



A96 Dualling Inverness to Nairn (including Nairn Bypass)

DMRB Stage 3 Scheme Assessment Report Engineering, Traffic and Economic Assessment Volume 1 – Main Report and Appendices

November 2016



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Contents

Part 1 – Environmental Statement

Part 2 – Engineering, Traffic and Economic Assessment

Volume 1 – Main Report and Appendices

Glossary of Terms	iv
Abbreviations	vii
1 Introduction.....	1-1
1.1 Overview.....	1-1
1.2 Background to Proposed Scheme.....	1-1
1.3 Scheme Objectives.....	1-2
1.4 The Proposed Scheme.....	1-2
1.5 DMRB Stage 3 Scheme Assessment Report.....	1-3
1.6 Do-Minimum Definition	1-3
1.7 References	1-3
2 Existing Conditions.....	2-1
2.1 Overview.....	2-1
2.2 Man-made Features	2-1
2.3 Existing Road Network	2-3
2.4 Other Carriageway Features	2-7
2.5 Existing Structures.....	2-14
2.6 Public Utilities	2-20
2.7 Existing Traffic Patterns.....	2-21
2.8 Existing Accident Data.....	2-22
2.9 Operational Issues.....	2-23
2.10 References	2-23
3 Description of the Proposed Scheme	3-1
3.1 Engineering Description	3-1
3.2 Cost Estimate	3-11
3.3 References	3-13
4 Engineering Assessment	4-1
4.1 Engineering Standards.....	4-1
4.2 Climate, Topography and Land Use.....	4-3
4.3 Geology, Ground Conditions and Earthworks.....	4-4
4.4 Drainage, Hydrology and Hydrogeology	4-11
4.5 Public Utilities	4-18
4.6 Structures	4-20
4.7 Fencing and Environmental Barriers.....	4-28
4.8 Traffic Signs and Road Markings, Traffic Signals and Lighting.....	4-28
4.9 Lay-Bys.....	4-30
4.10 Road Restraint Systems.....	4-30
4.11 Road Pavement.....	4-30
4.12 Indicative Construction Sequence.....	4-31

4.13	References	4-33
5	Traffic Assessment	5-1
5.1	Introduction	5-1
5.2	Model Inputs and Assumptions	5-1
5.3	Existing Traffic Operational Review	5-2
5.4	Accident Summary	5-4
5.5	Traffic Modelling	5-5
6	Economic Assessment	6-1
6.1	Introduction	6-1
6.2	Proposed Scheme Costs	6-1
6.3	Accident Benefits	6-1
6.4	Construction and Maintenance Delay	6-4
6.5	TUBA Assessment	6-6
6.6	Key Economic Assessment Results	6-7
7	Conclusion	7-1
7.1	Engineering Considerations	7-1
7.2	Scheme Objectives	7-1
7.3	Value for Money	7-3
7.4	References	7-3

Appendix A – Departures from Standard

Volume 2 – Figures

Figure 1.1	Existing Conditions
Figure 1.2	Proposed Scheme
Figure 1.3	Proposed Structures
Figure 2.1	Non-Motorised Users
Figure 2.2	Existing Bus Routes
Figure 2.3	Existing School Bus Routes
Figure 2.4	Personal Injury Accidents 2010 – 2014
Figure 3.1	Dual Carriageway Plan and Profile
Figure 3.2	Local Roads Plan and Profile
Figure 3.3	Junctions Plan and Profile
Figure 3.4	Road Cross Sections
Figure 3.5	Proposed Brackley Junction – Nairn West Junction Bus Route
Figure 3.6	Shared Use Path Cross Sections
Figure 4.1	Relaxations and Departures Location Plan
Figure 4.2	Dual Carriageway Drainage Overview
Figure 4.3	Local Road Drainage Overview
Figure 5.1	MFTM Model Network
Figure 5.2	ATC Site Locations
Figure 5.3	Journey Time Routes
Figure 5.4	2014 Observed Traffic Flows
Figure 5.5	Do Minimum 2036 High Growth AADT
Figure 5.6	Do Something 2036 High Growth AADT

Glossary of Terms

<i>Allocation</i>	A proposal for land for housing, industry or other uses within a Local Plan that identifies a specific area of land to be developed within the time period of the plan.
<i>Alluvium</i>	Sediment deposited by a river.
<i>Assessment</i>	An umbrella term for description, analysis and evaluation.
<i>Attenuation</i>	Increase in duration of flow hydrograph with a consequent reduction in peak flow.
<i>At-grade junction</i>	A junction arrangement at which two or more roads meet at the same level.
<i>Baseline</i>	The existing conditions which form the basis or start point of the environmental assessment.
<i>Bedrock</i>	Hard rock that lies beneath a superficial cover of soils and sediments.
<i>Benefit to Cost Ratio (BCR)</i>	An indicator, used in the formal discipline of cost-benefit analysis that attempts to summarize the overall value for money of a project or proposal. A BCR is the ratio of the benefits of a project or proposal, expressed in monetary terms, relative to its costs, also expressed in monetary terms.
<i>Biodiversity</i>	Biological diversity, or richness of living organisms present in representative communities and populations.
<i>Bund</i>	An embankment, wall or dam that can be used to minimise noise or alternatively built around an oil tank to contain the contents in the event of spillage.
<i>Calcareous</i>	Refers to a sediment, sedimentary rock, or soil type which is formed from or contains a high proportion of calcium carbonate.
<i>Compulsory Purchase Order (CPO)</i>	A legal document giving the government (Scottish Ministers) power to compulsorily purchase the areas of land necessary for the construction of the scheme.
<i>Contaminated Land</i>	The 'Environmental Protection Act 1990' defines Contaminated Land as 'any land which appears to the Local Authority as to be in such condition, by reason of substances in, on or under the land that (a) significant harm is being caused or there is a significant possibility of such harm being caused; or (b) significant pollution of controlled waters is being, or there is a significant possibility of such pollution being caused'.
<i>Culvert</i>	A metal, wooden, plastic, or concrete conduit through which surface water can flow under or across roads.
<i>Cutting</i>	Typically where part of a hill or mountain is cut out to make way for a road or railway line.
<i>Diverge</i>	A link road departing the main carriageway to a subsidiary road or junction.
<i>Do-minimum</i>	The base situation where there are no modifications to the existing road network. May also refer to the minimum modifications, which will necessarily take place in the absence of a proposed scheme.

<i>Do-Something</i>	The proposed scenario involving construction of a dual carriageway from Inverness to Nairn, including a Nairn bypass.
<i>Dual Carriageway</i>	The principal road being considered, namely the proposed A96 trunk road.
<i>Effect</i>	The result of change or changes on specific environmental resources or receptors.
<i>Element</i>	A component part of the landscape or environment (e.g. roads, hedges, woodlands).
<i>Environmental Impact Assessment (EIA)</i>	The process by which information about the environmental effects of a project is evaluated and mitigation measures are identified.
<i>Fill</i>	Material deposited by man in ground depression or excavated area or to construct an embankment.
<i>Free Flow Alignment</i>	A road layout that allows traffic to join and leave the carriageway at speed.
<i>Glaciofluvial</i>	Pertaining to streams fed by melting glaciers, or to the deposits and landforms produced by such streams.
<i>Glacial Till</i>	Glacial Till is that part of glacial drift which was deposited directly by the glacier. It may vary from clays to mixtures of clay, sand, gravel and boulders.
<i>Grade Separated Junction</i>	A junction arrangement that is separated by level from the through carriageway.
<i>Ground Investigation</i>	Exploratory investigation to determine the structure and characteristics of the ground influenced by a development. The collected information is used to establish or predict ground and groundwater behaviour during, and subsequent to, construction.
<i>Groundwater</i>	Water below the surface of the ground in the saturation zone and in direct contact with the ground or subsoil.
<i>Habitat</i>	Term most accurately meaning the place in which a species lives, but also used to describe plant communities or agglomerations of plant communities, as used, for example in a Phase 1 Habitat Survey.
<i>Heavy Goods Vehicle (HGV)</i>	Vehicles with 3 axles (articulated) or 4 or more axles (rigid and articulated).
<i>Hydrogeology</i>	The branch of geology that deals with the occurrence, distribution, and effect of ground water.
<i>Hydrological</i>	The exchange of water between the atmosphere, the land and the oceans.
<i>Impact</i>	Any changes attributable to the proposed scheme that have the potential to have environmental effects (i.e. the causes of the effects).
<i>Impermeable</i>	Material that does not allow fluids to pass through it.
<i>Infrastructure Investment Plan (IIP)</i>	A Scottish Government document that sets out priorities for investment and long-term strategy for the development of public infrastructure in Scotland.
<i>Landscape</i>	Human perception of the land, conditioned by knowledge and identity with a place.

<i>Local Road</i>	An A, B or C classified road (non Trunk Road) typically operated by a Local Authority or council.
<i>Loop</i>	A connecting road, utilising a continuous curve in the connection of two roads within a junction.
<i>Made Ground</i>	Material deposited by man i.e. not natural.
<i>Merge</i>	A link road accessing the main carriageway from a subsidiary road or junction.
<i>Mitigation</i>	Term used to indicate avoidance, remediation or alleviation of adverse impacts.
<i>Non-Motorised User (NMU)</i>	Road users other than vehicular traffic, particularly cyclists, pedestrians and equestrians.
<i>Peat</i>	Material consisting of decomposed vegetation forming a deposit found in bogs.
<i>Runoff</i>	Water that flows over the ground surface to the drainage system. This occurs if the ground is impermeable or if permeable ground is saturated.
<i>Severance</i>	The separation of communities from facilities and services they use within their community. Alternatively, in relation to agricultural land, the division of plots of land into separate land parcels, potentially affecting access or creating areas that may be impractical for agricultural use.
<i>Slip Road</i>	A connector road facilitating access between one road and another.
<i>Strategic Transport Project Review (STPR)</i>	A review of the Scottish transport network undertaken by Transport Scotland and published in 2008. It identifies and prioritises road, rail and other interventions of national significance, proposed to be taken forward to improve the network.
<i>Superficial Deposits</i>	The youngest geological deposits formed during the most recent period of geological time, the Quaternary, which extends back 1.8 million years from the present.
<i>Sustainable Drainage Systems (SUDS)</i>	A sequence of management practices and control structures designed to drain surface water in a more sustainable fashion than some conventional techniques.
<i>Trunk Road</i>	Part of the road network connecting major cities, towns, airports and ports for which the Scottish Government is responsible.
<i>Water Environment (Controlled Activities) (Scotland) Regulations</i>	Controls all engineering activity in or near watercourses.
<i>Water Quality</i>	The chemical and biological status of various parameters within the water column and their interactions, for example dissolved oxygen, indicator metals such as dissolved copper, or suspended solids (the movement of which is determined by hydrological process and forms geomorphological landforms).

Abbreviations

<i>AADT</i>	Annual Average Daily Traffic
<i>ATC</i>	Automatic Traffic Count
<i>BCR</i>	Benefit to Cost Ratio
<i>CAR</i>	Water Environment (Controlled Activities) (Scotland) Regulations 2005
<i>CBR</i>	California Bearing Ratio
<i>CEH</i>	Centre for Ecology and Hydrology
<i>CIRIA</i>	Construction Industry Research and Information Association
<i>CLH-PS</i>	CLH Pipeline Systems
<i>COBALT</i>	Cost and Benefit to Accidents – Light Touch software
<i>CPO</i>	Compulsory Purchase Order
<i>D&B</i>	Design and Build
<i>D2AP</i>	Dual 2 Lane Rural All-Purpose
<i>D3AP</i>	Dual 3 Lane Rural All-Purpose
<i>DfT</i>	Department for Transport
<i>DM</i>	Do-Minimum
<i>DMRB</i>	Design Manual for Roads and Bridges
<i>DS</i>	Do Something
<i>EB</i>	Eastbound
<i>EIA</i>	Environmental Impact Assessment
<i>FEH</i>	Flood Estimation Handbook
<i>FSR</i>	Flood Studies Report
<i>GBR</i>	General Binding Rule
<i>HGV</i>	Heavy Goods Vehicle
<i>HNDA</i>	Housing Needs and Demand Assessment
<i>HwLDP</i>	Highland-wide Local Development Plan
<i>IIP</i>	Infrastructure Investment Plan
<i>IP</i>	Intermediate Pressure
<i>IRIS</i>	Integrated Roads Information Service
<i>km</i>	Kilometres
<i>Kph</i>	Kilometres per hour
<i>kV</i>	Kilovolt
<i>LED</i>	Light Emitting Diodes
<i>LGV</i>	Light Goods Vehicles
<i>LHPG</i>	Local High Pressure Gas Main
<i>LP</i>	Low Pressure

<i>LV</i>	Low Voltage
<i>MCHW</i>	Manual of Contract Document for Highway Works
<i>MFTM</i>	Moray Firth Transport Model
<i>MGV</i>	Medium Goods Vehicles
<i>MP</i>	Medium Pressure
<i>NCN</i>	National Cycle Network
<i>NERC</i>	Natural Environment Research Council
<i>NMU</i>	Non-Motorised User
<i>N-RIP</i>	Scottish Enterprises' National Renewables Infrastructure Plan
<i>NRSWA</i>	New Roads and Street Works Act 1991
<i>OB</i>	Overbridge
<i>PAN</i>	Planning Advice Note
<i>PIA/MVkm</i>	Personal Injury Accidents per Million Vehicle Kilometres
<i>PSV</i>	Polished Stone Value
<i>PWS</i>	Private Water Supply
<i>Q1</i>	Quarter 1
<i>QUADRO</i>	Queues And Delays at Roadworks
<i>RDG</i>	Raeburn Drilling Geotechnical Ltd.
<i>RRRAP</i>	Road Restraint Risk Assessment Process
<i>SEPA</i>	Scottish Environment Protection Agency
<i>SERIS</i>	Scottish Executive Road Information System
<i>SHW</i>	Schedule for Highway Works
<i>SNH</i>	Scottish Natural Heritage
<i>SSD</i>	Stopping Sight Distance
<i>STPR</i>	Strategic Transport Projects Review
<i>SUDS</i>	Sustainable Drainage Systems
<i>SWFs</i>	Surface Water Features
<i>TEE</i>	Transport Economic Efficiency
<i>THC</i>	The Highland Council
<i>TMfS</i>	Transport Model for Scotland
<i>TSRGD</i>	Traffic Signs Regulations and General Directions 2016
<i>TUBA</i>	Transport Users Benefit Appraisal
<i>UB</i>	Underbridge
<i>UHI</i>	University of Highland and Islands
<i>VAT</i>	Value-added Tax
<i>VMS</i>	Variable Message System
<i>WB</i>	Westbound
<i>WEBS</i>	Wider Economic Benefits

1 Introduction

1.1 Overview

- 1.1.1 The A96 Aberdeen – Inverness Trunk Road, is located in the north-east of Scotland and is of national strategic importance linking Inverness to Aberdeen. This corridor is vital in supporting the future growth of the two cities and the various communities within, and connected to it. It runs between Raigmore Interchange at Inverness and Haudagain Roundabout at Aberdeen, and is approximately 99 miles (160km) long passing through, or nearby the settlements of Nairn, Forres, Elgin, Fochabers, Keith, Huntly and Inverurie.
- 1.1.2 In 2011 the Scottish Government, through the Infrastructure Investment Plan (IIP) (Scottish Government 2011), announced the commitment to dual the A96 between Inverness and Aberdeen by 2030, providing a number of benefits including improved journey times and reliability, delivering economic growth, improved connectivity and reducing the rate and severity of accidents.
- 1.1.3 The design and assessment of the A96 Dualling Inverness to Nairn (including Nairn Bypass) Scheme (hereafter referred to as the proposed Scheme) has progressed through Design Manual for Roads and Bridges (DMRB) Stage 2 (route option assessment), taking into account the commitments outlined in the IIP. A preferred option was announced in October 2014. Since 2015 the preferred option has been developed and assessed through DMRB Stage 3. The existing A96 between Inverness and Hardmuir is shown on Figure 1.1.
- 1.1.4 This Scheme Assessment Report has been prepared in relation to the proposed Scheme, which has been progressed to a 'Stage 3' level of design in accordance with the DMRB. This will inform the basis for the detailed design to be prepared and constructed by the appointed contractor(s), subject to agreement with Transport Scotland and adherence to environmental mitigation as identified within the DMRB Stage 3 Scheme Assessment Report, Part 1 Environmental Statement (hereafter referred to as the Environmental Statement).

1.2 Background to the Proposed Scheme

- 1.2.1 The Strategic Transport Projects Review (STPR) (Jacobs, Faber Maunsell, Grant Thornton and Tribal Consulting 2009) was published in 2008 and sets out the Scottish Government's transport investment priorities over the coming decades. Specific trunk road interventions that emerged from the review included upgrading the A96 between Inverness and Nairn to dual carriageway (Intervention 18) and a bypass of Nairn (Intervention 22).
- 1.2.2 In 2010, Transport Scotland commissioned a DMRB Stage 2 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. The design work was undertaken in order to support The Highland Council's Local Development Plan Proposals for the A96 corridor and improve the operation of the trunk road around Inverness.
- 1.2.3 On 6 December 2011, the then Cabinet Secretary for Infrastructure and Capital Investment launched the IIP (Scottish Government 2011) which provides an overview of the Scottish Government's plans for infrastructure investment up to 2030. Contained within the document is a commitment to complete the dualling of the A96 between Inverness and Aberdeen by 2030, thus completing the dual carriageway network between all Scottish cities.
- 1.2.4 On 9 May 2013 the then Minister for Transport and Veterans 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 following 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 Scottish Government commitment to dual the entire route.

- 1.2.5 Taking into account the objectives of the IIP, route options were developed to provide a dual carriageway with grade separated junctions between Inverness and Nairn and a dual carriageway bypass of Nairn.
- 1.2.6 As part of the A96 Dualling Programme Transport Scotland is committed to undertaking a rolling programme of regular engagement to ensure that communities, businesses and individuals affected by the work are kept fully informed and their vital feedback taken into account. In November 2013 Transport Scotland undertook a series of public exhibitions to present the route options under consideration for the A96 between Inverness and Nairn, including the bypass of Nairn, and to seek public feedback on these.
- 1.2.7 The DMRB Stage 2 route option assessment (Jacobs 2014) was completed with the preferred option presented to the public at a series of public exhibitions in October 2014.
- 1.2.8 Jacobs was commissioned by Transport Scotland in May 2015 to progress the DMRB Stage 3 design of the preferred option, including completion of a DMRB Stage 3 Environmental Impact Assessment (EIA), and to provide services to complete an Environmental Statement and draft Orders for the proposed Scheme. Extensive engagement has continued throughout the DMRB Stage 3 assessment, including a Meet the Team event on 26 and 27 August 2015 and drop-in sessions on 3 to 5 February 2016.

1.3 Scheme Objectives

- 1.3.1 The Scheme objectives for the A96 Dualling Inverness to Nairn (including Nairn Bypass) Scheme are as follows:
- To improve the operation of the A96 and inter-urban connectivity by:
 - reducing journey times;
 - improving journey time reliability;
 - increasing overtaking opportunities;
 - improving freight movement efficiency along the transport corridor; and
 - reducing conflicts between local traffic and other traffic in urban areas.
 - To improve safety for motorised and Non-Motorised Users (NMUs) by:
 - reducing accident rates and severity;
 - reducing driver stress; and
 - reducing NMU conflicts with strategic traffic in urban areas.
 - To provide opportunities to grow the regional economies on the corridor by:
 - improving access to the wider strategic transport network;
 - enhancing access to jobs and services; and
 - supporting access to tourist and recreation sites.
 - To facilitate active travel in the corridor
 - To facilitate integration with Public Transport facilities
 - To minimise the environmental effect on the communities along the corridor through reducing severance and improving environmental conditions in towns to be bypassed.

1.4 The Proposed Scheme

- 1.4.1 The DMRB Stage 3 engineering design presented in this report, assessed in the EIA and reported in the Environmental Statement is hereafter referred to as the 'proposed Scheme' and is shown on Figure 1.2 and Figure 1.3.

- 1.4.2 The proposed Scheme comprises the provision of approximately 31km of new dual carriageway, which would be mainly constructed off the line of the existing A96. The existing A96 would be de-trunked and reclassified as a local road to maintain local access where appropriate. The proposed Scheme incorporates:
- the provision of shared use paths suitable for NMUs, approximately 30km in length;
 - six grade separated junctions;
 - 25 principal structures including a crossing of the River Nairn and three structures over the Aberdeen to Inverness Railway Line;
 - local road diversions and the provision of new private means of access; and
 - utility diversions including major diversions for SGN (previously Scotia Gas Networks) and CLH Pipeline Systems (CLH-PS).
- 1.4.3 Further details of the proposed Scheme are provided in Chapter 3 (Description of the Proposed Scheme).

1.5 DMRB Stage 3 Scheme Assessment Report

- 1.5.1 This report has been prepared in accordance with the requirements of the DMRB, Volume 5, Section 1, Part 2, TD37/93, Scheme Assessment Reporting (The Highways Agency, The Scottish Office Development Department, The Welsh Office and The Department of The Environment for Northern Ireland 1993), and describes the outcomes of the DMRB Stage 3 development work undertaken in respect of the A96 Dualling Inverness to Nairn (including Nairn Bypass) Scheme.
- 1.5.2 The A96 Dualling Inverness to Nairn (including Nairn Bypass) Environmental Statement as published in November 2016 forms Part 1 of the DMRB Stage 3 Scheme Assessment Report and covers the environmental aspects of the assessment. This report forms Part 2 of the DMRB Stage 3 Assessment and details the assessment work in relation to engineering, traffic and economics.
- 1.5.3 Part 1 Environmental Statement and Part 2 Engineering, Traffic and Economic Assessment can be viewed at the Transport Scotland website: www.transport.gov.scot/project/a96-inverness-nairn-including-nairn-bypass.

1.6 Do-Minimum Definition

- 1.6.1 The situation describing the future conditions, if the scheme is not constructed, is termed the 'Do-Minimum' scenario. The 'Do-Minimum' scenario has been agreed with Transport Scotland to include maintenance of the existing road over the 60 year appraisal period as well as specific minor improvement schemes in the surrounding area. A full definition of the 'Do-Minimum' scenario is given in Section 5.5 (Traffic Modelling).

1.7 References

- Jacobs (*on behalf of Transport Scotland*) (2014). A96 Dualling Inverness to Nairn (including Nairn Bypass): DMRB Stage 2 Scheme Assessment Report. Transport Scotland.
- Jacobs, Faber Maunsell, Grant Thornton and Tribal Consulting (*on behalf of Transport Scotland*) (2009). Strategic Transport Projects Review: Final Report. Transport Scotland.
- Scottish Government (2011). Infrastructure Investment Plan. Scottish Government
- The Highways Agency, The Scottish Office Development Department, The Welsh Office and The Department of The Environment for Northern Ireland (1993). Volume 5, Section 1, Part 2, TD37/93, Scheme Assessment Reporting

2 Existing Conditions

2.1 Overview

- 2.1.1 This section provides an overview of the existing conditions of the A96 Aberdeen – Inverness Trunk Road between Inverness and Hardmuir. It provides information in relation to existing features including carriageway conditions and structures.
- 2.1.2 The A96 Dualling Inverness to Nairn (including Nairn Bypass) study area is approximately 31km in length, and is situated to the east of Raigmore Interchange. The study area starts at the existing Seafield Roundabout near the Inverness Retail and Business Park and ends at Hardmuir, located approximately 3.5km to the east of Auldearn.
- 2.1.3 The study area lies to the south of the Inner Moray Firth and to the north of the Cairngorm mountain range. The city of Inverness lies at the western edge of the study area, whilst the coastal town of Nairn and the village of Auldearn are located to the east of the study area. The study area broadly follows the existing A96 road corridor from Inverness to Blackcastle, with the proposed Scheme bypassing Nairn to the south and Auldearn to the north.
- 2.1.4 The study area comprises predominantly high quality arable farm land, with frequent blocks of woodland. Scattered villages and smaller clusters of properties transition to more substantial residential development in closer proximity to Inverness and Nairn, with some industrial development adjacent to the existing A96. Inverness airport is situated to the north of the study area and provides an important transport resource for the wider Highland region. The Aberdeen to Inverness Railway Line passes through the study area crossing the existing A96 at Gollanfield and within Nairn.
- 2.1.5 The existing road network, structures and associated features are shown on Figure 1.1.

2.2 Man-made Features

Roads

- 2.2.1 The existing road network is described in Sections 2.3 and 2.4 using the road names given in Table 2.1.

Table 2.1: List of Roads

Classification	Road Name
A Class Roads	
A96	Aberdeen – Inverness Trunk Road
A939	Tomintoul – Grantown on Spey – Nairn Road
B Class Roads	
B9006	Millburn Roundabout – Culcabock – Castle Hill – Culloden Moor – Croy – Gollanfield – Fort George Road
B9039	Newton – Castle Stuart – Ardersier Road
B9090	Loch Flemington – Clephanton – Cawdor – Nairn Road
B9091	Croy – Clephanton – Kildrummie – Nairn Road
B9092	Ardersier – Nairn Road
B9101	Auldearn – Cawdor Road
B9111	Auchnacloch – Auldearn Road
C Class Roads	
C1013	Gollanfield Road (C1013)
C1017	Kerrowgair – Croy Road (C1017)
C1020	Dalcross Station Road (C1020)
C1024	Tornagrain – Cantray Road (C1024)
C1028	Culloden Road (C1028)

Classification	Road Name
C1032	Barn Church Road (C1032)
C1036	Tower Road (C1036)
C1157	Boghole – Moyness – Fornightly Road (C1157)
C1159	Nairn – Lochloy – Bankhead Road (C1159)
C1163	Delnies – Kildrummie – Howford Road (C1163)
C1170	Moss-Side – Mosshall – Broadley Road (C1170)
C1171	Auldearn – Moyness Road (C1171)
C1172	Auldearn – Station – Drum Road (C1172)
C1175	Househill – Raitloan – Howford Road (C1175)
C1180	St Ninian Road – Marine Road – Seafield Street Road (C1180)
Unclassified Roads	
U1008	Morayston – Castle Stuart Road (U1008)
U1017	Wester Glackton – Balcroy – Kilravock – Cawdor Road (U1017)
U1025	Milton of Breachlich Road (U1025)
U1029	Tomhommie – Ballinreich – Balnagowan Road (U1029)
U1033	Link Road road between Gollanfield Road (C1013) and Tomhommie – Ballinreich – Balnagowan Road (U1029)
U1058	Stratton Lodge Road (U1058)
U1136	Milton Road (U1136)
U1144	Milton of Culloden Road (U1144)
U1283	Castle Stuart – Easter Dalziel Road (U1283)
U1347	Allanfearn – Alturlie Road (U1347)
U1351	Loch Flemington Road (U1351)
U1855	Keppoch Road (U1855)
U2218	McDermotts Road (U2218)
U2350	Loch Flemington Link Road (U2350)
U2378	Glackton Road (U2378)
U2820	Eastfield Way Road (U2820)
U2959	Broombank Road (U2959)
U2997	Waterloo – Eastertown – Inshoch Road (U2997)
U3010	Blackpark – Grigorhill – Newmill Road (U3010)
U3036	Ellands – Hardmuir – Boghole Road (U3036)
U3049	Moyness Smithy – Golford Road (U3049)
U3164	Penick Road (U3164)
U3226	Balnaspirach – Nairn Moss Lands Road (U3226)
U3362	King Street (U3362)
U3599	Tom Semple Road (U3599)

- 2.2.2 The A96 Aberdeen – Inverness Trunk Road is commonly referred to as “the A96” or “the existing A96” throughout this report. Other roads are described by their classification and road name. Junctions between the A96 and other roads listed in Table 2.1 are referenced simply by their classification, e.g. “the C1020 junction”.

Railway

- 2.2.3 The Aberdeen to Inverness Railway Line is a single track line which runs east to west through the study area, passing in close proximity to the existing A96 near Milton of Culloden, and under the existing A96 at Gollanfield.
- 2.2.4 There are five unmanned level crossings on this section of railway in the vicinity of the existing A96. There are three for vehicular traffic, on the Allanfearn – Alturlie Road (U1347), the access to the Redhill Farm and the Dalcross Station Road (C1020). There are two further level crossings for

pedestrian use only, one located to the east of Milton of Culloden and the second at Easter Glackton Farm.

Residential Properties

- 2.2.5 The areas of settlement including Smithton, Culloden and Balloch are situated at the western extent of the proposed Scheme to the south of the existing A96. Nairn and Auldearn are located at the eastern extent of the proposed Scheme.
- 2.2.6 Construction started in 2016 on the first phase of a mixed use development at Tornagrain which will expand in planned phases over approximately 50 years. This will create a new town at Tornagrain with the potential to deliver up to 5,000 new homes, shops, schools and community facilities.
- 2.2.7 Individual residential properties are scattered along the corridor of the existing A96 with clusters at Milton of Culloden South, Newton of Petty, Morayston, Tornagrain, Mid Coul, Gollanfield, Broombank and Courage.

Agricultural Properties

- 2.2.8 From Balloch to Gollanfield, the study area is primarily owned by Moray Estates, whose holdings within the study area are divided into tenanted agricultural farmland, woodland and proposed development land. The remainder of the study area consists primarily of smaller agricultural holdings and woodland. As with residential properties, farm steadings are dispersed across the study area, some of which take direct access from the existing A96 and some of those are situated immediately adjacent to the existing A96.

Commercial Properties

- 2.2.9 The Inverness Retail and Business Park is located on the south side of the existing A96 at the western end on the route. Inverness Airport is located to the north of the existing A96 at Mid Coul. Ozzy Ali's restaurant is located at Gollanfield on the south side of the existing A96.
- 2.2.10 Nairn Camping and Caravanning Club Site is located at Delnies Wood on the south side of the existing A96, west of Nairn, and there are several businesses located adjacent to the existing A96 through Nairn.
- 2.2.11 East of Auldearn towards the eastern end of the scheme Wester Hardmuir Fruit Farm operates a farm shop with direct access from the existing A96.

Industrial Properties

- 2.2.12 A wastewater treatment plant is located at Milton of Culloden, north of the existing A96. Norbord timber processing facility is located north of the existing A96 at Morayhill. Dalcross Industrial Estate is located next to Inverness Airport to the north of the existing A96 at Mid Coul.
- 2.2.13 The Port of Ardersier lies to the north of the study area on the McDermotts Road (U2218). Ardersier has been identified within Scottish Enterprises' National Renewables Infrastructure Plan (N-RIP) (Scottish Enterprise 2010) as a port location for offshore wind manufacturing, installation staging and operations and maintenance for the Moray Firth arrays.
- 2.2.14 There are industrial areas within Nairn and of particular note to the proposed scheme, John Gordon & Son sawmill at Balblair and Tulloch Timber Ltd on the Blackpark – Grigorhill – Newmill Road (U3010).

2.3 Existing Road Network

- 2.3.1 The A96 Aberdeen – Inverness Trunk Road commences at Raigmore Interchange, heading in a generally north-easterly direction towards Nairn. It is a rural route, generally through agricultural land with an area of woodland at Tornagrain. The Aberdeen to Inverness Railway Line is north of the existing A96 from Inverness to Gollanfield where they cross, and follows a similar north-easterly

direction. The general topography of the existing A96 through the study area is illustrated on Photo 2.1. For further details on the topography see Section 4.2 (Climate, Topography and Land Use) in Chapter 4 (Engineering Assessment).

- 2.3.2 The first 0.85km of the existing A96 from Raigmore Interchange to Seafield Roundabout is already dual carriageway. East of this roundabout the A96 is single carriageway.
- 2.3.3 The route continues for approximately 0.9km to a roundabout at the C1032 western junction. East of the roundabout at the C1032 western junction the route continues for approximately 8.5km to a roundabout at the C1017 junction at Mid Coul. Over this length it passes north of the communities of Culloden and Balloch. There are several local road junctions and numerous other private means of access including the access for the Norbord timber processing facility at Morayhill.
- 2.3.4 From the roundabout at the C1017 junction, the existing A96 continues a further 4.4km to the C1013 junction at Gollanfield. There is a local road junction with the B9006 Millburn Roundabout – Culcabock – Castle Hill – Culloden Moor – Croy – Gollanfield – Fort George Road at Brackley as well as other private means of access.
- 2.3.5 From the C1013 junction at Gollanfield, the existing A96 travels north-east for 4.8km, passing several junctions and accesses, crossing the Aberdeen to Inverness Railway Line and travelling through Blackcastle and Delnies Wood, to the B9092 junction, at Delnies. At the B9092 junction the route turns east through Tradespark, towards Nairn for 2.3km, before continuing north-east through Nairn. The existing A96 travels for approximately 1km through a residential area of Nairn to the Nairn Roundabout where it turns south-west. The route continues on this course through Nairn, crossing the River Nairn and under the Aberdeen to Inverness Railway Line.
- 2.3.6 Leaving Nairn, the existing A96 continues south-east for approximately 2.5km, passing to the north of Auldearn. The route continues north-east adjacent to Wester Hardmuir Wood and agricultural land to the eastern extents of the scheme. There are local road junctions with the B9111 Auchnacloch – Auldearn Road and B9101 Auldearn – Cawdor Road and several minor local roads, in addition to other private means of access to properties and fields.

Photo 2.1: View looking east from Inverness



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Speed Limit

- 2.3.7 A 50mph limit extends from Raigmore Interchange to approximately 250m east of the C1032 western junction, while the remaining length of single carriageway to Hardmuir, excluding Nairn, is subject to the national speed limit.
- 2.3.8 The speed limit through Nairn is 30mph with 40mph buffer zones on both the west and east approaches to the town. From west to east, the 40mph buffer zone begins 1.2km east of the B9092 junction and continues for 850m into Nairn. Leaving Nairn to the east, the speed limit increases from 30mph to 40mph 200m east of the A939 Tomintoul – Grantown on Spey – Nairn Road. The eastern 40mph buffer zone continues for 500m and ends 900m east of the B9111 Auchnacloch – Auldearn Road junction.

Junctions

- 2.3.9 The existing A96 through the study area has local road junctions with the A939 Tomintoul – Grantown on Spey – Nairn Road and a number of B-class, C-class and unclassified local roads leading to local destination, including:
- Smithton;
 - Balloch;
 - Croy;
 - Ardersier and Fort George;
 - Clephanton and Cawdor; and
 - Auldearn.
- 2.3.10 There are 31 local road junctions on the existing A96 within the study area, as shown in Table 2.2. In addition there are 35 private accesses that serve multiple properties in the study area and have direct access to the existing A96. These are identified in Table 2.3. In addition, there are a further 47 field and forestry accesses, not listed in the tables below, which have direct access onto the existing A96. The details shown in Table 2.2 and Table 2.3 exclude junctions and properties within the 30mph and 40mph speed limit zones in Nairn. Figure 1.1 shows the existing junctions and accesses along the existing A96.

Table 2.2: Existing A96 junctions

Access	Location	Approx. Proposed Scheme Chainage
Stoneyfield Business Park junction	Approximately 400m east of Raigmore Interchange	ch400
Inverness Retail Park junction	Approximately 850m east of Raigmore Interchange at Seafield Roundabout	ch800
C1032 western junction	Approximately 810m east of Seafield Roundabout	ch1750
U1144 junction	East of Milton of Culloden	ch2290
U1163 junction	At Milton of Culloden	ch2740
Allanfearn western junction	Approximately 720m east of U1163 junction	ch3550
U1347 junction	Opposite Allanfearn western junction	ch3550
Allanfearn eastern junction	East of Allanfearn	ch3750
C1032 eastern junction	North of Balloch	ch5150
B9039 junction	Approximately 1.3km northeast of C1032 junction	ch6400
U1008 junction	Approximately 700m northeast of B9039 junction	ch7350
C1024 junction	Approximately 270m southwest of C1020 junction	ch9350
C1020 junction	Approximately 270m southwest of C1024 junction	ch9600
C1017 junction	Approximately 910m northeast of C1020 junction	ch10550
U1025 junction	East of Milton of Gollanfield	ch13050
B9006 southern junction	North of Brackley	ch14050
B9006 northern junction	North of Brackley	ch14100
U1017 junction	Approximately 1.2km northeast of B9006 southern junction	ch15250
C1013 junction	Approximately 1.2km northeast of B9006 northern junction	ch15300
U1029 junction	West of Cockhill	ch17150
U2218 junction	Opposite Blackcastle Quarry	ch18000
C1163 northern junction	Approximately 1.3km northeast of U2218 junction	Junctions not adjacent to proposed alignment
C1163 southern junction	Approximately 1.3km northeast of U2218 junction	
B9092 junction	Approximately 820m east of C1163 junction	
Junctions in Nairn not included.		
U2997 junction	Southeast of Auchnacloch	
B9111 western junction	Southeast of Auchnacloch. Opposite U2997 junction	ch27300
C1172 junction	Approximately 670m west of the B9111 eastern junction	
B9101 eastern junction	East of Auldearn	ch27750
U2959 junction	Opposite B111 eastern junction	ch27800
U3164 junction	West of Hardmuir	ch29500
U3036 junction	East of Hardmuir	ch30950

Table 2.3: Properties with direct access from A96

Access	Location	Approx. Proposed Scheme Chainage
Seafield Farm	East of Seafield Roundabout	ch1100
Ashton Farm	South-East of Seafield Roundabout	ch1140
Four properties at Milton of Culloden	Approximately 1km east of Smithton Junction	ch2700
Allanfearn Cottage access	Approximately 1.5km east of Smithton Junction	ch3150
Allanfearn access	Approximately 2.0km east of Smithton Junction	ch3350
Redhill Farm access	West of Balloch Junction	ch4530
Balmachree access	South-East of Balloch Junction	ch5480
Newton of Petty Farm House access	Approximately 2.0km east of Balloch Junction	ch6060
Newton of Petty Cottages access	Approximately 2.0km east of Balloch Junction opposite Chestnut Cottage access	ch6620

Access	Location	Approx. Proposed Scheme Chainage
Chestnut Cottage access	Approximately 2.0km east of Balloch Junction opposite Newton of Petty	ch6620
Morayston access	Approximately 2.7km east of Balloch Junction	ch7400
Morayston Cottages access	Opposite the above location	ch7450
Morayhill access	Approximately 3km east of Balloch Junction	ch8050
Kerrowaird Farm Cottages access	Approximately 1.6km west of Mid Coul Junction	ch8850
Kerrowaird access	Opposite the above location	ch8850
Culblair access	East of Mid Coul Junction	ch11100
The Bungalow access	Approximately 2.5km east of Mid Coul Junction	ch12700
Drumine access	Access just east of above location	ch12800
Polfalden access	West of Brackley Junction	ch12820
Blackcastle Farm accesses	Approximately 270m north of U1029 junction	ch17300
Cockhill access	West of Nairn West Junction	ch17600
Ashley access	Approximately 130m northeast of C1163 northern junction	Accesses not adjacent to proposed alignment
Woodside Cottages Access	Adjacent to Ashley access	
Seven properties at Delnies	Opposite the B9092 junction	
Easter Delnies Farm Access	Approximately 390m east of the B9092 junction	
Newlands of Delnies access	East of Delnies	
Ruthven Cottage access	East of Delnies	
Access to properties in Nairn not included		
Auchnacloch access	Opposite B9111 western junction	
Broombank Cottage access	Approximately 290m east of the B9111 eastern junction	ch28000
Gallows View access	Approximately 880m east of the B9111 eastern junction	ch28600
Courage Cottage accesses	Opposite Gallows View access	ch28700
Courage Steading access	Approximately 430m west of the U3164 junction	ch29100
Muirend Farm access	Approximately 140m east of the U3164 junction	ch29650
Wester Hardmuir Farm access	West of Hardmuir of Boath	ch30000
Hardmuir of Boath	Approximately 650m east of the U3164 junction	ch30150

2.4 Other Carriageway Features

Road Pavement Condition

- 2.4.1 The existing road pavement type within the study area is constructed as a fully flexible pavement. There is currently limited information regarding the thickness of bituminous and granular material. Where required this will be established by the appointed contractor prior to construction. The DMRB Stage 2 pavement desk study was previously undertaken using the information available from the Scottish Executive Road Information System (SERIS). Since the study was undertaken SERIS has been replaced with the Integrated Roads Information System (IRIS). In light of this change, the desk study was revisited to reflect the data available on IRIS, as accessed February 2016.
- 2.4.2 The residual life of the existing A96 pavement has been determined using deflectograph data from the IRIS database and details of the percentage length and actual length from the existing A96 between Seafeld Roundabout and Hardmuir is shown in Table 2.4.

Table 2.4: Range of Pavement Residual Life

Residual Life (years)	% Total Length	Length of Section (km)
<5	25%	7.5
5-9	17%	5.1
10-14	33%	9.9
15-19	8%	2.4
>19	17%	5.1

2.4.3 From Table 2.4, 25% of the existing A96 has a residual life of 15 years or more with 25% has less than five years residual life.

2.4.4 It should be noted that the accuracy of the pavement desk study for the existing A96 within the study area is reliant on the accuracy of the data within IRIS. A thorough pavement investigation would be required to determine the accuracy of the data obtained from IRIS and verify any data discussed in this report.

Drainage

2.4.5 The existing A96 within the study area has a combination of kerbed edges with channel gullies connecting directly into carrier drains, over the edge drains draining naturally into the adjacent land, filter-drains and shallow ditches. On the whole there is no evidence that the surface water is treated before it outfalls into the various watercourses. However, the existing filter-drainage, where available, does provide one level of treatment prior to runoff water entering the main drainage pipe system. A typical view of the carriageway cross section showing filter-drainage along the A96 is shown in Photo 2.2.

2.4.6 The majority of junctions have kerbed edges with channel gullies likely connecting directly into carrier drains. Throughout Nairn, the existing A96 is kerbed with gullies.

Photo 2.2: Existing drainage looking westbound on approach to the Airport Roundabout



Vehicle Restraint Systems

2.4.7 Vehicle Restraint Systems (also known as safety barriers) are provided at various locations along the length of the existing A96 within the study area as detailed below:

- Open box beam safety barrier exists on the north verge to the east of Ashton Farm access for a distance of approximately 40m. The safety barrier has been provided adjacent to the adjoining watercourse.
- Open box beam safety barrier exists on the north verge on the eastbound approach to Barn Church Road roundabout for a distance of approximately 70m. The safety barrier has been provided along the length of the adjoining embankment.
- High containment safety barrier exists on the north verge, approximately 120m southeast of Milton Road (U1136) junction for a distance of approximately 280m. The safety barrier has been provided adjacent to the existing Aberdeen to Inverness Railway Line.
- Tension corrugated beam safety barrier exists on the south verge, approximately 180m southwest of Milton Road (U1136) junction for a distance of approximately 60m. The safety barrier has been provided adjacent to the existing water course.
- Open box beam safety barrier exists on the south verge just east of C1024 Tornagrain Junction for a distance of approximately 80m. The safety barrier has been provided adjacent to the existing watercourse.
- Open box beam safety barrier exists on the north and south verges, approximately 250m east of Mid Coul roundabout for a distance of approximately 80m. The safety barrier has been provided adjacent to the adjoining watercourse.
- Tension corrugated beam safety barrier exists on the south verge, approximately 700m east of Culblair Farm access for a distance of approximately 200m. The safety barrier extends along the length of the adjoining embankment.
- Tension corrugated beam safety barrier exists on the north and south verges, approximately 2.0km east of C1013 junction for a distance of 700m. The safety barrier is provided on the approach to the crossing of the Aberdeen to Inverness Railway Line.
- Open box beam safety barrier exists on the north and south verges west of the B9111 western junction. The safety barrier provides protection to the Auldearn Burn watercourse.
- Open box beam safety barrier exists adjacent to the B9111 western junction on the north and south verges. The safety barrier is provided for a distance of approximately 35m in advance of the Underpass.
- Tension corrugated beam safety barrier is provided on both verges west of the C1172 Boath junction. The safety barrier extends for a distance of approximately 80m and provides protection to the watercourse.
- Tension corrugated beam safety barrier is provided on the north and south verges on the westbound approach to the B9111 eastern junction. The safety barrier is provided for a distance of approximately 220m at the top of the embankment.
- Tension corrugated beam safety barrier exists on the north verge of the westbound approach to U2959 junction. The safety barrier extends for a distance of approximately 250m along the top of the embankment.
- Open box beam safety barrier exists on the south verge in front of Courage Cottage for a distance of approximately 65m.
- Tension corrugated beam safety barrier is provided on both verges on the westbound approach to U3164 junction for approximately 110m adjacent to the embankment.

2.4.8 Additional Vehicle Restraint Systems (also known as safety barriers) is provided in Nairn past the existing Variable Message Sign (VMS):

- Open box beam safety barrier exists on the north verge, approximately 130m east of Tom Semple Road in Nairn. The barrier extends for a distance of approximately 150m to provide protection from the VMS.

Lay-bys

2.4.9 There are currently 25 lay-bys provided on the existing A96 between Inverness and Hardmuir, not including lay-bys within Nairn. These lay-bys are similar to Type A, B and Bus lay-bys as detailed in DMRB Volume 6, Section 2, Part 3, TD69/07 The Location and Layout of Lay-bys and Rest Areas (The Highways Agency, Transport Scotland, Welsh Assembly Government and The Department for Regional Development Northern Ireland 2007).

2.4.10 Details of the locations of the existing lay-bys are shown in Table 2.5 with the location also shown in Figure 1.1.

Table 2.5: Location of Existing Lay-bys

Lay-by Type	Direction		Location
Type B	Eastbound		Approximately 120m east of C1032 western junction.
Bus Lay-by	Eastbound	Westbound	Adjacent to the U1136 junction.
Type B		Westbound	Approximately 190m west of C1032 eastern junction.
Type A		Westbound	Approximately 500m east of B9039 junction.
Bus Lay-by	Eastbound	Westbound	Adjacent to the C1024 junction.
Bus Lay-by	Eastbound	Westbound	Adjacent to Culblair Farm access.
Bus Lay-by	Eastbound	Westbound	Approximately 25m (EB) & 65m (WB) west of B9006 southern junction.
Bus Lay-by	Eastbound	Westbound	Approximately 50m east of C1013 junction.
Bus Lay-by	Eastbound	Westbound	Adjacent to the C1163 southern junction.
Type B	Eastbound		Approximately 160m east of Easter Delnies Farm access.
Type B	Westbound		Approximately 100m east of Easter Delnies Farm access.
Lay-bys within Nairn not included			
Type B	Eastbound		Approximately 170m west of Auchnacloch access.
Type B		Westbound	Approximately 800m east of B9111 western junction.
Type B	Eastbound		Approximately 550m east of B9111 eastern junction.
Type B	Eastbound		Adjacent to the U3164 junction.
Type B		Westbound	Opposite Hardmuir of Boath access.
Type A		Westbound	Approximately 160m east of U3164 junction.
Bus Lay-by	Eastbound		Opposite Hardmuir of Boath access.
Type B	Eastbound		Adjacent to the U3036 junction.

NMU Provision

2.4.11 The National Cycle Network 1 (NCN1) is a long distance cycle route which connects Dover and the Shetland Islands, via the east coast of the British Isles. Within Nairn, the cycle route is located east of the River Nairn and follows the A939 Tomintoul – Grantown on Spey – Nairn Road to the B9101 Auldearn – Cawdor Road. The NCN1 then crosses the B9101 Auldearn – Cawdor Road and follows C-class and U-class roads south of the B9090 Loch Flemington – Clephanton – Cawdor – Nairn Road and B9006 Millburn Roundabout – Culcabock – Castle Hill – Culloden Moor – Croy – Gollanfield – Fort George Road before passing through Balloch via Culloden Road (C1028). The NCN1 between Balloch and Inverness passes through Culloden, Smithton and Cradlehall.

2.4.12 The study area referred to for the NMU provision includes the existing A96, as well as any road on the local bus network that would be altered as part of the proposed Scheme. There are 19 core paths,

identified by The Highland Council path references, within the proposed A96 study area; five of which provide direct links to the existing A96. Details of the core paths within the A96 study are as follows:

- IN08.03 is a 0.4km surfaced path connecting the Stratton Lodge Road (U1058) to core path IN08.05 at Culloden.
- IN08.04 is a 0.2km surfaced path connecting Culloden to core paths IN08.03 and IN08.05 at Culloden.
- IN08.05 is a 0.6km track connecting the existing A96 to Culloden via Milton of Culloden Smallholdings.
- IN08.10 is a 1.5km track connecting the existing A96 to Stratton Lodge Road (U1058) via the Ashton Farm access track.
- IN08.15 is a 0.2km surfaced path connecting Culloden to core path IN08.21 at Allanfearn
- IN08.16 is a 0.9km surfaced path connecting Barn Church Road (C1032) to Stratton Lodge Road (U1058).
- IN08.21 is a 0.35km surfaced path connecting the existing A96 to Culloden via Allanfearn.
- IN08.23 is a 2km surfaced path travelling from Longman to Milton via the existing A96.
- IN08.24 is a 0.2km track joining the old A96 adjacent to the shoreline to the existing A96.
- IN08.30 is a 0.3km track connecting the existing A96 to the existing A96 at Seafield.
- IN08.32 is a 1.3km track connecting the existing A96 to High Wood via Balmachree.
- NA04.02 is a 2.6km surfaced and gravel path that travels adjacent to the east bank of the River Nairn between the Harbour and Firhall Bridge.
- NA04.03 is a 1.4km path that runs adjacent to the east bank of the River Nairn between Firhall Bridge and Howford Bridge.
- NA04.04 is a 5.5km path which runs adjacent to the east bank of the River Nairn south of Howford.
- NA04.07 is a 2.5km surfaced path travelling adjacent to the existing A96 and the B9111 Auchnacloch – Auldearn Road.
- NA04.13 is a 4.8km earth track travelling in a circular route at Delnies.
- NA04.15 is a 1.9km circuit through Delnies Community Wood.
- NA04.16 is a 1.3km path connecting Jubilee Bridge to Firhall along the west bank of the River Nairn.
- NA04.17 is a 0.4km track connecting core path NA04.02 and core path NA04.18 at Firhall.
- NA04.20 is a 1km surfaced path connecting Tradespark to the B9091 Croy – Clephanton – Kildrummie – Nairn Road.

2.4.13 For details of the core paths and other routes, refer to Figure 2.1.

Lighting

2.4.14 There is road lighting provided in the verge of the existing A96, from the start of the proposed Scheme, to 50m east of C1032 western junction. Further lighting is provided on the verge and physical islands of the C1017 junction, which is the roundabout providing access to Inverness Airport. Lighting is also provided through the town of Nairn and on the B9111 Auchnacloch – Auldearn Road which extends to the B9111 eastern junction.

Public Transport Facilities

2.4.15 There are several public bus services which operate along the existing A96 between Inverness Retail and Business Park, and Hardmuir operated by Stagecoach and D & E Coaches. Bus services which

travel along the existing A96 are listed in Table 2.6 below and shown on Figure 2.2. Official bus stops as detailed in the National Public Transport Access Node (NaPTAN) (Department for Transport 2016) database are shown on Figure 2.2.

Table 2.6: Details of Public Bus Service Routes

Service Number	Route	Roads
5	Inverness (Union Street) – Balloch (Turning Circle)	A96 Aberdeen to Inverness Trunk Road Barn Church Road (C1032) Tower Road (C1036) Keppoch Road (U1855) Culloden Road (C1028)
5A	Inverness (Union Street) – Croy (Ardcroy Road)	A96 Aberdeen to Inverness Trunk Road Barn Church Road (C1032) Tower Road (C1036) Keppoch Road (U1855) Culloden Road (C1028)
5B	Inverness (Union Street) – Culloden (Culloden Academy)	A96 Aberdeen to Inverness Trunk Road Barn Church Road (C1032) Tower Road (C1036) Keppoch Road (U1855)
10	Inverness (Bus Station) – Aberdeen (Union Square)	A96 Aberdeen to Inverness Trunk Road
11	Inverness (Bus Station) – (via Airport) – Elgin (Bus Station)	A96 Aberdeen to Inverness Trunk Road Kerrowgair – Croy Road (C1017) B9111 Auchnacloch – Auldearn Road Sandown Road (C1177) Moss-side – Mosshall – Broadley Road (C1170)
11A	Inverness (Bus Station) – (via Ardersier) – Elgin (Bus Station)	A96 Aberdeen to Inverness Trunk Road Morayston – Castle Stuart Road (U1008) B9039 Newton – Castle Stuart – Ardersier Road Kerrowgair – Croy Road (C1017) B9092 Ardersier – Nairn Road Sandown Road (C1177) Moss-side – Mosshall – Broadley Road (C1170) B9111 Auchnacloch – Auldearn Road
15	Inverness (Bus Station) - Ardersier (High Street)	A96 Aberdeen to Inverness Trunk Road Morayston – Castle Stuart Road (U1008) B9039 Newton – Castle Stuart – Ardersier Road
26B	Inverness (Bus Station) - Croy (Ardcroy Road)	A96 Aberdeen to Inverness Trunk Road Barn Church Road (C1032) Tower Road (C1036) Keppoch Road (U1855) Culloden Road (C1028)
108	Scorguie – Raigmore Hospital – Inverness Retail Park	A96 Aberdeen to Inverness Trunk Road Barn Church Road (C1032) Tower Road (C1036)

2.4.16 The Highland Council provides school bus transport for Culloden Academy, Nairn Academy, Auldearn Primary, Balloch Primary and Cawdor Primary. School bus transport travel on the following roads:

- Existing A96 Aberdeen – Inverness Trunk Road;
- A939 Tomintoul – Grantown on Spey – Nairn Road;
- B9039 Newton – Castle Stuart – Ardersier Road;
- B9006 Milburn – Millburn Roundabout – Culcabock – Castle Hill – Culloden Moor – Croy – Gollanfield – Fort George Road;
- B9090 Loch Flemington – Clephanton – Cawdor – Nairn Road;

- B9092 Ardersier – Nairn Road;
- B9111 Auchnacloch – Auldearn Road;
- B9101 Auldearn – Cawdor Road;
- Auldearn – Moyness Road (C1171);
- Dalcross Station Road (C1020);
- Barn Church Road (C1032);
- Boghole – Moyness – Fornightly Road (C1157); and
- Allanfearn – Alturlie Road (U1347);

2.4.17 Table 2.7 lists the schools served by school bus transport including their current prescribed routes and the current location of the collection points. School bus transport routes and collection points are subject to change on an annual basis depending on the demand and location of service users. The current routes are shown on Figure 2.3.

Table 2.7: Details of School Bus Transport

School	School Bus Transport No.	Route	Location of Collection Point
Balloch Primary	No 2B	A96	Inverness
		U1347	The Boat Shed Alturlie
		A96	Morayston - Tornagrain
		A96	Gollanfield Crossroads
		A96	Blackcastle Farm
		A96	Nairn Bus Station
		C1159	Kingsteps/ Nairn – Lochloy - Bankhead Road
		C1159	Maviston
		U2997	Woodend Cottages/ Drumduran Crossroads
	C1032	Balloch Primary	
Balloch Primary	No. 23	A96	Inverness
		U1347	The Boat Shed Alturlie
		A96	Morayston - Tornagrain
		U1283, C1020	Easter Dalziel Farm
		B9039	Westerton Rd End – Newton of Petty
		C1032	Balloch Primary
Culloden Academy	No. S4.1	A96	Inverness
		B9039	Ardersier
		A96, C1032	Culloden Academy
Culloden Academy	No. S4.2	A96	Inverness - Brackley
		B9006	Ardersier
		B9092	Blackcastle Farm
		A96, C1032	Culloden Academy
Nairn Academy and Cawdor Primary	No. 252	A96	Inverness - Brackley
		B9090	Cawdor – Firhall village
		A96	Nairn Academy

School	School Bus Transport No.	Route	Location of Collection Point
Nairn Academy and Auldearn Primary	No. 113	A96	Nairn Bus Station
		A939	Foynesfield Crossroads
		C1157	Boghole Farm
		A96	Easter Hardmuir
		B9111	Auldearn School
		A96	Nairn Academy

2.5 Existing Structures

2.5.1 Within the study there are seven bridge structures, ten culverts, one retaining wall and one sign gantry. These are described in more detail below. All structures are referenced by unique Transport Scotland structure numbers. See Figure 1.1 for existing structure locations.

Bridge Structures

Scretan Burn (Reference No. A96 570)

2.5.2 The Scretan Burn structure is located approximately 500m east of Seafeld Roundabout and carries the existing A96 over the Scretan Burn. The structure comprises a single span simply supported reinforced concrete slab deck. The end supports comprise full height reinforced concrete propped abutments on spread foundations. The Scretan Burn passes below the existing A96 on a skew of approximately 33 degrees with a clear skew span of 3.1m. The carriageway is of constant width of 7.3m between kerbs. A 1.8m wide grass verge and 1.5m wide footway are provided over the structure on the north side and a 2.0m wide footway and 0.8m wide grass verge are provided on the south side.

2.5.3 The most recent General and Principal Inspections, undertaken in 2012 and 2014 respectively, indicate that the structure was in reasonable condition with generally only minor defects. A single category 3 defect was identified in relation to the occurrence of scour undermining a downstream wingwall foundation. A subsequent inspection found no sign of scour.

Morayston (Reference No. A96 560)

2.5.4 The Morayston structure shown in Photo 2.3 is located approximately 1km east of the junction with the B9039 Newton – Castle Stuart – Ardersier Road and carries the existing A96 single carriageway over the Rough Burn. The structure comprises a single square span concrete block arch 2.5m long on the north side, a central 7.8m long masonry arch and a 4.9m long concrete block arch on the south side. The end supports comprise mass concrete gravity abutments on spread foundations. The structure passes over the Rough Burn with a clear square span of 4.5m. The carriageway is of constant width of 9.5m between kerbs. A 3.1m wide surfaced verge and 1.45m wide surfaced verge are provided over the structure on the north and south sides respectively.

2.5.5 The most recent General and Principal Inspections undertaken in 2014 and 2012 respectively, identified that the structure was in very good condition with no defects of note. No category 3 or 4 defects were identified.

Photo 2.3: Existing Morayston structure looking east (Reference No. A96 560)



Gollanfield Rail (Reference No. A96 550)

- 2.5.6 The Gollanfield Rail structure shown in Photo 2.4 is located approximately 2.0km east of the B9006 northern junction and carries the existing A96 over the Aberdeen to Inverness Railway Line. The structure comprises a single span simply supported precast pretensioned beam and concrete infill deck. The end supports comprise full height concrete cantilever abutments. It is not known whether the foundations comprise spread foundations or piles. The structure has a skew of 45 degrees with a clear skew span of 9.62m. The carriageway is of constant width of 7.3m between kerbs. A 2m wide raised verge is provided on the each side of the carriageway. No hard strips are provided, but ladder markings with red surfacing are provided between the running lanes.
- 2.5.7 The most recent General and Principal Inspections undertaken in 2012 and 2014 respectively, state that the structure is generally in a good condition with only minor defects. No category 3 or 4 defects were identified.

Photo 2.4: Existing Gollanfield Rail structure looking west (Reference No. A96 550)



Nairn River (Reference No. A96 540)

- 2.5.8 The Nairn River structure is located in the centre of Nairn and carries the existing A96 over the River Nairn. The structure comprises three spans of masonry arch construction. The intermediate supports comprise masonry faced solid wall piers and the end supports comprise masonry faced full height cantilever abutments, all on mass concrete spread footings on rock. The structure is square with spans of 8.8m, 12.0m and 16.3m from east to west. The deck is approximately 11.8m wide and includes two footpaths approximately 2m wide.
- 2.5.9 The most recent General and Principal Inspections undertaken in 2015 and 2013 respectively, indicate that the structure is generally in a good condition. The carriageway drainage is recorded in the General Inspection as causing staining to the east span along with spalling exposing severely corroded reinforcement which are recorded as category 3 defects. This defect does not affect the structural integrity of the structure.

New Nairn Rail Overbridge (Reference No. A96 530)

- 2.5.10 The New Nairn Rail structure is located to the south-east of the town of Nairn and carries the single track Aberdeen to Inverness Railway Line over the existing A96. The structure comprises a single span steel plate through girder deck supported on masonry faced end supports on mass concrete on rock. The structure has a skew of approximately 27 degrees and the skew span length is 23.9m. The deck is 5.8m wide.
- 2.5.11 The structure is owned and maintained by Network Rail. No inspection records are available for this structure.

Auchnacloch Burn (Reference No. A96 528)

- 2.5.12 The Auchnacloch Burn structure is located approximately 250m west of the B9111 western junction and carries the existing A96 over the Auldearn Burn. The structure comprises a reinforced concrete box type structure. The structure passes beneath the existing A96 on a skew of approximately 54 degrees and the internal span length is approximately 3m. The road over the structure comprises a carriageway approximately 8.46m wide with a grassed verge approximately 2.3m wide on the north side and a stone filled drainage trench approximately 2.1m wide and 1.5m wide surfaced footway on the south side.
- 2.5.13 The most recent General and Principal Inspections undertaken in 2015 and 2013 respectively, indicate that the structure is generally in a good condition. Pedestrian protection fencing is in need of repair and has been recorded as a category 3 defect. Further category 3 defects have been recorded due to the insufficient length of safety fencing on approach to the structure and also insufficient safety fence height over the structure. None of these defects have an affect the structural integrity of the structure.

Auchnacloch Underpass (Reference No. A96 526)

- 2.5.14 The Auchnacloch Underpass is located in the vicinity of the B9111 western junction and carries the existing A96 over a farm access track. The structure comprises a corrugated steel buried structure and passes below the existing A96 on a skew of approximately 8 degrees. The internal span length is approximately 3.9m. The road over the structure comprises a carriageway approximately 10.85m wide with a grassed verge approximately 4m wide on the north side and a grassed verge approximately 3.7m wide on the south side.
- 2.5.15 The most recent General and Principal Inspections undertaken in 2014 and 2012 respectively, indicate that the structure is generally in a good condition. The safety fencing over the structure is of insufficient height and is recorded as a category 3 defect. The structural integrity of the underpass is not affected by this defect.

Culverts

Milton 2 (Reference No. A96 560 C84)

- 2.5.16 The culvert, shown in Photo 2.5 is located just east of Milton of Culloden Road (U1144) and is approximately 25m in overall length. The culvert consists of a twin reinforced concrete arch type structure, each arch having a span of 2.0m and a rise of 1.0m.

Photo 2.5: Existing Milton 2 Culvert (Reference No. A96 560 C84)



Milton Burn (Reference No. A96 560 C80)

- 2.5.17 The culvert is located adjacent to Milton of Culloden Smallholdings and is approximately 33m in overall length. The culvert consists of three sections comprising 2.3m clear span reinforced concrete slab end sections and a central twin masonry slab section with spans of 0.9m and 0.95m separated by a 0.45m thick masonry wall. The culvert is 1.5m in height internally.

Newton Burn (Reference No. A96 560 C19)

- 2.5.18 The culvert is located to the west of the B9039 Newton of Petty Junction and is approximately 27m in overall length. The central section, approximately 20m long, consists of a 0.9m diameter corrugated steel pipe. The culvert has been extended by approximately 3.6m at each end by the local farmer. These extended sections of culvert consist of a 0.6m diameter concrete pipe.

Kerrowaird (Reference No. A96 550 C81)

- 2.5.19 The culvert is located to the west of the C1024 Tornagrain Junction and is approximately 34m in overall length. The culvert consists of a corrugated steel elliptical arch with a span of 1.74m and a rise of 0.8m.

Tornagrain (Reference No. A96 550 C77)

- 2.5.20 The culvert is located just west of Petty Church at the C1020 junction and is approximately 24m in overall length. The culvert consists of a corrugated steel pipe 0.9m in diameter.

Mid Coul (Reference No. A96 550 C62)

- 2.5.21 The culvert, shown in Photo 2.6, is located adjacent to Mid Coul Cottages and is approximately 20m in overall length. The culvert consists of a corrugated steel pipe approximately 1.8m in diameter.

Photo 2.6: Existing Mid Coul Culvert (Reference No. A96 550 C62)



Drumine Burn (Reference No. A96 550 C40)

- 2.5.22 The culvert is located to the west of Milton of Breachlich Road (U1025) and is approximately 18m in overall length. The culvert consists of a corrugated steel elliptical arch with a span of 1.6m and a rise of 0.7m.

Alton Burn (Reference No. A96 540 C28)

- 2.5.23 The culvert is located to the west of Tradespark Road in Nairn and is approximately 15m in overall length. The culvert consists of a reinforced concrete box with a span of 1.7m and is approximately 12m overall length.

Boath Burn (Reference No. A96 520 C85)

- 2.5.24 The culvert is located to the west of the C1172 Boath Junction and is approximately 39m in overall length. The culvert consists of a corrugated steel pipe 2.6m in diameter.

Broombank Burn (Reference No. A96 520 C75)

- 2.5.25 The culvert is located opposite the B9101 junction to Auldearn and is approximately 50m in overall length. The culvert consists of a corrugated steel pipe 2.0m in diameter.

Retaining Walls

Nairn (Reference No. A96 530 W85)

- 2.5.26 The retaining wall, shown in Photo 2.7, is located approximately 60m east of the River Nairn and supports the existing A96 on the south side. The wall is approximately 24m long with a maximum retained height of approximately 2.5m.

Photo 2.7: Existing Nairn Retaining Wall (Reference No. A96 530 W85)



Sign Gantries

VMS/A13 Nairn (Reference No. A96 528 G51)

- 2.5.27 The sign gantry, shown in Photo 2.8, is located approximately 650m east of structure A96 530 Nairn New Rail OB adjacent to the eastbound carriageway. The sign gantry is approximately 6m wide by 3m high and is mounted on a steel post approximately 3.15m high.

Photo 2.8: Existing VMS/A13 Nairn Sign Gantry (Reference No. A96 528 G51)



2.6 Public Utilities

- 2.6.1 All public utility companies were contacted in accordance with the New Roads and Street Works Act 1991 (NRSWA). All of the public utility companies with apparatus that would be affected by the proposed Scheme have provided a “C3” budget estimate, including preliminary details of the effects on their apparatus.
- 2.6.2 It is recognised that new utility apparatus is currently being installed in the Mid Coull area for the mixed use development at Tornagrain which is presently under construction. These new utilities have not been included in this report and will be addressed during the “C4” detailed estimate process if required.
- 2.6.3 The following sections identify the key utilities between Inverness and Gollanfield.

Telecoms

- 2.6.4 Underground BT cables run adjacent to the existing A96 between Inverness and Auldearn. At Auldearn the cable travels adjacent to the B9111 Auchnacloch – Auldearn Road, before re-joining the existing A96 at the B9111 eastern junction. BT cables also run adjacent to many of the major local roads; these cables connect to the mainline cable in the vicinity of the junctions with the A96.
- 2.6.5 Many individual underground and overground cables connect to these mainline cables, serving small settlements and residential properties. A Vodafone Limited telecommunications cable also runs adjacent to the existing A96 from the C1032 eastern junction to the eastern limit of the study area.

Gas

- 2.6.6 An intermediate pressure gas pipe is located adjacent to the existing A96 between Inverness and Tornagrain. A local high pressure gas pipe runs adjacent to the Aberdeen to Inverness Railway Line to the north of the existing A96 between Inverness and Milton of Culloden before crossing the existing

A96 at Milton of Culloden. The local high pressure gas pipe then travels in a generally easterly direction, and sits to the south of the existing A96.

- 2.6.7 Between Gollanfield and Hardmuir gas utilities are generally centred around Nairn and Auldearn. There are no pipes to the west of Nairn. Through Nairn itself, low pressure gas pipes run adjacent to the existing A96 intermittently. Between Nairn and Auldearn a medium pressure gas pipe crosses the existing A96 on three occasions. There is a high pressure gas main to the south of Nairn.
- 2.6.8 There are also several shorter pipelines that branch off the major pipelines, described above, to serve small settlements and residential properties.

Electricity

- 2.6.9 Scottish and Southern Energy's 132kV, 33kV and 11kV cables are present both overground and underground throughout the study area. Cables do not run adjacent to the existing A96 carriageway for any significant periods and cables cross both under and over the existing carriageway at several locations between Inverness and Hardmuir.

Water Supply and Sewerage

- 2.6.10 There are several water supply pipes across the study area including a water main which runs adjacent to the existing A96 between Inverness and Culloden, and another main runs adjacent to the trunk road between Upper Cullernie Farm and Brackley. There are also several mains which cross the existing A96 and tributaries which branch from the mainline pipes, providing water to small communities and isolated residential properties.
- 2.6.11 There is also a water supply pipe running adjacent to the existing A96 through the town of Nairn. The majority of water pipes are concentrated within Nairn and water pipes pass under the existing A96 on a number of occasions.
- 2.6.12 The sewage works at Milton of Culloden acts as a focal point for all foul pipes in the west of the scheme with foul pipes crossing the existing A96 on four occasions in the vicinity of the sewage works, connecting local areas of population with the plant. Despite a further crossing at Tornagrain there are few sewerage utilities present up to Gollanfield.
- 2.6.13 Beyond Gollanfield, foul pipes are concentrated around Nairn and Auldearn with little provision in rural areas. The pipes run adjacent to the existing A96 intermittently and also cross the trunk road on numerous occasions throughout this section of the study area.
- 2.6.14 A number of private water supplies (PWS) have been identified within the study area and these are discussed in Chapter 12 (Geology, Soils, Contaminated Land and Groundwater) of the Environmental Statement and shown on Figure 12.2 of the Environmental Statement.

Aviation Fuel Pipeline

- 2.6.15 A CLH-PS aviation fuel pipeline runs east from Inverness through the study area, sitting adjacent to the existing A96 between Inverness and Milton of Culloden and the C1032 eastern junction and Tornagrain. The pipeline then runs to the south of Nairn. The pipeline also passes beneath the existing A96 at Milton of Culloden and under the existing A96 near the B9111 western junction.

2.7 Existing Traffic Patterns

Traffic Flows

- 2.7.1 The existing A96 between Inverness and Hardmuir is of rural single carriageway standard with Annual Average Daily Traffic Level (AADT) levels that varies along the length of the route from approximately 10,900 at the eastern end, to approximately 30,400 vehicles per day based on data obtained from 2014 Automatic Traffic Count (ATC). Two-way AADT levels are shown in Table 2.8. Generally, traffic flows are greatest towards the western end of the study area and decrease steadily eastwards.

Table 2.8: 2014 Two-way AADT for existing A96 between Inverness and Hardmuir

Location	2-way AADT (2014)
A96 Raigmore Interchange to Seafield Roundabout	30,400
A96 Seafield Roundabout to Smithton Roundabout	26,000
A96 Smithton Roundabout to Balloch	14,500
A96 Balloch to Newton Junction	15,700
A96 Newton Junction to Airport Roundabout	14,900
A96 Airport Roundabout to B9006 Southern Junction	11,900
A96 B9006 Junction to B9092 Junction	12,300
A96 East of B9092 Junction	13,200
A96 Nairn to Auldearn	11,300
A96 East of Auldearn	10,900

Traffic Speeds

- 2.7.2 The speed limits vary along the existing A96 study area (from Inverness to Hardmuir) due to the proximity of the road to the urban areas. Table 2.9 details the posted speed limit for locations on the existing A96 as of 2016.

Table 2.9: Speed Limits on the A96 within the Scheme Boundary

Location	Speed Limit
Raigmore Interchange to Seafield Roundabout (dual carriageway)	50mph
Seafield Roundabout to 250m east of Smithton Roundabout (single carriageway)	50mph
250m east of Smithton Roundabout to the junction with Sandown Road (C1177)	National speed limit
Sandown Road (C1177) to the junction with Moss-Side – Mosshall – Broadley Road (C1170)	40mph
Moss-Side – Mosshall – Broadley Road (C1170) to approximately 200m east of the junction with the Tomintoul – Grantown on Spey – Nairn Road (A939)	30mph
200m east of the Tomintoul – Grantown on Spey – Nairn Road (A939) and the Balmakeith Roundabout	40mph
Balmakeith roundabout to the end of scheme extent at Hardmuir	National speed limit

2.8 Existing Accident Data

- 2.8.1 Accident data for the A96 corridor between Seafield Roundabout and Hardmuir, to the east of Auldearn, for the period of 2010 to 2014 was supplied by Transport Scotland in the form of STATS 19 Data in September 2015, and extracted from the Integrated Roads Information System (IRIS).
- 2.8.2 Road Casualties Scotland 2015 indicates that of the total accidents that have occurred on non-built-up A class trunk roads, 4% were recorded as fatal accidents and 20% were serious accidents. The percentage of fatal accidents and serious accidents that occur on built-up A class trunk roads are reported to be 2% and 16%. Of the total accidents recorded on the A96 corridor between the Seafield Roundabout and Hardmuir, 2% were recorded as fatal accidents and 17% recorded as serious accidents. The proportions of fatal and serious accidents that have occurred on the A96 are therefore in line with the national average.
- 2.8.3 It is acknowledged that a fatal accident occurred in Nairn town centre in 2015. As this occurred after the baseline study year of 2014, it has not been included in the assessment.
- 2.8.4 In total there were 63 recorded accidents between 2010 and 2014, inclusive, within the A96 study area, with an average of 13 accidents occurring each year. The number of accidents per year has varied from 19 accidents in 2010 to 11 accidents in 2014.

- 2.8.5 Analysis of the accident records indicate that the majority of accidents occurred at junctions. In particular the C1032 eastern junction at Balloch, the B9006 northern and southern junctions at Brackley and the B9111 eastern junction at Auldearn. There were also several smaller clusters of accidents at other junctions along the existing A96. For accident locations and severity, refer to Figure 2.4.
- 2.8.6 Further assessment of the existing accident data can be found in Chapter 5 (Traffic Assessment).

2.9 Operational Issues

- 2.9.1 The existing A96 is a strategic transport link which is used by a combination of all vehicle types including coaches, Heavy Goods Vehicles (HGVs), agricultural, tourist, local and long distance traffic. This mix of usage has led to an increase in driver frustration due to the single carriageway nature of the road. The single carriageway cross section, together with the volume of traffic and high number of junctions and private accesses, reduce the number of safe overtaking opportunities.
- 2.9.2 The large number of at-grade junctions which adjoin the existing A96 means vehicles enter the single carriageway at a speed much lower than vehicles already on the route, causing vehicles to either slow down or attempt dangerous overtaking manoeuvres, both of which contribute to unsafe driving conditions along the trunk road. This is evident by approximately 75% of accidents recorded within the study period occurring at junctions or accesses.
- 2.9.3 The existing A96 through Nairn town centre features traffic signals, reduced speed limit and urban environment which contribute to a decrease in journey time reliability.
- 2.9.4 The existing lay-bys along the road are substandard, with a number being inadequate in terms of size and are generally unsuitable for HGVs.

2.10 References

Department for Transport (2016). DfT NaPTAN & NPTG system [online]. Available from <http://naptan.app.dft.gov.uk/> [Assessed 14 November 2016]

New Roads and Street Works Act 1991 (New Roads and Street Works Act (NRSWA)). The Stationery Office.

Scottish Enterprise (2010). National Renewables Infrastructure Plan [Online] Available from www.scottish-enterprise.com/knowledge-hub/articles/guide/national-renewables-infrastructure-plan-stage-1 [Accessed 23 September 2016].

3 Description of the Proposed Scheme

3.1 Engineering Description

Scheme Procurement

- 3.1.1 For assessment purposes it is assumed that the proposed Scheme would be procured by means of a Design and Build (D&B) contract. Under the terms of this contract, the contractor undertakes both the detailed design and construction of the proposed Scheme. Upon completion of the proposed Scheme, responsibility for operating and maintaining the A96 Aberdeen to Inverness Trunk Road and local roads remains with the Scottish Ministers and The Highland Council, respectively.
- 3.1.2 Under a D&B contract, a specimen (outline) design is prepared for the proposed Scheme by Transport Scotland. Bidders in the D&B procurement process are provided with the specimen design for their information during the bidding process. Following a successful bid process the appointed contractor produces a detailed design for the proposed Scheme, which they may choose to refine and optimise further from the bid stage design. Such optimisation must be in accordance with the relevant statutory documents approved for the proposed Scheme, which includes the Environmental Statement and the constraints imposed by the Environmental Statement, the Schedule of Environmental Commitments (which contains the mitigation identified through the EIA process), statutory Orders and any specific criteria set within the contract documents.

Dual Carriageway Alignment

- 3.1.3 The proposed Scheme comprises approximately 31km of new dual carriageway, with six grade separated junctions and required local road connections. The proposed Scheme starts approximately 850m east of the Raigmore Interchange at the Seafield roundabout and continues in a north-easterly direction to Hardmuir, approximately 3.5km to the east of Auldearn. At the eastern extent of the proposed Scheme at Hardmuir the dual carriageway will terminate by tying into the existing A96 single carriageway in accordance with design standards.
- 3.1.4 The proposed Scheme is a Category 7A all-purpose dual carriageway with design speed of 120kph, in accordance with DMRB Volume 6, Section 1, Part 1, TD9/93 – Amendment No1: Highway Link Design (Highways Agency, Scottish Executive Development Department, The National Assembly for Wales and The Department for Regional Development Northern Ireland 2002). This is the highest category of all-purpose road, with grade separated junctions. Access to the proposed dual carriageway is only permitted via grade separated junctions. The plan and profile of the proposed dual carriageway, local roads and junctions are shown in Figures 3.1, 3.2 and 3.3, respectively.
- 3.1.5 The dual carriageway provision has been designed in accordance with DMRB Volume 6, Section 1, Part 2, TD27/05 Cross-Sections and Headrooms for a Dual 2 Lane Rural All-Purpose (D2AP) carriageway (Highways Agency, Scottish Government, Welsh Assembly Government and The Department for Regional Development Northern Ireland 2005). The standard dual carriageway cross section dimensions for a D2AP carriageway are shown in Figure 3.4. The dual carriageway will not be kerbed, except across dual carriageway underbridges.

Existing A96

- 3.1.6 The existing A96 single carriageway will be de-trunked and reclassified as a local road to maintain local access. It will be realigned where necessary to connect to the proposed grade separated junctions.
- 3.1.7 To the west of Smithton Junction the existing A96 will be retained as a “No through road” providing access to the properties at Seafield.
- 3.1.8 Between the Smithton and Brackley Junctions, for a length of approximately 12km, the existing A96 will be retained and reclassified maintaining local access and the existing routes for local public transport and school transport services along this length of the A96 corridor.

- 3.1.9 East of Brackley Junction the existing A96 will be retained as far as the Gollanfield Road (C1013) where a new local road junction will be created to provide access to Gollanfield to the north and Lochside to the south via a bridge over the proposed dual carriageway.
- 3.1.10 From the Gollanfield Road (C1013) to the Tomhommie – Ballenreich – Balnagowan Road (U1029) the existing A96 will be stopped up and the existing Gollanfield Rail structure will be demolished. This structure is a constraint to future re-doubling and electrification of the Aberdeen to Inverness Railway Line. A length of the existing A96 will be retained to provide access for Network Rail at Gollanfield and for access to proposed drainage ponds.
- 3.1.11 The existing A96 will be retained from the Tomhommie – Ballenreich – Balnagowan (U1029) Road to the proposed Nairn West Junction to maintain local access.
- 3.1.12 From Nairn West Junction the existing A96 through Nairn and eastwards to Hardmuir will be retained and reclassified. At Courage the existing road will be realigned to pass over the proposed dual carriageway. At Hardmuir a new at-grade ghost island T-junction is proposed to connect the existing road back to the proposed A96 Aberdeen – Inverness Trunk Road at the eastern extent of the scheme. This junction will provide local access to Hardmuir, to and from Forres and other destinations east of the proposed Scheme.

Junctions

- 3.1.13 There are six grade separated junctions provided as part of the proposed Scheme at Smithton, Balloch, Mid Coul, Brackley, Nairn West and Nairn East.

Smithton Junction (ch1750)

- 3.1.14 The existing Smithton Junction will be expanded to create a fully grade separated junction. The existing A96 alignment and existing Smithton Roundabout is proposed to be retained, with a second roundabout located to the south in order to create a dumbbell layout. The proposed dual carriageway will pass between the two roundabouts via an overbridge with the roundabouts being connected below. This junction will provide full access to and from the proposed dual carriageway and the C1032 Barn Church Road.
- 3.1.15 The eastbound diverge slip road from the proposed Scheme will consist of two lanes and a hardstrip on the approach to the roundabout. The eastbound merge will consist of a single lane and hardshoulder.
- 3.1.16 In a westbound direction both the diverge and merge slip roads will consist of a single lane and hardshoulder. The westbound merge with the dual carriageway will form a lane gain and a change in the dual carriageway cross section from D2AP to Dual 3 Lane Rural All-Purpose (D3AP) which will extend westerly for a distance of approximately 485m to Seafeld Roundabout.

Balloch Junction (ch5000)

- 3.1.17 At Balloch Junction the existing A96 single carriageway is proposed to be diverted to a new roundabout located to the north of the proposed dual carriageway. This will be connected in a dumbbell arrangement to a second roundabout south of the proposed dual carriageway which will connect to the Barn Church Road (C1032) accessing Balloch and a private access to Balmachree Farm. The proposed dual carriageway will pass between the two roundabouts via an overbridge with the roundabouts being connected underneath. This junction will provide full access to and from the proposed dual carriageway, the existing A96 single carriageway and the Barn Church Road (C1032).
- 3.1.18 Each of the diverge and merge slip roads consist of a single lane and hardshoulder.

Mid Coul Junction (ch10500)

- 3.1.19 Mid Coul Junction is proposed to consist of a new dumbbell layout and grade separated junction and will be constructed on the existing Kerrowgair – Croy Road (C1017), providing full access to and from

Inverness Airport and the proposed railway station at Dalcross. The two new roundabouts will be located predominantly on the line of the existing C1017, which will be raised to allow the proposed dual carriageway to pass under the local road.

- 3.1.20 The eastbound diverge and merge slip roads consist of a single lane and hardshoulder in a conventional slip road arrangement. The westbound merge and diverge form a two-way loop connecting to the southern roundabout of the dumb-bell arrangement.

Brackley Junction (ch14100)

- 3.1.21 Brackley Junction is proposed to be located at the existing A96/B9006 junction. The B9006 Millburn Roundabout – Culcabock – Castle Hill – Culloden Moor – Croy – Gollanfield – Fort George Road would be realigned over the new dual carriageway. This junction will provide full access to and from the proposed dual carriageway and the B9006. The realigned existing A96 and slip roads will connect to the realigned B9006 via give way junctions.
- 3.1.22 Both the eastbound and westbound slip roads consist of a single lane and hardshoulder forming two-way loops in a half cloverleaf layout with staggered at-grade junctions with the B9006 Millburn Roundabout – Culcabock – Castle Hill – Culloden Moor – Croy – Gollanfield – Fort George Road.

Nairn West Junction (ch17950)

- 3.1.23 Nairn West Junction is proposed to be constructed within part of the previously worked Blackcastle quarry area. The north roundabout will connect to the existing A96 single carriageway towards Nairn and the McDermotts Road (U2218). The south roundabout will provide access to land and property at Cockhill and North Kildrummie Farm.
- 3.1.24 The eastbound diverge and merge slip roads consist of a single lane and hardshoulder forming a two-way loop connecting to the northern roundabout of the dumb-bell arrangement. The westbound diverge and merge slip roads consists of a single lane with hardshoulder in a conventional slip road arrangement.

Nairn East Junction (ch25950)

- 3.1.25 Nairn East Junction is proposed to be located where the proposed dual carriageway crosses the existing A96 single carriageway between Nairn and Auldearn forming a dumbbell junction arrangement. This junction will provide full access to and from the proposed dual carriageway and the existing single carriageway into Nairn, including towards the A939 Tomintoul – Grantown-on-Spey – Nairn Road as well as connecting to the B9111 Auchnacloch – Auldearn Road for access to the west side of Auldearn.
- 3.1.26 All the slip roads consist of a single lane and hardshoulder in a conventional diamond junction layout.

Local Roads

- 3.1.27 A local road strategy has been developed in consultation with The Highland Council during design development at DMRB Stage 2 and Stage 3. The solutions for local roads generally follows one of the following descriptions:
- A local road with a structure to allow the road to pass over or under the proposed A96 dual carriageway will be maintained. The local road may be realigned to suit the appropriate structural solution.
 - A local road will be severed at the interface with the proposed A96 dual carriageway where an alternative route is available on the existing local road network.
 - A local road will be severed, and a new diversion provided to connect the road back into the local road network.

Ashton Farm Access Road (ch1150)

- 3.1.28 The private access road has direct at-grade access to the existing A96 approximately 300m east of Seafeld Roundabout. The existing at-grade access is to be closed and the new access provided from an arm off the Smithton Junction (south) roundabout in a south-westerly direction towards Ashton Farm.

Milton Road (U1136) (ch2750)

- 3.1.29 Milton Road (U1136) has direct at-grade access on to the existing A96 approximately 1km northeast of the existing Smithton Roundabout. The existing access onto the A96 is severed by the proposed dual carriageway. A new access road will be provided to the south along the upgraded Stratton Lodge Road (U1058), connecting to Barn Church Road (C1032) to the southeast of Smithton Junction.

Stratton Lodge Road (U1058) (ch2750)

- 3.1.30 Stratton Lodge Road (U1058) will be upgraded and has been designed in accordance with the standards set out in The Highland Council's Roads and Transport Guidelines for New Developments for a design speed of 60kph. The carriageway will be 5.5m wide with 1.5m wide verges.

Balmachree Access Road (ch5400)

- 3.1.31 The private access road has direct at-grade access to the existing A96 approximately 300m east of the C1032 eastern junction. The existing access will be retained for access to land between the existing A96 and proposed dual carriageway. A new access to Balmachree is provided from an arm off the Balloch Junction (south) roundabout in a generally north-easterly direction.

Morayston Access Road (ch7500)

- 3.1.32 The private access to the farm at Morayston has an at-grade access to the existing A96 approximately 800m east of the B9039 junction. This access will remain open. Access to the land to the south of the new A96 at Morayston Farm, severed by the proposed Scheme, will be gained via an existing farm access adjacent to Chestnut Cottage at ch6750.

Dalcross Station Road (C1020) (ch9550)

- 3.1.33 This is a local road that connects the B9039 Newton – Castle Stuart – Ardersier Road and the existing A96. The junction with the existing A96 is approximately 2.9km east of the B9039 junction and will remain. A new overbridge will be provided at ch9600 to provide access across the proposed A96 dual carriageway.
- 3.1.34 The realigned Dalcross Station Road (C1020) has been designed in accordance with the standards set out in The Highland Council's Roads and Transport Guidelines for New Developments for a design speed of 70kph. The carriageway will be 3.3m wide with passing places and with 2.0m wide verges. It will be kerbed across the new structure.

Culblair Farm Access Road (ch10600 and ch11200)

- 3.1.35 The farm at Culblair has two accesses: a direct access to the existing A96 approximately 640m northeast of the existing Airport junction, and an access to the existing roundabout on the C1017 near Inverness Airport.
- 3.1.36 The access directly onto the existing A96 is to remain. The access track to the existing roundabout on the Kerrowgair – Croy Road (C1017) is severed by Mid Coul Junction. This access track to Culblair will be re-aligned and combined with the existing track serving Mid Coul Cottages to provide a single access point onto the C1017 north of the existing A96.

Milton of Breachlich Road (U1025) (ch13050)

- 3.1.37 The local road has direct at-grade access to the A96 approximately 2.3km east of the C1017 junction on the north side of the A96. The access, which serves a number of properties including Milton of Gollanfield and Ballaggan, will be closed and the new access formed onto the B9006. The U1025 will be re-aligned to the south of Breachlich Gollanfield Cemetery.
- 3.1.38 The realigned Milton of Breachlich Road (U1025) has been designed in accordance with the standards set out in The Highland Council's Roads and Transport Guidelines for New Developments for a design speed of 60kph. The carriageway will be 3.3m wide with passing places and with 2.0m wide verges. Three new passing places are proposed on the existing U1025 between Milton of Gollanfield and Ballaggan.

Polfalden Access Road (ch13400)

- 3.1.39 The private access road to Polfalden has direct at-grade access to the existing A96 approximately 650m west of the B9006 junction. The existing at-grade access is to be closed and the new access to Polfalden formed off the U1025 Milton of Breachlich Road.

Wester Glackton – Balcroy – Kilravock – Cawdor Road (U1017) (ch15200)

- 3.1.40 The existing local road has direct at-grade access to the existing A96 approximately 1.2km northeast of the B9006 junction. Direct access is to be closed and a connection to the Gollanfield Road (C1013) made over the proposed dual carriageway. Access to the proposed dual carriageway is via a length of the existing A96 which is to be retained between the Gollanfield Road (C1013) and the proposed Brackley Junction.
- 3.1.41 The realigned Wester Glackton – Balcroy – Kilravock – Cawdor Road (U1017) has been designed in accordance with the standards set out in The Highland Council's Roads and Transport Guidelines for New Developments for a design speed of 60kph. The carriageway will be 5.5m wide and with 2.0m wide verges.

Gollanfield Road (C1013) (ch15300)

- 3.1.42 The existing local road has direct at-grade access to the existing A96 approximately 1.2km northeast of the B9006 junction. Direct at-grade access is to be closed and a connection to the Wester Glackton – Balcroy – Kilravock – Cawdor Road (U1017) made over the proposed dual carriageway. Access to the proposed dual carriageway is via a length of the existing A96 which will be retained between the Gollanfield Road (C1013) and the proposed Brackley Junction.
- 3.1.43 The realigned Gollanfield Road (C1013) has been designed in accordance with the standards set out in The Highland Council's Roads and Transport Guidelines for New Developments for a design speed of 60kph. The carriageway will be 5.5m wide and with 2.0m wide verges.

Tomhommie – Ballinreich – Balnagowan Road (U1029) (ch17050)

- 3.1.44 The local access to Tomhommie – Ballinreich – Balnagowan Road (U1029) has direct at-grade access to the existing A96 approximately 1.8km east of the C1013 junction. The existing direct access will be closed and access to the proposed Scheme provided east along the existing A96 to the Nairn West Junction.
- 3.1.45 The realigned Tomhommie – Ballinreich – Balnagowan Road (U1029) has been designed in accordance with the standards set out in The Highland Council's Roads and Transport Guidelines for New Developments for a design speed of 60kph. The carriageway will be 5.5m wide and with 2.0m wide verges but will narrow back to the existing road width north of the realignment.

Delnies – Kildrummie – Howford Road (C1163) (ch19500)

- 3.1.46 The Delnies – Kildrummie – Howford Road (C1163) is severed by the proposed A96 dual carriageway alignment at ch19500 to the north-west of Meikle Kildrummie.
- 3.1.47 North of the proposed dual carriageway the C1163 is realigned parallel with the dual carriageway alignment, connecting to the B9091 Croy – Clephanton – Kildrummie – Nairn Road. Access to the south is made available by the use of the B9090 overbridge to the east.
- 3.1.48 The realigned Delnies – Kildrummie – Howford Road (C1163) has been designed in accordance with the standards set out in The Highland Council's Roads and Transport Guidelines for New Developments for a design speed of 70kph. The carriageway will be 6.0m wide, with a 2.0m wide verge to one side and a wider verge including a 2.5m wide off-carriageway shared use path on the other.
- 3.1.49 South of the proposed dual carriageway the C1163 is stopped up with a turning head provided. Future access to the north towards Delnies would be via the realigned B9091 Croy – Clephanton – Kildrummie – Nairn Road to the B9090 Loch Flemington – Clephanton – Cawdor – Nairn Road. Access for non-motorised users between the severed sections of the C1163 would be maintained under the proposed dual carriageway via an underpass at ch19730.

Balnspirach – Nairn Moss Lands Road (U3226) (ch20600)

- 3.1.50 The local road from the B9091 Croy – Clephanton – Kildrummie – Nairn Road to the group of residential properties at Balnspirach is severed by the proposed A96 dual carriageway. The Balnspirach – Nairn Moss Lands Road (U3226) will take access from the new link road between the Delnies – Kildrummie – Howford Road (C1163) and the B9091 Croy – Clephanton – Kildrummie – Nairn Road.

B9091 Croy – Clephanton – Kildrummie – Nairn Road (ch21200)

- 3.1.51 The B9091 Croy – Clephanton – Kildrummie – Nairn Road is severed by the proposed A96 dual carriageway. The B9091 will be realigned on the south side of the proposed dual carriageway to connect to the B9090 Loch Flemington – Clephanton – Cawdor – Nairn Road at approximately ch22000.
- 3.1.52 The realigned B9091 Croy – Clephanton – Kildrummie – Nairn Road has been designed in accordance with the standards set out in The Highland Council's Roads and Transport Guidelines for New Developments for a design speed of 70kph. The carriageway will be 6.0m wide and with 2.0m wide verges.

B9090 Loch Flemington – Clephanton – Cawdor – Nairn Road (ch22100)

- 3.1.53 The B9090 Loch Flemington – Clephanton – Cawdor – Nairn Road connects the village of Cawdor to Nairn. The proposed A96 dual carriageway will pass under the B9090 Loch Flemington – Clephanton – Cawdor – Nairn Road at ch22100. The B9090 will be realigned with a 6.0m wide carriageway with 2.0m verges and will be kerbed across the structure.
- 3.1.54 The realigned B9090 Loch Flemington – Clephanton – Cawdor – Nairn Road has been designed in accordance with the standards set out in The Highland Council's Roads and Transport Guidelines for New Developments for a design speed of 85kph.

Househill – Raitloan – Howford Road (C1175) (ch22850)

- 3.1.55 The Househill – Raitloan – Howford Road (C1175) is severed by the proposed A96 dual carriageway at ch22850. The road will be lowered and realigned via an underpass under the proposed dual carriageway to maintain the existing local access.

- 3.1.56 The realigned Househill – Raitloan – Howford Road (C1175) has been designed in accordance with the standards set out in The Highland Council's Roads and Transport Guidelines for New Developments for a design speed of 60kph. The carriageway will be 3.3m wide with passing places and with 2.0m wide verges.

A939 Tomintoul – Grantown on Spey – Nairn Road (ch23850)

- 3.1.57 The A939 Tomintoul – Grantown on Spey – Nairn Road is severed by the proposed dual carriageway approximately 2km south of Nairn town centre at ch23850. It will be realigned and will cross the dual carriageway via an overbridge. Local access will be maintained to Blackpark and Skene Park Cottages to the north of the A96 dual carriageway.

- 3.1.58 The realigned A939 Tomintoul – Grantown on Spey – Nairn Road has been designed in accordance with the DMRB for a design speed of 85kph. The carriageway will be 6.0m wide and with 2.0m wide verges.

Blackpark – Grigorhill – Newmill Road (U3010) (ch24700)

- 3.1.59 The Blackpark – Grigorhill – Newmill Road (U3010) is severed by the proposed dual carriageway alignment. North of the proposed dual carriageway the U3010 will be stopped up 40m south of the Blackpark access junction and a turning head provided. South of the proposed dual carriageway alignment the U3010 will be stopped up 70 north of the gas distribution station access junction and a turning head provided. Local access will be maintained via the existing junctions with the A939 Tomintoul – Grantown on Spey – Nairn Road to the north and the B9101 Auldearn – Cawdor Road to the south.

B9111 Auchnacloch – Auldearn Road (ch25750)

- 3.1.60 The B9111 which connects the existing A96 to the village of Auldearn is severed by Nairn East Junction. A new underpass will be provided at ch25750 to maintain connectivity from the B9111 onto the existing A96.

Waterloo – Eastertown – Inshoch Road (U2997) (ch26650)

- 3.1.61 The Waterloo – Eastertown – Inshoch Road (U2997) provides local at-grade access onto the existing A96 and serves various properties including Waterloo Cottage, Mill of Boath and East Lodge Cottage. Although the road will be severed by the proposed A96 dual carriageway, access to the existing properties will be maintained from the Auldearn – Station – Drum Road (C1172).

Auldearn – Station – Drum Road (C1172) (ch27400)

- 3.1.62 The Auldearn – Station – Drum Road (C1172) is severed by the proposed A96 dual carriageway at ch27400. A new 3.3m wide road will be provided via a structure under the proposed dual carriageway to maintain the existing local access. It has been designed in accordance with the standards set out in The Highland Council's Roads and Transport Guidelines for New Developments for a design speed of 70kph.

Structures

- 3.1.63 In addition to those structures identified above which accommodate junctions, local roads and accesses, additional structures and culverts will be required to complete the proposed Scheme. A full list of all new bridges and culverts is given below in Table 3.1 and Table 3.2 respectively. A more detailed description of these structures is given in Chapter 4. The locations of proposed structures are shown on Figure 1.3.

Table 3.1: List of Principal Structures

Structure		Chainage (m)
Bridges		
PS01	Smithton Junction Underbridge	ch1755
PS24	Milton of Culloden Underpass	ch2765
PS02	Balloch Junction Underbridge	ch5025
PS23	Morayston Farm Access Underpass	ch6735
PS03	A96 Kerrowaird Underbridge	ch8500
PS04	C1020 Dalcross Station Road Overbridge	ch9570
PS05	Mid Coul Junction Overbridge	ch10520
PS26	Mid Coul Junction NMU Underpass	ch10600
PS06	Brackley Junction Overbridge	ch14120
PS21	Gollanfield Road Overbridge	ch15295
PS07	A96 Gollanfield Rail Bridge	ch16260
PS10	Nairn West Junction Overbridge	ch17950
PS12	Moss Side A96 Rail Bridge	ch19455
PS12A	Moss Side C1163 Rail Bridge	ch19565
PS25	Moss Side NMU Underpass	ch19735
PS13	B9090 Overbridge	ch22090
PS14	River Nairn Underbridge	ch22440
PS15	C1175 Underbridge	ch22880
PS16	A939 Overbridge	ch23840
PS22	B9111 Underbridge	ch25700
PS17	Nairn East Junction Underbridge	ch25935
PS28	Auldearn NMU Underpass	ch26675
PS18	C1172 Underbridge	ch27335
PS19	Hardmuir Overbridge No 1	ch28975
PS20	Hardmuir Overbridge No 2	ch30125

Table 3.2: List of Culvert Structures

Structure		Chainage (m)
Culverts		
C02	Scretan Burn Culvert	ch1250
C03	Cairnlaw Burn Culvert No 1	ch1750
C04	Cairnlaw Burn Culvert No 2	ch2280
C05	Kenneth's Black Well Culvert	ch2535
C26	Milton of Culloden Culvert No 1	ch2765
C27	Milton of Culloden Culvert No 2	ch2765
C29	Milton of Culloden Culvert No 4	ch2765
C30	Milton of Culloden Culvert No 5	ch2765
C06	Allanfearn Drain Culvert	ch3230
C07	Fiddler's Burn Culvert	ch4745
C08	Newton Burn Tributary Culvert	ch6320

Structure		Chainage (m)
C09	Rough Burn Culvert	ch7525
C10	Kerrowaird Culvert	ch8890
C11	Tornagrain Farm Culvert	ch9330
C12	Tornagrain Wood Culvert	ch9435
C13	Dalcross Culvert	ch10200
C22	Culblair Culvert	ch11300
C15	Drumine Drain Culvert No 1	ch12615
C16	Drumine Drain Culvert No 2	ch12700
C17	Blackcastle Culvert	ch17010
C23	Cranford Culvert	ch17150
C18	Alton Burn Culvert No 1	ch19610
C19	Knocknagillan Culvert	ch23405
C20	Auldearn Burn Culvert	ch26695

Lay-bys

- 3.1.64 Two new Type B bus stop lay-bys and seven new Type A lay-bys will be provided along the proposed Scheme with four on the eastbound carriageway at locations ch15500 (Type B), ch20000, ch23200, ch27900 and five on the westbound carriageway at locations ch15500 (Type B), ch20000, ch23200, ch27800 and ch29800.
- 3.1.65 Proposed lay-bys and bus lay-bys are shown on Figure 1.2.

Public Transport Facilities

- 3.1.66 The existing public bus routes are largely unaffected by the proposed Scheme. The retention of the existing A96 between Smithton Junction and Brackley Junction, and between Nairn West Junction and Hardmuir, through Nairn maintains access to existing bus services.
- 3.1.67 Between Brackley Junction and Nairn West Junction bus services will join the proposed dual carriageway for a short section as shown on Figure 3.5. The existing bus stops at the B9006 junction will be replaced by new bus lay-bys on the Brackley Junction West Link (existing A96) at Brackley Junction. The existing bus stops at the C1013 junction, for Gollanfield and Lochside, will be replaced with dedicated bus lay-bys on the dual carriageway, east of PS21 Gollanfield Road Overbridge. In addition two new bus lay-bys are proposed on the Nairn West Junction East Link (existing A96) at Nairn West Junction.

Provision for NMUs

A96 Inverness to Aberdeen Dualling Programme NMU Objectives

- 3.1.68 The following design objectives are set in the A96 Dualling Inverness to Aberdeen Preliminary Engineering Services, Non-Motorised User Strategy (Jacobs 2016a), and apply to the proposed Scheme.
- 3.1.69 With respect to the NMU network, these general design objectives are:
- to ensure that there are no hazards to NMUs built into schemes;
 - to ensure that the opportunities for NMUs within the scheme are recognised and exploited;
 - to ensure that the opportunities for NMUs on the surrounding networks, including the National Cycle Network and superseded sections of trunk road, are recognised and exploited;

- the NMU network will 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 everyone regardless of age or disability (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 (Transport Scotland 2013).

3.1.70 Furthermore, with respect to the NMU crossings, the general design objectives are:

- there will be no NMU at-grade crossings of the proposed A96 dual carriageway as all NMU crossing points will be grade separated;
- where practicable, NMU crossings in close proximity will be combined and 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 will only be provided where site specific requirements can be demonstrated.

A96 Dualling Inverness to Nairn (Including Nairn Bypass) Scheme Specific Objectives

3.1.71 The following design objectives are set in the A96 Dualling Inverness to Nairn (including Nairn Bypass) Non-Motorised User – Objective Setting & Context Report (Jacobs 2016b):

- to improve connectivity between Nairn and Inverness;
- to maintain connectivity of the path network between the communities of Balloch, Smithton, Culloden and Westhill and the Moray Firth coastline;
- to maintain connectivity of the path network between Nairn and Auldearn; and
- to enhance provision for NMUs in the A96 corridor with facilities to supplement the local core path network, National Cycle Network and Green Networks.

3.1.72 The following details the shared use path provision that has been included in the design:

- Seafield Roundabout to Smithton Junction: Provision of a new 3m wide shared use path will upgrade the existing footway adjacent to the westbound carriageway of the existing A96. The new shared use path will run adjacent to the westbound carriageway of the proposed Scheme from Seafield Roundabout for approximately 500m and then alongside the Ashton farm access track to Smithton Junction, where it crosses under the dual carriageway along Barn Church Road to the north roundabout.
- Smithton Junction to Balloch Junction: Provision of a new 3m wide shared use path along the eastbound carriageway to Balloch Junction. The path crosses under the proposed dual carriageway along Barn Church Road linking the north and south roundabouts. A link is also provided adjacent to the westbound carriageway at Allanfean, between core paths IN08.15 and IN08.16, to maintain connectivity with the northern core paths around Culloden.
- Balloch Junction to Mid Coul Junction: Provision of a 2.5m wide shared use path along the proposed westbound carriageway. Users of this section of path will be required to cross the existing A96 on the east side of the Kerrowaird Underbridge.
- Mid Coul Junction to Brackley Junction: Provision of a 2.5m wide shared use path along the proposed westbound carriageway. The shared use path crosses the dual carriageway via the Brackley Junction overbridge.
- Brackley Junction to Nairn West Junction: From Brackley Junction heading east, a 2.5m wide shared use path will be provided on the existing A96 for approximately 600m before crossing the dual carriageway via the Gollanfield Road Overbridge (PS21). East of this point there will be a new 2.5m wide shared use path adjacent to the proposed westbound carriageway.

- Nairn West Junction to Delnies: Provision of a 2.5m wide shared use path adjacent the existing A96 between Nairn West Junction and Delnies. From Delnies, users will continue on existing NMU provision between Delnies and Nairn.
- C1163 southern junction to the River Nairn: Provision of a 2.5m wide shared use path adjacent to the east carriageway of the New B9091 to C1163 Link Road, then adjacent to the southbound carriageway of the C1170, then crosses the River Nairn via the River Nairn Underbridge. The shared use path extends eastbound to the new C1175 underpass where it joins the existing National Cycle Network 1.
- Nairn to Auldearn: At Nairn East Junction a 2.5m wide shared use path will be provided adjacent to the northbound carriageway, of the lowered section of the B9111, to allow the core path NA04.07 to pass under the dual carriageway.
- Auldearn to Hardmuir: There are no NMU improvements proposed between Auldearn and Hardmuir.

3.1.73 For details of the proposed NMU facilities, refer to Figures 2.1 and 3.6.

3.2 Cost Estimate

Overview

3.2.1 The assessed cost estimate is calculated as £429M, excluding VAT. This is the cost estimate prepared on the basis of the proposed Scheme design and has been used for assessment purposes. The cost range for the Scheme is £375M to £475M and the cost estimate remains within this range. The estimate is in Pounds Sterling (£) and rates are based on prices, current at Q1 2014.

3.2.2 The cost estimate is made up of gross costs plus project risk and optimism bias adjustment. The gross cost estimate is made up of two parts, the pre-construction costs and construction phase costs. The cost breakdown is shown in Table 3.3.

Table 3.3: Cost Estimate Breakdown

Element	Estimated Cost at Q1 2014 Price Base
Pre-Construction	
Design and Preparation Costs (incl. Historic Costs)	£29.2M
Advanced Works	£5.5M
Land Costs	£9.5M
Sub-total	£44.2M
Construction Phase	
Preliminaries and Indirect Costs	£51.3M
Roadwork Series Costs	£204.1M
Structures Costs	£46.2M
Statutory Undertakers and Authorities	£21.2M
Client's Costs During Construction	£1.2M
Contingency and Economies of Scale	£-15.1M
Sub-total	£308.9M
Risk and Optimism Bias	
Project Risk & Optimism Bias Adjustment	£75.7M
Sub-total	£75.7M
Total Scheme Cost	
Total (excluding VAT)	£429M

3.2.3 The quantifiable items of the works have been measured and a cost per unit has been applied based on rates from similar schemes. Other works elements have been assessed as a percentage of other costs. Both unit prices and percentage allowances have been based upon knowledge of similar schemes.

- 3.2.4 Location factors have not directly been applied to the cost estimate, though the rates have been sourced from schemes of a similar size and location.
- 3.2.5 Value Engineering has been undertaken during the course of the design development process and will be further undertaken by the appointed D&B Contractor during the tender and subsequent detailed design process.

Pre-construction Costs

- 3.2.6 Design and preparation costs have been estimated and include estimates for design costs, geotechnical and topographical survey fees, de-trunking costs and an allowance for a potential public local inquiry.
- 3.2.7 Advanced works costs include an estimate for environmental and ecological advanced works, archaeological works and other pre-construction surveys.
- 3.2.8 The District Valuer has provided an estimate of land acquisition and compensation costs.

Construction Phase Costs

- 3.2.9 Preliminaries and indirect costs have been quantified as 17% of the total works costs in line with other, similar schemes. Preliminaries and indirect costs include an allowance for general preliminaries, traffic management, temporary works and insurance.
- 3.2.10 The roadwork series costs have been developed on the basis of estimated quantities of required materials and appropriate material rates. Quantities of required material have been calculated based on the DMRB Stage 3 design. Material rates have been obtained through comparison with similar contracts and from standard industry pricing information. Accommodation works are assumed as 3% of overall roadworks series costs.
- 3.2.11 Structure costs have been individually assessed and estimated based on the type of structure, foundations type and deck area.
- 3.2.12 The statutory undertaker and authority costs have been taken from C3 budget estimates provided by the relevant companies for carrying out the necessary diversionary and protective measures as a consequence of the proposed Scheme.
- 3.2.13 Client costs during construction include supervision costs and other costs to cover items such as Employer issued Intelligent Transport Systems (ITS) equipment.
- 3.2.14 A contingency of 5% has been added to the works costs to cover detailed items which will be required but have not been specifically designed or allowed for elsewhere in the cost estimate. Due to the large scale of this project, a 10% deduction has been applied to reasonably allow for economies of scale. The quantified risk register includes a risk that this will not transpire.

Risk and Optimism Bias

- 3.2.15 A list of proposed Scheme risks and uncertainties has been identified and quantified for inclusion in the cost estimate. Each risk and uncertainty has been allocated a probability and cost and a Monte Carlo simulation carried out to quantify the risk allowance included in the proposed Scheme cost.
- 3.2.16 In accordance with the Supplementary Green Book Guidance: Optimism Bias (HM Treasury 2013), an assessment of optimism bias has been undertaken for the proposed Scheme, taking regard of the risk assessment process and of the current stage of the proposed Scheme development. An allowance of 12% has been included within the estimate.

Assumptions and Exclusions

- 3.2.17 As part of the cost estimate the following assumptions have been made:
- adequate labour and plant are available throughout the construction period;
 - a source of acceptable fill material can be found within a reasonable distance of the scheme;
 - access to the site is available on or before the contract start date and continues to be available throughout the contract period; and
 - the proposed Scheme is procured on a design and build basis.
- 3.2.18 The cost estimate does not include for the following:
- future inflation, the cost estimate has been prepared at Q1 2014 prices;
 - financing or other charges;
 - legal fees; and
 - Value Added Tax.

3.3 References

Jacobs (*on behalf of Transport Scotland*) (2015). A96 Dualling Inverness to Aberdeen DMRB Stage 1 Assessment Report. Transport Scotland

Jacobs (*on behalf of Transport Scotland*) (2016a) A96 Dualling Inverness to Aberdeen Preliminary Engineering Services, Non-Motorised User Strategy. Transport Scotland

Jacobs (*on behalf of Transport Scotland*) (2016b). A96 Dualling Inverness to Nairn (including Nairn Bypass) Non-Motorised User – Objective Setting & Context Report. Transport Scotland

The Highways Agency, Scottish Executive Development Department, The National Assembly for Wales and The Department for Regional Development Northern Ireland (2002). Volume 6, Section 1, Part 1, TD9/93 Amendment No.1 Highway Link Design. The Stationery Office Ltd.

The Highways Agency, Scottish Executive, Welsh Assembly Government and The Department for Regional Development Northern Ireland (2005). Volume 6, Section 1, Part 2, TD27/05, Cross-sections and Headrooms. The Stationery Office Ltd.

Transport Scotland (2013). Roads for All, Good Practice Guide for Roads. Scottish Government

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Legislation.gov.uk. (2010). Equality Act 2010. [online] Available at:
<http://www.legislation.gov.uk/ukpga/2010/15/contents> [Accessed 04 Oct. 2016].

4 Engineering Assessment

4.1 Engineering Standards

Design Standards

4.1.1 The DMRB Stage 3 design has been developed in accordance with current design standards and good practice. Reference is made to sections of the DMRB and other relevant standards within each section of this chapter.

Dual Carriageway and Local Roads

4.1.2 The proposed dual carriageway has been designed in accordance with the following standards:

- DMRB Volume 6, Section 1, Part 1, TD9/93, Highway Link Design (The Highways Agency, Scottish Executive Development Department, The National Assembly for Wales and The Department for Regional Development Northern Ireland 2002) (hereafter referred to as TD9/93);
- DMRB Volume 6, Section 1, Part 2, TD27/05, Cross Sections and Headrooms (The Highways Agency, Scottish Executive, Welsh Assembly Government and The Department for Regional Development Northern Ireland 2005) (hereafter referred to as TD27/05); and
- DMRB Volume 6, Section 3, Part 3, TD69/07, The Location and Layout of Lay-bys and Rest Areas (The Highways Agency, Transport Scotland, Welsh Assembly Government and The Department for Regional Development Northern Ireland 2007b) (hereafter referred to as TD69/07).

4.1.3 Local Roads have been designed in accordance with Roads and Transport Guidelines for New Developments (The Highland Council 2013), with reference to TD9/93 and DMRB Volume 6, Section 1, Part 7, TD41/95, Vehicular Access to All-Purpose Trunk Roads (The Highways Agency, The Scottish Office Development Department, The Welsh Office, The Department of the Environment for Northern Ireland 1995b) (hereafter referred to as TD41/95);

Junctions

4.1.4 The six grade separated junctions have been developed and designed in accordance with:

- DMRB Volume 6, Section 2, Part 1, TD22/06, Layout of Grade Separated Junctions (The Highways Agency, Scottish Executive, Welsh Assembly Government and The Department for Regional Development Northern Ireland 2006) (hereafter referred to as TD22/06);
- DMRB Volume 6, Section 2, Part 6, TD42/95, Geometric Design of Major/Minor Priority Junctions (The Highways Agency, The Scottish Office Development Department, The Welsh Office, The Department of the Environment for Northern Ireland 1995a) (hereafter referred to as TD42/95); and
- DMRB Volume 6, Section 2, Part 3, TD16/07 – Geometric Design of Roundabouts (Highways Agency, Transport Scotland, Welsh Assembly Government and The Department for Regional Development Northern Ireland 2007a).

4.1.5 The priority junction at Hardmuir has been developed and designed in accordance with TD42/95.

4.1.6 Junction layouts have been design to minimise land take and make best use of existing infrastructure.

Non-Motorised Users (NMU)

4.1.7 The facilities for NMU have been developed and designed in accordance with Cycling by Design 2010 (Transport Scotland 2011) and Transport Scotland's Roads for All: Good Practice Guide for Roads (Transport Scotland 2013).

Relaxations and Departures

- 4.1.8 In order to avoid incurring high construction, social or environmental costs it is occasionally necessary to adopt geometric elements of design below the desirable minimum standards recommended by the DMRB. These geometric elements include cross section, gradient, visibility and horizontal and vertical curvature. A procedure exists whereby such departures from DMRB standards are applied for by the designer to the roads authority and the application is independently scrutinised and due diligence is applied in approving or rejecting the application.
- 4.1.9 For the proposed Scheme, the overseeing authority, acting independently, within Transport Scotland is responsible for approving or rejecting departures from standard applications on the proposed dual carriageway, junctions and the existing A96 trunk road. The overseeing authority also takes responsibility for approving or rejecting departure from standard applications on the local roads it provides. Departures from standard on the local roads will also be subject to acceptance from the local road authority, The Highland Council.
- 4.1.10 The following nine departures from standard associated with the proposed dual carriageway have been identified within the proposed Scheme where environmental and/or cost constraints have merited their inclusion. These departures are outlined below:
- Departure A96IN-001 – one departure on the westbound carriageway relating to the insufficient weaving distance between Smithton Junction and Seafield Roundabout being 485m which is less than 1km as defined in TD22/06.
 - Departure A96IN-002 – one departure on the eastbound carriageway relating to the insufficient weaving distance between Seafield Roundabout and Smithton Junction being 275m which is less than 1km as defined in TD22/06.
 - Departure A96IN-003 – one departure on the eastbound carriageway relating to the distance between the Brackley Junction and the lay-by at Gollanfield being 925m which is less than 1km as defined in TD69/07 and TD 22/06.
 - Departure A96IN-004 – one departure on the westbound carriageway relating to the distance between the lay-by at Gollanfield to Brackley Junction being 780m which is less than 1km as defined in TD 69/07 and TD 22/06.
 - Departure A96IN-005 – one departure on the westbound diverge and merge two way slip road at Mid Coul Junction relating to the carriageway cross section and lack of 2.5m central reserve and associated 0.7m hardstrips as defined in TD22/06 and TD27/05.
 - Departure A96IN-006 & A96IN-007 – one departure on the eastbound diverge and merge two way slip road and one departure on the westbound diverge and merge two way slip road at Brackley Junction relating to the carriageway cross section and lack of 2.5m central reserve and associated 0.7m hardstrips as defined in TD22/06 and TD27/05.
 - Departure A96IN-008 – one departure on the diverge and merge two way slip road eastbound at Nairn West Junction relating to the carriageway cross section and lack of 2.5m central reserve and associated 0.7m hardstrips as defined in TD22/06 and TD27/05.
 - Departure A96IN-122 – one departure at the eastbound lay-by at ch23200 relating to the combination of the lay-by and pond maintenance access as defined in TD69/07.
- 4.1.11 As mitigation for Departures A96IN-001 and A96IN-002, a proposed speed limit of 50mph, inclusion of street lighting and suitable traffic signing is proposed. In addition for departure A96IN-001 a lane gain is proposed to maximise the weaving length. For departures A96IN-003 and A96IN-004 full forward visibility through the bus lay-bys will be maintained on the approach to and from Brackley Junction. Mitigation proposals for departures A96IN-005 to A96IN-008 is the use of a high Polished Stone Value (PSV) or high friction surface on the loops and advanced signing on the approach of the road layout ahead.
- 4.1.12 There are an additional 23 departures from DMRB standards associated with the local roads. Of the 23 local road departures, 10 are a result of horizontal radii, six are due to the proximity of bus stop lay-bys to junctions, four are due to reduced forward visibility, two as a result of junction stagger

distances and one is due to junction visibility. For further details see Appendix A, Table A.2 and Figure 4.1.

- 4.1.13 There are an additional 30 access design components that fall below the recommended design guidelines for The Highland Council. Of these, 13 are due to junction spacing, ten are a result of junction stagger distances, six are due to junction visibility and one is due to vertical gradient. The Highland Council has been consulted regarding these. For further details see Appendix A, Table A.3 and Figure 4.1.
- 4.1.14 There are an additional 28 local road design components that are relaxations to DMRB standards and also fall below the recommended design guidelines for The Highland Council. Of these, 16 are a result of horizontal radii, eight are due to vertical gradient and four are due to junction spacing. The Highland Council has been consulted regarding these. For further details see Appendix A, Table A.4 and Figure 4.1.

4.2 Climate, Topography and Land Use

Climate

- 4.2.1 The climate in the study area is typical of the northern highlands. The average minimum monthly temperature range is between 1.1°C and 11.4°C. The average maximum monthly temperature range is between 6.9°C and 18.9°C while the average monthly rainfall is between 39.4mm and 78.1mm. Average rainfall and temperatures are in accordance with Met Office averages between 1981-2010 (Met Office 2016). It should be noted that the study area receives a higher hourly average of sunshine and a lower than average level of rainfall when compared to the north of Scotland average. In winter months, the local climate can also include sub-zero temperatures and snow.

Topography and Land Use

- 4.2.2 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 existing topography will change through the introduction of new road embankments and cuttings, grade separated junctions, local road re-alignments and structures including an underbridge carrying the proposed dual carriageway over the River Nairn. Landscape and visual impacts are assessed in greater detail in Chapter 9 (Landscape) and Chapter 10 (Visual) of the Environmental Statement.
- 4.2.3 The landscape surrounding the existing A96 Aberdeen – Inverness Trunk Road south of Nairn, is a mixture of pastoral and arable farmland, with pockets of woodlands spread across the study area. Land Use is assessed in greater detail in Chapter 15 (People and Communities – Community and Private Assets) of the Environmental Statement.
- 4.2.4 An example of the existing topography and land use is shown in Photo 4.1.

Photo 4.1: View of land to the south of Nairn looking west towards Inverness



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4.3 Geology, Ground Conditions and Earthworks

Superficial Deposits

- 4.3.1 The published geological information (British Geological Survey 1991-2012) indicates that the area of the proposed Scheme is predominantly underlain by Quaternary age, Late Devensian (circa 10,000 to 26,000 years ago) sediments comprising mainly Glaciofluvial Deposits and Glaciomarine Deposits with localised areas of Glacial Till. More recent deposits of Flandrian age (circa 10,000 years ago to present) occur locally throughout the area, comprising Alluvium associated with watercourses, and peat which occurs in the area around Gollanfield between approximately ch15400 to ch17100.
- 4.3.2 Made Ground is indicated to be present locally in the broader area and is generally limited to areas of existing railway embankment or as infill to historical areas of quarrying. An infilled clay pit underlies part of the northern half of Balloch Junction. Made Ground was also identified in historical exploratory hole records at Smithton.
- 4.3.3 A description of each of the superficial deposits, as identified on the published geological maps and in the memoir (British Geological Survey 1995), is given in Table 4.1.

Table 4.1: Summary of Superficial Deposits

Geological Unit	Sub-unit	Typical Description
Made Ground	-	Composition Unspecified. Deposits likely to be in relation to infill of sand and gravel pits, road embankments and historical industry.
Peat (Quaternary, Flandrian)	-	Basin peat. Anticipated to be up to 4m in places.
Alluvium (Quaternary, Flandrian)	Floodplain Alluvium	Deposits of present river floodplains (mainly gravel).
	Lacustrine Alluvium	Deposits of enclosed basins (mainly sand, silt and clay).
	Alluvial Fan Deposits	Clayey sand and gravel.
Raised Marine Deposits (Quaternary, Late Devensian)	Raised Marine Tidal Flat Deposits	Fine sand, silt and clay with lenses of gravel.
	Raised Shoreface and Beach Deposits	Medium sand and well-rounded shingle.
Glaciomarine Deposits (Quaternary, Late Devensian)	Ardersier Silts Formation	Mainly silt diamicton (an unsorted to poorly sorted soil that contains particles ranging in size from clay to boulders, suspended in a matrix of mud or sand) with lenses of gravel and clay, capped by rhythmically bedded silt and fine sand; locally contorted tectonically.
	Alturlie Gravels Formation	Mainly cross bedded sand and well rounded gravel capped locally by marine washed shingle.
Glaciofluvial Deposits (Quaternary, Late Devensian)	Sheet Deposits	Mainly terraced spreads of gravel with lenses of sand.
	Ice Contact Deposits	Undulating spreads and mounds of sands and gravels, including flat-topped mounds, but includes subsidiary beds of diamicton, silt and clay.
Glacial Till (Quaternary)	Supraglacial and Paraglacial Till	Heterogeneous, poorly sorted gravel, silty sand as well as silt and clay.
	Subglacial Till (Lodgement Till)	Typically very stiff, stony, sandy clayey diamictons with matrix support and little stratification.
	Hummocky Glacial Deposits	Poorly stratified, sandy diamicton, sand, gravel, silt and rock debris.

Note: Typical descriptions taken from 1:50,000 geological map (Fortrose Sheet 84W) and geological memoir (Geology of the Fortrose and eastern Inverness district).

Solid Geology

- 4.3.4 The published geological information indicates that the proposed Scheme is underlain by Middle Devonian age sedimentary rocks primarily belonging to the Inverness Sandstone Group. A small area at the eastern extremity of the proposed Scheme is underlain by the Forres Sandstone Group.
- 4.3.5 The Inverness Sandstone Group is differentiated into the subordinate formations of the Hillhead Sandstone Formation and the Inshes Flagstone Formation. The Raitcastle Conglomerate Formation is shown to be present only locally.
- 4.3.6 The Forres Sandstone Group comprises two formations, however only the uppermost, the Kingsteps Sandstone Formation is indicated to underlie the proposed Scheme.
- 4.3.7 A summary of the published geological sequence and typical strata descriptions is provided in Table 4.2.

Table 4.2: Summary of Published Geological Sequence (Solid Geology)

Geological Group (Age)	Formation/Member	Section of Route	Description
Forres Sandstone Group (Upper Devonian)	Kingsteps Sandstone Formation	East end – Hardmuir area	Sandstone, pebbly, white, yellow and red-brown, cross bedded, calcareous with thin mudstone interbeds, pale green and red-brown
Inverness Sandstone Group (Middle Devonian)	Undivided strata	Inverness Airport to Auldearn	Sandstone, red-brown, cross bedded with subordinate conglomerate, mudstone, siltstone and limestone
	Hillhead Sandstone Member	Auldearn to Courage	Sandstone, red and grey, with interbeds of micaceous siltstone and silty mudstone
	Hillhead Sandstone Formation	Smithton to Inverness airport	Red coarse grained sandstones, flaggy siltstones, calcareous mudstone and thin shaly mudstones with fish remains
	Inshes Flagstone Formation	Newton to Kerrowaird	Grey and purplish-red flaggy sandstones and siltstones with numerous dark grey and greenish-grey shaly mudstones containing thin limestones, calcareous concretions and fish remains
	Raitcastle Conglomerate Formation	River Nairn Crossing (to south of crossing on west side of Raitcastle Fault)	Conglomerate, light olive grey, with boulder and cobble clasts of psammite, semipelite and quartzite
Deeside subsuite of the Scottish Highlands Silurian suite (Late Silurian to early Devonian)	Auldearn Granite Pluton	To south of Blackpark	Granite intrusion

- 4.3.8 Although the bedrock geology is mainly of sedimentary origin, granite is indicated to outcrop immediately to the south of the proposed Scheme at Blackpark Farm. The granite intrusion dates from late Silurian to early Devonian, forming part of the Deeside Subsuite of the Scottish Highlands Silurian Suite. This is referred to as the Auldearn granite pluton.
- 4.3.9 The sedimentary strata of the Inverness Sandstone Group are generally indicated to dip at shallow angles to the north and northwest, with a dip of 4 degrees towards the northwest recorded to the east of Auldearn. In the vicinity of the Surface Water Feature (SWF) 23 – River Nairn, dips of 4 degrees to 7 degrees are recorded generally towards the north and locally towards the east. The geological structure, however, has been complicated by a number of faults of various orientations. The published geological information indicates that the proposed Scheme is crossed by three faults between Balnaspirach Farm and the River Nairn, one of which is specifically named as the Raitcastle Fault, which crosses the route approximately 300m to the southwest of proposed structure PS14 – River Nairn Underbridge. The Raitcastle Fault is north-west to south-east trending and is shown to downthrow strata to the south-west. The second fault in this area is north-south trending and downthrows strata to the west. The third fault, known as the Geddes House Fault trends approximately north-south and intersects the Raitcastle Fault just to the north of the River Nairn near Broadley. This fault downthrows strata to the east. Further to the east between Penick Farm and Wester Hardmuir Fruit Farm, a south-west to north-east trending fault which downthrows strata to the east, crosses the proposed Scheme. Only the downthrow direction of the various faults are indicated on the geological maps with no indication of displacements recorded.
- 4.3.10 There are limited exposures of bedrock in the area surrounding the proposed Scheme, however the solid geological map indicates that bedrock is close to the surface in the vicinity of the Rough Burn (SWF 12) at Morayston and surrounding the topographical high to the south of Penick Farm. A small area of exposed rock is also recorded immediately to the south of the River Nairn (SWF 23) crossing where sandstone bedrock was recorded during the site walkover in the bed and lower banks of the River Nairn.

Summary of Ground Conditions

- 4.3.11 The ground conditions along the proposed Scheme were predominantly established during the Preliminary Ground Investigation undertaken between March and June 2016 by Raeburn Drilling and Geotechnical Ltd (RDG). Further information was obtained from historical drilling records.
- 4.3.12 The ground investigation generally confirmed the anticipated sequence and distribution of superficial deposits, as indicated from the published geological information. The exploratory holes generally encountered thicknesses of silty and very silty sands and gravels, or sandy and gravelly silts with variable cobble and boulder contents throughout the length of the proposed Scheme. The predominantly coarse nature of the soils encountered is consistent with the indicated occurrence of glaciofluvial and glaciomarine deposits indicated on the geological maps. The nature of the drilling and sampling processes however did not allow these deposits to be further subdivided according to geological depositional environment due to disturbance but these deposits appear to have been laid down in a variety of glacial/late glacial environments. These deposits were proved to reach a thickness of at least 33m in a borehole located immediately to the west of Inverness Airport.
- 4.3.13 It is considered that a significant proportion of these deposits could be assigned to either the Alturlie Gravels Formation or the Ardersier Silts Formation, as indicated on the geological map; both formations being described as granular glaciomarine deposits. In some areas Glacial Till deposits, typically stiff sandy and gravelly clays with cobbles and boulders, were encountered locally beneath the glaciofluvial deposits typically reaching thicknesses of between approximately 1m to 8m before rock was encountered. An exception to this was encountered between Penick Farm and the proposed PS19 – Hardmuir Overbridge No.1 where glacial till deposits were encountered from surface (beneath topsoil layer) to a maximum depth of 21m where rock was encountered. These deposits are tentatively assigned to the Finglack Till Formation, as indicated on the published geological maps. The glacial till, however, is likely to be of highly variable composition and coarser varieties are likely to occur throughout the area which would not be readily distinguished from the glaciofluvial deposits.
- 4.3.14 Localised areas of possible Alluvium were encountered in the vicinity of Tornagrain and Inverness Airport typically comprising slightly silty sands potentially extending to depths of in excess of 15m locally. Occasional bands of soft clay were also encountered locally at shallow depth. Relatively thin bands of soft clay were also encountered in several of the boreholes and are interpreted to represent alluvial deposits or possibly raised brackish lagoon deposits which are recorded to occur nearby, in particular beneath Inverness Airport.
- 4.3.15 Peat deposits were encountered mainly at Gollanfield where thicknesses of up to 4.5m were encountered to the north of the proposed railway bridge (PS07 – A96 Gollanfield Rail Bridge) at ch16250. The peat appears to be of variable thickness, infilling hollows in the surface of the underlying glaciofluvial deposits and is present mainly between the north side of the existing railway bridge (A96 550 Gollanfield Rail) at ch16100 and Blackcastle Farm. Several other minor occurrences were also identified elsewhere, typically comprising less than 1m of surface peat.
- 4.3.16 Made Ground deposits were encountered locally along the length of the proposed Scheme, the most significant of these in terms of depth and extent is located at Balloch Junction associated with the backfilling of an old clay pit. At this location up to 5.75m of highly variable Made Ground deposits was encountered beneath the area adjacent to the proposed eastbound diverge, roundabout and SUDS ponds. These deposits are a mixture of natural and man-made materials, including quantities of putrescible materials such as timber and vegetation. Chemical testing of these deposits indicates low or negligible quantities of potential contaminants.
- 4.3.17 Made Ground deposits were also encountered in the vicinity of Smithton Junction where up to 3.65m of these deposits were encountered to the south of Barn Church Road (C1032). Localised areas of made ground were also identified to the north of Barn Church Road (C1032) with depths of up to 3.6m. It is unknown what historical activities these deposits are associated with but they are not anticipated to be widespread in occurrence. Chemical testing of these deposits also indicate low or negligible quantities of potential contaminants.

- 4.3.18 Shallow rock was encountered at a number of locations, in particular in the Morayston area and to the north of Auldearn (Boath House to Penick) where rockhead was encountered at depths of less than 5m over significant lengths of the proposed Scheme.
- 4.3.19 The rock encountered in the boreholes during the Preliminary Ground Investigation was found to comprise a sequence of mainly sandstones with subordinate layers of mudstone and siltstone, and occasional limestone bands, as anticipated from the published geological information.
- 4.3.20 Groundwater levels recorded during the ground investigation were highly variable, being very shallow in some areas (<1m) but dry in many of the exploratory holes. Longer term monitoring in standpipes and piezometers installed in the boreholes is ongoing. Initial results indicate water depths of between ground level and 22.0m below existing ground level. Artesian groundwater was encountered in the vicinity of the proposed railway bridge at Gollanfield (PS07 – A96 Gollanfield Railway Bridge) where a maximum water level of 1.3 m above ground level was recorded.

General Earthworks Design Issues

- 4.3.21 For the purposes of the DMRB Stage 3 assessment earthworks design, slope gradients have been selected for the various cuttings and embankments based on a number of assumptions. Selected 'critical sections' through the earthworks have been analysed for stability based on the results of the Preliminary Ground Investigation undertaken in 2016. Generally these sections coincide with the location of the maximum height/depth of embankment or cutting proposed. Substantial embankments and cuttings are shown in Table 4.3 and Table 4.4 below. For all cuttings 1(V):3(H) side slopes have been adopted recognising in particular the variable and generally limited amount of groundwater monitoring data available at present, and the relatively sparse coverage of exploratory holes. Further ground investigation, including groundwater monitoring, will be undertaken at the detailed ground investigation stage.

Table 4.3: Location of Proposed Embankments and Cuttings along the Proposed Dual Carriageway

Chainage	Embankment/Cutting	Details
ch1550 to ch2300	Embankment	Approximately 9m in height at Smithton Junction.
ch4750 to ch5250	Embankment	Approximately 7m in height at Balloch Junction.
ch6450 to ch7050	Embankment	Approximately 12m in height past Newton of Petty.
ch7700 to ch8750	Embankment	Approximately 16m in height between Morayston and Kerrowaird.
ch9050 to ch9200	Embankment	Approximately 6m in height past Kerrowaird.
ch16100 to ch16500	Embankment	Approximately 7m in height over the Aberdeen to Inverness Railway Line at Gollanfield.
ch17100 to ch17500	Cutting	Approximately 10m in depth at Blackcastle.
ch18500 to ch19750	Embankment	Approximately 10m in height between Drumdivan and Meikle Kildrummie including crossing of the Aberdeen to Inverness Railway Line.
ch23000 to ch23200	Embankment	Approximately 6m in height past Crook.
ch24000 to ch24700	Cutting	Approximately 10m in depth at Blackpark.
ch25500 to ch26300	Embankment	Approximately 10m in height at Nairn East Junction.
ch27700 to ch28200	Cutting	Approximately 6m in depth through Penick.
ch29800 to ch30400	Cutting	Approximately 9m in depth through Wester Hardmuir Wood.

Table 4.4: Location of Proposed Embankments and Cuttings on Local Roads

Chainage	Embankment/Cutting	Road Classification/Name	Details
ch9550	Embankment	Dalcross Station Road (C1020)	Approximately 9m in height as it rises over the dual carriageway alignment.
ch14100	Embankment	B9006 Millburn Roundabout – Culcabock – Castle Hill – Culloden Moor – Croy – Gollanfield – Fort George Road	Approximately 9m in height at Brackley Junction as it rises to pass over the dual carriageway alignment.
ch15300	Embankment	Gollanfield Road (C1013)	Approximately 6m as it rises to pass over the dual carriageway alignment.
ch17950	Embankment	Nairn West Junction Overbridge	Approximately 10m in height between the roundabouts as it rises to pass over the dual carriageway alignment.
ch19500 to ch19700	Embankment	Delnies – Kildrummie – Howford Road (C1163)	200m long embankment, roughly 6m high as it passes over the Aberdeen to Inverness Railway Line and merges parallel to the dual carriageway alignment.
ch22870	Cutting	Househill – Raitloan – Howford Road (C1175)	Approximately 6m deep as it passes under the dual carriageway alignment.
ch23840	Embankment	A939 Tomintoul – Grantown on Spey – Nairn Road	Approximately 7m in height as it rises to pass over the dual carriageway alignment.
ch25730	Cutting	B9111 Auchnacloch – Auldearn Road	Approximately 6m deep before passing under the dual carriageway alignment.
ch27360	Cutting	Auldearn – Station – Drum Road (C1172)	Approximately 8m deep as it passes under the dual carriageway alignment.
ch29000	Embankment	Hardmuir Overbridge No 1	Approximately 10m high as it rises to pass over the dual carriageway alignment.

- 4.3.22 In general the proposed cuttings will be formed substantially in soil, the main exception to this being at Penick Farm between ch27600 to ch28300 where the majority of the cutting will be formed in rock. With regard to the latter, the results of the Preliminary Ground Investigation suggest that the rock within the cutting, encountered from 1.5m below ground level to a maximum depth of approximately 7m below ground level, is weathered and highly fractured necessitating the adoption of relatively shallow slopes equivalent to a 1(V):3(H) slope overall.
- 4.3.23 The proposed cuttings will depress general groundwater levels locally in the long term, the limits of which will depend on existing groundwater levels and the permeability of the surrounding soils. The resulting groundwater drawdown could lead to settlement of the adjacent ground. Further assessment of this issue will be undertaken during the detailed ground investigation phase.
- 4.3.24 For embankments, the gradients given in Table 4.5 below have generally been adopted in the earthworks design. The analysis undertaken assumes that topsoil will be removed from beneath all embankments prior to construction.

Table 4.5: Adopted Gradients for Embankment

Embankment Height	Side Slopes – Class 1 Material
<5m	1(V):2(H)
5m to 10m	1(V):2.5(H)
>10m	1(V):3(H)

- 4.3.25 In the Morayston area, between approximately ch6580 to ch6860, the slope stability analysis indicates that special geotechnical design measures may be required to address the presence of soft ground, extending to depths of up to 10m. A number of alternative design measures could be adopted here, including supporting the embankment on a piled load transfer platform, using lightweight fill (e.g expanded clay pellets and polystyrene) or partial removal of the soft deposits combined with staged construction utilising band drains.

- 4.3.26 In other areas where soft ground deposits have been encountered, the limited thickness of these soils should allow excavation and replacement, followed by 'routine' construction of the overlying embankment. Localised soft deposits encountered during the Preliminary Ground Investigation were less than 4.0m thick.
- 4.3.27 An assessment of the potential re-use of excavated materials from the proposed cuttings, and including the SUDS ponds, has been undertaken using the results from the Preliminary Ground Investigation. The results indicate that a significant proportion of the material will be acceptable in its present condition as a Class 1 (General Granular Fill) or Class 2 (General Cohesive Fill) material, as defined in the Manual of Contract Documents for Highways Works (MCHW) Volume 1 Specification for Highway Works, Series 600 Earthworks (The Highways Agency, Transport Scotland, Welsh Government and The Department for Regional Development Northern Ireland 2016). Of the remaining volumes of material it is anticipated that these could be rendered acceptable through modification using lime and/or cement, or through air drying to reduce the natural moisture content. Alternatively, some of the unacceptable material could be re-used as Class 4 (Landscape Fill). It is noted that the soils generally contain a significant silt content making them moisture susceptible, presenting limitations for earth working activities in unfavourable weather conditions.
- 4.3.28 As noted above, there are areas where Made Ground deposits may require to be excavated and replaced with suitable engineered fill where road construction is required or beneath the footprints of embankments. In other areas, where suitable, it may be possible to undertake in situ ground treatment, such as the installation of vibro stone columns, to improve the engineering properties of the Made Ground. It is possible that some of the excavated Made Ground could be re-used as general or landscape fill. An allowance has been made for a percentage of these materials to be re-used for the proposed Scheme, otherwise off-site disposal will be required.
- 4.3.29 With regard to any soft Alluvium or other soft deposits, these are not anticipated to be extensive and only localised removal is likely to be required beneath embankments or at grade sections of road to address this. It may be possible to modify these soils in situ with lime and/or cement to improve their engineering properties, avoiding the requirement to excavate and replace them.
- 4.3.30 With regard to the peat deposits, which occur mainly at Gollanfield, these are anticipated to be present mainly to the north of the proposed PS07 – A96 Gollanfield Rail Bridge, with more localised deposits of limited thickness, present on the south side. Consideration has been given to the removal of these deposits beneath the proposed underbridge and beneath the proposed A96 dual carriageway at this location, and replacement with suitable engineered fill. There is however, a potential risk to the Aberdeen to Inverness Railway Line as a result of this approach, assuming that the railway was built on the peat without removal (probably constructed on fascines, comprising bundles of brushwood, laid beneath the railway). Further ground investigation is proposed in this area to confirm this. To avoid this risk it has therefore been assumed at this stage that the peat will not be excavated in the vicinity of the railway and that the bridge foundations will be supported on piles extended beneath the peat. Similarly, the approach embankments, mainly affecting the embankment to the north of the railway, will also be piled, with the embankment supported on a load transfer platform. Beyond the approach embankments it is assumed that the peat will be excavated and replaced with engineered fill. It is unlikely that the peat will be acceptable for re-use on the proposed Scheme, except possibly as a topsoil substitute or for low height landscape bunds. Disposal of volumes of peat, either on or off site will be required.

Earthworks Volumes/Balance

- 4.3.31 A summary of the estimated earthworks quantities for the construction of the proposed Scheme is provided in Table 4.6. While it is a key aim of the design to utilise as high a proportion as practicable of 'site won' material for construction of embankments and for landscaping purposes, the requirement for the import of bulk earthworks materials is unavoidable for the proposed Scheme due to the cut fill balance. The higher import volumes are a result of the proposed Scheme design being generally formed on embankment as the existing topography is generally flat.

Table 4.6: Estimated Earthworks Quantities

Import/Export (disposal)	Volume (m ³)
Bulk earthworks materials required	5.162 million
Estimated "site won" bulk earthworks materials	2.365 million
Estimated earthworks materials import	2.887 million
Estimated earthworks for disposal	0.090 million

4.4 Drainage, Hydrology and Hydrogeology

General

4.4.1 The DMRB Stage 3 drainage design for the proposed Scheme has been designed in accordance with current design standards and good practices. The design standards used are:

- DMRB Volume 4, Section 2, Part 1, HA78/96, Design of Outfalls for Surface Water Channels (The Highways Agency, The Scottish Office Development Department, The Welsh Office and The Department of The Environment for Northern Ireland 1996) (hereafter referred to as HA78/96);
- DMRB Volume 4, Section 2, Part 1, HA103/06 – Vegetated drainage systems for Highways Runoff (The Highways Agency, Scottish Government, Welsh Assembly Government and The Department for Regional Development Northern Ireland 2006b) (hereafter referred to as HA103/06);
- DMRB Volume 4, Section 2, Part 1, HA106/04 Drainage of runoff from natural catchments (The Highways Agency, Scottish Government, Welsh Assembly Government and The Department for Regional Development Northern Ireland 2004a) (hereafter referred to as HA106/04);
- DMRB Volume 4, Section 2, Part 3, HD33/06, Surface and Sub-Surface Drainage Systems for Highways (The Highways Agency, Transport Scotland, Welsh Assembly Government and The Department for Regional Development Northern Ireland 2006c) (hereafter referred to as HD33/06);
- DMRB Volume 4, Section 2, Part 7, HA107/04, Design of Outfall and Culvert Details (The Highways Agency, Scottish Executive, Welsh Assembly Government and The Department for Regional Development Northern Ireland 2004b) (hereafter referred to as HA107/04);

4.4.2 Other standards and guidance used include:

- BRE Digest 365 Soakaway design (Building Research Establishment 2003);
- Flood Estimation Handbook (FEH) (Centre for Ecology & Hydrology (CEH) 2009).
- Flood Studies Report (FSR) (Natural Environment Research Council (NERC) 1975)
- Institute of Hydrology Report No.124 Flood estimation for small catchments (DCW Marshall & AC Bayliss 1994);
- Planning Advice Note (PAN) 79: Water and Drainage (Scottish Executive 2006);
- Scottish Environment Protection Agency (SEPA) Guidance Note 2: Planning advice on Sustainable Urban Drainage (SEPA 2010);
- SUDS for Roads (SUDS Working Party 2008);
- Sustainable urban Drainage Systems (SUDS) Manual C753 (Construction Information Research and Information Association (CIRIA) 2015); and
- Technical Flood Risk Guidance for Stakeholders (SEPA 2015).

4.4.3 The following key stakeholders have been consulted as part of the design process:

- Scottish Natural Heritage (SNH);
- SEPA; and
- The Highland Council.

- 4.4.4 The DMRB Stage 3 drainage design is based on the principle of providing two or three levels of treatment for carriageway runoff within each catchment which was agreed with SEPA. In general, this has been achieved through the use of filter drains, retention ponds, detention basins and swales.
- 4.4.5 The proposed SUDS systems for the outfalls from the proposed A96 dual carriageway would be designed with an impermeable liner to reduce any identified risk of pollution to groundwater, unless otherwise agreed with SEPA by the Contractor. The proposed SUDS for some selected local road drainage networks may infiltrate into the ground.
- 4.4.6 The proposed A96 dual carriageway and the local road network have separate drainage systems. This is good practice when designing drainage systems due to ownership and maintenance. The drainage system for the trunk road network will be owned and maintained by Transport Scotland, with the local road network owned and maintained by The Highland Council.

Drainage features

- 4.4.7 The following components are proposed to manage surface water run off:

Pre-earthworks drainage systems

- 4.4.8 Pre-earthworks drainage in the form of ditches will be constructed at the top of all cuttings and the base of all embankments where the slope height exceeds 1.0m. The purpose of the pre-earthworks drainage is to collect runoff from the natural catchments and convey overland flow to the nearest watercourse. Once operational this system does not require treatment or attenuation prior to discharge. The pre-earthworks drainage has been designed in accordance with HA106/04. The ditches are designed to a 1 in 75 year storm event and have a minimum depth of 600mm and freeboard of 150mm.
- 4.4.9 During the construction of the works, drainage situated at the base of embankments will potentially contain sediment and will require careful management.

Carriageway drainage systems (filter drains)

- 4.4.10 These collect surface water runoff from the main carriageway together with surface water runoff from cutting slopes and any sub-surface drainage present in areas of cutting. These systems typically comprise perforated pipes placed at the base of free draining stone material, through which the surface water filters to enter the pipe. This filtration process provides a first level of treatment in removing pollutants arising from the surface water runoff. All new road surface and hard-standing areas will be drained by a positive drainage system, which will convey water from all impermeable areas to carriageway drainage systems.

Trench soakaways

- 4.4.11 Soakaways will be used to disperse surface water from new local roads in locations where no existing positive drainage is evident. The infiltration rates have been calculated from ground investigations at the proposed locations. At locations where an investigation has not been undertaken an assumed infiltration rate has been used. A safety factor has been added to all locations based on guidance taken from SUDS for Roads (SUDS Working Party 2008).

Swales

- 4.4.12 Swales comprise a grassed ditch and occasionally incorporating a standard filter drain below the grassed ditch. This system provides a level of treatment as it removes pollutants arising from the proposed scheme from the surface water runoff. Swales can be incorporated into a treatment train in areas where cover to pipes is limited such as at the connection from retention pond to receiving watercourse.

Detention Basins

4.4.13 Detention basins are depressions which remain dry except after rainfall events. Detention basins also remove suspended solids and provide some filtration but to a lesser extent than retention ponds.

Retention Ponds

4.4.14 Retention ponds receive water from drainage systems immediately prior to discharge into the receiving watercourse. This component has two principal functions. Firstly, it is designed to reduce the rate at which water outfalls into the receiving watercourse to the pre-development discharge rate. The ponds are designed to attenuate the run-off rate from the carriageway drainage in events up to the 1:200 year to the 1:2 year pre-development run-off rate. This prevents the flow rate exceeding the existing flow rate. In addition, the ponds have sufficient freeboard above the maximum attenuated water level. The second principal function is to enable the removal of pollutants contained in sediment from the 'first flush' of carriageway runoff through settlement such that the quality of the water discharged is at an acceptable level in terms of the receiving watercourse. Ponds with permanent water are highly effective at treating runoff laden with winter rock salts, particularly applicable to Highland trunk roads. Retention pond locations and discharge watercourses are detailed on Figure 4.2.

Carriageway Drainage Networks

Proposed SUDS Networks – Dual Carriageway with discharge to SWF

4.4.15 The proposed dual carriageway and associated slip road catchments are defined by the high and low points along the road vertical alignment and the location of existing SWF. The SUDS proposals are summarised below:

- Minimum of two levels of treatment prior to outfall to SWF.
- First level of treatment is achieved by using filter drains to capture runoff at source. Proposed filter drains will run parallel to the carriageway.
- Second level of treatment is achieved by using a retention pond. The pond has an element of permanent water in addition to the attenuation storage volume required. All volumes include an additional 10% allowance for vegetation growth.
- A third level of treatment (polishing) will be provided where required for high sensitivity receiving SWFs and for ecological reasons, primarily to outfalls located to the east of the River Nairn. This will be achieved by constructing a grassed swale downstream from the pond, prior to final outfall.

4.4.16 The drainage networks developed for the proposed Scheme have been designed to accommodate a 1:1 year return period rainfall event without surcharging and 1:5 year return period rainfall event up to a maximum surcharge level of 400mm without impacting the formation layers of the road pavement.

4.4.17 Table 4.7, lists the 26 drainage networks on the proposed dual carriageway. The extent of each drainage network is shown on Figure 4.2.

Table 4.7: Dual Carriageway Drainage Network

Catchment Reference	Approx. A96 chainage	Road Name	Approx. catchment size (ha.)	Proposed number of treatment levels	Receiving Watercourse
Network A	1250	Proposed dual carriageway	1.01	Two	SWF 02 - Scretan Burn
Network B	1300	Proposed dual carriageway	1.42	Two	SWF 02 - Scretan Burn
Network C	1700	Proposed dual carriageway	3.62	Two	SWF 02 - Scretan Burn
Network D	2250	Proposed dual carriageway	1.67	Two	SWF 03 - Cairnlaw Burn
Network E	2400	Proposed dual carriageway	1.48	Two	SWF 03 - Cairnlaw Burn
Network F	2850	Proposed dual carriageway	5.03	Two	SWF 06 – Kenneth's Black Well

Catchment Reference	Approx. A96 chainage	Road Name	Approx. catchment size (ha.)	Proposed number of treatment levels	Receiving Watercourse
Network G	5000	Proposed dual carriageway	3.82	Two	SWF 08 - Fiddler's Burn
Network H	6250	Proposed dual carriageway	2.96	Two	SWF 09 – Tributary of Rough Burn
Network I	6350	Proposed dual carriageway	2.99	Two	SWF 09 – Tributary of Rough Burn
Network J	8450	Proposed dual carriageway	2.17	Two	SWF 13 – Tributary of 'Unnamed Burn – Castle Stuart to source (Tornagrain)' (1)
Network K	8800	Proposed dual carriageway	1.01	Two	SWF 13 – Tributary of 'Unnamed Burn – Castle Stuart to source (Tornagrain)' (1)
Network L	10100	Proposed dual carriageway	3.01	Two	SWF 16 – Tributary of Ardersier Burn
Network V	10250	Proposed dual carriageway	3.64	Three	SWF 16 – Tributary of Ardersier Burn
Network M	10900	Proposed dual carriageway	4.85	Two	SWF 16 – Tributary of Ardersier Burn
Network N	12850	Proposed dual carriageway	5.11	Two	SWF 18 – Indirect tributary drains of Ardersier Burn
Network O	15750	Proposed dual carriageway	4.92	Three	SWF 19 – Balnagowan Burn
Network P	16950	Proposed dual carriageway	1.58	Two	SWF 19 – Balnagowan Burn
Network Q	17050	Proposed dual carriageway	8.19	Two	SWF 19 – Balnagowan Burn
Network R	19850	Proposed dual carriageway	2.99	Two	SWF 22 – Alton Burn
Network S	22200	Proposed dual carriageway	4.26	Three	SWF 23 – River Nairn
Network T	23350	Proposed dual carriageway	2.38	Three	SWF 24 – Tributary of the River Nairn
Network U	23450	Proposed dual carriageway	6.53	Three	SWF 24 – Tributary of the River Nairn
Network W	25900	Proposed dual carriageway	2.32	Three	SWF 26 – Auldearn Burn
Network X	26600	Proposed dual carriageway	1.97	Three	SWF 26 – Auldearn Burn
Network Y	26800	Proposed dual carriageway	3.46	Three	SWF 26 – Auldearn Burn
Network Z	28900	Proposed dual carriageway	5.93	Three	SWF 35 – Drain, tributary of Auldearn Burn - Brightmony Tributary

Proposed SUDS Networks – Local Roads discharging to existing positive drainage

4.4.18 The local road catchments, for local road diversions or new local roads required as part of the scheme, are defined by the high and low points along the road vertical alignment and the location of existing surface water drainage networks. The local road catchment areas are shown on Figure 4.3. The SUDS proposals for the local roads connecting to existing drainage networks are summarised below:

- Provide one level of treatment where outfall connects to existing surface water drainage network. This can only be achieved if there is positive drainage at the tie-in point.
- First level of treatment is achieved by using filter drains parallel to the carriageway to capture runoff at source. This is considered sufficient to match or better the treatment level provided by the current drainage network. If a further level of treatment is required this could be achieved by installing a bypass separator prior to connection to the existing surface water drainage network.

- Analysis of existing network and identification of peak discharge rate. A Flow Control Device (could be an orifice for small networks) will be incorporated to limit discharge at point of connection to existing network at 5 year peak flow or to 5 l/s whichever is higher. Attenuation to be sized for 30 year return period.
- Comply with SEPA General Binding Rule (GBR) 11 'Discharge into a surface water drainage system' as defined in The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended) – A Practical Guide (SEPA 2011)

4.4.19 The local road networks in Table 4.8 are proposed to connect into the existing networks pending agreement from The Highland Council.

Table 4.8: Local Road Drainage Networks with a Connection to an Existing Network

Catchment Reference	Approx. A96 chainage	Road Name	Approx. catchment size (ha.)	Proposed number of treatment levels	Method of discharge
SRa	4800	Balloch Junction West Link (existing A96)	0.192	One	Existing network
SRb	5300	Balloch Junction East Link (existing A96)	0.177	One	Existing network
SRe	9600	Dalcross Station Road (C1020)	0.168	One	Existing network
SRf	10500	Kerrowgair – Croy Road (C1017)	0.411	One	Existing network
SRg	13700	Brackley Junction West Link (existing A96)	0.455	One	Existing network
SRj	14400	Brackley Junction East Link (existing A96)	0.365	One	Existing network
SRI	15050	Gollanfield Overbridge West Link (existing A96)	0.147	One	Existing network
SRn	15500	New Gollanfield Retention Pond Access Track	0.095	One	Existing network
SRr	17700	Nairn West Junction West Link (existing A96)	0.206	One	Existing network
SRt	18300	Nairn West Junction East Link (existing A96)	0.586	One	Existing network
SRag	28900	Courage Overbridge (existing A96)	0.339	One	Existing network
SRAi	29100	Courage Overbridge (existing A96)	0.580	One	Existing network
SRAj	30500	Hardmuir Link Road (existing A96)	0.498	One	Existing network

Proposed SUDS Networks – Local Roads with discharge to ground

4.4.20 The location of the local roads with discharge to ground are shown on Figure 4.3. The SUDS proposals for these roads are summarised below:

- Minimum of two levels of treatment prior to outfall to ground.
- First level of treatment is achieved by using filter drains to capture runoff at source. Filter drains will run parallel to the carriageway.
- Second level of treatment is achieved by using an infiltration trench.
- The infiltration trenches are to be 1.5m in depth and 2.0m in width. The length of the infiltration trenches is variable and dependant on the total area drained. Where the trenches are of excessive length the width is assumed to increase and to form a drainage field closed circuit of parallel perforated pipes with 1.0m minimum spacing between each pipe.

- Infiltration is based on an assumed rate of 3.30×10^{-5} m/s with a safety factor of 3 as 'SUDS for Road'.
- Comply with SEPA GBR10 'Discharge of surface water run-off from a surface water drainage system to the water environment from construction sites, buildings, roads, yards and any other built-up areas'.

4.4.21 Table 4.9 lists the new proposed local road drainage networks which will outfall to an infiltration system.

Table 4.9: Local Road Drainage Networks with Outfall to Infiltration System

Catchment Reference	Approx. A96 chainage	Road Name	Approx. catchment size (ha.)	Proposed number of treatment levels	Method of discharge
SRal	2200	New Stratton Lodge Road (U1058)	0.345	Two	Infiltration
SRak	2500	New Stratton Lodge Road (U1058)	0.213	Two	Infiltration
SRc	5100	Balmachree Access Track	0.185	Two	Infiltration
SRd	9600	New Dalcross Station Road (C1020)	0.135	One	Infiltration
SRan	13600	New Milton of Breachlich Road (U1025)	0.084	Two	Infiltration
SRao	13700	New Milton of Breachlich Road (U1025)	0.104	Two	Infiltration
SRh	14100	New B9006 Milburn Roundabout – Culcabock – Castle Hill – Culloden Moor – Croy – Gollanfield – Fort George Road	0.303	Two	Infiltration
SRi	14100	New B9006 Milburn Roundabout – Culcabock – Castle Hill – Culloden Moor – Croy – Gollanfield – Fort George Road	0.435	Two	Infiltration
SRk	15300	New Gollanfield Road (C1013)	0.210	Two	Infiltration
SRm	15300	New Gollanfield Road (C1013)	0.153	Two	Infiltration
SRo	15700	New Easter Glackton Quarry Access	0.688	Two	Infiltration
SRp	16300	New Easter Glackton Quarry Access	0.258	Two	Infiltration
SRap	17100	New Tomhommie – Ballinreich – Balnagowan Road (U1029)	0.165	Two	Infiltration
SRq	17500	New Cockhill Access Road	0.083	Two	Infiltration
SRs	18200	Nairn West Junction North Link (McDermotts Road (U2218))	0.216	Two	Infiltration
SRu	19000	Proposed B9091 to C1163 Link Road	0.777	Two	Infiltration
SRaa	21200	Proposed B9090 to B9091 Link Road	1.272	Two	Infiltration
SRv	21600	Proposed B9091 to C1163 Link Road	1.002	Two	Infiltration
SRw	21800	Proposed B9091 to C1163 Link Road	0.179	Two	Infiltration

Catchment Reference	Approx. A96 chainage	Road Name	Approx. catchment size (ha.)	Proposed number of treatment levels	Method of discharge
SRx	22000	New Moss -side – Mosshall – Broadley Road (C1170)	0.297	Two	Infiltration
SRz	22000	New B9090 Loch Flemington – Clephanton – Cawdor – Nairn Road	0.366	Two	Infiltration
SRy	22200	New B9090 Loch Flemington – Clephanton – Cawdor – Nairn Road	0.411	Two	Infiltration
SRab	22900	New Househill – Raitloan – Howford Road (C1175)	0.407	Two	Infiltration
SRac	23800	New A939 Tomintoul – Grantown on Spey – Nairn Road	0.35	Two	Infiltration
SRad	23800	New A939 Tomintoul – Grantown on Spey – Nairn Road	0.153	Two	Infiltration
SRae	25800	New B9111 Auchnacloch – Auldearn Road	0.298	Two	Infiltration
SRaf	27400	New Auldearn – Station – Drum Road (C1172)	0.707	Two	Infiltration
SRah	29100	Courage Access Road	0.107	Two	Infiltration
Sraq	30150	Hardmuir of Boath Access Track	0.098	Two	Infiltration

Private Accesses

- 4.4.22 Drainage for private access tracks will be based on the catchment size and anticipated traffic level of each access. All private access tracks will have a minimum one level of treatment provided.

Watercourse Crossings

- 4.4.23 The impact of the proposed Scheme on the alignment of existing SWFs has been assessed and realignment of watercourses is proposed where required. Structural culverts will be located where the proposed alignment crosses a watercourse to convey the flow under the carriageway. Where existing structural culverts are to remain in place they are to be extended in length to cater for the additional width of the proposed alignment. Details of the proposed culverted watercourse crossings together with any proposed realignment are detailed in Table 4.10. Structure details are included in Section 4.6 and shown on Figure 1.3. Watercourses are also detailed on Figure 4.2.

Table 4.10: Watercourse Crossings

Watercourse	Culvert Reference	Watercourse Realignment
SWF 02 – Scretan Burn	C02 Scretan Burn Culvert	Yes
SWF 03 – Cairnlaw Burn	C03 Cairnlaw Burn Culvert No 1	No
SWF 03 – Cairnlaw Burn	C04 Cairnlaw Burn Culvert No 2	Yes
SWF 04 – Tributary of Cairnlaw Burn (1)	N/A	No
SWF 05 – Tributary of Cairnlaw Burn (2)	N/A	Yes
SWF 06 – Kenneth's Black Well	C05 Kenneth's Black Well Culvert	Yes
SWF 06 – Kenneth's Black Well	C26 Milton of Culloden Culvert No 1	No
SWF 06 – Kenneth's Black Well	C27 Milton of Culloden Culvert No 2	No
SWF 06 – Kenneth's Black Well	C29 Milton of Culloden Culvert No 4	No
SWF 06 – Kenneth's Black Well	C30 Milton of Culloden Culvert No 5	No
SWF 07 – Drain at Allanfearn	C06 Allanfearn Drain Culvert	Yes
SWF 08 – Fiddler's Burn	C07 Fiddler's Burn Culvert	Yes

Watercourse	Culvert Reference	Watercourse Realignment
SWF 09 – Tributary of Rough Burn	C08 Newton Burn Tributary Culvert	No
SWF 10 – Indirect tributary of Rough Burn (1)	N/A	No
SWF 11 – Indirect tributary of Rough Burn (2)	N/A	No
SWF 12 – Rough Burn	C09 Rough Burn Culvert	Yes
SWF 13 – Tributary of 'Unnamed Burn – Castle Stuart to source (Tornagrain)' (1)	C10 Kerrowaird Culvert	No
SWF 14 – Unnamed Burn – Castle Stuart to source (Tornagrain)	C11 Tornagrain Farm Culvert	No
SWF 15 – Tributary of 'Unnamed Burn – Castle Stuart to source (Tornagrain)' (2)	C12 Tornagrain Wood Culvert	No
SWF 16 – Tributary of Ardersier Burn	C13 Dalcross Culvert	No
SWF 17 – Drains at Culblair	C22 Culblair Culvert	No
SWF 18 – Indirect tributary drains of Ardersier Burn	C15 Drumine Drain Culvert No 1	Yes
SWF 18 – Indirect tributary drains of Ardersier Burn	C16 Drumine Drain Culvert No 2	Yes
SWF 19 – Balnagowan Burn	C17 Blackcastle Culvert	No
SWF 19 – Balnagowan Burn	C23 Cranford Culvert	No
SWF 21 – Field ditch tributaries of Balnagowan Burn	N/A	No
SWF 22 – Alton Burn	C18 Alton Burn Culvert No1	No
SWF 23 – River Nairn	N/A	No
SWF 24 – Tributary of the River Nairn	C19 Knocknagillan Culvert	No
SWF 26 – Auldearn Burn	C20 Auldearn Burn Culvert	Yes
SWF 29 – Tributary of Auldearn Burn (2)	N/A	No
SWF 31 – Auldearn Burn – Brightmony Tributary	N/A	No
SWF 33 – Drain at Penick Farm	N/A	No
SWF 34 – Tributary of Auldearn Burn (4)	N/A	No
SWF 35 – Drain, tributary of Auldearn Burn - Brightmony Tributary	N/A	No

4.4.24 The potential impacts of the proposed Scheme on the local SWF have been identified and detailed in Chapter 13 (Road Drainage and the Water Environment) of the Environmental Statement.

4.5 Public Utilities

General

4.5.1 Public utility companies were contacted in accordance with the New Roads and Street Works Act 1991 (NRSWA) to identify locations of existing plant and details of preliminary proposals for diversions and budget costs. The following public utility companies own apparatus that conflict with the proposed Scheme requiring diversionary and/or protection measures to be provided prior to and during construction.

4.5.2 At this stage, NRSWA C3 budget estimates have been provided by each of the following companies who own apparatus that conflicts with the proposed Scheme. A NRSWA C4 detailed estimate will allow for a more detailed design of utility apparatus protection or diversionary works to be undertaken in advance of the proposed Scheme construction.

BT

4.5.3 Underground BT cables run adjacent to the existing A96 across most of the study area. There is a 2km section near Auldearn where the apparatus is located adjacent to the B9111 Auchnacloch – Auldearn Road through the village of Auldearn and south of the existing A96. There are additional cable locations along many of the existing major local roads.

- 4.5.4 Based on the information provided by BT as part of the NRSWA C3 estimate there are 58 existing underground cables and two overhead cables proposed to be diverted or protected as part of the works. BT has confirmed that Fibre Optic cables are present within the extents of the proposed Scheme; however, details of the exact locations have yet to be disclosed.

Scottish Water

- 4.5.5 There are Scottish Water supplies across the proposed Scheme area including a water main which runs adjacent to the existing A96 between Upper Cullernie Farm and Brackley. There are also several mains located in both fields and local roads which cross the existing A96 and branches which divert away from the main supply pipes, providing water to small communities and isolated residential properties.
- 4.5.6 Based on the C3 information received, there are 36 clean water supply pipes and 11 sewage pipes to be diverted as part of the proposed Scheme.

SSE

- 4.5.7 There are SSE cables located on, or in the vicinity of, many of the roads throughout the proposed Scheme. Existing SSE apparatus is located mainly in fields and crosses the existing A96 at several locations within the study area.
- 4.5.8 There is an existing 132kV overhead transmission line in the vicinity of the SWF 23 - River Nairn at ch22600. SSE have completed investigatory work to confirm that there is adequate clearance between the existing overhead line and the proposed A96 road level in order to avoid the need to undertake diversionary works for this major transmission line.
- 4.5.9 There are 34 SSE distribution cables (11kV and 33kV) to be diverted or protected as part of the works. There are also 14 diversions involving the SSE telecommunications equipment.

SGN

- 4.5.10 A Local High Pressure Gas Main (LHPG) runs adjacent to the Aberdeen to Inverness Railway Line to the north of the existing A96 between Inverness and Milton of Culloden before crossing the existing A96 at Milton of Culloden. The LHPG pipe then travels in a generally easterly direction, and continues to remain south of the existing A96, terminating at a point approximately 750m east of Tornagrain. An intermediate pressure gas pipe is located adjacent to the existing A96 between Inverness and Tornagrain.
- 4.5.11 The LHPG pipeline runs parallel to the proposed Scheme between Smithton and Kerrowaird crossing proposed Scheme roads at six locations. Each of these locations requires diversionary or protection measure to be put in place. It is anticipated that diversionary and protection works for the LHPG pipeline would be carried out by SGN as advance works prior to the land being made available for the main works contract.
- 4.5.12 In addition to the above there are eight Intermediate Pressure (IP), four Medium Pressure (MP) and two Low Pressure (LP) gas pipeline locations where diversionary or protection measures will be required as part of the works.

CLH Pipeline System (CLH-PS)

- 4.5.13 The CLH-PS fuel pipeline runs east from Inverness through the study area in a generally north-easterly direction, and is affected by the proposed Scheme at a number of locations. Within the study area, the fuel pipeline generally sits to the south of the existing A96 with only a few sections present to the north. Diversionary or protection measures are proposed at seven locations.
- 4.5.14 The CLH-PS and SGN Local High Pressure Gas (LHPG) routes cross or run adjacent to each other at Milton of Culloden, Allanfearn and Upper Cullernie. Due to the nature of the utilities involved the phasing of the diversions is critical in ensuring the safe completion of construction.

Vodafone

- 4.5.15 There are 10 locations where diversionary or protection measures associated with Vodafone apparatus will be required within the extents of the proposed Scheme.

4.6 Structures

- 4.6.1 Structures proposals have been developed in accordance with DMRB standards and Eurocodes. Twenty-five principal structures are required as part of the proposed Scheme, including new NMU and farm access underpasses. In addition, 24 new culverts will be provided to carry the proposed Scheme over local watercourses.

- 4.6.2 The verge and central reserve widths stated for each structure below are the minimum anticipated requirements. Additional width may be necessary to provide the required forward stopping or overtaking sight distance in accordance with standards and any relaxations or departures from standards incorporated into the design.

Smithton Junction Underbridge (PS01)

- 4.6.3 The structure will carry the proposed A96 dual carriageway over Smithton Junction and is proposed to be a single span portal type structure with a clear span of approximately 36m between half-height abutment walls. The superstructure could comprise either precast prestressed concrete beam and slab or steel composite construction supported on a cast in situ reinforced concrete substructure.
- 4.6.4 The proposed A96 dual carriageway is proposed to be two 7.3m wide carriageways with two 1.0m wide hard strips, a 2.5m minimum wide central reserve and two 2.5m minimum wide verges.
- 4.6.5 The road cross section below the structure is proposed to be a 10.65m minimum wide single carriageway, a 3.0m NMU shared use path on each side of the carriageway and a 0.5m wide segregation between the carriageway and shared use path.
- 4.6.6 A parapet will be provided over the structure on each side. The parapet is likely to be a 1.0m high N2 parapet. In addition, noise barriers will be provided behind each parapet.

Milton of Culloden NMU Underpass (PS24)

- 4.6.7 The structure will carry the proposed A96 dual carriageway over the NMU shared use path connection at Milton of Culloden and is proposed to be a single span cast in situ reinforced concrete box structure.
- 4.6.8 The proposed A96 dual carriageway is proposed to be two 7.3m wide carriageways with two 1.0m wide hard strips, a 2.5m minimum wide central reserve and two 2.5m minimum wide verges.
- 4.6.9 The cross section through the structure is proposed to be a 3.0m wide NMU route with two 0.5m wide verges with a minimum headroom of 2.7m.
- 4.6.10 A safety barrier will be provided over the structure in the outer verges. The safety barrier is likely to be an N2 barrier.

Balloch Junction Underbridge (PS02)

- 4.6.11 The structure will carry the proposed A96 dual carriageway over Balloch Junction and is proposed to be a single span portal type structure with a clear span of approximately 35m between half-height abutment walls. The superstructure will comprise either precast prestressed concrete beam and slab or steel composite construction supported on a cast in situ reinforced concrete substructure.
- 4.6.12 The proposed A96 dual carriageway is proposed to be two 7.3m wide carriageways with two 1.0m wide hard strips, a 2.5m minimum wide central reserve and two 2.5m minimum wide verges.

- 4.6.13 The road cross section below the structure is proposed to be a 7.3m minimum wide single carriageway, two 1m wide hard strips, a 3.0m NMU shared use path on each side of the carriageway and a 0.5m wide segregation between the carriageway and NMU shared use path.
- 4.6.14 A parapet will be provided over the structure on each side. The parapet is likely to be a 1.0m high N2 parapet.

Morayston Farm Access Underpass (PS23)

- 4.6.15 The structure will carry the proposed A96 dual carriageway over the farm access track at Morayston and is proposed to be a single span cast in situ reinforced concrete box structure.
- 4.6.16 The proposed A96 dual carriageway is proposed to be two 7.3m wide carriageways with two 1.0m wide hard strips, a 2.5m minimum wide central reserve and two 2.5m minimum wide verges and a 2.5m wide NMU shared use path with two 0.5m wide verges on the south side.
- 4.6.17 The road cross section through the structure is proposed to be a 3.3m wide single carriageway with two 1.0m wide verges with a minimum headroom of 5.3m.
- 4.6.18 A safety barrier will be provided over the structure in the outer verges. The safety barrier is likely to be an N2 barrier.

A96 Kerrowaird Underbridge (PS03)

- 4.6.19 The structure will carry the proposed A96 dual carriageway over the existing A96 at Kerrowaird and is proposed to be a single span portal type structure with a clear square span of approximately 34m between three quarter height abutment walls. The superstructure will comprise either precast prestressed concrete beam and slab or steel composite construction supported on a cast in situ reinforced concrete substructure.
- 4.6.20 The proposed A96 dual carriageway is proposed to be two 7.3m wide carriageways with two 1.0m wide hard strips, a 2.5m minimum wide central reserve and two 2.5m minimum wide verges.
- 4.6.21 The existing A96 below the structure is proposed to be a 7.3m wide single carriageway plus two 2.0m minimum wide verges.
- 4.6.22 A parapet will be provided over the structure on each side. The parapet is likely to be a 1.0m high N2 parapet.

Dalcross Station Road (C1020) Overbridge (PS04)

- 4.6.23 The structure will carry the Dalcross Station Road (C1020) over the proposed dual carriageway and is proposed to be a three span continuous precast concrete beam and slab deck on reinforced concrete substructure.
- 4.6.24 The proposed A96 dual carriageway is proposed to be two 7.3m wide carriageways with two 1.0m wide hard strips, a 2.5m minimum wide central reserve and two 2.5m minimum wide verges and a 2.5m wide NMU shared use path with two 0.5m wide verges on the south side.
- 4.6.25 The road cross section over the structure is proposed to be a 3.3m wide single carriageway and two 2m wide verges.
- 4.6.26 A parapet will be provided over the structure on each side. The parapet is likely to be a 1.0m high N2 parapet.

Mid Coul Junction Overbridge (PS05)

- 4.6.27 The structure will carry the Mid Coul Junction link road over the proposed A96 dual carriageway and is proposed to be a three span continuous precast concrete beam and slab deck on reinforced concrete substructure.
- 4.6.28 The proposed A96 dual carriageway is proposed to be two 7.3m wide carriageways with two 1.0m wide hard strips, a 2.5m minimum wide central reserve and a 2.5m minimum wide verge on the north side. In addition, a westbound on-slip and a 2.5m wide NMU shared use path with two 0.5m wide verges are provided on the south side.
- 4.6.29 The road cross section over the structure is proposed to be a 7.3m wide single carriageway and two 2.5m wide NMU shared use paths each with two 0.5m wide verges on each side.
- 4.6.30 A parapet will be provided over the structure on each side. The parapet is likely to be a 1.4m high N2 parapet.

Mid Coul Junction NMU Underpass (PS26)

- 4.6.31 The structure will carry the westbound off and on slip roads over the NMU shared use path at Mid Coul Junction and is proposed to be a single span cast in situ reinforced concrete box structure.
- 4.6.32 The slip roads over the structure is proposed to be dual 3.7m wide slip roads with two 0.7m wide hard strips, a 3.0m minimum wide central reserve and two 2.0m minimum wide verges.
- 4.6.33 The cross section through the structure is proposed to be a 2.5m wide NMU shared use path plus two 0.5m wide verges.
- 4.6.34 A safety barrier will be provided over the structure in the outer verges. The safety barrier is likely to be an N2 barrier.

Brackley Junction Overbridge (PS06)

- 4.6.35 The structure will carry the Brackley Junction link road over the proposed A96 dual carriageway and is proposed to be a three span continuous precast concrete beam and slab deck on reinforced concrete substructure.
- 4.6.36 The proposed A96 dual carriageway is proposed to be two 7.3m wide carriageways with two 1.0m wide hard strips and a 2.5m minimum wide central reserve. In addition, an eastbound on-slip with a 3.7m wide lane, 3.3m wide hard shoulder, 0.7m wide hard strip and 2.0m wide verge is provided on the north side and a westbound on-slip with a 3.7m wide lane, 3.3m wide hard shoulder, 0.7m wide hard strip and a 2.5m wide NMU shared use path with two 0.5m wide verges are provided on the south side.
- 4.6.37 The road cross section over the structure is proposed to be a 6.0m wide single carriageway, a 2.5m wide NMU shared use path with two 0.5m wide verges on the east side and a 2.0m minimum wide verge on the west side.
- 4.6.38 A parapet will be provided over the structure on each side. The parapet is likely to be a 1.4m high N2 parapet on the east side and a 1.0m high N2 parapet on the west side.

Gollanfield Road (C1013) Overbridge (PS21)

- 4.6.39 The structure will carry the Gollanfield Road (C1013) over the proposed A96 dual carriageway and is proposed to be a three span continuous precast concrete beam and slab deck on reinforced concrete substructure.
- 4.6.40 The proposed A96 dual carriageway is proposed to be two 7.3m wide carriageways with two 1.0m wide hard strips, a 2.5m minimum wide central reserve and two 2.5m minimum wide verges.

- 4.6.41 The road cross section over the structure is proposed to be a 5.5m wide single carriageway, a 2.5m wide NMU shared use path with two 0.5m wide verges on the east side and a 2.0m minimum wide verge on the west side.
- 4.6.42 A parapet will be provided over the structure on each side. The parapet is likely to be a 1.4m high N2 parapet.

A96 Gollanfield Rail Bridge (PS07)

- 4.6.43 The structure will carry the proposed A96 dual carriageway over the Aberdeen to Inverness Railway Line and is proposed to be a single span portal type structure with a clear square span of approximately 15.5m between full height abutment walls to accommodate a future doubling of the existing single line track and 4.5m minimum clearance from the outer rails to the adjacent abutment walls. The superstructure will comprise precast prestressed concrete beam and concrete infill construction supported on a cast in situ reinforced concrete substructure. The structure will span across the railway at a skew of approximately 20 degrees to optimise the span length and construction depth.
- 4.6.44 The proposed A96 dual carriageway is proposed to be two 7.3m wide carriageways with two 1.0m wide hard strips, a 2.5m minimum wide central reserve, a 2.5m minimum wide verge on the north side and a 2.5m wide NMU shared use path with two 0.5m wide verges on the south side.
- 4.6.45 A parapet will be provided over the structure parallel to the proposed A96 dual carriageway. The parapet is likely to be a 1.5m high H4a parapet. In addition, pedestrian protection will also be provided around the skew ends of the structure.

Nairn West Junction Overbridge (PS10)

- 4.6.46 The structure will carry the Nairn West Junction link road over the proposed A96 dual carriageway and is proposed to be a three span continuous precast concrete beam and slab deck on reinforced concrete substructure.
- 4.6.47 The proposed A96 dual carriageway is proposed to be two 7.3m wide carriageways with two 1.0m wide hard strips, a 2.5m minimum wide central reserve and a 2.5m minimum wide verge on the south side. In addition, an eastbound on-slip with a 7.0m wide carriageway and 2.0m wide verge and 0.7m wide hard strip is provided on the north side.
- 4.6.48 The road cross section over the structure is proposed to be a 7.3m wide single carriageway, a 2.5m wide NMU shared use path with two 0.5m wide verges on the east side and a 2.5m minimum wide verge on the west side.
- 4.6.49 A parapet will be provided over the structure on each side. The parapet is likely to be a 1.4m high N2 parapet on the east side and a 1.0m high N2 parapet on the west side.

Moss-Side A96 Rail Bridge (PS12)

- 4.6.50 The structure will carry the proposed A96 dual carriageway over the Aberdeen to Inverness Railway Line and is proposed to be a single span portal type structure with a clear square span of approximately 16m between full height abutment walls to accommodate a future doubling of the existing single line track and 4.5m minimum clearance from the outer rails to the adjacent abutment walls. The superstructure will comprise precast prestressed concrete beam and concrete infill construction supported on a cast in situ reinforced concrete substructure. The structure will span across the railway at a skew of approximately 20 degrees to optimise the span length and construction depth.
- 4.6.51 The proposed A96 dual carriageway is proposed to be two 7.3m wide carriageways with two 1.0m wide hard strips, a 2.5m minimum wide central reserve and two 2.5m minimum wide verges.

- 4.6.52 A parapet will be provided over the structure parallel to the proposed A96 dual carriageway. The parapet is likely to be a 1.8m high H4a parapet. In addition, pedestrian protection will also be provided around the skew ends of the structure.

Moss-Side C1163 Rail Bridge (PS12A)

- 4.6.53 The structure will carry the proposed B9091 to C1163 Link Road over the Aberdeen to Inverness Railway Line and is proposed to be a single span portal type structure with a clear square span of approximately 16m between full height abutment walls to accommodate a future doubling of the existing single line track and 4.5m minimum clearance from the outer rails to the adjacent abutment walls. The superstructure will comprise precast prestressed concrete beam and concrete infill construction supported on a cast in situ reinforced concrete substructure.
- 4.6.54 The proposed B9091 to C1163 Link Road is will be a 6.0m wide single carriageway with a 2.0m minimum wide verge on the west side and a 2.5m wide NMU shared use path with 1.5m and 0.5m wide verges on the north side.
- 4.6.55 A parapet will be provided over the structure on each side. The parapet is likely to be a 1.8m high H4a parapet.

Moss-Side NMU Underpass (PS25)

- 4.6.56 The structure will carry the proposed A96 dual carriageway and the proposed B9091 to C1163 Link Road over the NMU shared use path connection at Moss-Side and is proposed to be a single span cast in situ reinforced concrete box structure.
- 4.6.57 The proposed A96 dual carriageway is proposed to be dual 7.3m wide carriageways with two 1.0m wide hard strips, a 2.5m minimum wide central reserve and two 2.5m minimum wide verges. The proposed B9091 to C1163 Link Road is proposed to be a 6.0m wide single carriageway with a 2.0m minimum wide verge on the south side and a 2.5m wide NMU shared use path with 1.5m and 1.3m wide verges on the east side.
- 4.6.58 The cross section through the structure is proposed to be a 2.5m wide NMU shared use path plus two 0.5m wide verges. In addition, a 4.0m wide farm access track will be provided through the structure on the east side, being separated from the NMU shared use path by a 1.4m high wall.
- 4.6.59 A safety barrier will be provided over the structure in the outer verges. The safety barrier is likely to be a N2 safety barrier. The superstructure will comprise precast prestressed concrete beam and concrete infill construction supported on a cast in situ reinforced concrete substructure.

B9090 Overbridge (PS13)

- 4.6.60 The structure will carry the New B9090 Loch Flemington – Clephanton – Cawdor – Nairn Road over the proposed A96 dual carriageway and is proposed to be a three span continuous precast concrete beam and slab deck on reinforced concrete substructure.
- 4.6.61 The proposed A96 dual carriageway is proposed to be two 7.3m wide carriageways with two 1.0m wide hard strips, a 2.5m minimum wide central reserve and two 2.5m minimum wide verges.
- 4.6.62 The road cross section over the structure is proposed to be a 6.0m wide single carriageway and two 2.0m minimum wide verges.
- 4.6.63 A safety barrier will be provided over the structure on each side. The safety barrier is likely to be a 1.0m high N2 parapet.

River Nairn Underbridge (PS14)

- 4.6.64 The structure will carry the proposed A96 dual carriageway over the River Nairn and is proposed to be a three span steel composite superstructure on reinforced concrete substructure.

- 4.6.65 The proposed A96 dual carriageway is proposed to be two 7.3m wide carriageways with two 1.0m wide hard strips, a 2.5m minimum wide central reserve, a 2.5m minimum wide verge on the south side and a 2.5m wide NMU shared use path with two 0.5m verges on the north side.
- 4.6.66 The River Nairn will pass below the eastern end span and a link will be provided adjacent to the east abutment to connect the existing right of way along the east bank of the river below the bridge.
- 4.6.67 A parapet will be provided over the structure on both sides. The parapet is likely to be a 1.0m high N2 parapet on the south side and a 1.4m high N2 parapet on the north side in conjunction with a noise barrier which will be provided behind the parapet.

C1175 Underbridge (PS15)

- 4.6.68 The structure will carry the proposed A96 dual carriageway over the New Househill – Raitloan – Howford Road (C1175) and is proposed to be a single span cast in situ reinforced concrete box structure.
- 4.6.69 The proposed A96 dual carriageway is proposed to be two 7.3m wide carriageways with two 1.0m wide hard strips, a 2.5m minimum wide central reserve and two 2.5m minimum wide verges.
- 4.6.70 The road cross section through the structure is proposed to be a 3.3m wide single carriageway with two 2.0m wide verges.
- 4.6.71 A safety barrier will be provided in the outer verges. The safety barrier is likely to be a N2 safety barrier.

A939 Overbridge (PS16)

- 4.6.72 The structure will carry the New A939 Tomintoul – Granttown on Spey – Nairn Road over the proposed A96 dual carriageway and is proposed to be a three span continuous precast concrete beam and slab deck on reinforced concrete substructure.
- 4.6.73 The proposed A96 dual carriageway is proposed to be two 7.3m wide carriageways with two 1.0m wide hard strips, a 2.5m minimum wide central reserve and two 2.5m minimum wide verges.
- 4.6.74 The road cross section over the structure is proposed to be a 6.0m wide single carriageway and two 2.0m wide verges.
- 4.6.75 A parapet will be provided over the structure on each side. The parapet is likely to be a 1.0m high N2 parapet.

B9111 Underbridge (PS22)

- 4.6.76 The structure will carry the proposed A96 dual carriageway and the eastbound diverge slip road and westbound merge slip road of the Nairn East Junction over the New B9111 Auchnacloch – Auldearn Road and is proposed to be twin single span portal type structures with a clear span of approximately 25m between half-height abutment walls. The superstructures will comprise precast prestressed concrete beam and slab construction supported on a cast in situ reinforced concrete substructure.
- 4.6.77 The proposed A96 dual carriageway is proposed to be two 7.3m wide carriageways with two 1.0m wide hard strips, a 2.5m minimum wide central reserve and two 2.5m minimum wide verges. The eastbound off ramp is proposed to be a 7.0m wide carriageway and 2.5m wide verge and 0.7m wide hard strip whilst the westbound on ramp is proposed to be a 7.0m wide carriageway and 2.0m wide verge and 0.7m wide hard strip.
- 4.6.78 The road cross section through the structure is proposed to be a 6.0m wide single carriageway with a 2.0m wide verge on the east side and a 2.5m wide NMU shared use path with two 0.5m verges on the west side.

- 4.6.79 A parapet will be provided over the structure on each side. The parapet is likely to be a 1.0m high N2 parapet.

Nairn East Junction Underbridge (PS17)

- 4.6.80 The structure will carry the proposed A96 dual carriageway over Nairn East Junction Link Road and is proposed to be a single span portal type structure with a clear span of approximately 40m between half-height abutment walls. The superstructure will comprise steel composite construction supported on a cast in situ reinforced concrete substructure.
- 4.6.81 The proposed A96 dual carriageway is proposed to be two 7.3m wide carriageways with two 1.0m wide hard strips, a 2.5m minimum wide central reserve and two 2.5m minimum wide verges.
- 4.6.82 The road cross section below the structure is proposed to be a 7.3m wide single carriageway with two 1.0m wide hard strips and two 2.5m wide verges on each side.
- 4.6.83 A parapet will be provided over the structure on each side. The parapet is likely to be a 1.0m high N2 parapet.

Auldearn NMU Underpass (PS28)

- 4.6.84 The structure will carry the proposed A96 dual carriageway over the NMU shared use path connection at Auldearn and is proposed to be a single span cast in situ reinforced concrete box structure.
- 4.6.85 The proposed A96 dual carriageway is proposed to be two 7.3m wide carriageways with two 1.0m wide hard strips, a 2.5m minimum wide central reserve and two 2.5m minimum wide verges.
- 4.6.86 The cross section through the structure is proposed to be a 3.0m wide NMU route with two 0.5m wide verges with a minimum headroom of 2.7m.
- 4.6.87 A safety barrier will be provided over the structure in the outer verges. The barrier is likely to be an N2 barrier.

C1172 Underbridge (PS18)

- 4.6.88 The structure will carry the proposed A96 dual carriageway over the New Auldearn – Station – Drum Road (C1172) and is proposed to be a single span cast in situ reinforced concrete box structure.
- 4.6.89 The proposed A96 dual carriageway is proposed to be two 7.3m wide carriageways with two 1.0m wide hard strips, a 2.5m minimum wide central reserve and two 2.5m minimum wide verges.
- 4.6.90 The road cross section through the structure is proposed to be a 3.3m wide single carriageway with one 3.0m wide west verge and one 2.0m wide east verge.
- 4.6.91 A safety barrier will be provided in the outer verges. The safety barrier is likely to be a N2 safety barrier.

Hardmuir Overbridge No 1 (PS19)

- 4.6.92 The structure will carry the realigned de-trunked existing A96 over the proposed A96 dual carriageway and is proposed to be a single span steel composite superstructure on reinforced concrete substructure.
- 4.6.93 The proposed A96 dual carriageway is proposed to be two 7.3m wide carriageways with two 1.0m wide hard strips, a 2.5m minimum wide central reserve and two 2.5m minimum wide verges.
- 4.6.94 The road cross section over the structure is proposed to be a 7.3m wide single carriageway with two 1.0m wide hard strips and two 2.0m wide verges.

4.6.95 A parapet will be provided over the structure on each side. The parapet is likely to be a 1.0m high N2 parapet.

Hardmuir Overbridge No 2 (PS20)

4.6.96 The structure will carry the access to Hardmuir of Boath over the proposed A96 dual carriageway and is proposed to be a three span continuous precast concrete beam and slab deck on reinforced concrete substructure.

4.6.97 The proposed A96 dual carriageway is proposed to be two 7.3m wide carriageways with two 1.0m wide hard strips, a 2.5m minimum wide central reserve and two 2.5m minimum wide verges.

4.6.98 The road cross section over the structure is proposed to be a 5.5m wide single carriageway and two 2.0m wide verges.

4.6.99 A parapet will be provided over the structure on each side. The parapet is likely to be a 1.0m high N2 parapet.

Culverts

4.6.100 A list of the culverts within the proposed Scheme carrying the proposed A96 dual carriageway, local roads and farm access tracks across watercourses is provided in Table 4.11 below. Culvert locations are also shown on Figure 1.3.

Table 4.11: List of Culverts

Culvert Reference	Chainage (m)	Engineering Description
C02 Scretan Burn Culvert	1250	The precast box culvert is 3.6m clear span and 2.7m internal height. The culvert structure is 66.3m in length.
C03 Cairlaw Burn Culvert No 1	1750	The precast box culvert is 4.2m clear span and 3.0m internal height. The culvert structure is 40.2m in length.
C04 Cairlaw Burn Culvert No 2	2280	The precast box culvert is 4.2m clear span and 3.6m internal height. The culvert structure is 60.3m in length.
C05 Kenneth's Black Well Culvert No 1	2535	The precast box culvert is 3.0m clear span and 2.1m internal height. The culvert structure is 48.3m in length.
C26 Milton of Culloden Culvert No 1	2765	The precast box culvert is 1.2m clear span and 1.5m internal height. The culvert structure is 83.7m in length.
C27 Milton of Culloden Culvert No 2	2765	The precast box culvert is 2.1m clear span and 1.5m internal height. The culvert structure is 10.1m in length.
C29 Milton of Culloden Culvert No 4	2765	The precast box culvert is 2.1m clear span and 1.5m internal height. The culvert structure is 6.0m in length.
C30 Milton of Culloden Culvert No 5	2765	The precast box culvert is 2.1m clear span and 1.5m internal height.
C06 Allanfean Drain Culvert	3230	The precast box culvert is 1.8m square. The culvert structure is 90.5m in length.
C07 Fiddler's Burn Culvert No 1	4745	The precast box culvert is 2.4m square. The culvert structure is 102.5m in length.
C08 Newton Burn Tributary Culvert	6320	The precast box culvert is 2.7m square. The culvert structure is 48.3m in length.
C09 Rough Burn Culvert	7525	The precast box culvert is 3.0m clear span and 2.1m internal height. The culvert structure is 74.5m in length.
C10 Kerrowaird Culvert	8890	The precast box culvert is 1.8m square. The culvert structure is 60.3m in length.
C11 Tornagrain Farm Culvert	9330	The precast box culvert is 2.7m clear span and 2.1m internal height. The culvert structure is 42.2m in length.
C12 Tornagrain Wood Culvert	9435	The precast box culvert is 1.8m square. The culvert structure is 64.3m in length.
C13 Dalcross Culvert	10200	New box culvert with 3.3m clear span and 2.4m internal height. The culvert structure is 58.5m in length.

Culvert Reference	Chainage (m)	Engineering Description
C22 Culblair Culvert	11300	The precast box culvert is 2.4m square. The culvert structure is 66.3m in length.
C15 Drumine Drain Culvert No 1	12615	The precast box culvert is 2.1m clear span and a 1.8m internal height. The culvert structure is 56.3m in length.
C16 Drumine Drain Culvert No 2	12700	The precast box culvert is 2.1m clear span and 1.8m internal height. The culvert structure is 58.3m in length.
C17 Blackcastle Culvert	17010	The precast box culvert is 2.4m square. The culvert structure is 42.2m in length.
C23 Cranford Culvert	17150	The precast concrete box culvert is 2.4m clear span and 1.8m internal height. The culvert structure is 14.1m in length.
C18 Alton Burn Culvert No 1	19610	The precast box culvert is 2.7m square. The culvert structure is 126.6m in length.
C19 Knocknagillan Culvert	23405	The precast box culvert is 1.8m clear span and 1.5m internal height. The culvert structure is 52.3m in length.
C20 Auldearn Burn Culvert	26695	The precast box culvert is 5.0m clear span and 2.0m internal height. The culvert structure is 48.25m in length.

Retaining Walls

- 4.6.101 No retaining walls are anticipated for the proposed Scheme.

4.7 Fencing and Environmental Barriers

Fencing

- 4.7.1 Boundary fencing will be provided along the proposed Scheme boundary. Fencing adjacent to the trunk road will be the responsibility of adjacent landowners. Environmental fencing or barriers will be provided where required as identified in Chapter 11 (Habitats and Biodiversity) of the Environmental Statement. All environmental fencing will be the maintenance responsibility of Transport Scotland. In addition, fencing may be provided as accommodation works for individual landowners. Whilst much of the land bounding the proposed Scheme is arable in nature, stock proof fencing may be required in some areas.
- 4.7.2 During construction temporary fencing may be erected where appropriate. This will be agreed between the selected Contractor and landowners.

Environmental Barriers

- 4.7.3 Environmental barriers are required to reduce the potential impacts of the proposed Scheme at specific locations. Where the requirement has been identified within the Environmental Statement, environmental barriers will be incorporated. This may include ecological fencing required to provide protection for wildlife by preventing access onto the proposed dual carriageway. The requirements for ecological fencing are given in Chapter 11 (Habitats and Biodiversity) of the Environmental Statement. Mitigation has also been identified to reduce impacts to residential properties from traffic-related noise. This may be through provision of environmental barriers or earth mounds (false cuttings or bunds). The requirements for noise mitigation measures are given in Chapter 8 (Noise and Vibration) of the Environmental Statement.

4.8 Traffic Signs and Road Markings, Traffic Signals and Lighting

Traffic Signs and Road Markings

- 4.8.1 As part of the Stage 3 design a specimen signing strategy has been derived to establish signing requirements for the proposed Scheme. The traffic signs required in the provision of the proposed Scheme will be designed in accordance with relevant design standards, with key reference to:
- The Traffic Signs Regulations and General Directions 2016 (TSRGD) (The Department for Transport 2016);

- Traffic Signs Manual (The Department for Transport 2006);
- Local Transport Note (LTN) 1/94 - Design and use of directional informatory signs (The Department for Transport 1994); and
- Trunk Road and Motorway Tourist Signposting Policy and Guidance (Transport Scotland 2006).

4.8.2 The detailed sign design will be the responsibility of the selected Contractor and will be subject to compliance with the contract documents. As part of the detailed design process the Contractor will consult with Transport Scotland, The Highland Council, VisitScotland and other appropriate stakeholders with regards to the provision of the required signage.

4.8.3 Signage will be provided by the use of post mounted signs only. The use of gantry mounted signs has been excluded to avoid adverse visual impact on the rural landscape.

4.8.4 Cantilever Variable Message Signs (VMS) will be provided east and westbound to provide live information to drivers. The VMS eastbound is located on the approach to Mid Coul Junction, approximately ch9350. Westbound, the VMS is located between Smithton Junction and Balloch Junction, approximately ch4050.

4.8.5 As part of the proposed Scheme brown tourist signs will be provided to advise drivers of VisitScotland accredited local tourist attractions. Proposed signs will link into the existing network of brown tourist signage. In addition, signage will be provided for the services and local facilities within Nairn.

4.8.6 As a result of the proposed Scheme the destination strategy on the local road network will need to be addressed. Local signage will be amended to direct strategic traffic onto the proposed dual carriageway. The existing A96 will be reclassified and all associated signs updated to reflect this.

Lighting

4.8.7 The requirements for road lighting have been assessed and developed in accordance with:

- DMRB Volume 8, Section 3, TA49/07 - Appraisal of New and Replacement Lighting on the Strategic Motorway and All Purpose Trunk Road Network (The Highways Agency, Transport Scotland, Welsh Assembly Government and The Department for Regional Development Northern Ireland 2007c);
- DMRB Volume 8, Section 3, TD34/07 - Design of Road Lighting for the Strategic Motorway and All Purpose Trunk Road Networks (The Highways Agency, Transport Scotland, Welsh Assembly Government and The Department for Regional Development Northern Ireland 2007d);
- BS 5489-1: 2013 – Code of practice for the design of road lighting – Part 1: Lighting of roads and public amenity areas (British Standards 2013); and
- with reference to CIE 115/2010 - Lighting of roads for motor and pedestrian traffic (International Commission on Illumination 2010), TD16/07, and TD22/06.

4.8.8 As part of the road lighting development the extents of road lighting and the environmental impact on the surrounding area has been considered. Minimum acceptable levels of lighting have been proposed to reduce the environment impact introduced by the proposed Scheme.

4.8.9 The proposed Scheme will include road lighting along the proposed dual carriageway between ch850 and ch2970 and at each of the grade separated junctions. Road lighting between ch850 and ch2970 is provided as mitigation for the substandard geometric weaving length as described in Departure A96IN-001 and A96IN-002 in paragraph 4.1.10. The proposed road lighting at each of the grade separated junctions extends along the slip roads and local road in the vicinity of the roundabouts and priority junctions.

4.8.10 The proposed road lighting will integrate with existing lighting, such as on the Kerrowgair – Croy Road (C1017) towards Inverness Airport and Barn Church Road (C1032).

- 4.8.11 Lighting along sections of the proposed NMU shared use path will be provided in line with TR23 - Lighting of Cycle Tracks (ILP 1998). Where lighting is not provided, solar powered road studs could be considered for guidance for users during the hours of darkness.
- 4.8.12 The proposed road lighting is expected to use emerging technologies such as Light Emitting Diodes (LEDs) to achieve energy cost savings. In addition, further energy cost savings could be achieved through the provision of an Intelligent Lighting Control System to enable the lighting to be dynamically controlled according to real-time traffic conditions.
- 4.8.13 Once the proposed Scheme is completed an assessment should be undertaken to determine whether there is justification to remove the existing street lighting on the existing A96 which will remain as a local road between Seafield and the Smithton Junction north roundabout.

4.9 Lay-bys

- 4.9.1 The lay-bys are designed in accordance with TD69/07. The lay-bys will be Type A with Merge Tapers and have a minimum parking bay length of 45m as shown on Figure 4/2 of TD69/07. Each lay-by shall also be designed in accordance with Roads for All: Good Practice Guide (Transport Scotland 2013). The location of the proposed lay-bys are listed in Table 4.12 and shown on Figure 1.2.
- 4.9.2 The lay-bys are located on sections of carriageway where the minimum curve radius is no less than 2040m at a design speed of 120kph with a recommended minimum spacing of 2.5km. Due to the horizontal alignment and junction layout it is not possible to locate lay-bys between ch850 and ch15500.
- 4.9.3 There is the additional requirement for bus lay-bys to be located at ch15500, which are designed to Type A layout with provision of bus lay-by geometric layout as shown on Figure 5/1 of TD69/07.

Table 4.12: Location of the proposed dual carriageway Lay-bys

Lay-by Reference	Type	Location	Chainage (m)	Direction
1	Type B – Bus Lay-by	Gollanfield	ch15500	Eastbound
2	Type B – Bus Lay-by	Gollanfield	ch15500	Westbound
3	Type A – Lay-by	Moss-Side	ch20000	Eastbound
4	Type A – Lay-by	Moss-Side	ch20000	Westbound
5	Type A – Lay-by	Skene Park	ch23200	Eastbound
6	Type A – Lay-by	Skene Park	ch23200	Westbound
7	Type A – Lay-by	Auldearn	ch27900	Eastbound
8	Type A – Lay-by	Auldearn	ch27800	Westbound
9	Type A – Lay-by	Wester Hardmuir	ch29800	Westbound

4.10 Road Restraint Systems

- 4.10.1 As part of the Stage 3 design a Road Restraints Risk Assessment Process (RRRAP) has been carried out to determine requirements for safety barriers in accordance with DMRB Volume 2, Section 2, Part 8, TD19/06, Requirement for Road Restraint Systems (The Highways Agency, Transport Scotland, Welsh Assembly Government and The Department for Regional Development Northern Ireland 2006a).
- 4.10.2 Safety barrier is proposed along the length of the proposed dual carriageway within the central reserve, along high embankments, in the vicinity of bodies of water and watercourses, over structures and in front of large street furniture.
- 4.10.3 The detailed design will be the responsibility of the selected Contractor and subject to compliance with relevant standards and the contract documents. Detailed assessments will be undertaken based on the detailed design.

4.11 Road Pavement

- 4.11.1 The type and specification of road pavement surfacing shall be agreed through consultation with relevant parties in advance of the preparation of tender documents. Surfacing may include a thin wearing course system such as Stone Mastic Asphalt.
- 4.11.2 All new road sections on the dual carriageway and slip roads (with the exception of the slip roads at Brackley Junction and the eastbound off slip at Nairn West Junction) of the proposed Scheme will be surfaced with low noise road surfacing material.
- 4.11.3 The minimum PSV required across the proposed Scheme will vary depending on location and traffic loading for the design year. PSV will be in accordance with DMRB Volume 7, Section 5, Part 1, HD36/06, Surfacing Materials for New and Maintenance Construction (The Highways Agency, Transport Scotland, Welsh Assembly Government and The Department for Regional Development Northern Ireland 2006d).
- 4.11.4 Further investigation of existing ground conditions may reveal that a capping layer may be required in areas of softer ground in particular in areas of cutting. For the purpose of developing an initial pavement design, a California Bearing Ratio (CBR) of 5% has been assumed across the proposed Scheme.
- 4.11.5 It is also anticipated that some resurfacing or pavement treatment may be carried out on sections of the existing A96 in agreement with The Highland Council, as part of the handover process.

4.12 Indicative Construction Sequence

- 4.12.1 Construction of the proposed Scheme can only commence if the scheme is approved under the statutory procedures and thereafter a timetable for progress can be determined. However for assessment purposes the construction of the proposed Scheme is expected to take place over 3-4 years. An indicative construction programme is shown in Table 4.13 below.
- 4.12.2 It is anticipated that the construction of the scheme may sensibly be split into three main work areas; West, Central and East, which will be constructed concurrently. The actual construction sections and sequence will be a decision for the Contractor and is therefore subject to change. The West section could extend from Seafield Roundabout to the existing A96 at Kerrowaird (ch850 to ch8500). The Central section could extend from the existing A96 at Kerrowaird to the A96 Aberdeen to Inverness Rail Line (ch8500 to ch19250). The East section could extend from the A96 Aberdeen to Inverness Rail Line to the existing A96 tie in at Hardmuir (ch19250 to ch31158). Some sections may open earlier than others subject to final construction sequencing.
- 4.12.3 The construction details proposed provide an outline of anticipated construction activities. These details are subject to change by the selected Contractor.

West Section

- 4.12.4 The West section requires the largest amount of bulk import material, construction of five structures, 12 culverts, two grade separated junctions, approximately 8.5km of dual carriageway and de-trunking of the existing A96.
- 4.12.5 Initial works, including mobilisation, enabling works and site clearance will be carried out early on in the construction. Due to the large quantity of bulk fill material, placement will begin during the early stages and continue for a large duration of the scheme. Structures and local road construction will begin later and progress throughout the scheme until completion. The proposed dual carriageway will be constructed in stages on completion of the earthworks.

Central Section

- 4.12.6 The Central section has a large import of bulk material, construction of three grade separated junctions, demolition of two existing structures over the Aberdeen to Inverness Rail Line, construction of eight structures, nine culverts, 11km of dual carriageway and de-trunking of the existing A96.
- 4.12.7 At the start of the works mobilisation, enabling works and site clearance will be carried out. Similarly to the West section, placement of fill will commence early in the scheme and continue to the late stages. Local roads diversion will be undertaken early in the scheme to allow the construction of the structures.

East Section

- 4.12.8 The East section includes the largest areas of earthwork cuttings, construction of one grade separated junction, construction of 12 structures including the River Nairn crossing, three culverts, approximately 12km of dual carriageway construction, the diversion of multiple local roads and de-trunking of the existing A96.
- 4.12.9 As with the West and Central section’s mobilisation, enabling works and site clearance will be carried out at the initial stages of the scheme. Due to the large volume of excavated material earth operations will commence at the early stages of the scheme and continue for a significant duration. A number of structures, including the River Nairn Crossing can commence at the early stages of the scheme in parallel with the earthworks. Local roads realignments will generally commence mid-way through the scheme.

Advanced Works

- 4.12.10 A number of advanced works, including environmental mitigation works, archaeological excavation, and advanced service diversions may be carried out before the main works commence.

Traffic Management

- 4.12.11 The majority of the proposed Scheme is offline and can be constructed with minimal disturbance to local traffic. For sections of the proposed Scheme which affect existing local roads traffic management systems will be implemented to ensure a safe area for both drivers and construction workers.

Table 4.13: Indicative Construction Programme

Phasing	Timescale	
West Section	Commencement Year	Typical Duration (month)
Mobilisation	Year 1	2
Enabling works	Year 1	2
Service diversions	Year 1	6
Site clearance	Year 1	7
Fencing	Year 1	7
Ground improvement	Year 1	6
Earthworks	Year 1	25
Structures	Year 2	22
Drainage	Year 1	30
Road Pavement	Year 1	34
Finishing	Year 4	6

Phasing	Timescale	
Central Section	Commencement Year	Typical Duration (month)
Mobilisation	Year 1	2
Enabling works	Year 1	2
Service diversions	Year 1	6
Site clearance	Year 1	7
Fencing	Year 1	7
Ground improvement	Year 1	6
Earthworks	Year 1	42
Structures	Year 2	36
Drainage	Year 1	30
Road Pavement	Year 2	10
Finishing	Year 3	18
East Section	Commencement Year	Typical Duration (month)
Mobilisation	Year 1	2
Enabling works	Year 1	2
Service diversions	Year 1	6
Site clearance	Year 1	7
Fencing	Year 1	7
Ground improvement	Year 1	6
Earthworks	Year 1	34
Structures	Year 2	14
Drainage	Year 1	39
Road Pavement	Year 2	12
Finishing	Year 3	19

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5 Traffic Assessment

5.1 Introduction

- 5.1.1 This chapter provides an overview of the transport model development, traffic forecasting and potential impacts of the proposed Scheme, compared to a Do-Minimum scenario. The economic appraisal of the proposed Scheme and the economic results are presented in Chapter 6 of this report.
- 5.1.2 The traffic and economic assessment of the proposed Scheme has been undertaken using an updated version of the Moray Firth Transport Model (MFTM). The MFTM is a regional, four-stage, multi-modal forecasting model that was originally developed for The Highland Council with a 2009 base year, that is the model was calibrated and validated to represent 2009 operating conditions.
- 5.1.3 The DMRB Stage 2 Scheme Assessment work that was undertaken using the original MFTM identified selected locations on the secondary road network around Nairn where the Base traffic model flows were not as representative of observed flow conditions when compared with, for example, DMRB validation criteria. As a result, in preparation for the DMRB Stage 3 Scheme Assessment, the MFTM Base model was updated using additional traffic data collected in 2014 on the A96 corridor between Inverness and Hardmuir, to the east of Auldearn.
- 5.1.4 As a further refinement to MFTM, a specific Inter-peak model was also developed to provide a more detailed assessment of the proposed Scheme based on the representation of the AM peak, PM peak and Inter-peak periods in the traffic modelling.
- 5.1.5 Figure 5.1 shows the geographic extent of the MFTM transport model.
- 5.1.6 The MFTM transport model was used to produce forecasts of multi-modal travel demand to determine the effects of the proposed Scheme compared to the Do Minimum scenario, for the future years of 2021 as the assumed Scheme year of opening, and 2036 as the assumed design year (15 years post-opening year). MFTM has been used to inform the design of the proposed Scheme, and undertake the traffic related operational, environmental and economic assessments.
- 5.1.7 Key proposed Scheme performance indicators such as changes to traffic flows, speeds, journey times and travel distances have been assessed using the MFTM. These outputs were then input to the Department for Transport's (DfT) Transport Users Benefit Appraisal (TUBA) Version 1.9.6 software to identify the economic benefits of the proposed Scheme compared to the Do-Minimum scenario. The infrastructure included in the agreed Do-minimum scenario is described in section 5.5.10 of this chapter. MFTM outputs have also been provided for the air quality, and traffic noise and vibration assessments contained in the Environmental Statement.
- 5.1.8 The following sections of this chapter describe the structure of the modelling system, including an overview of the models, inputs and forecasting assumptions. It also contains the assessment of effects of the proposed Scheme on the road network within the study area.

5.2 Model Inputs and Assumptions

Base Model Update

- 5.2.1 In preparation for the DMRB Stage 3 assessment, it was agreed with Transport Scotland to undertake a further data collection exercise in October/November 2014. The data collection consisted of an additional 38 Automatic Traffic Counters (ATC) along the A96 corridor between Inverness and Hardmuir, to the east of Auldearn, and on the local road network around Nairn as shown in Figure 5.2. The five existing permanent ATC sites on the A96 maintained by Transport Scotland that were used to inform the model update process are also shown in Figure 5.2.
- 5.2.2 Journey Time surveys were also undertaken as part of the October/November 2014 data collection, and comprised a series of routes between Inverness and Hardmuir, to the east of Auldearn, and arterial/radial routes around Nairn as shown in Figure 5.3.

- 5.2.3 In addition to this data collection programme, use was also made of the existing 43 permanent ATC sites located throughout the model area, located on the Trunk Road network and maintained by Transport Scotland.
- 5.2.4 For the purposes of the Base model update for MFTM, although the model is focused on the A96 Corridor and Inverness, it also covers all major commuting catchments to the city and strategic movements from the rest of Scotland. The observed model has been recalibrated to a base year of 2014 across the A96 corridor. Elsewhere the MFTM is largely unchanged as analysis of observed traffic growth across the trunk road network has shown little to no growth has occurred between 2009 and 2014. The Forecast years that have been developed for the proposed Scheme are 2021 as the assumed Year of Opening, and 2036 as the assumed Design Year.
- 5.2.5 The model has been developed to represent the following time periods:
- morning peak, 08:00 - 09:00;
 - inter peak average hour, 10:00 - 16:00; and
 - evening peak, 17:00 -18:00.

5.3 Existing Traffic Operational Review

- 5.3.1 The existing section of the A96 between Inverness and Nairn is approximately 31km long and extends from Raigmore Interchange at the western end, through Nairn town centre and past the settlement of Auldearn, as shown in Figure 1.1.
- 5.3.2 The majority of this section of the A96 is of rural single carriageway standard operating under the national speed limit, with the short section from a point just to the east of the Smithton roundabout to Raigmore Interchange being subject to a 50mph speed limit. The speed limit also reduces to 40mph on the outskirts of Nairn, reducing to 30mph entering the town.
- 5.3.3 The existing A96 between Inverness and Hardmuir has an Annual Average Daily Traffic (AADT) level that varies along the length of the route from approximately 10,900 at the eastern end, to approximately 30,400 vehicles per day based on 2014 ATCs. The highest AADT flow was recorded on the section between Raigmore Interchange and Seafield Roundabout.
- 5.3.4 A summary of the 2014 two-way AADT levels along all sections of the route and on selected local roads are detailed within Table 5.1 and shown in Figure 5.4. The traffic information has either been taken from the ATCs maintained by Transport Scotland, or from the additional ATCs that were surveyed over a two week period in 2014. The source of the count information has been included within Table 5.1. Traffic count information varies by location, with some locations disaggregated by vehicles class, and others only reporting on total traffic. The traffic counter on the A96 between Raigmore Interchange and West Seafield does not disaggregate by vehicles class, and hence no HGV data is available at this location.

Table 5.1: 2014 Two-way AADT on the A96 and selected local roads

ID	Location	Source	2-way AADT	%HGV
1	A96 at Raigmore Interchange	ATCNE011	30,400	-
2	A96 Seafield Roundabout to Smithton Junction	ATC01065	26,000	4%
3	A96 Smithton Junction to Balloch	ATC01066	14,500	-
4	A96 Balloch to Newton Junction	ATC01067	15,700	4%
5	A96 Newton Junction to Airport Roundabout	Additional ATC 13	14,900	5%
6	A96 Airport Roundabout to B9006 Southern Junction	ATC01064	11,900	4%
7	B9006 Culloden Road, east of Caulfield Road	Additional ATC 2	12,600	1%
8	B9006 Culloden Road at Culloden Battlefield	Additional ATC 7	4,100	1%
9	B9006 between Culloden Battlefield and Croy	Additional ATC 11	3,200	1%
10	B9091 between Croy and Clephanton	Additional ATC 18	2,200	1%
11	Barn Church Road West	Additional ATC 5	11,900	1%
12	Barn Church Road East	Additional ATC 10	2,500	1%
13	B9039 West of Dalcross Station Road	Additional ATC 15	2,600	2%
14	B9006 North of existing A96	Additional ATC 36	500	2%
15	A96/B9006 Southern Junction to B9092 Junction	Additional ATC 20	12,300	4%
16	A96 East of B9092 Junction	Additional ATC 23	13,200	4%
17	A96 Nairn to Auldearn	Additional ATC 30	11,300	4%
18	A96 East of Auldearn	Additional ATC 35	10,900	4%
19	B9091 at Balblair	Additional ATC 25	800	11%
20	B9090 at Firhall	Additional ATC 26	1,100	1%
21	A939 at Househill	Additional ATC 28	1,500	2%

Note: ATCNE011 and ATC01066 are volumetric ATCs that record total vehicles only, and therefore it has not been possible to calculate the HGV percentage for these two sites.

5.3.5 Traffic flows on the A96 are higher at the western end of the route, with an AADT flow of approximately 30,400 vehicles recorded on the section immediately east of Raigmore Interchange. Traffic flows begin to decrease as the route travels eastwards towards Inverness Airport with an AADT flow of approximately 14,900, before stabilising east of the airport with an AADT flow of approximately 12,000 to 13,000 vehicles. The B9006 forms a parallel route to the A96, travelling east to west along the corridor. Traffic flows on this route are considerably lower than the A96, however they follow the same pattern, with higher flows at the western end of the corridor and lower flows as the route travel eastwards into the more rural areas.

5.3.6 One of the journey time routes that were surveyed as part of the data collection programme was along the existing A96 between Raigmore Interchange and Hardmuir to the east of Nairn, covering a distance of approximately 31km. The average observed end to end journey times are included in Table 5.2.

Table 5.2: Observed A96 Journey Time Information

Start Point	End Point	Direction	Peak	Journey Time	Average Speed
Raigmore Interchange	Hardmuir	EB	AM	00:27:57	66 KPH
Hardmuir	Raigmore Interchange	WB	AM	00:32:43	56 KPH
Raigmore Interchange	Hardmuir	EB	Inter Peak	00:27:23	67 KPH
Hardmuir	Raigmore Interchange	WB	Inter Peak	00:27:53	66 KPH
Raigmore Interchange	Hardmuir	EB	PM	00:30:29	60 KPH
Hardmuir	Raigmore Interchange	WB	PM	00:29:33	62 KPH

5.3.7 The current locations of delay on the existing A96 are on the westbound approach to Inverness at the Smithton, Seafield Roundabout and Raigmore Interchange in the AM peak, and travelling through Nairn in both peaks. The speed limit on the A96 as it approaches Raigmore Interchange is 80kph (50mph), however the observed speed in the AM Peak is approximately 30kph, which indicates that

traffic is likely joining a slower traffic stream approaching the three roundabouts on this section of the A96. This highlighted further in the observed journey time information, as examination of the observed data indicates it takes approximately 2 minutes to travel the final 750m of the route in the westbound direction.

5.3.8 Similarly, the speed limit through Nairn is 48kph (30mph). From examination of the observed journey time data the average speed through Nairn reduces to less than 30kph on the A96 approaches to the roundabout in the centre of Nairn, and the eastbound approach to signalised junction with the A939 also appearing to be a particular constraint. There are also a number of other sets of traffic signals within Nairn that are also likely to increase observed journey times.

5.3.9 The Base model traffic levels are discussed at an AADT level from Section 5.5.7 below.

5.4 Accident Summary

Accident History

5.4.1 Accident data for the A96 corridor between Seafield Roundabout and Hardmuir, to the east of Auldearn, for the period of 2010 to 2014 was supplied by Transport Scotland in the form of STATS 19 Data in September 2015, and extracted from IRIS. The economic appraisal requires whole years of data to be used, and as the MFTM has been updated to a 2014 base year the most recent five year period from 2010 to 2014 was used to inform the accident appraisal.

5.4.2 Road Casualties Scotland 2015 indicates that of the total accidents that have occurred on non-built-up A class Trunk roads 4% were recorded as Fatal accidents, and 20% were Serious accidents. The percentage of Fatal Accidents and Serious Accident that occur on built-up A class Trunk Roads are reported to be 2% and 16%. Of the total accidents recorded on the A96 corridor between the Seafield Roundabout and Hardmuir, 2% were recorded as Fatal accidents and 17% recorded as Serious accidents. The proportions of Fatal and Serious accidents that have occurred on the A96 are therefore in line with the national average.

5.4.3 In total there were 63 recorded accidents between 2010 and 2014 within the A96 study area, with an average of 13 accidents occurring each year. In terms of the accident rate overall along the length of the existing A96 between Seafield Roundabout and Hardmuir, it is lower than the national average rate for similar road types, although it is recognised that there is a degree of variation along the A96 as accidents (and hence the calculated rates) are location specific.

5.4.4 The number and severity of accidents that occurred in each of the five years are shown in Table 5 3 below.

Table 5.3: Accident Severity

Year	Slight	Serious	Fatal	Total
2010	12	4	0	16
2011	10	4	0	14
2012	13	1	0	14
2013	8	1	0	9
2014	8	1	1	10
Total	51	11	1	63

5.4.5 In summary there are several key points associated with the accidents that have occurred on this section of A96, as follows:

- There is no evidence to indicate that the A96 has a particularly high Fatal accident record compared to the national average. The fatal accident that occurred during the five year reporting period was in September 2014 just prior to the junction at Tornagrain, and involved two vehicles and a pedestrian wearing dark clothing at night.

- 19% (12 accidents) of the recorded accidents were Fatal or Serious, which is a very similar pattern to the overall national average for A class roads.
- Approximately 75% (47 accidents) of the accidents appear to have occurred at a junction. The most accidents that were recorded at junctions are:
 - Five occurred at the Balloch Junction;
 - Three accidents occurred at the B9111 Auldearn junction;
 - Three accidents occurred at each of the Seafield, Brackley, Nairn Tradespark, and Nairn Industrial Estate junctions;
 - Two accidents occurred at each of the Smithton, Milton/Culloden, Culloden Hotel Access, Balmachree and Hardmuir junctions;
 - Single accidents also occurred at each of the Morayston, Kerrowaird, Drumine and Wester Delnies junctions;
 - A further 10 accidents occurred at various junctions with local and residential roads along the extents of the proposed Scheme; and
 - A further two accidents including the one fatal accident occurred just prior to the Tornagrain junction.

5.4.6 As identified in Figure 2.4, there are several accident clusters located on the A96 between Seafield Roundabout and Hardmuir, with the largest cluster occurring in the vicinity of Balloch Junction and comprised two Serious and three Slight accidents.

5.5 Traffic Modelling

Introduction

5.5.1 This section provides an overview of the transport model methodology, including the development of the Base model and the future year traffic forecasting. As noted previously, the MFTM was the primary tool that has been used to assess the proposed Scheme, and the relevant transport modelling and economic appraisal aspects have been subject to a separate independent audit process.

Moray Firth Transport Model

5.5.2 As part of the DMRB Stage 2 Scheme Assessment for the proposed Scheme the traffic modelling was undertaken using the original version of MFTM that was developed on behalf of The Highland Council.

5.5.3 The original version of MFTM has a base year of 2009, and covers a geographical area that broadly encompasses the Inverness Travel to Work area. It includes all Trunk Roads and non-Trunk principal roads, as well as a significant part of the key local road network. The model has been developed and maintained for The Highland Council by their transport modelling consultants, for use as a planning and forecasting tool for developments in the Inverness area including the Westlink project.

5.5.4 As noted previously in sections 5.1 and 5.2, in preparation for the DMRB Stage 3 Scheme Assessment for the proposed Scheme, the MFTM Base model was updated to include new 2014 traffic count data collected along the A96 corridor between Inverness and Hardmuir, to the east of Auldearn, and on the secondary road network around Nairn. The data was used as part of a targeted process to update the MFTM Base model and refine the representation of traffic within the corridor and particularly on the secondary road network. To provide Transport Scotland with the required level of technical assurance, the work undertaken to update the Base model has been subject to independent audit.

5.5.5 A number of the 2014 traffic surveys were undertaken on the local road network. To allow the inclusion of this data within the matrix estimation process, a review of the network coding was also undertaken. This resulted in the inclusion of a number of additional local road links that had previously

not been part of the model network, to refine the traffic assignment routing in the model on the local road network.

- 5.5.6 A targeted matrix estimation process was undertaken to provide a partial recalibration of the matrix, to refine the level of calibration within the A96 Corridor and the arterial and radial routes around Nairn by incorporating the newly collected 2014 count data. Elsewhere, the MFTM remained largely unchanged. To maintain consistency with the original model, the 2009 prior matrices were used as a starting point for matrix estimation, with a number of updates made including the update to the data used to develop external to external movements originally taken from the Transport Model for Scotland (TMfS) 07 with data from TMfS:12.

Base Model

- 5.5.7 The updated MFTM base year (2014) AADT flows and percentage HGV on the existing A96 and key links on the local road network are shown in Table 5.4.

Table 5.4: Base Year AADT

Location	2-way AADT	%HGV
A96 at Raigmore Interchange	38,500	5%
A96 Seafield Roundabout to Smithton Junction	31,600	6%
A96 Smithton Junction to Balloch	19,000	6%
A96 Balloch to Newton Junction	18,900	7%
A96 Newton Junction to Airport Roundabout	15,200	6%
A96 Airport Roundabout to B9006 Southern Junction	14,900	5%
A96/B9006 Southern Junction to B9092 Junction	13,600	5%
B9006 Culloden Road, east of Caulfield Road	11,000	4%
B9006 Culloden Road at Culloden Battlefield	3,800	3%
B9006 between Culloden Battlefield and Croy	2,900	5%
B9091 between Croy and Clephanton	2,300	7%
Barn Church Road West	11,800	3%
Barn Church Road East	3,600	2%
B9039 West of Dalcross Station Road	3,300	6%
B9006 North of existing A96	400	19%
B9006 South of existing A96	1,900	5%
A96 East of B9092 Junction	14,000	5%
A96 Nairn Centre	14,100	5%
A96 Nairn to Auldearn	10,000	5%
A96 East of Auldearn	11,100	5%
A96 East of Hardmuir	11,200	5%
B9092 West of A96 junction	1,400	5%
B9091 at Balbair	600	5%
B9090 at Firhall	600	4%
A939 at Househill	1,600	4%

- 5.5.8 The Base model traffic flows generally compare well to the observed flows on the A96, and during the AM, Interpeak and PM peak periods meet the traffic model validation criteria contained in WebTAG Unit M3.1. The calibration statistics for the A96 corridor and the entire model are summarised in Table 5.5 below.

Table 5.5: Calibration Results

Peak	A96 Corridor		Model	
	% Pass Link Flow	GEH <5 (%)	% Pass Link Flow	GEH <5 (%)
AM Peak	97%	96%	89%	87%
Interpeak	99%	96%	91%	88%
PM Peak	97%	94%	86%	85%

Consideration of the Do-Minimum Scenario

- 5.5.9 The scenario representing the likely future conditions if the proposed Scheme is not constructed, and against which the proposed Scheme has been assessed is defined as the 'Do-Minimum' scenario. The 'Do-Minimum' scenario includes other infrastructure improvements that have the required level of commitment for inclusion, and was agreed with Transport Scotland and The Highland Council.
- 5.5.10 As detailed within the Stage 2 Assessment, the 'Do-Minimum' interventions included within the MFTM are listed below:
- Two lane southbound off slip at Inshes and signal adjustments on Culloden Road;
 - New access junction arrangements to the University of Highlands and Islands (UHI) Campus;
 - Improvements at Longman Roundabout, including signalisation;
 - Rail upgrades between Inverness and Aberdeen (permitting an hourly service between the two cities by 2016);
 - New Rail Station at Dalcross;
 - The Inverness West Link Road;
 - Inshes Junction Improvements Phase 2;
 - Raigmore Interchange Signalisation;
 - Barn Church Road 2 lanes NB (planning condition requirement);
 - A96 dualling between Smithton roundabout and Business/Retail Park access junction (planning condition requirement; and
 - Kinnairdie Link Road, Dingwall.

Planning Scenarios

- 5.5.11 Transport Scotland and The Highland Council recognised that the development aspirations in the current Highland Wide Local Development Plan, and the subsequent Inner Moray Firth Local Development Plan would generate significant growth in the demand for travel in future years.
- 5.5.12 In recent years the changes in the economy have affected the Highland area in the same way as the rest of the UK, with house building and the employment market slowing, however the population of Inverness has continued to grow. As a result, the development forecasts previously set out by The Highland Council are not likely to be fully realised over the same timescale, particularly in zones that have been designated as large areas of employment. The renewable industry has however continued to grow, with jobs being created on the Cromarty Firth, around Nigg and to a lesser extent in Ardersier, which has yet to realise its potential.
- 5.5.13 In response to this, three revised planning scenarios that better reflect forecasts following the economic downturn were developed to reflect the emerging Housing Needs and Demand Assessment (HNDA) being undertaken by The Highland Council. The scenarios allowed the options to be tested with varying levels of growth and provide an understanding of how the network would operate under each growth scenario. This would also help to identify areas of the network that may need to be modified to cope with the increase in demand.

Low Demand Scenario

5.5.14 The low demand scenario assumes the same annual level of house build-out rate in the period between 2011 and 2016 as has been observed during the period 2009-2013. The build-out rate is expected to increase between 2016 and 2021 to take account of growth associated with the UHI Campus, the Tornagrain development and the renewables industry in Nigg. Post 2021, there is a gradual decline in house build-out rates reflecting the general trend reported in the Highland Council HNDA.

5.5.15 In each scenario the growth in employment associated with the renewables industry at Nigg, the Port at Invergordon and the UHI campus have been accounted for. Over the next 20 years, the low growth scenario assumes an increase in jobs at Nigg, Invergordon and the UHI campus. For assessment purposes, it is also assumed that there is marginal growth in employment at most of the existing industrial, commercial and business sites in the area over the same period. Table 5.6 and Table 5.7 below details the Low Demand Scenario figures for the Inner Moray Firth model area.

Table 5.6: Number of new houses in each scenario between 2011-2031 and 2011-2036 – Low Demand Scenario

Summary of the Number of New Houses							
Scenario	11 to 16	16 to 21	21 to 26	26 to 31	31 to 36	total 2011 to 2031	total 2011 to 2036
Low	3,366	4,212	3,503	3,137	2,413	14,218	16,631

Table 5.7: Number of new jobs in each scenario between 2011-2031 and 2011-2036 – Low Demand Scenario

Summary of the Number of New Jobs							
Scenario	11 to 16	16 to 21	21 to 26	26 to 31	31 to 36	total 2011 to 2031	total 2011 to 2036
Low	2,219	2,290	1,535	1,605	1,380	7,649	9,029

Mid Demand Scenario

5.5.16 The mid demand scenario assumes a modest increase in house building between 2011 and 2016, and then significantly higher levels between 2016 and 2031, with a decline in house building between 2031 and 2036. The new houses are allocated first to active sites and then to those with planning permission and developer interest. Active sites are those that are currently being developed, or currently have the same land-use as future development allocations.

5.5.17 In addition, further employment growth is assumed to be centred on existing industrial, commercial and business sites in the area. Employment at the Invergordon and UHI campus has been assumed to remain at the same level as the low growth scenario, however employment at Nigg is expected to increase further. Table 5.8 and Table 5.9 below details the Mid Demand Scenario figures for the Inner Moray Firth model area.

Table 5.8: Number of new houses in each scenario between 2011-2031 and 2011-2036 – Mid Demand Scenario

Summary of the Number of New Houses							
Scenario	11 to 16	16 to 21	21 to 26	26 to 31	31 to 36	total 2011 to 2031	total 2011 to 2036
Mid	3,416	5,055	5,110	4,447	2,457	18,028	20,485

Table 5.9: Number of new jobs in each scenario between 2011-2031 and 2011-2036 – Mid Demand Scenario

Summary of the Number of New Jobs							
Scenario	11 to 16	16 to 21	21 to 26	26 to 31	31 to 36	total 2011 to 2031	total 2011 to 2036
Mid	2,745	3,066	2,441	2,428	1,426	10,680	12,106

High Demand Scenario

- 5.5.18 The high demand scenario is based on the high migration scenario in the HNDA, modified to include an increase in employment and housing associated with the renewables industry in Nigg and a corresponding decrease at the development sites along the A96. This decrease has been included to balance the overall employment and housing in the Highland Wide Plan.
- 5.5.19 The employment at Invergordon and the UHI remains the same as the low growth scenario. Employment at Nigg is assumed to increase compared to the Mid Demand Scenario. There are also additional employment opportunities allocated to existing industrial, commercial and business sites in the area as well as expansion areas such as the Airport Business Park. Table 5.10 and Table 5.11 below details the High Demand Scenario figures for the Inner Moray Firth model area.

Table 5.10: Number of new houses in each scenario between 2011-2031 and 2011-2036 – High Demand Scenario

Summary of the Number of New Houses							
Scenario	11 to 16	16 to 21	21 to 26	26 to 31	31 to 36	total 2011 to 2031	total 2011 to 2036
High	4,003	6,439	5,739	4,809	2,272	20,990	23,262

Table 5.11: Number of new jobs in each scenario between 2011-2031 and 2011-2036 – High Demand Scenario

Summary of the Number of New Jobs							
Scenario	11 to 16	16 to 21	21 to 26	26 to 31	31 to 36	total 2011 to 2031	total 2011 to 2036
High	3,005	4,090	2,920	2,648	1,935	12,663	14,598

New Housing and Jobs Summary

- 5.5.20 Table 5.12 and Table 5.13 below summarise the overall figures for the Inner Moray Firth model area.

Table 5.12: Number of new houses in each scenario between 2011-2031 and 2011-2036

Summary of the Number of New Houses							
Scenario	11 to 16	16 to 21	21 to 26	26 to 31	31 to 36	total 2011 to 2031	total 2011 to 2036
Low	3,366	4,212	3,503	3,137	2,413	14,218	16,631
Mid	3,416	5,055	5,110	4,447	2,457	18,028	20,485
High	4,003	6,439	5,739	4,809	2,272	20,990	23,262

Table 5.13: Number of new jobs in each scenario between 2011-2031 and 2011-2036

Summary of the Number of New Jobs							
Scenario	11 to 16	16 to 21	21 to 26	26 to 31	31 to 36	total 2011 to 2031	total 2011 to 2036
Low	2,219	2,290	1,535	1,605	1,380	7,649	9,029
Mid	2,745	3,066	2,441	2,428	1,426	10,680	12,106
High	3,005	4,090	2,920	2,648	1,935	12,663	14,598

Proposed Scheme Description

- 5.5.21 The 'Do-Something' scenario for the dualling of the A96 Dualling Inverness to Nairn (including Nairn Bypass) is shown in Figure 1.2 and comprises:
- Dualling of the A96 from the existing Seafield Roundabout, approximately 850m east of Raigmore Interchange, at the western extent to Hardmuir, 3.5km to the east of Auldearn at the eastern extent;
 - Dual carriageway bypass of Nairn;
 - At the eastern extent of the proposed Scheme at Hardmuir the dual carriageway would terminate by tying into the existing A96 single carriageway in accordance with design standards; and

- The A96 is to be a Category 7A standard road, with new grade separated junctions located at Smithton, Balloch, Mid-Coul, Brackley, Nairn West and Nairn East.

Traffic Forecasting

5.5.22 The forecasting of future traffic demand was derived from the MFTM model. This 4-stage model represents the following responses and procedures in the order given below:

- Trip generation
- Mode choice
- Trip distribution
- Route choice (assignment)

5.5.23 The model makes use of planning data described in paragraphs 5.5.11 to 5.5.21 and projected changes in population, households and employment levels. Trip rates are applied by trip purpose. Mode choice and trip distribution are then derived from road and public transport cost skims.

5.5.24 The demand model:

- provides forecasts of changes in travel demand over time, as a result of changes in land-use, economic growth, travel costs and committed transport supply changes;
- provides forecasts of the demand responses of highway and public transport trips to changes to the transport system; and
- ensures that the forecast travel demand and generalised costs of travel are in equilibrium.

5.5.25 The traffic demand for the assessment of the proposed Scheme was developed for the following assumed years:

- Proposed Scheme Opening Year of 2021; and
- Proposed Scheme Design Year of 2036 (15 years after the assumed Opening Year).

5.5.26 The traffic growth forecasts in terms of the matrix totals by journey purpose derived from MFTM are shown in Table 5.14 to Table 5.19.

Table 5.14: Do Minimum High Growth AM Peak Growth

AM Peak – User Classes	Base	DM 2021	DM 2036	Base ↗ 2021	2021 ↗ 2036
Car_Commute	15,725	18,166	20,439	16%	13%
Car In Work	2,014	2,141	2,490	6%	16%
Car Others	6,295	7,662	9,014	22%	18%
LGV	1,376	2,045	2,819	49%	38%
HGV	649	775	1,000	19%	29%

Table 5.15: Do Minimum High Growth Inter Peak Growth

Inter Peak – User Classes	Base	DM 2021	DM 2036	Base ↗ 2021	2021 ↗ 2036
Car_Commute	3,858	4,324	4,685	12%	8%
Car In Work	1,219	1,361	1,555	12%	14%
Car Others	14,347	17,747	21,230	240%	20%
LGV	1,440	2,027	2,535	41%	25%
HGV	438	408	492	-7%	21%

Table 5.16: Do Minimum High Growth PM Peak Growth

PM Peak – User Classes	Base	DM 2021	DM 2036	Base ↗ 2021	2021 ↗2036
Car_Commute	10,445	12,045	13,475	15%	12%
Car In Work	1,805	1,883	2,191	4%	16%
Car Others	13,361	16,331	19,071	22%	17%
LGV	1,307	1,825	2,332	40%	28%
HGV	418	467	701	12%	50%

Table 5.17: Do Minimum Low Growth AM Peak Growth

AM Peak – User Classes	Base	DM 2021	DM 2036	Base ↗ 2021	2021 ↗2036
Car_Commute	15,725	17,562	19,103	12%	9%
Car In Work	2,014	2,079	2,312	3%	11%
Car Others	6,295	7,507	8,585	19%	14%
LGV	1,376	2,045	2,819	49%	38%
HGV	649	775	1,000	19%	29%

Table 5.18: Do Minimum Low Growth Inter Peak Growth

Inter Peak – User Classes	Base	DM 2021	DM 2036	Base ↗ 2021	2021 ↗2036
Car_Commute	3,858	4,206	4,427	9%	5%
Car In Work	1,219	1,333	1,475	9%	11%
Car Others	14,347	17,297	20,079	21%	16%
LGV	1,440	2,027	2,535	41%	25%
HGV	438	408	492	-7%	21%

Table 5.19: Do Minimum Low Growth PM Peak Growth

PM Peak – User Classes	Base	DM 2021	DM 2036	Base ↗ 2021	2021 ↗2036
Car_Commute	10,445	11,692	12,723	12%	9%
Car In Work	1,805	1,842	2,081	2%	13%
Car Others	13,361	15,977	18,217	20%	14%
LGV	1,307	1,825	2,332	40%	28%
HGV	418	467	701	12%	50%

5.5.27 The modelled Do Minimum and Do Something AADT flows and percentage HGV in 2036 at locations on the A96 (existing and proposed Scheme), and key locations on the local road network are shown in Table 5.20. The flows at the key locations are shown graphically in Figure 5.5 and Figure 5.6.

Table 5.20: Do Minimum and Do Something High Growth 2036 AADT

ID	Location	DM 2036	DS 2036	Difference	%Difference
1	A96 at Raigmore Interchange	57,000	65,400	8,400	15%
2	A96 Seafield Roundabout to Smithton Junction	41,500	57,500	16,000	39%
3	A96 at Allanfeearn (Existing)	25,900	3,600	-22,300	-86%
4	A96 Balloch to Newton of Petty (Existing)	25,900	11,300	-14,600	-56%
5	A96 Newton Junction to Airport Roundabout (Existing)	19,400	4,500	-14,900	-77%
6	A96 Airport Roundabout to B9006 Southern Junction (existing)	18,800	2,300	-16,500	-88%
7	B9006 Culloden Road, east of Caulfield Road	14,000	13,100	-900	-6%
8	B9006 Culloden Road at Culloden Battlefield	7,800	3,900	-3,900	-50%
9	B9006 between Culloden Battlefield and Croy	7,000	3,200	-3,800	-54%
10	B9091 between Croy and Clephanton	6,400	2,500	-3,900	-61%
11	Barn Church Road West	14,300	16,800	2,500	17%
12	Barn Church Road East	5,300	7,500	2,200	42%
13	B9039 West of Dalcross Station Road	5,200	5,400	200	4%
14	B9006 North of existing A96	900	1,400	500	56%
15	B9006 South of existing A96	3,200	4,200	1,000	31%
16	A96 Smithton Junction to Balloch Junction (Proposed Scheme)	-	35,200	-	-
17	A96 Balloch Junction to Mid-Coul Junction (Proposed Scheme)	-	25,200	-	-
18	A96 Mid-Coul Junction to Brackley Junction (Proposed Scheme)	-	25,800	-	-
19	A96 Brackley Junction to Nairn West Junction (Proposed Scheme)	-	26,700	-	-
20	A96/B9006 Southern Junction to B9092	17,500	11,200	6,300	-37%
21	B9092 West of A96 junction	3,400	3,200	-200	-6%
22	A96 East of B9092 Junction (Existing)	18,900	11,300	-7,600	-40%
23	A96 Nairn Centre (Existing)	19,500	10,100	-9,400	-48%
24	A96 Nairn to Auldearn (Existing)	12,800	5,000	-7,800	-61%
25	A96 East of Auldearn (Existing)	14,900	1,400	-13,500	-91%
26	A96 East of Hardmuir (Existing)	15,100	17,000	1,900	13%
27	B9091 at Balblair	1,700	800	-900	-53%
28	B9090 at Firhall	600	700	100	17%
29	A939 at Househill	2,800	3,400	600	21%
30	A96 Nairn Bypass (between Nairn West and Nairn East Junctions)	-	16,000	-	-
31	A96 East of Auldearn (Proposed Scheme)	-	15,400	-	-

5.5.28

The introduction of the proposed Scheme increases the number of vehicles between Raigmore Interchange and Seafield Roundabout by approximately 15%, and traffic flows between Seafield Roundabout and Smithton Junction by approximately 25% in the 2036 high growth scenario. Following the removal of the constraint at Smithton Junction, traffic flows also increase on Barn Church Road by approximately 15%, contributing to the increased traffic flows between Smithton Junction and Raigmore Interchange. As the route is predominantly offline, there is a significant reduction in traffic flows on the existing A96, as traffic is attracted to and transfers onto the proposed Scheme. Traffic flows on the existing A96 reduce by approximately 80% at Allanfeearn and between the Newton Junction and the Airport Roundabout. Similarly, within Nairn, there is a reduction in traffic on the existing A96 of approximately 45% as traffic transfers onto the Nairn Bypass section of the proposed Scheme.

- 5.5.29 The 2-way AADT traffic flows on the proposed Scheme between Smithton Junction and Balloch Junction are approximately 35,200, reducing to approximately 25,200 between Balloch Junction and Mid-Coul Junction. On the section between Brackley Junction and Nairn West Junction the proposed Scheme has an AADT traffic flow of 26,700, with a flow of 16,000 on the Nairn Bypass section.
- 5.5.30 Traffic flows are also expected to reduce on the parallel routes, with a reduction of up to 60% evident on the B9006 to the East of Dalcross, where flows reduce from 6,400 to 2,500. Similar reductions are evident on the B9006 at Culloden Battlefield, where traffic flows reduce by approximately 50%, from 7,800 to 3,900.
- 5.5.31 As traffic is required to re-route in order to access the A96 via the grade separated junction, traffic flows increase in some locations on the local road network. As mentioned above, there is an increase of approximately 20% on Barn Church Road south of Smithton Roundabout, which is likely due to the new grade-separated junction at Smithton, removing the constraint posed by the existing at-grade roundabout, thus attracting traffic back to this section of the new A96. Traffic flows also appear to increase on the B9006 to the south of the B9006 Southern Junction with approximately 30% more traffic using this route in order to access the proposed Scheme.
- 5.5.32 From the traffic modelling assessment the proposed Scheme reduces the end to end journey time from Hardmuir to Raigmore Interchange in all three peak periods when compared to the Do Minimum. The journey time savings in the AM, Interpeak and PM peak periods in 2036 are shown in Table 5.21 to Table 5.23 respectively, along with the journey times to and from the intermediate point at the Mid-Coul junction. The results show that the proposed Scheme would provide significant time savings of approximately 10 minutes on journeys undertaken over the full length of the route compared to the Do-Minimum. Journey time savings to and from the intermediate junction located at Mid-Coul are also significant, with the proposed Scheme providing a reduction in journey times of approximately 5 minutes compared to the Do-Minimum scenario.

Table 5.21: Journey Times AM Peak High Growth

High Growth Journey Time AM Peak		DM 2036	DS 2036	Difference
A96 Raigmore Interchange to Hardmuir	EB	00:28:14	00:17:27	00:10:47
	WB	00:30:25	00:19:49	00:10:36
A96 Raigmore Interchange to Mid-Coul Junction	EB	00:11:09	00:06:07	00:05:02
	WB	00:12:06	00:08:29	00:03:37
A96 Mid-Coul Junction to Hardmuir	EB	00:17:05	00:11:25	00:05:40
	WB	00:18:23	00:11:34	00:06:49

Table 5.22: Journey Times Inter Peak High Growth

High Growth Journey Time Inter Peak		DM 2036	DS 2036	Difference
A96 Raigmore Interchange to Hardmuir	EB	00:30:08	00:17:48	00:12:20
	WB	00:26:22	00:17:43	00:08:39
A96 Raigmore Interchange to Mid-Coul Junction	EB	00:12:39	00:06:23	00:06:16
	WB	00:08:40	00:06:34	00:02:06
A96 Mid-Coul Junction to Hardmuir	EB	00:17:29	00:11:30	00:05:59
	WB	00:17:46	00:11:23	00:06:23

Table 5.23: Journey Times PM Peak High Growth

High Growth Journey Time PM Peak		DM 2036	DS 2036	Difference
A96 Raigmore Interchange to Hardmuir	EB	00:31:32	00:19:48	00:11:44
	WB	00:26:46	00:17:58	00:08:48
A96 Raigmore Interchange to Mid-Coul Junction	EB	00:13:46	00:08:19	00:05:27
	WB	00:09:04	00:06:47	00:02:17
A96 Mid-Coul Junction to Hardmuir	EB	00:17:46	00:11:34	00:06:12
	WB	00:17:47	00:11:26	00:06:21

Summary of Performance Against Objectives

- 5.5.33 This section provides a summary of the performance of the proposed Scheme against the relevant scheme objectives, based primarily on the quantitative outputs extracted from the traffic models. The first objective relating to the operation of the proposed Scheme is:
- To improve the operation of the A96 and inter-urban connectivity by:
 - reducing journey times;
 - improving journey time reliability;
 - increasing overtaking opportunities;
 - improving freight movement efficiency along the transport corridor; and
 - reducing conflicts between local traffic and other traffic in urban areas.
- 5.5.34 The proposed Scheme would meet this objective through the forecast reductions in journey times providing savings during the AM, Inter Peak and PM Peak periods. The journey time savings extracted from the forecast traffic models for vehicles travelling the length of the proposed Scheme in 2036 under the High Growth traffic scenario would be:
- AM Peak – 10.5 minutes in both directions;
 - Inter Peak – 12.5 minutes eastbound, 8.5 minutes westbound; and
 - PM Peak – 12 minutes eastbound, 9 minutes westbound.
- 5.5.35 Furthermore the increased road standard of the dual carriageway route would improve journey time reliability, as it would provide increased overtaking opportunities along the full length of the route. In addition, the greater resilience provided by the dual carriageway under the proposed Scheme to incidents, including vehicle breakdowns and accidents, would also improve journey time reliability compared to the existing A96 operation. Finally the proposed Scheme would also provide greater resilience to maintenance works both on the dual carriageway and the existing A96, and again would contribute to improving journey time reliability.
- 5.5.36 The rationalisation of junctions and the improvement from grade separating the junctions providing access to the proposed Scheme would also contribute to improved journey times, with less disruption likely from vehicles joining and leaving the dual carriageway. The removal of a significant proportion of longer distance through trips from travelling through Nairn would lead to a reduction in the level of conflict with local traffic, and would improve the town centre environment for non-motorised users.
- 5.5.37 The second objective relating to safety is:
- To improve safety for motorised and NMUs by:
 - reducing accident rates and severity;
 - reducing driver stress; and
 - reducing NMU conflicts with strategic traffic in urban areas.

- 5.5.38 The accident rate for the existing A96 is lower overall than the national average rate for similar road types, although there is a degree of variation along the A96 as accidents (and hence the calculated rates) are location specific. It is evident that a significant proportion of accidents on the existing A96 occur at or in very close proximity to junctions (approximately 75%).
- 5.5.39 The accident appraisal indicates that the dual carriageway standard of road for the proposed Scheme would contribute to the safety objective by reducing the overall numbers of accidents, and in particular would reduce the numbers of Fatal and Serious accidents compared to the Do-Minimum situation. Over the 60 year appraisal period the results indicate that approximately four Fatal accidents, and between 39 and 48 Serious accidents would be saved under the Do-Something scenario compared to the Do-Minimum. In addition, the reduction in longer distance traffic travelling through Nairn with the proposed Scheme in place would reduce the conflict between NMU and traffic within the urban area.
- 5.5.40 The dual carriageway would result in safer overtaking opportunities for vehicles travelling on the route compared to the existing A96, and would provide consistency with the existing dualled sections of the A96.
- 5.5.41 Driver stress levels on the existing A96 single carriageway road are currently likely to be moderate or high in sections along the road in or on approach to urban areas, given the lack of overtaking opportunities. However in rural sections of the road, as expected, low levels of driver stress exist given the low population levels nearby and the lack of major junctions along the trunk road. During construction there would be temporary delays on the local road network which may lead to frustration and an increase in driver stress. However, once operational, the creation of a dual carriageway would significantly reduce the levels of driver stress, with low stress levels expected to be experienced along the majority of the proposed Scheme.
- 5.5.42 As access to the dual carriageway is provided by grade separated junctions along the route, this would reduce the number of conflicting traffic movements, and particularly through the separation of right turn movements from the local road network and removing these manoeuvres from crossing the straight through traffic streams.
- 5.5.43 The third objective relating to the wider economic effects of the proposed Scheme is:
- To provide opportunities to grow the regional economies on the corridor by:
 - improving access to the wider strategic transport network;
 - enhancing access to jobs and services; and
 - supporting access to tourist and recreation sites.
- 5.5.44 The improvement in journey times, journey time reliability and the quality of route provision of the dual carriageway would provide a more efficient means of transporting goods and people along the corridor. This would ultimately lead to the potential for increased productivity in the area. The quantification of the potential Wider Economic Benefits (WEBS) is to be undertaken as part of the business case development for the overall A96 Dualling Programme.
- 5.5.45 The proposed Scheme would improve access to a number of sectors and settlements along the corridor. The reduction in journey times and improved efficiency and reliability of the dual carriageway would result in goods being transported more effectively and would likely expand the employment catchment area.

6 Economic Assessment

6.1 Introduction

- 6.1.1 This chapter presents details of the economic appraisal for the proposed Scheme. It is based on comparisons between the Do-Minimum (i.e. without the proposed Scheme) and Do-Something (i.e. with the proposed Scheme) scenarios, including changes in traffic flows, average journey times, vehicle speeds and travel distance. A road-based assessment has been undertaken comprising the following vehicle types Cars, Light Goods Vehicles (LGV's), Medium Goods Vehicles (MGV's) and Heavy Goods Vehicles (HGV's).
- 6.1.2 The economic evaluation of the proposed Scheme has been carried out using the Department for Transport's (DfT) Transport User Benefit Appraisal (TUBA) software version 1.9.6. The TUBA software has been used to calculate the user benefits for the proposed Scheme based on travel time savings and vehicle operating costs savings. The necessary inputs to the TUBA software were generated from the Moray Firth Transport Model (MFTM) for the Do-Minimum and Do-Something scenarios.
- 6.1.3 The impact that the proposed Scheme has on accident benefits in the study area has been assessed using the DfT's COst and Benefit to Accidents – Light Touch (COBALT) software version 2013.02, in conjunction with the latest July 2016.1 WebTAG parameters file.
- 6.1.4 The economic impacts of delays during construction have been assessed using Highways England's QQueues And Delays at ROadworks (QUADRO) version 4.12 software.
- 6.1.5 In accordance with Her Majesty's Treasury 'Green Book' guidance and DMRB guidance, the benefit stream is calculated over a 60 year appraisal period. The summed monetised units of the final Transport Economic Efficiency (TEE) benefits calculated are expressed in 2010 prices, and for each appraisal year are discounted to 2010 at 3.5 per cent per annum for the first 30 years and at 3.0 per cent per annum thereafter.

6.2 Proposed Scheme Costs

- 6.2.1 The target construction costs for appraisal of the proposed Scheme are estimated as being £428.9 million in 2014 Q1 prices. The cost estimate excludes VAT and construction inflation. The costs of the Do-Minimum scenario have been assumed to be zero.
- 6.2.2 For assessment purposes the proposed Scheme construction is intended to commence in 2019 with an estimated 36 to 48 month construction period. For the purposes of the economic appraisal and the required TUBA input data it has been assumed the construction period, and hence spend profile, would commence in 2019 and end in 2022.

6.3 Accident Benefits

- 6.3.1 As noted in Section 6.1 the accident assessment has been undertaken using the COBALT software, with the potential accidents benefits of the Do-Something scenario evaluated against the Do-Minimum scenario.
- 6.3.2 The COBALT software calculates the number of accidents that would occur in the Do-Minimum and Do-Something scenarios using either a set of default accident rates for different road classes applied to both scenarios, or using a set of locally derived accident rates to apply to the Do Minimum scenario. The default accident rates are national rates derived for the different road classes using UK wide accident data records, and are not specific to the area. This could result in an over or under estimation in the number of casualties saved and therefore the accident benefits. As a result, the accident benefits for the proposed Scheme have been evaluated using both default rates and a set of locally derived rates applied to the existing A96 route.

6.3.3 The software calculates the number of Fatal, Serious and Slight casualties that would occur on each link using the defined accident rates, in conjunction with the traffic flows contained in the Do-Minimum and Do-Something scenario. The difference between each scenario is calculated and presented as the accident benefit. The software also outputs the number of casualties in each severity class that would be saved over the 60 year assessment period. This has been divided by 60 to give a yearly saving across all links included in the COBALT assessment. Table 6.1 and Table 6.2 show the calculated number of accident casualties predicted to occur in the Do-Minimum and Do-Something scenarios, and the number of accident casualties that would be saved under low traffic growth and high traffic growth respectively. This assessment was based on applying the locally derived accident rates to the existing A96 route.

Table 6.1: Average number of casualties saved per year - Inverness to Nairn (including Nairn Bypass): Low Growth – Local Accident Assessment

Low Growth	Fatal	Serious	Slight
DM Casualties (60 Years)	182	1,836	14,058
DS Casualties (60 Years)	178	1,788	13,910
Casualties Saved (60 Years)	4	48	148
Average Casualties Saved	0.1	0.8	2.5

Table 6.2: Average number of casualties saved per year - Inverness to Nairn (including Nairn Bypass) High Growth – Local Accident Assessment

High Growth	Fatal	Serious	Slight
DM Casualties (60 Years)	186	1,890	14,489
DS Casualties (60 Years)	183	1,851	14,414
Casualties Saved (60 Years)	3	39	74
Average Casualties Saved	0.1	0.7	1.2

6.3.4 The monetised cost of accidents and the resulting benefits based on the number of accident casualties saved from the accident appraisal for the low and high traffic growth scenarios are shown in Table 6.3 and Table 6.4 respectively.

Table 6.3: Accident Benefits (60 Years) Inverness to Nairn (including Nairn Bypass) Low Growth – Local Accident Assessment

Low Growth	£000
Total DM Accident Cost	£697,081
Total DS Accident Cost	£684,291
Accident Benefit	£12,790

Table 6.4: Accident Benefits (60 Years) Inverness to Nairn High Growth (including Nairn Bypass) – Local Accident Assessment

High Growth	£000
Total DM Accident Cost	£717,331
Total DS Accident Cost	£707,991
Accident Benefit	£9,340

6.3.5 It is slightly unusual that the low traffic growth scenario results in higher numbers of accident casualties saved than the high traffic growth scenario. This is largely due to the higher levels of traffic using the local road network in the high traffic growth Do-Something scenario in the MFTM future traffic models, compared to the low growth scenario. Ultimately this is driven by the planning data that has input to the MFTM demand model, which significantly increases the number of trips being forecast from the development zones, which in turn increases the traffic levels assigned to sections of the local road network.

6.3.6 From further examination of the traffic model outputs, the three areas where this appears to be most prominent are north of Allanfearn, adjacent to Barn Church Road and adjacent to the existing A96 near Tornagrain. In these areas the MFTM demand model is generating a relatively more significant

increase in trips to/from selected model zones in the high growth scenario, than in the low growth scenario.

6.3.7 As a result there is less of an accident benefit in the high growth scenario as there are significantly more trips using existing sections of the local road network, including the remaining sections of the existing A96, in the Do-Something when compared to the low growth scenario. As the accident casualty numbers are calculated using the forecast traffic flows, a higher level of flow results in a higher number of casualties. This therefore increases the total casualty numbers calculated for the Do-Something under high growth and when compared to the Do-Minimum results in a smaller net difference in casualty numbers.

6.3.8 As noted previously, an accident assessment using default accident rates applied to the existing A96 has also been undertaken. The reasoning for undertaking this sensitivity test is that this assessment should give an indication of the relative change in the accident regime resulting from an intervention based on a wider data set. It is recognised that the absolute number of casualties may be over or under estimated depending on the actual level of accidents in the existing situation. As the default accident rate is higher than the locally derived accident rates, the assessment results in a higher level of benefits. The number of accident casualties saved for the assessment using default accident rates under both low and high traffic growth are shown below in Table 6.5 and Table 6.6 respectively.

Table 6.5: Average number of casualties saved per year - Inverness to Nairn (including Nairn Bypass): Low Growth – Default Assessment

Low Growth	Fatal	Serious	Slight
DM Casualties (60 Years)	203	1,990	15,125
DS Casualties (60 Years)	182	1,824	14,169
Casualties Saved (60 Years)	21	167	956
Average Casualties Saved	0.4	2.8	15.9

Table 6.6: Average number of casualties saved per year - Inverness to Nairn (including Nairn Bypass) High Growth – Default Assessment

High Growth	Fatal	Serious	Slight
DM Casualties (60 Years)	208	2,046	15,570
DS Casualties (60 Years)	188	1,889	14,691
Casualties Saved (60 Years)	20	157	879
Average Casualties Saved	0.3	2.6	14.7

6.3.9 The monetised cost of accidents and the resultant benefits derived from the number of accident casualties saved using the default accident rates for the low and high traffic growth scenarios are shown in Table 6.7 and Table 6.8 respectively.

Table 6.7: Accident Benefits (60 Years) Inverness to Nairn (including Nairn Bypass) Low Growth – Default Assessment

Low Growth	£000
Total DM Accident Cost	£756,361
Total DS Accident Cost	£697,802
Accident Benefit	£58,558

Table 6.8: Accident Benefits (60 Years) Inverness to Nairn High Growth (including Nairn Bypass) – Default Assessment

High Growth	£000
Total DM Accident Cost	£777,435
Total DS Accident Cost	£722,497
Accident Benefit	£54,937

6.3.10 The accident benefits are considerably higher than the assessment using locally derived accident rates, as the default accident rate applied to the existing A96 in the Do Minimum scenario is higher than the local rates. This results in a higher set of casualty numbers being calculated for the Do-

Minimum scenario and hence a higher set of accident costs. When compared against the Do-Something, as the Do-Minimum has higher costs using the default rates this results in a higher level of accident benefits being calculated.

6.4 Construction and Maintenance Delay

Introduction

- 6.4.1 In order to undertake a robust assessment of the proposed Scheme, all significant costs and benefits arising from the implementation of the proposed Scheme were considered. Therefore, the changes in maintenance and road user costs associated with the implementation of the new dual carriageway were assessed, as well as the direct construction impact costs of the proposed Scheme.
- 6.4.2 The QUADRO software was originally designed to determine the total cost of major road maintenance works. However, the software may also be used to estimate the total costs incurred during construction. In particular, QUADRO is able to determine a total road user cost arising from road works, including those associated with road user delay, vehicle operating costs and accident costs.
- 6.4.3 QUADRO (version 4.12) was used to determine the impact of the cost of delays on road users arising from the likely traffic management restrictions associated with construction works for the proposed Scheme, and future maintenance works for both the Do-Minimum and Do-Something scenarios. This was undertaken by considering the effect of traffic management on the following three scenarios:
- **Construction**, which includes the road user costs incurred during construction;
 - **'Do-Minimum'** Maintenance, which incorporates the road user costs associated with the assumed maintenance regime for the existing carriageway over a 60 year period; and
 - **'Do-Something'** Maintenance, which consists of the anticipated road user costs associated with the assumed maintenance of the new dual carriageway over a 60 year period.
- 6.4.4 The overall impact of the proposed Scheme in terms of roadworks delay is calculated from the sum of the proposed Scheme construction costs and the Do-Something future maintenance costs, less the Do-Minimum future maintenance costs.

QUADRO Input

- 6.4.5 The input to the QUADRO program comprises three main elements, namely the traffic characteristics; carriageway type; and the traffic management description.
- 6.4.6 The traffic characteristics comprise the AADT flows derived from MFTM, seasonality index, vehicle proportions and the forecast growth rate for traffic on the existing A96 and on the proposed Scheme. QUADRO uses these values to factor the traffic levels to the year in which the works are to be undertaken. A summary of the values used to describe the traffic characteristics for the existing A96 and the proposed Scheme maintenance, and the construction phase are provided in Table 6.9.

Table 6.9: QUADRO Input for 2014 Traffic Characteristics

Input	Values
Network Classification	Non Built-Up Trunk
Seasonality Index	1.1
Base Year	2014
Vehicle Proportions (From MFTM)	Car 0.921 / LGV 0.058 / OGV1 0.010 / OGV2 0.010 / PSV 0.000
Traffic Growth Factors	Established from Moray Firth Transport Model
Speed Limit for Works Length	64kph
AADT	Varies along the length of the route

- 6.4.7 The assumed carriageway maintenance works for the existing A96 carriageway and the new dual carriageway were also input to the QUADRO software for the Do-Minimum and Do-Something scenarios respectively. The carriageway maintenance was assumed to be as follows:

- **Do-Minimum – Existing A96 from Inverness to Hardmuir, east of Auldearn**, which comprises essential carriageway maintenance to keep the route operational. The assumed maintenance programme involves 100mm inlaying in 2021; resurfacing in 2031; 200mm inlaying in 2041; resurfacing in 2051; full reconstruction in 2061; resurfacing in 2071; and 100mm inlaying in 2081; and
- **Do-Something - A96 Dualling Inverness to Nairn (including Nairn Bypass)**, which refers to the new dual carriageway between Inverness and Hardmuir. The future maintenance of the upgraded carriageway involves resurfacing in 2031; 100mm inlaying in 2041; resurfacing in 2051; 200mm inlaying in 2061; resurfacing in 2071; and its full reconstruction in 2081.

6.4.8 For the assessment the construction traffic management phases have been grouped into six stages, three of which relate to the construction of the Nairn bypass, and three relating to the dualling of the A96 between Inverness and Gollanfield. The three stages relating to the Nairn bypass are defined as:

- Nairn Bypass Section 1 (N1) that comprises all bypass construction traffic management east of Nairn;
- Nairn Bypass Section 2 (N2) that comprises the bypass construction area southwest of Nairn; and
- Nairn Bypass Section 3 (N3) that comprises the construction area from west of Nairn to Gollanfield.

6.4.9 Traffic management arrangements for the dualling of the A96 between Inverness and Gollanfield are split into three sections;

- Inverness to Gollanfield Section 1 (I1) that comprises the area between Brackley Junction and Gollanfield;
- Inverness to Gollanfield Section 2 (I2) that comprises an area further west around Kerrowaird; and
- Inverness to Gollanfield Section 3 (I3) that comprises the area to the east of Inverness.

6.4.10 Each phase of traffic management was assessed separately within the six overall stages and the resultant user costs summed together.

6.4.11 In relation to future maintenance, the route was divided into sections based on the locations of cross-over points along the length of the dual carriageway and traffic flow information was provided for each of these. The planned maintenance of the future dual carriageway would be undertaken in sections of varying lengths between these carriageway cross-over points, with contra flow traffic management arrangements in operation. Traffic flows on the model links between these cross-over section locations were used in the calculations.

QUADRO Output

6.4.12 The calculated road user costs for the construction of the proposed Scheme are presented in Table 6.10.

Table 6.10: QUADRO Output for Road User Costs during Construction

Scenario	Costs associated with Delay (2010 prices)		Costs associated with Accidents (2010 prices)		Total Cost (2010 prices)	
	Low Growth	High Growth	Low Growth	High Growth	Low Growth	High Growth
Do-Something	396,386	415,029	181,322	193,365	£612,239	£631,715

Note: Total cost also includes costs associated with changes in fuel.

QUADRO Results Summary

6.4.13 A summary of the QUADRO results are provided in Table 6.11.

Table 6.11: QUADRO Results

Phase	'Low Growth' Road User Cost (£ in 2010 Prices)	'High Growth' Road User Cost (£ in 2010 Prices)
Construction Stage N1	£86,500	£89,000
Construction Stage N2	£24,700	£25,300
Construction Stage N3	£3,400	£3,400
Construction Stage I1	£238,800	£246,000
Construction Stage I2	£14,300	£14,600
Construction Stage I3	£244,600	£253,400
Impact of Construction	£612,200	£631,700
Do-Minimum Maintenance	£63,807,000	£70,690,000
Do-Something Maintenance	£22,666,000	£25,581,000
Impact of Maintenance	-£41,141,000	-£45,109,000
Total Impact of Proposed Scheme	-£40,528,000	-£44,477,000

- 6.4.14 From Table 6.11 it is evident that the impact of construction in terms of the delay to road users is relatively low. The majority of the proposed Scheme has an alignment that is largely offline, and as a result the construction impacts are confined to the locations where the proposed Scheme is to 'tie-in' to connect to the existing A96 or where it crosses the existing A96. .
- 6.4.15 In terms of the impacts from future maintenance activities, it is clear from Table 6.11 that the Do-Minimum costs are expected to be greater than the Do-Something costs. With the proposed Scheme in place the trunk road network would have a greater level of resilience with respect to planned and unplanned maintenance, as being a two lane dual carriageway standard road, one carriageway can be closed for maintenance work with the traffic diverted onto the other carriageway to operate under a contraflow system. This would therefore allow maintenance to be planned with the ability to retain the availability of one carriageway for traffic all times. In addition, the Do-Something would also have the majority of the existing A96 itself available as a further potential diversion route if needed. The section between the B9006 Southern Junction and Nairn west junction will not be retained following the construction of the proposed Scheme.
- 6.4.16 In comparison, the Do-Minimum scenario (without the proposed Scheme in place) has a much more limited resilience with respect to maintenance work for the existing A96. There is clearly limited availability of appropriate diversion routes in the Do-Minimum scenario and maintenance of the existing A96 would impose additional delay on road users as a result of lane closures through, for example, the need to deploy shuttle-working techniques.
- 6.4.17 As a result the QUADRO assessment shows a net benefit to road users arising from the increased resilience of the proposed Scheme in the Do-something scenario, compared to the Do-Minimum scenario.

6.5 TUBA Assessment

- 6.5.1 The required inputs to the TUBA software comprise traffic matrices, and time, distance (and if relevant toll) 'skim' matrices for the Do-Minimum and Do-Something options extracted from the MFTM traffic model. The scheme benefits are calculated by comparing, for each pair of zones, the total costs of travel (including travel time, vehicles operating costs and tolls) for the Do-Minimum and the Do-Something scenarios.
- 6.5.2 The calculated TUBA benefits from the low and high growth scenarios are summarised in Table 6.12.

Table 6.12: TUBA Results

TUBA Benefits	Low Growth £000s	High Growth £000s
Travel Time	370,595	441,619
Vehicles Operating Costs	-35,984	-31,833
Indirect Tax	21,924	20,071
Greenhouse Gases	-10,102	-9,124
Present Value Benefits	346,433	420,732

6.6 Key Economic Assessment Results

6.6.1 The results of the economic assessment are summarised in Table 6.13 for the target cost derived for appraisal purposes of £428.9m. In accordance with guidance the cost that has been entered into TUBA includes an adjustment to take account of construction price inflation and therefore increases to £488.6m.

Table 6.13: Economic Assessment Results (Target Cost)

Impact	Monetary Value (in 2010 prices)	
	Low Growth	High Growth
Present Value of Benefits (TUBA)	£346,433,000	£420,732,000
Local Accident Benefits (COBALT)	£12,790,600	£9,339,800
QUADRO Benefits	£40,528,000	£44,477,000
Total Present Value of Benefits	£399,751,000	£474,549,000
Present Value of Costs	£377,992,000	£377,992,000
Net Present Value	£21,959,000	£96,557,000
Benefit to Cost Ratio	1.1	1.3

6.6.2 As Table 6.13 shows, the proposed Scheme would generate a positive net present value under both the low and high traffic growth scenarios, and would result in an overall benefit to cost ratio (BCR) in the range between 1.1 and 1.3.

6.6.3 Table 6.14 presents the results of the economic assessment allowing for the inclusion of accident benefits calculated using the application of default accident rates, as a sensitivity test. This provides for the relative comparison between the Do-Minimum and Do-Something as the net differences in accidents are more directly related to traffic changes. The results from the table show that the benefits accrued by the proposed Scheme would increase slightly, with the BCR lying in the range between 1.2 and 1.4.

Table 6.14: Economic Assessment Results (Target Cost) – Default Accident Sensitivity

Impact	Monetary Value in 2010 prices)	
	Low Growth	High Growth
Present Value of Benefits (TUBA)	£346,433,000	£420,732,000
Default Accident Benefits (COBALT)	£58,558,400	£54,937,200
QUADRO Benefits	£40,528,000	£44,477,000
Total Present Value of Benefits	£445,520,000	£520,146,000
Present Value of Costs	£377,992,000	£377,992,000
Net Present Value	£67,528,000	£142,154,000
Benefit to Cost Ratio	1.2	1.4

7 Conclusion

7.1 Engineering Considerations

- 7.1.1 The proposed Scheme has been developed as part of the A96 Dualling Programme to meet the commitment by the Scottish Government set out in the Infrastructure Investment Plan (Scottish Government 2011).
- 7.1.2 The proposed Scheme has been designed in accordance with the DMRB and comprises approximately 31km of new dual carriageway, six grade separated junctions, local road connections and dedicated NMU facilities. The proposed A96 dual carriageway is a Category 7A all-purpose dual carriageway. This is the highest category of all-purpose road with grade separated junctions and a smooth flowing alignment. As part of the design development Departures from Standard have been introduced for the proposed dual carriageway and local roads to minimise the environmental impact of the scheme and provide value for money. Local road realignments and new means of access from local roads have been designed through consultation and agreement with The Highland Council.
- 7.1.3 The proposed Scheme introduces a dedicated shared use path between Inverness and Nairn for NMUs. The proposed path is segregated from traffic and connects into existing local paths along its length.
- 7.1.4 Site constraints result in a requirement to construct a significant proportion of the scheme on embankment. It is a key aim of the design to utilise as high a proportion as practicable of 'site won' material for construction of embankments and for landscaping purposes. While there would be an earthworks balance over the eastern half of the scheme the shortfall of acceptable excavated material elsewhere results in a high overall net import of material.
- 7.1.5 In line with best practice, separate SUDS have been proposed for the dual carriageway and local road networks. The drainage along the proposed dual carriageway has been developed to provide two or three levels of treatment in line with site specific water quality requirements for carriageway runoff by means of filter drains, retention ponds, detention basins and swales before discharge into the local watercourses.
- 7.1.6 Consultation with public utility companies has taken place in accordance with the New Roads and Street Works Act 1991 (NRSWA) to identify locations of existing apparatus and identify conflicts with the proposed Scheme. Preliminary proposals for required diversions and budget costs have been obtained in advance of detailed design solutions to be undertaken in advance of construction.
- 7.1.7 As part of the proposed Scheme 25 overbridges and underbridges are required, including three crossings of the Aberdeen to Inverness Railway line and one crossing over the River Nairn. In addition 24 culverts are required to carry the proposed Scheme over local surface watercourses.
- 7.1.8 Road lighting is proposed at each of the grade separated junctions and on the dual carriageway between the proposed Smithton Junction and Seafield Roundabout. Existing lighting on Barn Church Road (C1032) and Kerrowgair – Croy Road (C1017) will be integrated into the proposed lighting.
- 7.1.9 The predominantly offline alignment of the proposed Scheme will limit disruption during construction to the existing A96 and local roads, maintaining local access during construction.

7.2 Scheme Objectives

- 7.2.1 The DMRB Stage 3 design, as detailed in this report, has been developed to meet the scheme objectives set out in Section 1.3. Detailed below are the scheme objectives and how the proposed Scheme meets these objectives.

To improve the operation of the A96 and inter-urban connectivity

- 7.2.2 The proposed Scheme would improve the operation of the A96 and inter-urban connectivity by completing over 20% of the Scottish Government's commitment to dual the A96 between Aberdeen and Inverness as outlined in the Infrastructure Investment Plan (Scottish Government 2011). The proposed Scheme would provide an approximate end to end journey time saving between Inverness and Hardmuir of between 8.5 and 12.5 minutes depending on the time of day of travel. Further benefits to journey time reliability would be achieved by the increased overtaking opportunities, increased resilience to accidents, breakdowns and road maintenance introduced by the proposed dual carriageway.

To improve safety for motorised and Non-Motorised Users (NMUs)

- 7.2.3 The accident appraisal indicates that the dual carriageway standard of road for the proposed Scheme would contribute to the safety objective by reducing the overall number of accidents, and in particular would reduce the numbers of fatal and serious accidents. Over the 60 year appraisal period the results indicate that approximately four fatal accidents and between 39 and 48 serious accidents would be saved under the Do-Something scenario compared to the Do-Minimum.
- 7.2.4 The provision of a dedicated off carriageway shared use path for NMUs would reduce conflict between road traffic and NMUs. Within Nairn there is a reduction in traffic on the existing A96 of approximately 45% as traffic transfers onto the Nairn Bypass which would improve road safety for NMUs within Nairn.

To provide opportunities to grow the regional economies on the corridor

- 7.2.5 The improvement in journey times, journey time reliability and the quality of route provision of the dual carriageway would provide a more efficient means of transporting of goods and people along the corridor.
- 7.2.6 The proposed Scheme would improve access to a number of sectors and settlements along the corridor. The reduction in journey times and improved efficiency and reliability of the dual carriageway would result in goods being transported more effectively and would likely expand the employment catchment area.
- 7.2.7 The purpose of the Scheme is to improve the operation of the strategic road network and enhance connectivity between Inverness and Aberdeen. In addition the proposed Scheme accommodates the future development aspirations of The Highland Council. The proposed upgraded Smithton Junction provides enhanced access to proposed developments in this area. The provision of Mid Coul Junction provides direct access to Inverness Airport and the ongoing developments in the area including the proposed settlement at Tornagrain as well as the proposed Dalcross railway station and park and ride facility. The provision of Nairn West Junction provides improved access to the potential Whiteness development site on the former Ardersier fabrication yard.

To facilitate active travel in the corridor

- 7.2.8 The NMU shared use path is provided in order to facilitate active travel within the proposed Scheme corridor. The proposed facilities will provide a safer, more appealing route for both commuting and recreational users between Inverness and Nairn.

To facilitate integration with Public Transport facilities

- 7.2.9 The scheme retains a substantial section of the existing A96 between Smithton and Brackley which would be detrunked and reclassified as a local road. Public transport provision along this section can be maintained using existing facilities. Between Brackley junction and Nairn West junction new bus stops are provided on the dual carriageway to maintain public transport access for local residents.
- 7.2.10 The reduction of traffic on the existing A96 through Nairn would benefit public transport operators by improving journey times and journey time reliability.

- 7.2.11 The grade separated junction at Mid Coul Junction provides access to Inverness Airport and to the proposed Dalcross railway station and associated park and ride facilities. The scheme would also have no adverse effect on the proposed site of the rail halt at Seafield to serve the Inverness Retail and Business Park.

To minimise the environmental effect on the communities along the corridor through reducing severance and improving environmental conditions in towns to be bypassed.

- 7.2.12 The retention of the existing A96 between Smithton Junction and Brackley Junction, and between Nairn West Junction and Hardmuir, through Nairn will provide local connectivity to the proposed dual carriageway at strategic location along the route.
- 7.2.13 The proposed Scheme would significantly reduce the level of traffic through Nairn improving the environment for local residents. Pollution and noise levels would be reduced overall providing a more attractive area for locals to use. Environmental mitigation including noise barriers, low noise surfacing and planting along the corridor would help to reduce the impact on the local surroundings as described in the DMRB Stage 3 Scheme Assessment Report, Part 1, Environmental Statement.

7.3 Value for Money

- 7.3.1 The cost estimate for the scheme is in Pounds Sterling (£) and rates are based on 2014 Quarter 1 prices which maintains the same cost basis as per the DMRB Stage 2 cost estimate. The assessed cost estimate is calculated as £429m, excluding VAT. This is the cost estimate prepared on the basis of the Stage 3 DMRB design and has been used for assessment purposes. The cost range for the Scheme is £375m to £475m and the cost estimate remains within this range.
- 7.3.2 At a cost of £429m the scheme has a Benefit to Cost Ratio (BCR) between 1.1 and 1.3. The proposed Scheme represents value for money for the tax payer and provides a vital upgrade to the Scottish Trunk road network.

7.4 References

Jacobs, Faber Maunsell, Grant Thornton and Tribal Consulting (*on behalf of Transport Scotland*) (2009). Strategic Transport Projects Review: Final Report. Transport Scotland.

Scottish Government (2011). Infrastructure Investment Plan. Scottish Government

Legislation

New Roads and Street Works Act 1991 (New Roads and Street Works Act (NRSWA). The Stationery Office

Appendix A – Departures from Standard

Table A.1: Dual carriageway departures from DMRB Standards.

Departure Reference	Road Name & Location	Approx. chainage	Description of Departure from Standard	Standards Ref.	Standard Required	Standard Provided	Figure No.
A96IN-001	Proposed A96 westbound carriageway between the Smithton Junction and the Seafield roundabout	ch810 – ch1300	Weaving length between adjacent junctions	DMRB TD 22/06 Para. 4.36 to 4.38	Desirable Minimum = 1km Absolute minimum = 250m	485m	4.1a
A96IN-002	Proposed A96 eastbound carriageway between the Seafield roundabout and start of Smithton Junction eastbound diverge taper	ch850 – ch1080	Weaving length between adjacent junctions	DMRB TD 22/06 Para. 4.36 to 4.38	Desirable Minimum = 1km Absolute minimum = 250m	275m	4.1a
A96IN-003	Proposed A96 eastbound carriageway between the Brackley Junction and Gollanfield bus lay-by	ch14500 – ch15500	Weaving length between Brackley Junction eastbound merge and eastbound bus lay-by	DMRB TD 22/06 Para. 4.36 to 4.38 DMRB TD 69/07 Para. 3.7	Desirable Minimum = 1km	925m	4.1k
A96IN-004	Proposed A96 westbound carriageway between the Gollanfield bus lay-by and the Brackley Junction	ch14650 – ch15500	Weaving length between westbound bus lay-by and Brackley junction westbound diverge	DMRB TD 22/06 Para. 4.36 to 4.38 DMRB TD 69/07 Para. 3.7	Desirable Minimum = 1km	780m	4.1k
A96IN-005	Mid Coul junction – Westbound diverge and merge slip roads – Two way slip road.	ch10650	Carriageway cross section on two way single carriageway slip road.	DMRB TD 22/06, Para. 5.27 DMRB TD 27/05, Para. 4.10.5	Diverge (DG1C) 2.0m n/s verge 3.3m n/s hardshoulder 3.7m carriageway 0.7m o/s hardstrip Central Reserve 2.5m central reserve Merge (MG1C) 2.0m n/s verge 3.3m n/s hardshoulder 3.7m carriageway 0.7m o/s hardstrip	Diverge (DG1C) 2.0m n/s verge 3.3m n/s hardshoulder 3.7m carriageway Merge (MG1C) 2.0m n/s verge 3.3m n/s hardshoulder 3.7m carriageway	4.1h
A96IN-006	Brackley junction – Eastbound diverge and merge slip roads – Two way slip road.	ch14050	Carriageway cross section on two way single carriageway slip road.	DMRB TD 22/06, Para. 5.27 DMRB TD 27/05, Para. 4.10.5			4.1j
A96IN-007	Brackley junction – Westbound diverge and merge slip roads – Two way slip road.	ch14200	Carriageway cross section on two way single carriageway slip road.	DMRB TD 22/06, Para. 5.27 DMRB TD 27/05, Para. 4.10.5			4.1j
A96IN-008	Nairn West junction – Eastbound diverge and merge slip roads – Two way slip road.	ch17850	Carriageway cross section on two way single carriageway slip road.	DMRB TD 22/06, Para. 5.27 DMRB TD 27/05, Para. 4.10.5			4.1m

Departure Reference	Road Name & Location	Approx. chainage	Description of Departure from Standard	Standards Ref.	Standard Required	Standard Provided	Figure No.
A96IN-122	A96 dual carriageway – eastbound lay-by	ch23200	Combined lay-by and access	DMRB TD69/07 Para. 3.8	Lay-bys and accesses must not be combined	A pond maintenance access has been located at the back of the lay-by	4.1p

Table A.2 : Local road departures from DMRB Standards with reference to The Highland Council guidelines

Departure Reference	Road Name & Location	Approx. chainage	Description of Departure from Standard	Standards Ref.	Standard Required	Standard Provided	Figure No.
A96IN-009	Existing A96 west link to B9006	ch13700	Horizontal Radius	DMRB TD9/93 Table 3 85kph design speed	Desirable Minimum = 510m	R255m	4.1j
				THC RTGND Table 5.2	Desirable Minimum = R510m		
A96IN-011	Existing A96 link. Eastbound bus layby west of B9006.	ch13600 – ch14100	Proximity of bus stop layby to junction.	DMRB TD 69/07 Para. 3.7 & 3.8	3.75V Where V = design speed = 318.75m	Upstream > 318.75m Downstream = 113m	4.1j
A96IN-012	Existing A96 link. Westbound bus layby west of B9006.	ch13 600 – ch14,100	Proximity of bus stop layby to junction.	DMRB TD 69/07 Para. 3.7 & 3.8	3.75V Where V = design speed = 318.75m	Upstream = 30m Downstream > 318.75m	4.1j
A96IN-015	North tie into existing C1020	ch9550	Horizontal Radius	DMRB TD9/93 Table 3 60kph design speed	Desirable Minimum = 360m	R103m	4.1g
				THC RTGND Table 5.2	Desirable Minimum = 255m		
A96IN-016	North tie into existing C1020	ch9550	Reduced forward SSD	THC RTGND Table 5.2	Desirable Minimum = 120m	81m north and southbound	4.1g
A96IN-017	C1017 – Northbound bus layby between existing A96 roundabout and Mid-Coul junction south roundabout	ch10550	Proximity of bus stop layby to junction.	DMRB TD 69/07 Para. 3.7 & 3.8	3.75V Where V = design speed = 318.75m	Upstream = 10m Downstream = 22m	4.1h
A96IN-018	C1017 – Southbound bus layby between existing A96 roundabout and Mid-Coul junction south roundabout	ch10500	Proximity of bus stop layby to junction.	DMRB TD 69/07 Para. 3.7 & 3.8	3.75V Where V = design speed = 318.75m	Upstream = 50m Downstream = 70m	4.1h

Departure Reference	Road Name & Location	Approx. chainage	Description of Departure from Standard	Standards Ref.	Standard Required	Standard Provided	Figure No.
A96IN-020	B9006 – stagger junction between westbound slip roads and existing A96 west link road	ch14100	Junction stagger distance	THC RTGND Para. 5.6.6.2	Minimum 50m	46m	4.1j
A96IN-021	B9006 at Brackley Junction north of overbridge	ch14100	Horizontal Radius	DMRB TD9/93 Table 3 85kph design speed	Desirable Minimum = R510m	R255m	4.1j
				THC RTGND Table 5.2	Desirable Minimum = R510m		
A96IN-023	Junction visibility from existing A96 link, west of B9006	ch14100	Junction visibility to north	THC RTGND Table 5.2	Desirable Minimum = 9.0x160m	9.0 x 146m north 4.5 x 153m north 2.4 x 160m north	4.1j
A96IN-025	New link between existing U1029 and existing A96	ch17100	Horizontal Radius	DMRB TD9/93 Table 3 60kph design speed	Desirable Minimum = R255m	R40m	4.1i
				THC RTGND Table 5.2	Desirable Minimum = R255m		
A96IN-026	Link from Narin West south roundabout to bus turning circle.	ch17900	Horizontal Radius	DMRB TD9/93 Table 3 60kph design speed	Desirable Minimum = 255m	R20m R50m	4.1m
				THC RTGND Table 5.2	Desirable Minimum = R255m		
A96IN-027	Nairn West westbound Approach to Roundabout	ch18050	Proximity of bus stop layby to junction.	DMRB TD 69/07 Para. 3.7 & 3.8	3.75V Where V = design speed = 318.75m	Upstream = 318.75m Downstream = 72m	4.1m
A96IN-028	Nairn West eastbound Approach to Roundabout	ch18050	Proximity of bus stop layby to junction.	DMRB TD 69/07 Para. 3.7 & 3.8	3.75V Where V = design speed = 318.75m	Upstream = 156m Downstream = 318.75m	4.1m
A96IN-030	Cross roads with western extent of C1170	ch19300	Junction stagger distance	THC RTGND Para. 5.6.6.2	Minimum 50m	10m	4.1n
A96IN-031	Eastern extent of realignment	ch21900	Horizontal Radius	DMRB TD9/93 Table 3 70kph design speed	Desirable Minimum = R360m	R90m	4.1o
				THC RTGND Table 5.2	Desirable Minimum = R255m		

Departure Reference	Road Name & Location	Approx. chainage	Description of Departure from Standard	Standards Ref.	Standard Required	Standard Provided	Figure No.
A96IN-032	U3226 to Balnaspirach	ch20500	Reduced forward SSD	TD 9/93 Para 1.23, 1.24, 1.26a, Table 3	Minimum = 90m	Northbound = 45m Southbound = 61m	4.1o
				THC RTGND Table 5.2	U Class Road = 120m		
A96IN-033	U3226 to Balnaspirach	ch20500	Horizontal Radius	DMRB TD9/93 Table 3 60kph design speed	Desirable Minimum = R255m	R50m	4.1o
				THC RTGND Table 5.2	Desirable Minimum = R255m		
A96IN-036	C1170 – link between B9090 and B9091	ch22000	Horizontal Radius	DMRB TD9/93 Table 3 70kph design speed	Desirable Minimum = R360m	R180m	4.1o
				THC RTGND Table 5.2	Desirable Minimum = R255m		
A96IN-038	Northern extent of realignment	ch22850	Horizontal Radius	DMRB TD9/93 Table 3 60kph design speed	Desirable Minimum = R255m	R127m	4.1p
				THC RTGND Table 5.2	Desirable Minimum = R255m		
A96IN-039	Northern extent of realignment	ch22850	Reduced forward SSD	THC RTGND Table 5.2	U Class Road = 120m	105m	4.1p
A96IN-043	U2997 near Mill o' Hill	ch26400	Horizontal Radius	DMRB TD9/93 Table 3 60kph design speed	Desirable Minimum = R255m	R25m	4.1r
				THC RTGND Table 5.2	Desirable Minimum = R255m		
A96IN-044	U2997 near Mill o' Hill	ch26400	Reduced forward SSD	THC RTGND Table 5.2	C Class Road = 120m	50m	4.1r

Table A.3: Accesses onto local roads with standards below The Highland Council guidance

Reference	Road Name & Location	Approx. chainage	Description of Departure from Standard	Standards Ref.	Standard Required	Standard Provided	Figure No.
A96IN-046	Existing A96 west of existing Smithton roundabout	Dual carriageway ch1480	Junction stagger distance - Pond access to ITS access	THC RTGND Para. 5.6.6.2	Minimum 50m	0m	4.1a
A96IN-047	Existing A96 east of Milton of Culloden	Dual carriageway ch3100	Junction spacing – Field access to existing accesses	THC RTGND Table 5.4	Minimum 160m	25m – West 55m - East	4.1c
A96IN-048	Existing A96 east of Milton of Culloden	Dual carriageway ch4500	Junction stagger distance – Field access to existing accesses	THC RTGND Para. 5.6.6.2	Minimum 50m	32m	4.1d
A96IN-049	Existing A96 east of Balloch Junction	Dual carriageway ch5100	Junction spacing – Field access to Balloch Junction	THC RTGND Table 5.4	Minimum 160m	115m	4.1d
A96IN-121	Existing A96 east of Balloch Junction	Dual carriageway ch6300	Junction visibility– Pond access to existing A96	THC RTGND Table 5.4	Minimum 160m	120m to the west	4.1e
A96IN-050	Existing A96 east of Balloch Junction	Dual carriageway ch6300	Junction spacing – Pond access to pond access	THC RTGND Table 5.4	Minimum 160m	38m	4.1e
A96IN-051	Existing A96 east of Kerrowaird Overbridge	Dual carriageway ch8900	Junction spacing – Pond access to property access	THC RTGND Table 5.4	Minimum 160m	65m east >160m west	4.1g
A96IN-052	U1136 near Milton of Culloden – Field access on east side of road	Dual carriageway ch2800	Junction stagger distance – Pond access to properties	Access to Single Houses and Small Housing Developments (ASHSHD) – Para. 4.1.4	Min to road junction = 90m Min to property access = 30m	9m, 26m – North 10m - South	4.1b
A96IN-117	U1136 near Milton of Culloden – Field access on east side of road	Dual carriageway ch2800	Junction stagger distance – Field access to properties	ASHSHD – Para. 4.1.4	Min to road junction = 90m Min to property access = 30m	3m, 12m, 23m –South	4.1b
A96IN-054	C1020 – Petty church	C1020 ch490	Junction spacing – Church access to C1020 junction with existing A96	THC RTGND Table 5.4	Min to road junction = 90m Min to property access = 30m	33m	4.1g
A96IN-057	C1020 –North of mainline	C1020 ch0	Junction visibility– Field access to railway line	THC RTGND Table 5.4	Minimum 120m	60m to north 120 to south	4.1g
A96IN-058	U5408 from C1017 – Mid Coul Junction	C1017 South Approach ch95	Junction spacing	ASHSHD – Para. 4.1.4	Min to road junction = 90m Min to property access = 30m	15m	4.1h

Reference	Road Name & Location	Approx. chainage	Description of Departure from Standard	Standards Ref.	Standard Required	Standard Provided	Figure No.
A96IN-059	B9006 - South of mainline	B9006 ch740	Junction stagger distance – Property access to field access	THC RTGND Para. 5.6.6.2	Minimum 50m	30m	4.1j
A96IN-060	B9006 - South of mainline	B9006 ch740	Junction spacing – Property access to field access	THC RTGND Table 5.4	Minimum 160m	69m	4.1j
A96IN-061	B9006 - South of mainline	B9006 ch770	Junction stagger distance – Field access to field access	THC RTGND Para. 5.6.6.2	Minimum 50m	45m	4.1j
A96IN-118	C1013 – north of existing A96 east side	C1013 ch440	Junction stagger distance – Field access to field access	THC RTGND Para. 5.6.6.2	Minimum 50m	10m	4.1k
A96IN-064	U1017 - South of mainline	U1017 ch40	Junction stagger distance – Field access to field access	THC RTGND Para. 5.6.6.2	Minimum 50m	0m	4.1k
A96IN-065	U1017 - South of mainline	U1017 ch40	Junction visibility – Field access (west)	THC RTGN Table 5.4	Minimum 120m	35m to north 60m to south	4.1k
A96IN-066	U1017 - South of mainline	U1017 ch40	Junction visibility – Field access (east)	THC RTGN Table 5.4	Minimum 120m	35m to north 60m to south	4.1k
A96IN-067	Link from Nairn West south roundabout	Cockhill Access ch530	Junction spacing	ASHSHD – Para. 4.1.4	Min to road junction = 90m Min to property access = 30m	28m	4.1m
A96IN-068	C1163 near existing A96	C1163 ch80	Junction spacing – Caravan Park to Ross Timber	THC RTGN Table 5.4	Min to road junction = 90m Min to property access = 30m	22m	4.1n
A96IN-070	C1163 near existing A96	C1163 ch80	Junction stagger distance – Property access (Caravan Park) to Property access (Quarry Access)	THC RTGND Para. 5.6.6.2	Minimum 50m	18m	4.1n
A96IN-075	C1163 east of Balnaspirach	C1163 ch1900	Junction stagger distance – Field access to field access	ASHSHD – Para. 4.1.4	Min to road junction = 90m Min to property access = 30m	22m	4.1o
A96IN-077	U3226 to Balnaspirach	C1163 ch1930	Junction visibility – Field access	THC RTGND Table 5.4	Minimum 120m	50m	4.1o
A96IN-078	B9090 to C1170 junction	B9090 ch170	Junction stagger distance – Private property access to C1170/B9090 junction	THC RTGND Para. 5.6.6.2	Minimum 50m	15m	4.1p
A96IN-082	Existing A96 west of courage overbridge	Existing A96 (Courage) ch0	Junction stagger distance – Pond access to existing property access	THC RTGND Para. 5.6.6.2	Minimum 50m	38m	4.1t

Reference	Road Name & Location	Approx. chainage	Description of Departure from Standard	Standards Ref.	Standard Required	Standard Provided	Figure No.
A96IN-045	C1172 – near Bogside of Boath	Dual carriageway ch27350	Vertical gradient	THC RTGND Table 5.2	C Class Road = 0.8% Min	0.5% for 180m	4.1s
A96IN-086	U2997 near Mill o Hill	U2997 ch60	Junction Spacing – Field access to U2997 junction	ASHSHD – Para. 4.1.4	Min to road junction = 90m Min to property access = 30m	15m	4.1r
A96IN-087	U2997 near Mill of Boath	C1172 ch360	Junction Stagger – Field access to private property to south	THC RTGND Para. 5.6.6.2	Minimum 50m	25m – West 95m – East	4.1s
A96IN-120	U2997 near East Lodge Cottage	C1172 ch360	Junction visibility – Pond access	THC RTGND Table 5.4	Minimum 120m	30m – West 60m – East	4.1s

Table A.4: Local road relaxations from DMRB standards and with standards below The Highland Council guidelines

Departure Reference	Road Name & Location	Approx. chainage	Description of Departure from Standard	Standards Ref.	Standard Required	Standard Provided	Figure No.
A96IN-089	West arm of Smithton junction north roundabout	Dual carriageway ch1700	Horizontal Radius	THC RTGND Table 5.2 DMRB TD16/07 Para. 7.49	Desirable Minimum = R510m Entry path radius <100m	R60m Entry path radius <100m	4.1b
A96IN-010	Existing A96 west link to B9006 at Brackley Junction	Dual carriageway ch13700	Vertical gradient	THC RTGND Table 5.2	B Class Road = 0.8% Min	0.46% for 110m at tie in	4.1j
A96IN-013	Junction spacing between existing A96 west link junction with B9006 and link onto existing B9006 providing access to restaurant	Dual carriageway ch14050	Junction spacing	THC RTGND Table 5.4	Minimum 160m	55m	4.1j
A96IN-090	West arm of Balloch junction north roundabout	Dual carriageway ch4900	Horizontal Radius	THC RTGND Table 5.2 DMRB TD16/07 Para. 7.49	Desirable Minimum = R510m Entry path radius <100m	R200m Entry path radius <100m	4.1d
A96IN-091	East arm of Balloch junction north roundabout	Dual carriageway ch5050	Horizontal Radius	THC RTGND Table 5.2 DMRB TD16/07 Para. 7.49	Desirable Minimum = R510m Entry path radius <100m	R100m Entry path radius <100m	4.1d

Departure Reference	Road Name & Location	Approx. chainage	Description of Departure from Standard	Standards Ref.	Standard Required	Standard Provided	Figure No.
A96IN-014	Upper Cullernie Road junction with C1032 Barn Church Road	Dual carriageway ch4950	Junction spacing	THC RTGND Table 5.4	Minimum 160m	155m to Balloch junction south roundabout	4.1d
A96IN-019	U5408 junction with C1017 -between existing A96 roundabout and Mid-Coul junction south roundabout	Dual carriageway ch10500	Junction spacing	THC RTGND Table 5.4	Minimum 120m	80m south as existing 94m to junction roundabout	4.1h
A96IN-092	Realigned U1025 connection with B9006, north of Brackley junction	Dual carriageway ch13650	Horizontal Radius	DMRB Table 3 60kph design speed	Desirable Minimum = R255m	R180m & R200m	4.1j
				THC RTGND Table 5.2	Desirable Minimum = R255m		
A96IN-024	Existing A96 east link to B9006 at Brackley Junction	Dual carriageway ch14400	Vertical gradient	THC RTGND Table 5.2	B Class Road = 0.8% Min	0.14% for 180m at tie in	4.1j
A96IN-093	Existing A96 link onto Gollanfield overbridge	Dual carriageway ch15,200	Horizontal Radius	THC RTGND Table 5.2	Desirable Minimum = R255m	R180m	4.1k
A96IN-094	B9006 at Brackley Junction south of overbridge	Dual carriageway ch14100	Horizontal Radius	DMRB Table 3 85kph design speed	Desirable Minimum = R510m	R360m	4.1j
				THC RTGND Table 5.2	Desirable Minimum = R510m		
A96IN-095	Link road south of overbridge	Dual carriageway ch15300	Horizontal Radius	DMRB Table 3 60kph design speed	Desirable Minimum = R255m	R180m	4.1k
				THC RTGND Table 5.2	Desirable Minimum = R255m		
A96IN-096	Existing A96 link onto U2218, north of Nairn West junction	Dual carriageway ch17900	Horizontal Radius	THC RTGND Table 5.2	Desirable Minimum = R255m	R50m	4.1m
A96IN-029	B9091 to C1163 link road	Dual carriageway ch18900 to 21600	Vertical gradient	THC RTGND Table 5.2	C Class Road = 0.8% Min	0.27% from ch0 to ch550 to match existing levels 0.5% from ch1000 to ch3050 to match mainline gradient	4.1n – 4.1o
A96IN-034	U3226 to Balnaspirach	Dual carriageway ch20500	Vertical geometry	THC RTGND Table 5.2	Desirable Minimum Crest = K17 Sag = K13	Crest = K10 Sag = K6.5	4.1o

Departure Reference	Road Name & Location	Approx. chainage	Description of Departure from Standard	Standards Ref.	Standard Required	Standard Provided	Figure No.
A96IN-035	C1170 – link between B9090 and B9091	Dual carriageway ch21900	Vertical gradient	THC RTGND Table 5.2	C Class Road = 0.8% Min	0.12% from ch0 to 140m to match existing levels	4.1o
A96IN-097	Western extent of new link road	Dual carriageway ch21100	Horizontal Radius	DMRB Table 3 70kph design speed	Desirable Minimum = R360m	R360m	4.1o
				THC RTGND Table 5.2	Desirable Minimum = R510m		
A96IN-037	C1175 near Crook Wood	Dual carriageway ch22850	Vertical gradient	THC RTGND Table 5.2	C Class Road = 0.8% Min	0.5% for 190m	4.1p
A96IN-098	Northern extent of realignment	Dual carriageway ch23700	Horizontal Radius	DMRB TD9/93 Table 3 85kph design speed	Desirable Minimum = R510m	R360m	4.1q
				THC RTGND Table 5.2	Refer to DMRB		
A96IN-040	B9111 – south of Nairn East junction	Dual carriageway ch25700	Vertical gradient	THC RTGND Table 5.2	B Class Road = 0.8% Min	0.617% for 360m	4.1r
A96IN-099	South of mainline underbridge	Dual carriageway ch25740	Horizontal Radius	DMRB TD9/93 Table 3 70kph design speed	Desirable Minimum = R360m	R255m	4.1r
				THC RTGND Table 5.2	Desirable Minimum = R510m		
A96IN-041	Existing A96 link near Hardmuir Toll	Dual carriageway ch30500	Vertical gradient	THC RTGND Table 5.2	B Class Road = 0.8% Min	0.4% for 95m at tie in	4.1u
A96IN-042	U3036 junction with existing A96 link road at Hardmuir	Dual carriageway ch30900	Junction spacing	THC RTGND Table 5.4	Minimum 160m	70m	4.1u
A96IN-100	Existing A96 realignment over mainline	Dual carriageway ch28900 & 29100	Horizontal Radius	DMRB TD9/93 Table 3 85kph design speed	Desirable Minimum = R510m	R360m	4.1t
				THC RTGND Table 5.2	Desirable Minimum = R510m		
A96IN-101	Eastern tie into new single carriageway mainline at Hardmuir Toll	Dual carriageway ch30900	Horizontal Radius	THC RTGND Table 5.2	Desirable Minimum = R510m	R50m	4.1u

Departure Reference	Road Name & Location	Approx. chainage	Description of Departure from Standard	Standards Ref.	Standard Required	Standard Provided	Figure No.
A96IN-102	U3164 Penick Road – west tie in	Dual carriageway ch27400	Horizontal Radius	THC RTGND Table 5.2	Desirable Minimum = R255m	R150m	4.1s
A96IN-116	U3164 Penick Road – east tie in	Dual carriageway ch29500	Horizontal Radius	THC RTGND Table 5.2	Desirable Minimum = R255m	R25m	4.1t
A96IN-103	Connection into existing A96 link road at eastern extent of scheme	Dual carriageway ch30900	Horizontal Radius	THC RTGND Table 5.2	Desirable Minimum = R255m	R35m	4.1u

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A96

DUALLING

INVERNESS TO NAIRN

(incl. Nairn Bypass)

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