with the AWPR

NMU facilities within this section consist of the following:

- A core path that runs from the Hill of Boghead to Blackburn. There are also a number of core paths within Kirkhill Forest which are accessed by the A96. There is also a core path that runs from Blackburn along the B979 to the A96, before heading along the A96 as far as Kinellar;
- Three NMU routes within the Kirkhill Forest; and
- Six crossing points: one overbridge, two underpasses and three at-grade.

(c) NMU Strategy

The NMU strategy is being developed in line with the dualling programme objectives, and the Scottish Government's aim to promote active travel through their 2014 Active Travel Vision, *Cycling Action Plan for Scotland 2013* and the Trunk

Road Cycling Initiative. The strategy will demonstrate how this dualling programme could enhance and promote sustainable transport, walking and cycling initiatives.

The Trunk Road Cycling Initiative sets out special consideration for cyclists in all new trunk road schemes and within improvements of existing trunk roads which fall into three general principles:

- To ensure that there are no hazards to cyclists built into schemes;
- To ensure that the opportunities for cyclists within the scheme are recognised and exploited; and
- To ensure that the opportunities for cyclists on the surrounding networks, including the National Cycle Network and superseded sections of trunk road, are recognised and exploited.

These considerations shall be adopted as over-arching general principles for the NMU Strategy for each scheme within the dualling programme but shall be expanded to include for all Non-Motorised Users.

In addition to the three general Trunk Road Cycling Initiative principles listed above, the A96 dualling programme will also ensure:

- The A96 dualling programme with be developed taking into account the dualling programme objective (and the Scottish Government's aim) of promoting active travel; and
- Development of the NMU network will take into account the needs of disabled people (i.e. the NMU network will be developed taking into account the requirements of the Equality Act 2010 and Transport Scotland's *Roads for All: Good Practice Guide for Roads*).

With respect to the NMU crossings, the general principles are:

- There will be no NMU at-grade crossings of the proposed A96 as all NMU crossing points will be grade separated;
- Where practicable, NMU crossing points in close proximity will be combined;
- Where practicable, NMU crossing points will make use of other grade separated crossing facilities such as junction overbridges/underpasses and accommodation works overbridges/underpasses; and
- Crossing points solely for the use of NMUs only will be provided where site specific requirements can be demonstrated.

There may be circumstances where an exception is encountered and a route or crossing cannot satisfy the high level principles outlined above. In such cases, these should be fully documented and justification provided to Transport Scotland.

The assessment of alternative NMU connections and/or new crossing points will be determined by using the NMU decision process chart and Assessment Matrix provided in **Appendix L**, the main principles of which are outlined below. For assessment purposes only, NMU provision has been grouped and categorised into four types:

- Group 1 – Existing Core Paths / National Cycle Routes;
- Group 2 – Existing Rights of Way (RoW);
- Group 3 – Existing Other Routes / Paths; and
- Group 4 – Proposed opportunities.

The categories have been grouped to ensure the needs of the most vulnerable users are fully considered but not necessarily to give priority to these groups in every location.

For existing Group 1 Core Paths and National Cycle Routes severed by the proposed dual carriageway layout, the parallel route/ crossing shall be maintained. However, the design team shall consider merging or incorporating into another Group 1 route. This decision shall be based on a Group 1 Assessment Matrix including travel distance. The level of severance with respect to travel distance should be assessed in accordance with DMRB Volume 11 Section 3 Part 8: *Pedestrians, Cyclists, Equestrians and Community Effects*. Please note that only Local Authorities have the power to designate a path as a Core Path.

For existing Group 2 RoW severed by the proposed dual carriageway layout, the decision to maintain the RoW will firstly be based on actual and potential usage. If the usage is assessed as acceptable, an alternative connection shall be developed and tested using the Group 2 Assessment Matrix.

Alternatively, the RoW may be merged or incorporated with another NMU route. If the assessment identifies any high impacts or unacceptable conditions for the alternative route, justification shall be provided to Transport Scotland for agreement to provide the new connection. Where no alternative connection is available or the impact of the connection would be unacceptable, a grade separated crossing can be considered where the usage of the route is justifiable. Where actual and potential usage is low, justification shall be recorded and discussed with Transport Scotland to potentially stop up the RoW.

The process for the assessment of existing Group 3 Other Routes / Paths is similar to Group 2, but will be assessed using the Group 3 Assessment Matrix included in **Appendix L**.

There may be circumstances where an exception is encountered and a route or crossing does not fall into any particular group. In this instance the potential and actual usage will be considered as well as the main type of user to determine where it will be assigned.

For Group 4 proposals by others, such as a Local Authority, the proposed opportunity shall be developed and tested using the appropriate Assessment Matrix for the type of facility, as included in **Appendix L**. Alternatively, it may be possible for the proposed opportunity to be merged or incorporated with another NMU route. If the assessment identifies any high impacts or unacceptable conditions for the alternative route, justification shall be provided to Transport Scotland for agreement to provide the new connection.

Stakeholder consultations are ongoing with a selected group of stakeholders including Local Authorities, Regional Transport Partnerships and NMU interest groups and organisations.

NMU facilities will be developed as the dualling programme moves forward to further stages of design development, which will include consultation with relevant local interest groups.

4.2.12 Roadside Features

(a) Overview

There are a significant amount of roadside infrastructure features on the existing A96 corridor between Inverness and Aberdeen. This infrastructure is important for the safe operation of the route and also assists in conveying important messages to users on the route. These roadside infrastructure features include:

- Traffic Signs;
- Road Markings and Studs;
- Bollards;
- Road Restraint Systems (Safety Barriers);
- Emergency Roadside Telephones;
- Variable Message Signs (Intelligent Transport Systems);
- Snow Gates and Snow Poles;
- Weather Stations;
- Police Observation Platforms;
- Road Lighting;
- Safety Cameras; and
- CCTV Cameras.

The requirement for roadside features arises from the DMRB, British Standards, Statutory Regulations and Legislation, and Design Guidance documents, such as Interim Advice Notes, Local Transport Notes and policy documents (Transport Scotland's Trunk Road Tourist Sign Policy document) which prescribe best design practice.

The Roadside Features section of this report considers the existing infrastructure and the proposed features which will be required for the dualling of the A96. It shall highlight the relevant standards and guidance applicable for infrastructure on the new route and, in particular, the considerations that will have to be undertaken during the future design stages. The overview provided is in no way exhaustive and other elements may be added at a later design stage. The following highlights the key issues which will require consideration to implement the appropriate infrastructure on the new A96 route:

Traffic Signs

- Suitability of existing traffic signage for retention;
- Requirement for new traffic signs based on the new alignment and junctions;
- Determining whether the new traffic signage, or existing signage in sections where the carriageway is being altered permanently as part of the final

scheme, requires illumination based on the requirements of legislation and design standards; and

- Consultation with relevant Local Authorities and the importance of providing a consistent sign strategy between the new route and local road network.

Road Markings and Studs

- Road markings and studs shall be provided on all new offline sections, and on the sections to be upgraded from single carriageway to dual carriageways, in accordance with the TSRGD and Traffic Sign Manual Chapter 5.
- An assessment shall be carried out where the carriageway is being altered permanently as part of the final scheme.

Bollards and Marker Posts

- Review the suitability of retaining existing bollards and marker posts where the carriageway is being altered permanently as part of the final scheme. Existing bollards and markers posts that are no longer required shall be removed.
- Determine the requirements for new bollards and marker posts on the new or upgraded sections of carriageway.

Road Restraint Systems (RRS)

- Ascertain whether current Road Restraint Systems (RRS) on existing dual carriageway sections should be assessed under TD 19/06 *'Requirements for Road Restraints Systems'*; where the carriageway is being altered permanently as part of the final works;
- Provision of Very High Containment RRS being required by TD 19/06 at carriageway locations which cross or run adjacent to the Aberdeen to Inverness Railway Line;
- Type of RRS to be introduced;
- Containment Level to be proposed for the Central Reserve; and
- Location of access points (emergency/maintenance access points) in the Central Reserve for emergency and maintenance crossing points.

Emergency Roadside Telephones (ERTs)

- Strategy for ERTs on the new route.

Variable Message Signs

- Programme wide Intelligent Transport System Strategy to be agreed between Transport Scotland and Traffic Scotland. Part of this strategy will cover the provision and location of Variable Message Signs for each scheme within the overall dualling programme. Consideration shall also be made to the suitability of retaining existing equipment based on functionality, condition and the finalised route.

Snow Gates and Snow Poles

- The location and type of snow gates to be agreed as part of the dualling programme – this would include the suitability of each location for the provision of a facility in the central reserve to allow vehicles to perform a U-turn.

Weather Stations

- The location of existing weather stations and equipment to be assessed for the suitability of being retained as part of the final works and also consideration to the introduction of new/replacement stations.

Police Observation Platforms

- Introduction of Police Observation Platforms, if required, on each proposed scheme within the dualling programme to supplement the three existing platforms.

Road Lighting

- Assessment to determine lighting requirements.

Safety Cameras

- Consultation required to discuss the existing and proposed safety cameras on the A96 and to establish safety camera requirements for the final A96 dualling.

CCTV Cameras

- Assessment of existing locations on the current route, whether these can be retained as part of the final A96 dualling and also the requirement for new cameras.

(b) Existing Features

Traffic Signs

Throughout the A96 corridor between Inverness and Aberdeen there are a significant number of traffic signs. These traffic signs provide information to traffic (joining and leaving the A96) at junctions and information such as the location of tourist attractions, maximum speed limit and warnings of specific hazards, such as an approach to a reduction in lanes from dual to single carriageway or the end of an overtaking lane. The A96 corridor features Advance Direction Signs, Directional Signs, Regulatory Signs, Warning Signs and Tourist Signs. An example of the signs present on the A96 can be seen in **Figure 4.2.17** and **Figure 4.2.18** overleaf.

Figure 4.2.17 Existing Signage on the A96 near Kirkton of Oyne

Figure 4.2.18 Directional and non-prescribed signs on the A96 west of Bucksburn

Road Markings and Studs

The A96 features road markings and studs throughout the corridor which defines the carriageway lanes (on both single and dual carriageway sections), the extent of the carriageway width and markings for the safe operation of junctions. Examples of the road markings on the A96 include edge of carriageway markings, junction markings (give way), box junctions, merge and diverge tapers at junctions, destination/route number markings (arrows), lane separation markings and tapered hatching markings at some junctions. Road studs supplement these markings and assist with visibility of the markings at night.

Bollards and Marker Posts

Bollards feature throughout the A96 between Inverness and Aberdeen. Bollards are present to highlight the presence of traffic islands at junctions and highlight minor accesses. Marker posts are used in the verges at a particular hazard on the route, such as lay-bys and sections where there is a tight bend in the road. An example of bollards on the A96 can be seen in **Figure 4.2.19** below.

Figure 4.2.19 Existing Bollards on the A96

Road Restraint Systems

RRS are located throughout the existing A96. The systems mitigate the risks associated with various hazards including embankment slopes, watercourses, roadside infrastructure and, in the case of dual carriageways, cars travelling in the opposite direction.

There are a number of different types of RRS present including High Containment, Tension Corrugated Beam, Open Box Beam and Wire Rope. They can be found on the near side verges of the single carriageway sections and also in the central

reserve of the dual carriageway sections. Examples of RRS on the A96 can be seen in **Figure 4.2.20** below and **Figure 4.2.21** overleaf.

Over the length of the A96, the containment class of the RRS includes Normal Containment (N2) and Higher Containment (H1, H2 or H4a). The containment levels are set on the basis of the maximum impact energy the RRS can withstand subject to satisfying the dynamic testing requirements prescribed by British Standards: BSEN1317.

Figure 4.2.20 Post and Wire RRS

Figure 4.2.21 High Containment Barrier adjacent to Aberdeen to Inverness Railway Line near Pticaple.

Emergency Roadside Telephones (ERTs)

There are four ERTs on the A96. All of these are located on the single carriageway sections, within lay-bys. The locations can be seen in **Table 4.2.35** below, with an example shown in **Figure 4.2.22** overleaf.

Emergency Roadside Telephone Reference	Lay-by Type	Location	Chainage	Direction	Carriageway Section Type
ERT 1	Type B Lay-by	East of Delnies Wood	20,100m	Eastbound	Single
ERT 2	Type B Lay-by and Bus Stop	Quarry Wood (west of Elgin)	53,650m	Westbound	Single
ERT 3	Type B Lay-by	East of Lhanbryde	66,415m	Eastbound	Single
ERT 4	Type A Lay-By	West of Pitcaple	127,700m	Eastbound	Single

Table 4.2.35 ERTs Located on the A96 between Inverness and Aberdeen

Figure 4.2.22 ERT at Pitcaple Lay-by eastbound

Variable Message Signs

There are a number of MS3 Variable Message Signs (VMS) on the A96 corridor at present. An example can be seen in **Figure 4.2.23** overleaf. These signs are operated by Traffic Scotland forming part of an Intelligent Transport System (ITS) and are primarily used to provide strategic messages to drivers but also to convey safety messages to drivers. Strategic messages include journey time information and advice of road closures across the trunk road network.

The signs are located on the existing A96 at Nairn (eastbound), Elgin (eastbound) and Keith (westbound). The signs are also accompanied by communication and electrical control equipment at each location.

Figure 4.2.23 VMS at Nairn

Snow Gates and Snow Poles

Snow gates are used to close the road during periods of adverse weather or road conditions. There are currently no snow gates on the A96 however virtual snow gates were installed at Glens of Foudland during the 2012/13 winter. Signs have been erected on the A96 just north of the A920 near Kirkton of Culsalmond and east of the A96 near Huntly. These signs are being trialled as a concept entitled 'virtual gates'. The purpose of the signs is to allow rapid notification of a closure of the A96 between the gates. The early notification will allow vehicles approaching the closed area the opportunity to turnaround and use an alternative route, or alternatively wait at a safer location until the road reopens.

Snow poles are positioned on the verge of a road to demarcate the edge of the carriageway during snow and wintery conditions. They are intended to provide a high visibility guide of the extents of the carriageway cross section to vehicle drivers during periods of poor weather conditions (blizzards/drifting snow/fog). The poles also act as a guide for the trunk road Operating Companies Winter Maintenance Operatives when clearing the road of snow. The location of snow poles on the A96 is given in **Table 4.2.36**, with an example shown in **Figure 4.2.24** overleaf.

Start Location	End Location	No. of Poles
A920 Junction	Ythanwells	16
A920 Junction	Ythanwells	8
Ythanwells	Clinkstone	8
Whinbrae	Climbing Lane	6
End of Climbing lane	End of Newtongarry	19
End of Climbing Lane	End of Newtongarry	23
Buckie Junction	Mulben Junction	19
Buckie Junction	Mulben Junction	18
Dramlachs climbing lane	-	27
Brodie climbing lane	-	12

Table 4.2.36 Snow Poles located on the A96 between Inverness and Aberdeen

Figure 4.2.24 Snow Poles at Glens of Foudland

Weather Stations

The A96 has a varying topography which provides a large variance in elevation across the route. This variance in elevation can provide differing weather conditions across the length of the A96. To adequately assess the weather there are currently three weather stations located along the A96, with an additional three sites comprising of ice sensors only. The information provided by each weather station assists Transport Scotland's trunk road Operating Companies and Traffic Scotland to provide an effective winter maintenance regime and provide information to the public. The three weather stations provide air temperature, road temperature, wind speed and precipitation information and are located at Brodie, Foudland and Tyrebagger. The weather station at Foudland can be seen in **Figure 4.2.25** overleaf. The three ice sensors are located at Fochabers, Keith and Delnies.

Figure 4.2.25 Weather station at Foudland

Police Observation Platforms

There are currently three Police Observation Platforms (POPs) on the A96 between Inverness and Aberdeen as shown in **Table 4.2.37** below. These are all located on the existing dual-carriageway section between Inverurie and Aberdeen.

Police Observation Platform Reference	Location	Chainage	Direction	Other Details
POP 1	Kintore Business Park Junction	141,500m	Eastbound	Dual-Carriageway
POP 2	West Kintore	143,000m	Westbound	Dual-Carriageway
POP 3	Kineller east of Blackburn	146,500m	Eastbound	Dual-Carriageway

Table 4.2.37 Summary of Existing Police Observation Platforms

Road Lighting

Single carriageway sections of the existing A96 that pass directly through urban areas are lit up with road lighting along the side of the road. Lighting is present in the towns and villages of Nairn, Forres, Alves, Elgin, Fochabers, Keith, and Old Rayne. There is also road lighting near the approach to roundabouts and junctions on the A96 around Huntly and Inverurie. The full length of the dual carriageway section between Raigmore Interchange and Seafield Roundabout at Inverness includes road lighting within the verges. The dual carriageway section between Inverurie and Aberdeen includes road lighting on both sides of the road at all roundabouts, and the sections between Port Elphinstone and Thainstone

Roundabout and the A96 junction with C89C (Chapel of Stoneywood road) and the proposed junction with the AWPR.

Safety Cameras

The existing A96 has a varying speed limit between the sections of urban and rural single carriageway (20/30/40/50/60mph) and dual carriageway for cars (50/70mph). As part of the safety improvements of the existing carriageway, there is a speed prevention programme in force on the road. This programme is overseen by the Scottish Safety Camera Partnership (SCP) and is delivered by North East Safety Camera Partnerships. This programme includes enforcement of speed limits on the carriageway through fixed and mobile safety cameras. Police Scotland are responsible for the enforcement of the speed limit of the road. There is one static camera on the carriageway between Inverness and Aberdeen, located at the A96 junction with C89C (Stoneywood road), (westbound). This can be seen below in **Figure 4.2.26**. Mobile cameras are also periodically at sites throughout the route between Lhanbyde and Mosstodloch, Keith, Huntly, Colpy and Old Rayne.

The locations of safety cameras are chosen where there is evidence (through statistics) that the location has a high accident rate. In addition, other locations are selected where it is viewed that there is an increased accident risk due to driver behaviour or carriageway alignment.

Figure 4.2.26 Safety Camera at near A96 junction with C89C (Stoneywood road),

CCTV Cameras

Cameras are installed at three locations along the A96 (Delnies, Foudland and Tyrebagger). These cameras provide the Operating Companies and Traffic Scotland with live eye views of the carriageway at particular locations. This can be used to observe traffic flows, congestion due to carriageway incidents and weather conditions. This can assist the two parties in enabling necessary management plans to be put in place to ensure effective operation of the carriageway or

implement appropriate diversions. The view from each camera is also available to the public through the Traffic Scotland website.

(c) Proposed Infrastructure

Traffic Signs

An assessment of the traffic signs on existing dual carriageway sections will be undertaken in relation to their suitability should any changes to the road layout be implemented.

On the new sections of dual carriageway new traffic signs will be required.

Traffic Sign design will be undertaken in accordance with the following:

- DMRB, Volume 6, Section 2, Part 1: TD 22/06 *'Layout of Grade Separated Junctions';*
- *Traffic Signs Regulations and General Directions 2002* (TSRGD); and
- Traffic Sign Manual and the Local Transport Note 1/94 *'The Design and use of Directional Informatory Signs'.*

Where existing local services are bypassed by offline sections of the A96, signing for local services will be important in minimising the impact of reduced passing traffic on the local services. Signing for local services will be in accordance with the Traffic Signs Regulations and General Directions 2002 (TSRGD) and includes signing for Fuel, Parking, Public Toilets, Refreshments, Restaurants and Accommodation.

Transport Scotland's Trunk Road and Motorway Tourist Signposting Policy and Guidance document provides guidance on the provision of tourist destination signs (white lettering on a brown background) on the all-purpose and motorway trunk road network in Scotland.

A tourist destination is defined by *'The Traffic Signs Regulations and General Directions 2002'* as a permanently established attraction or facility which:

- attracts or is used by visitors to an area;
- is open to the public without prior booking during its normal opening hours; and
- is recognised by Visit Scotland.

Tourist attractions can include visitor centres, theme parks, historic buildings and properties, ancient monuments, museums, zoos, parks and gardens, natural attractions (such as nature reserves, beaches and viewpoints), tourist shops, sports centres, golf courses (including Championship courses), concert venues, theatres and cinemas. Tourist facilities include hotels, guesthouses, bed & breakfast establishments, restaurants, holiday parks, touring caravan and camping parks, picnic sites, youth hostels and Tourist Information Centres.

A tourist destination will only be signed from the trunk road if continuity signing is provided on the local road network until the destination is reached. Signing is generally only permitted to a tourist destination which is within 12 miles of the trunk road. In exceptional circumstances, signing may be permitted to destinations in

rural areas at greater distance subject to there being no conflict with the Home Traffic Authority's (traffic authority for the road which provides the main direct access to a tourist destination) own tourist signposting policy.

Existing tourist signposting on the A96 will be reviewed at the appropriate stage in the design process and will be replaced as appropriate in accordance with Transport Scotland's Trunk Road and Motorway Tourist Signposting Policy and Guidance document.

The signing for truckstop facilities from the trunk road shall be in accordance with Transport Scotland's *Signposting of Truckstop Facilities from Motorways and Other Trunk Roads – Policy and Guidance*. The policy describes the procedures, standards and signing of truckstop facilities from the motorways and all-purpose trunk roads of the Scottish trunk road network and reflects the terms of the Scottish Planning Policy.

In order to be eligible for consideration of signing, the truckstop must satisfy minimum criteria in terms of facilities and opening hours. In addition, the guidance recommends that signing is generally limited to truckstops within 2 miles of the trunk road that provide a minimum of 30 LGV parking spaces and that the route to the truckstop must not require LGVs to travel through residential areas.

Furthermore, continuation signing must have been agreed in principle by the relevant Local Authority, as a prerequisite to Transport Scotland considering the provision of signing on the trunk road where the truckstop facility is accessed from local roads.

The provision of passively safe sign posts, which reduces the risk to vehicle occupants during impact of an errant vehicle, will also be reviewed. This is also likely to reduce/remove the need for RRS to protect errant vehicles from colliding with signage. Passively safe sign posts proposed will be provided in accordance with TD 89/08 *Use of passively safe signposts, lighting columns and traffic signal posts to BS EN 12767:2007*.

Consultation with the stakeholders affected by the dualling programme will also be undertaken. This will include Local Authorities, Transport Scotland's Network and Bus Operations, Visit Scotland (confirmation that Tourist Attractions meet the necessary criteria of Transport Scotland's Policy and Guidance document) and Sustrans (provision of cycle signage). An assessment of the impact on the wider network of a new signage strategy should also be undertaken. This would include a review of the trunk road network and the local road network.

Road Markings and Studs

On sections to be upgraded from single carriageway to dual carriageway, and for all new offline sections, the design of the road markings and studs shall be provided in accordance with the current version of the TSRGD and Traffic Sign Manual Chapter 5. The road marking and stud layout will be designed in accordance with TD 9/93 *'Highway Link Design'* and TD 22/06 *'Layout of Grade Separated Junctions'*.

Where a change to the layout of the existing carriageway is required, an assessment of the condition of the existing road markings and studs will be required. This will be done in accordance with current specifications.

Consultation will also be undertaken with respect to the design of road markings and studs with relevant stakeholders such as Local Authorities and Transport Scotland Network and Bus Operations.

Bollards and Marker Posts

Marker Posts and Bollards shall be incorporated into the design as required. Marker Posts shall be used on the segregation island at new or amended lay-bys and for situations in which to delineate hazards, such as the edge of carriageway or islands. Bollards shall be utilised at areas in which to prohibit vehicular access, such as junctions, footpaths, footways and pedestrian areas.

Road Restraint Systems

The requirement for the provision of RRS is detailed in DMRB, TD 19/06 *'Requirements for Road Restraint Systems'*. This design standard features a software based assessment tool known as RRRAP (Road Restraint Risk Assessment Process) which adopts a risk based approach to the hazards that are identified by the user. Following the input of the required information, such as road type, road speed and hazard offset, the RRRAP provides an output detailing where RRS must be located and the minimum containment level required.

All new sections of carriageway will require to be fully assessed in accordance with TD19/06, however existing online sections of dual carriageway will only require to be assessed where the road layout is being altered permanently, at the introduction of a new hazard or if existing RRS needs to be dismantled.

The following factors should also be considered in the design of RRS:

- Consideration should be given to aesthetics and consistency in the type of barrier, for each containment level, along the entire length of the route;
- All RRS or parapets to be retained should be condition assessed;
- Very high containment level parapets must be provided on all structures crossing or adjacent to railways. In addition the outputs from the RRRAP should also be scrutinised to validate the suitability of RRS in the vicinity of railways;
- Consideration should be given to the particular type of RRS in terms of the risk to motorcyclists;
- The location of maintenance crossing points and the ease in which they can be manually opened will be particularly important to the winter maintenance strategy and to allow traffic to use one carriageway in contraflow, should the other carriageway be closed in a maintenance/emergency situation. The locations of crossovers should be considered early in the design of individual schemes. In addition, crossovers should be provided to allow isolation of structures for maintenance purposes where practicable.

Emergency Roadside Telephones (ERTs)

There is currently limited standards and guidance on the design of ERTs on motorways and all-purpose trunk roads in Scotland. Presently DMRB, Vol 9, Section 4, TA 73/97 Annex A (England only), '*Motorway Emergency Telephones*' exists which within the document makes reference to Annex B for Scotland.

However there is no evidence available to demonstrate that Annex B has been published or is in development.

On this basis it will be important to consider TA 73/97 Annex A and continue ongoing discussions with Transport Scotland to create an appropriate strategy for introducing on an all-purpose trunk road. As part of the creation of the strategy, it will also be important to consider the following:

- Co-location of ERTs on each side of the carriageway to reduce the risk of pedestrians crossing the carriageway. This will include reviewing existing locations which are being retained;
- Spacing of ERTs throughout the route;
- Facilities at ERT locations to prevent vehicles obstructing the carriageway;
- Proximity of ERTs to the location of local villages/communities; and
- Availability of mobile network coverage across the route.

Variable Message Signs

The requirement for Variable Message Signs will form part of the ITS strategy for the dualling programme, which is currently being considered by Transport Scotland. As part of this strategy, an assessment of the existing condition of Variable Message Signs to be retained on online dual carriageway sections will be undertaken. The impact of proposed Variable Message Signs on other roadside features should also be considered (such as the location of Advance Direction Signs and requirement for RRS provision).

Snow Gates and Snow Poles

The provision of snow gates and snow poles will be reviewed in later stages of the assessment and design process. The infrastructure should be provided at suitable locations and where there is historical weather data to demonstrate that a section of the corridor is susceptible to inclement weather conditions. Trials are currently ongoing on the A96 on ‘virtual gates’ which permit the process of opening and closing the road remotely. The introduction of snow fences at locations which are prone to snow drifting on the route could also be considered which could contribute to reducing the frequency of snow gate road closures.

Weather Stations

An assessment of the positioning of the existing weather stations should be undertaken to establish whether they can remain at the existing locations with the upgrade from single to dual carriageway. It should be noted that with the exception of the Tyrebagger weather station, the rest are currently located on existing single carriageway sections of the A96.

It will be important to consider if additional weather stations are also required across the dualling programme. This will require discussions and agreement with Transport Scotland. It is important to ensure that any existing weather stations to be relocated, or the addition of new stations, do not clash with other roadside features.

Police Observation Platforms

Impacts to the three existing POPs on the route between Inverness and Aberdeen are not anticipated since the platforms are located on sections of existing dual carriageway. Further consultation with the Police will be required to establish whether additional facilities are required across the dualling programme.

Road Lighting

It is intended that the proposed route corridor shall not be illuminated with road lighting, however consideration should be given to the introduction of road lighting at junction locations on the route which may be necessary in accordance with the DMRB.

As part of this consideration for the introduction of road lighting at the locations of junctions, a Lighting Appraisal should be undertaken in accordance with TD 49/07 *'Appraisal of New and Replacement Lighting on the Strategic Motorway and All Purpose Trunk Road Network'*.

The design of road lighting should be undertaken in accordance with TD 34/07 *'Design of Road Lighting for the Strategic Motorway and All Purpose Trunk Road Network'* and BS5489 'Code of Practice for the Design of Road Lighting'. Consultation will also be required to be undertaken with affected stakeholders such as Local Authorities.

Where road lighting is to be provided and where practicable, the location of lighting poles or masts should not be sited in the central reserve. In addition, the specification of high mast lighting should also be avoided where practicable.

Safety Cameras

Sections on the proposed route where safety cameras may be considered necessary to influence driver behaviour include busy junctions with merging and diverging traffic and long straight sections of carriageway, where it may be attractive for users to break the speed limit and increase the risk of an accident occurring.

The introduction of electronic warning signs (solar powered) which can also contribute to reducing vehicle speeds and accident reduction at hazardous areas on the route i.e. locations prone to the congregation of deer will be considered. An example of such signage implemented on the trunk road network at present is on the A82 at Glencoe.

Consultation with the Scottish Safety Camera Partnership may be able to provide support and assistance to assess the benefits of introducing speed cameras at locations on the route. These partners may also be able to provide information on the required associated infrastructure (cameras, signage & road markings) and advice on enforcement policy.

The existing cameras on the route and the existing purpose they serve will also be reviewed, as to whether they are a requirement as part of the final A96 dualling.

CCTV Cameras

The provision of CCTV cameras on the upgraded route will need to consider the existing locations and the possibility of relocating or removing to accommodate the increase in carriageway cross section. It is unlikely that it will be beneficial or financially viable to have 100% CCTV camera coverage of the route. Therefore it should be considered to adopt a similar strategy as the present situation and cover key locations on the network, such as locations which are susceptible to inclement weather, but also provide coverage of major junctions along the dualling programme.

Emergency Turnaround Areas and Emergency Access/Egress tracks

The provision of emergency access and egress from the A96 should be considered. The nature, operations and form of the access and egress shall be discussed in consultation with Transport Scotland, the Operating Companies and Emergency Services as appropriate with consideration of all factors including the design, maintenance and operation of such a facility.

Emergency crossovers are anticipated to be required at regular intervals over the length of the A96 for both incident management and winter service operations (refer to **Section 2.12**). The crossovers may be combined with an Emergency Turnaround Area (ETA) to provide egress for vehicles utilising the opposite carriageway. Where lay-bys are to be constructed, consideration should be given to their location to facilitate an ETA as part of the route emergency access strategy, providing they can be utilised in a safe and controlled manner. The requirements for ETAs shall be considered as part of the demand assessment for the Lay-by Strategy and Rest Area Strategy.

In the design of the central reserve crossover, the opening in the central reserve must be secured with a section of vehicle restraint that is easily removed and replaced and which shall at least meet the containment standard of the adjacent barrier. The crossing point must be able to be quickly and effectively operated by trained operatives. The opening width shall be carefully designed to be of a suitable width to enable vehicles to pass through at low speeds and on to the secondary carriageway but not as large as to create operational difficulties, such as the equipment required to remove the barrier and the required length of time required to open and close the barrier.

The spacing and location of the crossovers and ETAs will be dependent on many factors including:

- Junction spacing;
- Traffic flow;
- Alignment of the proposed road;
- Central reserve barrier including maintenance requirements;
- Hardening of the central reserve;
- Lighting; and
- Maintenance and Operational considerations.

An example of an ETA has recently been constructed on the A66 in Cumbria where an ETA is provided at the location of a snow gate. This would avoid vehicles having to stack until the road conditions were suitable to re-open the section.

Purpose built emergency access links to the parallel roads or adjacent overbridge / underbridge on the local road networks are not anticipated at this time. However, any requirements for such a facility shall be provided in consultation with the Emergency Services, the local roads authority and Transport Scotland. The use of such facilities would require careful consideration to prevent unauthorised use, such as secure gates at each end and to ensure adverse traffic conditions are not created elsewhere on the local road network.

Providing accurate, real time information on incidents to road users may help to reduce the associated delays. This information which may include information such as the likely delay duration and road closures may be disseminated to the road users via various sources such as VMS which should be considered as part of the ITS Strategy for the dualling programme.

4.2.13 Intelligent Transport Systems

The minimal existing ITS features along the A96 route, discussed within **Section 4.2.12**, include the following: VMS, CCTV cameras, weather stations and traveller communication items such as ERTs. Future plans for A96 ITS improvements are in initial stages of consideration by Transport Scotland including the potential for an ITS Strategy for the dualling programme to offer safety and operational benefits.

4.2.14 Public Utilities

(a) Overview

Utility companies have commercial and legal requirements to maintain service through their apparatus at all times. The presence of public utility apparatus can therefore have significant impact on the constructability, programme and cost of trunk road schemes such as the A96 Dualling. It is essential that early consultation is held with public utility companies to understand the location of apparatus, allowing proposals to be developed that protect or divert the apparatus where necessary.

This section explains the process that has been undertaken to establish the presence of apparatus before summarising the key impacts. The key impacts include areas that contain a large quantity of apparatus or particularly significant apparatus.

The collation of public utility information for the A96, in accordance with the C2 Preliminary Inquiries stage of the New Roads and Street Works Act 1991, is ongoing, with further utilities information to be gathered at the next stage of design development.

Utility impacts are important factors in corridor option selection and future alignment development due to both community and economic risk factors. These impacts will be avoided whenever feasible. However, if unavoidable utility impacts arise, strong consideration will be given to construction methods for either protection or relocation, depending upon which option is most effective in terms of cost, programme and safety.

(b) Oil/Gas Pipelines

The Government Pipeline and Storage Systems (GPSS) Inverness to Lossiemouth fuel pipeline travels through the study area between Inverness and Forres, south of the existing A96, in a generally north-easterly direction. The pipeline initially runs south of the A96, crossing the A96 between Nairn and Auldearn and continuing to run north of the A96 until Forres. From Forres it travels away from the A96 towards Kinloss and Lossiemouth The pipeline is covered under the Land Powers (Defence) Act 1958.

A BP Oil pipeline and a Shell Natural Liquid Gas pipeline both cross the A96 to the west of the proposed AWPR junction.

(c) National Grid

From the C2 responses, National Grid have identified locations where they have apparatus within the existing A96 corridor. All apparatus are National Transmission High Pressure (NHP) Gas Mains.

There are four locations where the NHP Gas Main crosses the existing A96. These are west of Inverurie, north of Kintore (x2), west of Kinellar and Blackburn.

Early consultation with National Grid should continue to minimise risk and delays to the project due to the apparatus.

(d) Scottish Hydro Electric Transmission Network

Scottish Hydro Electric Transmission (SHE Transmission) is responsible for maintaining the electricity high voltage overhead lines and underground cable transmission network in the north of Scotland. There are several high voltage overhead lines along the route including a line which generally follows the route of the existing A96 although at varying distances from the A96. The interface between the A96 and the high voltage overhead transmission lines within the ten geographical subsections are discussed further in the sections below. Sections B1 and B2 have been described below for completeness, however as noted in **Sections 3.4.2** and **3.4.3**, these two sections have been assessed as part of the A96 Dualling Inverness to Nairn (including Nairn Bypass) DMRB Stage 2 Assessment, with the preferred option for the scheme announced in October 2014.

(i) Section B1: Raigmore Interchange to Gollanfield

The high voltage overhead transmission line in this section is outside of the existing A96 corridor.

(ii) Section B2: Gollanfield to Hardmuir Wood

The high voltage overhead transmission line approaches this section from the south-east and continues in a north-easterly direction to cross the existing A96 to the north-west of Auldearn before approaching the A96 again at Hardmuir at the extents of this section.

(iii) Section B3: Hardmuir Wood to Alves

From Hardmuir, the high voltage overhead transmission line heads north-east leaving the A96 corridor to head north of Brodie and Dyke to pass around Forres to

the north of the town. To the east of Forres, the transmission line turns south-east, crossing the A96 adjacent to Tarras Roundabout where it then leaves the A96 corridor.

(iv) Section B4: Alves to Lhanbryde

At Alves, the high voltage overhead transmission line re-joins the A96 corridor, heading in a north-east direction and crosses the A96 to the east of Alves. The line leaves the existing A96 corridor to continue north of Newton, heading east to meet the western edge of Elgin from there it passes to the north of the town before heading in a south-easterly direction, crossing the A96 to the east of Elgin. The line continues parallel to the south side of the A96 until Lhanbryde, before leaving the A96 corridor in a south-east direction.

(v) Section B5: Lhanbryde to west of Keith

The high voltage overhead transmission line re-joins the A96 corridor at Forgie, heading in a generally south-east direction, before crossing over the A96 to pass to the north of Aultmore.

A second high voltage overhead transmission line runs parallel to the first line through the Wood of Ordiequish, before changing direction to run approximately parallel to the south of the A96 in a south-easterly direction.

(vi) Section B6: West of Keith to west of Huntly

The first high voltage overhead transmission line continues to the north and east of Keith, before crossing back over the A96 approximately 1km to the south of Keith. The line then joins the Blackhillock electrical substation, approximately 800m south-west of the A96.

The second high voltage overhead transmission line continues in a south-easterly direction to pass to the south of Keith to join Blackhillock electrical substation.

A third high voltage overhead transmission line runs in a south-west/north-east direction, entering the A96 corridor and crossing the A96 to the south of Keith.

A single high voltage overhead transmission line leaves the Blackhillock substation in a south-easterly direction, crossing over the A96 twice to the north and east of the junction with the B9115, before leaving the A96 corridor.

Scottish and Southern Energy have commenced construction on a major upgrade to the Blackhillock Substation which includes an expansion of the existing site to cover an area of approximately 28 hectares. This site will be a major constraint in the development of offline improvement strategies which bypass Keith to the south.

(vii) Section B7: West of Huntly to east of Huntly

The high voltage overhead transmission line from Blackhillock substation continues in a south-easterly direction through this section. At Huntly, the transmission line runs to the south of the A96, briefly re-joining the A96 corridor before the corridor and transmission line diverge again.

(viii) Section B8: East of Huntly to Old Rayne

The high voltage overhead transmission line in this section runs parallel to the A96, albeit at a distance generally between 400m and 800m to the south of the road. There is a pinch point at Broomhill where the A96 meets with the transmission line at the western end of the Glens of Foudland, with a pylon located approximately 60m south of the A96. At the eastern end of the Glens of Foudland, the high voltage overhead transmission line crosses over the A96 near the junction with the A920.

(ix) Section B9: Old Rayne to Kintore

The high voltage overhead transmission line from Blackhillock crosses over the A96 to the west of Pitcaple and continues in a south-easterly direction. A second high voltage overhead transmission line also crosses the A96 in this vicinity, approximately 500m eastward of the first line and then continues to run in parallel with the first line.

Both lines continue approximately parallel in a south-easterly direction to the west of Inverurie, before terminating at Kintore substation.

(x) Section B10: Kintore to the proposed junction with the AWPR

In this section, two high voltage overhead transmission lines cross the A96, to the north of Broomhill Roundabout at Kintore, at a spacing of approximately 150m apart.

(e) Beatrice Onshore Transmission Works

Beatrice Offshore Windfarm Limited (BOWL) is a joint venture partnership formed between SSE Renewable, Repsol Nuevas Energias and Copenhagen Infrastructure Partners to develop the Beatrice Offshore Wind Farm in the Outer Moray Firth.

The onshore works connect the wind farm to the national grid through 20km of underground cable running from a landfall point at Portgordon to a new substation adjacent to the existing SSE substation at Blackhillock, south of Keith (refer to **Section 4.2.14(d)(vi)**).

A maximum of two cable trenches will be required with each trench up to 0.5m wide, at a target depth of 1.5m and with approximately 5m separation between the trenches. The underground cables will follow a route approximately parallel to the B9016, crossing underneath the A96 approximately 1km north-west of the junction of the A96 and B9016 and continues on towards the A95. After crossing the A95, the underground cables continue south-east and to the south of Keith to a new onshore substation at the northern edge of Cairds Wood at Blackhillock. A cable will then connect the new substation with the adjacent SSE Blackhillock substation.

The new substation will occupy a 13 hectare site and includes two access points to facilitate construction and ongoing maintenance of the site. The site will be surrounded by a landscaped bund and including landscaping to partially screen the site. This new substation will lie adjacent to the existing substation which is currently being expanded to 28 hectares. This combined site will be a major constraint in the development of offline improvement strategies in this area.

Detailed Planning Permission and the accompanying Environmental Statement for the Onshore Transmission Works has been submitted to The Moray Council on 1st April 2015 and subject to approval, construction is due to commence in 2016.

This substation will be a major constraint in the development of offline improvement strategies which bypass Keith to the south. Consideration will also need to be given to underground cable routes which may constrain the alignment of the proposed improvement strategies. Crossing of the cable routes will be avoided where practicable, but where impacts are unavoidable, consideration will be given to construction methods including apparatus protection.

(f) Wind Turbines

Wind turbines of varying size and numbers are located along the route of the existing A96, but are particularly prevalent in Aberdeenshire and Moray.

While the footprint of individual turbines may be relatively small, wind farms can cover a much wider area and are a significant constraint on a strategy. In addition, consideration should also be given to the proximity of the A96 to any wind turbine and a risk assessment process may be required to assess the risk to the A96 from a failure of a turbine and for the potential of driver distraction. As a minimum, the Scottish Government Wind Turbine Information document (2013) which was produced to assist Local Authorities in the consideration of planning applications for wind turbines, recommends a set back from roads of at least the height of the turbine to assure safety.

The movement of large components during the construction period, periodic maintenance and for decommissioning of wind farms may also require consideration where wind farms are currently accessed from the A96.

Two large wind farms are located near the A96 to the south-east of Huntly at Dummuie and the Glens of Foudland, comprising seven 80m high (to blade tip) turbines and twenty 80m high (to blade tip) turbines respectively.

The location of all existing, approved and proposed wind turbines are shown on the utilities plans contained in **Appendix D**.

(g) Other Known Utilities

As part of the initial information gathering exercise, the presence of the following utility apparatus has also been identified;

- Water;
- Gas;
- Electricity; and
- Telecommunications – telephone and mobile communication.

The utility information gathered to date is shown in **Appendix D**.

4.2.15 Key Issues

The combination of the existing A96 alignment, roadside properties and density of existing junctions and accesses, will likely constrain the extent of the existing road which can be widened to accommodate a dual carriageway cross section. It may be preferable to develop sections of the proposed dual carriageway alignment locally offline within the existing A96 corridor and retain the existing A96 as part of the local

road network. The extent of online widening and locally offline sections will be determined as part of the DMRB Stage 2 Assessment.

The key engineering issues specific to each subsection of Option B are outlined in the following sections. Sections B1 and B2 have been described below for completeness, however as noted in **Sections 3.4.2** and **3.4.3**, these two sections have been assessed as part of the A96 Dualling Inverness to Nairn (including Nairn Bypass) DMRB Stage 2 Assessment, with the preferred option for the scheme announced in October 2014.

(a) Section B1: Raigmore Interchange to Gollanfield

The constraints for Section B1: Raigmore Interchange to Gollanfield have been taken from the A96 Dualling Inverness to Nairn (including Nairn Bypass) DMRB Stage 2 Assessment, published October 2014.

- There are lengths of potentially unfavourable ground conditions affecting the section, including areas of Alluvium and Peat.
- The low-lying and flat topography may restrict opportunity to reclaim earthworks materials for embankments and may result in an earthworks imbalance for the section requiring material to be imported to site.
- There are a number of major public utilities within the section. These include the Inverness to Lossiemouth fuel pipeline and a high pressure gas main.

(b) Section B2: Gollanfield to Hardmuir Wood

The constraints for Section B2: Gollanfield to Hardmuir Wood have been taken from the A96 Dualling Inverness to Nairn (including Nairn Bypass) DMRB Stage 2 Assessment, published October 2014.

- There are lengths of potentially unfavourable ground conditions affecting the section, including areas of Alluvium and Peat.
- The low-lying and flat topography may restrict opportunity to reclaim earthworks materials for embankments and may result in an earthworks imbalance for the section requiring material to be imported to site.
- There are a number of major public utilities within the section, including extra-high voltage 132kV power lines.
- Crossings of both the River Nairn and the Aberdeen to Inverness Railway Line are required.

(c) Section B3: Hardmuir Wood to Alves

- In addition to the offline bypass of Forres, a bypass will also be required for the settlement at Brodie.
- The low-lying and flat topography may restrict opportunity to reclaim earthworks materials for embankments and may result in an earthworks imbalance for the section requiring material to be imported to site.
- The proximity of the Aberdeen to Inverness Railway Line to the existing A96 may restrict opportunities for improvement works in these areas. The northern bypass strategy will cross the railway line twice.

- The improvement strategy crosses the River Findhorn and the Burn of Mosset. There is an extensive area of flood risk to the north of Forres associated with both watercourses. To the south of Forres, the flood risk areas at the River Findhorn is much narrower, however the Burn of Mosset Flood Alleviation Scheme flood storage reservoir may constrain route options to the south.
- The ground conditions may include weak, compressible ground associated with the Alluvial and Peat Deposits.

(d) Section B4: Alves to Lhanbryde

- In addition to the offline bypass of Elgin, a bypass will also be required for the settlement at Alves.
- The existing single carriageway A96 bypass at Lhanbryde is physically constrained between the existing railway embankment and the properties on the edge of Lhanbryde including two existing retaining walls to retain the road earthworks requiring an offline bypass.
- The northern bypass improvement strategy will cross the River Lossie and its associated wide flood risk areas. There is an additional flood risk areas associated with the Spynie Canal to the north of the study area.
- The southern bypass improvement strategy also crosses the River Lossie and some of its tributaries. The flood risk areas associated with the River Lossie is less extensive to the south of Elgin.
- The ground conditions may include the potential to encounter weak, compressible ground associated with Peat, Alluvial and Lacustrine Deposits.
- The Aberdeen to Inverness Railway Line runs in close proximity to the A96 in sections of this strategy. Both north and south bypass improvement strategies are likely to cross the railway line, but the northern bypass improvement strategy may also cross a railway spur which heads north to Coltfield.

(e) Section B5: Lhanbryde to west of Keith

- The steep topography in this section is likely to constrain the route of the A96 as it passes between Whiteash Hill and Thief's Hill.
- The Fochabers New Bridge is the most significant bridge carrying the A96 over the River Spey which is also a SAC.
- The A96 is constrained to the west of the bridge between the Baxters factory and the Old Toll house/electricity substation. To the east, Fochabers Bypass is constrained between Fochabers and the Gordon Castle Estate. The main restriction is the Gordon Castle Main Driveway overbridge which accommodates a WS2+1 carriageway, but has insufficient width to accommodate a rural dual carriageway under the structure between abutments.
- The existing alignment on the approach to Fochabers, and the change of direction provided at Fochabers East Roundabout, in combination with the steep topography adjacent to the east roundabout and the garden centre to the west may constrain a Category 7A alignment and junction provision.

- There is an extensive flood risk areas associated with the River Spey albeit it is at its narrowest in the study area at the Fochabers New Bridge.
- The ground conditions may include the potential to encounter weak, compressible ground to the west of the section associated with Alluvium and the Peat Deposits at Forgie.

(f) Section B6: West of Keith to west of Huntly

- The topography of this section may impose constraints on potential route options and, in particular, the topography at the Bin Hill and to the south of Keith at Cairds Hill and Blackhill wood. At the Bin Hill, the topography is likely to constrain the route of the A96 as it passes between the two hills.
- The ground conditions may include the potential to encounter open joints and cavities associated with the Cuthill Limestone Member and weak, compressible ground throughout the section associated with the Alluvial and Peat Deposits.
- High voltage overhead transmission lines and the Blackhillock substation to the south-east of Keith.
- The proposed Beatrice Onshore Transmission Works comprising a high voltage underground cable route and new substation adjacent to the current Blackhillock substation.

(g) Section B7: West of Huntly to east of Huntly

- The topography of this section may impose constraints on potential route options and, in particular, the topography at the Bin Hill and to the south-east of Huntly where the topography rises out of Huntly at Cairn Hill. At the Bin Hill, the topography is likely to constrain the route of the A96 as it passes between the two hills.
- The ground conditions may include the potential to encounter weak, compressible ground throughout the section associated with the Alluvial Deposits.
- This section will cross the River Deveron and River Bogie and their associated flood risk areas.
- The Huntly Rail Overbridge cannot be readily extended to accommodate a dual carriageway cross section.

(h) Section B8: East of Huntly to Old Rayne

- The topography is a significant constraint in this section due to the elevation of parts of the section in combination with the steep slopes of the Glens of Foudland and parallel watercourses.
- The ground conditions may include the potential to encounter weak, compressible ground throughout the section associated with the Alluvial Deposits.
- The two large wind farms at Dummuie and Glens of Foudland are a significant constraint on the strategy due to their size and proximity to the A96.

- The settlement at Colpy and individual businesses, farms and residential properties and in particular those properties immediately adjacent to the A96.

(i) Section B9: Old Rayne to Kintore

- In addition to Inverurie, the settlements at Pitmachie and Pitcaple will require a bypass.
- The existing A96 between Oyne and Inveramsay is particularly constrained between Pitcaple and the Aberdeen to Inverness Railway Line in combination with the poor alignment in this section.
- The A96 corridor between Port Elphinstone and Kintore is constrained due to the proximity of the Aberdeen to Inverness Railway Line, the River Don and its floodplain, Inverurie Paper Mills, Kintore Business Park and other developments located between Port Elphinstone and Kintore.
- The River Urie and River Don and their associated flood risk areas particularly to the south of Inverurie where the River Don floodplain is wider.
- The ground conditions may include the potential to encounter weak, compressible ground throughout the section associated with the Alluvial and Glaciolacustrine Deposits.
- The available cross section under the Upperboat Overbridge on the existing Inverurie Bypass is insufficient to accommodate a rural dual carriageway cross section.
- The topography for the northern strategy to the east of Inverurie and Port Elphinstone will require consideration due to the slopes rising out the River Urie and River Don floodplains. For the southern strategy, the undulating topography with a number of hills and valleys will require careful consideration.
- The proximity of the Aberdeen to Inverness Railway Line to the sections of the A96 is a significant constraint in these areas. In addition, the inner, south and north strategies will all require to cross the railway line.

(j) Section B10: Kintore to the proposed junction with the AWPR

- The existing properties and businesses adjacent to the A96 have the potential to constrain upgrades to existing junctions and accesses.
- The topography at Tyrebagger Hill is a contributing factor to existing winter maintenance issues at this location.
- The ground conditions may include the potential to encounter weak, compressible ground throughout the section associated with the Alluvial and Glen Dye Silt Formation Deposits.
- The Forrest Road Overbridge, Dunnecht Road Overbridge and Kemnay Road Overbridge may potentially constrain the High Load strategy.

4.3 Offline Strategy Overview

The three offline strategies, Options C, D and N, are shown in **Appendix A**.

The offline strategies are intended to be used in conjunction with Option B throughout the remaining lengths of the route. They are therefore considered to be alternative improvement strategy options to the existing A96 corridor at certain feasible locations. Each of the three offline strategies provide alternatives for different sections of the corridor. However as two of these options bypass the same section of the A96 between Glens of Foudland and north of Inverurie, these options (Option C and Option D) may not be used in conjunction with each other.

The offline strategies considered within this report for the DMRB Stage 1 Assessment are:

- **Option C**, which comprises an offline strategy from Huntly to Blackburn;
- **Option D**, which comprises an offline strategy from Glens of Foudland to north of Inverurie; and
- **Option N**, which comprises an offline strategy from west of Forres to the east of Fochabers.

The following Sections, **4.4** to **4.6** outline the general offline improvement strategy descriptions and summarises the key engineering issues for each option against the same engineering criteria used for Option B.

4.4 Option C: Huntly to Blackburn

4.4.1 Improvement Strategy Description

Option C is an alternative improvement strategy to the existing A96 corridor between Huntly and Blackburn. This strategy bypasses Inverurie and avoids a number of sections of poor road alignment on the existing A96.

The improvement strategy diverges southwards from Option B south of Huntly, passing to the north of Insch and the south of Inveruie before re-joining Option B south of Kintore.

4.4.2 Topography and Land Use

The topography in Option C rises from a level of approximately 170mAOD, from the online corridor south of Huntly, as it follows the rising topography towards Wishach Hill (422mAOD) and the Hill of Foudland (467mAOD), which are located within close proximity to the improvement strategy. South of Wishach Hill, the topography is undulating with localised high spots at Candle Hill (267mAOD), to the north-west of Insch; Hill of Knockenbaird (190mAOD), to the north of Insch; and Candle Hill (204mAOD) to the south-east of Insch. The topography of the corridor is generally rising from Insch towards the Bennachie Mountain (528mAOD), south of Oyne. To the east of the Bennachie Mountain, the land is generally undulating with high spots to the west of Inverurie at Knockinglews (238mAOD) and Gallows Hill (153mAOD). The strategy crosses the River Don and its floodplain with the land rising out of the floodplain to the south to Aquhythie (130mAOD). The topography then begins to descent towards the existing A96 near Blackburn, at a level of approximately 65mAOD.

The main community within the vicinity of the offline strategy is Insch, however there are several other settlements which could be impacted by improvement strategy Option C including Aquhythie, Ardoyne, Burnhervie, Shanquhar, Oyne and Westhall. Land use is predominantly agricultural with two large areas of forestry at Gartly Moor on Wishach Hill and at Bennachie Forest on the lower slopes of the Bennachie Mountains. The land between Bennachie Mountain and Inverurie also contains a number of smaller areas of forestry dispersed across the area.

The Aberdeen to Inverness Railway Line crosses this option in an east-west direction, passing through Insch before re-joining the existing A96 corridor near Kirkton of Oyne.

The steep and undulating topography in this section is likely to constrain the improvement strategies. The Bennachie Mountain will constrain any routes resulting in the strategy passing around the base or over the lower slopes of the mountain. In addition, Wishach Hill and the Hill of Foudland will also constrain route options and will likely restrict the route to the small pass between the two hills. Careful consideration will be required on the vertical alignment as it passes between the two hills to avoid steep gradients. The elevation of this section is higher than the existing A96 and consideration should be given on the potential impact on winter maintenance from this increased elevation.

In addition, consideration will be required of the alignment in other sections of this strategy which may result in increased gradients or significant cut and embankment slopes due to the topography, where route options cross valleys between hills and where route options traverse the slopes of local high spots.

4.4.3 Geotechnical Considerations

Superficial Deposits for this improvement strategy option predominantly consist of Glacial Till Deposits. Alluvial Deposits are indicated to be associated with watercourses in the area. Occasionally the Alluvial Deposits are underlain by River Terrace and Glaciofluvial Sheet Deposits. Discrete pockets of Peat are also located throughout the study area. At higher elevations rock is shown to be absent or just below ground level.

Solid geology consists of a complex mix of metamorphic rocks of Precambrian age and igneous rocks of Ordovician age.

Geotechnical constraints are likely to include:

- Potential to encounter weak, compressible ground associated with the Alluvium and Peat.
- Potential for flooding associated with the watercourses in the area.
- A number of existing and disused quarries are located throughout the study area; the present condition of which is not currently known but if infilled, may have issues associated with weak, compressible and potentially contaminated infill. If not infilled, the condition and stability of the quarry faces will need assessed.
- Potential for localised contamination associated with historic land use including quarrying, sandpit, mills and dismantled railway land.

4.4.4 Drainage and Flooding

The SFRA described in **Section 4.2.3(b)** also considered the offline strategies. The design recommendations and next steps outlined in the SFRA also apply to the offline strategies. A summary of the SFRA flood risk constraints analysis for Option C, comprising an assessment of both potential flood sources and potential flood receptors, is included below:

- Option C could potentially compare favourably in this area, as few properties are located within the floodplain, but this would have to be considered in the context of other engineering/ environmental constraints and traffic demand analysis; and
- Option C has a number of properties at risk of flooding. In addition, Option C will require both major and minor watercourse crossings.

4.4.5 Alignment

The length of this offline improvement strategy is approximately 36km. The alignment of route options within the improvement strategy is dependent on the natural and built constraints, such as the existing topography, watercourses, infrastructure, settlements and the locations of geological and environmentally sensitive areas.

These constraints would require further examination during the DMRB Stage 2. Particular consideration should be given to the undulating topography within the strategy area as there are a substantial number of hills and elevated ground levels. The use of relaxations to the vertical alignment standards may therefore be considered to minimise earthworks in these areas. In addition, the horizontal alignment is likely to be constrained between Wishach Hill and the Hill of Foudland (refer to **Section 4.4.2**) and the use of relaxations for horizontal curvature may be considered to minimise the earthworks slopes in this area.

Under this strategy, the existing A96 will be retained as part of the local road network resulting in an additional 43km of de-trunking works.

4.4.6 Structures

A river crossing of the River Don will be required for this improvement strategy. Several other structures, including bridges and culverts, will also be required as this strategy is likely to cross The Shevock and Gadie Burns, in addition to a number of smaller watercourses.

A crossing will be required at the intersection with the Aberdeen to Inverness Railway Line, near the B9002. The strategy will also intersect with a number of existing roads and accesses. The requirement for bridges at these roads to maintain connectivity or as part of grade separated junctions will be determined at DMRB Stage 2 through application of the junction strategy (**Section 4.2.8(l)**).

All new structures which pass over the A96 dual carriageway shall be designed with headroom to satisfy the requirements for a 20ft (6.10m) High Load Route.

4.4.7 Junctions and Accesses

The junction strategy described in **Section 4.2.8(l)** will be applied to the offline strategies at the next stage of design development. An assessment, in accordance with the tier of road under assessment, will be carried out for each road for which the proposed strategy crosses to determine if a junction is to be provided at that location or if an alternative connection is to be provided.
This offline improvement strategy potentially intersects with the B992, B9002, B993, B994 and B977, in addition to a number of C Roads and unclassified roads.

As Option C could also sever access to properties and other minor accesses, each of the affected routes will require assessment during the DMRB Stage 2 Assessment.

4.4.8 Non-Motorised User Provision

The proposed strategy for enhancing NMU provision on the route is detailed in **Section 4.2.11**.

There is an extensive core path network on the Bennachie Mountain, with other core paths located to the north of Kenmay and around Insch. It should be noted that part of these core paths form the Insch Cycle Routes. There are also NMU networks located on Gartly Moor. Consideration will be given to NMU provision within this area and the positioning of crossing points during the DMRB Stage 2 Assessment.

4.4.9 Public Utilities

The presence of public utility apparatus can have a significant impact on constructability, programme and scheme cost. Impacts on utility apparatus will be avoided wherever feasible however if unavoidable, consideration should be given to construction methods for either protection or relocation, depending upon which option is most effective in terms of cost, programme and safety.

The collation of public utility information, in accordance with the C2 Preliminary Inquiries stage of the New Roads and Street Works Act 1991, is ongoing, with further utilities information to be gathered at the next stage of design development.

Two high voltage overhead transmission lines run approximately parallel in a south-east direction, to the east of Inverurie, before terminating at Kintore substation.

A wind farm is located at Dummuie comprising seven 80m high (to blade tip) turbines. In addition, a wind farm comprising five 100m high (to blade tip) turbines is currently in planning (pending approval) for a site on Stony Hill located on the south-west slopes of the Hill of Foudland.

4.4.10 Key Constraints

The key constraints for improvement strategy Option C are outlined below:

- The undulating and steep topography in parts of this strategy will require careful consideration to avoid steep gradients and significant cut and embankment slopes.

- The elevation where the strategy passes between Wishach Hill and the Hill of Foudland is higher than the existing A96 and consideration should be given on the potential impact on winter maintenance.
- Potential to encounter weak, compressible ground associated with the Alluvium and Peat.
- There are potential adverse effects on a number of smaller settlements located within the strategy area.
- Additional infrastructure would be required to cross a number of watercourses, including a crossing of the River Don.

4.5 Option D: Glens of Foudland to North of Inverurie

4.5.1 Improvement Strategy Description

Option D is an alternative improvement strategy to Option B between the Glens of Foudland and the north of Inverurie.

This offline strategy diverges from Option B at the Glens of Foudland before heading in a south-east direction to re-join Option B near Pitcaple, north-west of Inverurie.

4.5.2 Topography and Land Use

The existing A96 at the north-western extent of this improvement strategy passes in between the Hill of Skares (329mAOD) and the Hill of Tillymorgan (381mAOD) as it leaves the Glens of Foudland. The topography to the south-east of the Glens of Foudland quickly flattens with some local undulations to the north of Old Rayne. To the south and east of Old Rayne, the undulations become more pronounced with local high spots at The Law (155mAOD), Westerton (130mAOD) and Gallows Hill (135mAOD) before descending back towards the level of the existing A96 near Pitcaple, at an elevation of approximately 70mAOD.

There are several settlements within this strategy area including Colpy, Pitcaple, Whiteford, Bonnyton, Durno, and Kirkton of Culsalmond. The land use in the area outside of the settlements is agricultural with associated farm properties and buildings dispersed across the area. Forestry is limited to small isolated sections of woodland with the exception of some larger areas on the slopes of the Hill of Skares and the Hill of Tillymorgan and at the southern extent of the strategy in the vicinity of Pitcaple and Whiteford.

The topography of the section is unlikely to present a significant constraint during the development of route options in this section. However, the tie-in of the offline improvement strategy back into the A96 corridor is likely to be impacted by the Hill of Skares and the Hill of Tillymorgan and the tie-in may have to be south of these hills.

Similarly, the constraints on the existing A96 at Pitcaple identified in **Section 4.2.1(l)**, may restrict opportunities for the offline improvement strategy to tie back into the existing A96 corridor and as such, consideration should be given to combining Option D with a direct tie-in to a potential northern offline bypass of Inverurie (Option B9 North).

4.5.3 Geotechnical Considerations

The soils are indicated to consist predominantly of Glacial Till Deposits. Localised deposits of Alluvium are indicated to be associated with watercourses in the area. Discrete pockets of Peat are also located throughout the study area. At higher elevations, rock is shown to be absent or just below ground level.

The solid geology consists mainly of the Insch Pluton which is made up of iron rich olivine gabbro and gabbronorite, with the Macduff Formation consisting of micaceous psammite, semipelite and pelite indicated in the north of the option.

Geotechnical constraints are likely to include:

- Potential to encounter weak, compressible ground associated with the Alluvium and Peat.
- Potential for flooding associated with the watercourses in the area.
- A number of existing and disused quarries are located throughout the study area; the present condition of which is not currently known but if infilled, may have issues associated with weak, compressible and potentially contaminated infill. If not infilled, the condition and stability of the quarry faces will need assessed.
- Potential for localised contamination associated with historic land use including quarrying, sandpit, mills and dismantled railway land.

4.5.4 Drainage and Flooding

The SFRA described in **Section 4.2.3(b)** also considered the offline strategies. The design recommendations and next steps outlined in the SFRA also apply to the offline strategies. A summary of the SFRA flood risk constraints analysis for Option D, comprising an assessment of both potential flood sources and potential flood receptors, is included below:

- Option D appears to perform relatively well in terms of floodplain extents, watercourse crossings and properties at risk.

4.5.5 Alignment

This offline improvement strategy is approximately 16km in length. The alignment of route options within the improvement strategy is dependent on the natural and built constraints, such as the existing topography, watercourses, infrastructure, settlements and the locations of geological and environmentally sensitive areas.

These constraints will be examined further at the next stage of design development.

4.5.6 Structures

It is anticipated that a bridge will be required to cross the River Urie as well as other smaller bridges or culverts where the strategy crosses tributaries of the River Urie.

The strategy will also intersect with a number of existing roads and accesses. The requirement for bridges at these roads to maintain connectivity or as part of grade separated junctions will be determined at DMRB Stage 2 through application of the junction strategy (**Section 4.2.8(l)**).

All new structures which pass over the A96 dual carriageway shall be designed with headroom to satisfy the requirements for a 20ft (6.10m) High Load Route.

4.5.7 Junctions and Accesses

The junction strategy described in **Section 4.2.8(l)** will be applied to the offline strategies at the next stage of design development. An assessment, in accordance with the tier of road under assessment, will be carried out for each road for which the proposed strategy crosses to determine if a junction is to be provided at that location or if an alternative connection is to be provided.

This offline improvement strategy potentially intersects with the A920 and B992, in addition to a number of C Roads and unclassified roads.

As Option D could also sever access to properties and other minor accesses, each of the affected routes will require assessment during the DMRB Stage 2 Assessment.

4.5.8 Non-Motorised User Provision

The proposed strategy for enhancing NMU provision on the route is detailed in **Section 4.2.11**.

There is limited NMU provision in this section. However, consideration will be given to NMU provision and crossing points during the DMRB Stage 2 Assessment.

4.5.9 Public Utilities

The presence of public utility apparatus can have a significant impact on constructability, programme and scheme cost. Impacts on utility apparatus will be avoided wherever feasible however if unavoidable, consideration should be given to construction methods for either protection or relocation, depending upon which option is most effective in terms of cost, programme and safety.

The collation of public utility information, in accordance with the C2 Preliminary Inquiries stage of the New Roads and Street Works Act 1991, is ongoing, with further utilities information to be gathered at the next stage of design development.

A high voltage overhead transmission line runs in a north-west to south-east direction from Colpy and crosses over the A96 to the west of Pitcaple. A second high voltage overhead transmission line also crosses the A96 approximately 500m east of the first line.

A wind farm is located at Dummuie comprising seven 80m high (to blade tip) turbines. In addition, a wind farm comprising five 100m high (to blade tip) turbines is currently in planning (pending approval) for a site on Stony Hill located on the south-west slopes of the Hill of Foudland.

4.5.10 Key Constraints

The key constraints for improvement strategy Option D are outlined below:

- The Hill of Skares and the Hill of Tillymorgan will likely constrain the northern tie-in of Option D to Option B to a location south of these two hills.
- The constraints on the existing A96 at Pitcaple may restrict opportunities for Option D to tie back into Option B and as such, consideration should be given to combining Option D with a direct tie-in to a potential northern offline bypass of Inverurie.
- Potential to encounter weak, compressible ground associated with the Alluvium and Peat.

4.6 Option N: West of Forres to East of Fochabers

4.6.1 Improvement Strategy Description

Option N is an alternative improvement strategy to Option B from the west of Forres to the east of Fochabers. This option removes the need to travel a longer length of the A96 via Forres and Elgin.

This option diverges south from Option B to the west of Forres, heading south-east to pass to the south of Forres before continuing east to pass south of Elgin, Mosstodloch and Fochabers to re-join Option B to the east of Fochabers.

4.6.2 Topography and Land Use

The topography to the south and west of Forres is relatively flat, with elevation levels typically below 50mAOD. However, the Black Burn river valley is located to the east of Forres, where the topography rises to Heldon Hill (234mAOD) in the north and the Hill of the Wangie (319mAOD) in the south, with the Black Burn running along the flat base of the valley between the two hills towards the River Lossie. To the east of the River Lossie and its floodplain, the land generally starts to rise towards Brown Muir Hills (339mAOD), to the south of Fogwatt, and then falls slightly from Fogwatt towards the River Spey and Fochabers. On the east side of the River Spey and its floodplain, the topography rises steadily from around 20mAOD to the level of Whiteash Hill (265mAOD) and Thief's Hill (250mAOD), which are located to the south-east of Fochabers.

There are a number of settlements located within the improvement strategy area including Altonside, Fogwatt, Orbliston, Rafford, and Tulloch as well as individual residential and farm properties distributed across this section. The land use in this section is predominantly agricultural and forestry with large areas of forestry at Darnaway Forest (Option N shall avoid the Natura sites in this area - refer to **Section 3.3**), Altyre Woods, on the slopes of Heldon Hill and the Hill of the Wangie, Teinland Woods and at the eastern tie-in on the slopes of Whiteash Hill and Thief's Hill. To the south of Elgin, there are a number of distilleries in the area and a country park which is located at Millbuies.

The topography of the section is unlikely to require significant consideration during the development of route options in this section. However, Heldon Hill and the Hill of the Wangie will constrain route options to run either in the base of the valley or lower slopes between these two hills or to the north of Heldon Hill. Careful consideration of the vertical alignment of any route options passing through the

valley between the hills will be required where the route leaves the eastern end of the valley. In addition, the topography at the eastern tie-in of this improvement strategy will likely to constrain the route of the A96 as it passes between Whiteash Hill and Thief's Hill.

4.6.3 Geotechnical Considerations

This improvement strategy is predominantly underlain by Glaciofluvial Ice Contact and Sheet Deposits. Localised areas of Alluvium are also noted around watercourses, namely the Rivers Findhorn and Lossie. In addition, River Terrace and Lacustrine Deposits are also associated with these rivers. There are localised areas of Peat to the south of the study area. Glacial Till is shown to underlie the above superficial deposits throughout the section.

The solid geology underlying this section comprises the Nethybridge Psammite Formation consisting of psammite in the centre of the area, with sandstone and conglomerate of Devonian Age beneath the west and east of the improvement strategy option.

- Potential to encounter weak, compressible ground associated with Peat and Alluvium Deposits.
- Potential for flooding associated with the watercourses in the area.
- A number of existing and disused quarries are located throughout the study area; the present condition of which is not currently known but if infilled, may have issues associated with weak, compressible and potentially contaminated infill. If not infilled, the condition and stability of the quarry faces will need assessed.
- Potential for localised contamination associated with historic land use including quarrying, gravel and sand pits and saw mills.

4.6.4 Drainage and Flooding

The SFRA described in **Section 4.2.3(b)** also considered the offline strategies. The design recommendations and next steps outlined in the SFRA also apply to the offline strategies. A summary of the SFRA flood risk constraints analysis for Option N, comprising an assessment of both potential flood sources and potential flood receptors, is included below:

- Option N is constrained by fluvial floodplains; however, given that this option is generally further upstream in each catchment, fluvial floodplains may not be as widespread across each section;
- Option N has few properties within the functional floodplain; and
- Option N requires a major crossing for the River Spey. The location of the crossing would be a critical consideration due to Natura (nature conservation sites designated at a European level) and the potential flood risk implications to surrounding (hydrologically influenced) properties.

4.6.5 Alignment

The length of this offline improvement strategy is approximately 42km. The alignment of route options within the improvement strategy is dependent on the natural and built constraints located within the strategy area, such as with the existing topography, watercourses, infrastructure, settlements and the locations of geological and environmentally sensitive areas.

These constraints will be examined further at the next stage of the design development.

4.6.6 Structures

This strategy will require a major river crossing of the River Spey and its floodplain with the river designated as a SAC. This will require careful consideration as activity within the SAC is strictly regulated under European Environmental legislation which will likely place restrictions on the form and construction of the structure.

In addition, this strategy will require crossings of the River Findhorn and River Lossie and several other smaller watercourses. The strategy will also cross the Aberdeen to Inverness Railway Line to the south-east of Lhanbryde, as well as intersecting with a number of existing road and accesses.

The requirement for bridges at these roads to maintain connectivity or as part of grade separated junctions will be determined at DMRB Stage 2 through application of the junction strategy (**Section 4.2.8(l)**).

All new structures which pass over the A96 dual carriageway shall be designed with headroom to satisfy the requirements for a 20ft (6.10m) High Load Route.

4.6.7 Junctions and Accesses

The junction strategy described in **Section 4.2.8(l)** will be applied to the offline strategies at the next stage of design development. An assessment, in accordance with the tier of road under assessment, will be carried out for each road for which the improvement strategy crosses to determine if a junction is to be provided at that location or if an alternative connection is to be provided.

This offline improvement strategy potentially intersects with the A940, A941, B9010, B9103 and B9015, in addition to a number of C Roads and unclassified roads.

As Option N could also sever access to properties and other minor accesses, each of the affected routes will require assessment during the DMRB Stage 2 Assessment.

4.6.8 Non-Motorised User Provision

The proposed strategy for enhancing NMU provision on the route is detailed in **Section 4.2.11**.

There is a limited Core Path Network in this section, however there is a network of local routes at Millbuies Country Park at Fogwatt and within Monaughty Wood. Consideration will be given to enhancing NMU provision and providing crossing points during the DMRB Stage 2 Assessment.

4.6.9 Public Utilities

The presence of public utility apparatus can have a significant impact on constructability, programme and scheme cost. Impacts on utility apparatus will be avoided wherever feasible however if unavoidable, consideration should be given to construction methods for either protection or relocation, depending upon which option is most effective in terms of cost, programme and safety.

The collation of public utility information, in accordance with the C2 Preliminary Inquiries stage of the New Roads and Street Works Act 1991, is ongoing, with further utilities information to be gathered at the next stage of design development.

A high voltage overhead transmission line runs in a south-easterly direction from the A96 to the east of Elgin to join a second line south of Lhanbryde where they continue in a south-east direction.

4.6.10 Key Constraints

The key constraints for improvement strategy Option N are outlined below:

- The topography at Heldon Hill and the Hill of the Wangie will likely constrain the horizontal alignment with careful consideration of the vertical alignment required for any route options at the eastern extent of the valley. In addition, the topography at the eastern tie-in of this improvement strategy to Option B will likely constrain the route of the A96 as it passes between Whiteash Hill and Thief's Hill. Careful consideration will be required of the vertical alignment in this section where the strategy leaves Option B to pass to the south of Fochabers.
- A major structure will be required for the crossing of the River Spey and its floodplain with the river designated as a SAC. This will require careful consideration as activity within the SAC is strictly regulated under European Environmental legislation which will likely place restrictions on the form and construction of the structure. In addition, a number of smaller river crossings with associate flood risk areas will be required at the River Findhorn and River Lossie and their associated flood risk areas.
- Potential to encounter weak, compressible ground associated with Peat and Alluvial Deposits.
- Option N shall avoid the Natura sites at the western extent of the strategy at Darnaway Forest.

4.7 Comparative Preliminary Cost Estimates

At this stage of the development of the improvement strategy options, a comparative cost estimate between options has not been produced. The Improvement Strategy Options B, C, D and N are not directly comparable as they relate to different sections and lengths of the route.

The overall economic assessment of the A96 Dualling Programme is discussed in **Section 6.6**.

5 Environmental Assessment

5.1 Introduction

A Strategic Environmental Assessment (SEA) of the A96 Dualling Programme has been undertaken to comply with the Environmental Assessment (Scotland) Act 2005. The purpose of the SEA has been to consider at a high level what effects the A96 Dualling Programme may have on different aspects of the environment.

The SEA has been undertaken in parallel to, but separate from, this DMRB Stage 1 Assessment Report.

5.2 Environmental Approach

The A96 Dualling Programme SEA has adopted a two-tier approach to ensure that effective environmental assessment has been integrated throughout programme development.

- Tier 1 SEA informed the early Strategic Business Case work associated with the Inverness to Aberdeen strategic corridor study. The Tier 1 SEA Environmental Report and its NTS were published in September 2014.
- Tier 2 SEA considers a range of alternative Improvement Strategies for A96 Dualling, which have been developed via this Preliminary Engineering Services (PES) workstream, to consider alternative means of providing a dual carriageway between Inverness and Aberdeen.

SEA considers the potential effects of A96 dualling on a series of environmental constraints categorised against nine SEA topics:

- Biodiversity, Flora and Fauna;
- Soils and Geodiversity;
- Water and Flooding;
- Air;
- Population and Human Health;
- Historic Environment;
- Landscape;
- Climatic Factors; and
- Material Assets.

Through the SEA scoping process (carried out in December 2014) and in discussion with the SEA Consultation Authorities (Scottish Natural Heritage, Scottish Environment Protection Agency and Historic Scotland) two of these topics were scoped out of the SEA Assessment. The rationale for the SEA scope is summarised in **Table 5.2.1** overleaf.

SEA Topic	Scoping Rationale
Climatic Factors	• Following CA feedback, potential criteria for climate change were considered however at the very strategic and constraints-led level of assessment for this SEA none was considered to offer useful criteria to inform the appraisal. • CO2 emissions from traffic will not be included since there is no significant difference between the options under consideration. • Similarly embodied carbon/energy in infrastructure would not vary materially between options. • Carbon rich soils (in the Soil and Geodiversity topic) represents a broad proxy for impacts on release of carbon stored in soils/ peat affected by road development. • Flooding criteria (in the Water topic) are also representative of climate change related constraints in the corridor.
Material Assets	• At the level of assessment proposed and the constraints based approach to SEA material assets were not considered to represent constraints which help inform comparative environmental assessment of options. • Important to recognise that most linear features (e.g. pipelines, overhead cables, roads etc.) are not necessarily a major constraint to dualling as they can be accommodated through appropriate design/structures or avoided.

Table 5.2.1 Topics Scoped out of SEA Assessment

As well as a statutory requirement under the Environmental Assessment (Scotland) Act 2005 the SEA may be viewed as broadly equivalent to the environmental input to a DMRB Stage 1 assessment. DMRB Volume 11 requires that constraints/opportunities are identified under 12 environmental topics and **Table 5.2.2** demonstrates how these have been addressed within the scope of A96 Dualling SEA.

DMRB Environmental Topic	A96 SEA Topics
Air Quality	Air
Cultural Heritage	Historic Environment
Disruption Due to Construction	To be considered at future DMRB stages
Ecology and Nature Conservation	Biodiversity, Flora and Fauna
Landscape Effects	Landscape
Land Use	Population and Human Health
Noise and Vibration	
Pedestrians, Cyclists, Equestrians and Community Effects	
Vehicle Travellers	
Road Drainage and Water Environment	Water and Flooding
Geology and Soils	Soils and Geodiversity
Impact of Road Schemes on Policies and Plans	Detailed Policy, Plans and Strategy (PPS review)

Table 5.2.2 DMRB Environmental Topics and Related SEA Topics

In order to effectively identify, collate and assess key environmental issues and constraints along the route, the SEA adopted a GIS (Geographic Information Systems) mapping approach. This has focused on designations and constraints for

a 15km-wide corridor between Inverness and Aberdeen, broadly following the route of the existing A96 trunk road and the rail line between the cities.

Using environmental data and a review of the relationship between the A96 Dualling Programme with other relevant plans and programmes; a series of assessment criteria were developed to guide the SEA team on identifying the potential for significant effects, or possible benefits of each option. The criteria were reviewed throughout the assessment process as new datasets became available.

As the assessments progressed as part of the Tier 2 SEA and options were sifted out, a more detailed review of the environmental constraints was undertaken to broadly compare the remaining options.

The assessment was also informed by the following supporting studies:

- Strategic Flood Risk Assessment;
- Habitat Regulation Appraisal Screening; and
- Landscape Review.

It should be noted that it was not the objective of the SEA assessment to identify a clear option 'preference' in overall environmental terms. The SEA instead provides an increased understanding of environmental constraints for each remaining option and identifies any potential for significant effects.

The outputs of this SEA, presented in an Environmental Report, will be used at later stages of the design and development of route options, as well as project level environmental assessments.

5.3 Findings

This section provides a summary of the key findings of the assessment based on the environmental topics used in the SEA. It presents the key issues identified and the proposed mitigation. Further information on the SEA and the environmental assessment undertaken on the A96 Dualling Programme can be found in the A96 Dualling Programme Strategic Environmental Assessment Tier 2 Environmental Report.

5.3.1 Biodiversity, Flora and Fauna

SEA Topics addressed: Internationally designated sites: Ramsar sites; Special Protection Areas (SPAs) and Special Areas of Conservation (SACs); Sites of Special Scientific Interest (SSSIs); National Nature Reserves; Local Nature Reserves; Ancient Woodland; Native Woodland and sites designated for local nature conservation importance.

(i) Key Issues

- Nationally and internationally designated nature conservation sites are located within the corridor, primarily to the north of the A96.
- The River Spey SAC (and Biological SSSI) is a key constraint, crossing the corridor between Mosstodloch and Fochabers, and which would require an appropriate crossing, irrespective of the option taken forward.

- The Darnaway and Lethen Forest SPA, and Lower Findhorn Woods SAC encroach into Options B (south of Forres) and Option N.
- The Moray and Nairn Coast SPA/ Ramsar site encroach into Option B (north of Forres), while the Loch Spynie SPA and Ramsar site encroaches into Option B (north of Elgin).
- It is considered that land-take from these designated sites could be avoided within the alignment options.
- There are a number of biological, geological, and mixed SSSIs scattered throughout the corridor.
- Locally designated nature conservation sites (comprising comprising Sites of Interest to Natural Science [SINS] in Moray, Local Nature Conservation Sites [LNCS] and Study of Environmentally Sensitive Areas [SESA] in Aberdeenshire and Aberdeen City) are scattered throughout the options. Many of these sites overlap with nationally and internationally designated sites, and a number cross the breadth of option study boundaries, and may therefore be unavoidable, including:
  - Findhorn Valley SINS - Option N (west and south of Forres);
  - Spynie SINS - Option B (north of Elgin);
  - Spey, Garmouh - Boat O' Brig SINS - Options B and N;
  - Hill of Foudland SESA - Options C, D, and B; and
  - Foudland LNCS - Options B and D.
- Woodland is a key constraint, with native and ancient woodlands crossing the options at multiple points, therefore some land-take may be unavoidable. For example, there is a large area of ancient woodland south-east of Fochabers, which is likely to prove unavoidable.

(ii) Strategic Mitigation

- Avoidance of designated sites and other important areas for nature conservation wherever possible.
- Watercourse crossing designs to avoid/ or minimise land-take affecting river banks and valleys in particular for crossing of the River Spey (a designated SAC).
- Road alignment to minimise habitat fragmentation where habitat loss is unavoidable.
- Road design to incorporate appropriate species crossing infrastructure to minimise habitat fragmentation and severance.
- Key mitigation measures could include habitat restoration and creation of new areas of native woodland.
- Further screening of the potential for options to affect SACs and SPAs (Natura sites) would be required at subsequent stages of design and agreed with Scottish Natural Heritage.

5.3.2 Soils and Geodiversity

SEA Topics addressed: Geological SSSIs and Conservation Review sites; prime agricultural land and high carbon soils.

(i) Key Issues

- Agricultural land uses take place outwith the towns and there is potential for greater impacts on prime agricultural land in Option B north of Forres and Elgin and for parts of Options B and D between Inverurie and Colpy.
- Carbon rich soils are not extensive in the corridor; only in Option B to the north and south of Keith, and in part of Option C south of Insch, is more than 10% of soils classed as having a high carbon content.
- Severance of agricultural land and farm units is predicted to occur regardless of option selection and later stages of design and assessment would need to address this in more detail including through mitigation.

(ii) Strategic Mitigation

- Future corridor alignments to avoid prime agricultural land where possible.
- Farm accommodation works to be reviewed in more detail as design options are progressed.

5.3.3 Water and Flooding

SEA Topics addressed: Fluvial (rivers); pluvial (surface water) and coastal flooding; watercourse crossings; groundwater; flood defence infrastructure and properties in the floodplain

(i) Key Issues

- There are floodplains throughout the A96 corridor typically associated with rivers, burns and estuaries and particularly in areas of lower lying flat land.
- Substantial flood risk areas are located to the north west of Forres (affecting northern variant of Option B), north east of Elgin (also affecting northern variant of Option B) and to the east and south east of Inverurie (affecting much of the northern variant of Option B and parts of its other variants).
- Populated areas which typically contain large numbers of houses within the floodplain include Forres, Elgin, Insch and Inverurie.
- River crossings would be needed for the new road in a number areas including (from north to south) over the rivers Findhorn, Lossie, Spey, Isla, Deveron, Urie and Don.
- The assessment identified the presence of a number of existing flood defence/alleviation schemes near the route of existing A96 at Forres, Elgin, Lhanbryde and Inverurie which could be affected by the dualling; there is also a scheme proposed at Huntly.

(ii) Strategic Mitigation

- Where possible, avoidance of the most extensive areas of flooding with future route alignments.
- Road and bridge designs to minimise loss of storage capacity from floodplain.
- Use of bridges and culverts which maintain watercourse flows without affecting upstream and downstream hydrology.
- Further assess effects on flood alleviation schemes.

5.3.4 Population and Human Health

SEA Topics addressed: Areas of population; traffic flow; air quality; key walking; cycling and equestrian routes.

(i) Key Issues

- Option B typically follows a corridor closer to the existing A96 than other options, but splits into option variants at Forres, Elgin and Inverurie.
- Other towns within the corridor include Fochabers (near to Options B and N), Keith (edge of Option B), Huntly (Options B and C), Insch (Option C) and Kintore (Options B and C).
- Air quality throughout the corridor is generally good and within statutory objective levels. Projected increases in traffic within the corridor have the potential to both increase and decrease local air pollutant concentrations depending on the final dualled route alignment.
- Options B and N are crossed by regionally important cycling and walking routes near Forres (NCN Route 1 and Dava Way) and near Fochabers (Speyside Way).
- The Dava Way and Isla Way cross Option B near Keith and Core Paths are present throughout the route and in all options assessed.

(ii) Strategic Mitigation

- Route choice to take account of proximity of operational road traffic effects on receptors in populated areas to reduce potential air quality and noise effects.
- Use of noise barriers to be considered in locations where road traffic could increase noise impacts at nearby properties.
- Road design to accommodate crossings with paths, cycleways and other non-motorised users (NMUs) routes, with minimal disruption to their alignments where possible..
- Future corridor alignments to minimise need for property demolition and land take.

5.3.5 Historic Environment

SEA Topics addressed: Scheduled monuments; listed buildings; gardens and designed landscapes; inventory battlefields; conservation areas in towns and local archaeological sites.

(i) Key Issues

- There are designated historic assets throughout the A96 corridor, including scheduled monuments, listed buildings, conservation areas, inventory battlefields and gardens and designed landscapes.
- A future dualled route could affect both the structure and/ or setting of cultural heritage assets (designated and non-designated), which presents particular challenges for avoiding all sites.
- There are a large number of non-designated cultural heritage assets recorded on Moray and Aberdeenshire Historic Environment Records (HER). The value, nature and extent of these cannot be fully considered at this stage of assessment.
- There are a large number of non-designated assets recorded across all options, which indicates that there are likely to be concentrations of areas with archaeological potential identified at later stages of assessment.
- Validated and reliable HER data was not available for Aberdeen City for the assessment, resulting in a small gap in understanding of the potential archaeological resource at the southern extent of the corridor.
- Particular constraints include:
  - Dallas Dhu Distillery SM and listed buildings (Options B and N);
  - Gordon Castle and Keith Hall GDLs, associated listed buildings and scheduled monuments (Option B);
  - Williamston House and Newton House GDLs and associated listed buildings (Options B and D);
  - Harlaw Inventory Battlefield (Option B); and
  - Picardy Stone scheduled monument and Property in Care (Option C).

(ii) Strategic Mitigation

- In the first instance, avoidance of designated and non-designated cultural heritage assets with future road alignments to preserve their structure and setting in situ.
- Where preservation of remains in situ is not possible (in the case of non-designated assets) a range of measures may be undertaken to mitigate and offset the adverse impacts on the archaeological resource.
- Further analysis of the extent and significance of non-designated archaeological sites would be undertaken when more defined corridor options are available to understand the potential impacts of road development and mitigate these appropriately.

5.3.6 Landscape and Visual

SEA Topics addressed: Local landscape designations; landscape character; taking account of key contributing elements to the landscape such as landform; woodlands; settlement and infrastructure; landscape sensitivity; properties and settlements which could form visual receptors to dualling.

(i) Key Issues

- There are no national landscape designations within or adjacent to the corridor.
- The existing A96 is an established part of the local landscape and therefore is an existing feature which reduces its sensitivity.
- At the northern end of Option B around Forres and Elgin the landscape consists mainly of flat lowland agricultural land, with some large areas of woodland that should be avoided where possible. Generally the scale of the landscape can absorb the inclusion of a new road without a major detriment to the quality and character of this landscape.
- Around Fochabers the landscape character is more hilly and wooded, then undulating to the east. There are large areas of woodland to the east which may be difficult to avoid through dualling.
- The landscape between Keith and the Glens of Foudland is generally of a hilly, open character with patches of woodland and individual dwellings and farms. Some of this woodland, for example around Bin Forest, would be difficult to avoid as a result of dualling through challenging and hilly terrain.
- To the south of the corridor past Glens of Foudland, the landscape is generally of gently rolling terrain and agricultural land which is sensitive to change due to its openness.
- Any new elevated structures required to cross watercourses, or the railway line, would have a permanent effect on the character of the landscape and would therefore require careful design.
- There are three locally designated Areas of Great Landscape Value (AGLVs) to the north of the corridor; one associated with the River Spey, another with Pluscarden Abbey and one with the River Findhorn.
- The northern end of the corridor is constrained by setting impacts on historic features such as Dallas Dhu Distillery south of Forres.
- At the southern end of the corridor there are a large number of scheduled monuments and listed buildings which contribute to landscape character and sensitivity. Keith Hall GDL contributes to a very sensitive landscape east of Inverurie which could be impacted by the northern variant of Option B in this location.

(ii) Strategic Mitigation

- Avoidance of important areas for landscape wherever possible, taking account of other constraints including visual receptors in properties and settlements.

- Minimise impacts on key features and their setting, as well as on the structures of the landscape which contribute to its character and sensitivity including native woodlands, historic buildings and shelterbelts.
- Respecting topography when developing future alignments so that road designs flow with the contours of the land and the road sits out of sight of visual receptors wherever possible.
- Follow the principles of Transport Scotland's Fitting Landscapes guide.
- Mitigate landscape and visual aspects of new road infrastructure (e.g. junctions) through well designed screen planting using native species typical of the area.
- Take account of other road elements including positioning of signs and lighting columns.

5.4 Next Steps

The SEA process will be concluded through preparation of a Post Adoption Statement, following public consultation on the SEA Environmental Report, which will:

- explain the whole SEA process and how it has been integrated with the A96 Dualling Programme;
- summarise the key findings of the public consultation process;
- set out how the A96 Dualling Programme has been influenced by the SEA and by the feedback from consultation; and
- set out a finalised Monitoring Framework to ensure that the findings of the SEA are effectively cascaded to the later stages of DMRB design and environmental assessment.

6 Traffic and Economic Assessment

6.1 Introduction

Traffic on the A96 comprises both strategic and long distance trips between Inverness and Aberdeen as well as short, local trips between and within the various communities along the corridor. The majority of trips are between towns on the corridor and the two cities at either end, with only a small proportion travelling the full route. As the strategic traffic travels directly through settlements, there is the potential for conflict with local pedestrian and cyclist movements.

The traffic data has been collected from Transport Scotland and the Scottish Road Traffic Database (SRTDb)[11] which compiles data from Automatic Traffic Counters (ATCs) located on the A96. In addition, a series of 12-hour Junction Turning Counts (JTCs) and Road Side Interviews (RSIs) were undertaken in April and May 2013 at key locations along the route.

Traffic levels vary along the length of the A96, with the highest volume experienced on approach to Inverness and Aberdeen. In addition, increased demand can also be seen on approach to Elgin. This indicates the importance of Elgin as a key attractor on the corridor. Average Annual Daily Traffic (AADT) levels from 2008 to 2012 were highest on the western edges of Aberdeen, with 33,000 vehicles recorded between Aberdeen and Bucksburn. The section between Bucksburn and Aberdeen is not within the extents of the upgrade programme, but has been included within this traffic analysis to assist in the discussion of traffic levels, trends and driver behaviour.

The two-way 2012 AADT from Raigmore Interchange to Smithton Roundabout, Smithton Roundabout to Nairn and Kintore to Bucksburn were 29,000, 14,200 and 23,800 vehicles respectively, highlighting the variation along the route.

6.2 Base Line Traffic Conditions

6.2.1 A96 Average Annual Daily Traffic Data

In total there are 33 operating ATCs on the A96 between Inverness and Aberdeen. The data from each ATC was analysed separately to enable clear presentation of the traffic conditions at each location, in addition to allowing for overall trends in traffic demand along the A96 to be identified. The location of the counters is shown in **Table 6.2.1** overleaf.

[11] SRTDb is currently being replaced by the new National Traffic Data System (NTDS)

Section Name	ATC	Location
Inverness to West Seafield	ATCNE011	A96 Raigmore to West Seafield
West Seafield to Nairn	ATC01065 ATC01066 ATC01067 ATC01064	A96 Seafield to Smithton Distributor A96 Smithton Distributor to Balloch Ditributor A96 Balloch Distributor to Newton of Petty (B9039) Newton of Petty Gollanfield
Nairn	ATC01062 ATC01061	A96 Delnies Junction Nairn A96 Auldearn Bypass
Nairn to Forres	126401	A96 Brodie
Forres	ATC02038	A96 Forres
Forres to Elgin	ATCNE014 ATCNE019	A96 Forres to Elgin A96 Elgin West Road
Elgin	ATC00020 ATC00021 ATC02040 ATC00022	A96 Elgin High Street West A96 Elgin Alexandra Road A96 Elgin Town Centre A96 Elgin to East Road
Elgin to Fochabers	ATCNE006 ATC02037	A96 Elgin to Lhanbryde A96 Mosstodloch
Fochabers Bypass	N/A	
Fochabers Bypass to Keith	N/A	
Keith	ATC02036 ATC02035	A96 North of Keith A96 South of Keith
Keith to Huntly	N/A	
Huntly to Inverurie	ATC02034 ATCNE04 ATC02033	A96 Huntly A96 2.5km South of A920 Colpy A96 Inverurie Bypass (north)
Inverurie	ATC02032 ATC02031	A96 Inverurie Bypass (central) A96 Inverurie Bypass (South)
Inverurie to Kintore	N/A	
Kintore	ATC00019 ATCNE018 ATCNE017	A96 North of Kintore Bypass A96 B977 to Kintore Junction (N) A96 Broomhill Rbt to B977
Kintore to Bucksburn	ATCNE016	A96 Kineller Roundabout to Broomhill Roundabout
Bucksburn to Aberdeen	ATC02006 ATC02004	A96 Inverurie Road A96 Auchmill Road

Table 6.2.1 Location of ATC Counters on the A96

The following counters were found to have significant inconsistencies or omissions and were therefore excluded on the basis that the counters were unreliable:

- *A96 Clinterty (Weigh in Motion (WiM));*
- *A96 East of Blackburn; and*
- *A96 Stoneywood.*

Data from the ATCs at various locations on the route have been assessed to determine the change in flows over the last 5 years, indicating traffic growth or decline.

Figure 6.2.1 below and **Table 6.2.2** overleaf show the varying traffic levels along the A96 and highlights the increased demand on approach to Aberdeen and Inverness, as well as the relatively high traffic volume on approaches to Elgin and on the eastern approach to Inverurie. Traffic levels are generally lower between Fochabers and west of Inverurie with AADT levels of between approximately 6,400 and 7,350.

The variation in AADT along the corridor, over the five year period, is also shown in the figure. This indicates no significant change in traffic levels over the five year period. There appears to have been a slight decrease in traffic demand from 2008 to 2010, particularly in the most heavily trafficked sections of the route, however traffic levels seem to have recovered to some degree. This is generally in line with changes in traffic levels elsewhere in the country, reflecting the recent economic downturn.

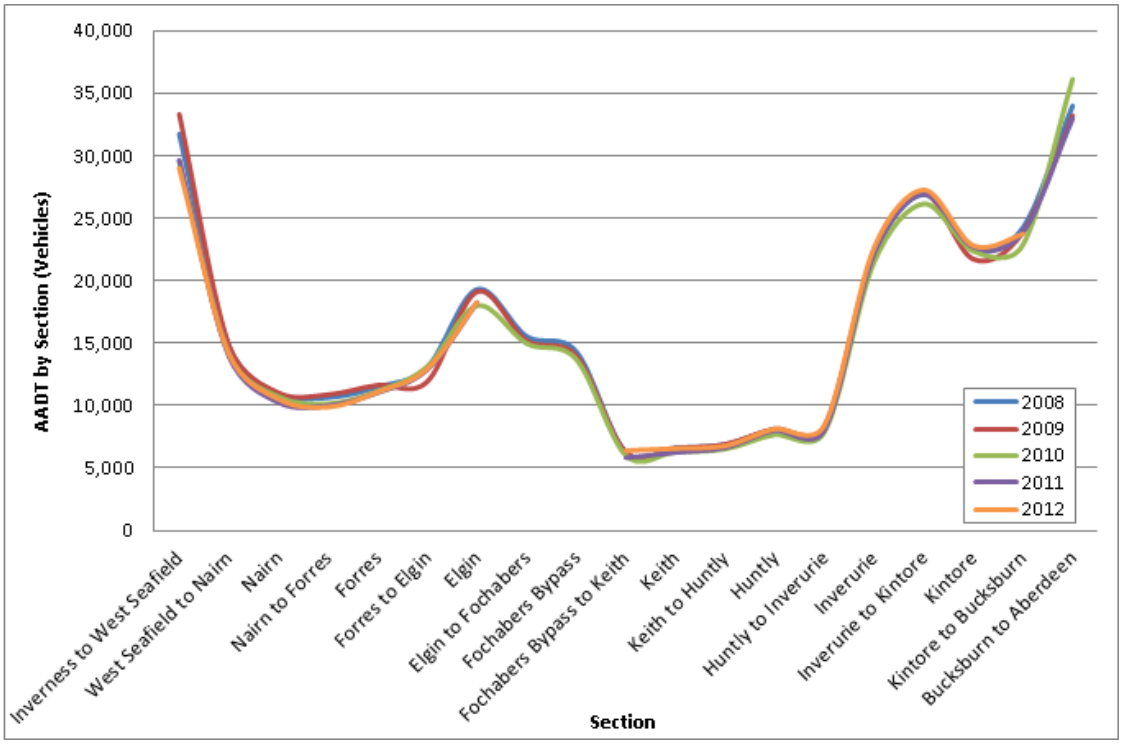

Figure 6.2.1 AADT by Section over Five Year Period (2008 – 2012)

Section Name	2008	2009	2010	2011	2012	% Change
Inverness to West Seafield	31,800	33,300	29,600	29,700	29,000	-9%
West Seafield to Nairn	14,800	14,800	14,100	14,000	14,200	-4%
Nairn	10,900	11,000	10,700	10,300	10,500	-4%
Nairn to Forres	10,600	10,900	10,100	10,000	9,900	-7%
Forres	11,500	11,600	11,200	11,000	11,100	-4%
Forres to Elgin	13,100	11,900	13,100	12,900	13,000	-1%
Elgin	19,300	19,100	18,000	18,300	18,300	-5%
Elgin to Fochabers	15,600	15,200	15,000	13,000	8,200	-47%[a]
Fochabers to Keith	6,300	6,300	6,000	5,800	6,400	+2%
Keith	6,600	6,600	6,300	6,200	6,600	-1%
Keith to Huntly	6,900	6,900	6,500	6,600	6,800	-2%
Huntly	8,100	8,200	7,700	8,000	8,100	0%
Huntly to Inverurie	8,200	8,300	7,900	8,100	8,400	+3%
Inverurie	22,200	22,300	21,500	22,200	22,700	+2%
Inverurie to Kintore	26,900	27,100	26,200	27,000	27,300	+1%
Kintore	22,500	21,700	22,400	22,700	22,800	+2%
Kintore to Bucksburn	24,300	23,900	22,900	23,900	23,800	-2%
Bucksburn to Aberdeen	34,000	33,200	36,200	33,000	No data	-3%[b]

Table 6.2.2 Traffic Volumes on the A96 (2008 – 2012)

Notes to Table 6.2.2
All flows rounded to the nearest 100
[a] - Large reduction on traffic around Fochabers due to the opening of the Fochabers Bypass in 2012 which bypassed this counter.
[b] – Based on 2011 data due to faulty counters in 2012

The data from **Table 6.2.2** is represented graphically in **Figure 6.2.2** overleaf.

Figure 6.2.2 Annual Average Daily Traffic by Section in 2012 (2011*) (2010**) from Scottish Road Traffic Database, Transport Scotland

6.2.2 Traffic Composition

RSI's undertaken during April 2013 recorded traffic levels by vehicle class during a 12-hour period (07:00 to 19:00). The number of HGVs and percentage, compared to overall traffic, recorded during this period is shown in **Figure 6.2.3** below.

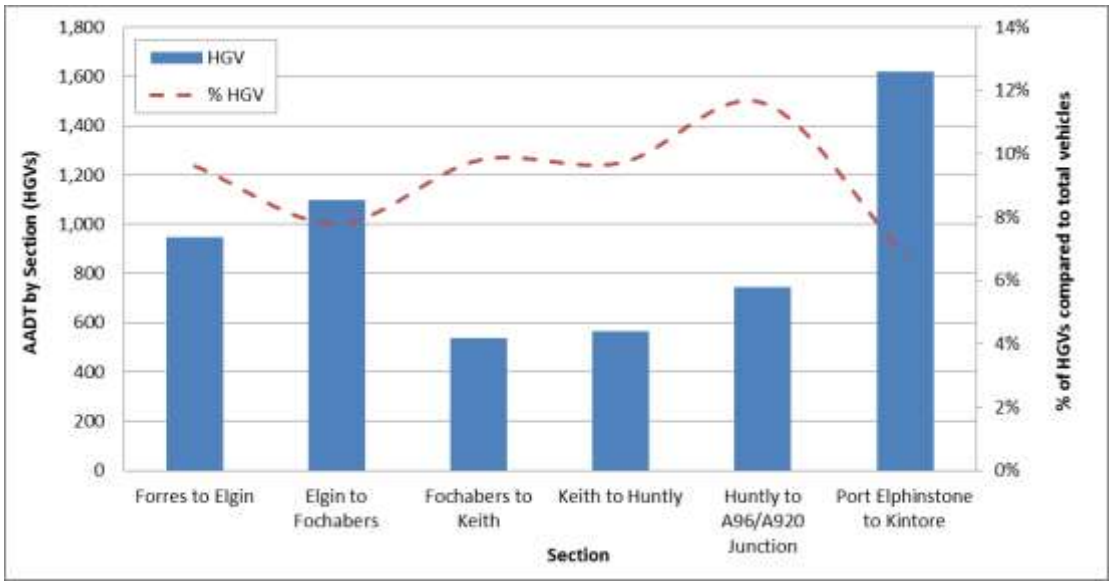

Figure 6.2.3 Percentage of HGVs on A96 (RSI data, 2013)

As shown in **Figure 6.2.3**, the percentage of Heavy Goods Vehicles along the route follows a different pattern. Traffic surveys, conducted in 2013, highlighted that the percentage of HGVs varies between just over 6% to almost 12%. There is a noticeable drop in the volume of HGVs east of Fochabers due to a significant proportion travelling on the A98 instead of the A96 east of Fochabers.

Agriculture, timber and whisky are key industries on the A96 and are some of the main generators of freight on the route. Analysis of traffic data indicates that the peak for HGV flow tends to be around September/October.

At the western end of the A96, the westbound HGV levels tend to be slightly higher than eastbound. It is considered that this is due to an anti-clockwise movement of HGVs from the A9 northbound to the A95 at Aviemore and then to the A96 westbound, before traffic re-joins the A9 at Inverness to travel south towards the central belt. A small minority of freight traffic are considered to use the entire length of the A96, with HGVs generally only using the route for local trips or other relatively short journeys.

It should be noted that there are problems associated with HGVs along the route, particularly in the towns where HGVs significantly impact traffic flow due to narrow lanes and road geometry which was not purpose built for such vehicles. This leads to increased conflict both between HGVs and other vehicles as well as between HGV and NMUs. High levels of HGV movements within urban areas will also have a negative impact on the amenity of these areas and potentially on road safety.

6.2.3 Seasonal Variations

Figure 6.2.4 below examines the seasonality of traffic on the A96 by expressing the relationship of traffic levels in the summer period to those at AADT level for the various sections along the route.

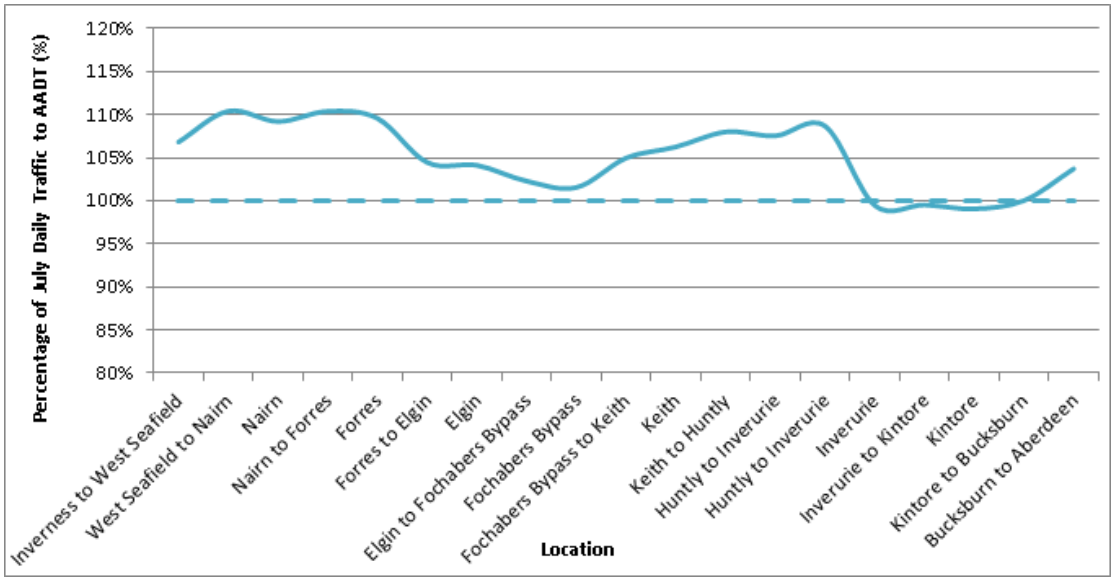

Figure 6.2.4 Seasonality by Section Five Year Average (2008 – 2012)

As portrayed in **Figure 6.2.4**, traffic levels appear to be around five to ten per cent higher in July than the AADT for sections between Inverness and Elgin and from Fochabers Bypass to Inverurie. This reflects the importance of tourist traffic on these areas of the corridor. On the sections of the route where commuting is pronounced, such as the immediate vicinity of Elgin and the approach to Aberdeen, the July flows are far closer to the AADT level, indicating that tourist traffic has less impact in these areas.

6.2.4 Origins and Destinations

Analysis of travel patterns, using RSI survey information[12], indicates that the majority of road based trips are between settlements within the corridor, with as little as 12 per cent of those surveyed, starting and finishing their journeys outwith the Inverness to Aberdeen corridor. **Figure 6.2.5** overleaf, shows the distribution of trips of the remaining 88 per cent that have an origin or destination in the corridor or the cities at either end.

[12] Roadside Interviews were undertaken on the A96 in April 2013

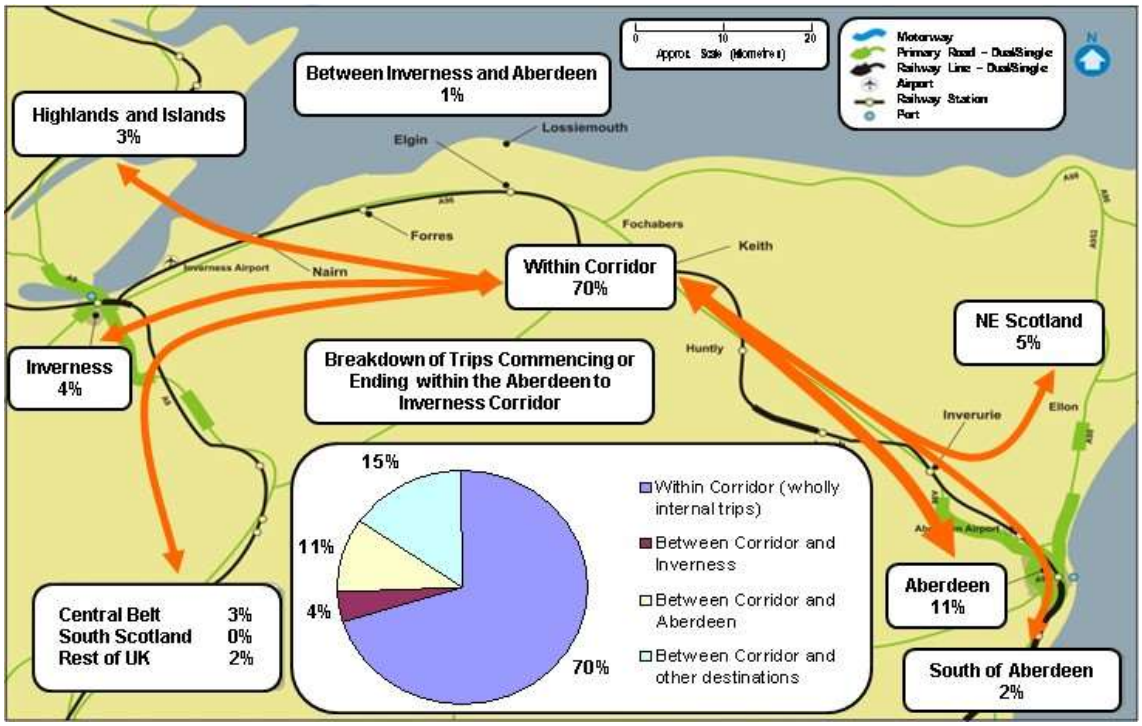

Figure 6.2.5 Origins and Destinations of Trips on the A96

Figure 6.2.5 highlights the significant proportion of trips within the corridor. This pattern, coupled with the fact that, of those surveyed, approximately half were travelling a distance of less than 40km, highlights the importance of the A96 in providing connections between the towns as well as to the cities at either end. Analysis of Scotland's Census Register Online (SCROL) data for each of the key settlements along the corridor supports this with the vast majority travelling less than 40km to travel to work.

RSI information indicates that, of those using the A96, 71 per cent of origins and 79 per cent of destinations are within the corridor. The distribution of the remaining 29 per cent and 21 per cent of origins and destinations, respectively, are presented in **Figure 6.2.6** overleaf.

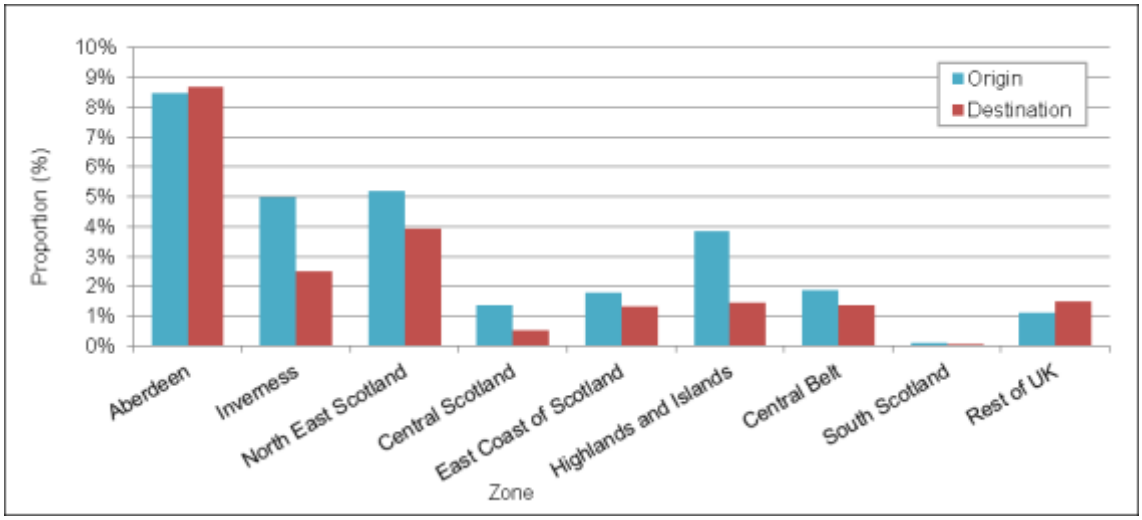

Figure 6.2.6 Distribution of Origins and Destinations which are external to the Inverness to Aberdeen Corridor Area[13]

As presented in **Figure 6.2.6**, the majority of trips which originate or terminate outwith the corridor have origins or destinations in North East Scotland.

Elgin has been identified as a significant attractor/generator of trips on the corridor, with the highest traffic volumes, outwith the approaches to Inverness and Aberdeen. RSIs have been analysed, and used alongside the available Transport Model for Scotland (TMfS:12), to determine the key destinations along the corridor. This analysis indicated that up to twice as many trips terminate in Elgin, than any of the other towns along the corridor.

Bluetooth data has been used to analyse journeys along the A96. A Bluetooth-enabled device broadcasts a Media Access Control (MAC) address (code). This code can then be captured by one detector and "matched" at another detector further away. The times that the code is detected provides the basis for understanding trip movements between the two detectors.

This analysis was undertaken in order to understand the broad level of through trips, trips without an origin or destination within a town; however additional methods of data collection would be required to validate the findings. Based on the analysis, it is considered that Elgin has the lowest level of through trips (less than 30 per cent) of all the towns along the corridor. This is supported by the analysis of RSI data, which indicated that Elgin is a significant trip attractor on the corridor. The remaining towns were generally found to have between 30 per cent and 60 per cent of through trips.

6.2.5 Junction Turning Counts

A number of junction turning counts were undertaken on the A96 and the surrounding roads in April 2013. These traffic flows have been used to inform the review of baseline conditions and will also be used to inform the junction strategy detailed in **Section 4.2.8(l)**. The locations of junctions surveyed are included in **Table 6.2.3** overleaf.

[13]Origins and destinations of the trips were grouped into zones which were considered to represent approximate areas, such as Aberdeen, Inverness, North East Scotland (North Aberdeenshire, to the north-east of the Inverness to Aberdeen Corridor), Central Scotland (from Loch Ness to the Central Belt), East Coast of Scotland (South East Aberdeenshire, East Angus and Fife), Highlands and Islands (north-west of Loch Ness), Central Belt (area surrounding Glasgow and Edinburgh) and South Scotland (south of the Central Belt).

Junction Reference	Location
JTC1	A96 / Travelodge & Holiday Inn (left in/left out count).
JTC2	A96 / Inverness Retail and Business Park (West Seafield) – three arm roundabout.
JTC3	A96 / Barnchurch Road (West) – three arm roundabout.
JTC4	A96 / Barnchurch Road (East) – three arm priority.
JTC5	A96 / B9039 – three arm priority.
JTC6	A96 / Inverness Airport Access – four arm roundabout.
JTC7	A96 / B9006 / B9090 – four arm staggered priority crossroads
JTC8	A96 / B9092 – three arm priority.
JTC9	B9091 / B9090 – three arm priority.
JTC10	A96 / Marine Road – four arm roundabout.
JTC11	A96 / B9090 / Harbour Street – four arm priority crossroads.
JTC12	A96 / Lochloy Rd / View Rd – four arm signal control crossroads.
JTC13	A96 / A939 – three arm priority.
JTC14	A96 / Auldearn (western entrance) – four arm staggered priority crossroads
JTC15	A96 / Auldearn (eastern entrance) – three arm priority.
JTC16	A96 / B9011 / West Road – four arm roundabout.
JTC17	A96 / A940 – three arm priority.
JTC18	A96 / B9011 / Victoria Rd – four arm roundabout.
JTC19	A96 / Morriston Road – four arm priority.
JTC20	A96 / Pluscarden Road / South St – four arm roundabout.
JTC21	A96 / A941 / High St – four arm roundabout.
JTC22	A96 / Haugh Rd / Tesco – four arm roundabout.
JTC23	A96 / A941 – three arm roundabout.
JTC24	A96 / Mosstodloch (western entrance) – three arm roundabout.
JTC25	A96 / B9015 – four arm roundabout.
JTC26	A96 / B9104 – four arm roundabout.
JTC27	A96 / A98 – four arm roundabout.
JTC28	A96 / B9016 – three arm priority.
JTC29	A96 / B9017 – three arm priority.
JTC30	A96 / A95 – three arm priority.
JTC31	A95 / B9017 – three arm priority.
JTC32	A96 / B9014 / Station Road –four arm priority crossroads
JTC33	A96 / B9116 – four arm priority crossroads (assume car park is a fourth arm).
JTC34	A96 / A95 / Mid Street – four arm priority crossroads.
JTC35	A96 / A920 – four arm priority crossroads.
JTC36	A96 / A97 – four arm roundabout.
JTC37	A96 / A97 – three arm priority.
JTC38	A96 / A920 – three arm priority.
JTC39	A96 / B992 – four arm staggered priority crossroads
JTC40	A96 / B9002 – three arm priority.
JTC41	A96 / B9170 – four arm roundabout.
JTC42	A96 / B993 – four arm roundabout.
JTCA	Unknown Road (Brodie)
JTCB	Unknown Road (Kinloss)
JTCC	B9103 (Newton)

JTCD1	B9103 (S) Lhanbryde
JTCD2	B9103 (N) Lhanbryde
JTCE	Thainstone Roundabout
JTCF	B987 W Roundabout
JTCG	B987 E Roundabout
JTCH	B977 On/Off Slips
JTCJ	Broomhill Roundabout
JTCK	B979 Blackburn Roundabout
JTCL	Clinterty Roundabout
JTCM	B979 Clinterty Wood

Table 6.2.3 Location of Junction Turning Counts on the A96 in April 2013

6.2.6 Journey Times and Speeds

(a) Journey Time Variability and Reliability

Journey times along the corridor vary significantly depending on the mode of travel. The shortest journey time is experienced by rail travel, with end-to-end journey times between the two cities around two hours and 15 minutes. This compares to a typical journey time for cars of approximately two hours 40 minutes. Journeys using bus are significantly longer with end-to-end travel time approximately three hours 50 minutes.

Analysis of travel demand indicates relatively low levels of city centre to city centre trips, with RSI surveys on the A96 indicating as low as one per cent of city centre to city centre car trips. However, from counts of rail passengers, almost 15 per cent of trips on the corridor were between Inverness and Aberdeen. Therefore, improved transport provision on the corridor should provide more opportunities to link the two cities.

Journey times between the towns along the route are shown graphically in **Figure 6.2.7** below. In order to provide a true comparison of journey times between modes, all journey times are taken from city centre to city centre.

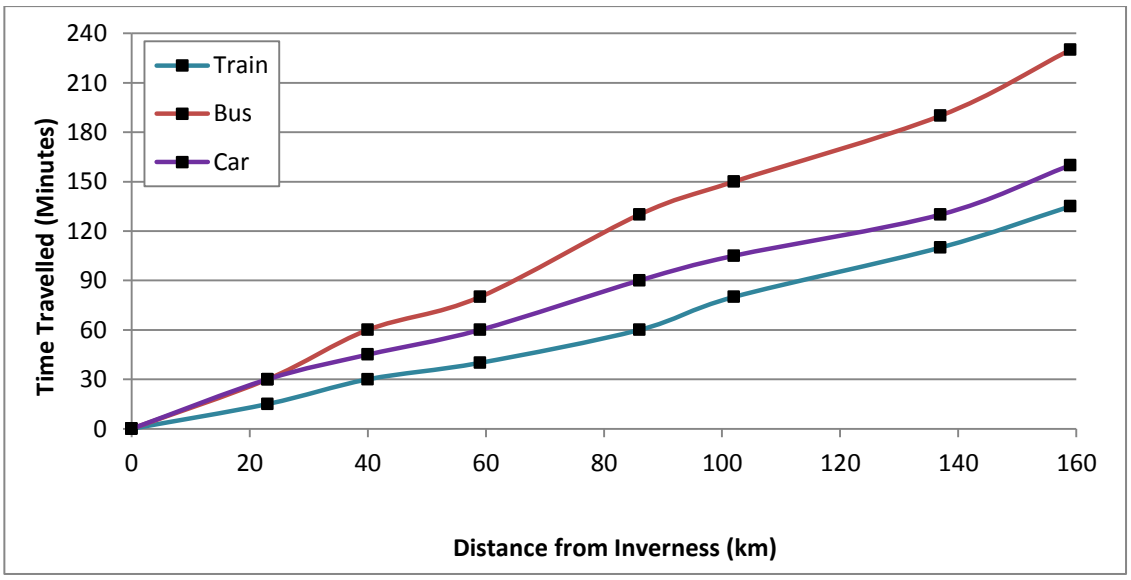

Figure 6.2.7 Journey Times from Inverness to Aberdeen by Bus, Train and Private Vehicle

Based on free flow speeds, using a simple distance-speed relationship, the journey time by road from Inverness City Centre to Aberdeen City Centre, would be approximately one hour 55 minutes (i.e. assuming no delays encountered along the route). Although a relatively crude method, this provides an indication of the general delay on the route, through a combination of cumulative junction delay through the towns, the impact of slower moving vehicles, and any constraints caused by road alignment.

Bluetooth analysis has been undertaken to assist in identifying journey time reliability on the route for trips travelling through the towns on the A96. The key findings suggest that traffic travelling through Elgin and Nairn are most likely to experience delay, with the spread of journey times generally greater than in the other towns, due to these being the most heavily populated towns on the route with the highest number of pedestrians and junctions. In addition, as these towns are both common origins and destinations, further delay may be caused by a higher number of manoeuvres being made on the main carriageway as drivers commence or terminate their journeys.

The remaining towns along the route appear to have a narrower distribution of journey times for through trips, therefore indicating more reliable journey times for through trips. Based on the Bluetooth analysis of such trips, the difference between minimum and maximum likely non-stop trips through the towns is generally between two to four minutes, therefore not necessarily significant when considered on an individual basis. For city centre to city centre trips, or longer distance intra-corridor trips, the cumulative impact through all, or a number of the towns, contributes towards more significant delays. The relatively low level of delays experienced through towns, when compared to the city centre to city centre journey time, indicates that, in addition to the potential cumulative impact of delays in the towns, there are delays on the rural sections between towns. A high level review of road provision indicates some sections which fall below design standards, however it is likely that the impact of slow moving vehicles also contributes towards journey time and journey time reliability issues on the route. Improving journey times and reliability should improve access to services and allow people to travel further distances, which in turn could have a beneficial effect on the economies of rural communities. **Table 6.2.4** overleaf shows the town to town journey times in the TMfS:12 Base Model 2012 AM peak.

		TO							
		IS	N	F	E	K	H	IE	A
FROM	Inverness (IS)	0	22	36	55	80	93	119	149
	Nairn (N)	23	0	14	33	58	70	97	127
	Forres (F)	37	14	0	19	43	56	83	112
	Elgin (E)	54	32	18	0	24	37	63	93
	Keith (K)	80	57	43	25	0	13	39	69
	Huntly (H)	93	70	56	38	13	0	26	56
	Inverurie (IE)	117	95	81	63	37	25	0	30
	Aberdeen (A)	145	122	108	90	65	52	28	0

Table 6.2.4 Town to Town Journey Times (minutes) by car – TMfS:12 Base Model 2012 AM Peak

(b) Speed Limit Review

The A96 was included in Transport Scotland's speed limit review, which was concluded in 2012. On the A96 between Inverness and Aberdeen, one location was proposed for a speed limit change; at Pitmachie, north of Inverurie, where Transport Scotland are proposing a reduction from 60mph to 50mph. The speed survey information for each section, from the speed limit review, are included within **Table 6.2.5** below.

Section	Current Speed Limit	Average Actual Vehicle Speed (mph)	
		All	HGV
Inverness to West Seafield [a]	50mph	46.03	42.12
West Seafield to Nairn	60mph	51.28	Not Available
Nairn West Approach[b]	40mph	38.99	38.92
Nairn East Approach[b]	40mph	44.51	42.86
Nairn to Brodie	60mph	54.04	Not Available
Brodie[c]	50mph	43.77	44.43
Brodie to Forres	60mph	52.45	Not Available
Forres West[a]	40mph	31.59	29.40
Forres East	40mph	45.33	44.26
Forres to Alves	60mph	51.49	Not Available
Alves	50mph	Not Available	Not Available
Alves to Elgin	60mph	52.28	Not Available
Elgin	30mph	Not Available	Not Available
Elgin to Mosstodloch	60mph	48.78	Not Available
Fochabers	30mph	Not Available	Not Available

Fochabers to B9016 Junction	60mph	53.64	Not Available
B9016 Junction to Keith	60mph	45.70	Not Available
Keith West[a]	30mph	30.01	29.20
Keith East[a]	30mph	27.58	24.24
Keith to Pitmachie	60mph	55.26	Not Available
Pitmachie[a]	60mph[d]	48.00	44.76
No Data available on the links between Pitmachie and Haudagain			

Table 6.2.5 Outcome of Transport Scotland's Speed Limit Review

Notes to Table 6.2.5
a – Survey undertaken April 2010
b – Survey undertaken May 2010
c – Survey undertaken September 2009
d – Proposed reduction in speed to 50mph

The information obtained as part of Transport Scotland's speed limit review shows that the average speeds of vehicles on the section are generally approaching the signed speed limits. However, the 'Keith to B9016 junction' and 'Mosstodloch to Elgin' sections have observed average speeds substantially lower than that of the posted speed limit.

The 'Keith to B9016 junction' section is signed as 60mph over its entire length. Transport Scotland identifies that the section contains an area locally known as Crookmill Bends in the vicinity of which there have been a number of accidents attributed to 'loss of control'. Whilst a number of improvements have been made with the aim of reducing accidents, it may be that drivers with local knowledge of the area still drive at lower speeds in order to maintain control through the area.

The 'Mosstodloch to Elgin' section is also sign posted as a 60mph link over its entire length. Whilst there is no clear reason as to why the average speed of vehicles on this section is low compared to other sections with similar speed limits, it may be due to the number of junctions and bus stops on this section causing delays to vehicles resulting in a lower average speed along the section.

6.2.7 Accident Data

STATS19 data is collected by the police and contains information on all incidents which they attend on the trunk road network in which one or more persons is killed or injured. This data, obtained from Transport Scotland, for the five year period of 2008 to 2012, was used to derive the most up to date accident statistics and was analysed to provide an understanding of trends and contributory factors in accidents on the A96. **Figure 6.2.8** overleaf contains details of the number and severity of accidents over the full route over the five year period.

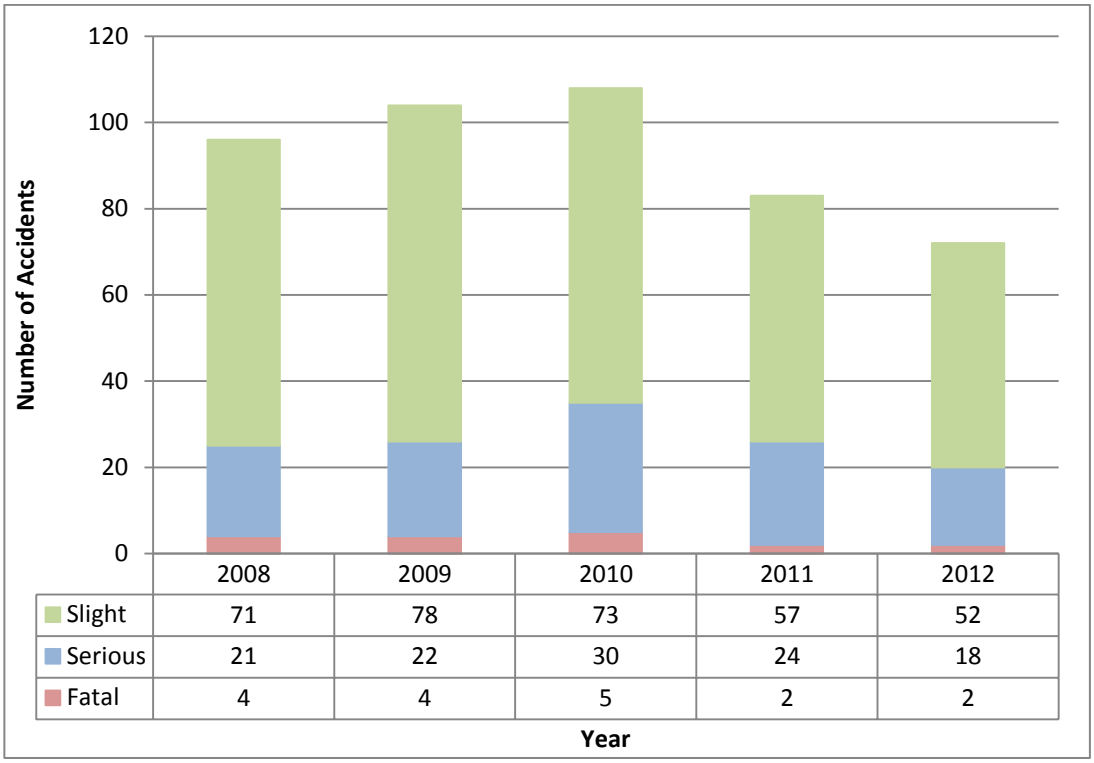

Figure 6.2.8 Accident Numbers and Severity for the five year period 2008 – 2012

Figure 6.2.8 shows accidents have reduced by 25 per cent from 2008 to 2012 and the combined number of fatalities in the years 2011 and 2012 were lower or equal to the number of fatal accidents recorded in each of the preceding years (2008, 2009 and 2010). This indicates that safety on the route has generally improved.

Table 6.2.6 below contains accident figures for the five year period 2008 to 2012, allowing a comparison of the number and severity of accidents on the A96 to the Scottish national average for all trunk roads in Scotland. This information is published on an annual basis by Transport Scotland using STATS19 data for the entire country. Each accident is classified according to the severity of the injury to the most seriously injured person involved in the accident.

Accident Severity	A96 5 Year Average (2008 – 2012)		A96 (2012)		All Scottish Roads 5 Year Average (2008 – 2012)[14]	
	Number	%	Number	%	Number	%
Slight	66	71.5%	52	72.2%	8,683	80.8%
Serious	23	24.8%	18	25.0%	1,871	17.4%
Fatal	3	3.7%	2	2.8%	193	1.8%
Total	**92**		**72**		**10,747**	

Table 6.2.6 Accident Figures for A96 and Scottish Roads (2008 – 2012)

Table 6.2.6 shows that the proportion of accidents on the A96 that result in fatal or serious injuries is significantly higher than the comparative national figure, for both the most recent year (2012) and the five year average. The proportion of slight accidents is below the national average both for five years and in 2012. This indicates that fatal and serious accidents levels are higher than would be expected on a route of this type.

[14] Table 4, Road Casualties Scotland 2012

(a) Accident Rates on the A96

The local and national levels can be compared more readily when examining accident rates. Accident rates are based on Personal Injury Accidents per 100 Million Vehicle Kilometres (PIA / 100MVKm). The accident rate between 2008 and 2012 was calculated based on STATS19 data and is detailed in **Table 6.2.7** below. The Scottish trunk road average for the same period was provided by Transport Scotland and is also shown in **Table 6.2.7** to provide a comparison with accident rates on the A96. This shows that the accident rate is marginally lower on dual carriageway sections than it is on single carriageway sections of the A96. The data also highlights that accident rates for the five year period from 2008 to 2012 are lower than the national average on single carriageway sections, but higher than the national average on dual carriageway sections of the road. The only dual carriageway sections on the route are on the approaches to Inverness and Aberdeen, where traffic levels are highest and congestion is more likely to occur, therefore potentially leading to more shunt type accidents.

Carriageway Section	Accident Rate (PIA/100 MVK) 2008 – 2012	
	A96	Scottish Trunk Road Average[15]
Single	12.51	18.33
Dual	12.12	8.24

Table 6.2.7 Accident Rate Comparison of A96 to Scottish Trunk Roads (2008 – 2012)

Analysis of the STATS 19 data from the five year period from 2008 to 2012 provided an accident rate for the A96. **Figure 6.2.9** overleaf shows the annual accident rate on the A96 compared to the accident rate for non built-up trunk roads in Scotland for the same years. It shows that there has been a reduction in the accident rate on national major roads since 2009 and on the A96 from 2010.

The national accident rates indicate that on trunk A roads through built-up areas, rates are more than double those in non built-up areas. The five year average rate in non built-up areas is 12.62/100MVK compared to 27.46/100MVK in built-up areas[16].

[15] Transport Scotland, 2014
[16] Table 5b, Road Casualties Scotland 2012

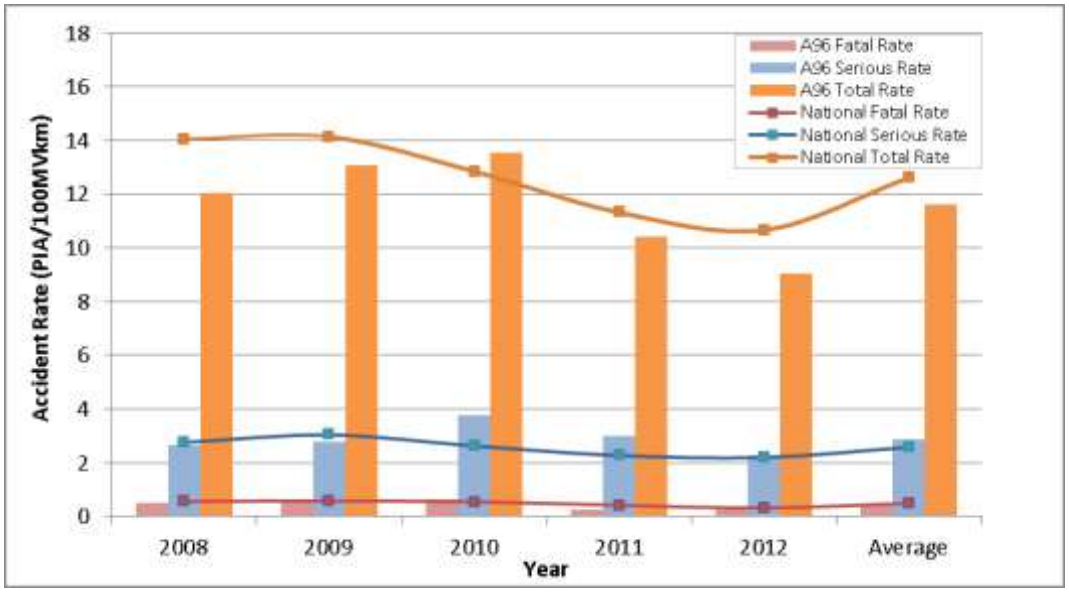

Figure 6.2.9 Comparison of A96 Accident Rate to National Accident Rate for Non Built-Up Trunk A Roads (2008 – 2012)[14]

(b) Fatal Accidents

Table 6.2.8 overleaf provides further details on the 17 fatal accidents that have occurred on the A96 in the five year period from 2008 to 2012. Five of the 17 fatal accidents involved a pedestrian, which may indicate that there are insufficient crossing or pavement facilities for pedestrians along the route. There are a range of contributory factors which are considered to have contributed towards the accidents on the section, most commonly 'failed to judge other person's path or speed' and 'failed to look properly', however there are several instances where someone has been 'impaired by drugs', 'impaired by alcohol', 'careless/reckless/in a hurry', driving aggressively, had a 'disability', or undertaken an illegal manoeuvre.

Section	Approximate Location	Route Provision	Date	Vehicles Involved	Type of Vehicles Involved	Contributory Factors
West Seafield - Nairn	East of Tornagrain	Single	Jun 2008	2	Car	Fatigue Impaired by drugs (illicit or medicinal)
	East of Inverness Airport	Single	Nov 2008	1 (and pedestrian)	Car	Dangerous action in carriageway (eg. playing) Disability or illness, mental or physical Failed to look properly Pedestrian wearing dark clothing at night
Nairn - Forres	The Old Mill Caravan Park Junction	Single	Aug 2012	1(and pedestrian)	Car	Buildings, road signs, street furniture Failed to judge other person's path or speed Failed to judge vehicle's path or speed Pedestrian wearing dark clothing at night Swerved Vegetation
	Brodie Castle Junction	Single	Feb 2011	2	Car	Failed to judge other person's path or speed
Forres	East of A96/Mosset Road Junction	Single	Jul 2008	3	Car	Swerved
Forres - Elgin	East of A96/Unclassifed Road to Kinloss Junction	Single	Nov 2009	3	Goods vehicle 3.5 tonnes maximum gross weight (mgw) and under Minibus / motor caravan	Failed to look properly
Elgin - Fochabers Bypass	West of A96/Unclassified Road to Elginshill Junction	Single	Jan 2009	1(and pedestrian)	Car	Careless/reckless/in a hurry Disability or illness, mental or physical
Keith	A96/Unnamed Lane North of Langstane Lane	Single	Oct 2010	1(and pedestrian)	Goods vehicle 3.5 tonnes mgw and under	Failed to look properly Impaired by alcohol
Keith - Huntly	A96/Car Park Entrance for Bin Forest	Single	Dec 2012	2	Car Van/goods vehicle 3.5 tonnes mgw and under	Failed to judge other person's path or speed Failed to look properly

	A96/Unclassified Road to Bin Forest Walks Junction	Single	Jan 2009	3	Car	Failed to judge other person's path or speed Inexperienced or learner driver/rider Loss of control Slippery road (due to weather) Swerved Tyres illegal, defective or under inflated
	West of A96/AB9022 Junction	Single	Dec 2010	3	Car	Illness or disability, mental or physical Inexperienced or learner driver/rider Slippery road (due to weather)
Huntly - Inverurie	Thomastown Farm	Single	Dec 2008	3	Car	Failed to judge other person's path or speed Failed to look properly Poor turn or manoeuvre
	East of Burn of Lipsden	Single	Jan 2010	2	Car	Loss of control Slippery road (due to weather)
	A96/B922 (East) Junction	Single	Aug 2011	2	Car	Dazzling sun Failed to look properly
Kintore - Bucksburn	West of A96/Walton Road Junction	Dual	Nov 2009	1(and pedestrian)	Motorcycle over 500cc	Failed to judge vehicle's path or speed
	West of A96/Walton Road	Dual	Nov 2010	2	Car	Failed to look properly Illegal turn or direction of travel
Bucksburn - Aberdeen	West of A96/Auchmill Road Junction	Dual	Sep 2010	2	Motorcycle over 500cc	Aggressive driving Careless/reckless/in a hurry Exceeding speed limit Impaired by alcohol Loss of control Swerved

Table 6.2.8 Fatal Accidents on the A96 for the five year period 2008 – 2012

(c) Seasonal Variation of Accidents on the A96

Figure 6.2.10 below shows the seasonal variations of accidents on the A96 for the five years between 2008 and 2012. The highest number of fatal accidents occurred in November (4), December (3) and January (3), for serious accidents there was a marked increase in the autumn months, with the highest number (16) occurring in September and October. Overall, the month with the most accidents was January (53). The peak months for traffic on the A96 is in the summer months with traffic levels in winter considerably lower. The increase in accidents during winter months is therefore likely attributed to the weather conditions leading to more hazardous driving conditions.

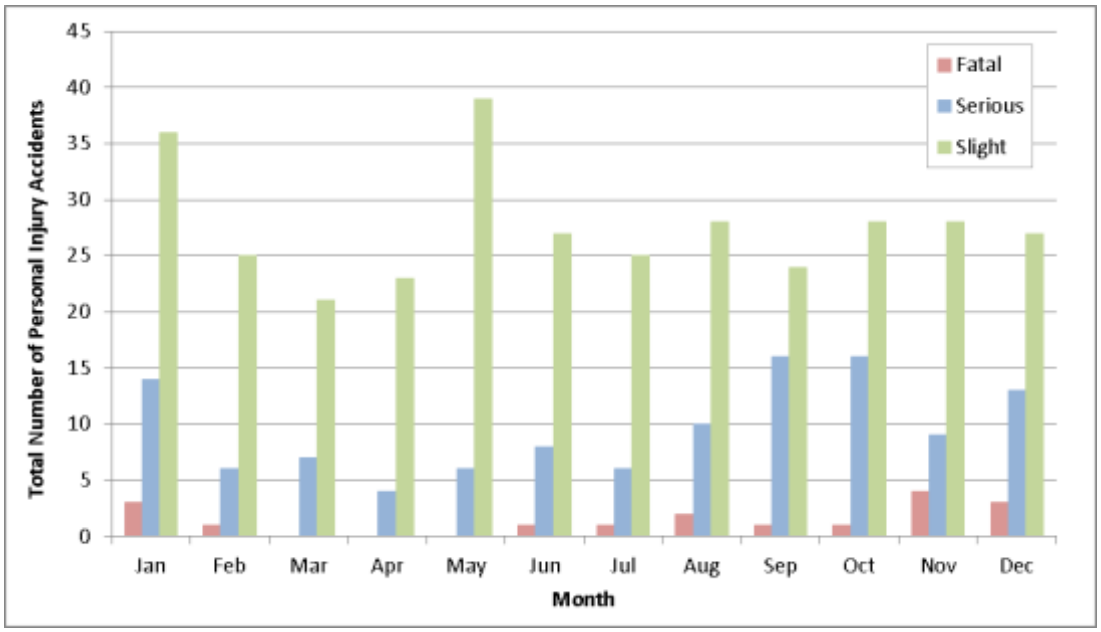

Figure 6.2.10 Seasonal Variation of Total Accidents on the A96 over the Five Year Period 2008 – 2012.

(d) Vehicle Conflict

The location of accidents on the A96 has been investigated in order to determine the impact of the many junctions and accesses along its length. There are approximately 600 junctions on the existing A96, excluding those within the main urban centres of Nairn, Forres, Elgin and Keith, therefore almost four junctions on average per kilometre. **Table 6.2.9** overleaf shows the type of junctions that accidents have taken place at on the A96 in the five year period from 2008 to 2012. It shows that just over half of the accidents took place within 20 metres of a junction, 24 per cent of which took place at a T or staggered junction, 14 per cent occurred at a roundabout and 13 per cent occurred at other types of junction, such as accesses, crossroads or mini-roundabouts.

The majority of fatal accidents did not occur at junctions; however, six fatalities (35 per cent) took place at a staggered junction, T-junction or access. There were no fatalities at roundabouts on the route, where speeds are generally slower on approach, whereas at a T-junction, mainline vehicles could still be travelling at the national speed limit.

Location	A96 Total Accidents					National Average (%)[17]	
	Fatal	Serious	Slight	Total	Percentage	All Roads	Non Built-Up Trunk Roads
Not at a Junction	11	62	153	226	49%	52%	72%
T or Staggered Junction	4	30	78	112	24%	22%	11%
Roundabout	0	10	53	63	14%	7%	5%
Other Junction	2	13	47	62	13%	19%	12%
Total	17	115	331	463	100%	100%	100%

Table 6.2.9 Location of Accidents on the A96 Comparison with National Average (2008– 2012)

As shown in **Table 6.2.9** a greater proportion of accidents took place at junctions on the A96 (51 per cent) compared to the average for all roads (48 per cent) and non built-up trunk roads (28 per cent), indicating greater conflict between different vehicle streams on the A96.

A comparison between the vehicle composition on the A96 and the national average proportion of car only accidents is provided in **Table 6.2.10** below.

Vehicles[18]	A96 Average Annual Accidents (2008 – 2012)		National Average for Cars on All Roads (2008 – 2012) (%)	National Average for Cars on Non Built-Up Roads (2008 – 2012) (%)[19]
	Number	Percentage		
One vehicle	23.2	25%	14%	28%
One vehicles & pedestrian	9.6	10%	11%	1%
Two vehicles	47.6	51%	56%	49%
Three or more vehicles	13.6	14%	18%	22%
Total	94	100%	100%	100%

Table 6.2.10 Comparison between Number of Vehicles Involved in Accidents on A96 and National Average

Table 6.2.10 illustrates that the proportion of accidents involving one vehicle on the A96 (25 per cent) is closer to that of the national average for non built-up trunk roads (28 per cent), however the proportion involving one vehicle and pedestrian (10 per cent) is much closer to that of the national average of all roads (11 per cent). This demonstrates the impact of urban areas on the number of pedestrian related accidents on the A96.

'Going ahead other' typically describes the process of driving when not undertaking any of the manoeuvres shown in **Figure 6.2.11** and usually corresponds to the act of making progress along a road at a relatively constant speed and direction. Of the 520 manoeuvres involved in the 463 accidents, 'going ahead other' was attributed to 261 of the manoeuvres. The remaining 259 manoeuvres which were recorded as occurring are shown in **Figure 6.2.11** overleaf.

[17] Table 14b, Road Casualty Scotland 2012 (Based on number of vehicles involved in accidents by junction detail)
[18] Road Casualties Scotland 2012 provided information on the number of cars involved in each accident for Built-Up and Non Built-Up roads, therefore a comparison between the proportions of vehicles on the A96 against the proportion of cars on all roads has been provided.
[19] Table 15, Road Casualty Scotland 2012

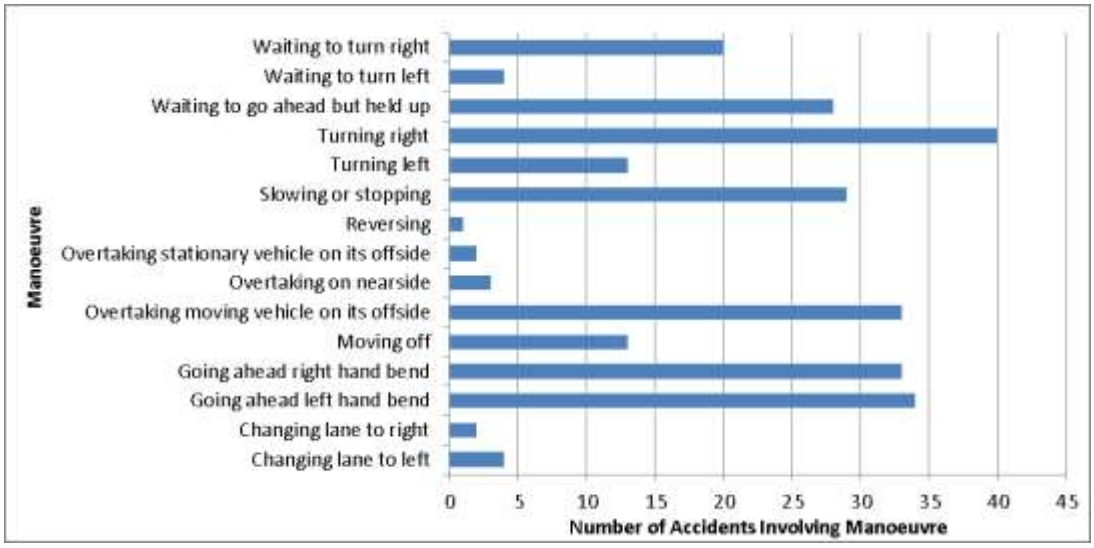

Figure 6.2.11 Manoeuvres (Excluding 'Going Ahead Other') Involved in Each Accident on the A96 (2008 – 2012)

As shown in **Figure 6.2.11**, 'turning right' was the second most common manoeuvre as it occurred in 40 accidents. 'Turning' or 'waiting to turn' was recorded in 65 accidents, indicating that existing junctions may not be to a sufficient standard. Overtaking was recorded in 38 accidents, which may be due to a lack of adequate overtaking opportunities on the route.

(e) Non-Motorised Vehicles and Pedestrian Accidents

As shown in **Figure 6.2.12**, five per cent of the 463 accidents on the route involved a pedal cycle. This may indicate that there is insufficient provision for cyclists on the route. Fifty-one (11 per cent) of accidents on the route also included a pedestrian. The sections of the route in which these accidents occurred are shown in **Figure 6.2.12** below.

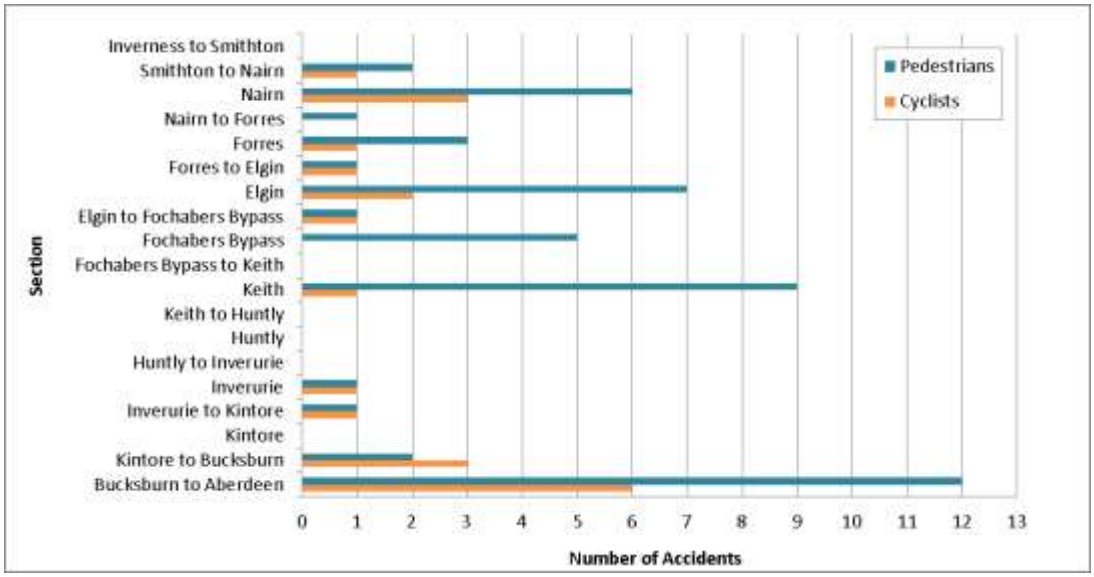

Figure 6.2.12 Number of Pedestrians and Cyclists Involved in Accidents on the A96 over the Five Year Period 2008 – 2012

Figure 6.2.12 demonstrates that the majority of accidents which involved pedestrians or cyclists occurred in the most populated areas within the route extents, including the towns of Nairn, Forres, Elgin, Keith and Inverurie. This data suggests that there are not sufficient measures in place to safeguard the most vulnerable road users from traffic on the A96, particularly in the more urban areas.

(f) Contributory Factors

In total there were 59 factors which were considered to have contributed in some way to the 463 accidents which occurred between January 2008 and December 2012. Ten of these factors were considered to have contributed to at least five per cent of accidents on the A96 within this period. These include:

- Driver failed to look properly (31 per cent);
- Slippery road (due to weather) (22 per cent);
- Failed to judge other persons path or speed (19 per cent);
- Loss of control (18 per cent);
- Driver was careless/reckless/in a hurry (16 per cent);
- Poor turn or manoeuvre (12 per cent);
- Travelling too fast for conditions (seven per cent);
- Sudden braking (six per cent);
- Following too close (six per cent); and
- Pedestrian failed to look properly (five per cent).

Contributory factors can typically be split into nine different categories. The national average proportions of contributory factors in 2012 for these nine categories are presented in **Table 6.2.11** overleaf providing a comparison with those on the A96 over the five year period.

Contributory Factor	Total Number of Contributory Factors on A96 (2008 – 2012)[20]		Total Number of Contributory Categories Per Accident on A96[21]		National Average 2012 (%)
	Number	%	Number	%	
Road environment contributed	124	27%	119	26%	20%
Vehicle defects	7	2%	7	2%	2%
Injudicious action	92	20%	84	18%	23%
Driver/rider error or reaction	457	99%	327	71%	67%
Impairment or distraction	64	14%	60	13%	11%
Behaviour or inexperience	121	26%	108	23%	18%
Vision affected	39	8%	36	8%	10%
Pedestrian only[22]	86	19%	42	9%	15%
Special codes	7	2%	7	2%	3%
Total	**997**		**790**		

Table 6.2.11 Comparison of Contributory Factors on A96 (2008 – 2012) to National Average in 2012

This information demonstrates that the most common contributory factors are due to driver error or reaction, however the road environment was found to be the second most common contributory category, primarily due to slippery road (due to weather) being considered a cause of 27 per cent of accidents. **Table 6.2.11** also highlights that the proportion of contributory factors on the A96 are broadly similar to the national average in 2012, however driver error and the road environment appeared to contribute to more accidents on the A96 than the national average, whereas pedestrians seemed to impact accidents less than the national average.

(g) Cluster Analysis / Moving Cursor Programme

Transport Scotland's Moving Cursor Programme (MCP) continuously monitors accidents and highlights areas where clusters are identified, therefore schemes that have been implemented as part of the MCP on the A96 may be working to reduce clusters.

For the period from 2010 to 2012, Transport Scotland's Moving Cursor Programme (MCP) analysis has identified a number of locations on the A96. **Table 6.2.12** overleaf shows the cluster sites identified for this period[23].

[20] Where duplicate contributory factors have been recorded in an accident they have been removed from this analysis.
[21] Contributory categories have only been counted once per accident, where more than one contributory factor within the same category has been recorded in one accident the contributory category has not been double counted.
[22] The contributory factors do not necessary state whether a contributory factor applies to a vehicle or pedestrian, therefore the proportion of contributory factors in each category is approximate.
[23] Moving Cursor Programme 2014/15, Strategic Road Safety, Scottish Trunk Road Network North East Unit, Transport Scotland.

Cluster No.	Location	No. of Accidents	Comment
1	Auldearn East Junction	3	Investigation recommended
2	River Nairn Bridge, Nairn	3	Works to be programmed
3	Balloch junction	4	Investigation recommended
4	Auchmill Road, West of Haudagain Roundabout	4	Study Programmed 2013/14
5	Blackhall Roundabout, Inverurie	3	Junction layout to be amended as part of developer works
6	Blackhall Roundabout, Inverurie	3	Ref site 5
7	Drimmies Junction nr Inverurie	3	No common causation factors
8	A96/A920 Junction, Huntly	4	Investigation programmed 2013/14
9	Cairnie, nr Huntly	3	Investigation programmed 2013/14
10	Cairnie, nr Huntly	5	Ref site 9
11	Keith	4	Investigation programmed 2013/14
12	Keith	4	Ref site 11
13	Keith	5	Ref site 11
14	Keith	3	Ref site 11
15	Chapel	6	Site recently investigated
16	Sclattie Park	7	Site recently investigated
17	Auchmill Road	6	Ref site 4
18	Auchmill Road	10	Ref site 4
19	Auchmill Road	3	Ref site 4
20	Auchmill Road	3	Ref site 4
21	Auchmill Road	6	Ref site 4
22	Auchmill Road	6	Ref site 4
23	Chapel	3	Ref site 15
24	Tyrebagger	3	Ref site 15
25	Kintore Roundabout	3	No common causation factors
26	Thainstone Roundabout	3	No common causation factors
27	Raigmore Interchange	4	Investigation programmed 2013/14
28	Raigmore Interchange	4	Ref site 27
29	Pansport Road Roundabout	3	No common causation factors

Table 6.2.12 Schemes constructed since 2007

Table 6.2.12 shows that, of the clusters identified two have been requested for further investigation (Auldearn East Junction and Balloch Junction).

(h) Accident Analysis by Section

Data collected as part of the 'Reported Road Casualties Scotland 2012' (RRCS) report, as published by Transport Scotland, has been compared against the accident rate for sections of the A96 calculated using Automatic Traffic Count (ATC) data and STATS 19 data. The RRCS data considers accident rates by class of road and accident severity in both urban and rural settings. A comparison of A96 accident rates against national accident rates has also been considered. The results are presented in **Table 6.2.13** overleaf, which demonstrates that there are several sections that exhibit accident rates and fatal accident rates higher than the corresponding national average for the five year period from 2008 to 2012.

The national rate for urban areas is higher than for rural areas due to the propensity for slight accidents in more congested areas where there are generally more junctions and potential conflict of traffic movements.

Section	Road Type	Total Accidents	Accident Rate (Per 100 MVKm)			Fatal Accident Rate (Per 100 MVKm)	
			A96	Reported Road Casualties Scotland[24]	Transport Scotland[25]	A96	Reported Road Casualties Scotland[21]
Inverness to Smithton	Urban Dual	7	16.82	27.46	8.24	0.00	0.34
Smithton to Nairn	Rural Single	44	8.50	12.62	18.33	0.39	0.49
Nairn	Urban Single	23	32.62	27.46	8.24	0.00	0.34
Nairn to Forres	Rural Single	19	7.60	12.62	18.33	0.80	0.49
Forres	Rural Single	7	10.84	12.62	18.33	1.55	0.49
Forres to Elgin	Rural Single	27	7.32	12.62	18.33	0.27	0.49
Elgin	Urban Single	28	19.37	27.46	8.24	0.00	0.34
Elgin to Fochabers Bypass	Rural Single	18	7.65	12.62	18.33	0.43	0.49
Fochabers Bypass	Rural Single	16	14.94	12.62	18.33	0.00	0.49
Fochabers Bypass to Keith	Rural Single	22	18.72	12.62	18.33	0.00	0.49
Keith	Urban Single	19	75.31	27.46	8.24	3.96	0.34
Keith to Huntly	Rural Single	29	16.92	12.62	18.33	1.75	0.49
Huntly	Rural Single	11	54.50	12.62	18.33	0.00	0.49
Huntly to Inverurie	Rural Single	69	15.53	12.62	18.33	0.68	0.49
Inverurie	Rural Single	12	16.33	12.62	18.33	0.00	0.49
Inverurie to Kintore	Rural Dual	7	6.86	12.62	8.24	0.00	0.49
Kintore	Rural Dual	12	8.44	12.62	8.24	0.00	0.49
Kintore to Bucksburn	Rural Dual	40	9.75	12.62	8.24	0.49	0.49
Bucksburn to Aberdeen	Urban Dual	53	20.08	27.46	8.24	0.38	0.34
Total	**Whole Route**	**463**	**11.63**			**0.43**	

Table 6.2.13 Accident Rate Comparison by Section for the five year period 2008 – 2012 (Transport Scotland 2008 – 2012, RRCS 2008 – 2012)

[24] Table 5b, Road Casualties Scotland 2012. Rates based on Major Roads Trunk A Roads Built-up (27.46) and Non Built-up (12.62).
[25] Transport Scotland, 2014. Rates based on dual carriageway (18.33) and single carriageway (8.24) trunk roads in Scotland (2008 - 2012).

6.3 Public Transport Provision

Existing public transport facilities along the A96 include bus and train services, as discussed in **Section 2.8**. The bus/coach operators on the Inverness to Aberdeen route are Megabus (Stagecoach group), Stagecoach Bluebird, Stagecoach Highlands and Bains Coaches. In general, the route between Inverness and Aberdeen consists of an hourly bus service seven days a week, along both eastbound and westbound directions of travel.

Trains between Inverness and Aberdeen are operated by ScotRail and run in close proximity to the A96 for much of its route, stopping at eight intermediate stations along the corridor. The majority of these stations lie within the main urban centres with two of the stations at Forres and Keith accessed directly from the A96. The railway line is mainly single track, with only a small percentage of dual. The journey time between Aberdeen and Inverness by rail is approximately 2 hours 15 minutes.

ScotRail train frequency within the corridor is shown below:

- There are 13 eastbound trains leaving Inverness each day (Monday to Saturday), of which 12 trains travel all the way to Aberdeen, with one terminating at Elgin.
- A further 18 trains travel between Huntly, Inverurie or Dyce and Aberdeen each day (Monday to Saturday).
- 26 westbound trains leave Aberdeen each day (Monday to Saturday), with 12 travelling all of the way to Inverness. Eleven terminate at Inverurie, with the remaining three terminating at Dyce.
- The times between these trains travelling from Inverness to Aberdeen and vice versa vary throughout the day with an average interval of 1-2 hours.
- There are seven trains departing Inverness each Sunday, five of which travel all the way to Aberdeen, with two only travelling as far as Elgin. There are a further six trains travelling from Inverurie to Aberdeen on a Sunday.
- Of the 11 trains departing from Aberdeen each Sunday, only five travel all of the way to Inverness while six terminate at Inverurie.

6.4 Future Conditions

Historic trends, presented in **Section 6.2.1**, indicate that traffic levels have been relatively consistent in the five year period from 2008 to 2012 with only a slight decrease in traffic demand from 2008 to 2010 which has then recovered to some degree. This is generally in line with changes in traffic levels elsewhere in the country, reflecting the recent economic downturn.

The expected completion year of the upgrade to dual carriageway on the A96 is 2030; therefore the design year is set at 2045 (opening year plus 15 years). 2045 is however beyond the traffic forecasting of National Road Traffic Forecasts (NRTF), Scottish Trip End Program (STEP) and Transport Model for Scotland (TMfS).

Current guidelines recommend the use of the STEP, a software application developed by Transport Scotland to enable the derivation of growth factors based on data from National Transport, Demand and Land Use Models. The use of local demand and land use forecasts can provide an understanding of the likely growth within the locality of the scheme. However, as the A96 is a strategic road with traffic

flows affected by changes from other parts of the country including the Central Belt, it is more appropriate to use the TMfS, which takes into consideration traffic demand and land use across Scotland and can inform strategic growth patterns more accurately.

Traffic levels are forecast to increase on the route, based on information taken from the Aberdeen Sub-Area Model (ASAM) and Transport Model for Scotland 2012 (TMfS:12). The TMfS:12 is currently being enhanced, in order to improve the validity of traffic forecasts in the corridor, hence the use of the ASAM where it was considered to provide more reliable traffic flow information. **Table 6.4.1** below shows modelled base traffic levels at 2012 (TMfS:12) and 2010 (ASAM), and the forecast percentage increase to approximately 2030 (ASAM model flows are for 2033, TMfS:12 are for 2032) for sections of the route.

Location	Modelled Flows at 2012 Base Year	Modelled Flows at Future Year	Forecast Percentage Change (Base-2032)	Source
East of Inverness (West of Airport)	15,500	25,500	64%	TMfS:12 Model (Base Year 2012 and Future Year 2032)
East of Nairn	9,700	15,000	55%	
East of Elgin	17,200	20,300	18%	
North of Huntly	7,400	9,300	26%	
North of Inverurie	9,600	10,700	11%	
South of Inverurie	30,200	38,100	25%	ASAM Model (Base Year 2010 and Future Year 2033)

Table 6.4.1 Modelled Traffic Growth at Base Year 2012 and Forecast Percentage Change

6.5 Effect of Improvement Strategies

At this stage in the process, the level of detail associated with the proposed improvement strategies is limited allowing the effect of options only to be assessed in broad terms for the upgrade of the existing road to Category 7A Dual Carriageway standard and not of the comparable effects between improvement strategies.

6.5.1 Impacts on Safety

The proposed upgrading to dual carriageway and provision of grade separated junctions should have a positive impact on safety along the A96. Opportunities for safe overtaking will be increased; therefore improving safety for this manoeuvre. In addition, with reduced conflict at junctions, this should therefore result in less potential for accidents.

Initial modelling undertaken for the A96 Inverness to Aberdeen Corridor Appraisal Report forecast that there would be a 30 to 40 per cent reduction in accident numbers and a reduction in severity ratios. Significant driver frustration benefits are

anticipated as the dualling will allow for safer overtaking sections along the entire route.

In addition, there is a likely change in the balance of the severity of accidents on the A96 as there is a lower proportion of fatal and serious accidents on grade separated rural dual carriageways than on rural single carriageways at any standard. Based on DMRB Volume 15 Table 6/4/2, the number of fatal and serious accidents are expected to reduce by approximately 30 per cent, on the sections of the route that are upgraded to dual carriageway.

6.5.2 Impacts on Journey times and Reliability

Improving the A96 to dual carriageway standard will result in reduced journey times and improved reliability of those journey times. The upgrade to dual carriageway will enable safe overtaking of slower moving traffic along the entire route, increased capacity and higher free flow speeds. In addition, the provision of bypasses along the route will mean through trips would not experience the delays associated with the localised congestion in the towns.

Initial modelling undertaken for the A96 Inverness to Aberdeen Corridor Appraisal Report, indicated that a saving of up to 35 minutes could be achieved by dualling the full route between Inverness and Aberdeen. Removal of through traffic in towns could result in a reduction in traffic levels on the existing A96 of 25 to 30 per cent in Elgin and over 75 per cent in Keith (which would significantly reduce conflict between local and strategic journeys). Reducing traffic levels within bypassed towns may potentially lead to a more attractive urban environment and reduce severance, potentially increasing the attractiveness of walking and cycling to access jobs and services.

6.6 Economics

The A96 Dualling Programme will provide travel time benefits, due to the increased speeds and subsequent reduced journey times. The A96 Inverness to Aberdeen Corridor Appraisal reported major positives for direct transport efficiency economics due to the significant savings from reduced journey times and benefits associated with a reduction of accidents. However, environmental disbenefits were recorded due to an increase in emissions from increased traffic flows and speeds and a small element of mode shift from public transport. The analysis indicated total net benefits of over £1bn over the 60 year appraisal period.

Connectivity improvements within the corridor and the north and east of Scotland to Tayside are likely to be achieved as well as an increase in accessibility to jobs and services. Approximately 4,500 new jobs are forecast to be generated and an increase in population of approximately 1,400 in 2037.

Analysis of Wider Economic Benefits (WEBS) indicated positives due to agglomeration and increased output, with £250m to £500m of benefits. The benefits associated with Economic Activity and Location Impacts (EALI), are also considered to be positive, with significant increases in population and employment forecast.

The economic results are summarised in **Table 6.6.1** overleaf. Overall, a Benefit-to-Cost Ratio (BCR) of between 0.75 and 1.0, excluding WEBS and driver frustration benefits, rising to between 1.0 and 1.25 (including these benefits) is estimated for the proposed upgrade to dual carriageway demonstrating that the programme is likely to provide value for money.

The economic results will be refined throughout the dualling programme as route options and associated scheme costs are developed.

Present value of benefits (PVB)	£1bn-£1.2bn
Present value of Costs (PVC)	£1.4-£1.5bn
Benefit-to-Cost Ratio (BCR)	0.75-1.0
Benefit-to-Cost Ratio including Wider Economic Benefits (BCR (WEBS))	1.0-1.25
Benefit-to-Cost Ratio including Driver Frustration and Wider Economic Benefits (BCR (DF and WEBS))	1.0-1.25

Table 6.6.1 Inverness to Aberdeen Corridor: Economic Appraisal results for Dual Carriageway

Notes to Table 6.6.1:
Costs and Benefits are indicative (£000s) and are discounted to 2010 in 2010 prices.
Costs and Benefits associated with dualling of Inverness to Nairn (including Nairn Bypass) section are excluded from this analysis as this forms part of Do-Minimum. Details of costs and benefits of this section are contained within economics section of Inverness to Nairn (including Nairn Bypass) Stage 2 Scheme Assessment Report.
PVB values take account of travel time, vehicle operating costs, global air quality and accidents, but do not take account of delays during construction or maintenance.
BCR (WEBS) includes benefits associated with the Wider Economic Benefits
BCR (WEBS) does not take account of any economic welfare benefits associated with improved labour supply (WB4)
BCR (DF and WEBS) includes benefits associated with the Wider Economic Benefits and the reduction in levels of driver frustration.

7 Key Findings and Recommendations

7.1 Improvement Strategies Recommended for Further Consideration

7.1.1 Introduction

As outlined in Section 3, following a two part sifting process, the improvement strategies that were significantly less advantageous than others were removed from further consideration and four improvement strategies progressed to DMRB Stage 1 Assessment. The four strategies were: Option B, a full scheme strategy that primarily follows the existing A96 corridor with offline bypasses, Option C, a part scheme offline strategy from Huntly to Blackburn, Option D, a part scheme offline strategy from Glens of Foudland to north-west of Inverurie and Option N a part scheme offline strategy east of Nairn to the south of Fochabers.

Based on the level of assessment undertaken in this report, it is recommended that all four improvement strategies are worthy of further consideration at the next stage of development (i.e. DMRB Stage 2 Assessment). Stage 2 will involve the identification and detailed assessment of route alignments developed from the broadly defined improvement strategies progressing from the Stage 1 assessment. The outcome of the Stage 2 assessment will be the confirmation of the preferred option for upgrading each section of the A96.

Each improvement strategy has been assessed in relation to the existing constraints and includes recommendations for any particular constraint which may warrant further investigation to inform the viability of a route corridor. In some circumstances, additional offline sections have been recommended for further assessment to locally avoid a constraint.

The key issues associated with each improvement strategy are discussed below. The full assessment tables can be seen in **Appendix H**. The key issues identified by the Strategic Environmental Assessment are summarised in Section 5.

7.1.2 Option B

- The combination of the existing alignment, roadside properties and density of junctions and accesses suggests it is likely to be preferable to develop the proposed dual carriageway alignment offline, within the existing A96 corridor, and retain the existing A96 as part of the local road network, rather than online widening of the existing road.
- Offline bypasses of the settlements at Brodie, Alves, Lhanbryde and Pitmachie should be considered.
- The location of the offline and online sections will be considered at the next stage of design development.
- There are extensive flood risk areas at Forres, Elgin, Fochabers and Inverurie. Encroachment of the road footprint on the floodplain may result in the need for geotechnical design solutions and additional land purchase to provide compensatory storage measures.
- The physical and environmental constraints between Mosstodloch and Fochabers, in particular, warrant further investigation at the next stage of

design development. It is recommended that an offline bypass to the south of Fochabers and Mosstodloch is also considered as part of this assessment.

- The combination of the proposed upgrade to the Blackhillock substation, the new substation proposed for the Beatrice Onshore Transmission Works and the topography of the area are significant constrains to the south of Keith which will restrict the feasible bypass options over this section of the route.
- The Huntly Rail Overbridge cannot be readily extended to accommodate a dual carriageway cross section below it. This should be investigated further as part of the next stage of design development which may result in an offline bypass to avoid this constraint.
- The A96 between Oyne and the Inveramsay Rail Bridge is particularly constrained due to the proximity of the Aberdeen to Inverness railway line which runs parallel to the south side of the A96 and the settlement at Pitcaple which the A96 passes through.. It is recommended that an offline bypass of this section is considered.
- The A96 Inverurie Bypass is constrained on both sides of the road by residential properties, which may require geotechnical solutions to minimise impacts on properties and accommodate a dual carriageway between the existing road boundaries. This will require careful consideration of traffic management during construction. In addition, the available cross section under the Upperboat Overbridge on Inverurie Bypass is insufficient to accommodate a rural dual carriageway cross section. Both issues warrant further investigation as part of the DMRB Stage 2 Assessment.
- The Keith Hall GDL, Rivers Don and Urie and associated floodplains, and the topography to the east of Inverurie present significant constraints to the northern bypass strategy. A variation of the northern strategy should be investigated at the next stage of design development which considers a route option that passes to the east of Keith Hall GDL.
- The Forrest Road Overbridge, Dunnecht Road Overbridge and Kemnay Road Overbridge on the existing dual carriageway may constrain the High Load strategy for the route. As these overbridges are located in close proximity to each other, further investigation is warranted to determine if a major intervention is required to upgrade the available headroom at these structures or whether an alternative option such as a local diversion route around these three structures may provide a more cost effective solution
- The existing dual carriageway sections should be reviewed to consider the closure of the at-grade junctions and removing all right turn manoeuvres by closing the central reserve openings in accordance with a Category 7A road.

7.1.3 Option C

- The undulating and steep topography in parts of this strategy will require careful consideration to avoid steep gradients and significant cut and embankment slopes.
- The elevation where the proposed strategy passes between Wishach Hill and the Hill of Foudland is higher than the existing A96 and consideration should be given on the potential impact on winter maintenance.

7.1.4 Option D

- The Hill of Skares and the Hill of Tillymorgan at the Glens of Foudland will likely constrain the northern tie-in of Option D to Option B to a location south of these two hills. The constraints on the existing A96 at Pitcaple may restrict opportunities for Option D to tie back into Option B and as such, consideration should be given to combining Option D with a direct tie-in to the northern offline bypass of Inverurie. This should be investigated as part of the next stage of design development.

7.1.5 Option N

- A major structure will be required for the crossing of the River Spey and its floodplain with the river designated as a SAC. This will require careful consideration as activity within the SAC is strictly regulated under European Environmental legislation which will likely place restrictions on the form and construction of the structure.
- The topography at Heldon Hill and the Hill of the Wangie will likely constrain the horizontal alignment. In addition, the topography at the eastern tie-in of this strategy to Option B will likely constrain the route of the A96 as it passes between Whiteash Hill and Thief's Hill, with additional constraints on the vertical alignment in this section where the strategy deviates from Option B to pass to the south of Fochabers.
- Route options should avoid the Natura sites at Darnaway Forest.

7.2 Risks and Uncertainties

7.2.1 Introduction

This report focuses on deliverability from a technical and legislative perspective, focussing on A96 Dualling Programme wide risks. Political, procurement and funding risks have not been considered as part of this assessment

Risks have been categorised under three headings as follows:

- **Environmental Constraints** – Risk potentially affecting scheme promotion – the sensitivity or significance of environmental constraints or the potential for more significant environmental effects could result in a more complex scheme development and promotion stage, particularly where a public inquiry is required;
- **Promotional Issues** – Risk potentially affecting scheme promotion – the proximity of the dualling to communities and potential difficulties associated with acquisition of land could result in a more complex scheme development and promotion stage, particularly where a public local inquiry is required; and
- **Construction Issues** – There are various technical issues that could prolong the design and construction of the dualling such as difficult topographical and geotechnical issues, proximity to railways and rivers and implications for structures and major public utilities.

A summary of the risks identified is presented in the following section.

7.2.2 Programme Wide Issues

The following risks are considered to be key dualling programme deliverability issues and will therefore be important factors when considering programme and delivery. The risks are categorised under the three headings outlined above; however, some of the risks will overlap.

Environmental Constraints (General) – There are a broad range of environmental constraints summarised within the SEA Environmental Report such as Special Protection Areas, Ancient Woodlands, SSSI, Ramsar sites, SAC and Battlefield sites. As a result, a significant level of interest can be expected which could impact on the scheme development and statutory processes. Ensuring continued consultation with interested parties and in particular with statutory bodies such as SNH, Historic Scotland and SEPA will assist the process.

Environmental Constraints (Flooding) – The route of the A96 interacts with a number of watercourses and associated floodplains over its length such as the Rivers Nairn, Findhorn, Lossie, Spey, Isla, Deveron, Bogie, Urie and Don. Encroachment of the road footprint on the floodplain may result in the need for geotechnical design solutions and additional land purchase to provide compensatory storage measures. Furthermore, watercourse crossings may result in the need for larger culverts or structures to ensure flood risks are mitigated, which may impact the vertical alignment and therefore the footprint of the road. Reference to the A96 dualling SFRA and continued consultation with SEPA will inform design requirements and mitigation.

Promotional Issues (Acquisition of Land) – Dualling the A96 will require extensive sections of new road which are offline from the existing A96 bringing the road closer to previously unaffected communities and properties as well as bypassing existing businesses and towns. This will require the compulsory purchase of private land belonging to businesses and individuals. Early consultation to seek to reduce the impact of the scheme on stakeholders, advising of the statutory process and working towards agreeing accommodation works will help to reduce the likelihood of delays associated with scheme objections.

Promotional Issues (NMU Routes) – The closure of A96 crossing points or adjacent NMU routes may require the construction of alternative routes and/or structures to avoid severance. In addition, NMU facilities will be developed as the dualling programme moves forward to further stages of design development in consultation with relevant local interest groups. This may require significant land purchase or complex structural arrangements in difficult ground/topography.

Construction Issues (Public Utilities) – The A96 runs parallel to the GPSS fuel pipeline for approximately 40km. There are also further Oil and Gas pipelines for BP, Shell and National Grid that the A96 currently crosses at six locations. These present a significant construction constraint and could potentially impact on the programme due to delays in consultation, design and construction. There is other public utility apparatus along the route such as water, gas, electricity and telecommunications which are also likely to present construction and programme issues.

Construction Issues (Structures) – A large number of structures of varying scale will require to be constructed, widened or replaced. This poses a potential risk to

the design and construction programme and cost if the structures are particularly long or complex.

Construction Issues (Railway Line) – A proportion of the A96 runs parallel to the Aberdeen to Inverness Railway Line and crosses at a number of locations necessitating various structural works. The close proximity of the railway line represents a significant constraint to the A96 dualling, with potential impacts on consultation, design and construction.

Construction Issues (Ground Conditions) – A range of ground conditions are expected to be encountered which will introduce a broad range of challenges. They will include localised Peat, Made Ground associated with the A96, old quarries and pits, rock and potentially contaminated land. The varying ground conditions could have an impact on the design and construction programme and cost.

Construction Issues (Junctions / Access) – Construction of grade separated junctions requires additional land. Complex design and construction may therefore be expected in constrained areas of the route. The Junction and Access Strategy will also require the closure of many junctions and accesses which, at some locations, will result in the construction of alternative routes and/or structures to avoid severance.

Construction Issues (Buildability) – Online construction is likely to require extensive temporary traffic management which may impact on the construction programme. In general, online construction durations are longer than those for offline routes.

7.3 DMRB Stage 2 Assessment

Based on the findings of the DMRB Stage 1 Assessment, a potential grouping of schemes has been considered for the next stage of design and assessment (i.e. DMRB Stage 2 Assessment).

The three offline improvement strategies, Option C, Option D and Option N cover part of the length of the proposed dualling programme and must be delivered in combination with Option B. In these cases, the offline improvement strategy replaces the equivalent geographic section of Option B. The geographic overlap between the four strategies is shown in **Table 7.3.1** overleaf.

To allow the appropriate comparison of scheme options developed from the four improvement strategies, the offline strategies need to be directly compared against the equivalent geographic section of Option B.

Table 7.3.1 shows that Option N overlaps with sections B3, B4 and part of B5. Similarly, Option C overlaps with B8, B9 and B10 with Option D also overlapping with Section B8 and B9. The remaining central section comprises sections B5 (part of), B6 and B7 of Option B.

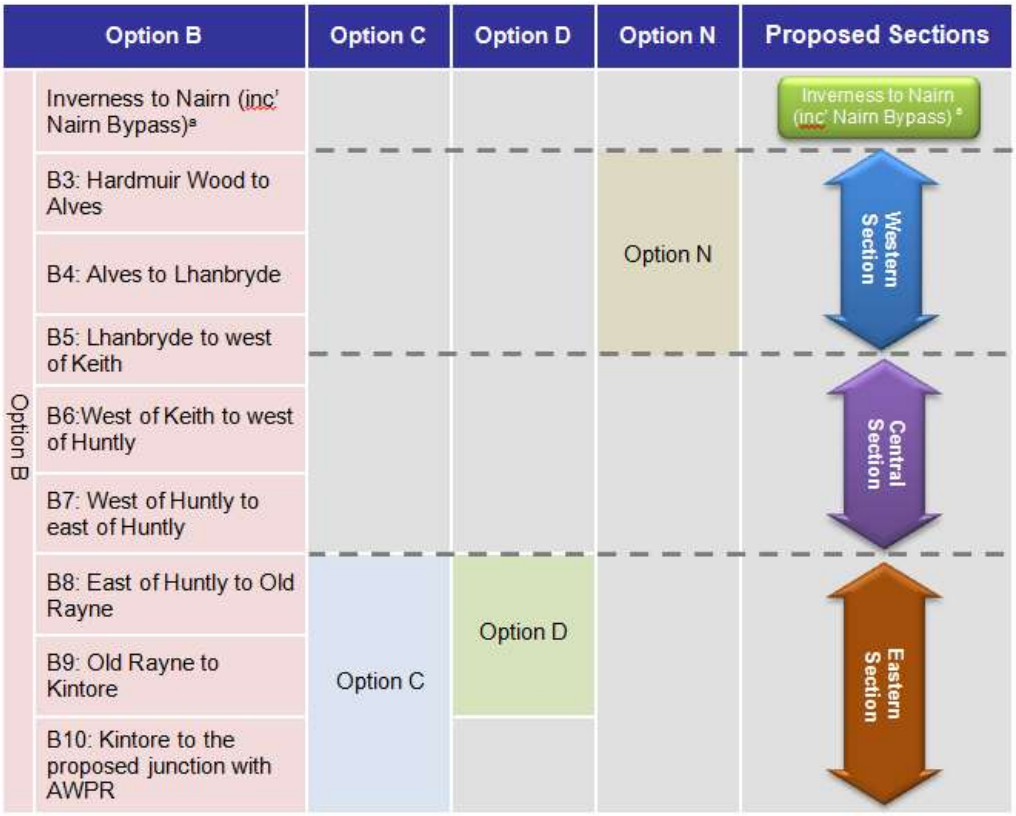

Table 7.3.1 Overlap of DMRB Stage 1 Improvement Strategies

Notes to Table 7.3.1
a – The A96 Inverness to Nairn (including Nairn Bypass) scheme is currently at a more advanced stage of development. The preferred option for this scheme was announced in October 2014.

Based on the four improvement strategies to be taken forward, it is recommended to progress the next stage of design development (i.e. DMRB Stage 2) of the A96 Dualling Programme as three geographically aligned sections in addition to the Inverness to Nairn (including Nairn Bypass) section. The A96 Dualling Inverness to Nairn (including Nairn Bypass) scheme is further advanced at DMRB Stage 3 and shall continue to be progressed separately.

The three sections are proposed on the basis of a Western (approximately 46 km), Central (approximately 31 km) and Eastern (approximately 42 km) section as shown in **Table 7.3.1** and also **Figure 7.3.1** overleaf.

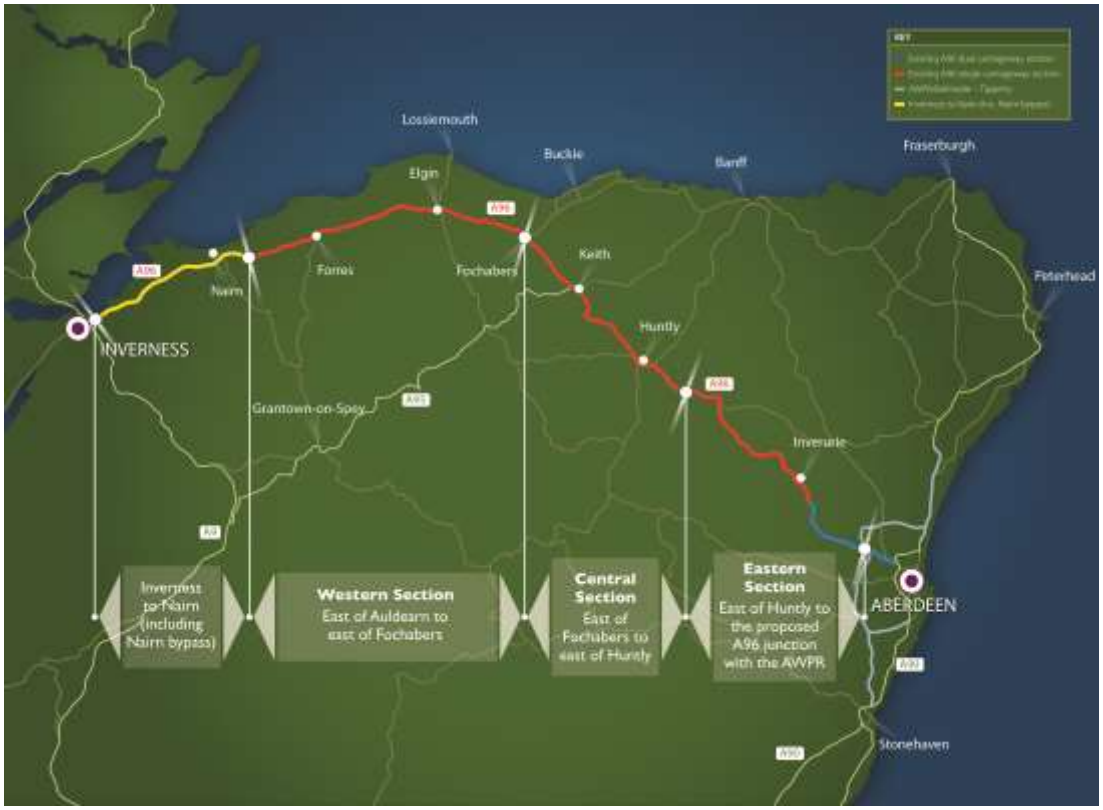

Figure 7.3.1 Proposed sections for DMRB Stage 2 Assessment

The Western Section would run from the tie-in of the A96 Dualling Inverness to Nairn (including Nairn Bypass) scheme to the east of Auldearn, to east of Fochabers. The Central Section would contain the section between east of Fochabers and east of Huntly. Finally, the Eastern Section would run from east of Huntly to the proposed junction with the AWPR.

The completion of DMRB Stage 2 Assessment for each section would inform further analysis to determine appropriate scheme definition for subsequent stages of assessment, promotion and construction.

8 Abbreviations

AADT	Annual Average Daily Traffic
AGLV	Areas of Great Landscape Value
AOD	Above Ordinance Datum
ARSA	Areas Requiring Special Attention
ASAM	Aberdeen Sub-Area Model
ATC	Automatic Traffic Counter
AWPR	Aberdeen Western Peripheral Route
BCR	Benefit-to-Cost Ratio
BOWL	Beatrice Offshore Windfarm Limited
BS	British Standard
CAR	Controlled Activity Regulations
CCTV	Closed-Circuit Television
Ch.	Chainage
CPO	Compulsory Purchase Order
D2AP	Dual-Two Lane All-Purpose Carriageway
DF	Driver Frustration
DMRB	Design Manual for Roads and Bridges
EALI	Economic Activity and Location Impacts
ERT	Emergency Roadside Telephone
ES	Environmental Statement
ETA	Emergency Turnaround Area
GCR	Geological Conservation Review
GDL	Garden and Designed Landscape
GIS	Geographical Information System
GPSS	Government Pipeline and Storage Systems
GVA	Gross Value Added
HER	Historic Environmental Records
HGDL	Historic Gardens and Designated Landscapes
HGV	Heavy Goods Vehicle
HITRANS	Highlands and Islands Transport Partnership
HS	Historic Scotland
IIP	Infrastructure Investment Plan
ITS	Intelligent Transport System
JTC	Junction Turning Count
LNCS	Local Nature Conservation Sites
LGV	Light Goods Vehicle
LiDAR	Light Detection and Ranging
MAC	Media Access Control
mAOD	metres Above Ordnance Datum
MCP	Moving Cursor Programme
MGW	Maximum Gross Weight
MVK	Million Vehicle Kilometres
NCN	National Cycle Network
NESTRANS	North-East of Scotland Transport Partnership
NHP	National Transmission High Pressure
NMU	Non-Motorised User
NTS	Non-Technical Summary
NRTF	National Road Traffic Forecast
PVB	Present Value Benefits
PVC	Present Value Costs
PES	Preliminary Engineering Services

PIA	Personal Injury Accidents
POP	Police Observation Platform
RoW	Rights of Way
RRCS	Reported Road Casualties Scotland
RRRAP	Road Restraint Risk Assessment Process
RRS	Road Restraint Systems
RSI	Road Side Interview
SAC	Special Area of Conservation
SBC	Strategic Business Case
SCOTFLAG	Scottish Freight and Logistics Advisory Group
SCROL	Scotland's Census Register Online
SCP	Safety Camera Partnership
SEA	Strategic Environmental Assessment
SEPA	Scottish Environment Protection Agency
SESA	Study of Environmentally Sensitive Areas
SERIS	Scottish Executive Roads Information System
SFRA	Strategic Flood Risk Assessment
SHE	Scottish Hydro Electric
SINS	Sites of Interest to Natural Science
SNH	Scottish National Heritage
SPA	Special Protection Area
SRTDb	Scottish Roads Traffic Database
SSD	Stopping Sight Distance
SSE	Scottish and Southern Energy
SSSI	Site of Specific Scientific Interest
STAG	Scottish Transport Appraisal Guidance
STEP	Scottish Trip End Program
STPR	Strategic Transport Projects Review
SuDS	Sustainable Drainage Systems
TMfS	Transport Model for Scotland
TSRGD	Traffic Signs Regulations and General Directions
VMS	Variable Message Sign
WEBS	Wider Economic Benefits
WiM	Weigh in Motion
WS2+1	Wide Single 2+1 Carriageway

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Appendix A Stage 1 Improvement Strategies

Appendix B Key Constraint Plans

Appendix C Existing NMU Provision

Appendix D Existing Public and Private Utility Plans

Appendix E Local Bus & Rail Services

Appendix F Flood Risk Assessments

Appendix G Departures from Standards Schedule

Appendix H Improvement Strategies Stage 1 Assessment Tables

Appendix I Structures Assessment

Appendix J Junctions & Access Strategy

Appendix K Lay-by Strategy

Appendix L NMU Strategy

Appendix M Junction Turning Count

Appendix N Accident Location Maps

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