A9/A96 Inshes to Smithton

DMRB Stage 2 Scheme Assessment Report

Volume 1 – Main Report

Part 1 – The Scheme

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TRANSPORT SCOTLAND
CÒMHDHAIL ALBA

JACOBS

Contents

Glossary of Terms

'A' weighting dB(A)	The human ear does not respond uniformly to different frequencies. A-weighting is commonly used to simulate the frequency response of the ear.
Above Ordnance Datum (AOD)	The mean sea level at Newlyn (UK) used as a base measurement on Ordnance Survey Maps for contours.
Allocation	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.
Alluvium	Sediment deposited by a river.
Amenity Value	Defined as the relative pleasantness of a journey and relates in particular to the exposure of pedestrians and others to traffic.
Appropriate Assessment	An assessment of likely impacts associated with a development on a European Protected Site. An Appropriate Assessment is required by law under Regulation 48 of the Habitats Regulations (1994), implementing Article 6(3) of the Habitats Directive (92/43/EEC).
Aquifer	A body of rock through which appreciable amounts of water can flow.
Assessment	An umbrella term for description, analysis and evaluation.
Attenuation	Increase in duration of flow hydrograph with a consequent reduction in peak flow.
At-grade junction	A junction arrangement at which two or more roads meet at the same level.
Baseline	The existing conditions which form the basis or start point of the environmental assessment.
Bedrock	Hard rock that lies beneath a superficial cover of soils and sediments.
Benefit to Cost Ratio (BCR)	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.
Biodiversity	Biological diversity, or richness of living organisms present in representative communities and populations.
Bund	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.
Calcareous	Refers to a sediment, sedimentary rock, or soil type which is formed from or contains a high proportion of calcium carbonate.
Compulsory Purchase Order (CPO)	A legal document giving the government (Scottish Ministers) power to compulsorily acquire the areas of land necessary for the construction of the scheme.

Community Severance	Community severance is defined here as the separation of residents from facilities and services they use within their community caused by new or improved roads or by changes in traffic flows.
Coniferous Woodland	An area of woodland with predominantly coniferous tree species (less than 10% deciduous trees in the canopy).
Contaminated Land	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'.
Conservation Area	Area of special architectural or historic interest, the character or appearance of which it is desirable to preserve or enhance. Designated under section 61 Planning (Listed Buildings and Conservation Areas) (Scotland) Act 1997.
Culvert	A metal, wooden, plastic, or concrete conduit through which surface water can flow under or across roads.
Cutting	Typically where part of a hill or mountain is cut out to make way for a road or railway line.
Critical Load	The quantitative estimate of the level of exposure of natural systems to pollutants below which significant harmful effects on specified sensitive elements of the environment do not occur.
Decibel (dB)	The range of audible sound pressures is approximately 0.00002 Pa to 200 Pa. Using decibel notation presents this range in a more manageable form, 0 dB to 140 dB. Mathematically: Sound pressure Level (dB) = 20 log (p_t/p_0) Where $p_0 = 2 \times 10^{-5}$ Pa
Diverge	A link road departing the main carriageway to a subsidiary road or junction.
Do-minimum	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.
Do-Something	The proposed scenario involving construction of a dual carriageway from Inverness to Nairn, including a Nairn bypass.
Drift Deposits	Drift geology overlying bedrock.
Effect	The result of change or changes on specific environmental resources or receptors.
Element	A component part of the landscape or environment (e.g. roods, hedges, woodlands).
Environmental Impact Assessment (EIA)	The process by which information about the environmental effects of a project is evaluated and mitigation measures are identified.

Eutrophication	A process where water bodies receive excess nutrients that stimulate excessive plant growth. This can lead to effects such as lack of oxygen and reductions in water quality, fish, and other animal populations.
Fill	Material deposited by man in ground depression or excavated area or to construct an embankment.
Floodplain	Land adjacent to a river, which is subject to regular flooding.
Fluvial Geomorphology	The study of landforms associated with river channels and the sediment processes which form them.
Fragmentation	Breaking up of an organism's habitat into smaller fragments that may vary in size.
Free Flow Alignment	A road layout that allows traffic to join and leave the carriageway at speed
Geomorphology	The branch of geology concerned with the structure, origin and development of topographical features of the earth's crust.
Geophysical Survey	Geophysical survey is a non-intrusive *pre-construction archaeological evaluation* technique that exploits a variety of physical or chemical characteristics of rocks and soils etc, in an attempt to locate underground features of archaeological interest. Types of geophysical survey include magnetometer survey, magnetic susceptibility survey and resistivity survey.
Glaciofluvial	Pertaining to streams fed by melting glaciers, or to the deposits and landforms produced by such streams.
Glacial Till	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.
Grade Separated Junction	A junction arrangement that is separated by level from the through carriageway.
Ground Investigation	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.
Groundwater	Water below the surface of the ground in the saturation zone and in direct contact with the ground or subsoil.
Habitat	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.
HA Rating/Loading	A loading arrangement defined within bridge design standards for normal design loading of vehicles up to 44 tonne gross vehicle weight.
HB Rating/Loading	A loading arrangement defined within bridge design standards comprising a vehicle with 4 axles and 4 wheels per axle.
Heavy Goods Vehicle (HGV)	Vehicles with 3 axles (articulated) or 4 or more axles (rigid and articulated).

High Load Route	An advisory route for extremely high abnormal loads.
Hydrogeology	The branch of geology that deals with the occurrence, distribution, and effect of ground water.
Hydrological	The exchange of water between the atmosphere, the land and the oceans.
Impact	Any changes attributable to the proposed scheme that have the potential to have environmental effects (i.e. the causes of the effects).
Impermeable	Material that does not allow fluids to pass through it.
Infrastructure Investment Plan (IIP)	A Scottish Government document that sets out priorities for investment and long–term strategy for the development of public infrastructure in Scotland.
L_{Aeq}	Equivalent Continuous Sound Level. A notional steady sound level which would cause the same A-weighted sound energy to be received as that due to the actual, possibly fluctuating, sound level over a given period of time.
Landform	Combination of slope and elevation producing the shape and form of the land surface.
Landscape	Human perception of the land, conditioned by knowledge and identity with a place.
Lane Gain/Drop	A layout where a merging connector road becomes a lane or lanes of the downstream main carriageway, followed by a layout where a lane or lanes of the upstream carriageway becomes the diverging connector road.
Listed Building	Building included on the list of buildings of special architectural or historic interest and afforded statutory protection under the 'Planning (Listed Buildings and Conservation Areas) (Scotland) Act 1997' and other planning legislation. Classified categories A – C(s).
Local Road	An A, B or C classified road (non Trunk Road) typically operated by a local authority or council.
Loop	A connecting road, utilising a continuous curve in the connection of two roads within a junction.
Made Ground	Material deposited by man i.e. not natural.
Magnitude	Size, extent, scale and duration of an impact.
Mainline	The principal road being considered, namely the A96 or the road proposed as its replacement.
Merge	A link road accessing the main carriageway from a subsidiary road or junction.
Mitigation	Term used to indicate avoidance, remediation or alleviation of adverse impacts.
Native	A species occurring naturally, in its normal geographic range.

Net Present Value (NPV)	The total present value of a time series of cash flows. It is a standard method for using the time value of money to appraise long-term projects.
Neutral Grassland	Grassland communities that grow on neutral soils (pH 5.5 – 7).
Non-Motorised User (NMU)	Road users other than vehicular traffic, particularly cyclists, pedestrians and equestrians.
Open Space	Any land laid out as public parks or used for the purpose of public recreation, or land which is a disused burial ground.
Peat	Material consisting of decomposed vegetation forming a deposit found in bogs.
Plantation Woodland	Woodland of any age that obviously originated from planting.
Prime Agricultural Land	Agricultural land of Land Capability for Agriculture (LCA) classes 1, 2 and 3.
Ramsar Sites	Internationally important wetland identified for conservation under the Ramsar convention (1971).
Regionally Important Geological Sites (RIGS)	Sites designated by regional geological groups on locally developed criteria, currently the most important places for geology and geomorphology outside statutorily protected land such as Sites of Special Scientific Interest (SSSI).
Riffle	A shallow section of a river/stream where the water is fast-flowing over a gravel/cobble substrate.
Riparian Zone	Natural home for plants and animals occurring in a thin strip of land bordering a stream or river.
Runoff	Water that flows over the ground surface to the drainage system. This occurs if the ground is impermeable or if permeable ground is saturated.
Salmonid	Belonging to the salmon family.
Scheduled Monument	A monument which has been scheduled by the Scottish Ministers as being of national importance under the terms of the 'Ancient Monuments and Archaeological Areas Act 1979'.
Scrub	Climax vegetation dominated by locally native shrubs, usually less than 5m tall.
Semi-improved pasture	Pasture land that has been modified by fertilizers, drainage or intensive grazing. Contain less species diversity than unimproved pasture land.
Semi-natural Woodland	Woodland that does not obviously originate from planting. The distribution of species will generally reflect the variations in the site and the soil. Planted trees must account for less than 30% of the canopy composition.
Severance	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.

Sites of Special Scientific Interest (SSSI)	Areas of national importance. The aim of the SSSI network is to maintain an adequate representation of all natural and semi-natural habitats and native species across Britain. The site network is protected under the provisions of Sections 28 and 19 of the Wildlife and Countryside Act 1981 as well as the Amendment Act 1985 and the Environmental Protection Act 1990.
Slip Road	A connector road facilitating access between one road and another.
Special Area of Conservation (SAC)	An area designated under the EC Habitats Directive to ensure that rare, endangered or vulnerable habitats or species of community interest are either maintained at or restored to a favourable conservation status.
Special Protection Area (SPA)	An area designated under the Wild Birds Directive (Directive74/409/EEC) to protect important bird habitats. Implemented under the Wildlife and Countryside Act 1981. Under the Habitats Directive, all SPAs will be proposed Special Areas of Conservation.
Strategic Environmental Assessment (SEA)	The process by which information about the environmental effects of proposed plans, policies and programmes are evaluated.
Strategic Transport Project Review (STPR)	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.
Superficial Deposits	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.
Susceptibility	The ability to accommodate change arising from the proposed road without adverse effect.
Sustainable Drainage Systems (SuDS)	A sequence of management practices and control structures designed to drain surface water in a more sustainable fashion than some conventional techniques.
Threshold	The minimum intensity or value of a signal etc. that will produce a response or specified effect.
Trunk Road	Part of the road network connecting major cities, towns, airports and ports for which the Scottish Government is responsible.
Vernacular	Refers to a type of architecture which is indigenous to a specific time or place.
Visual envelope	The visual envelope illustrates the extent of potential visibility to or from a specific area.
Vulnerable groups	Children, elderly and disabled.
Water Environment (Controlled Activities) (Scotland) Regulations	Controls all engineering activity in or near watercourses.

Water Framework Directive (WFD)	Wide-ranging European environmental legislation (2000/60/EC). Addresses inland surface waters, estuarine and coastal waters and groundwater. The fundamental objective of the WFD is to maintain "high status" of waters where it exists, preventing any deterioration in the existing status of waters and achieving at least "good status" in relation to all waters by 2015.
Water Quality	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).
Wildlife and Countryside Act 1981	Principal mechanism for wildlife protection in the UK.

Abbreviations

AADT	Annual Average Daily Traffic
Ac	Alignment Constraint
AEP	Annual Exceedance Probability
AOD	above Ordnance Datum
APIS	Air Pollution Information System
AQMA	Air Quality Management Area
AQO	Air Quality Objective
AQS	Air Quality Strategy
ATC	Automatic Traffic Count
AAWT	Annual Average Weekday Traffic
BCIS	Building Cost Information Service
BCR	Benefit to Cost Ratio
bgl	Below ground level
BGS	British Geological Survey
BS	British Standard
BT	British Telecom
CAR	Water Environment (Controlled Activities) (Scotland) Regulations 2005
CEH	Centre for Ecology and Hydrology
CEMP	Construction Environmental Management Plan
CIRIA	Construction Industry Research and Information Association
COBA	Cost Benefit Analysis
COBALT	Cost and Benefit to Accidents – Light Touch software
CO_2	Carbon Dioxide
CNMA	Candidate Noise Management Area
CPO	Compulsory Purchase Order
CROW	Catalogue of Rights of Way

CRTN	Calculation of Road Traffic Noise
CSM	Conceptual Site Model
dB	Decibel
DEFRA	Department of the Environment, Food and Rural Affairs
DfT	Department for Transport
DM	Do Minimum
DMRB	Design Manual for Roads and Bridges
DS	Do Something
D2AP	Dual 2 Lane Carriageway All Purpose
EEC	European Economic Committee
EIA	Environmental Impact Assessment
EICP	Environmental Incident Control Plan
END	Environmental Noise Directive
EPA	Environmental Protection Act (1990)
FEH	Flood Estimation Handbook
GCR	Geological Conservation Review
GIS	Geographic Information System
GWDTE	Groundwater Dependent Terrestrial Ecosystems
ha	Hectare
HA	Highways Agency
HC	Hydrocarbons
HDV	Heavy Duty Vehicle
HER	Historic Environment Record
HGV	Heavy Goods Vehicle
HLA	Historic Landscape Assessment
HRA	Hot Rolled Asphalt
HSa	Hillhead Sandstone Formation
HSE	Health and Safety Executive

HV	High Voltage
HwLDP	Highland-wide Local Development Plan
H4a	Very High Containment
IAN	Interim Advice Note
IBAA	Incinerator Bottom Ash Aggregate
IIP	Infrastructure Investment Plan
InF	Inshes Flagstone Formation
INLP	Inverness Local Plan
ITS	Intelligent Transport System
JHI	James Hutton Institute
km	Kilometres
Kph	Kilometres per hour
kV	Kilovolt
LAQM	Local Air Quality Management
Lc	Layout Constraint
LCA	Landscape Character Assessment
LCT	Landscape Character Type
LGV	Light Goods Vehicles
LiDAR	Light Detection And Ranging survey
LLCA	Local Landscape Character Area
LNR	Local Nature Reserve
LNRS	Low Noise Road Surface
LTS	Local Transport Strategy
LV	Low Voltage
MCHW	Manual of Contract Document for Highway Works
MFTM	Moray Firth Transport Model
MLURI	Macaulay Land Use Research Institute
MMP	Materials Management Plan

MSC	Matters Specified in Conditions
NCAP	National Collection of Aerial Photography
NCN	National Cycle Network
NESA	Network Evaluation from Surveys and Assignment
NMU	Non-Motorised User
NTS	National Transport Strategy
NO	Nitric Oxide
NOx	Oxides of Nitrogen
NO_2	Nitrogen Dioxide
NPF	National Planning Framework
NPF2	National Planning Framework 2
NPF3	National Planning Framework 3
NPV	Net Present Value
N2	Normal Containment Level
OGV	Other Goods Vehicles
OS	Ordnance Survey
O/H	Overhead
PAN	Planning Advice Note
PIA/MVkm	Personal Injury Accidents per Million Vehicle Kilometres
PIP	Planning in Principle
PLDP	Proposed Local Development Plan
PM_{10}	Particulate Matter
PP	Pollutant Pathways
PPG	Pollution Prevention Guideline
PSSR	Preliminary Sources Study Report
PVB	Present Value of Benefits
PVC	Present Value of Costs
PWS	Private Water Supply

QUADRO	Queues And Delays at Roadworks
RBMP	River Basin Management Plan
RCAHMS	Royal Commission on Ancient and Historical Monuments of Scotland
RIGS	Regionally Important Geological Sites
RSPB	Royal Society for the Protection of Birds
SAC	Special Area of Conservation
SAM	Scheduled Ancient Monument
ScotWays	Scottish Rights of Way and Access Society
SEA	Strategic Environmental Assessment
SEPA	Scottish Environment Protection Agency
SERIS	Scottish Executive Road Information System
SHEP	Scottish Historic Environmental Policies
SIMD	Scottish Index of Multiple Deprivation
SLA	Special Landscape Area
SNH	Scottish Natural Heritage
SPA	Special Protection Area
SPP	Scottish Planning Policy
SSD	Stopping Sight Distance
SSE	Scottish and Southern Energy
SSSI	Site of Special Scientific Interest
STAG	Scottish Transport Appraisal Guidance
STPR	Strategic Transport Projects Review
SuDS	Sustainable Drainage Systems
SWFs	Surface Water Features
S2	Single Carriageway
TPOs	Tree Preservation Orders
TUBA	Transport Users Benefit Appraisal
USA	Updating and Screening Assessment

U/G	Underground
VEM	Visual Envelope Map
WFD	Water Framework Directive
WML	The Waste Management Licensing (Scotland) Regulations 2011

1. Scheme Background

1.1 Background to Study

1.1.1 The Strategic Transport Projects Review (STPR) (Jacobs, 2008) 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 standard and including a new road connecting the A96 and A9 south of Inverness (Intervention 18). It also recommended interventions to the A9 corridor including improving the operational effectiveness of the A9 as it approaches Inverness.

1.1.2 In 2010, Transport Scotland commissioned a DMRB Stage 2 option assessment in relation to upgrading the A96 between Inverness and Nairn. The assessment considered a number of options for improvements to the A96 corridor and included a new dual carriageway road between Inshes on the A9 and Smithton on the A96. 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.

1.1.3 Following the initial assessment findings, in February 2012 Transport Scotland and The Highland Council (THC) undertook a joint consultation on the emerging Local Development Plan proposals and options for a new dual carriageway trunk road between the A9 at Inshes and the A96 at Smithton. Feedback from the consultation highlighted a number of concerns regarding the scale of the proposals for the dual carriageway between Inshes and Smithton and the severance, accessibility and integration aspects of the proposals. Following this feedback, the opportunity was taken to re-examine the wider context of the connection between the A9 and A96.

1.1.4 In 2013 Transport Scotland commissioned Jacobs to undertake the A9/A96 Connections Study. The study reviewed the wider issues on the A9, A96 and A82, and the local road network impacts in consultation with THC. It was undertaken following Scottish Transport Appraisal Guidance (STAG) principles which look at all modes of transport including walking, cycling and public transport.

1.1.5 In May/June 2014 Transport Scotland undertook a series of public exhibitions to present the options under consideration for junction improvements and a new road from the A9 at Inshes to the A96 at Smithton and to seek public feedback on the emerging options. This was a joint exhibition with THC who also presented the land use and local transport proposals relating to the Inshes and Raigmore Development Brief and Inshes Junction Improvements – Phase 2.

1.1.6 In June 2015 the Cabinet Secretary for Infrastructure, Investment and Cities, Keith Brown MSP, announced the emerging findings of the A9/A96 Connections Study which concluded that further design development should be undertaken for the grade-separation of the A9/A82 Longman Roundabout and two possible options for a single carriageway road connecting the A9 at Inshes across to the A96 at Smithton.

1.1.7 The A9/A96 Connections Study (Jacobs, 2016) was published in March 2016. Following this, Transport Scotland commissioned Jacobs to undertake a DMRB Stage 2 option assessment for a single carriageway road connection between the A9 at Inshes and the A96 at Smithton. The grade separation of Longman junction is not included within the scope of this assessment and is being taken forward separately.

1.1.8 On 30 January 2017 the £315 million Inverness & Highland City-Region Deal was formally signed. It will form an important delivery mechanism for the Region's economic vision and will capitalise on its substantial opportunities. The Deal will improve connectivity through investments in transport and includes the development of the A9/A96 Inshes to Smithton scheme.

1.2 Scheme Context and Dependencies

1.2.1 The scheme location plan is shown on Drawing B2103501-HW-0000-DR-001. The scheme is interdependent with projects and plans being progressed by The Highland Council (THC) as well as being dependent on the proposed A96 Dualling Inverness to Nairn (including Nairn Bypass) project.

1.2.2 The eastern end of the options tie-in to the proposed Smithton grade separated junction, which forms part of the A96 Dualling Inverness to Nairn (including Nairn Bypass) project, for which draft orders have been published and the statutory process is being progressed.

1.2.3 In the west, the options tie in to the A9 Trunk Road as well as the local road network. The network is congested during peak periods and subject to ongoing capacity improvement interventions by THC. THC has developed proposals to revise the layout and signalise the Inshes roundabout and other nearby junctions. This project is known as Inshes Phase 2 and has yet to be finalised. Options for the Inshes to Smithton scheme have been assessed using the current proposals for THC's scheme.

1.2.4 THC are currently preparing a brief for the development of land to the east of the A9. The scheme will function as an important transport corridor for this development area. Close collaboration with THC has therefore been a key element of the appraisal of options to ensure that the emerging preferred option is compatible with the emerging development brief.

1.3 Scheme Objectives

1.3.1 The scheme objectives for the A9/A96 Inshes to Smithton scheme are as follows:

- to encourage more effective use of the road network hierarchy and thereby improve the operation of the network for longer distance and local journeys;
- to contribute to The Highland Council's Development Plan aims for development east of the A9, and to complement the benefits arising from the dualling of the A96;
- to improve safety for motorised and non-motorised users where the trunk and local road network interact; and
- to maximise opportunities for active travel and public transport connections arising from the road infrastructure improvements.

1.4 Previous Studies

1.4.1 Previous studies have been undertaken by a number of different parties, which considered issues associated with the improvement of the existing transport network at different levels of detail. The reports of these studies are summarised below. The current option assessment process has taken consideration of previous studies, reports and consultations.

1.4.2 **The A96 Growth Corridor Development Framework, The Highland Council, 2007:** This planning framework was approved by The Highland Council in September 2007 and formed supplementary planning guidance to the approved Development Plan for the area until adoption of the Highland wide Local Development Plan in April 2012 and the subsequent Inner Moray Firth Local Development Plan. The A96 Growth Corridor Framework was developed in consultation with local stakeholders and included a line for a preferred Trunk road link between Inshes and Smithton as part of the East Inverness Development Framework. It is important to note that the options presented within the Framework were not subject to an engineering and environmental assessment and focused on planning development growth.

1.4.3 **The Strategic Transport Projects Review (STPR), Jacobs, 2008**: The STPR set out 29 investment priorities within an investment hierarchy for the 20 year period following the programme in place at that time. This programme was identified as a means of supporting the National Planning Framework 2 (NPF2) and the government's Purpose. STPR recommended a number of road and rail based interventions to take forward on the Aberdeen to Inverness corridor. Specific trunk road interventions that emerged from the review included upgrading the A96 between Inverness and Nairn to dual carriageway and including a new link connecting the A96 and A9 (South of Inverness) (Intervention 18).

1.4.4 **Inverness Trunk Link Road – East Link Summary Status, The Highland Council, 2009:** This report summarised work undertaken by The Highland Council and concentrated on the development of the eastern section of the proposed Inverness Trunk Link Road, a proposed link between the A9 at Inshes and the A96 at Smithton. It included a STAG Part 1 appraisal of options, which assessed each option for engineering, environmental, and traffic and economics criteria. A preferred alignment was identified for the eastern section of the Trunk Link Road, although it was noted that refinement of the junction design at the connection with the A96 would be required. A preferred option for a junction with the A9 at Inshes was not identified.

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

1.4.6 Following assessment of the existing conditions, Atkins continued work to identify and assess measures to improve the transport network between Inverness and Nairn. This work considered the corridor within four geographic sections namely: A9/A96 Trunk Road Link; A96 between Raigmore Interchange to Mid Coul; A96 between Mid Coul and a Nairn Bypass; and a Nairn Bypass.

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

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

1.4.9 In 2010 and 2011 Jacobs carried out an initial assessment of options in accordance with DMRB Stage 2 in relation to upgrading the A96 between Inverness and Nairn to dual carriageway (with at-grade junctions) and a single carriageway bypass of Nairn. The assessment findings were documented in a series of assessment tables, and this information was then used as the basis of a decision-making process to identify a number of feasible routes worthy of further investigation. These options were presented at public exhibition in February 2012.

1.4.10 **Highland-wide Local Development Plan April 2012:** This included an indicative line for the connector road from Inshes on the A9 to Smithton on the A96 under Section 11. It states that the developer must reserve land for the potential route of the A96-A9 Trunk Road. The Plan states that 'all proposed new roads are indicative and are subject to detailed consideration by Transport Scotland'.

1.4.11 **A9/A96 Connections Study, Transport Appraisal Report, Jacobs, 2016:** Transport Scotland examined the wider context of the A9/A96 looking at problems, opportunities and issues concerning traffic between Inshes, Raigmore and Longman junctions in Inverness in an effort to develop a potential solution to the congestion and journey time reliability issues that exist at these three junctions. The A9/A96 Connections Study was carried out in line with the principles of Scottish Transport Appraisal Guidance (STAG) which looks at all modes of transport including walking, cycling and public transport. The final report recommends the grade-separation of Longman roundabout and proposes two possible options for a single carriageway link road connecting the A96 at Smithton across to the A9 at Inshes.

1.5 Stakeholders

1.5.1 There are numerous stakeholders with interests in the A9/A96 Inshes to Smithton scheme. The scheme is of particular interest to the following key stakeholders:

- Transport Scotland;
- The Highland Council;
- MSPs, MPs, MEPs, and local Councillors;
- Community Councils;
- Landowners within the study area;
- Local retail business;
- Network Rail;
- Scottish Natural Heritage (SNH);
- Historic Environment Scotland (HES);
- Scottish Environment Protection Agency (SEPA);
- Forestry Commission Scotland;
- Health and Safety Executive;
- Highlands and Islands Transport Partnership (HITRANS);
- SUSTRANS;
- Highlands and Islands Enterprise; and
- University of the Highlands and Islands.

1.5.2 The work Transport Scotland is progressing along the A96 corridor includes a rolling programme of regular engagement with local communities and other stakeholders, which started with public exhibitions for the A9/A96 Connections Study in May 2014 and A9/A96 Inshes to Smithton in August 2016. Further public consultations will be undertaken as part of the design and development of the proposals. This engagement will help ensure that individuals, communities and businesses affected by the scheme are kept fully informed and consulted, and their feedback taken into account as proposals are developed.

1.6 Current A9/A96 Commissions

1.6.1 The A96 Dualling Inverness to Nairn (including Nairn Bypass) DMRB Stage 3 Scheme Assessment was undertaken by Jacobs on behalf of Transport Scotland. The Preferred Option development and assessment was concluded with the draft Orders and Environmental Statement published in November 2016. The draft Orders define the line of the proposed new road and side roads, and the Environmental Statement outlines the anticipated effects of the scheme on the environment. The Statutory Consultation Period closed in January 2017 and a number of objections have been received and consideration of these objections is ongoing. In June 2016, Mott Macdonald Sweco Joint Venture were appointed by Transport Scotland to carry out options assessment and thereafter detailed design work for dualling the 29-mile western section of the A96 between Hardmuir and Fochabers. In June 2017, Amey Arup Joint Venture were appointed by Transport Scotland to carry out options assessment and thereafter detailed design work for dualling the 26-mile eastern section of the A96 between east of Huntly and Aberdeen.

1.6.2 Construction has commenced on the first of the 11 road schemes that make up the 80 miles of the existing A9 to be upgraded from single carriageway to dual carriageway. Construction work between Kincraig and Dalraddy commenced in September 2015 and is now complete. The contract for the A9

Luncarty to Pass of Birnam is currently in the procurement process with a view to being awarded in Spring 2018. Design work is underway on the remaining nine projects.

1.6.3 The Highland Council adopted the Inner Moray Firth Local Development Plan in July 2015. It is the guide for development and investment in the Inner Moray Firth area over the next 20 years. This Plan sits alongside the Highland-wide Local Development Plan to provide the framework for delivery of new homes, jobs and services, and supporting infrastructure. Included within this development area are the proposals for an 'East Link' road, connecting the A9 with the A96 and the upgrade of Inshes roundabout. This junction improvement is a pre-requisite to the development of the A9/A96 Inshes to Smithton scheme as the Inshes roundabout needs to have sufficient capacity to convey the increased traffic flows resulting from the A9/A96 Inshes to Smithton scheme. The East Inverness plan includes much of the area required for construction of the A9/A96 Inshes to Smithton scheme. The proposed road provides a central means of access to the community, leisure and education facilities; and the residential, commercial and industrial premises proposed in the East Inverness development plan.

1.7 DMRB Stage 2 Scheme Assessment Report

1.7.1 This DMRB Stage 2 Scheme Assessment 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).

1.7.2 The purpose of this report is to document the factors that have been taken into account in the assessment of options, considering the scheme objectives and the engineering, environmental, traffic and economic advantages/disadvantages and constraints associated with each.

1.7.3 Preliminary option drawings showing the options considered in this DMRB Stage 2 assessment have been prepared and are included within Volume 2 of this report.

1.8 Report Layout

1.8.1 Whilst following the format prescribed in TD 37/93 to the extent practicable, the information included within this DMRB Stage 2 Scheme Assessment Report is presented in the following Volumes:

Volume 1 – Main Report and Appendices

- Part 1: The Scheme
- Part 2: Engineering Assessment
- Part 3: Environmental Assessment
- Part 4: Transport and Economic Assessment
- Part 5: Assessment Summary and Recommendation
- Part 6: Appendices

Volume 2 – Engineering Drawings

Volume 3 – Environmental Figures

1.8.2 This report can be viewed at the Transport Scotland website: https://www.transport.gov.scot/projects/a9a96-inshes-to-smithton

1.8.3 A bound paper copy of the complete A9/A96 Inshes to Smithton DMRB Stage 2 Scheme Assessment Report can be purchased (£223), and is available in DVD format (£10) on application in writing to the 'A9/96 Inshes to Smithton Team' at Transport Scotland. Applications can be made via email at a96dualling@transport.gov.scot or by post to "MTRIPS Design Team 3, Transport Scotland, Buchanan House, 58 Port Dundas Road, Glasgow, G4 0HF".

1.9 References

Jacobs, Faber Maunsell, Grant Thornton and Tribal Consulting (*on behalf of Transport Scotland*) (2008). Strategic Transport Projects Review: Final Report. Transport Scotland.

Jacobs (*on behalf of Transport Scotland*) (2016). A9/A96 Connections Study, Transport Appraisal Report. Transport Scotland.

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 Introduction

2.1.1 This section of the report describes the engineering conditions in the proposed location of the A9/A96 Inshes to Smithton scheme, within the scheme extents shown on Drawing B2103501-HW-0000-DR-001. As there is no existing direct route between Inshes and Smithton this section focusses on key features within the scheme study area that are likely to change physically and operationally as a result of the proposed scheme.

2.1.2 The existing road network is shown on Drawing B2103501-HW-0000-DR-002.

2.2 Scheme Location and Environment

Location

2.2.1 The A9/A96 Inshes to Smithton scheme is approximately 2.7km in length, and is located between Inshes Retail Park to the west of the A9 Perth – Inverness Trunk Road and the proposed Smithton Junction, which will form part of the A96 Dualling Inverness to Nairn (including Nairn Bypass) Scheme at the northern end of Barn Church Road. The study area runs between the existing A96 to the north and the communities of Inshes, Cradlehall and Smithton to the south.

Topography

2.2.2 The land within the study area is generally flat and low lying in nature. The highest ground level is approximately 40mAOD and is located in the vicinity of Inshes junction to the south of the study area. The land uniformly slopes towards the Moray Firth and on approach to the A96 Smithton Junction the ground level is approximately 20mAOD. There are number of watercourses and associated floodplain to the east of the Highland Main Line Railway.

Climate

2.2.3 The climate in the study area is typical of the northern highlands. The average monthly temperature range is between 0°C and 19°C while the average monthly rainfall is between 39mm and 65mm. 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 Scottish average. In winter months, the local climate can also include sub-zero temperatures and snow.

Land Use

2.2.4 The land within the study area is principally agricultural and comprises open fields used for both grazing and crops. There are a number of industrial estates, communities and settlements located within the study area.

2.2.5 Inshes Retail Park and Beechwood Business Park are commercial developments located to the west of the scheme. Inverness Retail and Business Park is another commercial development located on the A96 to the north of the study area and Cradlehall Business Park is located to the south of the study area at Cradlehall. Inverness College (University of the Highlands and Islands Campus) is also located in the study area at Beechwood and Simpsons Garden Centre is located south of the scheme on Culloden Road.

2.2.6 It should be noted that the land to the east of the existing A9 Perth to Inverness Trunk Road is subject to an emerging development brief being undertaken by THC.

2.2.7 The communities of Culloden and Smithton lie at the eastern end of the scheme and Inshes is the principal community at the western end of the scheme. There are several other small communities, settlements or individual residential properties in the vicinity of the scheme.

Man-made features

Roads

2.2.8 The existing road network is described in Section 2.3 using the road names given in Table 2.1.

Table 2.1 : List of Roads

Classification	Road Name
A96	Aberdeen – Inverness Trunk Road
A9	Perth – Inverness Trunk Road
B9006	Culloden Road (Millburn Roundabout – Culcabock – Castle Hill – Culloden Moor – Croy – Gollanfield – Fort George Road)
B8082	Sir Walter Scott Drive
B9177	Milton of Leys – Bogbain – Castlehill Road
C1032	Barn Church Road
C1036	Tower Road
U1058	Caulfield Road North (Castlehill – Cradlehall – Smithton – Stratton Lodge Road)
U1124	Caulfield Road
U1267	Dell of Inshes Road
U2820	Eastfield Way
U5096	Castlehill Road
U4715	Inshes Retail Park Road
U5020	Highlander Way
U2820	Eastfield Way

2.2.9 The A96 Aberdeen – Inverness Trunk Road is commonly referred to as “the A96” or “the existing A96” throughout this report and the A9 Perth – Inverness Trunk Road is commonly referred to as “the A9” throughout this report. Other roads are described by their classification and common road name.

Railway Lines

2.2.10 The Highland Main Line Railway is a dual track line which runs east to west through the study area. It passes under the A96 to the East of Raigmore Interchange and continues in an easterly direction passing south of Inverness Retail and Business Park and north of UHI towards Cradlehall and Smithton. The railway is on embankment as it passes through the study area.

Residential and Agricultural Properties

2.2.11 The residential areas of Smithton and Culloden are situated to the east of the study area. Other communities include Inshes to the west of the study area and smaller communities can be found at Cradlehall, Westhill and Inshes Wood.

2.2.12 Ashton Farm is centrally located within the study area.

Commercial Properties

2.2.13 Inshes Retail Park and Beechwood Business Park are commercial developments located to the west of the study area adjacent to the A9 at Inshes. Inverness Retail and Business Park is another commercial development located on the existing A96 to the north of the scheme and Cradlehall Business Park is located to the south of the scheme on Caulfield Road North/Castlehill Road at

Cradlehall. Inverness College (UHI Campus) is also located in the study area at Beechwood and Simpsons Garden Centre is located south of the scheme on Culloden Road.

2.3 Existing Road Network

Route Description

2.3.1 The route descriptions below focus on describing the existing roads within the study area. There is currently no direct link between Inshes on the A9 and Smithton on the A96, and traffic generally uses the existing local road network to access the east side of Inverness. The key routes below will be impacted/altered as a result of the options considered within this assessment.

A96 Aberdeen – Inverness Trunk Road between Raigmore and Smithton

2.3.2 This section of the existing A96 Aberdeen – Inverness Trunk Road commences at Raigmore Interchange, heading in a generally north-easterly direction towards Smithton. The first 0.85km of the route from Raigmore Interchange to the roundabout for Inverness retail park is already dual carriageway. East of the roundabout the existing A96 is single carriageway and continues for approximately 0.9km to the existing roundabout at Smithton junction. It should be noted that the above description is of the existing A96. The scheme assessment takes into account, where appropriate, the proposals for the A96 Dualling Inverness to Nairn (including Nairn bypass) scheme which will affect this section of the existing A96.

A9 Perth – Inverness Trunk Road between Raigmore and Inshes

2.3.3 This section of the A9 Perth – Inverness Trunk Road between Raigmore Interchange and Inshes junction is approximately 1.3km in length, heading in a southerly direction. It is an existing dual carriageway with a national speed limit of 70mph. There is a southbound merge slip from Raigmore Interchange onto the A9 and a southbound diverge slip from the A9 at Inshes junction to the B9006 Culloden Road. On the north bound carriageway there is a lane gain arrangement between Inshes junction and Raigmore.

2.3.4 The Inshes junction overbridge crosses the A9 1.2km south of Inverness. An NMU crossing facility known as the 'Golden Bridge' crosses over the A9 0.35km south of Raigmore Interchange.

B9006 Culloden Road

2.3.5 Within the study area the B9006 Culloden Road commences from the Inshes Roundabout, heading in a generally south-easterly direction for 1.2km to the B9177 junction. It is an urban route with a number of junctions facilitating commercial business, Inverness College (UHI Campus) and residential areas, and is one of the main routes into the city from the east.

B8082 Sir Walter Scott Drive

2.3.6 Within the study area the B8082 Sir Walter Scott Drive commences from Inshes Roundabout, heading in a south-westerly direction for 0.6km to the roundabout with Inshes Road, known locally as Eagle Roundabout. This route is a distributor road that carries traffic through the south of Inverness.

U1267 Dell of Inshes Road

2.3.7 The U1267 commences from Inshes Roundabout, heading south towards Dell of Inshes for approximately 0.2km to the Inshes Retail Park Roundabout adjacent to Aldi. This section of the route is a split single carriageway with trees in the central reserve and to the east. The west side of this section runs parallel to the car park for Tesco and Dobbies Garden Centre. It also provides access to the Tesco Petrol Filling Station. Tesco and Dobbies are accessed from the Inshes Retail park Roundabout.

2.3.8 The U1267 Dell of Inshes Road continues from the Inshes Retail Park roundabout for approximately

0.2km, heading in an easterly direction to access Dell of Inshes and Ardachy. This section facilitates access to a number of properties and a farm. This section has a rural setting, with the route being a single track access, lined on either side with mature trees.

U1058 Caulfield Road North/U5096 Castlehill Road

2.3.9 This section of Caulfield Road North commences from its junction with the B9006, approximately 0.2km south east of Inshes Overbridge. This section of the route is approximately 0.2km in length, heading in an easterly direction until the U5096 Castlehill Road Junction. At this point the through route at the junction changes from the U1058 to the U5096, where it continues for a short section to a roundabout that provides access to Cradlehall Business Park. There is also an access into the Inverness College (UHI Campus) from the U1058.

2.3.10 The U1058 continues from its junction with the U5096 in a north-easterly direction for approximately 0.6km until the Highland Main Line Railway. The route continues beyond the railway but prohibits vehicular access beyond this point. This section of the route is rural and forms a single carriageway tree lined access for a significant number of properties in Cradlehall. The route has speed control measures in place to discourage through traffic from the U1124 Caulfield Road.

C1032 Barn Church Road

2.3.11 This section of the C1032 Barn Church Road commences from the existing A96 Smithton Roundabout for approximately 1.3km, heading in a south-easterly direction to the junction with the C1036 Tower Road. This section of the C1032 is a single carriageway distributor road, in a rural setting passing through agricultural land until reaching Smithton. It should be noted that the northern end of Barn Church Road will be altered as a result of the proposed A96 Dualling Inverness to Nairn (including Nairn Bypass) scheme and as such the assessment of the A9/A96 Inshes to Smithton scheme assumes this will be in place.

Speed Limits

2.3.12 A 50mph limit extends from Raigmore Interchange to approximately 250m east of the C1032 Barn Church Road western junction on the A96. The national speed limit of 70mph applies along the existing section of the A9 dual carriageway covered by the study area.

2.3.13 The speed limit on the urban road network is generally 30mph. The national speed limit of 60mph applies to the single carriageway C1032 Barn Church Road while the speed limit on the B9006 Culloden Road is 40mph south of the U1058 Caulfield Road North.

Geometric Design Standards

2.3.14 The assessment of existing geometric standards on the A96 is not considered in this section as the A96 Dualling Inverness to Nairn (including Nairn Bypass) is assumed to be in place for the A9/A96 Inshes to Smithton scheme assessment.

2.3.15 An assessment of the junction spacing between Raigmore interchange and Inshes on the existing A9 was undertaken based on Ordnance Survey mapping data and topographical survey data. In accordance with TD22/06 of the DMRB the current junction spacing between Raigmore and Inshes is below standard. TD22/06 indicates that there should be a minimum 1km weaving length between junctions on a rural dual carriageway all-purpose road with a 120kph design speed. The existing layout has a weaving length of approximately 0.4km. The stopping sight distance (SSD) on approach to the Inshes diverge slip road is also below standard as visibility is restricted by the structure and the tight radius left hand curve on the slip road immediately after the structure.

2.3.16 The assessment of existing geometric standards is a limited assessment of this section of the existing A9 and will not identify every Departure from current design standards. It does however provide a broad measure of the geometric standards of this section of the A9.

2.3.17 The existing local road network is a mixture of varying standards ranging from local accesses to local distributor roads. The majority of the local roads identified within the scheme extents have had some recent improvement works and whilst an assessment of their geometric design standards has not been undertaken they appear to follow the THC's design standards.

Traffic Conditions

Existing Traffic Patterns

2.3.18 Traffic volume information on the trunk road network has been obtained from the 2014 Automatic Traffic Count (ATC) data provided by Transport Scotland. Transport Scotland place ATCs in strategic locations on the trunk road network and report the data collected annually allowing heavy and light vehicle traffic flows to be identified. The traffic volume data for the existing A9 and A96 within the study area are summarised below in Table 2.2

Table 2.2 : Automatic Traffic Counter Data within the Study Area (2014)

Location	AADT	AM Peak Hour Flow	PM Peak Hour Flow
A9 North of Raigmore Interchange	35,200	2,200	3,000
A96 Raigmore to West Seafield (Inverness Business and Retail Park)	30,400	1,800	2,500
A96 West Seafield (Inverness Business and Retail Park) to Smithton	26,000	1,700	2,200
A96 East of Smithton	14,500	900	1,200
A9 South of Raigmore Interchange	24,000	1,600	1,900

2.3.19 The highest traffic flows are recorded on the A9 to the north of Raigmore Interchange and on the A96 between Raigmore Interchange and West Seafield Roundabout. Traffic flows reduce on the A96 heading east from Inverness.

2.3.20 A number of additional temporary ATCs were also installed along the A96 Corridor over a two week period in 2014. The traffic flows at the ATC sites that fall within the study area are detailed within Table 2.3 below.

Table 2.3 : Temporary Automatic Traffic Counter Data within the Study Area (2014)

Location	AADT	AM Peak Hour Flow	PM Peak Hour Flow
Caulfield Road North	3,500	400	300
B1977	2,400	850	200
Caulfield Road	5,100	500	400
Tower Road	9,900	900	800
Barn Church Road east of Tower Road	7,200	700	600
Culloden Road west of B1977	12,600	800	1,100
Barn Church Road west of Tower Road	11,900	800	1,100

2.3.21 Traffic flows on the side road network are highest on Culloden Road between Culloden Road Overbridge and the B1977 and on Barn Church Road to the south of Smithton Junction.

Traffic Accidents

2.3.22 An analysis of personal injury accident data on the A9 and A96 between 1 January 2012 and 31 December 2016 was carried out to assess current road safety conditions and to compare current conditions with national trends. Personal injury accidents are classified as fatal, serious or slight dependent on the most severely injured casualty.

2.3.23 Drawing B2103501-HW-0000-DR-003 shows the location and severity of personal injury accidents during the identified 5 year period. Fatal accidents (red) are recorded where the level of injuries sustained cause death within 30 days of the accident. Serious accidents (blue) are recorded where a casualty is detained in hospital or sustains fractures, concussion, severe cuts or where death occurs 30 or more days after the accident. Slight accidents (green) are recorded when a casualty sustains a sprain, bruise or slight cut.

2.3.24 Road Casualties Scotland (Transport Scotland, 2015) indicates that of the total accidents that have occurred on non-built-up A roads 3% were recorded as Fatal accidents, and 22% were Serious accidents. Of the total accidents recorded on the A9 and A96 within the Inshes to Smithton study area, 0% were recorded as Fatal accidents and 15% recorded as Serious accidents. The proportions of Fatal and Serious accidents that have occurred on this section of the trunk road are therefore below the national average.

2.3.25 In total there were 27 recorded accidents between 2012 and 2016 on the A9 and A96 within the study area, with an average of 5 accidents occurring each year. The number and severity of accidents that occurred in each of the five years are shown in Table 2.4 below.

Table 2.4 : Accidents by Year and Severity

Year	Slight	Serious	Fatal	Total
2012	7	0	0	7
2013	3	2	0	5
2014	5	1	0	6
2015	4	1	0	5
2016	4	0	0	4
Total	23	4	0	27

Junctions

2.3.26 The main junctions within the scheme study area both on the Trunk road network and local road network are described below:

C1032 junction

2.3.27 The C1032 junction is a roundabout connecting the existing A96 to the C1032 Barn Church Road providing access to Culloden, Smithton and Balloch. Street lighting and illuminated keep left bollards are provided on the physical approach islands on each arm of the roundabout. A footway/cycleway runs along the south side of the existing A96 through this junction with dropped kerbs and a paved area in the splitter island to allow cyclists to cross the C1032 Barn Church Road arm of the roundabout.

Inshes Retail Park Junction

2.3.28 This junction is a roundabout providing access to Inshes Retail Park. Street lighting is provided as well as illuminated bollards on the physical approach islands at the following arms of the roundabout; the U4715 Inshes Retail Park Road arm, the U1267 Dell of Inshes Road arm and the entrance to Inshes Retail Park arm.

Inverness Retail and Business Park Junction

2.3.29 This junction is a roundabout within Inverness Retail and Business Park. Street lighting is provided as well as illuminated bollards on the physical approach islands at the following arms of the roundabout; the U5202 Highlander Way arm and both U2820 Eastfield Way arms. The U2820 Eastfield Way arm currently terminates approximately 170m from the roundabout, where it interfaces with a walkway from the Inverness College (UHI Campus).

A9 Diverge/Culloden Road/UHI Campus Junction

2.3.30 This is a signalised crossroad junction providing access from the A9 southbound onto the B9006 Culloden Road. It also provides access into the Inverness College (UHI Campus). A number of residential properties take access from the A9 southbound merge and diverge.

Caulfield Road North/Culloden Road Junction

2.3.31 This is a signalised T-junction with a physical approach island on the U1058 Caulfield Road North with segregated left turn for traffic turning onto the B9006 Culloden Road. There is an illuminated bollard located on the physical approach island. A footway/cycleway runs along Caulfield Road North with dropped kerbs and a paved area in the splitter island to allow cyclists to cross Caulfield Road North at the junction with Culloden Road.

Caulfield Road North/Inverness College (UHI Campus) Junction

2.3.32 This is a simple T-junction connecting to the U1058 Caulfield Road North, which provides access to Inverness College (UHI Campus). The junction is situated 0.2km east of B9006 Culloden Road. A footway/cycleway runs along the north side of the U1058 through this junction with dropped kerbs to allow cyclists to cross.

Caulfield Road North/Castlehill Road Junction

2.3.33 This is a simple T-junction connecting U5096 Castlehill Road to U1058 Caulfield Road North. The junction is situated 0.4km east of Culloden Road. A footway/cycleway runs along the north side of the U1058 Caulfield Road North with dropped kerbs set back approximately 20m from the junction to allow cyclists to cross.

Structures

2.3.34 There is one bridge and one sign gantry which may be affected by the proposed scheme.

2.3.35 The Transport Scotland IRIS database has been used to inform this section in relation to the condition of existing structures which may be affected by the scheme.

Bridge Structures

2.3.36 A summary of the existing bridge is provided in Table 2.5 below. A more detailed description of the structure follows this table.

Table 2.5 : Existing Bridges

Reference	Name	General Dimensions		Comments
		Span Lengths	Deck Width	
A9 1300	Inshes Overbridge	14.8m and 16.0m skew spans on skew of 22 degrees 20 minutes	14.2m	Two span simply supported precast concrete M-beam and slab deck supported on rubber bearing pads.

Inshes Overbridge (Reference No. A9 1300)

2.3.37 Located approximately 1km south of the A9 Raigmore Interchange, Inshes Overbridge carries the single carriageway B9006 Culloden Road over the A9. It was constructed circa 1981 and comprises a 2 span simply supported precast concrete M-beam and slab deck. The end supports comprise free standing reinforced concrete cantilever walls supported on spread foundations and the pier comprises a free standing reinforced concrete slab wall supported on spread foundations. The structure has a skew of 22 degrees with skew spans of 14.8m and 16.0m. The carriageway is 7.3m wide. An approximately 3m wide shared use NMU facility which forms part of NCN1 is provided on the north side and an approximately 3m wide raised verge is provided on the south side of the bridge. The minimum available headroom to the A9 below is 5.76m as measured on 31 July 2014. Steel parapets are provided on each edge of the deck with the north and south parapets being P2/80 1.4m high and P2/113 0.975m high respectively.

2.3.38 The most recent General and Principal Inspections (Transport Scotland, 2012 and 2014 respectively) identified that the structure was generally in good condition with generally only minor defects. However, three category 3 defects were identified in relation to debris on the bearing shelf brought in by pigeons, abutments were wet due to defective joints above and small areas of concrete are spalling behind parapet posts.

2.3.39 The cross section of this structure meets current standards required for an urban single carriageway all-purpose road.

2.3.40 The vehicle containment over the structure does not comply with current standards as it is of insufficient height (975mm actual compared with a current requirement of 1000mm) on the south side.

2.3.41 The structure is recorded as being designed to accommodate full HA loading and 45 units of HB loading. There is no record of an assessment to provide recent verification of its load carrying capacity.

Sign Gantries

2.3.42 The sign gantry which may be affected by the scheme is as follows:

- A9 1295 G63 Nadics A5

2.3.43 The most recent General and Principal Inspections (Transport Scotland, 2015 and 2013 respectively) identified that the structure was generally in good condition with generally only minor defects. However, three category 3 defects were identified in relation to fractured base grouting, coating failure and corrosion to the bottom of the access support at connection to the base.

2.3.44 No other category 3 or 4 defects other than those noted above affect this minor structure.

Culverts

2.3.45 The 12 culverts located in the study area are as follows:

- Inshes Burn U1267 Dell of Inshes culvert;

- Inshes Burn B9006 Culloden Road culvert;
- Scretan Burn B9006 Culloden Road culvert;
- Scretan Burn A96 culvert;
- Scretan Burn Highland Main Line Railway culvert;
- Scretan Burn Aberdeen to Inverness Railway line culvert;
- Cairnlaw Burn B9006 Culloden Road culvert;
- Cairnlaw Burn C1036 Tower Road culvert;
- Cairnlaw Burn Highland Main Line Railway culvert;
- Cairnlaw Burn C1032 Barn Church Road culvert;
- Cairnlaw Burn A96 culvert; and
- Cairnlaw Burn Aberdeen to Inverness Railway line culvert.

Retaining Walls

2.3.46 There are no retaining walls within the study area which may be affected by the scheme.

Non-Motorised User Provision

Footpaths

2.3.47 Table 2.6 below describes the footpaths and footways which are within the immediate vicinity of the proposed scheme. In total, 19 routes have been identified.

Table 2.6 : Existing Footways

Path	Description of Route
IN08.10	Core path along an access track to Ashton Farm, to the east of the Inverness Retail and Business Park. The path connects the A96 with Caulfield Road. The route links the residential areas of Smithton and Cradlehall with the Inverness Retail and Business Park and the Moray Firth.
IN08.11	A short core path through woodland to Cradlehall Court.
IN19.15	Core path to the north of the Raigmore Hospital, connecting with core path IN19.16.
IN19.16	Core path to the east of the Raigmore Hospital.
IN08.23	Core path along the old A96 running parallel to the Moray Firth.
IN08.30	Core path to the north of the A96, approximately 300m east of the Inverness Retail and Business Park roundabout. The path runs through a farm at Seafield, before crossing under the Aberdeen to Inverness Railway Line and linking in with core path IN08.23.
IN08.31	A short core path through woodland to Cradlehall Court.
LP1	Pavement along the B9006, before connecting with LP2 and NCR1.
LP2	Pavement along Caulfield Road North in the east and Culloden Road to the west.
LP3	Path along Barn Church Road crossing the A96 at the Smithton Roundabout.
LP4	Pavement along the B8082.
LP5	Local path to the north of the A96.
LP6	Local path to the south of the A96.
WN.1	Small stretch of track through agricultural land which ties in with ACP5.

Path	Description of Route
WN.2	Path along a residential road to the east of the Inshes Retail Park, before orientating through an agricultural landscape to the south.
WN.3	Path along the entrance road to the Inverness College (UHI Campus).
WN.4	Track through Inshes Wood, to the south of Culloden. The track is accessed from Birchwood Road.
National Cycle Network Route 1	NCN1 orientates along Caulfield Road North in the east and Culloden Road to the west.
Local cycle route connecting the Inverness College (UHI Campus) and the Inverness Retail and Business Park	Local cycle route to the north-west of Cradlehall, connecting the Inverness College (UHI Campus) with the Inverness Retail and Business Park.

2.3.48 The core paths are discussed in Part 3, Chapter 16 (All Travellers) of this report.

Cyclepaths

2.3.49 In addition to pedestrians, cyclists have a legal right to use core paths. The shared use footway/cycleway connecting the Inverness College (UHI Campus) and the Inverness Retail and Business Park and the national cycle route along the U1058 Caulfield Road North in the east and the B9006 Culloden Road to the west are the only cycleways in the study area.

Public Utilities

2.3.50 Public utilities have been identified and key utilities are shown in drawing B2103501-UT-0000-DR-001.

Telecoms

2.3.51 Underground and over ground BT cables run adjacent to the C1032 Barn Church Road and connect into the A96 at Smithton Junction. An underground BT cable also runs along the A96 access to Ashton Farm and terminates close to the farm buildings. An underground cable runs from Inshes adjacent to Culloden. An underground cable runs from the Inverness College (UHI Campus) and ties into the U1058 Caulfield Road North.

Gas

2.3.52 An intermediate pressure gas pipe is located adjacent to the existing A9 and also along the existing A96. A low pressure gas pipe is located at Inverness Retail and Business Park.

Electricity

2.3.53 Scottish and Southern Energy's 33kV and 11kV over ground and underground cables exist in the area. They do not run adjacent to any of the existing roads in the study area, but cross over existing carriageways. There is potential for the proposed A96 Dualling Inverness to Nairn (including Nairn Bypass) scheme to result in diversions to 11kV underground cables in the area.

Water Supply and Sewerage

2.3.54 There are several water supply pipes in the area. They run adjacent to the B9006 Millburn Roundabout – Culcabock – Castle Hill – Culloden Moor – Croy – Gollanfield – Fort George Road, the U1058 Castlehill – Cradlehall – Smithton – Stratton Lodge Road, the C1032 Barn Church Road, the

A96, the access road to Ashton Farm from the A96, within Inverness Retail and Business Park, and at the Inshes Retail Park roundabout. There is potential for the proposed A96 Dualling Inverness to Nairn (including Nairn Bypass) scheme to result in diversions to sewer and/or water supply services in the area.

2.3.55 Foul pipes are in the vicinity of the study area but do not run adjacent or cross over any of the existing roads that are impacted by the scheme.

Aviation Fuel Pipeline

2.3.56 An aviation fuel pipeline runs east from Inverness, sitting adjacent to the existing A96 between Inverness and Milton of Culloden.

Bus Services

2.3.57 The bus services and associated bus stops are listed and discussed in detail Part 3, Chapter 16 (All Travellers) of this report.

2.3.58 It is understood that no school bus transport services operate in the vicinity of the proposed scheme.

2.4 References

Transport Scotland (2015). Reported Road Casualties Scotland 2015 [online]. Available from https://www.transport.gov.scot/media/20223/j452722.pdf [Accessed 31 July 2017].

W.D.M (*on behalf of Transport Scotland*) (2012). General Inspection Report, Inshes O/B. Transport Scotland.

BEAR Scotland Ltd (*on behalf of Transport Scotland*) (2014). Principal Inspection Report, Inshes O/B. Transport Scotland.

BEAR Scotland Ltd (*on behalf of Transport Scotland*) (2013). Principal Inspection Report, NADICS A5. Transport Scotland.

W.D.M (*on behalf of Transport Scotland*) (2015). General Inspection Report, NADICS A5. Transport Scotland.

3. Description of Options

3.1 Introduction

3.1.1 This chapter provides a description of the options assessed within this DMRB Stage 2 Scheme Assessment Report.

3.2 Option Development

3.2.1 The option appraisal undertaken as part of the A9/A96 Connections Study identified two potential options to provide a link between the A9 at Inshes and the A96 Smithton junction.

3.2.2 Transport Scotland requested that Jacobs take forward these options to a DMRB Stage 2 Assessment. Further assessment and refinement through a sifting process ultimately identified three options to be taken forward in the full Stage 2 Assessment.

3.2.3 Drawings B2103501-HW-1000-DR-001 to 003 show Option 1, Option 2 and Option 3 respectively. The route between Smithton Junction and Cradlehall Roundabout is common to all three options. The presence of a scheduled monument on the line of the route immediately to the north of the Highland Main Line has resulted in two alignments being developed that either pass or bisect this feature. In turn the route alignment then either passes to the east or west of Ashton Farm. These alternative alignments have been labelled the A and B variants of each option. The A variant passes between the elements of the scheduled monument and to the west of Ashton Farm whereas the B variant passes the monuments to the east and then passes to the east of Ashton Farm.

Option 1A (Drawing B2103501-HW-1000-DR-001)

3.2.4 The route alignment commences at THC's proposed Inshes Phase 2 roundabout at Inshes Retail Park and proceeds in an easterly direction through Dell of Inshes to cross the A9 on an overbridge. The route continues on embankment through Inshes Smallholdings passing over the B9006 Culloden Road and through the grounds of Castlehill House to connect to the local road network at the proposed Cradlehall Roundabout. Cradlehall Roundabout will be a four arm roundabout and tie in to U1058 Caulfield Road North. The access to the Inverness College (UHI Campus) and the U5096 Castlehill Road will be locally realigned. The route then heads in a north-easterly direction to cross over the Highland Main Line and passes between two elements of a scheduled monument and then connects to the proposed Ashton Farm Roundabout. This junction links the route to the Inverness Retail and Business Park by means of a new road. The route then proceeds through agricultural land to the west of the Ashton Farm buildings to tie in to the south roundabout of the proposed grade separated A96 Smithton Junction, to be delivered as part of the A96 Dualling Inverness to Nairn (including Nairn bypass) scheme. This option also includes an additional running lane on the A9 southbound between Raigmore and Inshes junctions.

Option 1B (Drawing B2103501-HW-1000-DR-001)

3.2.5 The proposed alignment between Inshes Retail Park and Cradlehall Roundabout is the same as that for Option 1A. From Cradlehall Roundabout the route passes over the Highland Main Line and to the east of the scheduled monument. As for Option 1A the Ashton Farm Roundabout provides for a connection to the Inverness Retail and Business Park. The route continues in a north-easterly direction passing to the east of Ashton Farm buildings to tie in to the proposed grade separated A96 Smithton Junction, to be delivered as part of the A96 Dualling Inverness to Nairn (including Nairn bypass) scheme. This option also includes an additional running lane on the A9 southbound between Raigmore and Inshes junctions.

Option 2A/B (Drawing B2103501-HW-1000-DR-OPT-002)

3.2.6 This option and variants are identical to those for Option 1 other than in the vicinity of the A9 Trunk

Road. The existing merge and diverge slip roads on the A9 southbound carriageway at Inshes are closed and replaced by new slips that form a junction with the proposed link road alignment to the east of the proposed A9 overbridge. This option includes a lane gain arrangement on the A9 southbound between Raigmore and Inshes junctions. As part of this option the Inshes overbridge carrying B9006 Culloden Road over the A9 will be demolished and reconstructed to provide appropriate headroom for the new A9 diverge lane.

Option 3A/B (Drawing B2103501-HW-1000-DR-OPT-003)

3.2.7 The proposed alignment between Cradlehall Roundabout and Smithton junction is the same as that for Options 1 and 2. For this option the proposed Cradlehall Roundabout will be a three arm roundabout that ties into the existing U1058 Caulfield Road North. The U1058 Caulfield Road North approach to the B9006 Culloden Road will be widened. A new overbridge running parallel with the existing Inshes overbridge will be provided to accommodate two traffic lanes in each direction of travel. This option also includes an additional running lane on the A9 southbound between Raigmore and Inshes junctions.

3.3 Cost Estimates

3.3.1 Initial scheme cost estimates have been prepared for each option under consideration. The quantifiable items of the works have been measured and a cost per unit has been applied.

3.3.2 Other works elements have been assessed as a percentage of the total works costs. The percentage allowances are described below.

3.3.3 Preliminaries have been quantified as a percentage of the total works costs. This is in line with other, similar schemes. Percentage allowances have also been made at a scheme level for items such as contingency and optimism bias.

3.3.4 The base cost estimate is the sum of:

- Preparation costs;
- Advance works costs;
- Works costs;
- Contingency;
- Public utilities costs; and
- Employer issued ITS equipment costs.

3.3.5 Following the production of the base cost estimate, adjustments are required for the excess of construction cost inflation over general inflation, for risk and for optimism bias, as set out in STAG:

- Construction Cost Inflation (STAG paragraph 9.5.2) – No adjustment at this stage;
- Risk (STAG paragraph 13.2) – A risk allowance of 15% is included; and
- Optimism Bias (STAG paragraph 13.3.3) of 25% has been agreed by the project team based on the requirements of the Treasury Green Book and Transport Scotland's guidance in the Network Evaluation from Surveys and Assignment (NESA) manual for a DMRB Stage 2 assessment roads cost factor.

3.3.6 The estimated base cost, de-trunking costs, Part I compensation costs, risk allowance, and optimism bias are added to give a scheme total for each option.

3.3.7 The estimate is in Pounds Sterling (£) at a Quarter 1 2015 price base, excluding VAT.

3.3.8 The District Valuer has provided an initial estimate of land acquisition and compensation costs for each option.

3.3.9 Some elements of the cost estimate have been calculated as a percentage of the total construction costs. These allowances have been mainly based upon knowledge from other projects and from industry guidance. The percentage allowances are described below.

3.3.10 The preparation costs have been estimated by combining allowances for land acquisition, design and supervision, geotechnical and topographical surveys and for a potential Public Local Inquiry. An allowance has been made for ecological and archaeological advance works such as pre-construction surveys.

3.3.11 Preliminaries are calculated as 17% of overall base construction costs.

3.3.12 Traffic signs and road markings are calculated as 2% of overall costs of other road items.

3.3.13 Environmental mitigation and landscaping is estimated as 5% of overall costs of other road and structures items.

3.3.14 Accommodation works are assumed as 3% of overall costs of other road items (derived by experience on other schemes).

3.3.15 A contingency of 15% was added to the construction costs to cover detailed items which have not been designed or allowed for elsewhere in the cost estimate, such as contaminated land or NMU links.

3.3.16 The scheme cost estimate range for each option is shown in Table 3.1.

Table 3.1 : Scheme Cost Estimate Range

Option	Cost Range
Opt 1A/B	£35m-£45m
Opt 2A/B	£43m-£53m
Opt 3A/B	£25m-£35m

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