Prepared by

Jacobs AECOM

for

TRANSPORT SCOTLAND
CÒMHDHAIL ALBA

A96 Corridor Review

Climate Compatibility Assessment Report (Draft)

2024

Contents

List of Figures

List of Tables

List of Appendices

Glossary of Terms

Carbon emissions	Inclusive of all greenhouse gas emissions (group of gases that absorbs and emits radiant energy within the thermal infrared range, causing the greenhouse effect) and refers to tCO2e unless stated otherwise.
Climate change	Change in global, national, or regional climate patterns (such as temperature, precipitation and wind).
Climate change adaptation and resilience	Improving the adaptation for, resilience to, and optimisation of benefits from, future climate conditions.
Climate change compatibility	The degree to which a particular action is aligned with the climate change mitigation and adaptation.
Climate change mitigation	Preventing or minimising emissions of whole life carbon emission into the atmosphere.
Compatibility	How well two or more things occur together without causing conflicts or problems.
Ecosystem services	Services provided by an ecosystem such as: provisioning services: food, fresh water, wood, medicinal products, etc.; regulatory and maintenance services: purification of air and water, climate regulation, pollination, carbon sequestration, natural pest control etc.; and cultural services: tourism and recreation, cultural heritage, and educational opportunities and a sense of wellbeing.
Nature-based solutions	The sustainable management and use of natural features and processes to tackle socio-environmental challenges.
Resilience	The capacity of a system to absorb disturbance and still retain its basic function, structure and feedback systems - hence the ability to anticipate, prepare for, and respond to hazardous events, trends or disturbances related to climate.
Sustainable Travel Hierarchy	The National Transport Strategy 2 (NTS2) uses the Sustainable Travel Hierarchy to promote walking, cycling, public transport and bike, car and ride sharing in preference to single occupancy car use.
Traffic carbon emissions assessment period	The period from 2030 to 2045 over which the traffic carbon (greenhouse gas) emissions are assessed.
Vulnerability	The characteristics (determined by social, economic and environmental factors) of the option which increase/decrease the susceptibility of the surrounding environment to the impacts of climate change.
With Policy Scenario	Captures policy ambitions including 20% reduction (from 2019 levels) in car kilometres travelled by 2030, and assumptions to significantly reduce levels of commuting/business journeys to reflect post COVID-19

	working behaviours, leading to low levels of motorised traffic demand and emissions.
Without Policy Scenario	No policy ambitions are captured, and less significant reductions to levels of commuting/business journeys, leading to higher levels of motorised traffic demand and emissions.

Acronyms

AST	Assessment Summary Table
AWI	Ancient Woodland Inventory
CCC	Climate Change Committee
CCRA	Climate Change Risk Assessment
CO2e	Carbon dioxide equivalent
DMRB	Design Manual for Roads and Bridges
DRT	Demand Responsive Transport
EFT	Emissions Factors Toolkit
EV	Electric Vehicle
GHG	Greenhouse Gas
GIS	Geographic Information System
ICE	Internal Combustion Engine
LLA	Local Landscape Area
MaaS	Mobility as a Service
NCN	National Cycle Network
NTS	National Transport Strategy
NTS2	Second National Transport Strategy
NWSS	Native Woodland Survey of Scotland
PAS	Publicly Available Specification
SAC	Special Area of Conservation
SEA	Strategic Environmental Assessment
SEPA	Scottish Environment Protection Agency

SME	Subject Matter Expert
SPA	Special Protection Area
SSSI	Site of Special Scientific Interest
STAG	Scottish Transport Appraisal Guidance
STPR	Strategic Transport Projects Review
STPR2	Second Strategic Transport Projects Review
TAG	Transport Appraisal Guidance
TPO	Transport Planning Objective
TRACC	TRansport ACCessibility
UKCP	United Kingdom Climate Projections
ULEV	Ultra-Low Emission Vehicle

1. Introduction – A96 Corridor Review

1.1 The A96 Corridor Review

1.1.1 In August 2021, it was agreed by the Scottish Government to take forward a transport enhancements programme on the A96 corridor that improves connectivity between surrounding towns, tackles congestion and addresses safety and environmental issues.

1.1.2 Whilst the current plan is to fully dual the A96 route, it was agreed as part of this process there would be a transparent, evidence-based review of the programme, to include a climate compatibility assessment to assess direct and indirect impacts on the climate and the environment. Other statutory assessments would also be undertaken which include a Strategic Environmental Assessment (SEA) and Statutory Impact Assessments (SIAs).

1.1.3 As it has already received Ministerial consent following a Public Local Inquiry, dualling of the A96 from Inverness to Nairn as well as a bypass of Nairn is separate from the wider A96 review process.

1.1.4 The A96 Corridor Review is being carried out in accordance with the Scottish Transport Appraisal Guidance (STAG). STAG is the best practice, objective-led approach to transport appraisal. The transport appraisal has considered all relevant transport modes within the A96 corridor, including active travel, public transport, rail and roads-based transport modes. Adopting STAG also brings the review in line with the same methodology as set out in the Second Strategic Transport Projects Review (STPR2).

1.1.5 The A96 Corridor Review is being carried out by design consultants Jacobs AECOM acting on behalf of Transport Scotland. Jacobs AECOM supported Transport Scotland undertaking STPR2. The review considers transport problems and opportunities within the A96 corridor. It also looks at the changing policy context and other key considerations, such as development and growth aims for the corridor and surrounding area. Additionally, it considers the impact of the global climate emergency and the COVID-19 pandemic on how people work and travel within the corridor.

1.1.6 This Climate Compatibility Assessment has been undertaken as part of a series of materials produced to support the A96 Corridor Review, including:

- A96 Corridor Review Case for Change (Dec 2022)
- A96 Corridor Review Stakeholder & Public Engagement Consultation Report (Dec 2022)
- A96 Corridor Review, Strategic Business Case - Transport Appraisal Report (Draft)

- A96 Corridor Review, Strategic Business Case - Summary of Main Report (Draft)
- A96 Corridor Review, Strategic Environmental Assessment (SEA) Draft Environmental Report
- A96 Corridor Review, Strategic Environmental Assessment (SEA) Draft Environmental Report Non-Technical Summary
- A96 Corridor Review, Fairer Scotland Duty Assessment (FSDA) Report (Draft)
- A96 Corridor Review, Child Rights and Wellbeing Impact Assessment (CRWIA) Report (Draft)
- A96 Corridor Review, Equality Impact Assessment (EqIA) Report (Draft)
- A96 Corridor Review, Partial Business and Regulatory Impact Assessment (BRIA) Report (Draft)

1.2 A96 Corridor Review climate compatibility assessment

1.2.1 The climate compatibility assessment has drawn information and data from existing transport guidance, processes and assessments including the SEA, STAG and Design Manual for Roads and Bridges (DMRB), all of which are required as part of the suite of statutory reports and assessments as agreed with Transport Scotland.

1.2.2 The climate compatibility assessment is separate from and does not replace the transport guidance, processes and assessments, and instead should be considered in conjunction with these which provide the wider social, environmental and economic appraisal and assessment of the A96 Full Dualling and packages.

1.2.3 The climate compatibility assessment is a narrative assessment, that seeks to establish the alignment or otherwise of the proposals with the identified climate change criteria. The narrative assessments do not provide a definitive 'yes' or 'no' to an intervention being compatible or aligned to the climate change criteria. The criteria assessments are not combined to provide a collective impact assessment across all criteria.

1.2.4 The packages are at an early stage of development with limited design details. Therefore, the assessments are based on potential impacts and interactions the packages could have with aspects considered within the specific criteria. The A96 Full Dualling has been assessed at the same stage of design development as the packages to ensure a consistency of approach.

1.2.5 Below are the climate compatibility assessment criteria and their associated success factors, split across the two themes of 'climate change adaptation and resilience' and 'climate change mitigation'.

Climate change adaptation and resilience

1.2.6 Criterion 1 - extent to which the package supports adaptation and/or resilience to current and predicted future impacts of climate change.

1.2.7 Success Factors:

(a) Supports adaptation for and/or resilience to predicted increases in sea levels and storm surge.

(b) Supports adaptation for and/or resilience to predicted changes in temperatures.

(c) Supports adaptation for and/or resilience to predicted increase in likelihood and severity of fluvial and pluvial flooding.

(d) Supports adaptation for and/or resilience to predicted increase in likelihood and severity of storms and high winds.

1.2.8 Criterion 2 - extent to which the package supports the surrounding area to adapt and/or become more resilient to current and predicted future impacts of climate change.

1.2.9 Success Factor:

(a) Supports adaptation for and/or resilience to current and future impacts of climate change within the study area outside of the package boundary.

(b) Supports the natural environment to adapt for and/or increase resilience to current and predicted future impacts of climate change.

Climate change mitigation

1.2.10 Criterion 3 - extent to which the package supports the decarbonisation of the transport network in Scotland, including supporting transition from higher to lower emission modes, and the modal shift to greater public transport and active travel options.

1.2.11 Success Factor:

(a) The net change in user carbon emissions sits appropriately within a calculated emissions envelope for Scotland, taking account of changing legislation and targets (including any Climate Change Plan update for Scotland) (assumed current target of 2045).

(b) Supports the transition to low carbon modes of transport: transition from higher emission to lower emission modes, the modal shift to public transport and the modal shift to active travel for shorter everyday journeys.

1.2.12 Criterion 4 - extent to which the package supports the decarbonisation of the construction sector in Scotland and maximises reduction in carbon emissions.

1.2.13 Success Factor:

(a) Supports transition from higher emission to lower emission materials and technologies during construction, operation and maintenance.

1.2.14 Criterion 5 - extent to which land use change associated with the package mitigates carbon emissions and contributes to carbon storage and sequestration.

1.2.15 Success Factor:

(a) Supports the protection and development of carbon sinks, and takes appropriate measures to maximise carbon sequestration, taking account of wider ecosystem services/natural capital.

2. Methodology to develop a climate compatibility assessment

2.1 Overview

2.1.1 The following methodology was used to develop the climate compatibility assessment:

- literature and best practice review;
- policy context and alignment;
- transport guidance, processes and assessments gap analysis; and
- criteria development, testing and refinement.

2.2 Literature and best practice review

2.2.1 A review of public sector and academic literature was undertaken to provide insights into previous attempts to measure the climate change compatibility of projects, schemes and whole industries.

2.2.2 The literature and best practice review was used to:

- gain an understanding of the maturity of research into climate change compatibility or alignment; and
- create a theoretical framework of criteria to assess climate change compatibility.

2.2.3 Professional knowledge and experience were supplemented with online search engines to identify suitable literature for review, searching for relatable content with reference to various themes, including alignment with the Paris Agreement, the Glasgow Climate Pact, decarbonisation, climate change risk assessments, and measuring against the United Nations Sustainable Development Goals (UN SDGs).

2.2.4 Each piece of literature was reviewed to identify:

- key themes – how the assessment related to the topic of climate change compatibility;
- methodology – what approach was used to test the compatibility of the focus project/sector to a particular key theme; and
- strengths and limitations associated with each assessment.

2.2.5 The literature review highlighted the lack of similar assessments that exist to date. The results from the review, however, did identify key themes that informed the development of the climate compatibility assessment:

- The acknowledgement that both climate change adaptation and resilience, and climate change mitigation, are key climate outcomes.
- The use of qualitative (positive/negative lists) and quantitative (e.g. carbon emissions) metrics to provide data for assessments.

- The consideration of 'Paris-Aligned', 'Misaligned' and 'Conditionally Aligned' to assess the alignment of transport infrastructure investments.
- The acknowledgement that additional environmental outcomes, including water quality, air quality, waste and circular economy, nature and biodiversity, and a just transition may be indirectly impacted by climate change.

2.3 Policy context and alignment

2.3.1 The climate compatibility assessment was developed in the context of relevant Scottish national, regional and local policies, plans and strategies relating to climate change (Appendix A and Appendix B). Most of Scotland's national policies and strategies are published within the context of the statutory requirements of the Climate Change (Scotland) Act 2009, and the Climate Change (Emissions Reduction Targets) Act 2019.

2.3.2 The National Transport Strategy 2 (NTS2) and the National Planning Framework (NPF4) have been prepared following the introduction of legislation which requires both plans to be prepared with consideration of how they will contribute to the achievement of statutory outcomes. Those outcomes include how the strategy and framework contribute to the national emission reduction targets as per the Climate Change Acts.

2.3.3 All the climate compatibility assessment criteria are fully supported by at least one national policy/plan/strategy (see **Figure 2.3.1**). This shows that the criteria are representative of the relevant policies, plans and strategies. The table uses 'Not applicable' for when a national policy/plan/strategy is not relevant to a specific a specific climate change criterion by virtue of the scope of the policy/plan/strategy.

2.3.4 See Appendix C for the justification of the alignment between the relevant national policies, plans and strategies relating to the climate compatibility assessment criteria.

Figure 2.3.1: Correlation of national, regional and local policy, plans and strategies with the climate compatibility assessment criteria

		Climate compatibility assessment theme and criteria				
		Climate change adaptation and resilience		Climate change mitigation		
		1. Extent to which the package supports adaptation and/or resilience to current and predicted future impacts of climate change.	2. Extent to which the package supports the surrounding area to adapt and/or become more resilient to current and predicted future impacts of climate change.	3. Extent to which the package supports the decarbonisation of the transport network in Scotland, including supporting transition from higher to lower emission modes, and the modal shift to greater public transport and active travel options.	4. Extent to which the package supports the decarbonisation of the construction sector in Scotland and maximises reduction in carbon emissions.	5. Extent to which land use change associated with the package mitigates carbon emissions and contributes to carbon storage and sequestration.
National policies, plans and strategies	A National Mission with Local Impact: Infrastructure Investment Plan for Scotland 2021-22 to 2025-26	Partial correlation	Strong correlation	Strong correlation	Strong correlation	Strong correlation
	Climate Change Plan Third Report on Proposals and Policies 2018-2032	Not applicable	Not applicable	Partial correlation	Partial correlation	Strong correlation
	Update to the Climate Change Plan 2018-2032 (Securing a Green Recovery on a Path to Net Zero)	Partial correlation	Partial correlation	Strong correlation	Partial correlation	Strong correlation
	Scottish Climate Change Adaptation Programme 2019-2024	Strong correlation	Strong correlation	Strong correlation	Strong correlation	Strong correlation
	Just Transition Commission: A National Mission for a fairer, greener Scotland	Not applicable	Partial correlation	Strong correlation	Strong correlation	Partial correlation
	Evidence for the third UK Climate Change Risk Assessment (CCRA3) - Summary for Scotland	Strong correlation	Strong correlation	Partial correlation	Partial correlation	Strong correlation
	National Transport Strategy 2 (NTS2)	Partial correlation	Partial correlation	Strong correlation	Partial correlation	Not applicable
	Strategic Transport Projects Review 2	Partial correlation	Partial correlation	Strong correlation	Partial correlation	Not applicable
	A Route Map to achieve a 20% reduction in car kilometres by 2030	Partial correlation	Partial correlation	Strong correlation	Not applicable	Not applicable
	Rail Services Decarbonisation Action Plan	Partial correlation	Partial correlation	Strong correlation	Strong correlation	Not applicable
	National Planning Framework 4 (NPF4)	Strong correlation	Strong correlation	Strong correlation	Strong correlation	Strong correlation
Local policies, plans and strategies	The Highland Wide Local Development Plan 2012	Partial correlation	Partial correlation	Partial correlation	Partial correlation	Strong correlation
	Moray Local Development Plan 2020	Partial correlation	Partial correlation	Not applicable	Not applicable	Strong correlation
	Moray Council Climate Change Strategy 2020-2030	Not applicable	Partial correlation	Strong correlation	Partial correlation	Partial correlation
	Aberdeen City and Shire Strategic Development Plan 2020	Partial correlation	Partial correlation	Partial correlation	Strong correlation	Partial correlation
	Aberdeenshire Local Development Plan 2023	Partial correlation	Partial correlation	Strong correlation	Partial correlation	Strong correlation
	NESTRANS Regional Transport Strategy 2040	Not applicable	Partial correlation	Strong correlation	Not applicable	Not applicable
	HITRANS Regional Transport Strategy 2008	Not applicable	Not applicable	Strong correlation	Not applicable	Not applicable

2.4 Climate change considerations in transport guidance, processes and assessments

2.4.1 Existing transport guidance, processes and assessment methodologies were reviewed for alignment to the developed climate compatibility assessment criteria. The following transport guidance, processes and assessments were reviewed:

- STAG criteria for Environment and Climate Change (**Figure 2.5.1**);
- Draft STAG Transport Planning Objectives (TPOs) (**Figure 2.5.2**);
- SEA objectives (**Figure 2.6.1**); and
- Relevant parts of the Design Manual for Roads and Bridges (DMRB) (**Figure 2.7.1**).

2.4.2 The existing transport guidance, processes and assessments do not require a specific climate compatibility assessment as described in this report. However, in combination, the processes reviewed provide good coverage of the climate compatibility assessment criteria, with no significant gaps.

2.4.3 The existing transport guidance, processes and assessments reviewed provide a balanced assessment or appraisal covering wider environmental, social and economic aspects, including climate change aspects. This balanced approach is something that a stand-alone climate compatibility assessment does not provide. The following sub-sections provide additional context and information on the processes reviewed.

2.5 Scottish Transport Appraisal Guidance (STAG)

2.5.1 The transport appraisal for the A96 Corridor Review is being carried out in accordance with STAG, which is an objective-led, evidence-based, transport appraisal process.

2.5.2 The A96 Corridor Review Case for Change was the first stage of the STAG process, setting out the justification for taking the study forward. For the A96 Corridor Review, this included:

- a review of current national, regional and local strategy and policy documents used to provide the policy context for the review
- determination of the geographic, socio-economic, environmental and transport context for the transport appraisal study area
- the identification and definition of the key problems and opportunities for the transport corridor, developed from the evidence base that included analyses of a wide range of datasets, and supported by information obtained from the engagement activities that were undertaken and in particular through stakeholder engagement workshops and an online public consultation survey
- the development of overarching Transport Planning Objectives (TPOs), each with a set of corridor-specific sub-objectives, based on the identified problems and opportunities

- the generation and sifting of option suggestions applicable and relevant to the transport corridor.

2.5.3 As the STAG process progressed into the preliminary and detailed appraisal stages, the A96 Full Dualling and all six packages were appraised against the project specific TPOs, STAG criteria, established policy objectives and deliverability.

2.5.4 As per the updated STAG criteria on Climate Change, the quantification and monetisation of carbon emission impacts as a result of transport user emissions has been determined for the A96 Full Dualling and all six packages at the detailed appraisal stage.

2.5.5 **Figure 2.5.1** and **Figure 2.5.2** show that the STAG criteria for Environment and Climate Change and the STAG TPOs are well correlated with the climate compatibility assessment criteria. The tables use 'Not applicable' for when a STAG Criteria for Environment and Climate Change or STAG TPO is not relevant to a specific climate change criterion by virtue of the scope of the STAG Criteria for Environment and Climate Change or STAG TPO.

Figure 2.5.1: Correlation of the STAG environment and climate change sub-criteria with the climate compatibility assessment criteria

		Climate compatibility assessment theme and criteria				
		Climate change adaptation and resilience		Climate change mitigation		
STAG criteria	STAG sub-criteria	1. Extent to which the package supports adaptation and/or resilience to current and predicted future impacts of climate change.	2. Extent to which the package supports the surrounding area to adapt and/or become more resilient to current and predicted future impacts of climate change.	3. Extent to which the package supports the decarbonisation of the transport network in Scotland, including supporting transition from higher to lower emission modes, and the modal shift to greater public transport and active travel options.	4. Extent to which the package supports the decarbonisation of the construction sector in Scotland and maximises reduction in carbon emissions.	5. Extent to which land use change associated with the package mitigates carbon emissions and contributes to carbon storage and sequestration.
Environment	Biodiversity and habitats	Partial correlation	Partial correlation	Not applicable	Not applicable	Partial correlation
	Geology and soils	Partial correlation	Partial correlation	Not applicable	Not applicable	Partial correlation
	Land use (including agriculture and forestry)	Partial correlation	Partial correlation	Not applicable	Not applicable	Partial correlation
	Water, drainage and flooding	Strong correlation	Strong correlation	Partial correlation	Partial correlation	Partial correlation
	Air quality	Partial correlation	Partial correlation	Strong correlation	Partial correlation	Partial correlation
	Historic environment	Not applicable	Partial correlation	Not applicable	Not applicable	Not applicable
	Landscape	Partial correlation	Partial correlation	Partial correlation	Not applicable	Partial correlation
	Noise and vibration	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
Climate change	Carbon emissions	Partial correlation	Partial correlation	Strong correlation	Not applicable	Not applicable
	Vulnerability to the effects of climate change	Strong correlation	Strong correlation	Not applicable	Not applicable	Partial correlation
	Potential to adapt to the effects of climate change	Strong correlation	Strong correlation	Partial correlation	Partial correlation	Partial correlation

Figure 2.5.2: Correlation of the STAG Transport Planning Objectives (TPO) with the climate compatibility assessment criteria

#	A96 Corridor Review Transport Planning Objective (TPO)	A96 Corridor Review Sub-Objectives	Climate compatibility assessment theme and criteria				
			Climate change adaptation and resilience		Climate change mitigation		
			1. Extent to which the package supports adaptation and/or resilience to current and predicted future impacts of climate change.	2. Extent to which the package supports the surrounding area to adapt and/or become more resilient to current and predicted future impacts of climate change.	3. Extent to which the package supports the decarbonisation of the transport network in Scotland, including supporting transition from higher to lower emission modes, and the modal shift to greater public transport and active travel options.	4. Extent to which the package supports the decarbonisation of the construction sector in Scotland and maximises reduction in carbon emissions.	5. Extent to which land use change associated with the package mitigates carbon emissions and contributes to carbon storage and sequestration.
1	A sustainable strategic transport corridor that contributes to the Scottish Government's net zero emissions target.	Reduce transport related emissions through a shift to more sustainable modes of transport.	Partial correlation	Partial correlation	Strong correlation	Partial correlation	Not applicable
		Increase the active travel mode share for shorter everyday journeys	Not applicable	Not applicable	Strong correlation	Partial correlation	Not applicable
2	An inclusive strategic transport corridor that improves the accessibility of public transport in rural areas for access to healthcare, employment, and education.	Increase public transport mode share by improving connections between sustainable modes of transport	Partial correlation	Partial correlation	Strong correlation	Partial correlation	Not applicable
		Reduce the reliance on private car for access to healthcare, employment, and education.	Partial correlation	Partial correlation	Partial correlation	Partial correlation	Not applicable
		Improve mobility and inclusion, recognising the specific needs of disadvantaged and vulnerable users	Partial correlation	Partial correlation	Partial correlation	Not applicable	Not applicable
3	A coherent strategic transport corridor that enhances communities as places, supporting health, wellbeing, and the environment.	Reduce demand for unsustainable travel by enhancing place-making within settlements along the A96	Partial correlation	Partial correlation	Strong correlation	Partial correlation	Not applicable
		Increase active travel mode share for both shorter and longer distance journeys	Not applicable	Not applicable	Strong correlation	Partial correlation	Not applicable
		Reduce real and perceived severance caused by the strategic transport network both between and within communities	Partial correlation	Partial correlation	Partial correlation	Not applicable	Not applicable
		Protect or enhance the natural environment and heritage	Partial correlation	Partial correlation	Partial correlation	Not applicable	Not applicable
4	An integrated strategic transport system that contributes towards sustainable inclusive growth throughout the corridor and beyond.	Increase sustainable access to labour markets and key centres for employment, education, and training	Partial correlation	Partial correlation	Partial correlation	Not applicable	Not applicable
		Increase the mode share of freight by sustainable modes.	Not applicable	Not applicable	Partial correlation	Partial correlation	Not applicable
		Increase competitiveness of key sectors by improving journey time reliability for commercial transport	Partial correlation	Partial correlation	Partial correlation	Not applicable	Not applicable
5	A reliable and resilient strategic transport corridor that is safe for users.	Reduce the accident rates and severity of transport related casualties in line with reduction targets.	Strong correlation	Strong correlation	Strong correlation	Not applicable	Not applicable
		Improve resilience to disruption (from climate change events and maintenance activities) through adaptation of the corridor's trunk road and rail infrastructure	Strong correlation	Strong correlation	Strong correlation	Partial correlation	Not applicable

2.6 Strategic Environmental Assessment (SEA)

2.6.1 SEA is a means of systematically assessing the likely impact of a public plan on the environment. Under the Environmental Assessment (Scotland) Act 2005, those bodies preparing qualifying plans are required to undertake an SEA of plans that are likely to have significant environmental effects, if implemented. The Act transposes the requirements of the European Community SEA Directive (Directive 2001/42/EC, 2001).

2.6.2 SEA aims to offer greater protection to the environment by ensuring public bodies (in this case, Transport Scotland) and those organisations preparing plans of a 'public character' consider and address the likely significant environmental effects.

2.6.3 The SEA process began with the screening stage which determined that an SEA was required. This conclusion was confirmed by the SEA Consultation Authorities: NatureScot, SEPA and Historic Environment Scotland.

2.6.4 The SEA topics, to be considered at all SEA stages, are:

- biodiversity, fauna and flora;
- population and human health;
- water and soil;
- air;
- climatic factors;
- material assets;
- cultural heritage; and
- landscape.

2.6.5 The SEA utilises a set of objectives that cover each of the environmental topics scoped into the assessment. The SEA objectives have been developed for the STPR2 SEA and further developed for the A96 Corridor Review. Objectives for the climatic factors topic include:

- Reduce emissions from Scotland's transport sector by reducing the need to travel and encouraging modal shift to help meet Scotland's wider targets to reduce greenhouse gas emissions.
- Adapt the transport network to the predicted effects of climate change.

2.6.6 **Figure 2.6.1** demonstrates that the SEA Objectives correlate with the climate change compatibility criteria. The table uses 'Not applicable' for when the SEA Objective is not relevant to a specific climate change criterion by virtue of the scope of the SEA Objective.

Figure 2.6.1: Correlation of the Strategic Environmental Assessment (SEA) objectives with the climate compatibility assessment criteria

		Climate compatibility assessment theme and criteria				
		Climate change adaptation and resilience		Climate change mitigation		
SEA topic	SEA objective	1. Extent to which the package supports adaptation and/or resilience to current and predicted future impacts of climate change.	2. Extent to which the package supports the surrounding area to adapt and/or become more resilient to current and predicted future impacts of climate change.	3. Extent to which the package supports the decarbonisation of the transport network in Scotland, including supporting transition from higher to lower emission modes, and the modal shift to greater public transport and active travel options.	4. Extent to which the package supports the decarbonisation of the construction sector in Scotland and maximises reduction in carbon emissions.	5. Extent to which land use change associated with the package mitigates carbon emissions and contributes to carbon storage and sequestration.
Climatic factors	Reduce emissions from Scotland's transport sector by reducing the need to travel and encouraging modal shift to help meet Scotland's wider targets to reduce carbon emissions	Not applicable	Not applicable	Strong correlation	Strong correlation	Partial correlation
	Adapt the transport network to the predicted effects of climate change	Strong correlation	Strong correlation	Not applicable	Not applicable	Partial correlation
Air quality	Reduce all forms of transport-related air pollution and improve air quality	Not applicable	Not applicable	Partial correlation	Partial correlation	Not applicable
Population and human health	Improve quality of life and human health and increase sustainable access to essential services, employment and the natural environment	Partial correlation	Partial correlation	Partial correlation	Not applicable	Not applicable
	Reduce noise and vibration associated with the transport network	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
	Promote, invest in, build and maintain infrastructure to support the development of high-quality places	Partial correlation	Partial correlation	Not applicable	Not applicable	Not applicable
	Improve safety on the transport network	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
Material assets	Promote and improve the sustainable use of the transport network	Partial correlation	Partial correlation	Partial correlation	Partial correlation	Partial correlation
	Reduce use of natural resources	Partial correlation	Partial correlation	Partial correlation	Partial correlation	Partial correlation
Water environment	Protect, maintain and improve the quality of water bodies, wetlands and the marine environment from any direct or indirect impacts from the project, and protect against the risk of flooding	Strong correlation	Strong correlation	Not applicable	Not applicable	Strong correlation
Biodiversity, flora and fauna	Protect, maintain and enhance biodiversity and ecosystem services, avoiding damage to or loss of designated and undesignated wildlife or geological sites	Partial correlation	Partial correlation	Not applicable	Not applicable	Strong correlation
Soils	Safeguard and improve soil quality in Scotland, particularly high value agricultural land and carbon-rich soil	Partial correlation	Partial correlation	Not applicable	Not applicable	Strong correlation
Cultural heritage	Protect and enhance (where appropriate) historic and archaeological sites and other culturally and historically important features and their settings.	Partial correlation	Partial correlation	Not applicable	Not applicable	Not applicable
Landscape and visual amenity	Safeguard and enhance the character and diversity of the Scottish landscape and areas of valuable landscape	Not applicable	Partial correlation	Not applicable	Not applicable	Partial correlation

2.7 Design Manual for Roads and Bridges (DMRB)

2.7.1 The DMRB and associated National Application Annexes for developed administrations contain information about current standards, advice notes and other published documents relating to the design, assessment and operation of trunk roads, including motorways.

2.7.2 The level of detail increases throughout the DMRB stages:

- Stage 1: Preliminary Assessment
- Stage 2: Route Option Assessment
- Stage 3: Scheme Assessment

2.7.3 Many DMRB documents have direct and indirect relationships to climate change impacts. To focus the review of DMRB in relation to the climate compatibility criteria, the following DMRB documents were identified as of greatest relevance:

- GG 103: Introduction and general requirements for sustainable development and design. This document introduces the general requirements for sustainable development and design.
- CG 501: Design of highway drainage systems. This document contains the over-arching requirements for drainage design of highways.
- LA 113: Road drainage and the water environment. This document describes the requirements for assessment and management of the impacts that road projects can have on the water environment.
- LA 114: Climate. This document sets out the requirements for assessing and reporting the effects of climate on highways (climate change resilience and adaptation), and the effect on climate of carbon emissions from construction, operation and maintenance projects.
- LA 105: Air Quality. This document sets out the requirements for assessing and reporting the effects of highway projects on air quality.

2.7.4 **Figure 2.7.1** shows that the above DMRB guidance correlates with the climate compatibility criteria. The table uses 'Not applicable' for when the DMRB guidance is not relevant to a specific climate change criterion by virtue of the scope of the DMRB guidance.

Figure 2.7.1: Correlation of the Design Manual for Roads and Bridges (DMRB) with the climate compatibility assessment criteria

		Climate compatibility assessment criteria and theme				
		Climate change adaptation and resilience		Climate change mitigation		
DMRB guidance	Description of guidance	1. Extent to which the package supports adaptation and/or resilience to current and predicted future impacts of climate change.	2. Extent to which the package supports the surrounding area to adapt and/or become more resilient to current and predicted future impacts of climate change.	3. Extent to which the package supports the decarbonisation of the transport network in Scotland, including supporting transition from higher to lower emission modes, and the modal shift to greater public transport and active travel options.	4. Extent to which the package supports the decarbonisation of the construction sector in Scotland and maximises reduction in carbon emissions.	5. Extent to which land use change associated with the package mitigates carbon emissions and contributes to carbon storage and sequestration.
GG 103 Introduction and general requirements for sustainable development and design	Describes how sustainable development and good road design can be applied to the design of motorway and all-purpose trunk roads. It aligns with a range of global, European and national commitments on sustainable development and standards of design.	Strong correlation	Strong correlation	Strong correlation	Strong correlation	Strong correlation
CG 501 Design of highway drainage systems	Sets out requirements and provides recommendations on the design of drainage for the UK motorway and all-purpose trunk roads. It describes the various alternative drainage solutions that are available, including their potential to control pollution and flooding, as well as detailed design factors to be considered.	Partial correlation	Partial correlation	Not applicable	Partial correlation	Not applicable
LA 113 Road drainage and the water environment	Sets out the requirements associated with the assessment and management of potential environmental impacts on the water environment from highway construction, operation, improvement, and maintenance, and aligns with the requirements of the 2000/60/EC.	Partial correlation	Partial correlation	Not applicable	Not applicable	Partial correlation
LA 114 Climate	Sets out the requirements for assessing and reporting the effects of climate on highways (climate change resilience and adaptation), and the effect on climate of carbon emissions from construction, operation, and maintenance projects.	Strong correlation	Strong correlation	Strong correlation	Strong correlation	Strong correlation
LA 105 Air quality	Sets out the requirements for assessing and reporting the effects of highway projects on air quality. It provides a framework for assessing, mitigating, and reporting the effects of motorway and all-purpose trunk roads projects on air quality by determining whether the impact of a project affects the UK's reported ability to comply with the Air Quality Directive (Ref 4.N) and triggers a significant air quality effect on nearby sensitive receptors.	Partial correlation	Partial correlation	Not applicable	Not applicable	Not applicable

3. Climate compatibility assessment

3.1 Assessment methodology

3.1.1 The methodology used to establish the environmental and geographic context and assessments is described for each criterion in **Table 3.1**, **Table 3.2**, **Table 3.3**, **Table 3.4** and **Table 3.5**.

Table 3.1: Assessment methodology for establishing context for criterion 1: extent to which the package supports adaptation for and/or resilience to current and predicted future impacts of climate change

Success Factor	Methodology for establishing context
1a. Supports adaptation for and/or resilience to predicted increases in sea levels and storm surge	Data on the risk of coastal flooding is obtained from the SEPA Coastal Hazard Flood Maps (Version v2.0, issue 11 May 2020, received 25 May 2022) within a 7.5km boundary of the study area. This includes: • 1 in 10-Year, Extent and Depth • 1 in 200-Year, Extent and Depth • 1 in 1,000-Year, Extent and Depth
1b. Supports adaptation for and/or resilience to predicted changes in temperatures	Data on the change in mean annual air temperature, maximum summer air temperature and minimum winter air temperature between 2020-2049 and 2070-2099 (50% probability) is obtained from the MET Office within a 25km boundary of the study area (received 28 March 2022).
1c. Supports adaptation for and/or resilience to predicted increase in likelihood and severity of fluvial and pluvial flooding	Data on fluvial and pluvial flooding is obtained from the SEPA River Hazard Flood Maps and Surface Water Hazard Maps (Version v2.0, issue 11 May 2020, received 25 May 2022) within a 7.5km boundary of the study area. For both the River Hazard Flood Maps and Surface Water Hazard Maps this includes: • 1 in 10-Year, Extent and Depth • 1 in 200-Year, Extent and Depth • 1 in 1,000-Year, Extent and Depth Data is also obtained from the SEPA Future Flood Maps, outlining both Coastal Depth (2080s - 1 in 200-Year +Climate Change) and River Depth (2080s – 1 in 200-Year +Climate Change) within a 7.5km boundary of the study area. Data on the change in annual precipitation rate is obtained from the MET Office for the period 2020-2049 and 2070-2099 (50% probability) within a 25km boundary of the study area (received 28 March 2022).

Success Factor	Methodology for establishing context
1d. Supports adaptation for and/or resilience to predicted increase in likelihood and severity of storms and high winds	There is no available information for the full study area at the time of assessment to understand the predicted increase in likelihood and severity of storms and high winds. However, road closure data has been provided by BEAR Scotland from their Management of Incidents Database for the time period of 2016-2021. The data on A96 road closure incidents was filtered to show weather-related incident types (flooding; snow; landscaping/fallen/overhanging branches). Once filtered, the incidents were located on the A96 using the section code provided. If any of the incidents were within 7.5km of the study area they were recorded.

Limitations for establishing assessment for criterion 1

3.1.2 With limited design information available, the assessment narrative is based on the potential impacts and interactions associated with the A96 Full Dualling and all six packages, given the environmental and geographic context. The assessment assumes that the A96 Full Dualling and all six packages are all developed and delivered on the basis that all relevant standards, assessments and guidance will be followed.

Table 3.2: Assessment methodology for establishing context for criterion 2: extent to which the package supports the surrounding area to adapt and/or become more resilient to current and predicted future impacts of climate change

Success Factor	Methodology for establishing context
2a. Supports adaptation for and/or resilience to current and future impacts of climate change within the study area outside of the package boundary	Data on the geographic and environmental context is outlined above in criterion 1.
2b. Supports the natural environment to adapt for and/or increase resilience to current and predicted future impacts of climate change	Data on designated habitats is obtained from NatureScot within a 7.5km boundary of the study area. Designated habitats considered include: Sites of Special Scientific Interest (SSSI), Special Protection Areas (SPAs), Special Areas of Conservation (SAC), Wetlands of International Importance (Ramsar), Ancient Woodland Inventory (AWI), Native Woodland Survey for Scotland (NWSS) and Geological Conservation Review Sites.

Limitations for establishing assessment for criterion 2

3.1.3 With limited design information available, the assessment narrative is based on the potential impacts and interactions associated with the A96 Full Dualling and all six packages, given the environmental and geographic context.

3.1.4 The assessment assumes that the A96 Full Dualling and all six packages are developed and delivered in accordance with all relevant standards, assessments and guidance. The ecosystem services (including supporting, cultural, regulating, and provisioning) provided by the study area were determined through a web search to identify elements including: woodlands (supporting); castles, museums and farm (cultural); peatlands (regulating); and timber merchants (provisioning) .

Table 3.3: Assessment methodology for establishing context for criterion 3: extent to which the package supports the decarbonisation of the transport network in Scotland, including supporting transition from higher to lower emission modes, and the modal shift to greater public transport and active travel options

Success Factor	Methodology for establishing context
3a. The net change in user carbon emissions sit appropriately within the calculated emissions envelope for Scotland, taking account of changing legislation and targets (including any Climate Change Plan update for Scotland) (assumed current target of 2045)	The annual emissions envelope for Scotland has been calculated to provide the context or comparator for the scale of the net change in emissions per year. The emissions envelope uses Scotland's 1990 emissions as the baseline and assumes a percentage reduction from 1990 to zero emissions in 2045. The traffic related carbon emissions are assessed for the years from 2030 to 2045 based on the following rational: • 2030 – the year that policy ambitions have set for a 20% reduction (from 2019 levels) in car kilometres travelled. • 2045 – the net zero carbon target year for Scotland. The carbon emissions are calculated from the change in carbon dioxide and nitrogen oxides (converted to CO2e). Data on the net change in road user emissions (year 2030-2045) was obtained from traffic modelling and air quality modelling as part of the A96 corridor review. This data covers annual road user emissions for two scenarios with their inherent variants of transport behaviours – 'Without Policy Scenario' and 'With Policy Scenario': • 'Without Policy Scenario' - No policy ambitions are captured, and less significant reductions to levels of commuting/business journeys, leading to higher levels of motorised traffic demand and emissions

Success Factor	Methodology for establishing context
	• 'With Policy Scenario' - Captures policy ambitions including 20% reduction (from 2019 levels) in car kilometres travelled by 2030, and assumptions to significantly reduce levels of commuting/business journeys to reflect post COVID-19 working behaviours, leading to low levels of motorised traffic demand and emissions.
3b. Supports the transition to low carbon modes of transport: transition from higher emissions to lower emissions modes, the modal shift to public transport and the modal shift to active travel for shorter everyday journeys	Data on active travel networks (National Cycle Network, received 31 May 2022, Core Paths, received 16 May 2019 and active travel hubs, received 11 May 2019) was obtained from Sustrans within a 7.5km boundary of the study area. Data on the number of Electric Vehicle (EV) charging points within a 7.5km boundary of the study area was obtained from Zap Map (received 07 November 2024). This includes: • slow charging locations (3kW-6kW); • fast charging locations (7kW-22kW); • rapid charging locations (43kW-51kW); and • ultra-rapid charging locations (100+kW).

Limitations for establishing assessment criterion 3 success factor 3a.

3.1.5 The modelling and emissions calculation have been produced with the following parameters:

- Zero traffic growth beyond 2045.
- No change in carbon emission rates beyond 2030 and therefore representing a worst-case approach.
- Motorcycles are assumed 0% Zero Emissions Vehicles (electric) in 2030, but 100% in 2045.
- Motorcycles are only 0% Zero Emissions Vehicles for the 2045 'With Policy' scenario (as all other vehicles are ZEV's), not the 'Without Policy' scenario (as only a small proportion are ZEVs)
- No embodied carbon (CO2e) is calculated for battery or fuel cell vehicles due to lack of consistent emission factors for different types of vehicles that can be used.

3.1.6 The calculated emissions envelope assumes zero carbon emissions in 2045, and so 100% reduction against the baseline year of 1990. The percentage reductions in national emissions which provide the annual envelopes are illustrative and not based on forecasts or modelled changes in national emissions for Scotland.

Limitations for establishing assessment for criterion 3 success factor 3b.

3.1.7 With limited design information available, the assessment narrative is based on the potential impacts and interactions associated with the A96 Full Dualling and all six packages, given the environmental and geographic context.

3.1.8 The assessment assumes that the A96 Full Dualling and all six packages are developed and delivered in accordance with all relevant standards, assessments and guidance.

3.1.9 The assessment considers where the A96 Full Dualling and all six packages align with the National Transport Strategy 2 (NTS2) Sustainable Travel Hierarchy, as shown in **Figure 3.1.1**. The Sustainable Travel Hierarchy promotes walking, cycling, public transport, taxis and shared transport in preference to single occupancy car use. Considering alignment with the hierarchy helps to develop an understanding of the potential impacts and opportunities each package may have on the shift to low carbon modes of transport.

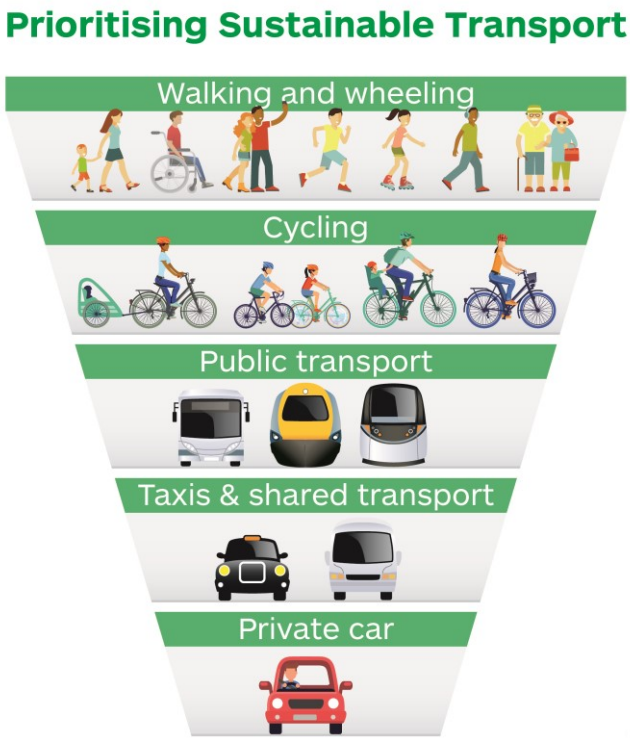


Figure 3.1.1: Scotland's Sustainable Travel Hierarchy

Table 3.4: Assessment methodology for establishing context for criterion 4: extent to which the package supports the decarbonisation of the construction sector in Scotland and maximises reduction in whole life carbon emissions

Success Factor	Methodology for establishing context
4a. Supports transition from higher emission to lower emission materials and technologies during construction, operation, and maintenance	General UK wide context on carbon emissions/carbon emissions reduction in the built environment is provided from the UK Green Building Council (2021); current energy procurement approach for operation of the road network is provided by Transport Scotland.

Limitations for establishing assessment for criterion 4

3.1.10 With limited design information available, the assessment narrative is based on the potential impacts and interactions associated with the A96 Full Dualling and all six packages, given the environmental and geographic context.

3.1.11 The assessment is high-level and utilises Input-Output tables for high-level carbon assessment of procured goods and services in the absence of detailed information for each of the interventions e.g. Bill of Quantities. The Input-Output tables for high-level carbon assessment of procured goods and services were developed by the Scottish Government and used, in the absence of more reliable carbon emissions factors, to estimate the carbon emission impact from the procurement of purchased goods and services. The Input-Output tables provide tonnes of carbon dioxide equivalent per £1m spend for different industries – for construction this is 280.7 tCO2e/£1m. The assessment assumes that the A96 Full Dualling and all six packages are developed and delivered in accordance with all relevant standards, assessments and guidance.

3.1.12 The calculated carbon emissions are high-level estimates and shown to four significant figures to reflect this.

Table 3.5: Assessment methodology for establishing context for criterion 5: extent to which land use change associated with the package mitigates carbon emissions and contributes to carbon storage and sequestration

Success Factor	Methodology for establishing context
5a. Supports the protection and development of carbon sinks, and takes appropriate measures to maximise carbon sequestration, taking account of wider ecosystem services/natural capital	Data obtained from NatureScot on designated habitats with the potential for carbon sequestration within a 7.5km boundary of the study area. Designated habitats considered include: Native Woodland Survey for Scotland (NWSS), Ancient Woodland, Local Landscape Areas (LLA) and Peatlands (Class 1, 2 and 3).

Limitations for establishing assessment for Criterion 5

3.1.13 With limited design information available, the assessment narrative is based on the potential impacts and interactions associated with the A96 Full Dualling and all six packages, given the environmental and geographic context.

3.1.14 The assessment assumes that the A96 Full Dualling and all six packages are developed and delivered in accordance with all relevant standards, assessments and guidance.

3.2 Structure of assessment sections

3.2.1 Each assessment section is structured as follows:

- package description;
- geographic and environmental context tables;
- package assessment; and
- recommendations.

3.3 Overview of packages assessed

3.3.1 In addition to the A96 Full Dualling Hardmuir to Craibstone, hereon referred to as A96 Full Dualling, six packages of transport options were assessed. The A96 Full Dualling and packages of transport options are described at the start of each assessment chapter in this report. A description of the options found in each package is presented in Appendix D.

4. A96 Full Dualling

4.1 A96 Full Dualling description

4.1.1 The A96 Full Dualling focuses on improving the trunk road network in the north-east of Scotland to address road safety concerns and provide resilience and reliability improvements for a key connection between Inverness and Aberdeen. The location of the option is illustrated in **Figure 4.1.1**.

4.1.2 As part of any potential design for the dual carriageway, it is assumed that new active travel provision would be embedded as part of the dual carriageway as a matter of course. This would likely comprise new active travel provision adjacent to the potential route of any dual carriageway as well as facilities at junctions along any potential route. This provision would be expected to support and enhance the long-distance active travel network in the region and has been considered in the appraisal for A96 Full Dualling. However, it should be noted that any improvements to the active travel network that may be facilitated by bypassing communities have not been considered directly as part of this option.

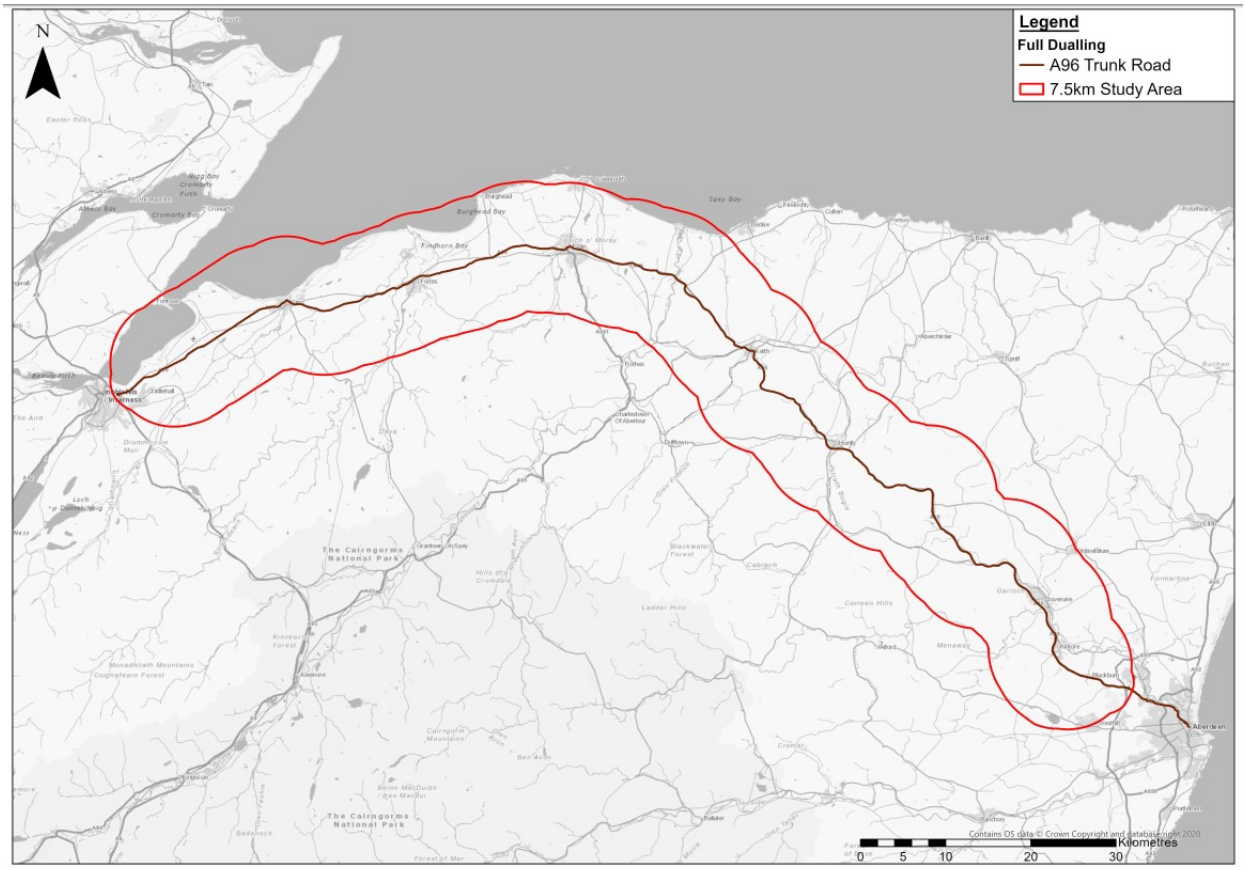
4.1.3 The A96 is a strategic trunk road which is approximately 155km long and routes from Raigmore Interchange, Inverness in the west to Craibstone Roundabout, Aberdeen in the east. This option considers dualling the full section between Hardmuir (east of Auldearn) and Craibstone Roundabout (west of Aberdeen) which is a total distance of approximately 125km.

4.1.4 It should be noted that the A96 Dualling Inverness to Nairn (including Nairn Bypass) scheme has been excluded from the scope of the A96 Corridor Review as it already has ministerial consent.

4.1.5 The A96 Trunk Road is predominantly single carriageway; however, there are 12 sections which have been upgraded to provide overtaking opportunities via climbing lanes or wide single 2+1 carriageways, equating to approximately 12km of the route. Within the extents being considered as part of this option, the section of the route between Inverurie Roundabout and Craibstone Roundabout is currently dual carriageway, with the majority of junctions being at-grade roundabouts.

4.1.6 This option is designed to deliver economic growth through improving road safety and, as a consequence, improving the resilience and reliability of the route. The option would also be expected to support the shift towards alternative fuelled vehicles, most likely electric vehicles (EVs). For communities and businesses on the corridor, the dualling will provide better connectivity between Inverness and Aberdeen and, in combination with the dualling of the A9 Trunk Road, improve connectivity to the Central Belt.

Figure 4.1.1 The A96 Full Dualling study area (high resolution versions in Appendix E)



4.2 Criterion 1

Criterion and success factors

4.2.1 Criterion 1 is:

- Extent to which the package supports adaptation for and/or resilience to current and predicted future impacts of climate change.

4.2.2 Success factors:

- 1a. Supports adaptation for and/or resilience to predicted increases in sea levels and storm surge.
- 1b. Supports adaptation for and/or resilience to predicted changes in temperatures.
- 1c. Supports adaptation for and/or resilience to predicted increase in likelihood and severity of fluvial and pluvial flooding.
- 1d. Supports adaptation for and/or resilience to predicted increase in likelihood and severity of storms and high winds.

Geographic and environmental context

4.2.3 **Table 4.1**, **Table 4.2**, **Table 4.3** and **Table 4.4** outline the geographic and environmental context of the study area against criterion 1 within a 7.5km boundary (unless otherwise stated, for example, when using the MET Office Data) of the full corridor.

Table 4.1: Geographic and environmental context of the A96 Full Dualling study area against Criterion 1, Success Factor 1a. Supports adaptation for and/or resilience to predicted increases in sea levels and storm surge

A96 Full Dualling Study Area	Geographic and Environmental Context
A96 Full Dualling	SEPA Coastal Hazard Maps identify a 0.1% chance of coastal flooding each year during a 1 in 1,000-year return period, and a 0.5% chance during a 1 in 200-year period. This risk is confined to the coastal settlements within the wider study area of Findhorn, Burghead and Lossiemouth, although the estuary at Findhorn does allow for a greater extent of coastal flood risk inland. There is also potential coastal flood risk for Nairn, the estuary at Spey Bay and Burghead Bay - though Burghead Bay coastal flooding is largely centred around the beach and does not extend significantly further inland (compared with Findhorn Bay and Spey Bay).

Table 4.2: Geographic and environmental context of the A96 Full Dualling study area against Criterion 1, Success Factor 1b. Supports adaptation for and/or resilience to predicted changes in temperatures

A96 Full Dualling Study Area	Geographic and Environmental Context
A96 Full Dualling	Change in mean annual air temperature is predicted to range between +0.87C (2020-2049) and +3.05°C (2070-2099) within a geographical boundary of 25km around the corridor (50% probability). Change in maximum summer air temperature is predicted to range between +0.74°C (2020-2049) and +3.46°C (2070-2099) and change in minimum winter air temperature is predicted to range between +0.83°C (2020-2049) and +3.08°C (2070-2099) (50% probability).

Table 4.3: Geographic and environmental context of the A96 Full Dualling study area against Criterion 1, Success Factor 1c. Supports adaptation for and/or resilience to predicted increase in likelihood and severity of fluvial and pluvial flooding

A96 Full Dualling Study Area	Geographic and Environmental Context
A96 Full Dualling	<u>Fluvial Flooding</u> SEPA Coastal Hazard Maps identify a 10% chance of river flooding each year during a 1 in 10-year return period; 0.5% chance during a 1 in 200-year return period; and 0.1% chance during a 1 in 1,000-year return period. In addition, the geographical area at risk of flooding increases between 10 and 1,000-year return periods, with flood depths ranging between 0.3m and 1.0m. Given the significant number of watercourses, the main risk of flooding within the study area is from river flooding. This risk follows the following watercourses: ▪ the River Lossie and associated waterways; ▪ the River Isla and associated waterways; ▪ the River Urie and associated waterways; ▪ the River Don and associated waterways; ▪ the River Findhorn, Muckle Burn and tributaries of Findhorn Bay; ▪ the River Spey, associated waterways tributaries of Spey Bay; and ▪ tributaries of Burghead Bay; the River Deveron and associated waterways. The flood mapping illustrates that the River Don poses significant flood risk to roads and settlements between Old Rayne and Dyce, with Kintore and Inverurie at significant risk. Keith however, is deemed to be at low risk. The other main settlements within the corridor of Nairn, Forres, Elgin, Fochabers, Huntly and Blackburn show significant areas of flood risk from various watercourses, including the River Spey and River Deveron. Flood protection

A96 Full Dualling Study Area	Geographic and Environmental Context
	schemes have been implemented within the corridor, including at Forres, Elgin, and Huntly, and a flood study for Inverurie and Port Elphinstone is underway. <u>Pluvial Flooding</u> The average change in annual precipitation (50% probability) is predicted to be +4.65% (2020-2049), +4.59% (2040-2069) and +6.27% (2070-2099). Change in summer precipitation rate (50% probability) is predicted to be -0.59% (2020-2049), -7.74% (2040-2069) and -15.28% (2070-2099) while the change in winter precipitation rate (50% probability) is predicted to be +11.88% (2020-2049), +17.06% (2040-2069) and +27.69% (2070-2099). More frequent, high-intensity rainfall will increase the risk of flash flooding from surface water or sewers for inland communities, especially during winter months.

Table 4.4: Geographic and environmental context of the A96 Full Dualling study area against Criterion 1, Success Factor 1d. Supports adaptation for and/or resilience to predicted increase in likelihood and severity of storms and high winds

A96 Full Dualling Study Area	Geographic and Environmental Context
A96 Full Dualling	There was a total of 11 weather-related incidents (flooding, snow or landscaping/fallen/overhanging branches) between 2016-2021 along the A96 Full Dualling study area.

A96 Full Dualling criterion 1 assessment

4.2.4 The A96 Full Dualling design being assessed is at an early stage of development with limited design details on which to base an assessment. The assessment is based on potential impacts and interactions the options could have with aspects considered within this criterion.

4.2.5 The geographic and environmental context for the A96 Full Dualling forecast that annual temperatures will increase across the corridor, with drier, warmer summers and wetter, milder winters. This means that the A96 corridor will need to be prepared for a wider range of annual temperatures and need to be resilient to higher peak summer temperatures (which could potentially warp surfaces, impact electronic and electrical equipment and cause heatstroke for operational users or construction workers).

4.2.6 Current standards for designing and constructing transport infrastructure are maintained and updated regularly to account for climate factors. This process should ensure that each option is designed and built to adapt to the predicted future impacts of climate change in and around each of the bypassed towns. Any resulting infrastructure that is built to adapt to future impacts of climate change has the potential to increase the overall resilience of the transport network throughout the A96.

4.2.7 The A96 Full Dualling will be developed in accordance with the Design Manual for Roads and Bridges including DMRB LA 114 Climate standard, which assesses the resilience and adaptation of proposed road infrastructure assets at detailed design stage (DMRB Stage 3). DMRB LA 114 states *"the scoping assessment shall identify whether anticipated changing climate conditions and weather events are likely to have significant adverse effects on the project (or elements of the project) during construction and operation*".

4.2.8 Examples of potential climate impacts cited in DMRB LA 114 during construction and operations include increased frequency of extreme weather; increased temperatures; increased precipitation; increased sea level rise and wave height; and gales. Therefore, it is assumed that the A96 Full Dualling infrastructure will be designed to ensure resilience against extreme weather and to minimise the potential effects of climate change, to reduce the vulnerability of the infrastructure.

A96 Full Dualling criterion 1 recommendations

4.2.9 All relevant design, construction and maintenance guidance, standards, processes, and assessments should be kept up to date with the latest climate change forecasts and associated best practice and applied to the development of all options.

4.2.10 If the A96 Full Dualling is developed, a climate change vulnerability scoping/assessment exercise should be undertaken, in line with current standards such as DMRB LA 114.

4.2.11 If the A96 Full Dualling is taken forward it is recommended that any potential impacts to the climate resilience of the towns and settlements along the A96 are understood at the earliest design stage and accounted for within the design. Technologies to counteract the impacts of climate change and provide resilience for all relevant elements of the A96 Full Dualling should be considered. The design for each option should embed measures for adaptation against climate-related hazards where practicable, to reduce the significance levels of any adverse impacts.

4.2.12 The vulnerability of the A96 Full Dualling to climate change should be appropriately scoped to understand the potential impacts on the associated assets during construction and operation – for example on electronic equipment; construction workers; end users; site facilities; structures; earthworks; verges; drainage; and construction plant.

4.2.13 Consideration should be made during the site selection process for locations along the A96 that require construction of new facilities or infrastructure, to prioritise locations which are more resilient to the potential effects of climate change. For example, selecting a location for new infrastructure on naturally higher ground levels and building away from coastal areas and/or floodplains that are anticipated to be subject to flooding. Additionally, the drainage capabilities of the infrastructure should be designed to deal with more intense rainfall events and flooding.

4.2.14 Consideration should also be given to including structural adaptation measures, for example, selecting materials that are resistant to the expected extremes of both low and high temperatures; building protective infrastructure such as flood defences in and around the bypassed towns; and using permeable paving surfaces to reduce run-off during heavy rainfalls. Nature-based solutions should also be considered to further enhance natural resilience and adaptation measures.

4.2.15 Finally, the selection of materials used within the construction of the A96 Full Dualling should be based on their resilience to extreme weather, for example, preference should be given to corrosion-resistant materials rather than utilising metals and treating them with a non-corrosive powder coating.

4.3 Criterion 2

Criterion and success factor

4.3.1 Criterion 2 is:

- Extent to which the package supports the surrounding area to adapt and/or become more resilient to current and predicted future impacts of climate change.

4.3.2 Success factors:

- 2a. Supports adaptation for and/or resilience to current and future impacts of climate change within the study area outside of the package boundary.
- 2b. Supports the natural environment to adapt for and/or increase resilience to current and predicted future impacts of climate change.

Geographic and environmental context

4.3.3 **Table 4.5** and **Table 4.6** outline the geographic and environmental context against criterion 2 within a 7.5km boundary (unless otherwise stated, for example, when using the MET Office Data) of the full corridor.

Table 4.5: Geographic and environmental context of the A96 Full Dualling study area against Criterion 2, Success Factor 2a. Supports adaptation for and/or resilience to current and future impacts of climate change within the study area outside of the package boundary

A96 Full Dualling Study Area	Geographic and Environmental Context
A96 Full Dualling	The geographic and environmental context for the study area are described in the A96 Full Dualling Criterion 1 - extent to which the package supports adaptation and/or resilience to current and predicted future impacts of climate change.

Table 4.6: Geographic and environmental context of the A96 Full Dualling study area against Criterion 2, Success Factor 2b. Supports the natural environment to adapt for and/or increase resilience to current and predicted future impacts of climate change

A96 Full Dualling Study Area	Geographic and Environmental Context
A96 Full Dualling	Ecological designations fall either completely or partially within the study area for the A96 Corridor and include: • 43 Sites of Special Scientific Interest (SSSI); • Eight Special Protection Areas (SPA); • Seven Special Areas of Conservation (SAC); • Four Ramsar sites; • One Local Nature Reserves (LNR); • Two Royal Society for the Protection of Birds (RSPB) Reserves; and

A96 Full Dualling Study Area	Geographic and Environmental Context
	• 20 Conservation Areas. The number, frequency and density of environmental designations is notably higher at the western end (particularly between Inverness and Huntly). The full extent of the Moray Firth coastline within the study area has environmental protection.

A96 Full Dualling criterion 2 assessment

4.3.4 The A96 Full Dualling design being assessed is at an early stage of development with limited design details on which to base an assessment. The assessment is based on potential impacts and interactions the options could have with aspects considered within this criterion.

4.3.5 The construction of the A96 Full Dualling could impact the surrounding area's ability to adapt to climate change. This could be either positive or negative depending on how the options are designed and delivered.

4.3.6 The design and construction of the A96 Full Dualling would be developed in accordance with DMRB. A risk that would need to be managed through design would be the interaction that the option would have with the drainage of the surrounding area. DMRB requires that schemes developed in accordance with the relevant standards should not increase flood risk to the surrounding area. The design should take account of existing risks such as communities that already experience flooding. Development of the option could have a net positive impact on the area's ability to adapt to climate change if designed and delivered to go beyond mitigating risks and identify and take advantage of potential opportunities. This could include appropriate drainage features and flood defence systems – including outside of the option boundary.

4.3.7 The delivery of the options included in the A96 Full Dualling could positively or negatively impact the ecosystem services provided by the surrounding area, depending on how the options are designed and delivered. The ecosystem services provided by the area surrounding the bypassed towns and which may be impacted by the delivery of the transport options include (but are not limited to):

- **Regulating services**: such as soil conservation and the carbon sequestration service provided by peatland. For example, between Fochabers and Keith where there are 20 pockets of Class 1 peatland which are nationally important carbon-rich soils, deep peat and priority peatland habitat.
- **Supporting services**: including nutrient cycling, soil formation and photosynthesis provided by the natural environment along the A96 corridor such as High Wood near Forres; Kirkhill and Birkenhill woods near Elgin; Bennachie Forest near Inverurie; Moray Monster Trails near Fochabers; Crooked Wood near Lhanbryde; and Tyrebagger Hill near Blackburn.
- **Provisioning services**: fresh water; timber and other forest products processed by companies such as Linnorie Firewood Services and Jewson Huntly timber merchants both in Huntly; Robertson Timber Engineering in Elgin; and Chas Smith Sawmill between Huntly and Keith.
- **Cultural services**: the recreational and aesthetic sites within the study area including (but not limited to) Garioch Heritage Centre in Inverurie; Huntly Castle; museums including the Moray Motor Museum; the many distilleries in the area including Strathisla Distillery and Strathmill Distillery (both in Keith) and Glen

Moray Distillery in Elgin; Gordon Castle Estate near Mosstodloch; Benromach Distillery near Forres; Marshall's Farm Shop and Forest Farm The Organic Dairy both near Blackburn; Coxton Tower near Lhanbryde; the Coach House Caravan and Campsite and Dunnideer Castle, both between Inverurie and Huntly; and Threaplands Garden Centre between Lhanbryde and Mosstodloch.

4.3.8 The A96 Full Dualling study area includes land designated as environmentally sensitive, including 43 SSSI, seven SAC, eight SPA and 20 Geological Conservation Review Sites, which presents a risk and opportunity regarding their future management. As such, there may be impact on the designated land and its ability to adapt to current and predicted future impacts of climate change.

A96 Full Dualling criterion 2 recommendations

4.3.9 All relevant design, construction and maintenance guidance, standards, processes, and assessments should be kept up to date with the latest climate change forecasts and associated best practice and applied to the development of all options.

4.3.10 The A96 Full Dualling should be designed, constructed and maintained to maximise the opportunities to improve the resilience and adaption of the surrounding area to the future impacts of climate change and local conditions. This could include appropriate drainage features and flood defence systems – including outside of the option boundary.

4.3.11 The A96 Full Dualling should be designed, constructed and maintained to maximise the opportunities to improve the ecosystem services of the surrounding area and the natural environments resilience to the future impacts of climate change. This should include the potential impacts listed in paragraph 4.3.7.

4.4 Criterion 3

Criterion and success factor

4.4.1 Criterion 3 is:

- Extent to which the package supports the decarbonisation of the transport network in Scotland, including supporting transition from higher to lower emission modes, and the modal shift to greater public transport and active travel options.

4.4.2 Success factors:

- 3a. The net change in user carbon emissions sit appropriately within the calculated emissions envelope for Scotland, taking account of changing legislation and targets (including any Climate Change Plan update for Scotland) (assumed current target of 2045).
- 3b. Supports the transition to low carbon modes of transport: transition from higher emissions to lower emissions modes, the modal shift to public transport and the modal shift to active travel for shorter everyday journeys.

Geographic and environmental context

4.4.3 **Table 4.7** and **Table 4.8** outline the geographic and environmental context against criterion 3 within a 7.5km boundary (unless otherwise stated, for example, when using the MET Office Data) of the full corridor.

Table 4.7: Geographic and environmental context of the A96 Full Dualling study area against Criterion 3, Success Factor 3a. The net change in user carbon emissions sit appropriately within the calculated emissions envelope for Scotland, taking account of changing legislation and targets (including any Climate Change Plan update for Scotland) (assumed current target of 2045).

A96 Full Dualling Study Area	Geographic and Environmental Context
A96 Full Dualling	No additional context required - the net change calculations are shown in the A96 Full Dualling Criterion 3 Assessment section below (Table 4.9 & Table 4.10).

Table 4.8: Geographic and environmental context of the A96 Full Dualling study area against Criterion 3, Success Factor 3b. Supports the transition to low carbon modes of transport: transition from higher emissions to lower emissions modes, the modal shift to public transport and the modal shift to active travel for shorter everyday journeys.

A96 Full Dualling Study Area	Geographic and Environmental Context
A96 Full Dualling	There are several on and off-road walking and cycling corridors in the study area, many being local networks, alongside a network of long-distance cycle routes that form part of the National Cycle Network (NCN). Though NCN routes are not always adjacent to the A96, they are important long-distance connections between the rural and urban communities within the wider study area. These include: ▪ NCN 1 – Between Aberdeen and Inverness within the confines of this study area via Torduff, Elgin and Nairn. ▪ NCN 195 – Route from Ballater (South of study area) to Aberdeen. ▪ NCN 7 – Route from the South of Inverness following the general alignment of the A9 Trunk Road Long sections of the NCN routes in the study area are on-road and therefore require interactions with traffic. Traffic-free parts of the routes exist in small sections but for longer travel between settlements and towns it is necessary to travel on-road. The entire A96 route is covered by a bus route between Aberdeen and Inverness, with local services available in the larger towns along the route including Elgin and Inverurie. The regional bus network is primarily underpinned by supported public and school transport services run by Stagecoach, as well as First Bus in Aberdeen City, alongside smaller coach operators and local authority run services. Community transport and demand responsive transport services are operated within each of the local authorities although coverage is limited, with membership often required. Transport Accessibility (TRACC) Travel Time Analysis has been used to indicate frequency of bus services along the A96 corridor. This analysis indicates that the smaller towns in the more rural sections of the study area, including Huntly, Keith, and Fochabers have a very infrequent bus service at peak times for commuting to employment or education. Active travel options are available across the study area through both the NCN and Core Path networks. There are more than 320 EV charging points along the entire A96 route, with 73% of those charging points made up of fast charging points. The largest cluster of EV charging points is at the town of Blackburn which has 173 charging points including slow charging, fast charging, rapid charging and ultra-rapid charging points. The EV charging points are largely centred around communities across the A96 route, with very few charging locations across the wider, remoter network.

A96 Full Dualling criterion 3 assessment

4.4.4 **Table 4.9** and **Table 4.10** below show the net change in road user emissions with and without the scheme, under both the 'With Policy' and 'Without Policy' transport behaviour scenarios.

Table 4.9: The net change in road user emissions with and without the A96 Full Dualling, under the 'With Policy' scenario. The target emissions reduction, and annual carbon emissions envelope have been set as per the Climate Compatibility Assessment methodology.

Year	% Emissions reduction from baseline year	Annual carbon emissions envelope (Mt CO2e)	Without A96 Full Dualling (Do Nothing) (tCO2e)	With A96 Full Dualling (Do-Something) (tCO2e)	Net change (tCO2e)	Net tCO2e as % of the annual carbon emission envelope
1990	**Baseline**	**75.7**	N/A	N/A	N/A	N/A
2030	**75%**	**18.93**	212639.8	234954.8	22315.0	0.118%
2031	**76.50%**	**17.79**	198463.8	219291.2	20827.4	0.117%
2032	**78.00%**	**16.65**	184287.8	203627.5	19339.7	0.116%
2033	**79.50%**	**15.52**	170111.8	187963.9	17852.0	0.115%
2034	**81.00%**	**14.38**	155935.9	172300.2	16364.4	0.114%
2035	**82.50%**	**13.25**	141759.9	156636.6	14876.7	0.112%
2036	**84.00%**	**12.11**	127583.9	140972.9	13389.0	0.111%
2037	**85.50%**	**10.98**	113407.9	125309.2	11901.4	0.108%
2038	**87.00%**	**9.84**	99231.9	109645.6	10413.7	0.106%
2039	**88.50%**	**8.71**	85055.9	93981.9	8926.0	0.103%
2040	**90%**	**7.57**	70879.9	78318.3	7438.3	0.098%
2041	**92.00%**	**6.06**	56703.9	62654.6	5950.7	0.098%
2042	**94.00%**	**4.54**	42528.0	46991.0	4463.0	0.098%
2043	**96.00%**	**3.03**	28352.0	31327.3	2975.3	0.098%
2044	**98.00%**	**1.51**	14176.0	15663.7	1487.7	0.098%
2045	**100%**	**0**	0.0	0.0	0.0	N/A

Table 4.10: The net change in road user emissions with and without the A96 Full Dualling, under the 'Without Policy' scenario. The target emissions reduction, and annual carbon emissions envelope have been set as per the Climate Compatibility Assessment methodology.

Year	% Emissions reduction from baseline year	Annual carbon emissions envelope (Mt CO2e)	Without A96 Full Dualling (Do Nothing) (tCO2e)	With A96 Full Dualling (Do-Something) (tCO2e)	Net change (tCO2e)	Net tCO2e as % of the annual carbon emission envelope
1990	**Baseline**	**75.7**	N/A	N/A	N/A	N/A
2030	**75%**	**18.93**	318601.7	347159.7	28558.0	0.151%
2031	**76.50%**	**17.79**	311750.3	340270.0	28519.7	0.160%
2032	**78.00%**	**16.65**	304898.9	333380.2	28481.4	0.171%
2033	**79.50%**	**15.52**	298047.4	326490.5	28443.1	0.183%
2034	**81.00%**	**14.38**	291196.0	319600.7	28404.7	0.197%
2035	**82.50%**	**13.25**	284344.6	312711.0	28366.4	0.214%
2036	**84.00%**	**12.11**	277493.2	305821.3	28328.1	0.234%
2037	**85.50%**	**10.98**	270641.7	298931.5	28289.8	0.258%
2038	**87.00%**	**9.84**	263790.3	292041.8	28251.5	0.287%
2039	**88.50%**	**8.71**	256938.9	285152.0	28213.1	0.324%
2040	**90%**	**7.57**	250087.5	278262.3	28174.8	0.372%
2041	**92.00%**	**6.06**	243236.0	271372.5	28136.5	0.465%
2042	**94.00%**	**4.54**	236384.6	264482.8	28098.2	0.619%
2043	**96.00%**	**3.03**	229533.2	257593.0	28059.8	0.927%
2044	**98.00%**	**1.51**	222681.8	250703.3	28021.5	1.851%
2045	**100%**	**0**	215830.3	243813.5	27983.2	N/A

4.4.5 **Figure 4.4.1** below shows the alignment of the A96 Full Dualling with the levels in the Sustainable Travel Hierarchy.

Figure 4.4.1: An overview of the A96 Full Dualling and its alignment with the Sustainable Travel Hierarchy

		A96 Full Dualling
Sustainable Travel Hierarchy Tier	Walking and wheeling	No direct alignment
	Cycling	No direct alignment
	Public transport	No direct alignment
	Taxis and shared transport	Strong alignment
	Private car	Strong alignment

4.4.6 The carbon emissions have been calculated for the whole of the traffic model and are predicted to increase over the traffic carbon emissions assessment period for both the 'With Policy' and 'Without Policy' scenarios. This increase is due to an increase in internal combustion engine vehicle kilometres travelled across the entirety of the traffic model.

Walking, wheeling and cycling

4.4.7 The A96 Full Dualling alone does not directly align to the top two tiers of the Sustainable Travel Hierarchy. The A96 Full Dualling as described does not included committed improvements to active travel routes along the corridor and so any resulting benefits are not considered within this assessment. However, it is established practice that active travel improvements will be considered and developed where possible during the detailed design of A96 Full Dualling.

Public transport

4.4.8 The A96 Full Dualling as described does not include committed improvements to the provision of public transport along the corridor and so any resulting benefits are not considered within this assessment. It is established practice that public transport infrastructure will be considered and developed where possible during the detailed design of the A96 Full Dualling and, if included, the provision of any public transport infrastructure could support the decarbonisation of Scotland's transport network through enabling modal shift.

Taxis, shared transport and private car

4.4.9 Full dualling of the A96 corridor will be utilised by modes of transport that sit lower on the Sustainable Travel Hierarchy (private cars, vans, HGVs and shared transport such as taxis). As the provision of the A96 Full Dualling may improve attractiveness of the A96 for private vehicles this may have a counter effect on modal shift.

A96 Full Dualling criterion 3 recommendations

4.4.10 All relevant design, construction and maintenance guidance, standards, processes, and assessments should be kept up to date with the latest climate change forecasts and associated best practice and applied to the development of all options.

4.4.11 The A96 Full Dualling should be designed to maximise alignment with the Sustainable Travel Hierarchy and careful consideration should be given to how the options can work together to optimise the lowest carbon option, for example, for different journeys and shorter routes. The A96 Full Dualling would be designed to DMRB standards. As such, the design will be obligated to consider the provision of facilities for non-motorised users of the A96 corridor. The A96 Full Dualling should be designed to maximise associated active travel; and opportunities for public transport, and therefore, could provide potentially beneficial opportunities to encourage local lower emission modes of transport.

4.4.12 Interventions along the corridor should include 'electrifying' the A96 corridor wherever practical to encourage the change from traditional engine to electric vehicles, where private car use will still be high. The electrification of the corridor should include the distribution of electric and hydrogen-based fuel sources in addition to other alternative fuels such as HVO and Ammonia. The dispensaries should be placed strategically along the A96 so that they are highly accessible to both road users and rural local communities. Consideration should also be given to demountable and mobile infrastructure.

4.4.13 Public transport, which sits higher in the Sustainable Travel Hierarchy, should be encouraged/incentivised for the journeys of locals and visitors within the corridor. Investment into low carbon/zero carbon technologies should be explored - such as producing new fleets of electric buses for all routes within the corridor.

4.5 Criterion 4

Criterion and success factor

4.5.1 Criterion 4 is:

- Extent to which the package supports the decarbonisation of the construction sector in Scotland and maximises reduction in whole life carbon emissions.

4.5.2 Success factor:

- 4a. Supports transition from higher emission to lower emission materials and technologies during construction, operation, and maintenance.

Geographic and environmental context

4.5.3 **Table 4.11** outlines the geographic and environmental context against criterion 4 within a 7.5km boundary (unless otherwise stated, for example, when using the MET Office Data) of the full corridor.

Table 4.11: Geographic and environmental context of the A96 Full Dualling study area against Criterion 4, Success Factor 4a. Supports transition from higher emission to lower emission materials and technologies during construction, operation, and maintenance

A96 Full Dualling Study Area	Geographic and Environmental Context
A96 Full Dualling	UK Built Environment is responsible for 25% of total UK carbon emissions including buildings and infrastructure (UK Green Building Council, 2021). In relation to operation of their network Transport Scotland, as part of the Scottish Government, use renewable or zero carbon electricity tariffs for the electricity used to power the road network (such as for the use in lighting).

A96 Full Dualling criterion 4 assessment

4.5.4 The A96 Full Dualling design being assessed is at an early stage of development with limited design details on which to base an assessment. The assessment is based on potential impacts and interactions the options could have with aspects considered within this criterion.

4.5.5 Since there are limited design details, the carbon emissions impact is estimated from the capital cost forecast by applying the Scottish Government 'Supply, Use and Input-Output Tables' figure for construction. This provides an estimate of between 701,700tCO_2e and 1,403,000tCO_2e for the capital stage carbon emissions impact.

4.5.6 The construction stage carbon emissions will vary between the elements of the A96 Full Dualling. The variability is likely to depend on the level of new infrastructure required to implement the elements – with the greater the level of construction resulting in greater levels of associated carbon emissions.

4.5.7 The A96 Full Dualling as described makes no commitments to how the carbon emissions impact from construction, maintenance and operation would be minimised and so any resulting benefits or carbon reduction measures cannot be specifically considered within this assessment.

4.5.8 The operational element of the carbon emissions impact is reduced in part through the use of renewable/zero carbon electricity tariffs, if that approach is continued.

4.5.9 If the A96 Full Dualling is developed the proposed design alignment would be subject to relevant standards and assessment procedures for the type of transport infrastructure. For example, for road development this would include the Design Manual for Roads and Bridges. Where the latest version of the DMRB climate change assessment standard (LA 114) is applied it requires the assessment of carbon emissions at detailed design stage.

A96 Full Dualling criterion 4 recommendations

4.5.10 All relevant design, construction and maintenance guidance, standards, processes, and assessments should be kept up to date with the latest best practice on carbon emission reductions and applied to the development of all options.

4.5.11 If the A96 Full Dualling was taken forward there would be an opportunity as a major infrastructure project in Scotland to strongly support decarbonisation of the construction sector. Application of PAS2080: Carbon Management in Buildings and Infrastructure to all schemes and all suppliers will help to systematically address whole life carbon emissions. This should include stretching carbon emissions reduction targets for suppliers, and consideration of carbon neutral standards (such as PAS 2060 – Carbon Neutrality Standard and Certification) for any suppliers managing the network beyond 2045.

4.5.12 The impact of the A96 Full Dualling on carbon emissions will depend on the methods used during construction. It is therefore recommended that innovative techniques and technologies are used where relevant to reduce emissions. These should be focused on optimising the design to build less and to consume less carbon intensive materials (such as asphalt, concrete and steel). This could include lower temperature mixes for asphalt, concrete with high cement replacement, and steel with high recycled content.

4.5.13 During construction opportunities to reduce carbon emissions should be maximised such as local sourcing, construction and logistics efficiencies, and alternative modes of transport – for example rail rather than road, low emission vehicles, and low carbon fuels.

4.5.14 With regards maintenance, more resilient technology could be installed in the first instance to withstand climatic factors, subsequently making the option more resilient and requiring less maintenance. As techniques and technologies improve, it is recommended that these are adopted at the earliest possible stage, subject to a cost/benefit analysis being undertaken.

4.5.15 The principles of the circular economy should be applied during design, construction, and maintenance. For example, material reduction and reuse should be prioritised to comply with the waste management hierarchy, and opportunities should be sought to recondition and use existing transport infrastructure where appropriate.

4.6 Criterion 5

Criterion and success factor

4.6.1 Criterion 5 is:

- Extent to which land use change associated with the package mitigates carbon emissions and contributes to carbon storage and sequestration.

4.6.2 Success factor:

- 5a. Supports the protection and development of carbon sinks, and takes appropriate measures to maximise carbon sequestration, taking account of wider ecosystem services/natural capital.

Geographic and environmental context

4.6.3 **Table 4.12** outlines the geographic and environmental context against criterion 5 within a 7.5km boundary (unless otherwise stated, for example, when using the MET Office Data) of the full corridor.

Table 4.12: Geographic and environmental context of t**he** A96 Full Dualling study area against Criterion 5, Success Factor 5a. Supports the protection and development of carbon sinks, and takes appropriate measures to maximise carbon sequestration, taking account of wider ecosystem services/natural capital

A96 Full Dualling Study Area	Geographic and Environmental Context
A96 Full Dualling	There are several pockets of peatland across the study area: • 118 pockets of Class 1 peatland (nationally important carbon-rich soils, deep peat and priority peatland habitat. Areas likely to be of high conservation value). • 32 pockets of Class 2 peatland (nationally important carbon-rich soils, deep peat and priority peatland habitat). • 193 pockets of Class 3 peatland (Dominant vegetation cover is not priority peatland habitat but is associated with wet and acidic type). • 1763 pockets of Class 4 peatland (Area unlikely to be associated with peatland habitats or wet and acidic type. Area unlikely to include carbon-rich soils). Within the A96 Study Corridor, there are approximately 32,400 hectares of Ancient Woodland (AWI) (919 counts) and 12,150 hectares of woodland recorded in the Native Woodland of Scotland Survey (NWSS) (3,325 counts).

A96 Full Dualling criterion 5 assessment

4.6.4 The A96 Full Dualling design being assessed is at an early stage of development with limited design details on which to base an assessment. The assessment is based on potential impacts and interactions the options could have with aspects considered within this criterion.

4.6.5 The A96 Full Dualling option is solely infrastructure-led and does not explicitly include the provision of public realm improvements to green space or blue or green infrastructure assets. Therefore, it is not possible to confirm if the A96 Full Dualling would have a positive impact on land use change, carbon storage and sequestration

4.6.6 The option has the potential for negative environmental effects on the storage and sequestration of carbon within natural ecosystems. The scale of the effects would be subject to detailed design and the route being determined. Therefore, at this stage the extent of effects is uncertain.

4.6.7 If the scheme is developed, it would be subject to relevant standards and assessment procedures. If the latest DMRB climate change assessment standard was applied (DMRB LA114) this would assess the carbon emissions changes at detailed design stage.

4.6.8 The study area includes land designated as environmentally sensitive which present a risk and opportunity to be managed in terms of how they are impacted on/or supported in terms of their ability to sequester and store carbon.

A96 Full Dualling criterion 5 recommendations

4.6.9 All relevant design, construction and maintenance guidance, standards, processes, and assessments should be kept up to date with the latest climate change forecasts and associated best practice and applied to the development of all options.

4.6.10 If the A96 Full Dualling is taken forward it could present opportunities to improve the ecosystem services provided (including carbon sequestration) through positive land use change.

4.6.11 Existing carbon sinks should be enhanced wherever possible, to increase potential carbon sequestration as an integral part of the schemes, particularly relating to peatland restoration and wetland enhancement.

4.6.12 While the exact route is to be determine during later stages of design, it is anticipated the scheme would be sited as far as possible from environmentally sensitive areas including woodland and peatland. This should not exclude the opportunity to consider the wider corridor within any works to seek to improve degraded peatland to improve carbon sequestration within the corridor. This would in turn have a positive effect in reducing the net carbon emissions associated with the scheme. Woodland planting, in areas that are not currently being used for grazing or crops, could also have positive effects on biodiversity and provide additional sequestration.

5. Package 1

5.1 Package description

5.1.1 The options included in this package are:

- Active Communities;
- Bus Priority Measures;
- Improved Public Transport Passenger Interchange Facilities
- Investment in Demand Responsive Transport (DRT) and Mobility as a Service (MaaS);
- Linespeed, Passenger and Freight Capacity Improvements on the Aberdeen to Inverness Rail Line;
- Bypasses of Forres, Elgin, Keith and Inverurie; and
- A96 Electric Corridor

5.1.2 This package is focused on primarily delivering transport network improvements to specific towns along the A96 corridor, namely Nairn, Forres, Elgin, Keith and Inverurie, by providing enhancements which would aim to encourage a shift to sustainable modes, increasing opportunities for residents and businesses and improving road safety. It should be noted that the A96 Dualling Inverness to Nairn (including Nairn Bypass) scheme does not form part of the A96 Corridor Review as it has successfully progressed through a Public Local Inquiry and has Ministerial consent. Interventions within Nairn itself, similar to those proposed within the other bypassed towns, however, have been included in this package for appraisal.

5.1.3 This package focuses on delivering networks of high quality active travel routes and facilitates placemaking improvements within the settlements of Nairn, Forres, Elgin, Keith and Inverurie, by creating 'Active Communities', where more space would be provided for people rather than traffic, which could reduce the need to travel unsustainably. Active Communities draws from the '20-minute neighbourhood' concept (10 minutes there, 10 minutes back) and is built around an approximate radius of 800m from the centre of each town, whilst also creating safer routes to school and encouraging more inclusive environments for people walking, wheeling and cycling. This would enhance the sense of place and encourage the local communities to spend more time within their local areas.

5.1.4 This package also aims to improve the safety, resilience and reliability of the A96 Trunk Road through the provision of a bypass at Forres, Elgin, Keith and Inverurie, whilst also addressing real and perceived severance within these communities by removing through trips. This element of the package is seen as a key enabler to maximising the benefits associated with Active Communities. As noted above, the provision of a bypass at Nairn is not included within this package as it forms part of the A96 Dualling Inverness to Nairn (including Nairn Bypass) scheme.

5.1.5 A number of public transport interventions targeted at delivering faster and more reliable journey times as well as improving the overall passenger experience also form part of this package. Journey time and reliability improvements would be achieved through the inclusion of bus priority measures at appropriate locations, with rail improvements delivered through linespeed and reliability interventions on the Aberdeen to Inverness rail line, reducing end-to-end journey times to two hours (currently approximately two hours and 25 minutes). This would be facilitated through the provision of passing loops, new rolling stock and improving passenger service frequencies and freight opportunities. This package does not however consider the provision of new park and ride facilities for onward travel by bus as they are only likely to be a viable option for capturing trips travelling to the larger cities of Aberdeen and Inverness where congestion is highest.

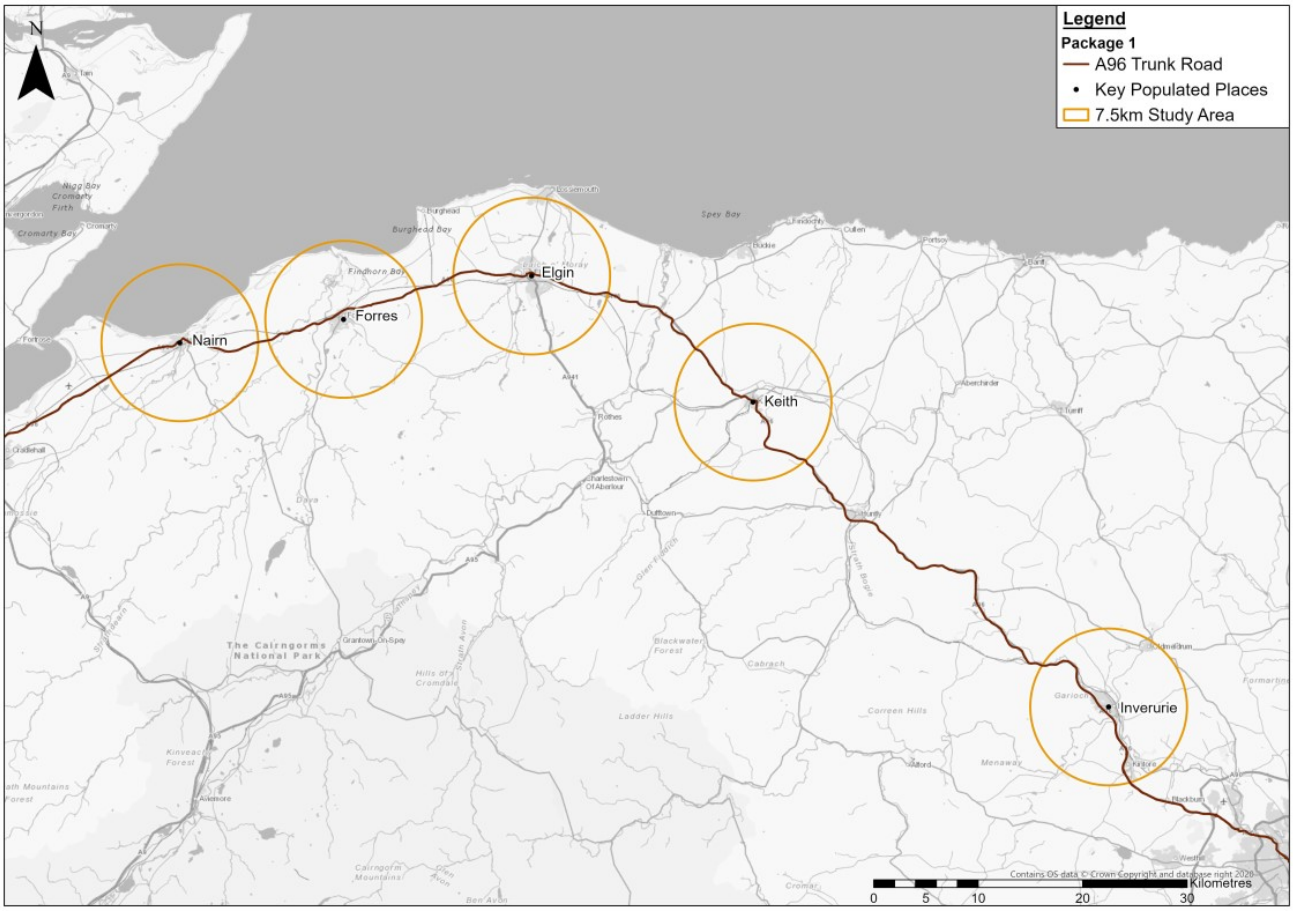
5.1.6 This package also includes interventions to improve accessibility and quality of public transport interchange facilities such as bus and railway stations throughout the corridor. Improvements are likely to include smaller scale interventions such as placemaking enhancements, improved wayfinding, enhancements to the waiting environment and/or improved accessibility, including lifts and step-free access. However, it may also include the construction of new interchange facilities.

5.1.7 Improvements to the public transport network coverage are also proposed through the use of flexible services, such as Demand Responsive Transport (DRT) or Community Transport (CT), supported by Mobility as a Service (MaaS) or smart technology where appropriate, at a corridor level.

5.1.8 Development of the A96 Electric Corridor is also included within this package to encourage a shift away from internal combustion engine (ICE) vehicles. This intervention would seek to improve the provision of alternative refuelling infrastructure and facilities along the full A96 corridor and its interfacing local roads, including those in Nairn, Forres, Elgin, Keith and Inverurie.

5.1.9 The locations of the settlements and interventions considered in relation to the wider A96 Corridor Review transport appraisal study area (as defined within A96 Corridor Review Case for Change) are illustrated in **Figure 5.1.1**. It should be noted that whilst this package is primarily targeted at the aforementioned settlements, it also includes corridor-wide interventions which are anticipated to result in benefits to other areas within the corridor.

Figure 5.1.1: Package 1 study area (high resolution versions in Appendix E).



5.2 Criterion 1

Criterion and success factors

5.2.1 Criterion 1 is:

- Extent to which the package supports adaptation for and/or resilience to current and predicted future impacts of climate change.

5.2.2 Success Factors:

- 1a. Supports adaptation for and/or resilience to predicted increases in sea levels and storm surge.
- 1b. Supports adaptation for and/or resilience to predicted changes in temperatures.
- 1c. Supports adaptation for and/or resilience to predicted increase in likelihood and severity of fluvial and pluvial flooding.
- 1d. Supports adaptation for and/or resilience to predicted increase in likelihood and severity of storms and high winds.

Geographic and environmental context

5.2.3 **Table 5.1**,**Table 5.2**, **Table 5.3** and **Table 5.4** outline the geographic and environmental context of the study area against Criterion 1 within a 7.5km boundary (unless otherwise stated, for example, when using the MET Office Data) of each of the towns (Nairn, Forres, Elgin, Keith and Inverurie).

Table 5.1: Geographic and environmental context of Package 1 study area against Criterion 1, Success Factor 1a. Supports adaptation for and/or resilience to predicted increases in sea levels and storm surge

Package 1 Study Area	Geographic and Environmental Context
Nairn	The SEPA Coastal Hazard Maps identify a 0.1% chance of coastal flooding each year during a 1 in 1,000-year return period, and a 0.5% chance during a 1 in 200-year period within the Nairn study area. This is due to Nairn being located close to the coast. Across all of Nairn there is a 0.1%-10% chance of flooding each year, depending on the specific location.
Forres	The SEPA coastal hazard maps highlight that coastal flood risk is confined to Findhorn, the coastal settlement within 7.5km of the Forres study area.
Elgin	The SEPA Coastal Hazard Maps identify a 0.1% chance of coastal flooding each year during a 1 in 1,000-year return period, and a 0.5% chance during a 1 in 200-year period. In addition, the hazard maps identify coastal flooding to raise to a depth of 0.3m-1.0m during 1 in 200 and 1 in 1,000-year return periods. However, this risk is confined to the north of the Elgin study area (within the first 1km of the study area). Although SEPA identifies such risks, the SEA highlights that coastal flood risk is confined to Lossiemouth, the coastal settlement within 7.5km of the Elgin study area.
Keith	The SEPA coastal hazard maps identify no risk of coastal flooding within the Keith study area due to Keith being located inland, away from the coast.
Inverurie	The SEPA coastal hazard maps identify no risk of coastal flooding within the Inverurie study area due to Inverurie being located inland, away from the coast.

Table 5.2: Geographic and environmental context of the Package 1 study area against Criterion 1, Success Factor 1b. Supports adaptation for and/or resilience to predicted changes in temperatures

Package 1 Study Area	Geographic and Environmental Context
Nairn	Mean annual air temperature is predicted to range between +0.87°C (2020-2049) and +3.00°C (2070-2099) within a geographical boundary of 25km around the town of Nairn (50% probability). Maximum summer air temperature is predicted to range between +0.75°C (2020-2049) and +3.38°C (2070-2099), and minimum winter air temperature is predicted to range between +0.83°C (2020-2049) and +2.76°C (2070-2099).
Forres	Mean annual air temperature is predicted to range between +0.87°C (2020-2049) and +3.00°C (2070-2099) within a geographical boundary of 25km around the town of Forres (50% probability). Maximum summer air temperature is predicted to range between +0.74°C (2020-2049) and +3.38°C (2070-2099), and minimum winter air temperature between +0.83°C (2020-2049) and +3.08°C (2070-2099) .
Elgin	Mean annual air temperature is predicted to range between +0.87°C (2020-2049) and +3.05°C (2070-2099) within a geographical boundary of 25km around the town of Elgin (50% probability). Maximum summer air temperature is predicted to range between +0.74°C (2020-2049) and +3.46°C (2070-2099), and minimum winter air temperature is predicted to range between +0.83°C (2020-2049) and +3.08°C (2070-2099).
Keith	Mean annual air temperature is predicted to range between +0.88°C (2020-2049) and +3.00°C (2070-2099) within a geographical boundary of 25km around the town of Keith (50% probability). Maximum summer air temperature is predicted to range between +0.75°C (2020-2049) and +3.33°C (2070-2099), and minimum winter air temperature is predicted to range between +0.86°C (2020-2049) and +2.81°C (2070-2099).
Inverurie	Mean annual air temperature is predicted to range between +0.89°C (2020-2049) and +3.05°C (2070-2099) within a geographical boundary of 25km around the town of Inverurie (50% probability). Maximum summer air temperature is predicted to range between +0.77°C (2020-2049) and +3.46°C (2070-2099), and minimum winter air temperature is predicted to range between +0.87°C (2020-2049) and +2.83°C (2070-2099).

Table 5.3: Geographic and environmental context of the Package 1 study area against Criterion 1, Success Factor 1c. Supports adaptation for and/or resilience to predicted increase in likelihood and severity of fluvial and pluvial flooding

Package 1 Study Area	Geographic and Environmental Context
Nairn	Fluvial Flooding SEPA River Hazard Maps identify a 10% chance of river flooding each year during a 1 in 10-year return period; 0.5% chance during a 1 in 200-year return period; and 0.1% chance during a 1 in 1000-year return period. In addition, the geographical area at risk of flooding increases between 10 and 1,000-year return periods, with flood depths ranging between 0.3m and 1.0m. This risk follows the River Nairn and its associated waterways that flows through the centre of Nairn. Future flood maps (2080s) identify a larger geographical area at risk of fluvial flooding. No flood protection schemes have been implemented in this rural section. Pluvial Flooding SEPA Surface Water Hazard Maps identify a 10% chance of surface water flooding each year during a 1 in 10-year return period; a 0.5% chance during a 1 in 200-year return period; and 0.1% change during a 1 in 1,000-year return period. In addition, the geographical area at risk of flooding increases between 10 and 1000-year return periods, with flood depths ranging between 0.3m and 1.0m. This risk follows the River Nairn and its associated waterways that flows through the centre of Nairn. Change in annual precipitation is predicted to range between +4.82% (2020-2049) and +7.81%% (2070-2099) within a geographical boundary of 25km around the town of Nairn (50% probability). Change in winter precipitation is predicted to peak between +10.88% and +28.00%. These predicted increases in precipitation present an added risk of increased likelihood and severity of pluvial flooding, especially during winter months.
Forres	Fluvial Flooding SEPA River Hazard Maps identify a 10% chance of river flooding each year during a 1 in 10-year return period; 0.5% chance during a 1 in 200-year return period; and 0.1% chance during a 1 in 1,000-year return period. In addition, the geographical area at risk of flooding increases between 10 and 1,000-year return periods, with flood depths ranging between 0.3m and 1.0m. This risk follows the Burn of Mosset and the River Findhorn that flow to the west of Forres. Future flood maps (2080s) identify a larger geographical area at risk of fluvial flooding. 2 flood protections schemes have been implemented in Forres (1 on the Burn of Mosset and 1 on the River Findhorn).

Package 1 Study Area	Geographic and Environmental Context
	Pluvial Flooding SEPA Surface Water Hazard Maps identify a 10% chance of surface water flooding each year during a 1 in 10-year return period; a 0.5% chance during a 1 in 200-year return period; and 0.1% change during a 1 in 1,000-year period. In addition, the geographical area at risk of flooding increases between 10 and 1,000-year return periods, with flood depths ranging between 0.3m and 1.0m. This risk follows the Burn of Mosset and the River Findhorn that flow to the west of Forres. Change in annual precipitation is predicted to range between +4.93% (2020-2049) and +7.55% (2070-2099) within a geographical boundary of 25km around the town of Forres (50% probability). Change in winter precipitation is predicted to peak between +11.06% and +28.81%%. These predicted increases in precipitation present an added risk of increased likelihood and severity of pluvial flooding, especially during winter months.
Elgin	Fluvial Flooding SEPA River Hazard Maps identify a 10% chance of river flooding each year during a 1 in 10-year return period; 0.5% chance during a 1 in 200-year return period; and 0.1% chance during a 1 in 1000-year return period. In addition, the geographical area at risk of flooding increases between 10 and 1,000-year return periods, with flood depths ranging between 0.3m and 1.0m. This risk follows the River Lossie through the centre of Elgin and associated waterways. Future flood maps (2080s) identify a larger geographical area at risk of fluvial flooding, with river extent widening by 1.5km at certain points. A flood protection scheme has been implemented at Elgin. Pluvial Flooding SEPA Surface Water Hazard Maps identify a 10% chance of surface water flooding each year during a 1 in 10-year return period; and a 0.5% chance during a 1 in 200-year return period. In addition, the geographical area at risk of flooding increases between 10 and 1,000-year return periods, with flood depths ranging between 0.3m and 1.0m. This risk follows the River Lossie through the centre of Elgin and sporadically within the Elgin study area. Change in annual precipitation is predicted to range between +4.82% (2020-2049) and +7.81% (2070-2099) within a geographical boundary of 25km around the town of Elgin (50% probability). Change in winter precipitation is predicted to peak between +10.88% and +28.00%. More frequent, high-intensity rainfall will increase the risk of flash flooding from surface water or sewers for inland communities, especially during winter months.
Keith	Fluvial Flooding

Package 1 Study Area	Geographic and Environmental Context
	SEPA River Hazard Maps identify a 10% chance of river flooding each year during a 1 in 10-year return period; 0.5% chance during a 1 in 200-year return period; and 0.1% chance during a 1 in 1000-year return period. In addition, the geographical area at risk of flooding increases between 10 and 1,000-year return periods, with flood depths ranging between 0.3m and 1.0m. This risk follows the River Isla through the centre of Keith and associated waterways. Future flood maps (2080s) identify a larger geographical area at risk of fluvial flooding. A flood protection scheme has been implemented in the vicinity of Keith (Deveron River flood warning scheme). Pluvial Flooding SEPA Surface Water Hazard Maps identifies a 10% chance of surface water flooding each year during a 1 in 10-year return period; and a 0.1% chance during a 1 in 200-year return period. In addition, the geographical area at risk of flooding increases between 10 and 1,000-year return periods, with flood depths ranging between 0.3m and 1.0m. This risk follows the River Isla through Keith and sporadically within the Keith study area. Change in annual precipitation is predicted to range between +4.31% (2020-2049) and +5.46% (2070-2099) within a geographical boundary of 25km around the town of Keith (50% probability). Change in winter precipitation is predicted to peak between +9.59% and +24.21%. These predicted increases in precipitation present an added risk of increased likelihood and severity of pluvial flooding, especially during winter months.
Inverurie	Fluvial Flooding SEPA River Hazard Maps identify a 10% chance of river flooding each year during a 1 in 10-year return period; 0.5% chance during a 1 in 200-year return period; and 0.1% chance during a 1 in 1,000-year return period. In addition, the geographical area at risk of flooding increases between 10 and 1000-year return periods, with flood depths ranging between 0.3m and 1.0m for the 1 in 10-year return period, between 0.3m and 1.0m for the 1 in 200-year return period, and between 0.3m and 1.0m for the 1 in 1,000-year return period. This risk follows the River Urie and River Don through the centre of Inverurie and associated waterways. Future river extent flood maps (2080s, 1 in 200-years identify a larger geographical area at risk of fluvial flooding, with river extent widening by as much as approximately 300m.

Package 1 Study Area	Geographic and Environmental Context
	Pluvial Flooding SEPA Surface Water Hazard Maps identify a 10% chance of surface water flooding each year during a 1 in 10-year return period; and a 0.5% chance during a 1 in 200-year return period. In addition, the geographical area at risk of flooding increases between 10 and 1,000-year return periods, with flood depths ranging between 0.3m and 1.0m. This risk follows the River Urie and River Don through the centre of Inverurie and sporadically within the Inverurie study area. Change in annual precipitation is predicted to range between +5.26% (2020-2049) and +6.21% (2070-2099) within a geographical boundary of 25km around the town of Inverurie (50% probability). Change in winter precipitation is predicted to peak between +16.88% (2020-2049) and +33.13% (2070-2099). More frequent, high-intensity rainfall will increase the risk of flash flooding from surface water or sewers for inland communities, especially during winter months.

Table 5.4: Geographic and environmental context of the Package 1 study area against Criterion 1, Success Factor 1d. Supports adaptation for and/or resilience to predicted increase in likelihood and severity of storms and high winds

Package 1 Study Area	Geographic and Environmental Context
Nairn	There was a total of two weather-related incidents (flooding, snow or landscaping/fallen/overhanging branches) between 2016-2021 along the A96 within a 7.5km boundary of Nairn.
Forres	There were no weather-related incidents (flooding, snow or landscaping/fallen/overhanging branches) between 2016-2021 along the A96 within a 7.5km boundary of Forres.
Elgin	There were no weather-related incidents (flooding, snow or landscaping/fallen/overhanging branches) between 2016-2021 along the A96 within a 7.5km boundary of Elgin.
Keith	There was one weather-related incident (flooding, snow or landscaping/fallen/overhanging branches) between 2016-2021 along the A96 within a 7.5km boundary of Keith.
Inverurie	There was a total of four weather-related incidents (flooding, snow or landscaping/fallen/overhanging branches) between 2016-2021 along the A96 within 7.5km of Inverurie.

Package 1 criterion 1 assessment

5.2.4 Package 1 is at an early stage of development with limited design details on which to base an assessment. The assessment is based on potential impacts and interactions the options could have with aspects considered within this criterion.

5.2.5 The geographic and environmental context for Package 1 forecasts that annual temperatures will increase across the corridor, with drier, warmer summers and wetter, milder winters. This means that the A96 corridor will need to be prepared for a wider range of annual temperatures and need to be resilient to higher peak summer temperatures (which could potentially warp surfaces, impact electronic and electrical equipment and cause heatstroke for operational users or construction workers).

5.2.6 Current standards for designing and constructing transport infrastructure are maintained and updated regularly to account for climate factors. This process should ensure that each option is designed and built to adapt to the predicted future impacts of climate change throughout the A96 corridor, including in and around each of the five towns. Any resulting infrastructure that is built to adapt to future impacts of climate change has the potential to increase the overall resilience of the transport network in the study area.

5.2.7 Package 1 includes the option to make line speed, passenger and freight capacity improvements on the Aberdeen to Inverness rail line. This option will make the A96 corridor more resilient as it aims to provide a more reliable public transport service throughout the corridor, cutting journey times and providing a more frequent passenger service. However, there may be locations along the A96 corridor where the rail line is more vulnerable to the effects of climate change.

5.2.8 Package 1 includes alternative refuelling infrastructure as part of the A96 Electric Corridor which is not noted to be particularly prone to the identified effects of climate change. However, throughout the A96 corridor and within and around the towns included in this package, there may be locations that may be more vulnerable to the effects of climate change, for example, future flooding that may occur in and around Forres and Elgin.

5.2.9 Package 1 will be developed in accordance with relevant standards such as the Design Manual for Roads and Bridges (DMRB). The DMRB includes LA 114 Climate standard, which assesses the resilience and adaptation of proposed road infrastructure assets at detailed design stage. DMRB LA 114 states "*the scoping assessment shall identify whether anticipated changing climate conditions and weather events are likely to have significant adverse effects on the project (or elements of the project) during construction and operation*".

5.2.10 Examples of potential climate impacts cited in DMRB LA 114 during construction and operations include increased frequency of extreme weather; increased temperatures; increased precipitation; increased sea level rise and wave height; and gales. Therefore, it is assumed that the options within Package 1 will be designed in accordance with DMRB LA 114 to ensure resilience against extreme weather and to minimise the potential effects of climate change, to reduce the vulnerability of the infrastructure.

Package 1 criterion 1 recommendations

5.2.11 All relevant design, construction and maintenance guidance, standards, processes, and assessments should be kept up to date with the latest climate change forecasts and associated best practice and applied to the development of all options.

5.2.12 If Package 1 is developed, a climate change vulnerability scoping/assessment exercise should be undertaken, in line with current standards such as DMRB LA 114.

5.2.13 If Package 1 is taken forward it is recommended that any potential impacts on the A96 corridor, including the towns within the package, climate resilience is understood at the earliest design stage and accounted for within the design. Technologies to counteract the impacts of climate change and provide resilience for each option within Package 1 should be considered. The design for each option should embed measures for adaptation against climate-related hazards where practicable, to reduce the significance levels of any adverse impacts.

5.2.14 The vulnerability of all the options included in Package 1 to climate change should be appropriately scoped to understand the potential impacts on the associated assets during construction and operation, for example on electronic equipment; construction workers; end users; site facilities; structures; earthworks; verges; drainage; and construction plant.

5.2.15 Consideration should be made during the site selection process for options that require construction of new facilities or infrastructure to prioritise locations along the A96 corridor, and in and around the towns, which are more resilient to the potential effects of climate change. For example, selecting a location for the infrastructure on naturally higher ground levels and building away from coastal areas and/or floodplains that are anticipated to be subject to flooding. Additionally, the drainage capabilities of the infrastructure should be designed to deal with more intense rainfall events and flooding.

5.2.16 Active travel provisions should include elements that will support adaptation for and/or resilience to current and predicted future impacts of climate change. For example, the use of porous pavements for pedestrianised areas and cycling routes should be considered; the use of higher solar reflectance/cool pavements in pedestrianised areas and cycling lanes should be considered. Additionally, road salt and snow removal should be prioritised in pedestrianised areas and cycling routes.

5.2.17 It is recommended that during the design development of the options within this package, consideration is given to including structural adaptation measures. For example, selecting materials that are resistant to the expected extremes of both low and high temperatures; building protective infrastructure such as flood defences in and around the towns; and using permeable paving surfaces to reduce run-off during heavy rainfalls. Nature-based solutions should also be considered to further enhance natural resilience and adaptation measures.

5.2.18 Finally, the selection of materials used within the construction of the transport options should be based on their resilience to extreme weather, for example, preference should be given to corrosion-resistant materials rather than utilising metals and treating them with a non-corrosive powder coating.

5.3 Criterion 2

Criterion and success factor

5.3.1 Criterion 2 is:

- Extent to which the package supports the surrounding area to adapt and/or become more resilient to current and predicted future impacts of climate change.

5.3.2 Success factors:

- 2a. Supports adaptation for and/or resilience to current and future impacts of climate change within the study area outside of the package boundary.
- 2b. Supports the natural environment to adapt for and/or increase resilience to current and predicted future impacts of climate change.

Geographic and environmental context

5.3.3 **Table 5.5** and **Table 5.6** outline the geographic and environmental context of the study area against criterion 2 within a 7.5km boundary (unless otherwise states, for example, when using the MET Office Data) for the towns of Nairn, Forres, Elgin, Keith and Inverurie.

Table 5.5: Geographic and environmental context of the Package 1 study area against Criterion 2, Success Factor 2a. Supports adaptation for and/or resilience to current and future impacts of climate change within the study area outside of the package boundary

Package 1 Study Area	Geographic and Environmental Context
Nairn	Geographic and environmental context for the towns are described in Package 1 Criterion 1 (Section 5.2).
Forres	Geographic and environmental context for the towns are described in Package 1 Criterion 1 (Section 5.2).
Elgin	Geographic and environmental context for the towns are described in Package 1 Criterion 1 (Section 5.2).
Keith	Geographic and environmental context for the towns are described in Package 1 Criterion 1 (Section 5.2).
Inverurie	Geographic and environmental context for the towns are described in Package 1 Criterion 1 (Section 5.2).

Table 5.6: Geographic and environmental context of the Package 1 study area against Criterion 2, Success Factor 2b. Supports the natural environment to adapt for and/or increase resilience to current and predicted future impacts of climate change

Package 1 Study Area	Geographic and Environmental Context
Nairn	There are a number of designated habitats within the study area of Nairn: - Ancient woodland: 2,326 hectares. - Native Woodland Survey for Scotland: 823.50 hectares. - Special Protection Areas: Three Special Protection Areas – Moray Firth, Moray and Nairn Coast and Inner Moray Firth. - Special Area of Conservation: Three Special Areas of Conservation – Moray Firth, Culbin Bar and Cawdor Wood. - Site of Special Scientific Interest: Four Sites of Special Scientific Interest - Culbin Sands, Culbin Forest and Findhorn Bay, Kildrummie Kames, Whiteness Head and Cawdor Wood. - Wetland of International Importance (Ramsar): Two Wetlands of International Importance - Moray and Nairn Coast, and Inner Moray Firth. - Geological Conservation Review Site: Four Geological Conservation Review Sites – Kildrummie Kames, Culbin, Culbin (Saltmarsh morphology) and Whiteness Head.
Forres	There are a number of designated habitats within the study area of Forres: - Ancient woodland: 4,679.26 hectares. - Native Woodland Survey for Scotland: 1,242.32 hectares. - Special Protection Areas: Three Special Protection Areas – Moray Firth, Darnaway and Lethen Forest and Moray and Nairn Coast. - Special Area of Conservation: Two Special Areas of Conservation – Lower Findhorn Woods and Culbin Bar. - Wetland of International Importance (Ramsar): One Wetland of International Importance (Ramsar) – Moray and Nairn Coast. - Site of Special Scientific Interest: Four Sites of Special Scientific Interest – Culbin Sands, Culbin Forest and Findhorn Bay, Lower Findhorn Woods, Lethenhill and Boghole, Muckle Burn. - Geological Conservation Review Site: Three Geological Conservation Review Sites – Culbin, Culbin (Saltmarsh morphology), and Boghole, Muckle Burn.

Package 1 Study Area	Geographic and Environmental Context
Elgin	There are a number of designated habitats within the study area of Elgin: - Ancient woodland: 1,939.43 hectares. - Native Woodland Survey for Scotland: 650.77 hectares. - Special Protection Areas: One Special Protection Area – Loch Spynie. - Wetland of International Importance (Ramsar): One Wetland of International Importance (Ramsar) site – Loch Spynie. - Site of Special Scientific Interest: Nine Sites of Special Scientific Interest – Buinach and Glenlatterach, Coleburn Pasture, Cutties Hillock, Findrassie, Loch Oire, Loch Spynie, Quarry Wood, Scaat Craig and Spynie Quarry. - Geological Conservation Review Site: Four Geological Conservation Review Sites – Spynie, Scaat Craig, Findrassie and Cutties Hillock.
Keith	There are a number of designated habitats within the study area of Keith: - Ancient woodland: 1,572.18 hectares. - Native Woodland Survey for Scotland: 834.23 hectares. - Site of Special Scientific Interest: Two SSSI – Mill Wood and Den of Pitlurg.
Inverurie	There are a number of designated habitats within the study area of Inverurie: - Ancient woodland: 1,429.77 hectares. - Native Woodland Survey for Scotland: 1,179.65 hectares. - Site of Special Scientific Interest: Two SSSI – Hill of Barra, and Pitcaple and Legatsden Quarries. - Geological Conservation Review Site: Two - Hill of Barra, and Pistcurry (Pitmedden) and Legatsden Quarries.

Package 1 criterion 2 assessment

5.3.4 Package 1 is at an early stage of development with limited design details, on which to base an assessment. The assessment is based on potential impacts and interactions the options could have with aspects considered within this criterion.

5.3.5 The construction of the options included in Package 1 could impact the surrounding area's ability to adapt to climate change. This could be either positive or negative depending on how the options are designed and delivered.

5.3.6 The design and construction of the options included in Package 1 would be developed in accordance with relevant standards such as DMRB. A risk that would need to be managed through design would be the interaction that the option would have with the drainage of the surrounding area. DMRB requires that schemes developed in accordance with the relevant standards should not increase flood risk to the surrounding area. The design should take account of existing risks such as flooding, for example, in and around Inverurie where, between 2016-2021, a total of four weather-related incidents involving rain with high winds caused A96 road closures. Development of the option could have a net positive impact on the area's ability to adapt to climate change if designed and delivered to go beyond mitigating risks and identify and take advantage of potential opportunities. This could include appropriate drainage features and flood defence systems – including outside of the option boundary.

5.3.7 The delivery of the options included in Package 1 could positively or negatively impact the ecosystem services provided by the surrounding area, depending on how the options are designed and delivered. The ecosystem services provided by the study area which may be impacted by the delivery of the transport options include (but are not limited to):

- **Regulating services**: such as soil conservation and the carbon sequestration service provided by peatland, for example, in and around Keith where there are 19 pockets of Class 1 peatland which are nationally important carbon-rich soils, deep peat and priority peatland habitat.
- **Supporting services**: including nutrient cycling, soil formation and photosynthesis provided by the natural environment along the A96 corridor such as High Wood near Forres; Kirkhill and Birkenhill woods near Elgin; and Bennachie Forest near Inverurie.
- **Provisioning services**: fresh water, timber and other forest products processed by companies such as Robertson Timber Engineering in Elgin.
- **Cultural services**: the recreational and aesthetic sites within the study area including (but not limited to) Garioch Heritage Centre in Inverurie; Huntly Castle; museums including the Moray Motor Museum; and the many distilleries in the area including Strathisla Distillery and Strathmill Distillery (both in Keith), Glen Moray Distillery in Elgin, and Benromach Distillery in Forres.

5.3.8 Collectively the options included in Package 1 have the potential to support the communities within the towns to become more resilient to current and predicted future impacts of climate change through provision of additional transport options. For example, Package 1 includes three options to improve public transport facilities (bus priority measures, improved public transport passenger interchange facilities and linespeed, passenger and freight capacity improvements on the Aberdeen to Inverness rail line). If one of these modes of public transport experiences travel disruption due to adverse weather conditions, then the improvements made to other facilities have the potential to provide an alternative transport option.

5.3.9 Package 1 includes alternative refuelling infrastructure as part of the A96 Electric Corridor, and investment in DRT and MaaS options. The impact of these options on the surrounding area's ability to adapt to climate change could be positive depending on how the options are designed and delivered.

5.3.10 The study area includes land designated as environmentally sensitive, including Sites of Special Scientific Interest (SSSI), Special Areas of Conservation (SAC), Special Protection Areas (SPA) and Geological Conservation Review Sites, which presents a risk and opportunity regarding their future management. Notably, Nairn, Forres and Elgin have a high number of SSSIs, SPAs and SACs, meaning they are particularly environmentally sensitive. As such, the options delivered within Package 1 may impact on the designated land and its ability to adapt to current and predicted future impacts of climate change.

Package 1 criterion 2 recommendations

5.3.11 All relevant design, construction and maintenance guidance, standards, processes, and assessments should be kept up to date with the latest climate change forecasts and associated best practice and applied to the development of all options.

5.3.12 Options should be designed, constructed and maintained to maximise the opportunities to improve the resilience and adaption of the surrounding area to the future impacts of climate change and local conditions. This could include appropriate drainage features and flood defence systems – including outside of the option boundary.

5.3.13 Consideration should be given to the interdependency of the transport options and their ability to function if one or more of the transport modes is interrupted due to adverse weather conditions.

5.3.14 Options should be designed, constructed and maintained to maximise the opportunities to improve the ecosystem services of the surrounding area and the natural environment's resilience to the future impacts of climate change. This should include the potential impacts listed in paragraph 5.3.7.

5.4 Criterion 3

Criterion and success factor

5.4.1 Criterion 3 is:

- Extent to which the package supports the decarbonisation of the transport network in Scotland, including supporting transition from higher to lower emission modes, and the modal shift to greater public transport and active travel options.

5.4.2 Success factors:

- 3a. The net change in user carbon emissions sit appropriately within the calculated emissions envelope for Scotland, taking account of changing legislation and targets (including any Climate Change Plan update for Scotland) (assumed current target of 2045).
- 3b. Supports the transition to low carbon modes of transport: transition from higher emissions to lower emissions modes, the modal shift to public transport and the modal shift to active travel for shorter everyday journeys.

Geographic and environmental context

5.4.3 **Table 5.7** and **Table 5.8** outline the geographic and environmental context of the study area against criterion 3 within a 7.5km boundary (unless otherwise stated, for example, when using the MET Office Data) for the towns of Nairn, Forres, Elgin, Keith and Inverurie.

Table 5.7: Geographic and environmental context of the Package 1 study area against Criterion 3, Success Factor 3a. The net change in user carbon emissions sit appropriately within the calculated emissions envelope for Scotland, taking account of changing legislation and targets (including any Climate Change Plan update for Scotland) (assumed current target of 2045)

Package 1 Study Area	Geographic and Environmental Context
Nairn	No additional context required - the net change calculations are shown in the Package 1 Criterion 3 Assessment section below (Table 5.9 & Table 5.10).
Forres	No additional context required - the net change calculations are shown in the Package 1 Criterion 3 Assessment section below (Table 5.9 & Table 5.10).
Elgin	No additional context required - the net change calculations are shown in the Package 1 Criterion 3 Assessment section below (Table 5.9 & Table 5.10).
Keith	No additional context required - the net change calculations are shown in the Package 1 Criterion 3 Assessment section below (Table 5.9 & Table 5.10).
Inverurie	No additional context required - the net change calculations are shown in the Package 1 Criterion 3 Assessment section below (Table 5.9 & Table 5.10).

Table 5.8: Geographic and environmental context for the Package 1 study area against Criterion 3, Success Factor 3b. Supports the transition to low carbon modes of transport: transition from higher emissions to lower emissions modes, the modal shift to public transport and the modal shift to active travel for shorter everyday journeys

Package 1 Study Area	Geographic and Environmental Context
Nairn	The National Cycle Network (NCN) runs through the Nairn study area and intersects the A96 on Bridge Street. The majority of the NCN route in the study area is on road and therefore requires interactions with traffic. The bus route networks run throughout Nairn on both major and minor roads, with multiple bus stops located across the town. Active travel options are available across the study area through both the NCN and the Core Path network that runs along the River Nairn. There are no active travel hubs in Nairn. There are approximately 4 fast charging and 3 rapid charging Electric Vehicle (EV) charging points within the Nairn study area.

Package 1 Study Area	Geographic and Environmental Context
Forres	The National Cycle Network (NCN) runs through the Forres study area and intersects the A96 north of Market Street. The majority of the NCN route in the study area is on road and therefore requires interactions with traffic. The bus route networks run throughout Forres on both major and minor roads, with multiple bus stops located across the town. Active travel options are available across the study area through both the NCN and the Core Path network that runs throughout Forres. There are no active travel hubs in Forres. There are approximately 24 fast charging and 4 rapid charging EV charging points within the Forres study area.
Elgin	The National Cycle Network (NCN) runs through the Elgin study area and intersects the A96 at the junction between Alexandra Road and Lossie Wynd. The majority of the NCN route in the study area is on road and therefore requires interactions with traffic. The bus route networks run throughout Elgin on both major and minor roads, with multiple bus stops located across the town. Active travel options are available across the study area through both the NCN and the Core Path network that runs throughout Elgin. There are no active travel hubs in Elgin. There are approximately 2 slow charging, 44 fast charging and8 rapid charging EV charging points within the Elgin study area.
Keith	The National Cycle Network (NCN) does not cross the Keith study area. The bus route networks run throughout Keith on both major and minor roads, with multiple bus stops located across the town. Active travel options are available across the study area through the Core Path network that runs throughout Keith. There are no active travel hubs in Keith. There are approximately 6 fast charging and 5 rapid charging EV charging points within the Keith study area.
Inverurie	The National Cycle Network (NCN) does not cross the Inverurie study area. The bus route networks run throughout Inverurie on both major and minor roads, with multiple bus stops located across the town. Active travel options are available across the study area through the Core Path network that runs throughout Inverurie. There are no active travel hubs in Inverurie. There are approximately 51 fast charging,15 rapid charging and 2 ultra-rapid charging EV charging points within the Inverurie study area.

Package 1 criterion 3 assessment

5.4.4 Tables 5.9 and 5.10 show the net change in road user emissions with and without the package, under both the 'With Policy' and 'Without Policy' transport behaviour scenarios.

Table 5.9: The net change in road user emissions with and without the package, under the 'With Policy' scenario. The target emissions reduction, and annual carbon emissions envelope have been set as per the Climate Compatibility Assessment methodology.

Year	% Emissions reduction from baseline year	Annual carbon emissions envelope (Mt CO2e)	Without package (Do Nothing) (tCO2e)	With package (Do-Something) (tCO2e)	Net change (tCO2e)	Net tCO2e as % of the annual carbon emission envelope
1990	**Baseline**	**75.7**	N/A	N/A	N/A	N/A
2030	**75%**	**18.93**	212639.8	213309.6	669.8	0.004%
2031	**76.50%**	**17.79**	198463.8	199088.9	625.1	0.004%
2032	**78.00%**	**16.65**	184287.8	184868.3	580.5	0.003%
2033	**79.50%**	**15.52**	170111.8	170647.7	535.8	0.003%
2034	**81.00%**	**14.38**	155935.9	156427.0	491.2	0.003%
2035	**82.50%**	**13.25**	141759.9	142206.4	446.5	0.003%
2036	**84.00%**	**12.11**	127583.9	127985.7	401.9	0.003%
2037	**85.50%**	**10.98**	113407.9	113765.1	357.2	0.003%
2038	**87.00%**	**9.84**	99231.9	99544.5	312.6	0.003%
2039	**88.50%**	**8.71**	85055.9	85323.8	267.9	0.003%
2040	**90%**	**7.57**	70879.9	71103.2	223.3	0.003%
2041	**92.00%**	**6.06**	56703.9	56882.6	178.6	0.003%
2042	**94.00%**	**4.54**	42528.0	42661.9	134.0	0.003%
2043	**96.00%**	**3.03**	28352.0	28441.3	89.3	0.003%
2044	**98.00%**	**1.51**	14176.0	14220.6	44.7	0.003%
2045	**100%**	**0**	0.0	0.0	0.0	N/A

Table 5.10: The net change in road user emissions with and without the package, under the 'Without Policy' scenario. The target emissions reduction, and annual carbon emissions envelope have been set as per the Climate Compatibility Assessment methodology.

Year	% Emissions reduction from baseline year	Annual carbon emissions envelope (Mt CO2e)	Without package (Do Nothing) (tCO2e)	With package (Do-Something) (tCO2e)	Net change (tCO2e)	Net tCO2e as % of the annual carbon emission envelope
1990	**Baseline**	**75.7**	N/A	N/A	N/A	N/A
2030	**75%**	**18.93**	318601.7	320567.2	1965.5	0.010%
2031	**76.50%**	**17.79**	311750.3	313726.4	1976.1	0.011%
2032	**78.00%**	**16.65**	304898.9	306885.6	1986.7	0.012%
2033	**79.50%**	**15.52**	298047.4	300044.8	1997.3	0.013%
2034	**81.00%**	**14.38**	291196.0	293204.0	2007.9	0.014%
2035	**82.50%**	**13.25**	284344.6	286363.1	2018.6	0.015%
2036	**84.00%**	**12.11**	277493.2	279522.3	2029.2	0.017%
2037	**85.50%**	**10.98**	270641.7	272681.5	2039.8	0.019%
2038	**87.00%**	**9.84**	263790.3	265840.7	2050.4	0.021%
2039	**88.50%**	**8.71**	256938.9	258999.9	2061.0	0.024%
2040	**90%**	**7.57**	250087.5	252159.1	2071.6	0.027%
2041	**92.00%**	**6.06**	243236.0	245318.3	2082.3	0.034%
2042	**94.00%**	**4.54**	236384.6	238477.5	2092.9	0.046%
2043	**96.00%**	**3.03**	229533.2	231636.7	2103.5	0.069%
2044	**98.00%**	**1.51**	222681.8	224795.9	2114.1	0.140%
2045	**100%**	**0**	215830.3	217955.0	2124.7	N/A

5.4.5 Package 1 includes options that sit across the Sustainable Travel Hierarchy (and have varying contribution to decarbonisation of the transport network). How these align with the Sustainable Travel Hierarchy is presented in **Figure 5.4.1**.

Figure 5.4.1: Overview of the Package 1 options and their alignment with the Sustainable Travel Hierarchy

		Package 1 Options						
		Active communities	**Bus priority measures**	**Linespeed, passenger and freight capacity improvements on the Aberdeen to inverness rail line**	**Investment in DRT and MaaS**	**A96 electric corridor**	**Bypasses of Forres, Elgin, Keith and Inverurie**	**Improved public transport passenger interchange facilities**
Sustainable Travel Hierarchy Tier	**Walking and Wheeling**	Strong alignment	No direct alignment	No direct alignment	No direct alignment	No direct alignment	No direct alignment	Strong alignment
	Cycling	Strong alignment	No direct alignment	No direct alignment	No direct alignment	No direct alignment	Partial alignment	Strong alignment
	Public Transport	No direct alignment	Strong alignment	Strong alignment	Strong alignment	Partial alignment	Partial alignment	Strong alignment
	Taxis and Shared Transport	No direct alignment	Strong alignment	No direct alignment	Strong alignment	Strong alignment	Strong alignment	Strong alignment
	Private Car	No direct alignment	No direct alignment	No direct alignment	No direct alignment	Strong alignment	Strong alignment	Strong alignment

5.4.6 The carbon emissions have been calculated for the whole of the traffic model and are predicted to increase over the 15-year traffic carbon emissions assessment period for both the 'With Policy' and 'Without Policy' scenarios. This increase is due to an increase in internal combustion engine vehicle kilometres travelled across the entirety of the traffic model.

Walking and wheeling & cycling

5.4.7 The Active Communities option within Package 1 supports walking, wheeling and cycling - transport modes which sit at the top of the Sustainable Travel Hierarchy. This could encourage the reduced use of non-renewable energy fuelled modes of transport, supporting the decarbonisation of the transport network throughout the A96 corridor, including in and around the towns. The improved public transport passenger interchange facilities option also supports walking, wheeling and cycling as the improvements are likely to encourage the use of alternative, low carbon modes of transport.

Public transport

5.4.8 The options included in the public transport tier of the Sustainable Travel Hierarchy include investment in DRT and MaaS; bus priority measures; improved public transport passenger interchange facilities; and linespeed, passenger and freight capacity improvements on the Aberdeen to Inverness rail line.

5.4.9 Collectively, these options have the potential to improve the flow of traffic throughout the A96 corridor (including in and around the towns), increase the attractiveness of public transport and could encourage a modal shift away from private car use over time. This may contribute to a decrease in associated carbon emissions during the operation of the proposed measures, thus contributing to the Scottish Government's net zero emissions target.

Taxis and shared transport & private car

5.4.10 The delivery of the bypasses is likely to improve the reliability of the A96 road corridor, and as such may make it a more attractive route for private vehicles, though by removing traffic within the bypassed towns this may also make it more attractive for residents to use the town's public transport and active travel options (aligning with the Sustainable Travel Hierarchy). As the provision of the bypasses may improve attractiveness of the A96 for private vehicles this may have a counter effect on modal shift. However, the delivery of the A96 Electric Corridor option will improve the overall network coverage and capacity for electric vehicles, which is expected to increase the overall attractiveness and reliability of using low/zero-emission vehicles along the A96. Through this option, it is expected that there will be a reduction in tailpipe carbon emissions, particularly over the long term as the uptake of low and zero-emission vehicles increases.

5.4.11 In the longer term, Package 1 could help to facilitate a modal shift to public transport and active travel through options such as bus priority measures and improved public transport interchange facilities for short journeys within the towns and along the A96. If this was achieved, it would support decarbonisation of the transport network in Scotland and the transition from higher to lower emission modes of transport.

Package 1 criterion 3 recommendations

5.4.12 All relevant design, construction and maintenance guidance, standards, processes, and assessments should be kept up to date with the latest climate change forecasts and associated best practice and applied to the development of all options.

5.4.13 All the options in Package 1 should be designed to maximise alignment with the Sustainable Travel Hierarchy and careful consideration should be given as to how the options can work together to optimise the lowest carbon option, for example, for different journeys and shorter routes.

5.4.14 As part of the Active Communities option, it is recommended that connections are maximised within the towns to improve and maximise walking, wheeling, and cycling opportunities for both local residents and visitors. Improvements could include suitable surfacing for all user types (including wheelchair users); few slopes/no stairs wherever possible; improved crossing points to promote safety; and suitably secure bike storage in and around the towns.

5.4.15 The impact of the options in the public transport tier of the Sustainable Travel Hierarchy on carbon emissions will depend on the fuel being used by buses and trains. It is therefore recommended that low-carbon modes of buses and trains are considered. It is envisaged that low carbon/zero carbon alternatives will become more cost efficient as technologies improve.

5.4.16 To fully support decarbonisation of the transport network along the A96 corridor, and in and around the towns, the following should be considered for all rail and transport hub improvement options: suitable provisions for bike storage at any improved rail station or transport hub; and improved local walking/cycling connections to promote train facilities as a suitable, sustainable mode of transport. It is important that consideration is given to how the public transport options can work together to optimise use of the lowest carbon options.

5.4.17 The development of the A96 Electric Corridor option could include the distribution of electric and hydrogen-based fuel sources in addition to other alternative fuels such as Hydrotreated Vegetable Oil (HVO) and Ammonia. The dispensaries should be placed strategically in and around the towns so that they are highly accessible to both road users and rural local communities. Consideration should also be given to demountable and mobile infrastructure.

5.4.18 The options included in Package 1 would be designed to relevant standards, such as DMRB, and therefore the design will be obligated to consider the provision of facilities for non-motorised users of the A96 corridor. The bypasses should be designed to maximise associated active travel and opportunities for public transport. It is important that consideration is given as to how the active travel and public transport options can work together to optimise use of the lowest carbon options.

5.5 Criterion 4

Criterion and success factor

5.5.1 Criterion 4 is:

- Extent to which the package supports the decarbonisation of the construction sector in Scotland and maximises reduction in whole life carbon emissions.

5.5.2 Success factor:

- 4a. Supports transition from higher emission to lower emission materials and technologies during construction, operation, and maintenance.

Geographic and environmental context

5.5.3 **Table 5.11** below outlines the geographic and environmental context of the study area against Criterion 4 within a 7.5km boundary (unless otherwise stated, for example, when using the MET Office Data) for the towns of Nairn, Forres, Elgin, Keith and Inverurie.

Table 5.11: Geographic and environmental context of the Package 1 study area against Criterion 4, Success Factor 4a. Supports transition from higher emission to lower emission materials and technologies during construction, operation and maintenance

Package 1 Study Area	Geographic and Environmental Context
Nairn	UK Built Environment is responsible for 25% of total UK carbon emissions including buildings and infrastructure (UK Green Building Council, 2021). In relation to operation of their network, Transport Scotland, as part of the Scottish Government, use renewable or zero carbon electricity tariffs for the electricity used to power the road network (such as for the use in lighting).
Forres	UK Built Environment is responsible for 25% of total UK carbon emissions including buildings and infrastructure (UK Green Building Council, 2021). In relation to operation of their network, Transport Scotland, as part of the Scottish Government, use renewable or zero carbon electricity tariffs for the electricity used to power the road network (such as for the use in lighting).
Elgin	UK Built Environment is responsible for 25% of total UK carbon emissions including buildings and infrastructure (UK Green Building Council, 2021). In relation to operation of their network, Transport Scotland, as part of the Scottish Government, use renewable or zero carbon electricity tariffs for the electricity used to power the road network (such as for the use in lighting).

Package 1 Study Area	Geographic and Environmental Context
Keith	UK Built Environment is responsible for 25% of total UK carbon emissions including buildings and infrastructure (UK Green Building Council, 2021). In relation to operation of their network, Transport Scotland, as part of the Scottish Government, use renewable or zero carbon electricity tariffs for the electricity used to power the road network (such as for the use in lighting).
Inverurie	UK Built Environment is responsible for 25% of total UK carbon emissions including buildings and infrastructure (UK Green Building Council, 2021). In relation to operation of their network, Transport Scotland, as part of the Scottish Government, use renewable or zero carbon electricity tariffs for the electricity used to power the road network (such as for the use in lighting).

Package 1 criterion 4 assessment

5.5.4 Package 1 is at an early stage of development with limited design details on which to base an assessment. The assessment is based on potential impacts and interactions the options could have with aspects considered within this criterion.

5.5.5 Since there are limited design details for Package 1, the carbon emissions impact is estimated from the capital cost forecast by applying the Scottish Government 'Supply, Use and Input-Output Tables' figure for construction. This provides an estimate of between 140,600tCO_2e and 280,600tCO_2e for the capital stage carbon emissions impact.

5.5.6 The construction stage carbon emissions will vary between the options in the package. The variability is likely to depend on the level of new infrastructure required to implement the options – with the greater the level of construction resulting in greater levels of associated carbon emissions.

5.5.7 Package 1 as described makes no commitments to how the carbon emissions impact from construction, maintenance and operation would be minimised and so any resulting benefits or carbon reduction measures cannot be specifically considered within this assessment.

5.5.8 The operational element of the carbon emissions impact is reduced in part using renewable/zero carbon electricity tariffs, if that approach is continued.

5.5.9 If Package 1 is developed the options would be subject to relevant standards and assessment procedures for the type of transport infrastructure. For example, for road development this would include the Design Manual for Roads and Bridges. Where the latest version of the DMRB climate change assessment standard (LA 114) is applied it requires the assessment of carbon emissions at detailed design stage.

Package 1 criterion 4 recommendations

5.5.10 All relevant design, construction and maintenance guidance, standards, processes, and assessments should be kept up to date with the latest best practice on carbon emission reductions and applied to the development of all options.

5.5.11 If Package 1 was taken forward, there would be an opportunity as a major infrastructure project in Scotland to strongly support decarbonisation of the construction sector. Considerations of the merits of applying PAS2080: Carbon Management in Buildings and Infrastructure to schemes and suppliers has the potential to help to systematically address whole life carbon emissions. Consideration should also be given to stretching carbon emissions reduction targets for suppliers, and to the implementation of carbon neutral standards (such as PAS 2060 - Carbon Neutrality Standard and Certification) by suppliers managing the network beyond 2045.

5.5.12 The impact of Package 1 on carbon emissions will depend on the methods used during construction. It is therefore recommended that innovative techniques and technologies be considered for use where relevant to reduce emissions. These should be focused on optimising the design to consider the opportunities to build less and to consume less carbon intensive materials (such as asphalt, concrete and steel). Where these products are used, low carbon alternatives could be specified and sourced. For asphalt this could include lower temperature mixes, concrete with high cement replacement, and steel with high recycled content.

5.5.13 During construction, opportunities to reduce carbon emissions should be maximised, such as local sourcing, construction and logistics efficiencies, alternative modes of transport, for example rail rather than road, low emission vehicles, and low carbon fuels.

5.5.14 With regards maintenance, more resilient technology could be installed in the first instance to withstand climatic factors, subsequently making the options included in Package 1 more resilient and requiring less maintenance. As techniques and technologies improve, it is recommended that these are adopted at the earliest possible stage, subject to a cost/benefit analysis being undertaken.

5.5.15 The principles of the circular economy should be considered during design, construction, and maintenance. For example, material reduction and reuse should be prioritised to comply with the waste management hierarchy, and opportunities should be sought to recondition and use existing transport infrastructure where appropriate.

5.6 Criterion 5

Criterion and success factor

5.6.1 Criterion 5 is:

- Extent to which land use change associated with the package mitigates carbon emissions and contributes to carbon storage and sequestration.

5.6.2 Success factor:

- 5a. Supports the protection and development of carbon sinks, and takes appropriate measures to maximise carbon sequestration, taking account of wider ecosystem services/natural capital.

Geographic and environmental context

5.6.3 **Table 5.12** outlines the geographic and environmental context of the study area against criterion 5 within a 7.5km boundary (unless otherwise stated, for example, when using the MET Office Data) for the town of Nairn, Forres, Elgin, Keith and Inverurie.

Table 5.12: Geographic and environmental context of the Package 1 study area against Criterion 5, Success Factor 5a. Supports the protection and development of carbon sinks, and takes appropriate measures to maximise carbon sequestration, taking account of wider ecosystem services/natural capital

Package 1 Study Area	Geographic and Environmental Study Area
Nairn	There are designated habitats with the potential for carbon sequestration within the study area of the package around Nairn: - Ancient woodland: 2,326 hectares. - Native Woodland Survey for Scotland: 823.50 hectares. - Peatland: Five pockets of Class 1 (nationally important carbon-rich soils, deep peat and priority peatland habitat) and seven pockets of Class 3 (dominant vegetation cover is not priority peatland habitat but is associated with wet and acidic type). - Local Landscape Area: The Sutors of Cromarty, Rosemarkie and Fort George LLA to the north-west of Nairn feature an array of coastal farmlands, as well as beaches, dunes and links.
Forres	There are designated habitats with the potential for carbon sequestration within the study area of the package around Forres: - Ancient woodland: 4,679.26 hectares. - Native Woodland Survey for Scotland: 1,242.32 hectares. - Peatland: Three pockets of Class 1 (nationally important carbon-rich soils, deep peat and priority peatland habitat), one pocket of Class 2 (nationally important carbon-rich soils, deep peat and priority peatland

Package 1 Study Area	Geographic and Environmental Study Area
	habitat) and 18 pockets of Class 3 (dominant vegetation cover is not priority peatland habitat but is associated with wet and acidic type). - Local Landscape Area: The Culbin to Burghead Coast LLA to the north of Forres features an array of expansive coastal farmlands, moorland hills and broadleaf woodlands.
Elgin	There are designated habitats with the potential for carbon sequestration within the study area of the package around Elgin: - Ancient woodland: 1,939.43 hectares. - Native Woodland Survey for Scotland: 650.77 hectares. - Peatland: Two pockets of Class 1 (nationally important carbon-rich soils, deep peat and priority peatland habitat) and four pockets of Class 3 (dominant vegetation cover is associated with wet and acidic type). - Local Landscape Area: The Spynie LLA within the north of the Elgin study area features a rich array of wetlands, loch, woodlands and farmland.
Keith	There are designated habitats with the potential for carbon sequestration within the study area of the package around Keith: - Ancient woodland: 1,572.18 hectares. - Native Woodland Survey for Scotland: 834.23 hectares. - Peatland: 19 pockets of Class 1 (nationally important carbon-rich soils, deep peat and priority peatland habitat) and 43 pockets of Class 3 (dominant vegetation cover is not priority peatland habitat but is associated with wet and acidic type). - Local Landscape Area: The Deveron Valley LLA to the south-east of Keith features a rich array of farmed and wooded river valleys that form a significant feature within the extensive agricultural heartlands of Moray.
Inverurie	There are designated habitats with the potential for carbon sequestration within the study area of the package around Inverurie: - Ancient woodland: 1,429.77 hectares. - Native Woodland Survey for Scotland: 1,179.65 hectares. - Peatland: Three pockets of Class 1 (nationally important carbon-rich soils, deep peat and priority peatland habitat) and one pocket of Class 3 (dominant vegetation cover is not priority peatland habitat but is associated with wet and acidic type). - Local Landscape Area (LLA): The Bennachie LLA to the west of Inverurie features a rich array of woodlands, heather moorland and numerous historic features including an Iron Age hill fort at the summit of Mither Tap, Barmykyn Hill fort on Airlie Hill and cairns on other summits.

Package 1 criterion 5 assessment

5.6.4 Package 1 is at an early stage of development with limited design details on which to base an assessment. The assessment is based on potential impacts and interactions the options could have with aspects considered within this criterion.

5.6.5 The transport options within Package 1 are solely infrastructure-led and do not explicitly include the provision of public realm improvements to green space or blue or green infrastructure assets. Therefore, it is not possible to confirm if Package 1 would have a positive impact on land use change, carbon storage and sequestration.

5.6.6 Package 1 will likely have a negative environmental effect on the storage and sequestration of carbon within natural ecosystems, particularly resulting from the bypasses of Forres, Elgin, Keith and Inverurie. However, due to limited design information the extent of any effect is uncertain.

5.6.7 The options included in Package 1 would be developed in accordance with the relevant standards including DMRB and relevant Scottish Government and Transport Scotland policies and plans. The scale of the effects would be subject to detailed design and the location of the options being determined.

Package 1 criterion 5 recommendations

5.6.8 All relevant design, construction and maintenance guidance, standards, processes, and assessments should be kept up to date with the latest climate change forecasts and associated best practice and applied to the development of all options.

5.6.9 Consideration should be made during the site selection process to prioritise locations where there are likely to be minimal potential adverse effects on natural capital, carbon storage and sequestration.

5.6.10 Existing carbon sinks should be enhanced wherever possible, to increase potential carbon sequestration as an integral part of the schemes, particularly relating to peatland restoration and wetland enhancement.

6. Package 2

6.1 Package description

6.1.1 The options included in this package are:

- Active Communities;
- Bus Priority Measures;
- Improved Public Transport Passenger Interchange Facilities;
- Investment in DRT and Maas;
- Linespeed, Passenger and Freight Capacity Improvements on the Aberdeen to Inverness Rail Line;
- Targeted Road Safety Improvements; and
- A96 Electric Corridor

6.1.2 This package is focused on providing transport network improvements to some of the less populated settlements along the A96 corridor that are not suggested to be bypassed within Package 1. The package would provide enhancements which would aim to encourage a shift to sustainable modes, increase opportunities for residents and businesses and improve road safety.

6.1.3 The specific settlements considered in this package are Lhanbryde, Mosstodloch, Fochabers, Huntly, Kintore and Blackburn and are shown within the context of the wider A96 Corridor Review transport appraisal study area (as defined within the A96 Corridor Review Case for Change) in **Figure 6.1.1**. It should be noted that whilst this package is primarily targeted at the aforementioned settlements, the package also includes corridor-wide interventions which are anticipated to result in benefits to other areas within the corridor.

6.1.4 This package would provide high quality active travel routes and facilitate placemaking improvements within the aforementioned settlements through the provision of 'Active Communities', where more space would be provided for people rather than traffic, which could reduce the need to travel unsustainably. Active Communities draws from the '20-minute neighbourhood' concept (10 minutes there, 10 minutes back) and is built around an approximate radius of 800m from the centre of each town or settlement, whilst also creating safer routes to school and encouraging more inclusive environments for people walking, wheeling and cycling. This would enhance the sense of place and encourage the local communities to spend more time within their local areas.

6.1.5 A number of public transport interventions targeted at delivering faster and more reliable journey times as well as improving the overall passenger experience form part of this package. Journey time and reliability improvements would be achieved through the inclusion of bus priority measures at appropriate locations within the aforementioned settlements, with rail improvements delivered through linespeed and capacity improvements on the wider Aberdeen to Inverness rail line. Linespeed improvements would target a reduction in end-to-end journey times to two hours (currently approximately two hours and 25 minutes). This would be facilitated through the provision of passing loops, new rolling stock and improving passenger service frequencies and freight opportunities.

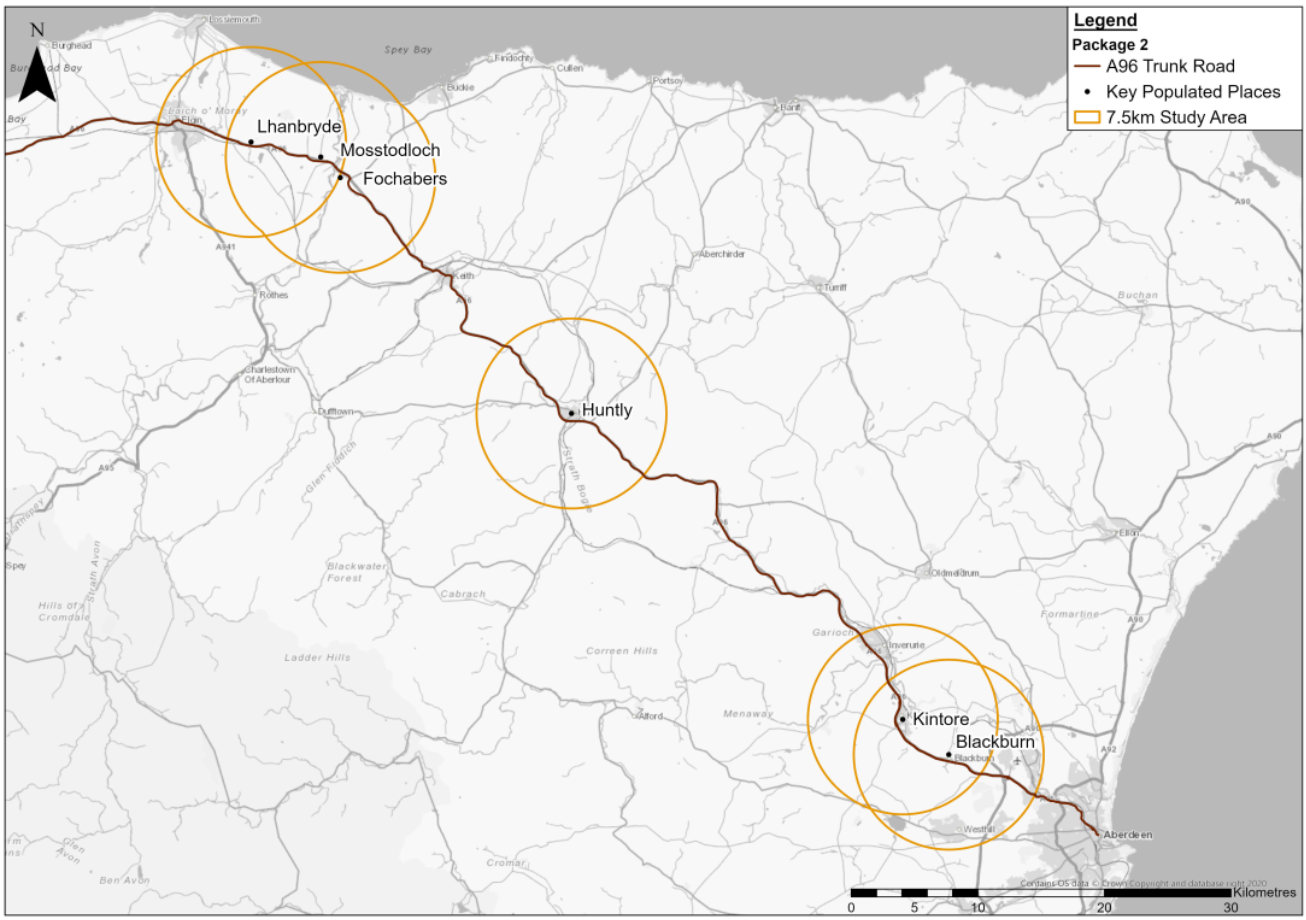
6.1.6 The package also includes interventions to improve accessibility and quality of public transport interchange facilities such as bus and railway stations throughout the corridor. Improvements are likely to include smaller scale interventions such as placemaking enhancements, improved wayfinding, enhancements to the waiting environment and/or improved accessibility, including lifts and step-free access, though they may also include the construction of new interchange facilities. This package does not however consider the provision of new Park and Ride facilities for onward travel by bus as they are only likely to be a viable option for capturing trips travelling to the larger cities of Aberdeen and Inverness where congestion is highest.

6.1.7 Improvements to the public transport network coverage are also proposed through the use of flexible services, such as Demand Responsive Transport (DRT) or Community Transport (CT), supported by Mobility as a Service (MaaS) or smart technology where appropriate, at a corridor level.

6.1.8 Development of the A96 Electric Corridor is also included within this package to encourage a shift away from internal combustion engine (ICE) vehicles. This intervention would seek to improve the provision of alternative refuelling infrastructure and facilities along the full A96 corridor and its interfacing local roads, including those in Lhanbryde, Mosstodloch, Fochabers, Huntly, Kintore and Blackburn.

6.1.9 Finally, this package aims to improve road safety through the provision of targeted safety improvements to address both real and perceived safety concerns on the A96 Trunk Road. It is envisaged that this would be achieved through the provision of improved overtaking opportunities, junction improvements and improvements to the alignment of the carriageway at targeted locations along the route.

Figure 6.1.1: Package 2 study area (high resolution versions in Appendix E)



6.2 Criterion 1

Criterion and success factors

6.2.1 Criterion 1 is:

- Extent to which the package supports adaptation for and/or resilience to current and predicted future impacts of climate change.

6.2.2 Success factors:

- 1a. Supports adaptation for and/or resilience to predicted increases in sea levels and storm surge.
- 1b. Supports adaptation for and/or resilience to predicted changes in temperatures.
- 1c. Supports adaptation for and/or resilience to predicted increase in likelihood and severity of fluvial and pluvial flooding.
- 1d. Supports adaptation for and/or resilience to predicted increase in likelihood and severity of storms and high winds.

Geographic and environmental context

6.2.3 Table 6.1, Table 6.2, Table 6.3 and Table 6.4 outline the geographic and environmental context against criterion 1 within a 7.5km boundary (unless otherwise stated, for example, when using the MET Office Data) of each of the settlements included in the package.

Table 6.1: Geographic and environmental context of Package 2 study area against Criterion 1, Success Factor 1a. Supports adaptation for and/or resilience to predicted increases in sea levels and storm surge

Package 2 Study Area	Geographic and Environmental Context
Lhanbryde	The SEPA coastal hazard maps identify a 10% chance of river flooding each year during a 1 in 10-year return period; 0.5% chance during a 1 in 200-year return period; and 0.1% chance during a 1 in 1,000-year return period, focused to the north of Lhanbryde. Given the relative distance from the coast, it is not envisaged that this will severely impact Lhanbryde.
Mosstodloch and Fochabers	The SEPA coastal hazard maps identify a 10% chance of river flooding each year during a 1 in 10-year return period; 0.5% chance during a 1 in 200-year return period; and 0.1% chance during a 1 in 1,000-year return period, focused around Spey Bay, approximately 6km north. Given the relative distance from the coast, it is not envisaged that this will severely impact Mosstodloch or Fochabers (which are more prone to fluvial flooding).

Package 2 Study Area	Geographic and Environmental Context
Huntly	The SEPA coastal hazard maps identify no risk of coastal flooding within the Huntly study area due to Huntly being located inland, away from the coast.
Kintore	The SEPA coastal hazard maps identify no risk of coastal flooding within the Kintore study area due to Kintore being located inland, away from the coast.
Blackburn	The SEPA coastal hazard maps identify no risk of coastal flooding within the Blackburn study area due to Blackburn being located inland, away from the coast.

Table 6.2: Geographic and environmental context of Package 2 study area against Criterion 1, Success Factor 1b. Supports adaptation for and/or resilience to predicted changes in temperatures

Package 2 Study Area	Geographic and Environmental Context
Lhanbryde	Mean annual air temperature is predicted to range between +0.87°C (2020-2049) and +3.04°C (2070-2099) within a geographical boundary of 25km around the town of Lhanbryde (50% probability. Maximum summer air temperature is predicted to range between +0.74°C (2020-2049) and +3.38°C, and minimum winter air temperature between +0.83°C (2020-2049) and +3.08°C (2070-2099.
Mosstodloch and Fochabers	Mean annual air temperature is predicted to range between +0.88°C (2020-2049) and +3.00°C (2070-2099) within a geographical boundary of 25km around the towns of Mosstodloch and Fochabers (50% probability at 1.5m). Maximum summer air temperature is predicted to range between +0.75°C (2020-2049) and +3.33°C, and minimum winter air temperature between +0.86°C (2020-2049) and +2.81°C (2070-2099.
Huntly	Mean annual air temperature is predicted to range between +0.89°C (2020-2049) and +3.04°C (2070-2099) within a geographical boundary of 25km around the town of Huntly (50% probability at 1.5m). Maximum summer air temperature is predicted to range between +0.77°C (2020-2049) and +3.40°C, and minimum winter air temperature between +0.87°C (2020-2049) and +2.83°C (2070-2099.
Kintore	Mean annual air temperature is predicted to range between +0.89°C (2020-2049) and +3.05°C (2070-2099) within a geographical boundary of 25km around the town of Kintore (50% probability). Maximum summer air temperature is predicted to range between +0.77°C (2020-2049) and +3.46°C (2070-2099), and minimum winter air temperature is predicted to range between +0.87°C (2020-2049) and +2.83°C (2070-2099).

Package 2 Study Area	Geographic and Environmental Context
Blackburn	Mean annual air temperature is predicted to range between +0.89°C (2020-2049) and +3.05°C (2070-2099) within a geographical boundary of 25km around the town of Blackburn (50% probability). Maximum summer air temperature is predicted to range between +0.77°C (2020-2049) and +3.46°C (2070-2099), and minimum winter air temperature is predicted to range between +0.87°C (2020-2049) and +2.83°C (2070-2099).

Table 6.3: Geographic and environmental context of Package 2 study area against Criterion 1, Success Factor 1c. Supports adaptation for and/or resilience to predicted increase in likelihood and severity of fluvial and pluvial flooding

Package 2 Study Area	Geographic and Environmental Context
Lhanbryde	Fluvial Flooding: SEPA River Hazard Maps identify a 10% chance of river flooding each year during a 1 in 10-year return period; 0.5% chance during a 1 in 200-year return period; and 0.1% chance during a 1 in 1,000-year return period. In addition, the geographical area at risk of flooding increases between 10 and 1,000-year return periods, with flood depths ranging between 0.3m and 1.0m for the 1 in 10-year return period, 0.3m and 1.0m for the 1 in 200-year return period and 0.3m and 1.0m for the 1 in 1,000-year return period. This risk follows the River Findhorn, Muckle Burn and tributaries of Findhorn Bay. Future flood maps (River Extent 2080s - 1 in 200-Year) identify the surrounding areas of Lhanbryde at risk of flooding (0.5% by the 2080s). Pluvial Flooding: SEPA Surface Water Hazard Maps identifies a 10% chance of surface water flooding each year during a 1 in 10-year return period; and a 0.1% chance during a 1 in 200-year return period. In addition, the geographical area at risk of flooding increases between 10 and 1,000-year return periods, with flood depths ranging between 0.3m and 1.0m. This is spread across the study area. Change in annual precipitation is predicted to range between +4.82% (2020-2049) and +7.81% (2070-2099) within a geographical boundary of 25km around the town of Lhanbryde (50% probability). Change in winter precipitation is predicted to peak between +10.88% and +28.00%. More frequent, high-intensity rainfall will increase the risk of flash flooding from surface water or sewers for inland communities, especially during winter months.

Package 2 Study Area	Geographic and Environmental Context
Mosstodloch and Fochabers	Fluvial Flooding: SEPA River Hazard Maps identifies a 10% chance of river flooding each year during a 1 in 10-year return period; 0.5% chance during a 1 in 200-year return period; and 0.1% chance during a 1 in 1,000-year return period, focused around the River Spey (closer to Fochabers than Mosstodloch). The geographical area at risk of flooding increases between 10 and 1,000-year return periods, with flood depths ranging between 0.3m and 1.0m for the 1 in 10-year return period, 0.3m and 1.0m for the 1 in 200-year return period and 0.3m and 1.0m for the 1 in 1,000-year return period. This risk follows the River Findhorn, Muckle Burn and tributaries of Findhorn Bay. Future flood maps (River Extent 2080s - 1 in 200-Year identify the surrounding areas of Fochabers and Mosstodloch at risk of flooding (0.5% by the 2080s), following the route of the River Spey. Pluvial Flooding: SEPA Surface Water Hazard Maps identifies a 10% chance of surface water flooding each year during a 1 in 10-year return period; and a 0.1% chance during a 1 in 200-year return period. In addition, the geographical area at risk of flooding increases between 10 and 1,000-year return periods, with flood depths ranging between 0.3m and 1.0m. This is spread across the study area. Change in annual precipitation is predicted to range between +3.91% (2020-2049) and +4.3% (2070-2099) within a geographical boundary of 25km around the town of Huntly (50% probability). Change in winter precipitation is predicted to peak between +10.98% (2020-2049) and +24.3% (2070-2099). More frequent, high-intensity rainfall will increase the risk of flash flooding from surface water or sewers for inland communities, especially during winter months.

Package 2 Study Area	Geographic and Environmental Context
Huntly	Fluvial Flooding: SEPA River Hazard Maps identify a 10% chance of river flooding each year during a 1 in 10-year return period; 0.5% chance during a 1 in 200-year return period; and 0.1% chance during a 1 in 1,000-year return period, largely focused around the River Deveron and River Bogie. The geographical area at risk of flooding increases between 10 and 1,000-year return periods, with flood depths ranging between 0.3m and 1.0m for the 1 in 10-year return period, 0.3m and 1.0m for the 1 in 200-year return period and 0.3m and 1.0m for the 1 in 1,000-year return period. This risk follows the River Findhorn, Muckle Burn and tributaries of Findhorn Bay. Future flood maps (River Extent 2080s - 1 in 200-Year) identify the surrounding areas of Huntly at risk of flooding (0.5% by the 2080s), largely focused around the River Deveron and River Bogie. Pluvial Flooding: SEPA Surface Water Hazard Maps identify a 10% chance of surface water flooding each year during a 1 in 10-year return period; and a 0.1% chance during a 1 in 200-year return period. The geographical area at risk of flooding increases between 10 and 1000-year return periods, with flood depths ranging between 0.3m and 1.0m. This is spread across the study area. Change in annual precipitation is predicted to range between +3.91% (2020-2049) and +4.3% (2070-2099) within a geographical boundary of 25km around the town of Huntly (50% probability). Change in winter precipitation is predicted to peak between +10.98% (2020-2049) and +24.3% (2070-2099). More frequent, high-intensity rainfall will increase the risk of flash flooding from surface water or sewers for inland communities, especially during winter months.

Package 2 Study Area	Geographic and Environmental Context
Kintore	<u>Fluvial Flooding:</u> SEPA River Hazard Maps identifies a 10% chance of river flooding each year during a 1 in 10-year return period; 0.5% chance during a 1 in 200-year return period; and 0.1% chance during a 1 in 1,000-year return period, largely focused around the River Don, Torry Burn and Tuach Burn. The geographical area at risk of flooding increases between 10 and 1,000-year return periods, with flood depths ranging between 0.3m and 1.0m for the 1 in 10-year return period, 0.3m and 1.0m for the 1 in 200-year return period and 0.3m and 1.0m for the 1 in 1,000-year return period. Future flood maps (River Extent 2080s - 1 in 200-Year) identify the surrounding areas of Kintore at risk of flooding (0.5% by the 2080s), largely focused around the River Don, Torry Burn and Tuach Burn. <u>Pluvial Flooding:</u> SEPA Surface Water Hazard Maps identifies a 10% chance of surface water flooding each year during a 1 in 10-year return period; and a 0.1% chance during a 1 in 200-year return period. In addition, the geographical area at risk of flooding increases between 10 and 1,000-year return periods, with flood depths ranging between 0.3m and 1.0m. This is spread across the study area. Change in annual precipitation is predicted to range between +5.26% (2020-2049) and +6.21% (2070-2099) within a geographical boundary of 25km around the town of Kintore (50% probability). Change in winter precipitation is predicted to peak between +16.88% (2020-2049) and +33.13% (2070-2099). More frequent, high-intensity rainfall will increase the risk of flash flooding from surface water or sewers for inland communities, especially during winter months.

Package 2 Study Area	Geographic and Environmental Context
Blackburn	Fluvial Flooding: SEPA River Hazard Maps identifies a 10% chance of river flooding each year during a 1 in 10-year return period; 0.5% chance during a 1 in 200-year return period; and 0.1% chance during a 1 in 1,000-year return period, focused around the Black Burn. In addition, the geographical area at risk of flooding increases between 10 and 1,000-year return periods, with flood depths ranging between 0.3m and 1.0m for the 1 in 10-year return period, 0.3m and 1.0m for the 1 in 200-year return period and 0.3m and 1.0m for the 1 in 1,000-year return period. Future flood maps (River Extent 2080s - 1 in 200-Year) identify the surrounding areas of Blackburn at risk of flooding (0.5% by the 2080s). Pluvial Flooding: SEPA Surface Water Hazard Maps identifies a 10% chance of surface water flooding each year during a 1 in 10-year return period; and a 0.1% chance during a 1 in 200-year return period. In addition, the geographical area at risk of flooding increases between 10 and 1,000-year return periods, with flood depths ranging between 0.3m and 1.0m. This risk is spread across the study area. Change in annual precipitation is predicted to range between +5.26% (2020-2049) and +6.21% (2070-2099) within a geographical boundary of 25km around the town of Blackburn (50% probability). Change in winter precipitation is predicted to peak between +16.88% (2020-2049) and +33.13% (2070-2099). More frequent, high-intensity rainfall will increase the risk of flash flooding from surface water or sewers for inland communities, especially during winter months.

Table 6.4: Geographic and environmental context of Package 2 study area against Criterion 1, Success Factor 1d. Supports adaptation for and/or resilience to predicted increase in likelihood and severity of storms and high winds

Package 2 Study Area	Geographic and Environmental Context
Lhanbryde	There were no weather-related incidents (flooding, snow or landscaping/fallen/overhanging branches) between 2016-2021 along the A96 within a 7.5km boundary of Lhanbryde.
Mosstodloch and Fochabers	There were no weather-related incidents (flooding, snow or landscaping/fallen/overhanging branches) between 2016-2021 along the A96 within a 7.5km boundary of Mosstodloch and Fochabers.
Huntly	There was a total of two weather-related incidents (flooding, snow or landscaping/fallen/overhanging branches) between 2016-2021 along the A96 within a 7.5km boundary of Huntly.
Kintore	There was a total of two weather-related incidents (flooding, snow or landscaping/fallen/overhanging branches) between 2016-2021 along the A96 within a 7.5km boundary of Kintore.
Blackburn	There was a total of two weather-related incidents (flooding, snow or landscaping/fallen/overhanging branches) between 2016-2021 along the A96 within a 7.5km boundary of Blackburn.

Package 2 criterion 1 assessment

6.2.4 Package 2 is at an early stage of development with limited design details on which to base an assessment. The assessment is based on potential impacts and interactions the options could have with aspects considered within this criterion.

6.2.5 The geographic and environmental context for Package 2 forecasts that annual temperatures will increase across the corridor, with drier, warmer summers and wetter, milder winters. This means that the A96 corridor will need to be prepared for a wider range of annual temperatures and need to be resilient to higher peak summer temperatures (which could potentially warp surfaces, impact electronic and electrical equipment and cause heatstroke for operational users or construction workers).

6.2.6 Current standards for designing and constructing transport infrastructure are maintained and updated regularly to account for climatic factors. This process should ensure that each option is designed and built to adapt to the predicted future impacts of climate change throughout the A96 corridor, including in and around each of the six settlements. Any resulting infrastructure that is built to adapt to future impacts of climate change has the potential to increase the overall resilience of the transport network in the study area.

6.2.7 Package 2 includes the option to make linespeed, passenger and freight capacity improvements on the Aberdeen to Inverness rail line. Of the six settlements included in this package, only Huntly and Kintore have a train station. As such, this option will make these two settlements more resilient as it aims to provide a more reliable public transport service, cutting journey times and providing a more frequent passenger service. However, there may be locations along the A96 corridor where the rail line is more vulnerable to the effects of climate change.

6.2.8 Package 2 includes alternative refuelling infrastructure as part of the A96 Electric Corridor option which is not noted to be particularly prone to the identified effects of climate change. However, throughout the A96 corridor, and within and around the settlements included in this package, there may be locations that may be more vulnerable to the effects of climate change, for example, future flooding that may occur in and around Lhanbryde, Mosstodloch and Fochabers.

6.2.9 Package 2 will be developed in accordance with relevant standards such as the Design Manual for Roads and Bridges. The DMRB includes LA 114 Climate standard, which assesses the resilience and adaptation of proposed road infrastructure assets at detailed design stage. DMRB LA 114 states '*the scoping assessment shall identify whether anticipated changing climate conditions and weather events are likely to have significant adverse effects on the project (or elements of the project) during construction and operation*'.

6.2.10 Examples of potential climate impacts cited in DMRB LA 114 during construction and operations include increased frequency of extreme weather; increased temperatures; increased precipitation; increased sea level rise and wave height; and gales. Therefore, it is assumed that the options within Package 2 will be designed in accordance with DMRB LA 114 to ensure resilience against extreme weather and to minimise the potential effects of climate change, to reduce the vulnerability of the infrastructure.

Package 2 criterion 1 recommendations

6.2.11 All relevant design, construction and maintenance guidance, standards, processes, and assessments should be kept up to date with the latest climate change forecasts and associated best practice and applied to the development of all options.

6.2.12 If Package 2 is developed, a climate change vulnerability scoping/assessment exercise should be undertaken, in line with current standards such as DMRB LA 114

6.2.13 If Package 2 is taken forward, it is recommended that any potential impacts on the A96 corridor, including the settlements within the package, climate resilience are understood at the earliest design stage and accounted for within the design. Technologies to counteract the impacts of climate change and provide resilience for each option within Package 2 should be considered. The design for each option should embed measures for adaptation against climate-related hazards where practicable, to reduce the significance levels of any adverse impacts.

6.2.14 The vulnerability of all the options included in Package 2 to climate change should be appropriately scoped to understand the potential impacts on the associated assets during construction and operation – for example on electronic equipment; construction workers; end users; site facilities; structures; earthworks; verges; drainage; and construction plant.

6.2.15 Consideration should be made during the site selection process for options that require construction of new facilities or infrastructure to prioritise locations along the A96 corridor, and in and around the settlements, which are more resilient to the potential effects of climate change. For example, selecting a location for the infrastructure on naturally higher ground levels and building away from coastal areas and/or floodplains that are anticipated to be subject to flooding. Additionally, the drainage capabilities of the infrastructure should be designed to deal with more intense rainfall events and flooding.

6.2.16 Active travel provisions should include elements that will support adaptation for and/or resilience to current and predicted future impacts of climate change. For example, the use of porous pavements for pedestrianised areas and cycling routes and the use of higher solar reflectance/cool pavements in pedestrianised areas and cycling lanes should be considered. Additionally, road salt and snow removal should be prioritised in pedestrianised areas and cycling routes.

6.2.17 It is recommended that during the design development of the options within this package, consideration is given to including structural adaptation measures. For example, selecting materials that are resistant to the expected extremes of both low and high temperatures; integrating protective infrastructure such as flood defences in and around the settlements; and using permeable paving surfaces to reduce run-off during heavy rainfalls. Nature-based solutions should also be considered to further enhance natural resilience and adaptation measures.

6.2.18 Finally, the selection of materials used within the construction of the transport options should be based on their resilience to extreme weather, for example, preference should be given to corrosion-resistant materials rather than utilising metals and treating them with a non-corrosive powder coating.

6.3 Criterion 2

Criterion and success factor

6.3.1 Criterion 2 is:

- Extent to which the package supports the surrounding area to adapt and/or become more resilient to current and predicted future impacts of climate change.

6.3.2 Success factors:

2a. Supports adaptation for and/or resilience to current and future impacts of climate change within the study area outside of the package boundary.

2b. Supports the natural environment to adapt for and/or increase resilience to current and predicted future impacts of climate change.

Geographic and environmental context

6.3.3 **Table 6.5** and **Table 6.6** outline the geographic and environmental context against criterion 2 within a 7.5km boundary (unless otherwise stated, for example, when using the MET Office Data) of each of the settlements included in the package.

Table 6.5: Geographic and environmental context of Package 2 study area against Criterion 2, Success Factor 2a. Supports adaptation for and/or resilience to current and future impacts of climate change within the study area outside of the package boundary

Package 2 Study Area	Geographic and Environmental Context
Lhanbryde	Geographic and environmental context for the other settlements is described in Package 2 Criterion 1 (Section 6.2).
Mosstodloch and Fochabers	Geographic and environmental context for the other settlements is described in Package 2 Criterion 1 (Section 6.2).
Huntly	Geographic and environmental context for the other settlements is described in Package 2 Criterion 1 (Section 6.2).
Kintore	Geographic and environmental context for the other settlements is described in Package 2 Criterion 1 (Section 6.2).
Blackburn	Geographic and environmental context for the other settlements is described in Package 2 Criterion 1 (Section 6.2).

Table 6.6: Geographic and environmental context of Package 2 study area against Criterion 2, Success Factor 2b. Supports the natural environment to adapt for and/or increase resilience to current and predicted future impacts of climate change

Package 2 Study Area	Geographic and Environmental Context
Lhanbryde	There are a number of designated habitats within the study area of the package around Lhanbryde: - Ancient woodland: 2,603.59 hectares. - Native Woodland Survey for Scotland: 669.19 hectares. - Site of Special Scientific Interest: 10 Sites of Special Scientific Interest within the Lhanbryde study area – Loch Oire, Teindland Quarry, Coleburn Pasture, Dipple Brae, Loch Spynie, Lower River Spey, Scaat Craig, Spey Bay, Spynie Quarry and River Spey. - Special Area of Conservation: Two SAC – River Spey and Lower River Spey (Spey Bay) - Special Protection Area: Three SPA – Loch Spynie, Moray Firth and Moray and Nairn Coast - Wetland of International Importance (Ramsar): Two Ramsar Sites – Loch Spynie and Moray and Nairn Coast - Geological Conservation Review Site: Six Geological Conservation Review Sites – Dipple Brae, Lower River Spey, Scaat Craig, Spey Bay, Spynie and Teindland Quarry.
Mosstodloch and Fochabers	There are a number of designated habitats within the study area of the package around Mosstodloch and Fochabers: - Ancient woodland: 5,457.87 hectares. - Native Woodland Survey for Scotland: 909.86 hectares. - Special Protection Areas: Two Special Protection Areas within the Mosstodloch and Fochabers study area – Moray and Nairn Coast, and Moray Firth. - Special Area of Conservation: Two Special Areas of Conservation within the Mosstodloch and Fochabers study area – River Spey and Lower River Spey (Spey Bay). - Wetland of International Importance (Ramsar): One Wetland of International Importance (Ramsar) within the Mosstodloch and Fochabers study area – Moray and Nairn Coast. - Site of Special Scientific Interest: Seven Sites of Special Scientific Interest within the Mosstodloch and Fochabers study area - Loch Oire, Lower River Spey, Spey Bay, Teindland Quarry, River Spey, Dipple Brae and Tynet Burn. - Geological Conservation Review Site: Six Geological Conservation Review Sites – Tynet Burn, Dipple Brae, Spey Bay, Lower River Spey, Tynet Burn (Elgin), and Teindland Quarry

Package 2 Study Area	Geographic and Environmental Context
Huntly	There are a number of designated habitats within the study area of the package around Huntly: - Ancient woodland: 2,042.01 hectares. - Native Woodland Survey for Scotland: 827.88 hectares. - Special Area of Conservation: One SAC – Mortlach Moss - Site of Special Scientific Interest: Four Sites of Special Scientific Interest within the Huntly study area - Bin Quarry, Whitehill, Craigs of Succoth and Mortlach Moss - Geological Conservation Review Site: Two Geological Conservation Review Sites – Bin Quarry and Binhill Quarry
Kintore	There are a number of designated habitats within the study area of the package around Kintore: - Ancient woodland: 1,752.11 hectares. - Native Woodland Survey for Scotland: 1,248.83 hectares.
Blackburn	There are a number of designated habitats within the study area of the package around Blackburn: - Ancient woodland: 1,444.97 hectares. - Native Woodland Survey for Scotland: 942.34 hectares. - Special Protection Area: One SPA – Loch of Skene - Site of Special Scientific Interest: One SSSI – Loch of Skene - Wetland of International Importance (Ramsar): One Ramsar Site – Loch of Skene

Package 2 criterion 2 assessment

6.3.4 Package 2 is at an early stage of development with limited design details on which to base an assessment. The assessment is based on potential impacts and interactions the options could have with aspects considered within this criterion.

6.3.5 The construction of the options included in Package 2 could impact the surrounding area's ability to adapt to climate change. This could be either positive or negative depending on how the options are designed and delivered.

6.3.6 The design and construction of the options included in Package 2 would be developed in accordance with relevant standards including DMRB. A risk that would need to be managed through design would be the interaction that the option would have with the drainage of the surrounding area. DMRB requires that schemes developed in accordance with the relevant standards should not increase flood risk to the surrounding area. The design should take account of existing risks such as the communities that already experience flooding, for example, Huntly, Kintore and Blackburn where, between 2016-2021 each settlement had a total of two weather-related incidents involving either snow with high winds or rain with high winds causing A96 road closure. Development of the option could have a net positive impact on the area's ability to adapt to climate change if designed and delivered to go beyond mitigating risks and identify and take advantage of potential opportunities. This could include appropriate drainage features and flood defence systems – including outside of the option boundary.

6.3.7 The delivery of the options included in Package 2 could positively or negatively impact the ecosystem services provided by the surrounding area, depending on how the options are designed and delivered. The ecosystem services provided by the area surrounding the study area and which may be impacted by the delivery of the transport options include (but are not limited to):

- **Regulating services**: such as soil conservation and the carbon sequestration service provided by peatland, for example, in and around Mosstodloch and Fochabers where there are 9 pockets of Class 1 peatland which are nationally important carbon-rich soils, deep peat and priority peatland habitat.
- **Supporting services**: including nutrient cycling, soil formation and photosynthesis provided by the natural environment along the A96 corridor such as Moray Monster Trails near Fochabers; Crooked Wood near Lhanbryde; and Tyrebagger Hill near Blackburn.
- **Provisioning services**: fresh water; and timber and other forest products processed by companies such as Linnorie Firewood Services and Jewson Huntly timber merchants, both in Huntly.
- **Cultural services**: the recreational and aesthetic sites within the study area including (but not limited to) Gordon Castle Estate near Mosstodloch; Marshall's Farm Shop and Forest Farm the Organic Dairy both near Blackburn; Huntly Castle; and Coxton Tower near Lhanbryde.

6.3.8 Collectively the options included in Package 2 have the potential to support the communities within the settlements to become more resilient to current and predicted future impacts of climate change through provision of additional transport options. For example, Package 2 includes three options to improve public transport facilities (bus priority measures, linespeed, passenger and freight capacity improvements on the Aberdeen to Inverness rail line and improved public transport passenger interchange facilities). If one of these modes of public transport experiences travel disruption due to adverse weather conditions then the improvements made to other facilities have the potential to provide an alternative transport option.

6.3.9 Package 2 includes alternative refuelling infrastructure as part of the A96 Electric Corridor and investment in DRT and MaaS options. The impact of these options on the surrounding area's ability to adapt to climate change could be positive depending on how the options are designed and delivered. Currently, these options are not noted to be particularly prone to the identified effects of climate change.

6.3.10 The study area includes land designated as environmentally sensitive, including SSSIs, SACs, SPAs and Geological Conservation Review Sites, which presents a risk and opportunity with regard to their future management. Notably, Lhanbryde, Mosstodloch and Fochabers have a high number of SSSIs, SPAs and SACs, meaning they are particularly environmentally sensitive. As such, the options delivered within Package 2 may impact on the designated land and its ability to adapt to current and predicted future impacts of climate change.

Package 2 criterion 2 recommendations

6.3.11 All relevant design, construction and maintenance guidance, standards, processes, and assessments should be kept up to date with the latest climate change forecasts and associated best practice and applied to the development of all options.

6.3.12 Options should be designed, constructed and maintained to maximise the opportunities to improve the resilience and adaption of the surrounding area to the future impacts of climate change and local conditions. This could include appropriate drainage features and flood defence systems – including outside of the option boundary.

6.3.13 Consideration should be given to the interdependency of the transport options and their ability to function if one or more of the transport modes is interrupted due to adverse weather conditions.

6.3.14 Options should be designed, constructed and maintained to maximise the opportunities to improve the ecosystem services of the surrounding area and the natural environment's resilience to the future impacts of climate change. This should include the potential impacts listed in paragraph 6.3.7.

6.4 Criterion 3

Criterion and success factor

6.4.1 Criterion 3 is:

- Extent to which the package supports the decarbonisation of the transport network in Scotland, including supporting transition from higher to lower emission modes, and the modal shift to greater public transport and active travel options.

6.4.2 Success factors:

- 3a. The net change in user carbon emissions sit appropriately within the calculated emissions envelope for Scotland, taking account of changing legislation and targets (including any Climate Change Plan update for Scotland) (assumed current target of 2045).
- 3b. Supports the transition to low carbon modes of transport: transition from higher emissions to lower emissions modes, the modal shift to public transport and the modal shift to active travel for shorter everyday journeys.

Geographic and environmental context

6.4.3 **Table 6.7** and **Table 6.8** outline the geographic and environmental context against criterion 3 within a 7.5km boundary (unless otherwise stated, for example, when using the MET Office Data) of each of the settlements included in the package.

Table 6.7: Geographic and environmental context of Package 2 study area against Criterion 3, Success Factor 3a. The net change in user carbon emissions sit appropriately within the calculated emissions envelope for Scotland, taking account of changing legislation and targets (including any climate Change Plan update for Scotland) (assumed current target of 2045)

Package 2 Study Area	Geographic and Environmental Context
Lhanbryde	No additional context required - the net change calculations are shown in the Package 2 Criterion 3 Assessment section below (Table 6.9 & Table 6.10)
Mosstodloch and Fochabers	No additional context required - the net change calculations are shown in the Package 2 Criterion 3 Assessment section below (Table 6.9 & Table 6.10).
Huntly	No additional context required - the net change calculations are shown in the Package 2 Criterion 3 Assessment section below (Table 6.9 & Table 6.10).
Kintore	No additional context required - the net change calculations are shown in the Package 2 Criterion 3 Assessment section below (Table 6.9 & Table 6.10).

Blackburn	No additional context required - the net change calculations are shown in the Package 2 Criterion 3 Assessment section below (Table 6.9 & Table 6.10).

Table 6.8: Geographic and environmental context of Package 2 study area against Criterion 3, Success Factor 3b. Supports the transition to low carbon modes of transport: transition from higher emissions to lower emissions modes, the modal shift to public transport and the modal shift to active travel for shorter everyday journeys

Package 2 Study Area	Geographic and Environmental Context
Lhanbryde	The National Cycle Network (NCN) runs to the north of the Lhanbryde study area. The majority of the NCN route in the study area is on the road, and therefore requires interactions with traffic. The bus route networks run throughout Lhanbryde on both major and minor roads, with multiple bus stops located across the settlement. Active travel options are available across the study area through both the NCN and the Core Path network that runs throughout Lhanbryde. There are no active travel hubs in Lhanbryde. There are approximately 2 slow charging, 42 fast charging and 8 rapid charging EV charging points within the Lhanbryde study area.
Mosstodloch and Fochabers	The National Cycle Network (NCN) runs to the north of the Mosstodloch and Fochabers study area. The majority of the NCN route in the study area is on the road, and therefore requires interactions with traffic. The bus route networks run along the A96 past Mosstodloch and through minor roads in Fochabers, with multiple bus stops located along the route network. Active travel options are available across the study area through both the NCN and the Core Path network that runs throughout both Mosstodloch and Fochabers. There are no active travel hubs in Mosstodloch and Fochabers. There are approximately 6 fast charging EV charging point within the Mosstodloch and Fochabers study area.
Huntly	The National Cycle Network (NCN) does not run through the Huntly study area. The bus route networks run throughout Huntly on both major and minor roads, with multiple bus stops located across the settlement. Active travel options are available across the study area through the Core Path network that runs throughout Huntly. There are no active travel hubs in Huntly. There are approximately 10 fast charging and 2 rapid charging EV charging points within the Huntly study area.
Kintore	The National Cycle Network (NCN) does not run through the Kintore study area. The bus route networks run throughout Kintore on both major and minor roads, with multiple bus stops located across the settlement. Active travel options are available across the study area through the Core Path network that runs throughout Kintore. There are no active travel hubs in Kintore. There are approximately 50 fast

Package 2 Study Area	Geographic and Environmental Context
	charging, 10 rapid charging and 6 ultra-rapid charging EV charging points within the Kintore study area.
Blackburn	The National Cycle Network (NCN) runs to the east of the Blackburn study area. The majority of the NCN route in the study area is on the road, and therefore requires interactions with traffic. The bus route networks run through Blackburn, along both the A96 and B973 with multiple bus stops located across the study area. There are no active travel hubs in Blackburn. There are approximately 1 slow charging, 110 fast charging, 21 rapid charging and 35 ultra-rapid charging EV charging points within the Blackburn study area.

Package 2 criterion 3 assessment

6.4.4 **Table 6.9** and **Table 6.10** below show the net change in road user emissions with and without the package, under both the 'With Policy' and 'Without Policy' transport behaviour scenarios.

Table 6.9: The net change in road user emissions with and without the package, under the 'With Policy' scenario. The target emissions reduction, and annual carbon emissions envelope have been set as per the Climate Compatibility Assessment methodology.

Year	% Emissions reduction from baseline year	Annual carbon emissions envelope (Mt CO2e)	Without package (Do Nothing) (tCO2e)	With package (Do-Something) (tCO2e)	Net change (tCO2e)	Net tCO2e as % of the annual carbon emission envelope
1990	**Baseline**	**75.7**	N/A	N/A	N/A	N/A
2030	**75%**	**18.93**	212639.8	212450.5	-189.3	-0.001%
2031	**76.50%**	**17.79**	198463.8	198287.2	-176.7	-0.001%
2032	**78.00%**	**16.65**	184287.8	184123.8	-164.0	-0.001%
2033	**79.50%**	**15.52**	170111.8	169960.4	-151.4	-0.001%
2034	**81.00%**	**14.38**	155935.9	155797.1	-138.8	-0.001%
2035	**82.50%**	**13.25**	141759.9	141633.7	-126.2	-0.001%
2036	**84.00%**	**12.11**	127583.9	127470.3	-113.6	-0.001%
2037	**85.50%**	**10.98**	113407.9	113306.9	-100.9	-0.001%
2038	**87.00%**	**9.84**	99231.9	99143.6	-88.3	-0.001%
2039	**88.50%**	**8.71**	85055.9	84980.2	-75.7	-0.001%
2040	**90%**	**7.57**	70879.9	70816.8	-63.1	-0.001%
2041	**92.00%**	**6.06**	56703.9	56653.5	-50.5	-0.001%
2042	**94.00%**	**4.54**	42528.0	42490.1	-37.9	-0.001%
2043	**96.00%**	**3.03**	28352.0	28326.7	-25.2	-0.001%
2044	**98.00%**	**1.51**	14176.0	14163.4	-12.6	-0.001%
2045	**100%**	**0**	0.0	0.0	0.0	N/A

Table 6.10: The net change in road user emissions with and without the package, under the 'Without Policy' scenario. The target emissions reduction, and annual carbon emissions envelope have been set as per the Climate Compatibility Assessment methodology.

Year	% Emissions reduction from baseline year	Annual carbon emissions envelope (Mt CO2e)	Without package (Do Nothing) (tCO2e)	With package (Do-Something) (tCO2e)	Net change (tCO2e)	Net tCO2e as % of the annual carbon emission envelope
1990	**Baseline**	**75.7**	N/A	N/A	N/A	N/A
2030	**75%**	**18.93**	318601.7	321050.5	2448.8	0.013%
2031	**76.50%**	**17.79**	311750.3	314019.6	2269.3	0.013%
2032	**78.00%**	**16.65**	304898.9	306988.7	2089.8	0.013%
2033	**79.50%**	**15.52**	298047.4	299957.8	1910.4	0.012%
2034	**81.00%**	**14.38**	291196.0	292926.9	1730.9	0.012%
2035	**82.50%**	**13.25**	284344.6	285896.0	1551.4	0.012%
2036	**84.00%**	**12.11**	277493.2	278865.1	1372.0	0.011%
2037	**85.50%**	**10.98**	270641.7	271834.2	1192.5	0.011%
2038	**87.00%**	**9.84**	263790.3	264803.3	1013.0	0.010%
2039	**88.50%**	**8.71**	256938.9	257772.4	833.6	0.010%
2040	**90%**	**7.57**	250087.5	250741.5	654.1	0.009%
2041	**92.00%**	**6.06**	243236.0	243710.6	474.6	0.008%
2042	**94.00%**	**4.54**	236384.6	236679.8	295.1	0.006%
2043	**96.00%**	**3.03**	229533.2	229648.9	115.7	0.004%
2044	**98.00%**	**1.51**	222681.8	222618.0	-63.8	-0.004%
2045	**100%**	**0**	215830.3	215587.1	-243.3	N/A

6.4.5 Package 2 includes options that sit across the Sustainable Travel Hierarchy and have varying contribution to decarbonisation of the transport network. The options map to the Sustainable Travel Hierarchy as below in **Figure 6.4.1**.

Figure 6.4.1: Overview of the Package 2 options and their alignment with the Sustainable Travel Hierarchy

		Package 2 Options						
		Active communities	**Bus priority measures**	**Linespeed, passenger and freight capacity improvements on the Aberdeen to Inverness rail line**	**Investment in DRT and MaaS**	**A96 Electric Corridor**	**Targeted road safety improvements**	**Improved public transport passenger interchange facilities**
Sustainable Travel Hierarchy Tier	**Walking and wheeling**	Strong alignment	No direct alignment	No direct alignment	No direct alignment	No direct alignment	No direct alignment	Strong alignment
	Cycling	Strong alignment	No direct alignment	No direct alignment	No direct alignment	No direct alignment	Partial alignment	Strong alignment
	Public transport	No direct alignment	Strong alignment	Strong alignment	Strong alignment	Partial alignment	Partial alignment	Strong alignment
	Taxis and shared transport	No direct alignment	Strong alignment	No direct alignment	Strong alignment	Strong alignment	Strong alignment	Strong alignment
	Private car	No direct alignment	No direct alignment	No direct alignment	No direct alignment	Strong alignment	Strong alignment	Strong alignment

6.4.6 The carbon emissions have been calculated for the whole of the traffic model. The carbon emissions are predicted to decrease over the traffic carbon emissions assessment period for the 'With Policy' scenario. This decrease is due to a decrease in internal combustion engine vehicle kilometres travelled across the entirety of the traffic model. The carbon emissions are predicted to increase for 14 of the years in assessment period for the 'Without Policy' scenario, with a decrease in years 2044 and 2045. The increase is due to an increase in internal combustion engine vehicle kilometres travelled across the entirety of the traffic model for those years showing an increase.

Walking and wheeling & cycling

6.4.7 The Active Communities option within Package 2 supports walking, wheeling and cycling - transport modes which sit at the top of the Sustainable Travel Hierarchy. This could encourage the reduced use of non-renewable energy fuelled modes of transport, supporting the decarbonisation of the transport network throughout the A96 corridor, including in and around the settlements. The improved public transport passenger interchange facilities option also supports walking, wheeling and cycling as the improvements are likely to encourage the use of alternative, low carbon modes of transport.

Public transport

6.4.8 The options included in Package 2 which support the public transport tier of the Sustainable Travel Hierarchy include investment in DRT and MaaS; bus priority measures; improved public transport passenger interchange facilities; and linespeed, passenger and freight capacity improvements on the Aberdeen to Inverness rail line.

6.4.9 Collectively, these options have the potential to improve the flow of traffic throughout the A96 corridor (including in and around the settlements), increase the attractiveness of public transport and could encourage a modal shift away from private car use over time. This may contribute to a decrease in associated carbon emissions during the operation of the proposed measures, thus contributing to the Scottish Government's net zero emissions target.

6.4.10 The extent of change in carbon emissions from affected buses and cars will depend on the fuel being used and factors such as the location of the new bus priority measures. Delivering faster and more reliable journey times for bus passengers could increase the attractiveness of bus as a mode of transport, resulting in mode shift from car. In addition, provision of bus priority measures could reduce bus operating costs, providing the opportunity to leverage other bus service improvements from operators, such as increased mileage.

Taxis and shared transport and private car

6.4.11 The delivery of targeted road safety improvements at selected locations between Hardmuir, to the east of the town of Nairn, and Craibstone Roundabout west of Aberdeen is likely to improve the reliability of the A96 road corridor since it will primarily consist of improvements to highway infrastructure. As such these improvements may make the A96 a more attractive route for private vehicles to use. The road safety improvements to the A96 may also make it a more attractive route for residents to use public transport travelling on the route, aligning with the Sustainable Travel Hierarchy. As the provision of the targeted road safety improvements may improve attractiveness of the A96 for private vehicles, this may have a counter effect on modal shift. However, the delivery of the A96 Electric Corridor option will improve the overall network coverage and capacity for electric vehicles in and around the study area. This is expected to increase the overall attractiveness and reliability of using low/zero-emission vehicles along the A96. Through this option, it is expected that there will be a reduction in tailpipe carbon emissions, particularly over the long-term as the uptake of low and zero emission vehicles increases.

6.4.12 In the longer term, Package 2 could help to facilitate a modal shift to public transport and active travel through options such as bus priority measures and improved public transport interchange facilities for short journeys within and between the settlements and along the A96. If this was achieved, it would support decarbonisation of the transport network in Scotland and the transition from higher to lower emission modes of transport.

Package 2 criterion 3 recommendations

6.4.13 All relevant design, construction and maintenance guidance, standards, processes, and assessments should be kept up to date with the latest climate change forecasts and associated best practice and applied to the development of all options.

6.4.14 All the options in Package 2 should be designed to maximise alignment with the Sustainable Travel Hierarchy and careful consideration should be given to how the options can work together to optimise the lowest carbon option, for example, for different journeys and shorter routes.

6.4.15 As part of the Active Communities option, it is recommended that active travel routes are maximised within the settlements to improve and maximise walking, wheeling, and cycling opportunities for both local residents and visitors. Improvements could include suitable surfacing for all user types (including wheelchair users); few slopes/no stairs wherever possible; improved crossing points to promote safety; and suitably secure bike storage in and around the towns.

6.4.16 The impact of the options in the public transport tier of the Sustainable Travel Hierarchy on carbon emissions will depend on the fuel being used by buses and trains. It is therefore recommended that low-carbon modes of buses and trains are considered. It is envisaged that low carbon/zero carbon alternatives will become more cost efficient as technologies improve.

6.4.17 To fully support decarbonisation of the transport network in and around the settlements, the following should be considered for all rail and transport hub improvement options: suitable provisions for bike storage at any improved rail station or transport hub; suitable bus station facilities to minimise private car miles; and improved local walking/cycling connections to promote train facilities as a suitable, sustainable mode of transport. It is important that consideration is given to how the public transport options can work together to optimise use of the lowest carbon options.

6.4.18 Improved public transport passenger interchange facilities and linespeed, passenger and freight capacity improvements on the Aberdeen to Inverness rail line could also include increased parking provision and increased provision of EV/ Ultra-Low Emission Vehicle (ULEV) parking facilities to encourage private car users to switch to using public transport for both short and long-distance journeys.

6.4.19 The development of the A96 Electric Corridor option could include the distribution of electric and hydrogen-based fuel sources in addition to other alternative fuels such as HVO and Ammonia. The dispensaries should be placed strategically in and around the settlements so that they are highly accessible to both road users and rural local communities. Consideration should also be given to demountable and mobile infrastructure.

6.4.20 The options included in Package 2 would be designed to DMRB standards and therefore the design will be obligated to consider the provision of facilities for non-motorised users of the A96 corridor. The road safety improvements should be designed to maximise associated active travel and opportunities for public transport. It is important that consideration is given as to how the active travel and public transport options can work together to optimise use of the lowest carbon options.

6.5 Criterion 4

Criterion and success factors

6.5.1 Criterion 4 is:

- Extent to which the package supports the decarbonisation of the construction sector in Scotland and maximises reduction in whole life carbon emissions.

6.5.2 Success factor:

- 4a. Supports transition from higher emission to lower emission materials and technologies during construction, operation, and maintenance.

Geographic and environmental context

6.5.3 **Table 6.11** outlines the geographic and environmental context against criterion 4 within a 7.5km boundary (unless otherwise stated, for example, when using the MET Office Data) of each of the settlements included in the package.

Table 6.11: Geographic and environmental context of Package 2 study area against Criterion 4, Success Factor 4a. Supports transition from higher emission to lower emission materials and technologies during construction, operation and maintenance

Package 2 Study Area	Geographic and Environmental Context
Lhanbryde	UK Built Environment is responsible for 25% of total UK carbon emissions including buildings and infrastructure (UK Green Building Council, 2021). In relation to operation of their network, Transport Scotland, as part of the Scottish Government, use renewable or zero carbon electricity tariffs for the electricity used to power the road network (such as for the use in lighting).
Mosstodloch and Fochabers	UK Built Environment is responsible for 25% of total UK carbon emissions including buildings and infrastructure (UK Green Building Council, 2021). In relation to operation of their network, Transport Scotland, as part of the Scottish Government, use renewable or zero carbon electricity tariffs for the electricity used to power the road network (such as for the use in lighting).
Huntly	UK Built Environment is responsible for 25% of total UK carbon emissions including buildings and infrastructure (UK Green Building Council, 2021). In relation to operation of their network, Transport Scotland, as part of the Scottish Government, use renewable or zero carbon electricity tariffs for the electricity used to power the road network (such as for the use in lighting).

Package 2 Study Area	Geographic and Environmental Context
Kintore	UK Built Environment is responsible for 25% of total UK carbon emissions including buildings and infrastructure (UK Green Building Council, 2021). In relation to operation of their network, Transport Scotland, as part of the Scottish Government, use renewable or zero carbon electricity tariffs for the electricity used to power the road network (such as for the use in lighting).
Blackburn	UK Built Environment is responsible for 25% of total UK carbon emissions including buildings and infrastructure (UK Green Building Council, 2021). In relation to operation of their network, Transport Scotland, as part of the Scottish Government, use renewable or zero carbon electricity tariffs for the electricity used to power the road network (such as for the use in lighting).

Package 2 criterion 4 assessment

6.5.4 Package 2 is at an early stage of development with limited design details on which to base an assessment. The assessment is based on potential impacts and interactions the options could have with aspects considered within this criterion.

6.5.5 Since there are limited design details, the carbon emissions impact is estimated from the capital cost forecast by applying the Scottish Government 'Supply, Use and Input-Output Tables' figure for construction. This provides an estimate of between 140,600tCO_2e and 280,600tCO_2e for the capital stage carbon emissions impact.

6.5.6 The construction stage carbon emissions will vary between the options in the package. The variability is likely to depend on the level of new infrastructure required to implement the options – with the greater the level of construction resulting in greater levels of associated carbon emissions.

6.5.7 Package 2 as described makes no commitments to how the carbon emissions impact from construction, maintenance and operation would be minimised and so any resulting benefits or carbon reduction measures cannot be specifically considered within this assessment.

6.5.8 The operational element of the carbon emissions impact is reduced in part through the use of renewable/zero carbon electricity tariffs, if that approach is continued.

6.5.9 If Package 2 is developed, the transport options would be subject to relevant standards and assessment procedures for the type of transport infrastructure. For example, for road development this would include the Design Manual for Roads and Bridges (DMRB). Where the latest version of the DMRB climate change assessment standard (LA 114) is applied it requires the assessment of carbon emissions at detailed design stage.

Package 2 criterion 4 recommendations

6.5.10 All relevant design, construction and maintenance guidance, standards, processes, and assessments should be kept up to date with the latest best practice on carbon emission reductions and applied to the development of all options.

6.5.11 If Package 2 was taken forward, there would be an opportunity as a major infrastructure project in Scotland to strongly support decarbonisation of the construction sector. Application of PAS2080: Carbon Management in Buildings and Infrastructure to all schemes and all suppliers will help to systematically address whole life carbon emissions. This should include stretching carbon emissions reduction targets for suppliers, and consideration of carbon neutral standards (such as PAS 2060 - Carbon Neutrality Standard and Certification) for any suppliers managing the network beyond 2045.

6.5.12 The impact of Package 2 on carbon emissions will depend on the methods used during construction. It is therefore recommended that innovative techniques and technologies are used where relevant to reduce emissions. These should be focused on optimising the design to build less and to consume less carbon intensive materials (such as asphalt, concrete and steel). For asphalt this could include lower temperature mixes, concrete with high cement replacement, and steel with high recycled content.

6.5.13 During construction, opportunities to reduce carbon emissions should be maximised, such as local sourcing, construction and logistics efficiencies and alternative modes of transport – for example rail rather than road low emission vehicles, and low carbon fuels.

6.5.14 With regards maintenance, more resilient technology could be installed in the first instance to withstand climatic factors, subsequently making the option more resilient and requiring less maintenance. As techniques and technologies improve, it is recommended that these are adopted at the earliest possible stage, subject to a cost/benefit analysis being undertaken.

6.5.15 The principles of the circular economy should be applied during design, construction, and maintenance. For example, material reduction and reuse should be prioritised to comply with the waste management hierarchy, and opportunities should be sought to recondition and use existing transport infrastructure where appropriate.

6.6 Criterion 5

Criterion and success factor

6.6.1 Criterion 5 is:

- Extent to which land use change associated with the package mitigates carbon emissions and contributes to carbon storage and sequestration.

6.6.2 Success factor:

5a. Supports the protection and development of carbon sinks, and takes appropriate measures to maximise carbon sequestration, taking account of wider ecosystem services/natural capital.

Geographic and environmental context

6.6.3 **Table 6.12** outlines the geographic and environmental context against criterion 5 within a 7.5km boundary (unless otherwise stated, for example, when using the MET Office Data) of each of the settlements included in the package.

Table 6.12: Geographic and environmental context of Package 2 study area against Criterion 5, Success Factor 5a. Supports the protection and development of carbon sinks, and takes appropriate measures to maximise carbon sequestration, taking account of wider ecosystem services

Package 2 Study Area	Geographic and Environmental Context
Lhanbryde	There are a number of designated habitats with the potential for carbon sequestration within the study area of the package around Lhanbryde: - Ancient Woodland: 2,603.59 hectares. - Native Woodland Survey for Scotland: 669.19 hectares. - Peatland: Three pockets of Class 3 (Dominant vegetation cover is not priority peatland habitat but is associated with wet and acidic type). - Local Landscape Area: Spynie LLA to the north-west of Lhanbryde featuring coastal farmlands.
Mosstodloch and Fochabers	There are a number of designated habitats with the potential for carbon sequestration within the study area of the package around Mostodloch and Fochabers: - Ancient Woodland: 5,457.87 hectares. - Native Woodland Survey for Scotland: 909.86 hectares. Peatland: Nine pockets of Class 1 (nationally important carbon-rich soils, deep peat and priority peatland habitat) and seven pockets of Class 3 (Dominant vegetation cover is not priority peatland habitat but is associated with wet and acidic type). - Local Landscape Area: Two LLA's (The Spey Valley and Lower Spey), featuring low forested hills and coastal farmlands.

Package 2 Study Area	Geographic and Environmental Context
Huntly	There are a number of designated habitats with the potential for carbon sequestration within the study area of the package around Huntly: - Ancient Woodland: 2,042.01 hectares. - Native Woodland Survey for Scotland: 827.88 hectares. - Peatland: Five pockets of Class 1 (nationally important carbon-rich soils, deep peat and priority peatland habitat), and 22 pockets of Class 3 (Dominant vegetation cover is not priority peatland habitat but is associated with wet and acidic type). - Local Landscape Area: Deveron Valley LLA, featuring farmed and wooded river valleys, and outlying hills and ridges.
Kintore	There are a number of designated habitats with the potential for carbon sequestration within the study area of the package around Kintore: - Ancient Woodland: 1,444.97 hectares. - Native Woodland Survey for Scotland: 1,248.83 hectares. - Peatland: One pocket of Class 1 (nationally important carbon-rich soils, deep peat and priority peatland habitat) and three pockets of Class 3 (Dominant vegetation cover is not priority peatland habitat but is associated with wet and acidic type). - Local Landscape Area: Bennachie LLA to the west of Kintore, featuring a rich array of woodlands, heather moorland and numerous historic features including an Iron Age hill fort at the summit of Mither Tap, Barmykyn Hill fort on Airlie Hill and cairns on other summits.
Blackburn	There are a number of designated habitats with the potential for carbon sequestration within the study area of the package around Blackburn: - Ancient Woodland: 1,444.97 hectares. - Native Woodland Survey for Scotland: 942.34 hectares. - Peatland: Four pocket of Class 1 (nationally important carbon-rich soils, deep peat and priority peatland habitat) and four pockets of Class 3 (Dominant vegetation cover is not priority peatland habitat but is associated with wet and acidic type). - Local Landscape Area: Bennachie LLA to the north-west of Blackburn, featuring a rich array of woodlands, heather moorland and numerous historic features including an Iron Age hill fort at the summit of Mither Tap, Barmykyn Hill fort on Airlie Hill and cairns on other summits.

Package 2 criterion 5 assessment

6.6.4 Package 2 is at an early stage of development with limited design details on which to base an assessment. The assessment is based on potential impacts and interactions the options could have with aspects considered within this criterion.

6.6.5 The transport options within Package 2 are solely infrastructure-led and do not explicitly include the provision of public realm improvements to green space, or blue or green infrastructure assets. Therefore, it is not possible to confirm if Package 2 would have a positive impact on land use change, carbon storage and sequestration.

6.6.6 Package 2 will likely have a negative environmental effect on the storage and sequestration of carbon within natural ecosystems, particularly resulting from the inclusion of the targeted road safety improvements. However, due to limited design information the extent of any effect is uncertain.

6.6.7 All the options within Package 2 would be developed in accordance with the relevant standards and relevant Scottish Government and Transport Scotland policies and plans. The scale of the effects would be subject to detailed design and the location of the options being determined.

Package 2 criterion 5 recommendations

6.6.8 All relevant design, construction and maintenance guidance, standards, processes, and assessments should be kept up to date with the latest climate change forecasts and associated best practice and applied to the development of all options.

6.6.9 Consideration should be made during the site selection process to prioritise locations where there are likely to be minimal potential adverse effects on natural capital, carbon storage and sequestration.

6.6.10 Existing carbon sinks should be enhanced wherever possible, to increase potential carbon sequestration as an integral part of the schemes. Particularly, relating to peatland restoration and wetland enhancement, for example near Mosstodloch and Fochabers where there are nine pockets of Class 1 peatland.

7. Package 3

7.1 Package description

7.1.1 The options included in this package are:

- Active Connections;
- Bus Priority Measures;
- Investment in DRT and Maas;
- Linespeed, Passenger and Freight Capacity Improvements on the Aberdeen to Inverness Rail Line;
- Targeted Road Safety Improvements; and
- A96 Electric Corridor

7.1.2 This package is focused primarily on delivering transport network improvements to rural sections along the A96 corridor between noted settlements included in Package 1 and Package 2. The package would provide enhancements which aim to encourage a shift to more sustainable modes, increase active travel and public transport options and improve road safety.

7.1.3 This package aims to address both real and perceived safety concerns on the A96 Trunk Road is targeted at improving road safety through the provision of targeted safety improvements to address both real and perceived safety concerns on the A96 Trunk Road. It is envisaged that this would be achieved through the provision of improved overtaking opportunities, junction improvements and improvements to the alignment of the carriageway at targeted locations along the route.

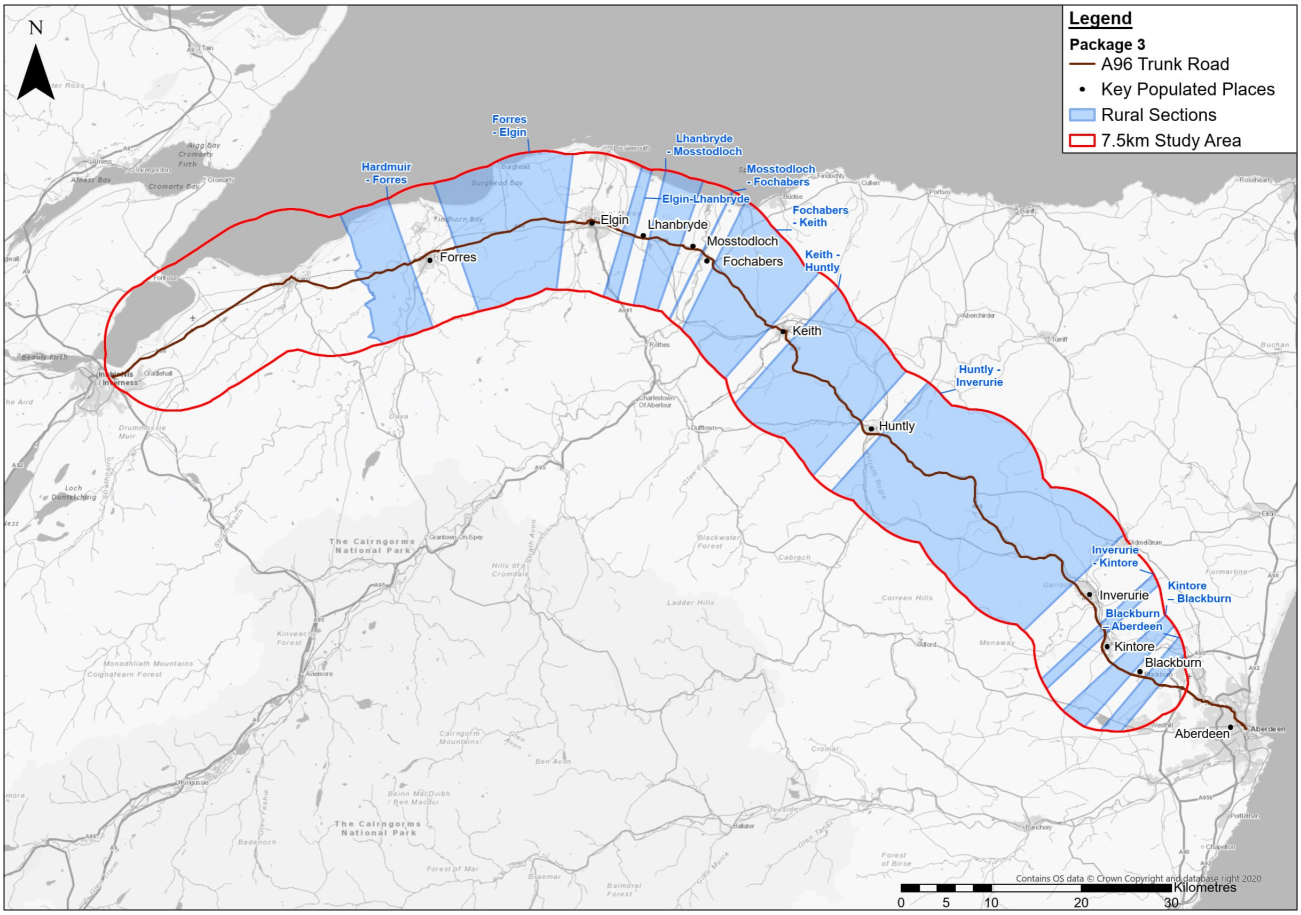
7.1.4 This package also aims to deliver networks of high-quality active travel routes between settlements along the A96 corridor. By connecting communities, this package would also address the need for junction improvements to enhance the provision for active modes along the route and the creation of safe crossings in rural areas, providing safe, attractive, and convenient choices for many functional and recreational journeys, enabling people to benefit from improved access to key trip attractors in neighbouring settlements, using sustainable travel modes.

7.1.5 A number of public transport interventions targeted at delivering faster and more reliable journey times as well as improving the overall passenger experience form part of this package. Journey time and reliability improvements would be achieved through the inclusion of bus priority measures at appropriate locations, with rail improvements delivered through linespeed and capacity interventions on the Aberdeen to Inverness rail line. Linespeed improvements would target a reduction in end-to-end journey times to two hours (currently approximately two hours and 25 minutes). This would be facilitated through the provision of passing loops, new rolling stock and improving passenger service frequencies and freight opportunities. This package does not however consider the provision of new park and ride facilities for onward travel by bus as they are only likely to be a viable option for capturing trips travelling to the larger cities of Aberdeen and Inverness where congestion is highest.

7.1.6 Improvements to the public transport network coverage are also proposed through the use of flexible services, such as Demand Responsive Transport (DRT) or Community Transport (CT), supported by Mobility as a Service (MaaS) or smart technology where appropriate, at a corridor level.

7.1.7 Development of the A96 Electric Corridor is also included within this package to encourage a shift away from internal combustion engine (ICE) vehicle. This intervention would seek to improve the provision of alternative refuelling infrastructure and facilities along the full A96 corridor and its interfacing local roads.

Figure 7.1.1: Package 3 study area (high resolution version in Appendix E)



7.2 Criterion 1

Criterion and success factors

7.2.1 Criterion 1 is:

- Extent to which the package supports adaptation for and/or resilience to current and predicted future impacts of climate change.

7.2.2 Success factors:

- 1a. Supports adaptation for and/or resilience to predicted increases in sea levels and storm surge.
- 1b. Supports adaptation for and/or resilience to predicted changes in temperatures.
- 1c. Supports adaptation for and/or resilience to predicted increase in likelihood and severity of fluvial and pluvial flooding.
- 1d. Supports adaptation for and/or resilience to predicted increase in likelihood and severity of storms and high winds.

Geographic and environmental context

7.2.3 **Table 7.1**, **Table 7.2**, **Table 7.3** and **Table 7.4** outline the geographic and environmental context of Package 3 against criterion 1 within a 7.5km boundary (unless otherwise stated, for example, when using the MET Office Data) of each of the rural sections.

Table 7.1: Geographic and environmental context of Package 3 study area against Criterion 1, Success Factor 1a. Supports adaptation for and/or resilience to predicted increases in sea levels and storm surge

Package 3 Study Area	Geographic and Environment Context
Hardmuir - Forres	The SEPA coastal hazard maps identify a 10% chance of river flooding each year during a 1 in 10-year return period; 0.5% chance during a 1 in 200-year return period; and 0.1% chance during a 1 in 1,000-year return period, focused around the north of the study area (north of Culbin Forest and around Muckle Burn). Given the relative distance from the coast, it is not envisaged that this will severely impact the rural section.
Forres - Elgin	The SEPA coastal hazard maps identify a 10% chance of river flooding each year during a 1 in 10-year return period; 0.5% chance during a 1 in 200-year return period; and 0.1% chance during a 1 in 1,000-year return period, focused around the north and north-east of the rural section (near Findhorn Bay and Findrassie Wood). Given the relative distance from the coast, it is not envisaged that this will severely impact the rural section.

Package 3 Study Area	Geographic and Environment Context
Elgin - Lhanbryde	The SEPA coastal hazard maps identify a 10% chance of river flooding each year during a 1 in 10-year return period; 0.5% chance during a 1 in 200-year return period; and 0.1% chance during a 1 in 1,000-year return period, focused around the north of the study area (River Lossie and Oakenhead Wood). Given the relative distance from the coast, it is not envisaged that this will severely impact the rural section.
Lhanbryde - Mosstodloch	The SEPA coastal hazard maps identify a 10% chance of river flooding each year during a 1 in 10-year return period; 0.5% chance during a 1 in 200-year return period; and 0.1% chance during a 1 in 1,000-year return period, focused around the north of the study area (north-west of Lochhill). Given the relative distance from the coast, it is not envisaged that this will severely impact the rural section.
Mosstodloch - Fochabers	The SEPA coastal hazard maps identify a 10% chance of river flooding each year during a 1 in 10-year return period; 0.5% chance during a 1 in 200-year return period; and 0.1% chance during a 1 in 1,000-year return period, focused around the north of the study area (the River Spey/Spey Bay). Given the relative distance from the coast, it is not envisaged that this will severely impact the rural section.
Fochabers – Keith	The SEPA coastal hazard maps identify a 10% chance of river flooding each year during a 1 in 10-year return period; 0.5% chance during a 1 in 200-year return period; and 0.1% chance during a 1 in 1,000-year return period, focused around the north of the study area (west of Portgordon). Given the relative distance from the coast, it is not envisaged that this will severely impact the rural section.
Keith - Huntly	The SEPA coastal hazard maps identify no risk of coastal flooding due to the rural section being located inland, away from the coast.
Huntly - Inverurie	The SEPA coastal hazard maps identify no risk of coastal flooding due to the rural section being located inland, away from the coast.
Inverurie - Kintore	The SEPA coastal hazard maps identify no risk of coastal flooding due to the rural section being located inland, away from the coast.
Kintore - Blackburn	The SEPA coastal hazard maps identify no risk of coastal flooding due to the rural section being located inland, away from the coast.
Blackburn – Craibstone Junction	The SEPA coastal hazard maps identify no risk of coastal flooding due to the rural section being located inland, away from the coast.

Table 7.2: Geographic and environmental context of Package 3 study area against Criterion 2, Success Factor 1b. Supports adaptation for and/or resilience to predicted changes in temperatures

Package 3 Study Area	Geographic and Environment Context
Hardmuir - Forres	Mean annual air temperature is predicted to range between +0.87°C (2020-2049) and +3.00°C (2070-2099) within a geographical boundary of 25km around the rural section (50% probability). Maximum summer air temperature is predicted to range between +0.74°C (2020-2049) and +3.38C (2070-2099), and minimum winter air temperature is predicted to range between +0.83°C (2020-2049) and +3.08°C (2070-2099).
Forres - Elgin	Mean annual air temperature is predicted to range between +0.87°C (2020-2049) and +2.95°C (2070-2099) within a geographical boundary of 25km around the rural section (50% probability). Maximum summer air temperature is predicted to range between +0.74°C (2020-2049) and +3.29°C (2070-2099), and minimum winter air temperature is predicted to range between +0.89°C (2020-2049) and +3.08°C (2070-2099).
Elgin - Lhanbryde	Mean annual air temperature is predicted to range between +0.88°C (2020-2049) and +3.00°C (2070-2099) within a geographical boundary of 25km around the rural section (50% probability). Maximum summer air temperature is predicted to range between +0.75°C (2020-2049) and +3.33°C (2070-2099), and minimum winter air temperature is predicted to range between +0.86°C (2020-2049) and +2.81°C (2070-2099).
Lhanbryde - Mosstodloch	Mean annual air temperature is predicted to range between +0.88°C (2020-2049) and +3.00°C (2070-2099) within a geographical boundary of 25km around the rural section (50% probability). Maximum summer air temperature is predicted to range between +0.75°C (2020-2049) and +3.33°C (2070-2099), and minimum winter air temperature is predicted to range between +0.86°C (2020-2049) and +2.81°C (2070-2099).
Mosstodloch - Fochabers	Mean annual air temperature is predicted to range between +0.88°C (2020-2049) and +3.00°C (2070-2099) within a geographical boundary of 25km around the rural section (50% probability). Maximum summer air temperature is predicted to range between +0.75°C (2020-2049) and +3.33°C (2070-2099), and minimum winter air temperature is predicted to range between +0.86°C (2020-2049) and +2.81°C (2070-2099).
Fochabers – Keith	Mean annual air temperature is predicted to range between +0.89C (2020-2049) and +3.04C (2070-2099) within a geographical boundary of 25km around the rural section (50% probability). Maximum summer air temperature is predicted to range between +0.77C (2020-2049) and

Package 3 Study Area	Geographic and Environment Context
	+3.40C (2070-2099), and minimum winter air temperature is predicted to range between +0.87C (2020-2049) and +2.83C (2070-2099).
Keith - Huntly	Mean annual air temperature is predicted to range between +0.89C (2020-2049) and +3.04C (2070-2099) within a geographical boundary of 25km around the rural section (50% probability). Maximum summer air temperature is predicted to range between +0.77C (2020-2049) and +3.40C (2070-2099), and minimum winter air temperature is predicted to range between +0.87C (2020-2049) and +2.83C (2070-2099).
Huntly - Inverurie	Mean annual air temperature is predicted to range between +0.89C (2020-2049) and +3.04C (2070-2099) within a geographical boundary of 25km around the rural section (50% probability). Maximum summer air temperature is predicted to range between +0.77C (2020-2049) and +3.40C (2070-2099), and minimum winter air temperature is predicted to range between +0.87C (2020-2049) and +2.83C (2070-2099).
Inverurie - Kintore	Mean annual air temperature is predicted to range between +0.90°C (2020-2049) and +3.05°C (2070-2099) within a geographical boundary of 25km around the rural section (50% probability). Maximum summer air temperature is predicted to range between +0.79°C (2020-2049) and +3.46°C (2070-2099), and minimum winter air temperature is predicted to range between +0.88°C (2020-2049) and +2.82°C (2070-2099).
Kintore - Blackburn	Mean annual air temperature is predicted to range between +0.90°C (2020-2049) and +3.05°C (2070-2099) within a geographical boundary of 25km around the rural section (50% probability). Maximum summer air temperature is predicted to range between +0.79°C (2020-2049) and +3.46°C (2070-2099), and minimum winter air temperature is predicted to range between +0.88°C (2020-2049) and +2.82°C (2070-2099).
Blackburn – Craibstone Junction	Mean annual air temperature is predicted to range between +0.90°C (2020-2049) and +3.05°C (2070-2099) within a geographical boundary of 25km around the rural section (50% probability). Maximum summer air temperature is predicted to range between +0.79°C (2020-2049) and +3.46°C (2070-2099), and minimum winter air temperature is predicted to range between +0.88°C (2020-2049) and +2.82°C (2070-2099).

Table 7.3: Geographic and environmental context of Package 3 study area against Criterion 1, Success Factor 1c. Supports adaptation for and/or resilience to predicted increase in likelihood and severity of fluvial and pluvial flooding

Package 3 Study Area	Geographic and Environment Context
Hardmuir - Forres	Fluvial Flooding: SEPA River Hazard Maps identify a 10% chance of river flooding each year during a 1 in 10-year return period; 0.5% chance during a 1 in 200-year return period; and 0.1% chance during a 1 in 1,000-year return period. In addition, the geographical area at risk of flooding increases between 10 and 1000-year return periods, with flood depths ranging between 0.3m and 1.0m. This risk predominantly follows Muckle Burn and the Burn of Freddon. No flood protections schemes have been implemented in this rural section. Pluvial Flooding: SEPA Surface Water Hazard Maps identify a 10% chance of surface water flooding each year during a 1 in 10-year return period; and a 0.1% chance during a 1 in 200-year return period. In addition, the geographical area at risk of flooding increases between 10 and 1,000-year return periods, with flood depths ranging between 0.3m and 1.0m. This rise is spread across the study area. Change in annual precipitation is predicted to range between +4.82% (2020-2049) and +7.81% (2070-2099) within a geographical boundary of 25km around the rural section (50% probability). Change in winter precipitation is predicted to peak between +10.88% (2020-2049) and +28.00% (2070-2099) within the geographical boundary (50% probability). These predicted increases in precipitation present an added risk of increased likelihood and severity of pluvial flooding, especially during winter months.
Forres - Elgin	Fluvial Flooding: SEPA River Hazard Maps identify a 10% chance of river flooding each year during a 1 in 10-year return period; 0.5% chance during a 1 in 200-year return period; and 0.1% chance during a 1 in 1,000-year return period. In addition, the geographical area at risk of flooding increases between 10 and 1,000-year return periods, with flood depths ranging between 0.3m and 1.0m. This risk predominantly follows the River Lossie and minor waterways including Kinloss Burn and Den Burn. No flood protections schemes have been implemented in this rural section. Pluvial Flooding: SEPA Surface Water Hazard Maps identify a 10% chance of surface water flooding each year during a 1 in 10-year return period; and a 0.1% chance during a 1 in 200-year return period. In addition, the geographical area at risk of flooding increases between 10 and 1,000-year return periods, with flood depths ranging between 0.3m and 1.0m. This rise is spread across the study area.

Package 3 Study Area	Geographic and Environment Context
	Change in annual precipitation is predicted to range between +4.93% (2020-2049) and +7.55% (2070-2099) within a geographical boundary of 25km around the rural section (50% probability). Change in winter precipitation is predicted to peak between +11.06% (2020-2049) and +28.81% (2070-2099) within the geographical boundary (50% probability). These predicted increases in precipitation present an added risk of increased likelihood and severity of pluvial flooding, especially during winter months.
Elgin - Lhanbryde	Fluvial Flooding: SEPA River Hazard Maps identify a 10% chance of river flooding each year during a 1 in 10-year return period; 0.5% chance during a 1 in 200-year return period; and 0.1% chance during a 1 in 1,000-year return period. In addition, the geographical area at risk of flooding increases between 10 and 1,000-year return periods, with flood depths ranging between 0.3m and 1.0m. This risk predominantly follows the River Lossie and minor waterways including Lhanbryde Burn. No flood protections schemes have been implemented in this rural section. Pluvial Flooding: SEPA Surface Water Hazard Maps identify a 10% chance of surface water flooding each year during a 1 in 10-year return period; and a 0.1% chance during a 1 in 200-year return period. In addition, the geographical area at risk of flooding increases between 10 and 1,000-year return periods, with flood depths ranging between 0.3m and 1.0m. This rise is spread across the study area. Change in annual precipitation is predicted to range between +4.31% (2020-2049) and +5.46% (2070-2099) within a geographical boundary of 25km around the rural section (50% probability). Change in winter precipitation is predicted to peak between +9.59% (2020-2049) and +24.21% (2070-2099) within the geographical boundary (50% probability). These predicted increases in precipitation present an added risk of increased likelihood and severity of pluvial flooding, especially during winter months.
Lhanbryde - Mosstodloch	Fluvial Flooding: SEPA River Hazard Maps identify a 10% chance of river flooding each year during a 1 in 10-year return period; 0.5% chance during a 1 in 200-year return period; and 0.1% chance during a 1 in 1,000-year return period. In addition, the geographical area at risk of flooding increases between 10 and 1,000-year return periods, with flood depths ranging between 0.3m and 1.0m. This risk is predominantly concentrated around Loch na Bo and other minor waterways, including Lhanbryde Burn and Black Burn. No flood protections schemes have been implemented in this rural section. Pluvial Flooding:

Package 3 Study Area	Geographic and Environment Context
	SEPA Surface Water Hazard Maps identify a 10% chance of surface water flooding each year during a 1 in 10-year return period; and a 0.1% chance during a 1 in 200-year return period. In addition, the geographical area at risk of flooding increases between 10 and 1,000-year return periods, with flood depths ranging between 0.3m and 1.0m. This rise is spread across the study area. Change in annual precipitation is predicted to range between +4.31% (2020-2049) and +5.46% (2070-2099) within a geographical boundary of 25km around the rural section (50% probability). Change in winter precipitation is predicted to peak between +9.59% (2020-2049) and +24.21% (2070-2099) within the geographical boundary (50% probability). These predicted increases in precipitation present an added risk of increased likelihood and severity of pluvial flooding, especially during winter months.
Mosstodloch - Fochabers	<u>Fluvial Flooding:</u> SEPA River Hazard Maps identify a 10% chance of river flooding each year during a 1 in 10-year return period; 0.5% chance during a 1 in 200-year return period; and 0.1% chance during a 1 in 1,000 year return period. In addition, the geographical area at risk of flooding increases between 10 and 1,000-year return periods, with flood depths ranging between 0.3m and 1.0m. This risk predominantly follows the River Spey. No flood protections schemes have been implemented in this rural section. <u>Pluvial Flooding:</u> SEPA Surface Water Hazard Maps identify a 10% chance of surface water flooding each year during a 1 in 10-year return period; and a 0.1% chance during a 1 in 200-year return period. In addition, the geographical area at risk of flooding increases between 10 and 1,000-year return periods, with flood depths ranging between 0.3m and 1.0m. This rise is spread across the study area. Change in annual precipitation is predicted to range between +4.31% (2020-2049) and +5.46% (2070-2099) within a geographical boundary of 25km around the rural section (50% probability). Change in winter precipitation is predicted to peak between +9.59% (2020-2049) and +24.21% (2070-2099) within the geographical boundary (50% probability). These predicted increases in precipitation present an added risk of increased likelihood and severity of pluvial flooding, especially during winter months.
Fochabers – Keith	<u>Fluvial Flooding:</u> SEPA River Hazard Maps identify a 10% chance of river flooding each year during a 1 in 10-year return period; 0.5% chance during a 1 in 200-year return period; and 0.1% chance during a 1 in 1,000-year return period. In addition, the geographical area at risk of flooding increases

Package 3 Study Area	Geographic and Environment Context
	between 10 and 1,000-year return periods, with flood depths ranging between 0.3m and 1.0m. This risk predominantly follows minor waterways including the Burn of Fochabers. No flood protections schemes have been implemented in this rural section. Pluvial Flooding: SEPA Surface Water Hazard Maps identify a 10% chance of surface water flooding each year during a 1 in 10-year return period; and a 0.1% chance during a 1 in 200-year return period. In addition, the geographical area at risk of flooding increases between 10 and 1,000-year return periods, with flood depths ranging between 0.3m and 1.0m. This rise is spread across the study area. Change in annual precipitation is predicted to range between +4.31% (2020-2049) and +5.46% (2070-2099) within a geographical boundary of 25km around the rural section (50% probability). Change in winter precipitation is predicted to peak between +9.59% (2020-2049) and +24.21% (2070-2099) within the geographical boundary (50% probability). These predicted increases in precipitation present an added risk of increased likelihood and severity of pluvial flooding, especially during winter months.
Keith - Huntly	Fluvial Flooding: SEPA River Hazard Maps identify a 10% chance of river flooding each year during a 1 in 10-year return period; 0.5% chance during a 1 in 200-year return period; and 0.1% chance during a 1 in 1,000-year return period. In addition, the geographical area at risk of flooding increases between 10 and 1,000-year return periods, with flood depths ranging between 0.3m and 1.0m. This risk predominantly follows minor waterways including Road Burn and Burn of Cairnie. No flood protections schemes have been implemented in this rural section. Pluvial Flooding: SEPA Surface Water Hazard Maps identify a 10% chance of surface water flooding each year during a 1 in 10-year return period; and a 0.1% chance during a 1 in 200-year return period. In addition, the geographical area at risk of flooding increases between 10 and 1,000-year return periods, with flood depths ranging between 0.3m and 1.0m. This rise is spread across the study area. Change in annual precipitation is predicted to range between +3.91% (2020-2049) and +4.30% (2070-2099) within a geographical boundary of 25km around the rural section (50% probability). Change in winter precipitation is predicted to peak between +10.98% (2020-2049) and +24.30% (2070-2099) within the geographical boundary (50% probability). These predicted increases in precipitation present an added risk of increased likelihood and severity of pluvial flooding, especially during winter months.

Package 3 Study Area	Geographic and Environment Context
Huntly - Inverurie	Fluvial Flooding: SEPA River Hazard Maps identify a 10% chance of river flooding each year during a 1 in 10-year return period; 0.5% chance during a 1 in 200-year return period; and 0.1% chance during a 1 in 1,000-year return period. In addition, the geographical area at risk of flooding increases between 10 and 1,000-year return periods, with flood depths ranging between 0.3m and 1.0m. This risk predominantly follows the River Urie, The Shevock and minor waterways. No flood protections schemes have been implemented in this rural section. Pluvial Flooding: SEPA Surface Water Hazard Maps identify a 10% chance of surface water flooding each year during a 1 in 10-year return period; and a 0.1% chance during a 1 in 200- year return period. In addition, the geographical area at risk of flooding increases between 10 and 1,000-year return periods, with flood depths ranging between 0.3m and 1.0m. This rise is spread across the study area. Change in annual precipitation is predicted to range between +3.91% (2020-2049) and +4.30% (2070-2099) within a geographical boundary of 25km around the rural section (50% probability). Change in winter precipitation is predicted to peak between +10.98% (2020-2049) and +24.30% (2070-2099) within the geographical boundary (50% probability). These predicted increases in precipitation present an added risk of increased likelihood and severity of pluvial flooding, especially during winter months.
Inverurie - Kintore	Fluvial Flooding: SEPA River Hazard Maps identify a 10% chance of river flooding each year during a 1 in 10-year return period; 0.5% chance during a 1 in 200-year return period; and 0.1% chance during a 1 in 1,000-year return period. In addition, the geographical area at risk of flooding increases between 10 and 1,000-year return periods, with flood depths ranging between 0.3m and 1.0m. This risk predominantly follows the River Don. No flood protections schemes have been implemented in this rural section. Pluvial Flooding: SEPA Surface Water Hazard Maps identify a 10% chance of surface water flooding each year during a 1 in 10-year return period; and a 0.1% chance during a 1 in 200-year return period. In addition, the geographical area at risk of flooding increases between 10 and 1,000-year return periods, with flood depths ranging between 0.3m and 1.0m. This rise is spread across the study area. Change in annual precipitation is predicted to range between +5.26% (2020-2049) and +6.21% (2070-2099) within a geographical boundary of 25km around the rural section (50% probability). Change

Package 3 Study Area	Geographic and Environment Context
	in winter precipitation is predicted to peak between +16.88% (2020-2049) and +33.13% (2070-2099) within the geographical boundary (50% probability). These predicted increases in precipitation present an added risk of increased likelihood and severity of pluvial flooding, especially during winter months.
Kintore - Blackburn	Fluvial Flooding: SEPA River Hazard Maps identify a 10% chance of river flooding each year during a 1 in 10-year return period; 0.5% chance during a 1 in 200-year return period; and 0.1% chance during a 1 in 1,000-year return period. In addition, the geographical area at risk of flooding increases between 10 and 1,000-year return periods, with flood depths ranging between 0.3m and 1.0m. This risk predominantly follows the River Don and other minor waterways. No flood protections schemes have been implemented in this rural section. Pluvial Flooding: SEPA Surface Water Hazard Maps identify a 10% chance of surface water flooding each year during a 1 in 10-year return period; and a 0.1% chance during a 1 in 200-year return period. In addition, the geographical area at risk of flooding increases between 10 and 1,000-year return periods, with flood depths ranging between 0.3m and 1.0m. This rise is spread across the study area. Change in annual precipitation is predicted to range between +5.26% (2020-2049) and +6.21% (2070-2099) within a geographical boundary of 25km around the rural section (50% probability). Change in winter precipitation is predicted to peak between +16.88% (2020-2049) and +33.13% (2070-2099) within the geographical boundary (50% probability). These predicted increases in precipitation present an added risk of increased likelihood and severity of pluvial flooding, especially during winter months.
Blackburn – Craibstone Junction	Fluvial Flooding: SEPA River Hazard Maps identify a 10% chance of river flooding each year during a 1 in 10-year return period; 0.5% chance during a 1 in 200-year return period; and 0.1% chance during a 1 in 1,000-year return period. In addition, the geographical area at risk of flooding increases between 10 and 1,000-year return periods, with flood depths ranging between 0.3m and 1.0m. This risk predominantly follows the River Don and minor waterways. No flood protections schemes have been implemented in this rural section. Pluvial Flooding: SEPA Surface Water Hazard Maps identify a 10% chance of surface water flooding each year during a 1 in 10-year return period; and a 0.1% chance during a 1 in 200-year return period. In addition, the geographical area at risk of flooding increases between 10 and 1,000-

Package 3 Study Area	Geographic and Environment Context
	year return periods, with flood depths ranging between 0.3m and 1.0m. This rise is spread across the study area. Change in annual precipitation is predicted to range between +5.26% (2020-2049) and +6.21% (2070-2099) within a geographical boundary of 25km around the rural section (50% probability). Change in winter precipitation is predicted to peak between +16.88% (2020-2049) and +33.13% (2070-2099) within the geographical boundary (50% probability). These predicted increases in precipitation present an added risk of increased likelihood and severity of pluvial flooding, especially during winter months.

Table 7.4: Geographic and environmental context of Package 3 study area against Criterion 1, Success Factor 1d. Supports adaptation for and/or resilience to predicted increase in likelihood and severity of storms and high winds

Package 3 Study Area	Geographic and Environment Context
Hardmuir - Forres	No weather-related incidents (flooding, snow or landscaping/fallen/overhanging branches) occurred between 2016-2021 along the A96 within this rural section.
Forres - Elgin	No weather-related incidents (flooding, snow or landscaping/fallen/overhanging branches) occurred between 2016-2021 along the A96 within this rural section.
Elgin - Lhanbryde	No weather-related incidents (flooding, snow or landscaping/fallen/overhanging branches) occurred between 2016-2021 along the A96 within this rural section.
Lhanbryde - Mosstodloch	No weather-related incidents (flooding, snow or landscaping/fallen/overhanging branches) occurred between 2016-2021 along the A96 within this rural section.
Mosstodloch - Fochabers	No weather-related incidents (flooding, snow or landscaping/fallen/overhanging branches) occurred between 2016-2021 along the A96 within this rural section.
Fochabers – Keith	No weather-related incidents (flooding, snow or landscaping/fallen/overhanging branches) occurred between 2016-2021 along the A96 within this rural section.
Keith - Huntly	No weather-related incidents (flooding, snow or landscaping/fallen/overhanging branches) occurred between 2016-2021 along the A96 within this rural section.
Huntly - Inverurie	There was one weather-related incident (flooding, snow or landscaping/fallen/overhanging branches) that occurred between 2016-2021 along the A96 within this rural section.

Package 3 Study Area	Geographic and Environment Context
Inverurie - Kintore	There was one weather-related incident (flooding, snow or landscaping/fallen/overhanging branches) that occurred between 2016-2021 along the A96 within this rural section.
Kintore - Blackburn	There was one weather-related incident (flooding, snow or landscaping/fallen/overhanging branches) that occurred between 2016-2021 along the A96 within this rural section.
Blackburn – Craibstone Junction	There was one weather-related incident (flooding, snow or landscaping/fallen/overhanging branches) that occurred between 2016-2021 along the A96 within this rural section.

Package 3 criterion 1 assessment

7.2.4 Package 3 is at an early stage of development with limited design details on which to base an assessment. The assessment is based on potential impacts and interactions the options could have with aspects considered within this criterion.

7.2.5 The geographic and environmental context for Package 3 forecasts that annual temperatures will increase across the corridor, with drier, warmer summers and wetter, milder winters. This means that the A96 corridor will need to prepare for a wider range of annual temperatures and be resilient to higher peak summer temperatures (which could potentially warp surfaces, impact electronic and electrical equipment and cause heatstroke for operational users or construction workers).

7.2.6 Current standards for designing and constructing transport infrastructure are maintained and updated regularly to account for climate factors. This process should ensure that each option is designed and built to adapt to the predicted future impacts of climate change throughout the A96 corridor, including across the rural sections included in this package. Any resulting infrastructure that is built to adapt to future impacts of climate change has the potential to increase the overall resilience of the transport network in and around the settlements.

7.2.7 Package 3 includes the option to make linespeed, passenger and freight capacity improvements on the Aberdeen to Inverness rail line. This option will make the A96 corridor more resilient as it aims to provide a more reliable public transport service throughout the corridor, cutting journey times and providing a more frequent passenger service. However, there may be locations along the A96 corridor where the rail line if more vulnerable to the effects of climate change.

7.2.8 Package 3 includes alternative refuelling infrastructure as part of the A96 Electric Corridor which is not noted to be particularly prone to the identified effects of climate change. However, throughout the A96 corridor, and across the rural sections included in this package, there may be locations that may be more vulnerable to the effects of climate change.

7.2.9 Package 3 will be developed in accordance with relevant standards such as the Design Manual for Roads and Bridges (DMRB). The DMRB includes LA 114 Climate standard, which assesses the resilience and adaptation of proposed road infrastructure assets at detailed design stage. DMRB states '*the scoping assessment shall identify whether anticipated changing climate conditions and weather events are likely to have significant adverse effects on the project (or elements of the project) during construction and operation*'.

7.2.10 Examples of potential climate impacts cited in DMRB LA 114 during construction and operations include increased frequency of extreme weather; increased temperatures; increased precipitation; increased sea level rise and wave height; and gales. Therefore, it is assumed that the options within Package 3 will be designed in accordance with DMRB LA 114 to ensure resilience against extreme weather and to minimise the potential effects of climate change, and to reduce the vulnerability of the infrastructure.

Package 3 criterion 1 recommendations

7.2.11 All relevant design, construction and maintenance guidance, standards, processes, and assessments should be kept up to date with the latest climate change forecasts and associated best practice and applied to the development of all options.

7.2.12 If Package 3 is developed, a climate change vulnerability scoping/assessment exercise should be undertaken, in line with current standards such as DMRB LA 114.

7.2.13 If Package 3 is taken forward it is recommended that any potential impacts on the A96 corridor, including the rural sections within this package, climate resilience are understood at the earliest design stage and accounted for within the design. Technologies to counteract the impacts of climate change and provide resilience for each option within Package 3 should be considered. The design for each option should embed measures for adaptation against climate-related hazards where practicable, to reduce the significance levels of any adverse impacts.

7.2.14 The vulnerability of all the options included in Package 3 to climate change should be appropriately scoped to understand the potential impacts on the associated assets during construction and operation – for example on electronic equipment; construction workers; end users; site facilities; structures; earthworks; verges; drainage; and construction plant.

7.2.15 Consideration should be made during the site selection process for options that require construction of new facilities or infrastructure to prioritise locations along the A96 corridor, including the rural sections within this package, which are more resilient to the potential effects of climate change. For example, selecting a location for the infrastructure on naturally higher ground levels and building away from coastal areas and/or floodplains that are anticipated to be subject to flooding. Additionally, the drainage capabilities of the infrastructure should be designed to deal with more intense rainfall events and flooding.

7.2.16 Active travel provisions should include elements that will support adaptation for and/or resilience to current and predicted future impacts of climate change. For example, the use of porous pavements for pedestrianised areas and cycling routes should be considered; the use of higher solar reflectance/cool pavements in pedestrianised areas and cycling lanes should be considered. Additionally, road salt and snow removal should be prioritised in pedestrianised areas and cycling routes.

7.2.17 It is recommended that during the design development of the options within this package, consideration is given to including structural adaptation measures, for example, selecting materials that are resistant to the expected extremes of both low and high temperatures; building protective infrastructure such as flood defences across the rural sections; and using permeable paving surfaces to reduce run-off during heavy rainfalls. Nature-based solutions should also be considered to further enhance natural resilience and adaptation measures.

7.2.18 Finally, the selection of materials used within the construction of the transport options should be based on their resilience to extreme weather, for example, preference should be given to corrosion-resistant materials rather than utilising metals and treating them with a non-corrosive powder coating.

7.3 Criterion 2

Criterion and success factor

7.3.1 Criterion 2 is:

- Extent to which the package supports the surrounding area to adapt and/or become more resilient to current and predicted future impacts of climate change.

7.3.2 Success factors:

- 2a. Supports adaptation for and/or resilience to current and future impacts of climate change within the study area outside of the package boundary.
- 2b. Supports the natural environment to adapt for and/or increase resilience to current and predicted future impacts of climate change.

Geographic and environmental context

7.3.3 Table 7.5 and Table 7.6 outline the geographic and environmental context against criterion 2 within a 7.5km boundary (unless otherwise stated, for example, when using the MET Office Data) of each of the rural sections.

Table 7.5: Geographic and environmental context of Package 3 study area against Criterion 2, Success Factor 2a. Supports adaptation for and/or resilience to current and future impacts of climate change within the study area outside of the option boundary

Package 3 Study Area	Geographic and Environment Context
Hardmuir - Forres	Geographic and environmental context for the Rural Sections is described in Package 3 Criterion 1 (Section 7.2).
Forres - Elgin	Geographic and environmental context for the Rural Sections is described in Package 3 Criterion 1 (Section 7.2).
Elgin – Lhanbryde	Geographic and environmental context for the Rural Sections is described in Package 3 Criterion 1 (Section 7.2).
Lhanbryde – Mosstodloch	Geographic and environmental context for the Rural Sections is described in Package 3 Criterion 1 (Section 7.2).
Mosstodloch - Fochabers	Geographic and environmental context for the Rural Sections is described in Package 3 Criterion 1 (Section 7.2).
Fochabers – Keith	Geographic and environmental context for the Rural Sections is described in Package 3 Criterion 1 (Section 7.2).
Keith - Huntly	Geographic and environmental context for the Rural Sections is described in Package 3 Criterion 1 (Section 7.2).
Huntly – Inverurie	Geographic and environmental context for the Rural Sections is described in Package 3 Criterion 1 (Section 7.2).
Inverurie - Kintore	Geographic and environmental context for the Rural Sections is described in Package 3 Criterion 1 (Section 7.2).

Package 3 Study Area	Geographic and Environment Context
Kintore - Blackburn	Geographic and environmental context for the Rural Sections is described in Package 3 Criterion 1 (Section 7.2).
Blackburn – Craibstone Junction	Geographic and environmental context for the Rural Sections is described in Package 3 Criterion 1 (Section 7.2).

Table 7.6: Geographic and environmental context of Package 3 study area Criterion 2, Success Factor 2b. Supports the natural environment to adapt for and/or increase resilience to current and predicted future impacts of climate change

Package 3 Study Area	Geographic and Environment Context
Hardmuir - Forres	There are a number of designated habitats within the study area of Hardmuir - Forres: - Ancient Woodland: 4,022.31 hectares - Native Woodland Survey for Scotland: 899.44 hectares - Special Area of Conservation: Three SAC - Culbin Bar, Lower Findhorn Woods and Moray Firth - Special Protection Areas: Three SPA - Darnaway and Lethen Forest, Moray and Nairn Coast and Moray Firth - Sites of Special Scientific Interest: Four SSSI - Lower Findhorn Woods, Randolph's Leap, Boghole, Muckle Burn, and Culbin Sands, Culbin Forest and Findhorn Bay - Wetland of International Importance (Ramsar): One Ramsar Site - Moray and Nairn Coast - Geological Conservation Review Site: Four Geological Conservation Review Site - Culbin, Boghole, Muckle Burn, Randolph's Leap and Culbin Saltmarsh morphology
Forres - Elgin	There are a number of designated habitats within the study area of Forres – Elgin: - Ancient Woodland: 2,801.65 hectares - Native Woodland Survey for Scotland: 445.07 hectares - Special Area of Conservation: One SAC - Moray Firth - Special Protection Areas: Two SPA - Moray and Nairn Coast and Moray Firth - Sites of Special Scientific Interest: Six SSSI - Clashach - Covesea, Culbin Sands, Culbin Forest and Findhorn Bay, Cutties Hillock, Lethenhill, Masonshaugh, Quarry Wood - Wetland of International Importance (Ramsar): One Ramsar Sites - Moray and Nairn Coast

Package 3 Study Area	Geographic and Environment Context
	- Geological Conservation Review Site: Five Geological Conservation Review Sites - Clashach Quarry, Clashach Covesea, Masonshaugh Quarries and Burghead, Cutties Hillock, and Masonshaugh Quarry
Elgin - Lhanbryde	There are a number of designated habitats within the study area of Elgin – Lhanbryde: - Ancient Woodland: 118.63 hectares - Native Woodland Survey for Scotland: 43.41 hectares - Special Area of Conservation: One SAC - Lower River Spey - Spey Bay - Special Protection Areas: One SPA - Moray Firth - Sites of Special Scientific Interest: Three SSSI - Spey Bay, Scaat Craig and Coleburn Pasture - Geological Conservation Review Site: Two Geological Conservation Review Sites - Spey Bay and Scaat Craig
Lhanbryde - Mosstodloch	There are a number of designated habitats within the study area of Lhanbryde – Mosstodloch: - Ancient Woodland: 1,417.40 hectares - Native Woodland Survey for Scotland: 194.17 hectares - Special Area of Conservation: Two SAC - Lower River Spey - Spey Bay, and River Spey - Special Protection Areas: Two SPA - Moray and Nairn Coast and Moray Firth - Sites of Special Scientific Interest: Four SSSI - Loch Oire, Teindland Quarry, Spey Bay and River Spey - Wetland of International Importance (Ramsar): One Ramsar Site - Moray and Nairn Coast - Geological Conservation Review Site: Two Geological Conservation Review Sites - Spey Bay and Teindland Quarry
Mosstodloch - Fochabers	There are a number of designated habitats within the study area of Mosstodloch – Fochabers: - Ancient Woodland: 14.72 hectares - Native Woodland Survey for Scotland: 10.33 hectares - Special Area of Conservation: Two SAC - Lower River Spey - Spey Bay, and River Spey - Special Protection Areas: Two SPA - Moray and Nairn Coast and Moray Firth - Sites of Special Scientific Interest: Three SSSI - Lower River Spey, Spey Bay and River Spey - Wetland of International Importance (Ramsar): One Ramsar Site - Moray and Nairn Coast - Geological Conservation Review Site: Two Geological Conservation Review Sites - Lower River Spey and Spey Bay
Fochabers – Keith	There are a number of designated habitats within the study area of Fochabers – Keith:

Package 3 Study Area	Geographic and Environment Context
	- Ancient Woodland: 3,455.24 hectares - Native Woodland Survey for Scotland: 510.28 hectares - Special Area of Conservation: One SAC - River Spey - Special Protection Areas: One SPA - Moray Firth - Sites of Special Scientific Interest: Two SSSI - Tynet Burn and Spey Bay - Geological Conservation Review Site: Three Geological Conservation Review Site - Tynet Burn, Spey Bay and Elgin
Keith - Huntly	There are a number of designated habitats within the study area of Keith – Huntly: - Ancient Woodland: 2,431.69 hectares - Native Woodland Survey for Scotland: 1231.92 hectares - Special Area of Conservation: One SAC - Mortlach Moss - Special Protection Areas: One SPA - Tips of Corsemaul and Tom Mor - Sites of Special Scientific Interest: Seven SSSI - Bin Quarry, Craigs of Succoth, Den of Pitlurg, Mortlach Moss, Mill Wood, Whitehill and Tips of Corsemaul and Tom Mor - Geological Conservation Review Site: Two Geological Conservation Review Sites - Bin Quarry and Binhill Quarry
Huntly - Inverurie	There are a number of designated habitats within the study area of Huntly - Inverurie: - Ancient Woodland: 2,417.49 hectares - Native Woodland Survey for Scotland: 2,143.32 hectares - Sites of Special Scientific Interest: Five SSSI - Wartle Moss, Tilliefoure Wood, Pittodrie, Pitcaple and Legatsden Quarries and Paradise Wood - Geological Conservation Review Site: Two Geological Conservation Review Sites - Pittodrie and Pitscurry (Pitmedden) & Legatesden Quarries
Inverurie - Kintore	There are a number of designated habitats within the study area of Inverurie – Kintore: - Ancient Woodland: 222.29 hectares - Native Woodland Survey for Scotland: 177.60 hectares
Kintore - Blackburn	There are a number of designated habitats within the study area of Kintore – Blackburn: - Ancient Woodland: 281.39 hectares - Native Woodland Survey for Scotland: 112.75 hectares
Blackburn – Craibstone Junction	There are a number of designated habitats within the study area of Blackburn to Craibstone Junction: - Ancient Woodland: 454.60 hectares - Native Woodland Survey for Scotland: 106.33 hectares - Special Protection Area: One SPA – Loch of Skene - Site of Special Scientific Interest: One SSSI – Loch of Skene - Wetland of International Importance (Ramsar): One Ramsar Site – Loch of Skene

Package 3 criterion 2 assessment

7.3.4 Package 3 is at an early stage of development with limited design details on which to base an assessment. The assessment is based on potential impacts and interactions the options could have with aspects considered within this criterion.

7.3.5 The construction of the options included in Package 3 could impact the surrounding area's ability to adapt to climate change. This could be either positive or negative depending on how the options are designed and delivered.

7.3.6 The design and construction of the options included in Package 3 would be developed in accordance with relevant standards including DMRB. A risk that would need to be managed through design would be the interaction that the option would have with the drainage of the surrounding area. DMRB requires that schemes developed in accordance with the relevant standards should not increase flood risk to the surrounding area. The design should take account of existing risks such as communities that already experience flooding. Development of the option could have a net positive impact on the area's ability to adapt to climate change if designed and delivered to go beyond mitigating risks and identify and take advantage of potential opportunities. This could include appropriate drainage features and flood defence systems – including outside of the option boundary.

7.3.7 The delivery of the options included in Package 3 could positively or negatively impact the ecosystem services provided by the surrounding area, depending on how the options are designed and delivered. The ecosystem services provided by the area surrounding the study area and which may be impacted by the delivery of the transport options include (but are not limited to):

- **Regulating services**: such as soil conservation and the carbon sequestration service provided by peatland, for example, between Fochabers and Keith where there are 20 pockets of Class 1 peatland which are nationally important carbon-rich soils, deep peat and priority peatland habitat.
- **Supporting services**: including nutrient cycling, soil formation and photosynthesis provided by the natural environment along the A96 corridor such as Deerpark Wood between Huntly and Keith; and Pulwhite Wood between Huntly and Inverurie.
- **Provisioning services**: fresh water; and timber and other forest products processed by companies such as Chas Smith Sawmill between Huntly and Keith.
- **Cultural services**: the recreational and aesthetic sites within the study area including (but not limited to) the Coach House Caravan and Campsite and Dunnideer Castle, both between Inverurie and Huntly; and Threaplands Garden Centre between Lhanbryde and Mosstodloch.

7.3.8 Collectively the options included in Package 3 have the potential to support the communities in the study area to become more resilient to current and predicted future impacts of climate change through provision of additional transport options. For example, Package 3 includes three options to improve public transport facilities (bus priority measures and linespeed, passenger and freight capacity improvements on the Aberdeen to Inverness rail line). If one of these modes of public transport experiences travel disruption due to adverse weather conditions, then the improvements made to other facilities have the potential to provide an alternative transport option.

7.3.9 Package 3 includes alternative refuelling infrastructure as part of the A96 Electric Corridor and investment in DRT and MaaS. The impact of these options on the surrounding area's ability to adapt to climate change could be positive depending on how the options are designed and delivered.

7.3.10 The study area includes land designated as environmentally sensitive, including SSSIs, SACs, SPAs and Geological Conservation Review Sites, which presents a risk and opportunity with regard to their future management. Notably, between Keith to Huntly, which has 7 SSSIs; Forres to Elgin which has 6 SSSIs; and from Hardmuir to Forres which has 3 SACs and 3 SPAs, meaning these areas are particularly environmentally sensitive. As such, the options delivered within Package 3 may impact on the designated land and its ability to adapt to current and predicted future impacts of climate change.

Package 3 criterion 2 recommendations

7.3.11 All relevant design, construction and maintenance guidance, standards, processes, and assessments should be kept up to date with the latest climate change forecasts and associated best practice and applied to the development of all options.

7.3.12 Options should be designed, constructed and maintained to maximise the opportunities to improve the resilience and adaption of the surrounding area to the future impacts of climate change and local conditions. This could include appropriate drainage features and flood defence systems – including outside of the option boundary.

7.3.13 Consideration should be given to the interdependency of the transport options and their ability to function if one or more of the transport modes is interrupted due to adverse weather conditions.

7.3.14 Options should be designed, constructed and maintained to maximise the opportunities to improve the ecosystem services of the surrounding area and the natural environment's resilience to the future impacts of climate change. This should include the potential impacts listed in paragraph 7.3.7.

7.4 Criterion 3

Criterion and success factor

7.4.1 Criterion 3 is:

- Extent to which the package supports the decarbonisation of the transport network in Scotland, including supporting transition from higher to lower emission modes, and the modal shift to greater public transport and active travel options.

7.4.2 Success factors:

- 3a. The net change in user carbon emissions sit appropriately within the calculated emissions envelope for Scotland, taking account of changing legislation and targets (including any Climate Change Plan update for Scotland) (assumed current target of 2045).
- 3b. Supports the transition to low carbon modes of transport: transition from higher emissions to lower emissions modes, the modal shift to public transport and the modal shift to active travel for shorter everyday journeys.

Geographic and environmental context

7.4.3 **Table 7.7** and **Table 7.8** outline the geographic and environmental context of Package 3 against Criterion 3 within a 7.5km boundary (unless otherwise stated, for example, when using the MET Office Data) of each of the rural sections.

Table 7.7: Geographic and environmental context of Package 3 study area against Criterion 3, Success Factor 3a. The net change in user carbon emissions sit appropriately within the calculated emissions envelope for Scotland, taking account of changing legislation and targets (including any Climate Change Plan update for Scotland) (assumed current target of 2045)

Package 3 Study Area	Geographic and Environment Context
Hardmuir - Forres	No additional context required - the net change calculations are shown in the Package 3 Criterion 3 Assessment section below (Table 7.9 & Table 7.10).
Forres - Elgin	No additional context required - the net change calculations are shown in the Package 3 Criterion 3 Assessment section below (Table 7.9 & Table 7.10).
Elgin - Lhanbryde	No additional context required - the net change calculations are shown in the Package 3 Criterion 3 Assessment section below (Table 7.9 & Table 7.10).
Lhanbryde - Mosstodloch	No additional context required - the net change calculations are shown in the Package 3 Criterion 3 Assessment section below (Table 7.9 & Table 7.10).

Package 3 Study Area	Geographic and Environment Context
Mosstodloch - Fochabers	No additional context required - the net change calculations are shown in the Package 3 Criterion 3 Assessment section below (Table 7.9 & Table 7.10).
Fochabers – Keith	No additional context required - the net change calculations are shown in the Package 3 Criterion 3 Assessment section below (Table 7.9 & Table 7.10).
Keith - Huntly	No additional context required - the net change calculations are shown in the Package 3 Criterion 3 Assessment section below (Table 7.9 & Table 7.10).
Huntly - Inverurie	No additional context required - the net change calculations are shown in the Package 3 Criterion 3 Assessment section below (Table 7.9 & Table 7.10).
Inverurie - Kintore	No additional context required - the net change calculations are shown in the Package 3 Criterion 3 Assessment section below (Table 7.9 & Table 7.10).
Kintore - Blackburn	No additional context required - the net change calculations are shown in the Package 3 Criterion 3 Assessment section below (Table 7.9 & Table 7.10).
Blackburn – Craibstone Junction	No additional context required - the net change calculations are shown in the Package 3 Criterion 3 Assessment section below (Table 7.9 & Table 7.10).

Table 7.8: Geographic and environmental context for Package 3 study area against Criterion 3, Success Factor 3b. Supports the transition to low carbon modes of transport: transition from higher emissions to lower emissions modes, the modal shift to public transport and the modal shift to active travel for shorter everyday journeys

Package 3 Study Area	Geographic and Environment Context
Hardmuir - Forres	The National Cycle Network (NCN) runs through the study area. The majority of the NCN route in the study area is on the road, and therefore requires interactions with traffic. The bus route networks run along the A96 and other minor roads, including Fir Park, with multiple bus stops located across the study area. Active travel options are available across the study area through both the NCN and the Core Path network (to the north of the study area). There are approximately 4 fast charging EV charging points within the study area.
Forres - Elgin	The National Cycle Network (NCN) runs to the north of the study area. The majority of the NCN route in the study area is on the road, and therefore requires interactions with traffic. The bus route networks run along the A96 and other minor roads, with multiple bus stops located

Package 3 Study Area	Geographic and Environment Context
	across the study area. Active travel options are available across the study area, however this is confined to the NCN as the Core Path network (to the north) is limited. There are approximately 4 fast charging and 4 rapid charging EV charging points within the study area.
Elgin - Lhanbryde	The National Cycle Network (NCN) runs through the study area. The majority of the NCN route in the study area is on the road, and therefore requires interactions with traffic. The bus route networks run along the A96 and other minor roads, with multiple bus stops located across the study area. Active travel options are available across the study area, however this is confined to the NCN as the Core Path network (to the south) is limited. There are no EV charging points within the study area.
Lhanbryde - Mosstodloch	The National Cycle Network (NCN) runs to the north of the study area. The majority of the NCN route in the study area is on the road, and therefore requires interactions with traffic. The bus route networks run along the A96, with one bus stop located across the study area. Active travel is not frequently used across the study area. There are no EV charging points within the study area.
Mosstodloch - Fochabers	The National Cycle Network (NCN) runs to the north of the study area. The majority of the NCN route in the study area is on the road, and therefore requires interactions with traffic. The bus route networks run along the A96, with three bus stops located across the study area. Active travel options are available across the study area through both the NCN and Core Path networks. There are no EV charging points within the study area.
Fochabers – Keith	The National Cycle Network (NCN) runs to the north of the study area. The majority of the NCN route in the study area is on the road, and therefore requires interactions with traffic. The bus route networks run along the A96, with multiple bus stops located across the study area. Active travel is not frequently across the study area as the Core Path network is limited and the NCN is confined to the north of the study area. There is approximately 1 fast charging EV charging point within the study area.
Keith - Huntly	The National Cycle Network (NCN) does not cross the study area. The bus route networks run along the A96 and other minor roads, with multiple bus stops located across the study area. Active travel routes are not frequently used across the study area. There are no EV charging points within the study area.
Huntly - Inverurie	The National Cycle Network (NCN) does not cross the study area. The bus route networks run along the A96 and other minor roads, with multiple bus stops located across the study area. Active travel routes are not frequently used across the study area. There are approximately

Package 3 Study Area	Geographic and Environment Context
	2 rapid charging and 2 fast charging EV charging points within the study area.
Inverurie – Kintore	The National Cycle Network (NCN) does not cross the study area. The bus route networks run along the A96 and other minor roads, with multiple bus stops located across the study area. Active travel routes are frequently used through the Core Path networks. There are approximately 9 fast charging and 2 fast charging EV charging points within the study area.
Kintore - Blackburn	The National Cycle Network (NCN) does not cross the study area. The bus route networks run along the A96 and other minor roads, with multiple bus stops located across the study area. Active travel routes are frequently used through the Core Path networks. There are approximately 4 fast charging EV charging points within the study area.
Blackburn – Craibstone Junction	The National Cycle Network (NCN) runs through the study area. The majority of the NCN route in the study area is on the road, and therefore requires interactions with traffic. The bus route networks run along the A96 and other minor roads, with multiple bus stops located across the study area. Active travel routes are frequently used through the NCN and Core Path networks. There are approximately 4 fast charging EV charging points within the study area.

Package 3 criterion 3 assessment

7.4.4 **Table 7.9** and **Table 7.10** below show the net change in road user emissions with and without the package, under both the 'With Policy' and 'Without Policy' transport behaviour scenarios.

Table 7.9: The net change in road user emissions with and without the package, under the 'With Policy' scenario. The target emissions reduction, and annual carbon emissions envelope have been set as per the Climate Compatibility Assessment methodology

Year	% Emissions reduction from baseline year	Annual carbon emissions envelope (Mt CO2e)	Without package (Do Nothing) (tCO2e)	With package (Do-Something) (tCO2e)	Net change (tCO2e)	Net tCO2e as % of the annual carbon emission envelope
1990	**Baseline**	**75.70**	N/A	N/A	N/A	N/A
2030	**75%**	**18.92**	212639.8	212428.1	-211.66	-0.001%
2031	**76.50%**	**17.79**	198463.8	198266.3	-197.55	-0.001%
2032	**78.00%**	**16.65**	184287.8	184104.4	-183.44	-0.001%
2033	**79.50%**	**15.52**	170111.8	169942.5	-169.33	-0.001%
2034	**81.00%**	**14.38**	155935.9	155780.6	-155.22	-0.001%
2035	**82.50%**	**13.25**	141759.9	141618.8	-141.11	-0.001%
2036	**84.00%**	**12.11**	127583.9	127456.9	-127.00	-0.001%
2037	**85.50%**	**10.98**	113407.9	113295.0	-112.89	-0.001%
2038	**87.00%**	**9.85**	99231.9	99133.1	-98.78	-0.001%
2039	**88.50%**	**8.71**	85055.9	84971.3	-84.67	-0.001%
2040	**90%**	**7.57**	70879.9	70809.4	-70.55	-0.001%
2041	**92.00%**	**6.05**	56703.9	56647.5	-56.44	-0.001%
2042	**94.00%**	**4.54**	42528.0	42485.6	-42.33	-0.001%
2043	**96.00%**	**3.03**	28352.0	28323.8	-28.22	-0.001%
2044	**98.00%**	**1.51**	14176.0	14161.9	-14.11	-0.001%
2045	**100%**	**0**	0.0	0.0	0.0	N/A

Table 7.10: The net change in road user emissions with and without the package, under 'Without Policy' scenario. The target emissions reduction, and annual carbon emissions envelope have been set as per the Climate Compatibility Assessment methodology

Year	% Emissions reduction from baseline year	Annual carbon emissions envelope (Mt CO2e)	Without package (Do Nothing) (tCO2e)	With package (Do-Something) (tCO2e)	Net change (tCO2e)	Net tCO2e as % of the annual carbon emission envelope
1990	**Baseline**	**75.70**	N/A	N/A	N/A	N/A
2030	**75%**	**18.92**	318601.7	318390.9	-210.81	-0.001%
2031	**76.50%**	**17.79**	311750.3	311539.1	-211.16	-0.001%
2032	**78.00%**	**16.65**	304898.9	304687.4	-211.50	-0.001%
2033	**79.50%**	**15.52**	298047.4	297835.6	-211.85	-0.001%
2034	**81.00%**	**14.38**	291196.0	290983.8	-212.20	-0.001%
2035	**82.50%**	**13.25**	284344.6	284132.0	-212.55	-0.002%
2036	**84.00%**	**12.11**	277493.2	277280.3	-212.90	-0.002%
2037	**85.50%**	**10.98**	270641.7	270428.5	-213.24	-0.002%
2038	**87.00%**	**9.85**	263790.3	263576.7	-213.59	-0.002%
2039	**88.50%**	**8.71**	256938.9	256724.9	-213.94	-0.002%
2040	**90%**	**7.57**	250087.5	249873.2	-214.29	-0.003%
2041	**92.00%**	**6.05**	243236.0	243021.4	-214.63	-0.004%
2042	**94.00%**	**4.54**	236384.6	236169.6	-214.98	-0.005%
2043	**96.00%**	**3.03**	229533.2	229317.8	-215.33	-0.007%
2044	**98.00%**	**1.51**	222681.8	222466.1	-215.68	-0.014%
2045	**100%**	**0**	215830.3	215614.3	-216.03	N/A

7.4.5 Package 3 includes options that sit across the Sustainable Travel Hierarchy and have varying contribution to decarbonisation of the transport network. The options map to the Sustainable Travel Hierarchy in **Figure 7.4.1** as follows.

Figure 7.4.1: Overview of the Package 3 options and their alignment with the Sustainable Travel Hierarchy

		Package 3 Options					
		Active connections	**Bus priority measures**	**Linespeed, passenger and freight capacity improvements on the Aberdeen to Inverness rail line**	**Investment in DRT and MaaS**	**A96 Electric Corridor**	**Targeted road safety improvements**
Sustainable Travel Hierarchy Tier	**Walking and wheeling**	Strong alignment	No direct alignment	No direct alignment	No direct alignment	No direct alignment	Strong alignment
	Cycling	Strong alignment	No direct alignment	No direct alignment	No direct alignment	No direct alignment	Strong alignment
	Public transport	No direct alignment	Strong alignment	Strong alignment	Strong alignment	Partial alignment	Strong alignment
	Taxis and shared transport	No direct alignment	Strong alignment	No direct alignment	Strong alignment	Strong alignment	Strong alignment
	Private car	No direct alignment	No direct alignment	No direct alignment	No direct alignment	Strong alignment	Strong alignment

7.4.6 The carbon emissions have been calculated for the whole of the traffic model and are predicted to decrease over the traffic carbon emissions assessment period for both the 'With Policy' and 'Without Policy' scenarios. This decrease is due to a decrease in internal combustion engine vehicle kilometres travelled across the entirety of the traffic model.

Walking and wheeling & cycling

7.4.7 The Active Connections option included in Package 3 would help to facilitate a modal shift from car to active modes and would thus lead to a modest reduction in carbon emissions. This could encourage the reduced use of non-renewable energy fuelled modes of transport, supporting the decarbonisation of the transport sector.

Public transport

7.4.8 The options included in the public transport tier of the Sustainable Travel Hierarchy include investment in DRT and MaaS; bus priority measures; and linespeed, passenger and freight capacity improvements on the Aberdeen to Inverness rail line.

7.4.9 Collectively, these options have the potential to improve the flow of traffic the A96 corridor (including the rural sections included in this package), increase the attractiveness of public transport and could encourage a modal shift away from private car use over time. This may contribute to a decrease in associated carbon emissions during the operation of the proposed measures, thus contributing to the Scottish Government's net zero emissions target.

7.4.10 The extent of change in carbon emissions from affected buses and cars will depend on the fuel being used and factors such as the location of the new bus priority sites. Delivering faster and more reliable journey times for bus passengers could increase the attractiveness of bus as a mode of transport, resulting in mode shift from car. In addition, provision of bus priority measures could reduce bus operating costs, providing the opportunity to leverage other bus service improvements from operators, such as increased mileage.

Taxis and shared transport & private car

7.4.11 The development of the A96 Electric Corridor option will improve the overall network coverage and capacity for electric vehicles across A96 corridor, which is expected to increase the overall attractiveness and reliability of using low/zero-emission vehicles and enable the decarbonisation of the transport sector. Through this option, it is expected that there will be a reduction in tailpipe carbon emissions, particularly over the long-term as the uptake of low and zero emission vehicles increases.

7.4.12 The delivery of the targeted road safety improvements option is likely to improve the reliability of the A96 road corridor, and as such may make it a more attractive route for private vehicles.

7.4.13 In the longer term, Package 3 could help to facilitate a modal shift to public transport and active travel through options such as active connections and bus priority measures. If this was achieved, it would support decarbonisation of the transport network in Scotland and the transition from higher to lower emission modes of transport.

Package 3 criterion 3 recommendations

7.4.14 All relevant design, construction and maintenance guidance, standards, processes, and assessments should be kept up to date with the latest climate change forecasts and associated best practice and applied to the development of all options.

7.4.15 All the options in Package 3 should be designed to improve alignment with the Sustainable Travel Hierarchy and careful consideration should be given to how the options can work together to optimise the lowest carbon option, for example, for different journeys and shorter routes.

7.4.16 As part of the Active Connections option it is recommended that active travel linkages are maximised within and between the rural sections of the A96 corridor to improve and maximise walking, wheeling, and cycling opportunities for both local residents and visitors. Improvements could include suitable surfacing for all user types (including wheelchair users); few slopes/no stairs wherever possible; improved crossing points to promote safety; and suitably secure bike storage.

7.4.17 The impact on carbon emissions, of the options in the public transport tier of the Sustainable Travel Hierarchy, will depend on the fuel being used by buses and trains. It is therefore recommended that low-carbon modes of fuelling buses and trains are considered. It is envisaged that low carbon/zero carbon alternatives will become more cost efficient as technologies improve.

7.4.18 To fully support decarbonisation of the transport network, the following should be considered for all rail and transport hub improvement options: suitable provisions for bike storage at any improved/new stations; suitable station facilities to minimise private car miles; and improved local walking/cycling connections to promote the train facilities as a suitable, sustainable mode of transport.

7.4.19 The development of the A96 Electric Corridor option should include the distribution of electric and hydrogen-based fuel sources in addition to other alternative fuels such as HVO and Ammonia. The dispensaries should be placed strategically across the rural sections of the A96 corridor so that they are highly accessible to both road users and rural local communities. Consideration should also be given to demountable and mobile infrastructure.

7.4.20 The options included in Package 3 would be designed to DMRB standards and therefore the design will be obligated to consider the provision of facilities for non-motorised users of the A96 corridor. The road safety improvements should be designed to maximise associated active travel and opportunities for public transport. It is important that consideration is given as to how the active travel and public transport options can work together to optimise use of the lowest carbon options.

7.5 Criterion 4

Criterion and success factor

7.5.1 Criterion 4 is:

- Extent to which the package supports the decarbonisation of the construction sector in Scotland and maximises reduction in whole life carbon emissions.

7.5.2 Success factor:

- 4a. Supports transition from higher emission to lower emission materials and technologies during construction, operation, and maintenance.

Geographic and environmental context

7.5.3 **Table 7.11** outlines the geographic and environmental context against criterion 4 within a 7.5km boundary (unless otherwise stated, for example, when using the MET Office Data) of each of the rural sections.

Table 7.11: Geographic and environmental context of Package 3 study area Criterion 4, Success Factor 4a. Supports transition from higher emission to lower emission materials and technologies during construction, operation and maintenance

Package 3 Study Area	Geographic and Environmental Study Area
Hardmuir - Forres	UK Built Environment is responsible for 25% of total UK carbon emissions including buildings and infrastructure (UK Green Building Council, 2021). In relation to operation of their network Transport Scotland, as part of the Scottish Government, use renewable or zero carbon electricity tariffs for the electricity used to power the road network (such as for the use in lighting).
Forres - Elgin	UK Built Environment is responsible for 25% of total UK carbon emissions including buildings and infrastructure (UK Green Building Council, 2021). In relation to operation of their network Transport Scotland, as part of the Scottish Government, use renewable or zero carbon electricity tariffs for the electricity used to power the road network (such as for the use in lighting).
Elgin-Lhanbryde	UK Built Environment is responsible for 25% of total UK carbon emissions including buildings and infrastructure (UK Green Building Council, 2021). In relation to operation of their network Transport Scotland, as part of the Scottish Government, use renewable or zero carbon electricity tariffs for the electricity used to power the road network (such as for the use in lighting).

Package 3 Study Area	Geographic and Environmental Study Area
Lhanbryde - Mosstodloch	UK Built Environment is responsible for 25% of total UK carbon emissions including buildings and infrastructure (UK Green Building Council, 2021). In relation to operation of their network Transport Scotland, as part of the Scottish Government, use renewable or zero carbon electricity tariffs for the electricity used to power the road network (such as for the use in lighting).
Mosstodloch - Fochabers	UK Built Environment is responsible for 25% of total UK carbon emissions including buildings and infrastructure (UK Green Building Council, 2021). In relation to operation of their network Transport Scotland, as part of the Scottish Government, use renewable or zero carbon electricity tariffs for the electricity used to power the road network (such as for the use in lighting).
Fochabers – Keith	UK Built Environment is responsible for 25% of total UK carbon emissions including buildings and infrastructure (UK Green Building Council, 2021). In relation to operation of their network Transport Scotland, as part of the Scottish Government, use renewable or zero carbon electricity tariffs for the electricity used to power the road network (such as for the use in lighting).
Keith - Huntly	UK Built Environment is responsible for 25% of total UK carbon emissions including buildings and infrastructure (UK Green Building Council, 2021). In relation to operation of their network Transport Scotland, as part of the Scottish Government, use renewable or zero carbon electricity tariffs for the electricity used to power the road network (such as for the use in lighting).
Huntly - Inverurie	UK Built Environment is responsible for 25% of total UK carbon emissions including buildings and infrastructure (UK Green Building Council, 2021). In relation to operation of their network Transport Scotland, as part of the Scottish Government, use renewable or zero carbon electricity tariffs for the electricity used to power the road network (such as for the use in lighting).
Inverurie - Kintore	UK Built Environment is responsible for 25% of total UK carbon emissions including buildings and infrastructure (UK Green Building Council, 2021). In relation to operation of their network Transport Scotland, as part of the Scottish Government, use renewable or zero carbon electricity tariffs for the electricity used to power the road network (such as for the use in lighting).
Kintore - Blackburn	UK Built Environment is responsible for 25% of total UK carbon emissions including buildings and infrastructure (UK Green Building Council, 2021). In relation to operation of their network Transport Scotland, as part of the Scottish Government, use renewable or zero carbon electricity tariffs for the electricity used to power the road network (such as for the use in lighting).

Package 3 Study Area	Geographic and Environmental Study Area
Blackburn – Craibstone Junction	UK Built Environment is responsible for 25% of total UK carbon emissions including buildings and infrastructure (UK Green Building Council, 2021). In relation to operation of their network Transport Scotland, as part of the Scottish Government, use renewable or zero carbon electricity tariffs for the electricity used to power the road network (such as for the use in lighting).

Package 3 criterion 4 assessment

7.5.4 Package 3 is at an early stage of development with limited design details on which to base an assessment. The assessment is based on potential impacts and interactions the options could have with aspects considered within this criterion.

7.5.5 Since there are limited design details, the carbon emissions impact is estimated from the capital cost forecast by applying the Scottish Government 'Supply, Use and Input-Output Tables' figure for construction. This provides an estimate of between 140,600tCO_2e and 280,600tCO_2e for the capital stage carbon emissions impact.

7.5.6 The construction stage carbon emissions will vary between the options in the package. The variability is likely to depend on the level of new infrastructure required to implement the options – with the greater the level of construction resulting in greater levels of associated carbon emissions.

7.5.7 Package 3 as described makes no commitments to how the carbon emissions impact from construction, maintenance and operation would be minimised and so any resulting benefits or carbon reduction measures cannot be specifically considered within this assessment.

7.5.8 The operational element of the carbon emissions impact is reduced in part through the use of renewable/zero carbon electricity tariffs, if that approach is continued.

7.5.9 If Package 3 is developed, the options would be subject to relevant standards and assessment procedures for the type of transport infrastructure. For example, for road development this would include the Design Manual for Roads and Bridges (DMRB). Where the latest version of the DMRB climate change assessment standard (LA 114) is applied it requires the assessment of carbon emissions at detailed design stage.

7.5.10 All relevant design, construction and maintenance guidance, standards, processes, and assessments should be kept up to date with the latest best practice on carbon emission reductions and applied to the development of all options.

7.5.11 If Package 3 was taken forward, there would be an opportunity as a major infrastructure project in Scotland to strongly support decarbonisation of the construction sector. Application of PAS2080: Carbon Management in Buildings and Infrastructure to all schemes and all suppliers will help to systematically address whole life carbon emissions. This should include stretching carbon emissions reduction targets for suppliers, and consideration of carbon neutral standards (such as PAS 2060 - Carbon Neutrality Standard and Certification) for any suppliers managing the network beyond 2045.

7.5.12 The impact of Package 3 on carbon emissions will depend on the methods used during construction. It is therefore recommended that innovative techniques and technologies are used where relevant to reduce emissions. These should be focused on optimising the design to build less and to consume less carbon intensive materials (such as asphalt, concrete and steel). For asphalt this could include lower temperature mixes, concrete with high cement replacement, and steel with high recycled content.

7.5.13 During construction, opportunities to reduce carbon emissions should be maximised, such as local sourcing, construction and logistics efficiencies, alternative modes of transport – for example rail rather than road, low emission vehicles, and low carbon fuels.

7.5.14 With regards maintenance, more resilient technology could be installed in the first instance to withstand climatic factors, subsequently making the option more resilient and requiring less maintenance. As techniques and technologies improve, it is recommended that these are adopted at the earliest possible stage, subject to a cost/benefit analysis being undertaken.

7.5.15 The principles of the circular economy should be applied during design, construction, and maintenance. For example, material reduction and reuse should be prioritised to comply with the waste management hierarchy, and opportunities should be sought to recondition and use existing transport infrastructure where appropriate.

7.6 Criterion 5

Criterion and success factor

7.6.1 Criterion 5 is:

- Extent to which land use change associated with the package mitigates carbon emissions and contributes to carbon storage and sequestration.

7.6.2 Success factor:

- 5a. Supports the protection and development of carbon sinks, and takes appropriate measures to maximise carbon sequestration, taking account of wider ecosystem services/natural capital.

Geographic and environmental context

7.6.3 **Table 7.12** outlines the geographic and environmental context against criterion 5 within a 7.5km boundary (unless otherwise stated, for example, when using the MET Office Data) of each of the rural sections.

Table 7.12: Geographic and environmental context of Package 3 study area against Criterion 5, Success Factor 5a. Supports the protection and development of carbon sinks, and takes appropriate measures to maximise carbon sequestration, taking account of wider ecosystem services

Package 3 Study Area	Geographic and Environmental Context
Hardmuir - Forres	- Ancient Woodland: 4,022.31 hectares - Native Woodland Survey for Scotland: 899.44 hectares - Peatland: Three pockets of Class 1 (nationally important carbon-rich soils, deep peat and priority peatland habitat), and seven pockets of Class 3 (Dominant vegetation cover is not priority peatland habitat but is associated with wet and acidic type). - Local Landscape Area (LLA): 2 LLA – Burghead Coast and Findhorn Valley and the Wooded Estates.
Forres - Elgin	- Ancient Woodland: 2,801.65 hectares - Native Woodland Survey for Scotland: 445.07 hectares - Peatland: Six pockets of Class 1 (nationally important carbon-rich soils, deep peat, and priority peatland habitat), and 15 pockets of Class 3 (Dominant vegetation cover is not priority peatland habitat but is associated with wet and acidic type). - Local Landscape Area (LLA): Five LLA – Culbin to Burghead Coast, Quarrelwood, Pluscarden Valley, Burghead to Lossiemouth Coast and Cluny Hill

Package 3 Study Area	Geographic and Environmental Context
Elgin-Lhanbryde	- Ancient Woodland: 118.63 hectares - Native Woodland Survey for Scotland: 43.41 hectares - Peatland: One pocket of Class 3 (Dominant vegetation cover is not priority peatland habitat but is associated with wet and acidic type). - Local Landscape Area (LLA): One LLA – Lossiemouth to Portgordon Coast
Lhanbryde - Mosstodloch	- Ancient Woodland: 1,417.40 hectares - Native Woodland Survey for Scotland: 194.17 hectares - Peatland: One pocket of Class 3 (Dominant vegetation cover is not priority peatland habitat but is associated with wet and acidic type). - Local Landscape Area (LLA): Two LLA - Lossiemouth to Portgordon Coast and The Spey Valley
Mosstodloch - Fochabers	- Ancient Woodland: 14.72 hectares - Native Woodland Survey for Scotland: 10.33 hectares - Local Landscape Area (LLA): Three LLA – The Spey Valley, Lower Spey and Gordon Castle Policies, and Lossiemouth to Portgordon Coast.
Fochabers – Keith	- Ancient Woodland: 3,455.24 hectares - Native Woodland Survey for Scotland: 510.28 hectares - Peatland: 20 pockets of Class 1 (nationally important carbon-rich soils, deep peat and priority peatland habitat), and 24 pockets of Class 3 (Dominant vegetation cover is not priority peatland habitat but is associated with wet and acidic type). - Local Landscape Area (LLA): Four LLA – The Spey Valley, Lower Spey and Gordon Castle Policies, Lossiemouth to Portgordon Coast, and Portgordon to Cullen Coast.
Keith - Huntly	- Ancient Woodland: 2,431.69 hectares - Native Woodland Survey for Scotland: 1,231.92 hectares - Peatland: 22 pockets of Class 1 (nationally important carbon-rich soils, deep peat and priority peatland habitat), and 91 pockets of Class 3 (Dominant vegetation cover is not priority peatland habitat but is associated with wet and acidic type). - Local Landscape Area (LLA): Three LLA – Deveron Valley, Portgordon to Cullen Coast and North Aberdeenshire Coast.

Package 3 Study Area	Geographic and Environmental Context
Huntly - Inverurie	- Ancient Woodland: 2,417.49 hectares - Native Woodland Survey for Scotland: 2,143.32 hectares - Peatland: 22 pockets of Class 1 (nationally important carbon-rich soils, deep peat and priority peatland habitat), one pocket of Class 2 (nationally important carbon-rich soils, deep peat and priority peatland habitat) and 20 pockets of Class 3 (Dominant vegetation cover is not priority peatland habitat but is associated with wet and acidic type). - Local Landscape Area (LLA): Two LLA – Bennachie and Deveron Valley
Inverurie - Kintore	- Ancient Woodland: 222.28 hectares - Native Woodland Survey for Scotland: 177.60 hectares
Kintore - Blackburn	- Ancient Woodland: 281.39 hectares - Native Woodland Survey for Scotland: 112.75 hectares - Peatland: One pocket of Class 3 (Dominant vegetation cover is not priority peatland habitat but is associated with wet and acidic type).
Blackburn – Craibstone Junction	- Ancient Woodland: 222.28 hectares - Native Woodland Survey for Scotland: 177.60 hectares

Package 3 criterion 5 assessment

7.6.4 Package 3 is at an early stage of development with limited design details on which to base an assessment. The assessment is based on potential impacts and interactions the options could have with aspects considered within this criterion.

7.6.5 The transport options within Package 3 are solely infrastructure-led and do not explicitly include the provision of public realm improvements to green space, or blue or green infrastructure assets. Therefore, it is not possible to confirm if Package 3 would have a positive impact on land use change, carbon storage and sequestration.

7.6.6 Package 3 will likely have a negative environmental effect on the storage and sequestration of carbon within natural ecosystems, particularly resulting from the inclusion of the targeted road safety improvements. However, due to limited design information the extent of any effect is uncertain.

7.6.7 All the options would be developed in accordance with the relevant standards and relevant Scottish Government and Transport Scotland policies and plans. The scale of the effects would be subject to detailed design and the location of the options being determined.

Package 3 criterion 5 recommendations

7.6.8 All relevant design, construction and maintenance guidance, standards, processes, and assessments should be kept up to date with the latest climate change forecasts and associated best practice and applied to the development of all options.

7.6.9 Consideration should be made during the site selection process to prioritise locations where there are likely to be minimal potential adverse effects on carbon storage and sequestration.

7.6.10 Existing carbon sinks should be enhanced wherever possible, to increase potential carbon sequestration as an integral part of the package, particularly relating to peatland restoration and wetland enhancement.

8. Package 4

8.1 Package description

8.1.1 The options included in this package are:

- Active Communities;
- Active Connections;
- Improved Public Transport Passenger Interchange Facilities;
- Introduction of Rail Freight Terminals;
- Linespeed, Passenger and Freight Capacity Improvements on the Aberdeen to Inverness Rail Line;
- Targeted Road Safety Improvements; and
- A96 Electric Corridor

8.1.2 This package of interventions is targeted at longer distance journeys along the A96 corridor, with a focus on delivering transport network improvements aiming to encourage a shift to sustainable modes and improve road safety.

8.1.3 The locations of the interventions considered within this package in relation to the wider A96 Corridor Review transport appraisal study area (as defined within A96 Corridor Review Case for Change) are illustrated in **Figure 8.1.1**.

8.1.4 The package would provide high quality active travel routes and facilitate placemaking improvements within settlements along the A96 Trunk Road through the provision of 'Active Communities' where more space would be provided for people rather than traffic, which could reduce the need to travel unsustainably. Active Communities draws from the '20-minute neighbourhood' concept (10 minutes there, 10 minutes back) and is built around an approximate radius of 800m from the centre of each town or settlement, whilst also creating safer routes to school and encouraging more inclusive environments for people walking, wheeling and cycling. This would enhance the sense of place and encourage the local communities to spend more time within their local areas.

8.1.5 High quality active travel routes between settlements along the A96 corridor also form part of this package, which would be intended to be combined to form a continuous motorised traffic-free route between Aberdeen and Inverness. By connecting communities, this element of the package would also address the need for junction improvements to enhance the provision for active modes along the route and the creation of safe crossings in rural areas, providing safe, attractive, and convenient choices for many functional and recreational journeys, enabling people to benefit from improved access to key trip attractors in neighbouring settlements, using sustainable travel modes.

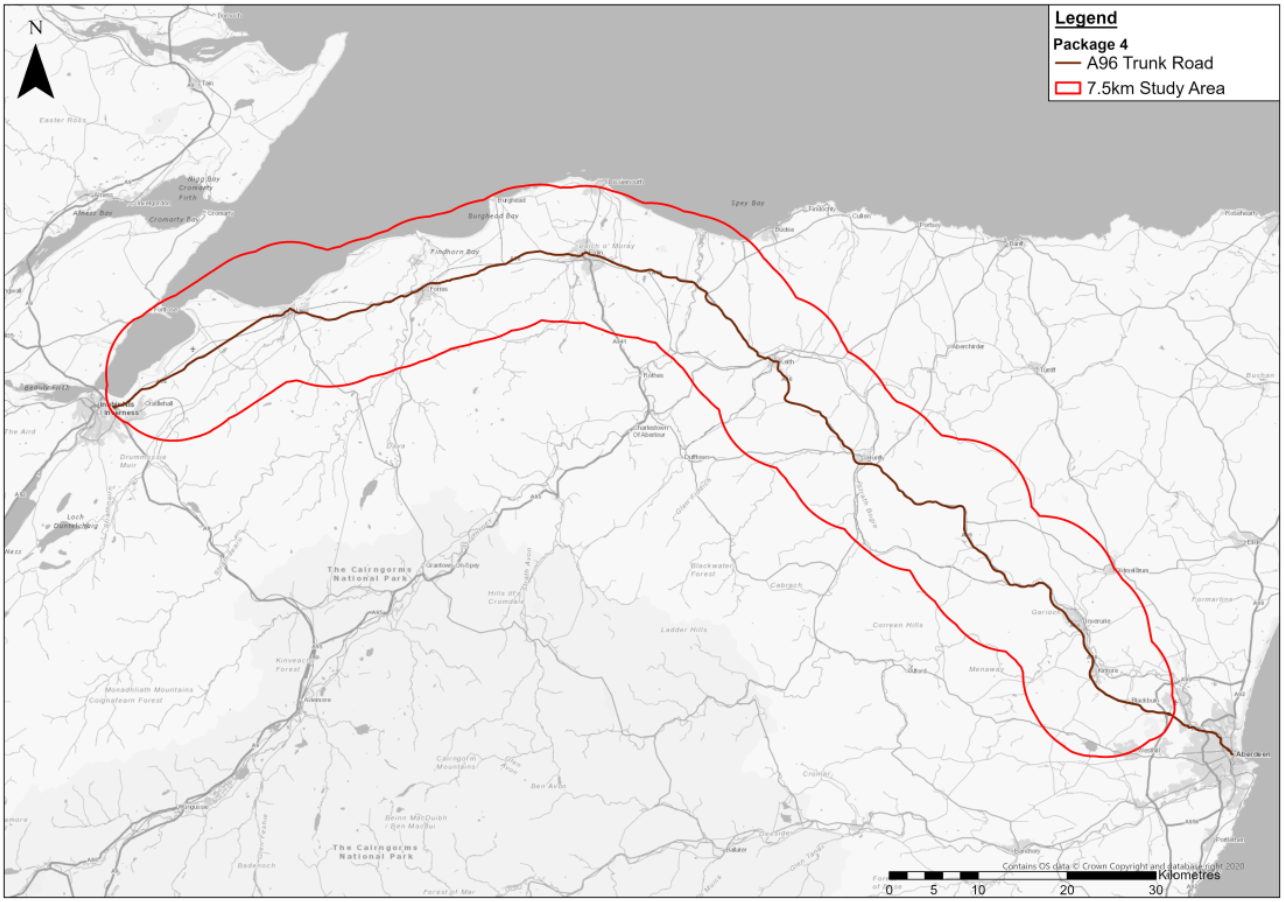
8.1.6 A number of public transport interventions targeted at delivering faster and more reliable journey times as well as improving the overall passenger experience form part of this package. Journey time and reliability improvements would be achieved through the inclusion of linespeed and capacity interventions on the Aberdeen to Inverness rail line. Linespeed improvements would target a reduction in end-to-end journey times to two hours (currently approximately two hours and 25 minutes). This would be facilitated through the provision of passing loops, new rolling stock and improving passenger service frequencies and freight opportunities. This package also includes interventions to improve accessibility and quality of public transport interchange facilities such as bus and railway stations throughout the corridor. Improvements are likely to include smaller scale interventions such as placemaking enhancements, improved wayfinding, enhancements to the waiting environment and/or improved accessibility, including lifts and step-free access. However, it may also include the construction of new interchange facilities.

8.1.7 The package also contains the introduction of rail freight terminals, with associated gauge enhancement which would encourage freight to be transported by rail.

8.1.8 Development of the A96 Electric Corridor is also included within this package to encourage a shift away from internal combustion engine (ICE) vehicles. This intervention would seek to improve the provision of alternative refuelling infrastructure and facilities along the full A96 corridor and its interfacing local roads.

8.1.9 Targeted safety improvements also form part of this package, aiming to address both real and perceived safety concerns on the A96 Trunk Road. It is envisaged that this would be achieved through the provision of improved overtaking opportunities, junction improvements and improvements to the alignment of the carriageway at targeted locations along the route.

Figure 8.1.1: Package 4 study area (high resolution versions in Appendix E)



8.2 Criterion 1

Criterion and success factors

8.2.1 Criterion 1 is:

- Extent to which the package supports adaptation for and/or resilience to current and predicted future impacts of climate change.

8.2.2 Success factors:

- 1a. Supports adaptation for and/or resilience to predicted increases in sea levels and storm surge.
- 1b. Supports adaptation for and/or resilience to predicted changes in temperatures.
- 1c. Supports adaptation for and/or resilience to predicted increase in likelihood and severity of fluvial and pluvial flooding.
- 1d. Supports adaptation for and/or resilience to predicted increase in likelihood and severity of storms and high winds.

Geographic and environmental context

8.2.3 **Table 8.1**, **Table 8.2**, **Table 8.3** and **Table 8.4** outline the geographic and environmental context against criterion 1 within a 7.5km boundary (unless otherwise stated, for example, when using the MET Office Data) of the route.

Table 8.1: Geographic and environmental context of Package 4 study area against Criterion 1, Success Factor 1a. Supports adaptation for and/or resilience to predicted increases in sea levels and storm surge

Package 4 Study Area	Geographic and Environmental Context
Full corridor	SEPA Coastal Hazard Maps identify a 0.1% chance of coastal flooding each year during a 1 in 1,000-year return period, and a 0.5% chance during a 1 in 200-year period. This risk is confined to the coastal settlements within the wider study area of Findhorn, Burghead and Lossiemouth, although the estuary at Findhorn does allow for a greater extent of coastal flood risk inland. There is also potential coastal flood risk for Nairn, the estuary at Spey Bay and Burghead Bay - though Burghead Bay coastal flooding is largely centred around the beach and does not extend significantly further inland (compared with Findhorn Bay and Spey Bay).

Table 8.2: Geographic and environmental context of Package 4 study area against Criterion 1, Success Factor 1b. Supports adaptation for and/or resilience to predicted changes in temperatures

Package 4 Study Area	Geographic and Environmental Context
Full corridor	Change in mean annual air temperature is predicted to range between +0.87C (2020-2049) and +3.05°C (2070-2099) within a geographical boundary of 25km around the corridor (50% probability). Change in maximum summer air temperature is predicted to range between +0.74°C (2020-2049) and +3.46°C (2070-2099) and change in minimum winter air temperature is predicted to range between +0.83°C (2020-2049) and +3.08°C (2070-2099) (50% probability).

Table 8.3: Geographic and environmental context of Package 4 study area against Criterion 1, Success Factor 1c. Supports adaptation for and/or resilience to predicted increase in likelihood and severity of fluvial and pluvial flooding

Package 4 Study Area	Geographic and Environmental Context
Full corridor	<u>Fluvial Flooding:</u> SEPA Coastal Hazard Maps identify a 10% chance of river flooding each year during a 1 in 10-year return period; 0.5% chance during a 1 in 200-year return period; and 0.1% chance during a 1 in 1,000-year return period. In addition, the geographical area at risk of flooding increases between 10 and 1,000-year return periods, with flood depths ranging between 0.3m and 1.0m. Given the significant number of watercourses, the main risk of flooding within the A96 corridor is from river flooding. This risk follows the following watercourses: - the River Lossie and associated waterways; - the River Isla and associated waterways; - the River Urie and associated waterways; - the River Don and associated waterways; - the River Findhorn, Muckle Burn and tributaries of Findhorn Bay; - the River Spey, associated waterways tributaries of Spey Bay; and - tributaries of Burghead Bay; the River Deveron and associated waterways.

Package 4 Study Area	Geographic and Environmental Context
	The flood mapping illustrates that the River Don poses significant flood risk to roads and settlements between Old Rayne and Dyce, with Kintore and Inverurie at significant risk. Keith however, is deemed to be at low risk. The other main settlements within the corridor of Nairn, Forres, Elgin, Fochabers, Huntly and Blackburn show significant areas of flood risk from various watercourses, including the River Spey and River Deveron. Flood protection schemes have been implemented within the corridor, including at Forres, Elgin, and Huntly, and a flood study for Inverurie and Port Elphinstone is underway. Pluvial Flooding: The average change in annual precipitation (50% probability) is predicted to be +4.65% (2020-2049), +4.59% (2040-2069) and +6.27% (2070-2099). Change in summer precipitation rate (50% probability) is predicted to be -0.59% (2020-2049), -7.74% (2040-2069) and -15.28% (2070-2099) while the change in winter precipitation rate (50% probability) is predicted to be +11.88% (2020-2049), +17.06% (2040-2069) and +27.69% (2070-2099). More frequent, high-intensity rainfall will increase the risk of flash flooding from surface water or sewers for inland communities, especially during winter months.

Table 8.4: Geographic and environmental context of Package 4 study area against Criterion 1, Success Factor 1d. Supports adaptation for and/or resilience to predicted increase in likelihood and severity of storms and high winds

Package 4 Study Area	Geographic and Environmental Context
Full corridor	There was a total of 11 weather-related incidents (flooding, snow or landscaping/fallen/overhanging branches) between 2016-2021 along the Package 4 study area.

Package 4 criterion 1 assessment

8.2.4 Package 4 is at an early stage of development with limited design details on which to base an assessment. The assessment is based on potential impacts and interactions the options could have with aspects considered within this criterion.

8.2.5 The geographic and environmental context for the full A96 corridor forecasts that annual temperatures will increase across the corridor, with drier, warmer summers and wetter, milder winters. This means that the settlements that fall within the A96 corridor will potentially have to account for a wider range of annual temperatures and be resilient to higher peak summer temperatures (which could potentially warp surfaces, impact electronic and electrical equipment and cause heatstroke for operational users or construction workers).

8.2.6 Current standards for designing and constructing transport infrastructure are maintained and updated regularly to account for climate factors. This process should ensure that each option is designed and built to adapt to the predicted future impacts of climate change across the full A96 corridor. Any resulting infrastructure that is built to adapt to future impacts of climate change has the potential to increase the overall resilience of the transport network in and around the settlements.

8.2.7 Package 4 includes the option to make linespeed, passenger and freight capacity improvements on the Aberdeen to Inverness rail line, and the option to introduce rail freight terminals. These options will make the settlements within the A96 corridor more resilient as these options aim to provide a more reliable public transport service throughout the corridor, cutting journey times and providing a more frequent rail passenger service. The introduction of rail freight terminals will also reduce the journey time for road passengers since freight vehicles often contribute to delays.

8.2.8 Package 4 includes alternative refuelling infrastructure as part of the A96 Electric Corridor. There may be locations that may be more vulnerable to the effects of climate change impacting the existing A96, for example, future flooding that may occur in and around specific settlements. However, currently this option is not noted to be particularly prone to the identified effects of climate change.

8.2.9 Package 4 includes the option of the targeted road safety improvements which will be developed in accordance with the Design Manual for Roads and Bridges (DMRB), including DMRB LA 114 Climate standard, which assesses the resilience and adaptation of proposed road infrastructure assets at detailed design stage. DMRB LA 114 states '*the scoping assessment shall identify whether anticipated changing climate conditions and weather events are likely to have significant adverse effects on the project (or elements of the project) during construction and operation*'.

8.2.10 Examples of potential climate impacts cited in DMRB LA 114 during construction and operations include increased frequency of extreme weather; increased temperatures; increased precipitation; increased sea level rise and wave height; and gales. Therefore, it is assumed that the roads will be designed in accordance with DMRB LA 114 to ensure resilience against extreme weather and to minimise the potential effects of climate change, to reduce the vulnerability of the infrastructure.

Package 4 criterion 1 recommendations

8.2.11 All relevant design, construction and maintenance guidance, standards, processes, and assessments should be kept up to date with the latest climate change forecasts and associated best practice and applied to the development of all options.

8.2.12 If Package 4 is taken forward it is recommended that any potential impacts on the climate resilience of the full corridor are understood at the earliest design stage and accounted for within the design. Technologies to counteract the impacts of climate change and provide resilience for each option within Package 4 should be considered. The design for each option should embed measures for adaptation against climate-related hazards where practicable, to reduce the significance levels of any adverse impacts.

8.2.13 The vulnerability of all the options included in Package 4 to climate change across the full corridor should be appropriately scoped to understand the potential impacts on the associated assets during construction and operation – for example on electronic equipment; construction workers; end users; site facilities; structures; earthworks; verges; drainage; and construction plant.

8.2.14 Consideration should be made during the site selection process for options that require construction of new facilities or infrastructure to prioritise locations across the full corridor which are more resilient to the potential effects of climate change. For example, selecting a location for the infrastructure on naturally higher ground levels and building away from coastal areas and/or floodplains that are anticipated to be subject to flooding. Additionally, the drainage capabilities of the infrastructure should be designed to deal with more intense rainfall events and flooding.

8.2.15 Active travel provisions should include elements that will support adaptation for and/or resilience to current and predicted future impacts of climate change. For example, the use of porous pavements for pedestrianised areas and cycling routes and the use of higher solar reflectance/cool pavements in pedestrianised areas and cycling lanes should be considered. Additionally, road salt and snow removal should be prioritised in pedestrianised areas and cycling routes.

8.2.16 It is recommended that during the design development of the options within this package, consideration is given to including structural adaptation measures, for example, selecting materials that are resistant to the expected extremes of both low and high temperatures, building protective infrastructure such as flood defences; and using permeable paving surfaces to reduce run-off during heavy rainfalls. Nature-based solutions should also be considered to further enhance natural resilience and adaptation measures.

8.2.17 Finally, the selection of materials used within the construction of the transport options should be based on their resilience to extreme weather, for example, preference should be given to corrosion-resistant materials rather than utilising metals and treating them with a non-corrosive powder coating.

8.3 Criterion 2

Criterion and success factor

8.3.1 Criterion 2:

- Extent to which the package supports the surrounding area to adapt and/or become more resilient to current and predicted future impacts of climate change.

8.3.2 Success factors:

- 2a. Supports adaptation for and/or resilience to current and future impacts of climate change within the study area outside of the package boundary.
- 2b. Supports the natural environment to adapt for and/or increase resilience to current and predicted future impacts of climate change.

Geographic and environmental context

8.3.3 **Table 8.5** and **Table 8.6** outline the geographic and environmental context against criterion 2 within a 7.5km boundary (unless otherwise stated, for example, when using the MET Office Data) of the route.

Table 8.5: Geographic and environmental context of Package 4 study area against Criterion 2, Success Factor 2a. Supports adaptation for and/or resilience to current and future impacts of climate change within the study area outside of the option boundary

Package 4 Study Area	Geographic and Environmental Context
Full Corridor	The geographic and environmental context for the full corridor are described in Package 4 Criterion 1 (Section 8.2).

Table 8.6: Geographic and environmental context of Package 4 study area against Criterion 2, Success Factor 2b. Supports the natural environment to adapt for and/or increase resilience to current and predicted future impacts of climate change

Package 4 Study Area	Geographic and Environmental Context
Full Corridor	Ecological designations falling either completely or partially within the study area of the A96 corridor include: • 43 Sites of Special Scientific Interest (SSSI); • Eight Special Protection Areas (SPA); • Seven Special Areas of Conservation (SAC); • Four Ramsar sites; • One Local Nature Reserves (LNR); • Two Royal Society for the Protection of Birds (RSPB) Reserves; • 20 Conservation Areas. The number, frequency and density of environmental designations is notably higher at the western end (particularly between Inverness and Huntly). The full extent of the Moray Firth coastline within the study area has environmental protection.

Package 4 criterion 2 assessment

8.3.4 Package 4 is at an early stage of development with limited design details on which to base an assessment. The assessment is based on potential impacts and interactions the options could have with aspects considered within this criterion.

8.3.5 The construction of the options included in Package 4 could impact the surrounding area's ability to adapt to climate change. This could be either positive or negative depending on how the options are designed and delivered.

8.3.6 The design and construction of the options included in Package 4 would be developed in accordance with relevant standards including DMRB. A risk that would need to be managed through design would be the interaction that the option would have with the drainage of the surrounding area. DMRB requires that schemes developed in accordance with the relevant standards should not increase flood risk to the surrounding area. The design should take account of existing risks such as communities that already experience flooding, for example, between 2016-2021, a total of eleven weather-related incidents involving either rain with/without high winds or snow with/without high winds caused A96 road closures. Development of the option could have a net positive impact on the area's ability to adapt to climate change if designed and delivered to go beyond mitigating risks and identify and take advantage of potential opportunities. This could include appropriate drainage features and flood defence systems – including outside of the option boundary.

8.3.7 The delivery of the options included in Package 4 could positively or negatively impact the ecosystem services provided by the surrounding area, depending on how the options are designed and delivered. The ecosystem services provided by the area surrounding the study area and which may be impacted by the delivery of the transport options include (but are not limited to):

- **Regulating services**: such as soil conservation and the carbon sequestration service provided by peatland, for example, between Fochabers and Keith where there are 20 pockets of Class 1 peatland which are nationally important carbon-rich soils, deep peat and priority peatland habitat.
- **Supporting services**: including nutrient cycling, soil formation and photosynthesis provided by the natural environment along the A96 corridor such as High Wood near Forres; Kirkhill and Birkenhill woods near Elgin; Bennachie Forest near Inverurie; Moray Monster Trails near Fochabers; Crooked Wood near Lhanbryde; and Tyrebagger Hill near Blackburn.
- **Provisioning services**: fresh water; timber and other forest products processed by companies such as Linnorie Firewood Services and Jewson Huntly timber merchants (both in Huntly); Robertson Timber Engineering in Elgin; and Chas Smith Sawmill between Huntly and Keith.

- **Cultural services**: the recreational and aesthetic sites within the study area including (but not limited to) Garioch Heritage Centre in Inverurie; Huntly Castle; museums including the Moray Motor Museum; the many distilleries in the area including Strathisla Distillery and Strathmill Distillery (both in Keith) and Glen Moray Distillery in Elgin; Gordon Castle Estate near Mosstodloch; Benromach Distillery near Forres; Marshall's Farm Shop and Forest Farm The Organic Dairy, both near Blackburn; Huntly Castle; Coxton Tower near Lhanbryde; the Coach House Caravan and Campsite and Dunnideer Castle, both between Inverurie and Huntly; and Threaplands Garden Centre between Lhanbryde and Mosstodloch.

8.3.8 Collectively the options included in Package 4 have the potential to support the communities within the study area to become more resilient to current and predicted future impacts of climate change through provision of additional transport options. For example, Package 4 includes options to improve public transport facilities including rail and public transport passenger interchange facilities. If one of these modes of public transport experiences travel disruption due to adverse weather conditions then the improvements made to other facilities have the potential to provide an alternative transport option.

8.3.9 Package 4 includes alternative refuelling infrastructure as part of the A96 Electric Corridor and the introduction of rail freight terminals. The impact of these options on the surrounding area's ability to adapt to climate change could be positive depending on how the options are designed and delivered. Currently, these options are not noted to be particularly prone to the identified effects of climate change.

8.3.10 The Package 4 study area includes land designated as environmentally sensitive, including 43 SSSI, seven SAC, eight SPA and 20 Geological Conservation Review Sites, which presents a risk and opportunity regarding their future management. As such, there may be impact on the designated land and its ability to adapt to current and predicted future impacts of climate change.

Package 4 criterion 2 recommendations

8.3.11 All relevant design, construction and maintenance guidance, standards, processes, and assessments should be kept up to date with the latest climate change forecasts and associated best practice and applied to the development of all options.

8.3.12 Options should be designed, constructed and maintained to maximise the opportunities to improve the resilience and adaption of the surrounding area to the future impacts of climate change and local conditions. This could include appropriate drainage features and flood defence systems – including outside of the option boundary.

8.3.13 Consideration should be given to the interdependency of the transport options and their ability to function if one or more of the transport modes is interrupted due to adverse weather conditions.

8.3.14 Options should be designed, constructed and maintained to maximise the opportunities to improve the ecosystem services of the surrounding area and the natural environments resilience to the future impacts of climate change. This should include the potential impacts listed in paragraph 8.3.7.

8.4 Criterion 3

Criterion and success factor

8.4.1 Criterion 3 is:

- Extent to which the package supports the decarbonisation of the transport network in Scotland, including supporting transition from higher to lower emission modes, and the modal shift to greater public transport and active travel options.

8.4.2 Success factors:

- 3a. The net change in user carbon emissions sit appropriately within the calculated emissions envelope for Scotland, taking account of changing legislation and targets (including any Climate Change Plan update for Scotland) (assumed current target of 2045).
- 3b. Supports the transition to low carbon modes of transport: transition from higher emissions to lower emissions modes, the modal shift to public transport and the modal shift to active travel for shorter everyday journeys.

Geographic and environmental context

8.4.3 Table 8.7 and Table 8.8 outline the geographic and environmental context against criterion 1 within a 7.5km boundary (unless otherwise stated, for example, when using the MET Office Data) of the route.

Table 8.7: Geographic and environmental context of Package 4 study area against Criterion 3, Success Factor 3a. The net change in user carbon emissions sit appropriately within the calculated emissions envelope for Scotland, taking account of changing legislation and targets (including any Climate Change Plan update for Scotland) (assumed current target of 2045)

Package 4 Study Area	Geographic and Environmental Context
Full Corridor	No additional context required - the net change calculations are shown in the Package 4 Criterion 3 Assessment section below (Table 8.9 andTable 8.10).

Table 8.8: Geographic and environmental context of Package 4 study area against Criterion 3, Success Factor 3b. Supports the transition to low carbon modes of transport: transition from higher emissions to lower emissions modes, the modal shift to public transport and the modal shift to active travel for shorter everyday journeys

Package 4 Study Area	Geographic and Environmental Context
Full Corridor	There are several on and off-road walking and cycling corridors in the study area, many being local networks, alongside a network of long-

Package 4 Study Area	Geographic and Environmental Context
	distance cycle routes that form part of the National Cycle Network (NCN). Though NCN routes are not always adjacent to the A96, they are important long-distance connections between the rural and urban communities within the wider study area. These include: ▪ NCN 1 – Between Aberdeen and Inverness within the confines of this study area via Torduff, Elgin and Nairn. ▪ NCN 195 – Route from Ballater (south of study area) to Aberdeen. ▪ NCN 7 – Route from the south of Inverness following the general alignment of the A9 Trunk Road. Long sections of the NCN routes in the study area are on-road and therefore require interactions with traffic. Traffic-free parts of the routes exist in small sections but for longer travel between settlements and towns it is necessary to travel on-road. The entire A96 route is covered by a bus route between Aberdeen and Inverness, with local services available in the larger towns along the route including Elgin and Inverurie. The regional bus network is primarily underpinned by supported public and school transport services run by Stagecoach, as well as First Bus in Aberdeen City, alongside smaller coach operators and local authority run services. Community transport and demand responsive transport services are operated within each of the local authorities although coverage is limited, with membership often required. Transport Accessibility (TRACC) Travel Time Analysis has been used to indicate frequency of bus services along the A96 corridor. This analysis indicates that the smaller towns in the more rural sections of the study area, including Huntly, Keith, and Fochabers have a very infrequent bus service at peak times for commuting to employment or education. There are more than 320 EV charging points along the entire A96 route, with 73% of those charging points made up of fast charging points. The largest cluster of EV charging points is at the town of Blackburn which has 173 charging points including slow charging, fast charging, rapid charging and ultra-rapid points.. The EV charging points are largely centred around communities across the A96 route, with very few charging locations across the wider, remoter network.

Package 4 criterion 3 assessment

8.4.4 **Table 8.9** and **Table 8.10** below show the net change in road user emissions with and without the package, under both the 'With Policy' and 'Without Policy' transport behaviour scenarios.

Table 8.9 The net change in road user emissions with and without the package, under the 'With Policy' scenario. The target emissions reduction, and annual carbon emissions envelope have been set as per the Climate Compatibility Assessment methodology

Year	% Emissions reduction from baseline year	Annual carbon emissions envelope (Mt CO2e)	Without package (Do Nothing) (tCO2e)	With package (Do-Something) (tCO2e)	Net change (tCO2e)	Net tCO2e as % of the annual carbon emission envelope
1990	**Baseline**	**75.7**	N/A	N/A	N/A	N/A
2030	**75%**	**18.93**	212639.8	212302.6	-337.24	-0.002%
2031	**76.50%**	**17.79**	198463.8	198149.1	-314.76	-0.002%
2032	**78.00%**	**16.65**	184287.8	183995.6	-292.27	-0.002%
2033	**79.50%**	**15.52**	170111.8	169842.1	-269.79	-0.002%
2034	**81.00%**	**14.38**	155935.9	155688.5	-247.31	-0.002%
2035	**82.50%**	**13.25**	141759.9	141535.0	-224.83	-0.002%
2036	**84.00%**	**12.11**	127583.9	127381.5	-202.34	-0.002%
2037	**85.50%**	**10.98**	113407.9	113228.0	-179.86	-0.002%
2038	**87.00%**	**9.84**	99231.9	99074.5	-157.38	-0.002%
2039	**88.50%**	**8.71**	85055.9	84921.0	-134.90	-0.002%
2040	**90%**	**7.57**	70879.9	70767.5	-112.41	-0.001%
2041	**92.00%**	**6.06**	56703.9	56614.0	-89.93	-0.001%
2042	**94.00%**	**4.54**	42528.0	42460.5	-67.45	-0.001%
2043	**96.00%**	**3.03**	28352.0	28307.0	-44.97	-0.001%
2044	**98.00%**	**1.51**	14176.0	14153.5	-22.48	-0.001%
2045	**100%**	**0**	0.0	0.0	0	N/A

Table 8.10: The net change in road user emissions with and without the package, under the 'Without Policy' scenario. The target emissions reduction, and annual carbon emissions envelope have been set as per the Climate Compatibility Assessment methodology

Year	% Emissions reduction from baseline year	Annual carbon emissions envelope (Mt CO2e)	Without package (Do Nothing) (tCO2e)	With package (Do-Something) (tCO2e)	Net change (tCO2e)	Net tCO2e as % of the annual carbon emission envelope
1990	**Baseline**	**75.7**	N/A	N/A	N/A	N/A
2030	**75%**	**18.93**	318601.7	318206.8	-394.96	-0.002%
2031	**76.50%**	**17.79**	311750.3	311363.0	-387.32	-0.002%
2032	**78.00%**	**16.65**	304898.9	304519.2	-379.69	-0.002%
2033	**79.50%**	**15.52**	298047.4	297675.4	-372.06	-0.002%
2034	**81.00%**	**14.38**	291196.0	290831.6	-364.43	-0.003%
2035	**82.50%**	**13.25**	284344.6	283987.8	-356.80	-0.003%
2036	**84.00%**	**12.11**	277493.2	277144.0	-349.17	-0.003%
2037	**85.50%**	**10.98**	270641.7	270300.2	-341.54	-0.003%
2038	**87.00%**	**9.84**	263790.3	263456.4	-333.91	-0.003%
2039	**88.50%**	**8.71**	256938.9	256612.6	-326.28	-0.004%
2040	**90%**	**7.57**	250087.5	249768.8	-318.65	-0.004%
2041	**92.00%**	**6.06**	243236.0	242925.0	-311.02	-0.005%
2042	**94.00%**	**4.54**	236384.6	236081.2	-303.39	-0.007%
2043	**96.00%**	**3.03**	229533.2	229237.4	-295.76	-0.010%
2044	**98.00%**	**1.51**	222681.8	222393.6	-288.13	-0.019%
2045	**100%**	**0**	215830.3	215549.8	-280.50	N/A

8.4.5 Package 4 includes options that sit across the Sustainable Travel Hierarchy and have varying contribution to decarbonisation of the transport network. The options map to the Sustainable Travel Hierarchy is as below in **Figure 8.3.1**.

Figure 8.3.1: Overview of Package 4 options and their alignment with the Sustainable Travel Hierarchy

		Package 4 Options						
		Active communities	**Active connections**	**Introduction of rail freight terminals**	**Linespeed, passenger and freight capacity improvements on the Aberdeen to Inverness rail line**	**A96 Electric Corridor**	**Targeted road safety improvements**	**Improved public transport passenger interchange facilities**
Sustainable Travel Hierarchy Tier	**Walking and wheeling**	Strong alignment	Strong alignment	No direct alignment	No direct alignment	No direct alignment	No direct alignment	Strong alignment
	Cycling	Strong alignment	Strong alignment	No direct alignment	No direct alignment	No direct alignment	Partial alignment	Strong alignment
	Public transport	No direct alignment	No direct alignment	Partial alignment	Strong alignment	Partial alignment	Partial alignment	Strong alignment
	Taxis and shared transport	No direct alignment	No direct alignment	No direct alignment	No direct alignment	Strong alignment	Strong alignment	Strong alignment
	Private car	No direct alignment	No direct alignment	No direct alignment	No direct alignment	Strong alignment	Strong alignment	Strong alignment

8.4.6 The carbon emissions have been calculated for the whole of the traffic model and are predicted to decrease over the traffic carbon emissions assessment period for both the 'With Policy' and 'Without Policy' scenarios. This decrease is due to a decrease in internal combustion engine vehicle kilometres travelled across the entirety of the traffic model.

Walking, wheeling and cycling

8.4.7 The Active Communities and Active Connections options included in Package 4 would help to facilitate a modal shift from car to active modes and would thus lead to a modest reduction in carbon emissions. These options sit high in the Sustainable Travel Hierarchy and could encourage the reduced use of non-renewable energy fuelled modes of transport, supporting the decarbonisation of the transport network. The improved public transport passenger interchange facilities option also supports walking, wheeling and cycling as the improvements are likely to encourage the use of alternative, low carbon modes of transport.

Public transport

8.4.8 The options included in the public transport tier of the Sustainable Travel Hierarchy include improved public transport passenger interchange facilities and linespeed, passenger and freight capacity improvements on the Aberdeen to Inverness rail line.

8.4.9 Collectively, these options have the potential to increase the attractiveness of public transport and could encourage a modal shift away from private car use over time. This may contribute to a decrease in associated carbon emissions during the operation of the proposed measures, thus contributing to the Scottish Government's net zero emissions target.

8.4.10 The extent of change in carbon emissions from affected buses and cars will depend on the fuel being used and factors such as the location of the new bus priority sites. Delivering faster and more reliable journey times for bus passengers could increase the attractiveness of bus as a mode of transport, resulting in mode shift from car. In addition, provision of bus priority measures could reduce bus operating costs, providing the opportunity to leverage other bus service improvements from operators, such as increased mileage.

Taxis, shared transport and private car

8.4.11 The delivery of the targeted road safety improvements at selected locations between Hardmuir, to the east of the town of Nairn, and Craibstone Roundabout west of Aberdeen is likely to improve the reliability of the A96 road corridor since it will primarily consist of improvements to highway infrastructure. As such these improvements may make the A96 a more attractive route for private vehicles to use. The road safety improvements to the A96 may also make it a more attractive route for residents to use public transport travelling on the route, aligning with the sustainability transport hierarchy. As the provision of the targeted road safety improvements may improve attractiveness of the A96 for private vehicles this may have a counter effect on modal shift. However, the delivery of the A96 Electric Corridor option will improve the overall network coverage and capacity for electric vehicles in and around the study area. This is expected to increase the overall attractiveness and reliability of using low/zero-emission vehicles along the A96. Through this option, it is expected that there will be a reduction in tailpipe carbon emissions, particularly over the long-term as the uptake of low and zero emission vehicles increases.

8.4.12 In the longer term, Package 4 could help to facilitate a modal shift to public transport through improved public transport interchange facilities along the A96 and, if this was achieved, it would support decarbonisation of the transport network in Scotland and the transition from higher to lower emission modes of transport.

Package 4 criterion 3 recommendations

8.4.13 All relevant design, construction and maintenance guidance, standards, processes, and assessments should be kept up to date with the latest climate change forecasts and associated best practice and applied to the development of all options.

8.4.14 All the options in Package 4 should be designed to improve alignment with the Sustainable Travel Hierarchy and careful consideration should be given to how the options can work together to optimise the lowest carbon option, for example, for different journeys and shorter routes.

8.4.15 As part of the Active Connections and Active Communities options, it is recommended that connections are maximised within and between the rural sections of the A96 corridor to improve and maximise walking, wheeling, and cycling opportunities for both local residents and visitors. Improvements could include suitable surfacing for all user types (including wheelchair users); few slopes/no stairs wherever possible; improved crossing points to promote safety; and suitably secure bike storage in and around the villages.

8.4.16 The impact of the options in the public transport tier (improved public transport passenger interchange facilities and linespeed, passenger and freight capacity improvements on the Aberdeen to Inverness rail line) of the Sustainable Travel Hierarchy on carbon emissions, will depend on the fuel being used by buses and trains. It is therefore recommended that low-carbon modes of buses and trains are considered. It is envisaged that low carbon/zero carbon alternatives will become more cost efficient as technologies improve.

8.4.17 To fully support decarbonisation of the transport network in and around the rural sections of the A96 corridor, the following should be considered for all rail and transport hub improvement options:

- suitable provisions for bike storage at any improved/new stations;
- suitable station facilities to minimise private car miles; and
- improved local walking/cycling connections to promote the train facilities as a suitable, sustainable mode of transport.

8.4.18 Improved public transport passenger interchange facilities and line speed passenger and freight capacity improvements on the Aberdeen to Inverness rail line could also include increased parking provision and increased provision of EV / ULEV parking facilities to encourage private car users to switch to using public transport for both short and long-distance journeys.

8.4.19 The development of the A96 Electric Corridor option should include the distribution of electric and hydrogen-based fuel sources in addition to other alternative fuels such as HVO and Ammonia. The dispensaries should be placed strategically across the rural sections of the A96 corridor so that they are highly accessible to both road users and rural local communities. Consideration should also be given to demountable and mobile infrastructure.

8.4.20 The targeted road safety improvements would be designed to DMRB standards and therefore the design will be obligated to consider the provision of facilities for non-motorised users of the A96 corridor. The road safety improvements should be designed to maximise associated active travel and opportunities for public transport.

8.5 Criterion 4

Criterion and success factor

8.5.1 Criterion 4 is:

- Extent to which the package supports the decarbonisation of the construction sector in Scotland and maximises reduction in whole life carbon emissions.

8.5.2 Success factor:

- 4a. Supports transition from higher emission to lower emission materials and technologies during construction, operation, and maintenance.

Geographic and environmental context

8.5.3 **Table 8.11** outlines the geographic and environmental context of Package 4 against criterion 4 within a 7.5km boundary (unless otherwise stated, for example, when using the MET Office Data) of the route.

Table 8.11: Geographic and environmental context of Package 4 study area against Criterion 4 Success Factor 4a. Supports transition from higher emission to lower emission materials and technologies during construction, operation and maintenance

Package 4 Study Area	Geographic and Environmental Context
Full Corridor	UK Built Environment is responsible for 25% of total UK carbon emissions including buildings and infrastructure (UK Green Building Council, 2021). In relation to operation of their network Transport Scotland, as part of the Scottish Government, use renewable or zero carbon electricity tariffs for the electricity used to power the road network (such as for the use in lighting).

Package 4 criterion 4 assessment

8.5.4 Package 4 is at an early stage of development with limited design details which to base an assessment. The assessment is based on potential impacts and interactions the options could have with aspects considered within this criterion.

8.5.5 Since there are limited design details, the carbon emissions impact is estimated from the capital cost forecast by applying the Scottish Government 'Supply, Use and Input-Output Tables' figure for construction. This provides an estimate of between 140,600tCO_2e and 280,600tCO_2e for the capital stage carbon emissions impact.

8.5.6 The construction stage carbon emissions will vary between the options in the package. The variability is likely to depend on the level of new infrastructure required to implement the options – with the greater the level of construction resulting in greater levels of associated carbon emissions.

8.5.7 Package 4 as described makes no commitments to how the carbon emissions impact from construction, maintenance and operation would be minimised and so any resulting benefits or carbon reduction measures cannot be specifically considered within this assessment.

8.5.8 The operational element of the carbon emissions impact is reduced in part through the use of renewable/zero carbon electricity tariffs, if that approach is continued.

8.5.9 If Package 4 is developed the targeted road safety improvements would be subject to relevant standards and assessment procedures for the type of transport infrastructure. For example, for road development this would include the Design Manual for Roads and Bridges (DMRB). Where the latest version of the DMRB climate change assessment standard (LA 114) is applied it requires the assessment of carbon emissions at detailed design stage.

Package 4 criterion 4 recommendations

8.5.10 All relevant design, construction and maintenance guidance, standards, processes, and assessments should be kept up to date with the latest best practice on carbon emission reductions and applied to the development of all options.

8.5.11 If Package 4 was taken forward there would be an opportunity as a major infrastructure project in Scotland to strongly support decarbonisation of the construction sector. Application of PAS2080: Carbon Management in Buildings and Infrastructure to all schemes and all suppliers will help to systematically address whole life carbon emissions. This should include stretching carbon emissions reduction targets for suppliers, and consideration of carbon neutral standards (such as PAS 2060 - Carbon Neutrality Standard and Certification) for any suppliers managing the network beyond 2045.

8.5.12 The impact of Package 4 on carbon emissions will depend on the methods used during construction. It is therefore recommended that innovative techniques and technologies are used where relevant to reduce emissions. These should be focused on optimising the design to build less and to consume less carbon intensive materials (such as asphalt, concrete and steel). This could include lower temperature mixes for asphalt, concrete with high cement replacement, and steel with high recycled content.

8.5.13 During construction, opportunities to reduce carbon emissions should be maximised, such as local sourcing, construction and logistics efficiencies, and alternative modes of transport – for example rail rather than road, low emission vehicles, and low carbon fuels.

8.5.14 With regards maintenance, more resilient technology could be installed in the first instance to withstand climatic factors, subsequently making the option more resilient and requiring less maintenance. As techniques and technologies improve, it is recommended that these are adopted at the earliest possible stage, subject to a cost/benefit analysis being undertaken.

8.5.15 The principles of the circular economy should be applied during design, construction, and maintenance. For example, material reduction and reuse should be prioritised to comply with the waste management hierarchy, and opportunities should be sought to recondition and use existing transport infrastructure where appropriate.

8.6 Criterion 5

Criterion and success factor

8.6.1 Criterion 5 is:

- Extent to which land use change associated with the package mitigates carbon emissions and contributes to carbon storage and sequestration.

8.6.2 Success factor:

- 5a. Supports the protection and development of carbon sinks, and takes appropriate measures to maximise carbon sequestration, taking account of wider ecosystem services/natural capital.

Geographic and environmental context

8.6.3 **Table 8.12** outlines the geographic and environmental context against criterion 5 within a 7.5km boundary (unless otherwise stated, for example, when using the MET Office Data) of the route.

Table 8.12: Geographic and environmental context of Package 4 study area against Criterion 5, Success Factor 5a. Supports the protection and development of carbon sinks, and takes appropriate measures to maximise carbon sequestration, taking account of wider ecosystem services

Package 4 Study Area	Geographic and Environmental Context
Full Corridor	There are several pockets of peatland across the study area: • 118 pockets of Class 1 peatland (nationally important carbon-rich soils, deep peat and priority peatland habitat. Areas likely to be of high conservation value) • 32 pockets of Class 2 peatland (nationally important carbon-rich soils, deep peat and priority peatland habitat) • 193 pockets of Class 3 peatland (Dominant vegetation cover is not priority peatland habitat but is associated with wet and acidic type) • 1763 pockets of Class 4 peatland (Area unlikely to be associated with peatland habitats or wet and acidic type. Area unlikely to include carbon-rich soils) Within the full corridor study area, there are approximately 32,400 hectares of Ancient Woodland (AWI) (919 counts) and 12,150 hectares of woodland recorded in the Native Woodland of Scotland Survey (NWSS) (3,325 counts).

Package 4 criterion 5 assessment

8.6.4 Package 4 is at an early stage of development with limited design details on which to base an assessment. The assessment is based on potential impacts and interactions the options could have with aspects considered within this criterion.

8.6.5 The transport options within Package 4 are solely infrastructure-led and do not explicitly include the provision of public realm improvements to green space or blue or green infrastructure assets. Therefore, it is not possible to confirm if Package 4 would have a positive impact on land use change, carbon storage and sequestration.

8.6.6 All the options would be developed in accordance with the relevant standards and relevant Scottish Government and Transport Scotland policies and plans. The scale of the effects would be subject to detailed design and the location of the options being determined.

8.6.7 The option has the potential for negative environmental effects on the storage and sequestration of carbon within natural ecosystems. The scale and location of the interventions would be subject to detailed design, therefore at this stage the extent of effects is uncertain.

8.6.8 The area within Package 4 includes land designated as environmentally sensitive, which presents a risk and opportunity to be managed in terms of how they are impacted on/or supported in terms of their ability to sequester and store carbon.

Package 4 criterion 5 recommendations

8.6.9 All relevant design, construction and maintenance guidance, standards, processes, and assessments should be kept up to date with the latest climate change forecasts and associated best practice and applied to the development of all options.

8.6.10 Consideration should be made during the site selection process to prioritise locations where there are likely to be minimal potential adverse effects on carbon storage and sequestration.

8.6.11 Existing carbon sinks should be enhanced wherever possible to increase potential carbon sequestration as an integral part of the package, particularly relating to peatland restoration and wetland enhancement.

9. Package 5

9.1 Package description

9.1.1 The options included in this package are:

- Active Communities;
- Active Connections;
- Bus Priority Measures;
- Improved Public Transport Passenger Interchange Facilities;
- Investment in DRT and Maas;
- Introduction of Rail Freight Terminals;
- Linespeed, Passenger and Freight Capacity Improvements on the Aberdeen to Inverness Rail Line;
- Targeted Road Safety Improvements;
- Bypasses of Forres, Elgin, Keith, and Inverurie; and
- A96 Electric Corridor.

9.1.2 This package is focused on delivering transport network improvements to settlements and rural sections across the A96 corridor, which would aim to encourage a shift to sustainable modes, increase opportunities for residents and businesses and improve road safety. It should be noted that the A96 Dualling Inverness to Nairn (including Nairn Bypass) scheme does not form part of the A96 Corridor Review as it has successfully progressed through a Public Local Inquiry and has Ministerial consent. Interventions within Nairn itself, similar to those proposed within the other bypassed towns, however, have been included in this package for appraisal.

9.1.3 The locations of the settlements and interventions considered within this package in relation to the wider A96 Corridor Review transport appraisal study area (as defined within A96 Corridor Review Case for Change) are illustrated in **Figure 9.1.1**.

9.1.4 This package focuses on delivering networks of high-quality active travel routes and facilitates placemaking improvements within the settlements of Nairn, Forres, Elgin, Lhanbryde, Mosstodloch, Fochabers, Keith, Huntly, Inverurie, Kintore and Blackburn by creating 'Active Communities', where more space would be provided for people rather than traffic, which could reduce the need to travel unsustainably. Active Communities draws from the '20-minute neighbourhood' concept (10 minutes there, 10 minutes back) and is built around an approximate radius of 800m from the centre of each town or settlement, whilst also creating safer routes to school and encouraging more inclusive environments for people walking, wheeling and cycling. This would enhance the sense of place and encourage the local communities to spend more time within their local areas.

9.1.5 High quality active travel routes between settlements along the A96 corridor also form part of this package, which would be intended to be combined to form a continuous motorised traffic-free route between Aberdeen and Inverness. By connecting communities, this element of the package would also address the need for junction improvements to enhance the provision for active modes along the route and the creation of safe crossings in rural areas, providing safe, attractive, and convenient choices for many functional and recreational journeys, enabling people to benefit from improved access to key trip attractors in neighbouring settlements, using sustainable travel modes.

9.1.6 A number of public transport interventions targeted at delivering faster and more reliable journey times as well as improving the overall passenger experience also form part of this package. Journey time and reliability improvements would be achieved through the inclusion of bus priority measures at appropriate locations, with rail improvements delivered through linespeed and reliability interventions on the Aberdeen to Inverness rail line, reducing end-to-end journey times to two hours (currently approximately two hours and 25 minutes). This would be facilitated through the provision of passing loops, new rolling stock and improving passenger service frequencies and freight opportunities. This package does not however consider the provision of new Park and Ride facilities for onward travel by bus as they are only likely to be a viable option for capturing trips travelling to the larger cities of Aberdeen and Inverness where congestion is highest.

9.1.7 The package also contains the introduction of rail freight terminals, with associated gauge enhancement which would encourage freight to be transported by rail.

9.1.8 This package also includes interventions to improve accessibility and quality of public transport interchange facilities such as bus and railway stations throughout the corridor. Improvements are likely to include smaller scale interventions such as placemaking enhancements, improved wayfinding, enhancements to the waiting environment and/or improved accessibility, including lifts and step-free access. However, it may also include the construction of new interchange facilities.

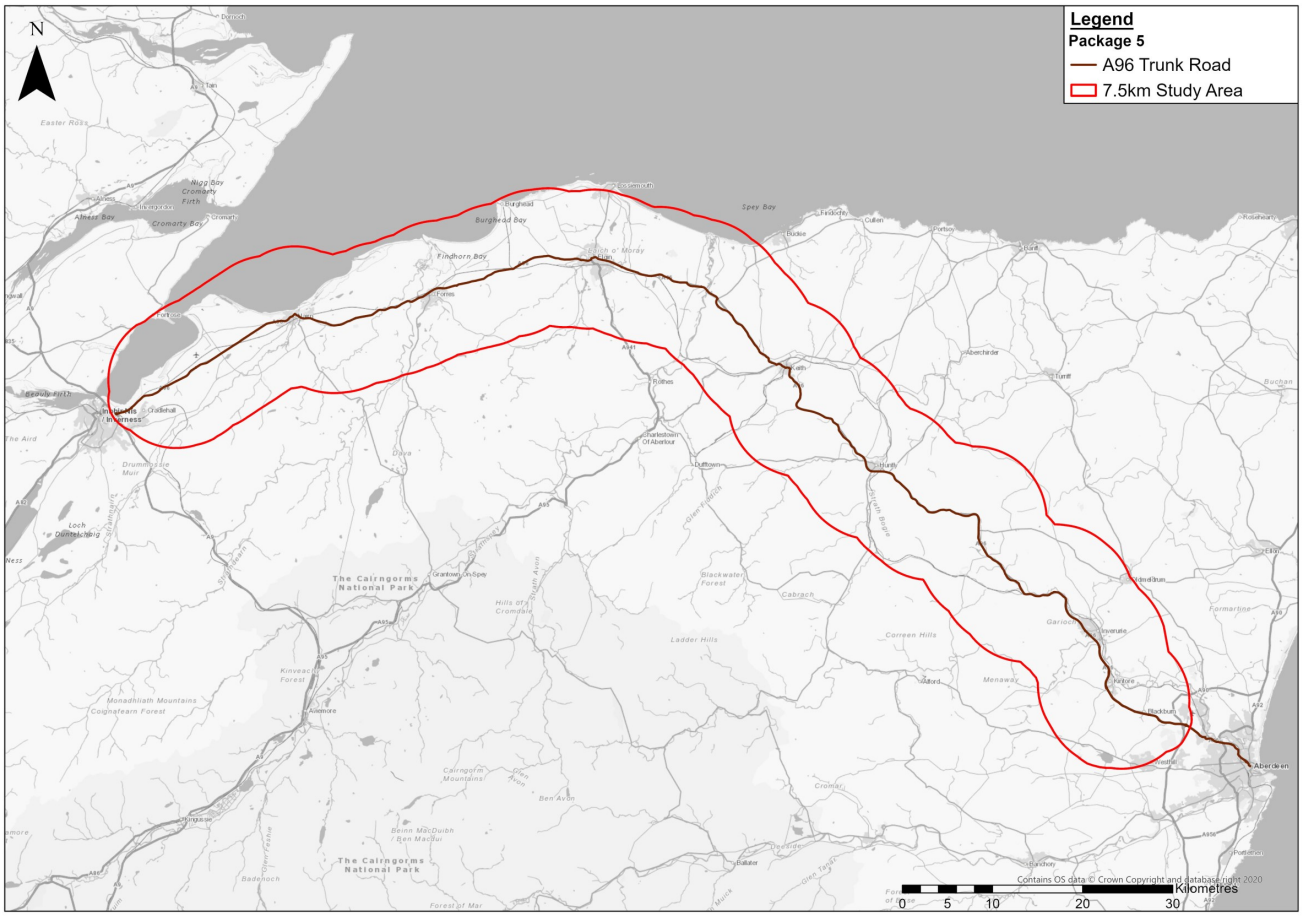
9.1.9 Improvements to the public transport network coverage are also proposed through the use of flexible services, such as Demand Responsive Transport (DRT) or Community Transport (CT), supported by Mobility as a Service (MaaS) or smart technology where appropriate, at a corridor level.

9.1.10 This package also aims to improve the safety, resilience and reliability of the A96 Trunk Road through the provision of a bypass at Forres, Elgin, Keith and Inverurie, whilst also addressing real and perceived severance within these communities by removing through trips. This element of the package is seen as a key enabler to maximising the benefits associated with Active Communities. As noted above, the provision of a bypass at Nairn is not included within this package as it forms part of the A96 Dualling Inverness to Nairn (including Nairn Bypass) scheme.

9.1.11 Targeted safety improvements also form part of this package, aiming to address both real and perceived safety concerns on the A96 Trunk Road. It is envisaged that this would be achieved through the provision of improved overtaking opportunities, junction improvements and improvements to the alignment of the carriageway at targeted locations along the route.

9.1.12 Development of the A96 Electric Corridor is also included within this package to encourage a shift away from internal combustion engine (ICE) vehicles. This intervention would seek to improve the provision of alternative refuelling infrastructure and facilities along the full A96 corridor and its interfacing local roads.

Figure 9.1.1: Package 5 study area (high resolution versions in Appendix E)



9.2 Criterion 1

Criterion and success factors

9.2.1 Criterion 1 is:

- Extent to which the package supports adaptation for and/or resilience to current and predicted future impacts of climate change.

9.2.2 Success factors:

- 1a. Supports adaptation for and/or resilience to predicted increases in sea levels and storm surge.
- 1b. Supports adaptation for and/or resilience to predicted changes in temperatures.
- 1c. Supports adaptation for and/or resilience to predicted increase in likelihood and severity of fluvial and pluvial flooding.
- 1d. Supports adaptation for and/or resilience to predicted increase in likelihood and severity of storms and high winds.

Geographic and environmental context

9.2.3 **Table 9.1**, **Table 9.2**, **Table 9.3** and **Table 9.4** outline the geographic and environmental context against criterion 1 within a 7.5km boundary (unless otherwise stated, for example, when using the MET Office Data) of the route.

Table 9.1: Geographic and environmental context of Package 5 study area against Criterion 1, Success Factor 1a. Supports adaptation for and/or resilience to predicted increases in sea levels and storm surge

Package 5 Study Area	Geographic and Environmental Context
Full Corridor	SEPA Coastal Hazard Maps identify a 0.1% chance of coastal flooding each year during a 1 in 1,000-year return period, and a 0.5% chance during a 1 in 200-year period. This risk is confined to the coastal settlements within the wider study area of Findhorn, Burghead and Lossiemouth, although the estuary at Findhorn does allow for a greater extent of coastal flood risk inland. There is also potential coastal flood risk for Nairn, the estuary at Spey Bay and Burghead Bay - though Burghead Bay coastal flooding is largely centred around the beach and does not extend significantly further inland (compared with Findhorn Bay and Spey Bay).

Table 9.2: Geographic and environmental context of Package 5 study area against Criterion 1, Success Factor 1b. Supports adaptation for and/or resilience to predicted changes in temperatures

Package 5 Study Area	Geographic and Environmental Context
Full Corridor	Change in mean annual air temperature is predicted to range between +0.87C (2020-2049) and +3.05°C (2070-2099) within a geographical boundary of 25km around the corridor (50% probability). Change in maximum summer air temperature is predicted to range between +0.74°C (2020-2049) and +3.46°C (2070-2099) and change in minimum winter air temperature is predicted to range between +0.83°C (2020-2049) and +3.08°C (2070-2099) (50% probability).

Table 9.3: Geographic and environmental context of Package 5 study area against Criterion 1, Success Factor 1c. Supports adaptation for and/or resilience to predicted increase in likelihood and severity of fluvial and pluvial flooding

Package 5 Study Area	Geographic and Environmental Context
Full Corridor	<u>Fluvial Flooding:</u> SEPA Coastal Hazard Maps identify a 10% chance of river flooding each year during a 1 in 10-year return period; 0.5% chance during a 1 in 200-year return period; and 0.1% chance during a 1 in 1,000-year return period. In addition, the geographical area at risk of flooding increases between 10 and 1,000-year return periods, with flood depths ranging between 0.3m and 1.0m. Given the significant number of watercourses, the main risk of flooding within the A96 corridor is from river flooding. This risk follows the following watercourses: - the River Lossie and associated waterways; - the River Isla and associated waterways; - the River Urie and associated waterways; - the River Don and associated waterways; - the River Findhorn, Muckle Burn and tributaries of Findhorn Bay; - the River Spey, associated waterways tributaries of Spey Bay; and - tributaries of Burghead Bay; the River Deveron and associated waterways. The flood mapping illustrates that the River Don poses significant flood risk to roads and settlements between Old Rayne and Dyce, with Kintore and Inverurie at significant risk. Keith however, is deemed to be at low risk. The other main settlements within the corridor of Nairn, Forres, Elgin, Fochabers, Huntly and Blackburn show significant areas of flood risk from various watercourses, including the River Spey and River Deveron. Flood protection schemes have been implemented within the corridor, including at Forres,

Package 5 Study Area	Geographic and Environmental Context
	Elgin, and Huntly, and a flood study for Inverurie and Port Elphinstone is underway. Pluvial Flooding: The average change in annual precipitation (50% probability) is predicted to be +4.65% (2020-2049), +4.59% (2040-2069) and +6.27% (2070-2099). Change in summer precipitation rate (50% probability) is predicted to be -0.59% (2020-2049), -7.74% (2040-2069) and -15.28% (2070-2099) while the change in winter precipitation rate (50% probability) is predicted to be +11.88% (2020-2049), +17.06% (2040-2069) and +27.69% (2070-2099). More frequent, high-intensity rainfall will increase the risk of flash flooding from surface water or sewers for inland communities, especially during winter months.

Table 9.4: Geographic and environmental context of Package 5 study area against Criterion 1, Success Factor 1d. Supports adaptation for and/or resilience to predicted increase in likelihood and severity of storms and high winds

Package 5 Study Area	Geographic and Environmental Context
Full Corridor	There was a total of 11 weather-related incidents (flooding, snow or landscaping/fallen/overhanging branches) between 2016-2021 along the Package 5 study area.

Package 5 criterion 1 assessment

9.2.4 Package 5 is at an early stage of development with limited design details on which to base an assessment. The assessment is based on potential impacts and interactions the options could have with aspects considered within this criterion.

9.2.5 The geographic and environmental context for the full A96 corridor forecasts that annual temperatures will increase across the corridor, with drier, warmer summers and wetter, milder winters. This means that the settlements that fall within the A96 corridor will potentially have to account for a wider range of annual temperatures and be resilient to higher peak summer temperatures (which could potentially warp surfaces, impact electronic and electrical equipment and cause heatstroke for operational users or construction workers).

9.2.6 Current standards for designing and constructing transport infrastructure are maintained and updated regularly to account for climate factors. This process should ensure that each option is designed and built to adapt to the predicted future impacts of climate change across the full A96 corridor. Any resulting infrastructure that is built to adapt to future impacts of climate change has the potential to increase the overall resilience of the transport network in and around the settlements.

9.2.7 Package 5 includes options to improve public transport facilities, including bus priority measures, investment in DRT and MaaS, linespeed, passenger and freight capacity improvements on the Aberdeen to Inverness rail line, and the option to introduce rail freight terminals. These options will make the settlements within the A96 corridor more resilient as these options aim to provide a more reliable public transport service throughout the corridor, cutting journey times and providing a more frequent rail passenger service. The introduction of rail freight terminals will also reduce the journey time for road passengers since freight vehicles often cause delays.

9.2.8 Package 5 includes alternative refuelling infrastructure as part of the A96 Electric Corridor. There may be locations that may be more vulnerable to the effects of climate change impacting the existing A96, for example, future flooding that may occur in and around specific settlements. However, currently this option is not noted to be particularly prone to the identified effects of climate change.

9.2.9 Package 5 includes the option of the bypasses of Forres, Elgin, Keith and Inverurie and the option of the targeted road safety improvements which will be developed in accordance with the Design Manual for Roads and Bridges including DMRB LA 114 Climate standard, which assesses the resilience and adaptation of proposed road infrastructure assets at detailed design stage. DMRB LA 114 states '*the scoping assessment shall identify whether anticipated changing climate conditions and weather events are likely to have significant adverse effects on the project (or elements of the project) during construction and operation*'.

9.2.10 Examples of potential climate impacts cited in DMRB LA 114 during construction and operations include increased frequency of extreme weather; increased temperatures; increased precipitation; increased sea level rise and wave height; and gales. Therefore, it is assumed that the roads will be designed in accordance with DMRB LA 114 to ensure resilience against extreme weather and to minimise the potential effects of climate change, to reduce the vulnerability of the infrastructure.

Package 5 criterion 1 recommendations

9.2.11 All relevant design, construction and maintenance guidance, standards, processes, and assessments should be kept up to date with the latest climate change forecasts and associated best practice and applied to the development of all options.

9.2.12 If Package 5 is taken forward it is recommended that any potential impacts on the climate resilience of the full corridor are understood at the earliest design stage and accounted for within the design. Technologies to counteract the impacts of climate change and provide resilience for each option within Package 5 should be considered. The design for each option should embed measures for adaptation against climate-related hazards where practicable, to reduce the significance levels of any adverse impacts.

9.2.13 The vulnerability of all the options included in Package 5 to climate change across the full corridor should be appropriately scoped to understand the potential impacts on the associated assets during construction and operation – for example on electronic equipment; construction workers; end users; site facilities; structures; earthworks; verges; drainage; and construction plant.

9.2.14 Consideration should be made during the site selection process for options that require construction of new facilities or infrastructure to prioritise locations across the full corridor which are more resilient to the potential effects of climate change. For example, selecting a location for the infrastructure on naturally higher ground levels and building away from coastal areas and/or floodplains that are anticipated to be subject to flooding. Additionally, the drainage capabilities of the infrastructure should be designed to deal with more intense rainfall events and flooding.

9.2.15 Active travel provisions should include elements that will support adaptation for and/or resilience to current and predicted future impacts of climate change. For example, the use of porous pavements for pedestrianised areas and cycling routes and the use of higher solar reflectance/cool pavements in pedestrianised areas and cycling lanes should be considered. Additionally, road salt and snow removal should be prioritised in pedestrianised areas and cycling routes.

9.2.16 It is recommended that during the design development of the options within this package, consideration is given to including structural adaptation measures, for example, selecting materials that are resistant to the expected extremes of both low and high temperatures, building protective infrastructure such as flood defences; and using permeable paving surfaces to reduce run-off during heavy rainfalls. Nature-based solutions should also be considered to further enhance natural resilience and adaptation measures.

9.2.17 Finally, the selection of materials used within the construction of the transport options should be based on their resilience to extreme weather, for example, preference should be given to corrosion-resistant materials rather than utilising metals and treating them with a non-corrosive powder coating.

9.3 Criterion 2

Criterion and success factor

9.3.1 Criterion 2 is:

- Extent to which the package supports the surrounding area to adapt and/or become more resilient to current and predicted future impacts of climate change.

9.3.2 Success factors:

- 2a. Supports adaptation for and/or resilience to current and future impacts of climate change within the study area outside of the package boundary.
- 2b. Supports the natural environment to adapt for and/or increase resilience to current and predicted future impacts of climate change.

Geographic and environmental context

9.3.3 **Table 9.5** and **Table 9.6** outline the geographic and environmental context against criterion 2 within a 7.5km boundary (unless otherwise stated, for example, when using the MET Office Data) of the route.

Table 9.5: Geographic and environmental context of Package 5 study area against Criterion 2, Success Factor 2a. Supports adaptation for and/or resilience to current and future impacts of climate change within the study area outside of the option boundary

Package 5 Study Area	Geographic and Environmental Context
Full Corridor	The geographic and environmental context for the full corridor are described in Package 5 Criterion 1 (Section 9.2).

Table 9.6: Geographic and environmental context of Package 5 study area against Criterion 2, Success Factor 2b. Supports the natural environment to adapt for and/or increase resilience to current and predicted future impacts of climate change

Package 5 Study Area	Geographic and Environmental Context
Full Corridor	Ecological designations fall either completely or partially within the study area of the A96 corridor include: • 43 Sites of Special Scientific Interest (SSSI); • Eight Special Protection Areas (SPA); • Seven Special Areas of Conservation (SAC); • Four Ramsar sites; • One Local Nature Reserves (LNR); • Two Royal Society for the Protection of Birds (RSPB) Reserves; • 20 Conservation Areas. The number, frequency and density of environmental designations is notably higher at the western end (particularly between Inverness and Huntly). The full extent of the Moray Firth coastline within the study area has environmental protection.

Package 5 criterion 2 assessment

9.3.4 Package 5 is at an early stage of development with limited design details on which to base an assessment. The assessment is based on potential impacts and interactions the options could have with aspects considered within this criterion.

9.3.5 The construction of the options included in Package 5 could impact the surrounding area's ability to adapt to climate change. This could be either positive or negative depending on how the options are designed and delivered.

9.3.6 The design and construction of all options included in Package 5 would be developed in accordance with relevant standards including DMRB. A risk that would need to be managed through design would be the interaction that the option would have with the drainage of the surrounding area. DMRB requires that schemes developed in accordance with the relevant standards should not increase flood risk to the surrounding area. The design should take account of existing risks such as communities that already experience flooding, for example, between 2016-2021, a total of eleven weather-related incidents involving either rain with/without high winds or snow with/without high winds caused A96 road closure. Development of the option could have a net positive impact on the area's ability to adapt to climate change if designed and delivered to go beyond mitigating risks and identify and take advantage of potential opportunities. This could include appropriate drainage features and flood defence systems – including outside of the option boundary.

9.3.7 The delivery of the options included in Package 5 could positively or negatively impact the ecosystem services provided by the surrounding area, depending on how the options are designed and delivered. The ecosystem services provided by the area surrounding the study area and which may be impacted by the delivery of the transport options include (but are not limited to):

- **Regulating services**: such as soil conservation and the carbon sequestration service provided by peatland, for example, between Fochabers and Keith where there are 20 pockets of Class 1 peatland which are nationally important carbon-rich soils, deep peat and priority peatland habitat.
- **Supporting services**: including nutrient cycling, soil formation and photosynthesis provided by the natural environment along the A96 corridor such as High Wood near Forres; Kirkhill and Birkenhill woods near Elgin; Bennachie Forest near Inverurie; Moray Monster Trails near Fochabers; Crooked Wood near Lhanbryde; and Tyrebagger Hill near Blackburn.
- **Provisioning services**: fresh water; timber and other forest products processed by companies such as Linnorie Firewood Services and Jewson Huntly timber merchants both in Huntly; Robertson Timber Engineering in Elgin; and Chas Smith Sawmill between Huntly and Keith.
- **Cultural services**: the recreational and aesthetic sites within the study area including (but not limited to) Garioch Heritage Centre in Inverurie; Huntly Castle; museums including the Moray Motor Museum; the many distilleries in the area

including Strathisla Distillery and Strathmill Distillery (both in Keith) and Glen Moray Distillery in Elgin; Gordon Castle Estate near Mosstodloch; Benromach Distillery in Forres; Marshall's Farm Shop and Forest Farm The Organic Dairy, both near Blackburn; Huntly Castle; Coxton Tower near Lhanbryde; the Coach House Caravan and Campsite and Dunnideer Castle, both between Inverurie and Huntly; and Threaplands Garden Centre between Lhanbryde and Mosstodloch.

9.3.8 Collectively the options included in Package 5 have the potential to support the communities within the study area to become more resilient to current and predicted future impacts of climate change through provision of additional transport options. For example, Package 5 includes options to improve public transport facilities including bus priority measures, improved public transport passenger interchange facilities and linespeed, passenger and freight capacity improvements on the Aberdeen to Inverness rail line. If one of these modes of public transport experiences travel disruption due to adverse weather conditions then the improvements made to other facilities have the potential to provide an alternative transport option.

9.3.9 Package 5 includes alternative refuelling infrastructure as part of the A96 Electric Corridor and investment in DRT and MaaS options. The impact of these options on the surrounding area's ability to adapt to climate change could be positive depending on how the options are designed and delivered. Currently, these options are not noted to be particularly prone to the identified effects of climate change.

9.3.10 The Package 5 study area includes land designated as environmentally sensitive, including 43 SSSI, seven SAC, eight SPA and 20 Geological Conservation Review Sites, which present a risk and opportunity regarding their future management. As such, there may be impact on the designated land and its ability to adapt to current and predicted future impacts of climate change.

Package 5 criterion 2 recommendations

9.3.11 All relevant design, construction and maintenance guidance, standards, processes, and assessments should be kept up to date with the latest climate change forecasts and associated best practice and applied to the development of all options.

9.3.12 Options should be designed, constructed and maintained to maximise the opportunities to improve the resilience and adaption of the surrounding area to the future impacts of climate change and local conditions. This could include appropriate drainage features and flood defence systems – including outside of the option boundary.

9.3.13 Consideration should be given to the interdependency of the transport options and their ability to function if one or more of the transport modes is interrupted due to adverse weather conditions.

9.3.14 Options should be designed, constructed and maintained to maximise the opportunities to improve the ecosystem services of the surrounding area and the natural environment's resilience to the future impacts of climate change. This should include the potential impacts listed in paragraph 9.3.7.

9.4 Criterion 3

Criterion and success factor

9.4.1 Criterion 3 is:

- Extent to which the package supports the decarbonisation of the transport network in Scotland, including supporting transition from higher to lower emission modes, and the modal shift to greater public transport and active travel options.

9.4.2 Success factors:

- 3a. The net change in user carbon emissions sit appropriately within the calculated emissions envelope for Scotland, taking account of changing legislation and targets (including any Climate Change Plan update for Scotland) (assumed current target of 2045).
- 3b. Supports the transition to low carbon modes of transport: transition from higher emissions to lower emissions modes, the modal shift to public transport and the modal shift to active travel for shorter everyday journeys.

Geographic and environmental context

9.4.3 Table 9.7 and Table 9.8 outline the geographic and environmental context against criterion 3 within a 7.5km boundary (unless otherwise stated, for example, when using the MET Office Data) of the route.

Table 9.7: Geographic and environmental context of Package 5 study area against Criterion 3, Success Factor 3a. The net change in user carbon emissions sit appropriately within the calculated emissions envelope for Scotland, taking account of changing legislation and targets (including any Climate Change Plan update for Scotland) (assumed current target of 2045)

Package 5 Study Area	Geographic and Environmental Context
Full Corridor	No additional context required - the net change calculations are shown in the Package 5 Criterion 3 Assessment section below (Table 9.9 and Table 9.10).

Table 9.8: Geographic and environmental context of Package 5 study area against Criterion 3, Success Factor 3b. Supports the transition to low carbon modes of transport: transition from higher emissions to lower emissions modes, the modal shift to public transport and the modal shift to active travel for shorter everyday journeys

Package 5 Study Area	Geographic and Environmental Context
Full Corridor	There are several on and off-road walking and cycling corridors in the study area, many being local networks, alongside a network of long-

Package 5 Study Area	Geographic and Environmental Context
	distance cycle routes that form part of the National Cycle Network (NCN). Though NCN routes are not always adjacent to the A96, they are important long-distance connections between the rural and urban communities within the wider study area. These include: ▪ NCN 1 – Between Aberdeen and Inverness within the confines of this study area via Torduff, Elgin and Nairn. ▪ NCN 195 – Route from Ballater (south of study area) to Aberdeen. ▪ NCN 7 – Route from the south of Inverness following the general alignment of the A9 Trunk Road. Long sections of the NCN routes in the study area are on-road and therefore require interactions with traffic. Traffic-free parts of the routes exist in small sections but for longer travel between settlements and towns it is necessary to travel on-road. The entire A96 route is covered by a bus route between Aberdeen and Inverness, with local services available in the larger towns along the route including Elgin and Inverurie. The regional bus network is primarily underpinned by supported public and school transport services run by Stagecoach, as well as First Bus in Aberdeen City, alongside smaller coach operators and local authority run services. Community transport and demand responsive transport services are operated within each of the local authorities although coverage is limited, with membership often required. Transport Accessibility (TRACC) Travel Time Analysis has been used to indicate frequency of bus services along the A96 corridor. This analysis indicates that the smaller towns in the more rural sections of the study area, including Huntly, Keith, and Fochabers have a very infrequent bus service at peak times for commuting to employment or education. There are more than 320 EV charging points along the entire A96 route, with 73% of those charging points made up of fast charging points. The largest cluster of EV charging points is at the town of Blackburn which has 173 charging points including slow charging, fast charging, rapid charging and ultra-rapid charging points.. The EV charging points are largely centred around communities across the A96 route, with very few charging locations across the wider, remoter network.

Package 5 criterion 3 assessment

9.4.4 **Table 9.9** and **Table 9.10** below show the net change in road user emissions with and without the package, under both the 'With Policy'' and 'Without Policy' transport behaviour scenarios.

Table 9.9: The net change in road user emissions with and without the package, under the 'With Policy' scenario. The target emissions reduction, and annual carbon emissions envelope have been set as per the Climate Compatibility Assessment methodology

Year	% Emissions reduction from baseline year	Annual carbon emissions envelope (Mt CO2e)	Without package (Do Nothing) (tCO2e)	With package (Do-Something) (tCO2e)	Net change (tCO2e)	Net tCO2e as % of the annual carbon emission envelope
1990	**Baseline**	75.7	N/A	N/A	N/A	N/A
2030	**75%**	18.93	212639.8	213114.3	474.51	0.003%
2031	**76.50%**	17.79	198463.8	198906.7	442.88	0.002%
2032	**78.00%**	16.65	184287.8	184699.1	411.24	0.002%
2033	**79.50%**	15.52	170111.8	170491.5	379.61	0.002%
2034	**81.00%**	14.38	155935.9	156283.8	347.98	0.002%
2035	**82.50%**	13.25	141759.9	142076.2	316.34	0.002%
2036	**84.00%**	12.11	127583.9	127868.6	284.71	0.002%
2037	**85.50%**	10.98	113407.9	113661.0	253.07	0.002%
2038	**87.00%**	9.84	99231.9	99453.3	221.44	0.002%
2039	**88.50%**	8.71	85055.9	85245.7	189.81	0.002%
2040	**90%**	7.57	70879.9	71038.1	158.17	0.002%
2041	**92.00%**	6.06	56703.9	56830.5	126.54	0.002%
2042	**94.00%**	4.54	42528.0	42622.9	94.90	0.002%
2043	**96.00%**	3.03	28352.0	28415.2	63.27	0.002%
2044	**98.00%**	1.51	14176.0	14207.6	31.63	0.002%
2045	**100%**	0	0.0	0.0	0	N/A

Table 9.10: The net change in road user emissions with and without the package, under 'Without Policy' scenario. The target emissions reduction, and annual carbon emissions envelope have been set as per the Climate Compatibility Assessment methodology

Year	% Emissions reduction from baseline year	Annual carbon emissions envelope (Mt CO2e)	Without package (Do Nothing) (tCO2e)	With package (Do-Something) (tCO2e)	Net change (tCO2e)	Net tCO2e as % of the annual carbon emission envelope
1990	**Baseline**	75.7	N/A	N/A	N/A	N/A
2030	**75%**	18.93	318601.7	319805.1	1203.43	0.006%
2031	**76.50%**	17.79	311750.3	313007.1	1256.79	0.007%
2032	**78.00%**	16.65	304898.9	306209.0	1310.15	0.008%
2033	**79.50%**	15.52	298047.4	299411.0	1363.51	0.009%
2034	**81.00%**	14.38	291196.0	292612.9	1416.87	0.010%
2035	**82.50%**	13.25	284344.6	285814.8	1470.24	0.011%
2036	**84.00%**	12.11	277493.2	279016.8	1523.60	0.013%
2037	**85.50%**	10.98	270641.7	272218.7	1576.96	0.014%
2038	**87.00%**	9.84	263790.3	265420.6	1630.32	0.017%
2039	**88.50%**	8.71	256938.9	258622.6	1683.68	0.019%
2040	**90%**	7.57	250087.5	251824.5	1737.05	0.023%
2041	**92.00%**	6.06	243236.0	245026.4	1790.41	0.030%
2042	**94.00%**	4.54	236384.6	238228.4	1843.77	0.041%
2043	**96.00%**	3.03	229533.2	231430.3	1897.13	0.063%
2044	**98.00%**	1.51	222681.8	224632.2	1950.49	0.129%
2045	**100%**	0	215830.3	217834.2	2003.86	N/A

9.4.5 Package 5 includes options that sit across the Sustainable Travel Hierarchy and have varying contribution to decarbonisation of the transport network. The options map to the Sustainable Travel Hierarchy is as below in Figure 9.3.1.

Figure 9.3.1: Overview of Package 5 options and their alignment with the Sustainable Travel Hierarchy

		Package 5 Options									
		Active communities	**Active connections**	**Bus priority measures**	**Linespeed, passenger, and freight capacity improvements on the Aberdeen to Inverness rail line**	**Investment in DRT and MaaS**	**Introduction of rail freight terminals**	**A96 electric corridor**	**Targeted road safety improvements**	**Bypasses of Forres, Elgin, Keith and Inverurie**	**Improved public transport passenger interchange facilities**
Sustainable Travel Hierarchy Tier	**Walking and wheeling**	Strong alignment	Strong alignment	No direct alignment	No direct alignment	No direct alignment	No direct alignment	No direct alignment	No direct alignment	No direct alignment	Strong alignment
	Cycling	Strong alignment	Strong alignment	No direct alignment	No direct alignment	No direct alignment	No direct alignment	No direct alignment	Partial alignment	Partial alignment	Strong alignment
	Public transport	No direct alignment	No direct alignment	Strong alignment	Strong alignment	Strong alignment	Partial alignment	Partial alignment	Partial alignment	Partial alignment	Strong alignment
	Taxis and shared transport	No direct alignment	No direct alignment	Strong alignment	No direct alignment	Strong alignment	No direct alignment	Strong alignment	Strong alignment	Strong alignment	Strong alignment
	Private car	No direct alignment	No direct alignment	No direct alignment	No direct alignment	No direct alignment	No direct alignment	Strong alignment	Strong alignment	Strong alignment	Strong alignment

9.4.6 The carbon emissions have been calculated for the whole of the traffic model and are predicted to increase over the traffic carbon emissions assessment period for both the 'With Policy' and 'Without Policy' scenarios. This increase is due to an increase in internal combustion engine vehicle kilometres travelled across the entirety of the traffic model.

Walking, wheeling and cycling

9.4.7 The Active Communities and Active Connections options included in Package 5 would help to facilitate a modal shift from car to active modes and would thus lead to a modest reduction in carbon emissions. These options sit high in the Sustainable Travel Hierarchy and could encourage the reduced use of non-renewable energy fuelled modes of transport, supporting the decarbonisation of the transport network. The improved public transport passenger interchange facilities option also supports walking, wheeling and cycling as the improvements are likely to encourage the use of alternative, low carbon modes of transport.

Public transport

9.4.8 The options included in the public transport tier of the Sustainable Travel Hierarchy include investment in DRT and MaaS; bus priority measures; improved public transport passenger interchange facilities; and linespeed, passenger and freight capacity improvements on the Aberdeen to Inverness rail line.

9.4.9 Collectively, these options have the potential to increase the attractiveness of public transport and could encourage a modal shift away from private car use over time. This may contribute to a decrease in associated carbon emissions during the operation of the proposed measures, thus contributing to the Scottish Government's net zero emissions target.

9.4.10 The extent of change in carbon emissions from affected buses and cars will depend on the fuel being used and factors such as the location of the new bus priority sites. Delivering faster and more reliable journey times for bus passengers could increase the attractiveness of bus as a mode of transport, resulting in mode shift from car. In addition, provision of bus priority measures could reduce bus operating costs, providing the opportunity to leverage other bus service improvements from operators, such as increased mileage.

Taxis, shared transport and private car

9.4.11 The delivery of the bypasses and the targeted road safety improvements at selected locations between Hardmuir, to the east of the town of Nairn, and Craibstone Roundabout, west of Aberdeen, is likely to improve the reliability of the A96 corridor since it will primarily consist of improvements to highway infrastructure. As such these improvements may make the A96 a more attractive route for private vehicles to use. The road safety improvements to the A96 may also make it a more attractive route for residents to use public transport travelling on the route, aligning with the Sustainable Travel Hierarchy. As the provision of the targeted road safety improvements may improve attractiveness of the A96 for private vehicles this may have a counter effect on modal shift. However, the delivery of the A96 Electric Corridor option will improve the overall network coverage and capacity for electric vehicles in and around the study area. This is expected to increase the overall attractiveness and reliability of using low/zero-emission vehicles along the A96. Through this option, it is expected that there will be a reduction in tailpipe carbon emissions, particularly over the long-term as the uptake of low and zero emission vehicles increases.

9.4.12 In the longer term, Package 5 could help to facilitate a modal shift to public transport and active travel through options such as bus priority measures and improved public transport. If this was achieved, it would support decarbonisation of the transport network in Scotland and the transition from higher to lower emission modes of transport.

Package 5 criterion 3 recommendations

9.4.13 All relevant design, construction and maintenance guidance, standards, processes, and assessments should be kept up to date with the latest climate change forecasts and associated best practice and applied to the development of all options.

9.4.14 All the options in Package 5 should be designed to improve alignment with the Sustainable Travel Hierarchy and careful consideration should be given to how the options can work together to optimise the lowest carbon option, for example, for different journeys and shorter routes.

9.4.15 As part of the Active Connections option, it is recommended that connections are maximised within and between the rural sections of the A96 corridor to improve and maximise walking, wheeling, and cycling opportunities for both local residents and visitors. Improvements could include suitable surfacing for all user types (including wheelchair users); few slopes/no stairs wherever possible; improved crossing points to promote safety; and suitably secure bike storage in and around the villages.

9.4.16 The impact on carbon emissions, of the options in the public transport tier of the Sustainable Travel Hierarchy (improved public transport passenger interchange facilities, bus priority measures, and line speed, passenger and freight capacity improvements on the Aberdeen to Inverness rail line), will depend on the fuel being used by buses and trains. It is therefore recommended that low-carbon modes of buses and trains are considered. It is envisaged that low carbon/zero carbon alternatives will become more cost efficient as technologies improve.

9.4.17 To fully support decarbonisation of the transport network, the following should be considered for all rail and transport hub improvement options: suitable provisions for bike storage at any improved/new stations; suitable station facilities to minimise private car miles; and improved local walking/cycling connections to promote the train facilities as a suitable, sustainable mode of transport. It is important that consideration is given to how the public transport options can work together to optimise use of the lowest carbon options.

9.4.18 The development of the A96 Electric Corridor option should include the distribution of electric and hydrogen-based fuel sources in addition to other alternative fuels such as HVO and Ammonia. The dispensaries should be placed strategically across the rural sections of the A96 corridor so that they are highly accessible to both road users and rural local communities. Consideration should also be given to demountable and mobile infrastructure.

9.4.19 The bypasses of Forres, Elgin, Keith and Inverurie and the targeted road safety improvements would be designed to DMRB standards and therefore the design will be obligated to consider the provision of facilities for non-motorised users of the A96 corridor. The bypasses and the road safety improvements should be designed to maximise associated active travel and opportunities for public transport. It is important that consideration is given to how the active travel and public transport options can work together to optimise use of the lowest carbon options.

9.5 Criterion 4

Criterion and success factor

9.5.1 Criterion 4 is:

- Extent to which the package supports the decarbonisation of the construction sector in Scotland and maximises reduction in whole life carbon emissions.

9.5.2 Success factor:

- 4a. Supports transition from higher emission to lower emission materials and technologies during construction, operation, and maintenance.

Geographic and environmental context

9.5.3 **Table 9.11** outlines the geographic and environmental context against criterion 4 within a 7.5km boundary (unless otherwise stated, for example, when using the MET Office Data) of the route.

Table 9.11: Geographic and environmental context of Package 5 study area against Criterion 4, Success Factor 4a. Supports transition from higher emission to lower emission materials and technologies during ocnstruction, operation and maintenance.

Package 5 Study Area	Geographic and Environmental Context
Full Corridor	UK Built Environment is responsible for 25% of total UK carbon emissions including buildings and infrastructure (UK Green Building Council, 2021). In relation to operation of their network Transport Scotland, as part of the Scottish Government, use renewable or zero carbon electricity tariffs for the electricity used to power the road network (such as for the use in lighting).

Package 5 criterion 4 assessment

9.5.4 Package 5 is at an early stage of development with limited design details on which to base an assessment. The assessment is based on potential impacts and interactions the options could have with aspects considered within this criterion.

9.5.5 Since there are limited design details, the carbon emissions impact is estimated from the capital cost forecast by applying the Scottish Government 'Supply, Use and Input-Output Tables' figure for construction. This provides an estimate of between 280,900tCO_2e and 701,700tCO_2e for the capital stage carbon emissions impact.

9.5.6 The construction stage carbon emissions will vary between the options in the package. The variability is likely to depend on the level of new infrastructure required to implement the options – with the greater the level of construction resulting in greater levels of associated carbon emissions.

9.5.7 Package 5 as described makes no commitments to how the carbon emissions impact from construction, maintenance and operation would be minimised and so any resulting benefits or carbon reduction measures cannot be specifically considered within this assessment.

9.5.8 The operational element of the carbon emissions impact is reduced in part through the use of renewable/zero carbon electricity tariffs, if that approach is continued.

9.5.9 If Package 5 is developed, the bypasses and the targeted road safety improvements would be subject to relevant standards and assessment procedures for the type of transport infrastructure. For example, for road development this would include the Design Manual for Roads and Bridges. Where the latest version of the DMRB climate change assessment standard (LA 114) is applied it requires the assessment of carbon emissions at detailed design stage.

Package 5 criterion 4 recommendations

9.5.10 All relevant design, construction and maintenance guidance, standards, processes, and assessments should be kept up to date with the latest best practice on carbon emission reductions and applied to the development of all options.

9.5.11 If Package 5 was taken forward there would be an opportunity as a major infrastructure project in Scotland to strongly support decarbonisation of the construction sector. Application of PAS2080: Carbon Management in Buildings and Infrastructure to all schemes and all suppliers will help to systematically address whole life carbon emissions. This should include stretching carbon emissions reduction targets for suppliers, and consideration of carbon neutral standards (such as PAS 2060 - Carbon Neutrality Standard and Certification) for any suppliers managing the network beyond 2045.

9.5.12 The impact of Package 5 on carbon emissions will depend on the methods used during construction. It is therefore recommended that innovative techniques and technologies are used where relevant to reduce emissions. These should be focused on optimising the design to build less and to consume less carbon intensive materials (such as asphalt, concrete and steel). This could include lower temperature mixes for asphalt, concrete with high cement replacement, and steel with high recycled content.

9.5.13 During construction, opportunities to reduce carbon emissions should be maximised such as local sourcing, construction and logistics efficiencies, alternative modes of transport – for example rail rather than road, low emission vehicles, and low carbon fuels.

9.5.14 With regards maintenance, more resilient technology could be installed in the first instance to withstand climatic factors, subsequently making the option more resilient and requiring less maintenance. As techniques and technologies improve, it is recommended that these are adopted at the earliest possible stage, subject to a cost/benefit analysis being undertaken.

9.5.15 The principles of the circular economy should be applied during design, construction, and maintenance. For example, material reduction and reuse should be prioritised to comply with the waste management hierarchy, and opportunities should be sought to recondition and use existing transport infrastructure where appropriate.

9.6 Criterion 5

Criterion and success factor

9.6.1 Criterion 5 is:

- Extent to which land use change associated with the package mitigates carbon emissions and contributes to carbon storage and sequestration.

9.6.2 Success factor:

- 5a. Supports the protection and development of carbon sinks, and takes appropriate measures to maximise carbon sequestration, taking account of wider ecosystem services/natural capital.

Geographic and environmental context

9.6.3 **Table 9.12** outlines the geographic and environmental context against criterion 5 within a 7.5km boundary (unless otherwise stated, for example, when using the MET Office Data) of the route.

Table 9.12: Geographic and environmental context of Package 5 study area against Criterion 5, Success Factor 5a. Supports the protection and development of carbon sinks, and takes appropriate measures to maximise carbon sequestration, taking account of wider ecosystem services/natural capital

Package 5 Study Area	Geographic and Environmental Context
Full Corridor	There are several pockets of peatland across the study area: • 118 pockets of Class 1 peatland (nationally important carbon-rich soils, deep peat and priority peatland habitat. Areas likely to be of high conservation value) • 32 pockets of Class 2 peatland (nationally important carbon-rich soils, deep peat and priority peatland habitat) • 193 pockets of Class 3 peatland (Dominant vegetation cover is not priority peatland habitat but is associated with wet and acidic type) • 1763 pockets of Class 4 peatland (Area unlikely to be associated with peatland habitats or wet and acidic type. Area unlikely to include carbon-rich soils) Within the full corridor study area, there are approximately 32,400 hectares of Ancient Woodland (AWI) (919 counts) and 12,150 hectares of woodland recorded in the Native Woodland of Scotland Survey (NWSS) (3,325 counts).

Package 5 criterion 5 assessment

9.6.4 Package 5 is at an early stage of development with limited design details which to base an assessment. The assessment is based on potential impacts and interactions the options could have with aspects considered within this criterion.

9.6.5 The transport options within Package 5 are solely infrastructure-led and do not explicitly include the provision of public realm improvements to green space, or blue or green infrastructure assets. Therefore, it is not possible to confirm if Package 5 would have a positive impact on land use change, carbon storage and sequestration.

9.6.6 All the options would be developed in accordance with the relevant standards and relevant Scottish Government and Transport Scotland policies and plans. The scale of the effects would be subject to detailed design and the location of the options being determined.

9.6.7 The option has the potential for negative environmental effects on the storage and sequestration of carbon within natural ecosystems. The scale and locations of the interventions would be subject to detailed design and therefore at this stage the extent of effects is uncertain.

9.6.8 The area within the full corridor includes land designated as environmentally sensitive, which presents a risk and opportunity to be managed in terms of how they are impacted on/or supported in terms of their ability to sequester and store carbon.

Package 5 criterion 5 recommendations

9.6.9 All relevant design, construction and maintenance guidance, standards, processes, and assessments should be kept up to date with the latest climate change forecasts and associated best practice and applied to the development of all options.

9.6.10 Consideration should be made during the site selection process to prioritise locations where there are likely to be minimal potential adverse effects on carbon storage and sequestration.

9.6.11 Existing carbon sinks should be enhanced wherever possible, to increase potential carbon sequestration as an integral part of the schemes, particularly relating to peatland restoration and wetland enhancement.

10. Refined Package

10.1 Package description

10.1.1 The options included in this package are:

- Active Communities;
- Improved Public Transport Passenger Interchange Facilities;
- Investment in DRT and MaaS;
- Targeted Road Safety Improvements;
- Bypasses of Elgin and Keith;
- Linespeed, Passenger and Freight Capacity Improvements on the Aberdeen to Inverness Rail Line; and
- A96 Electric Corridor.

10.1.2 The Refined Package is focused on primarily delivering transport network improvements to both settlements and rural sections throughout the A96 corridor, by providing enhancements which would aim to encourage a shift to sustainable modes, increase opportunities for residents and businesses and improve road safety. It should be noted that the A96 Dualling Inverness to Nairn (including Nairn Bypass) scheme does not form part of the A96 Corridor Review as it has successfully progressed through a Public Local Inquiry and has Ministerial consent. Interventions within Nairn itself, similar to those proposed within the other bypassed towns, however, have been included in this package for appraisal.

10.1.3 The location of the settlements and interventions considered in relation to the wider A96 Corridor Review transport appraisal study area (as defined within A96 Corridor Review Case for Change) is illustrated in **Error! Reference source not found.**.

10.1.4 This package focuses on delivering networks of high-quality active travel routes and facilitating placemaking improvements within the settlements of Nairn, Forres, Elgin, Lhanbryde, Mosstodloch, Fochabers, Keith, Huntly, Inverurie, Kintore and Blackburn by creating 'Active Communities', where more space would be provided for people rather than traffic, which could reduce the need to travel unsustainably. Active Communities draws from the '20-minute neighbourhood' concept (10 minutes there, 10 minutes back) and is built around an approximate radius of 800m from the centre of each town or settlement, whilst also creating safer routes to schools and encouraging more inclusive environments for people walking, wheeling and cycling. This would enhance the sense of place and encourage local communities to spend more time within their local areas.

10.1.5 This package also aims to improve the safety, resilience and reliability of the A96 Trunk Road through the provision of a bypass at Elgin and Keith, whilst also addressing real and perceived severance within these communities by removing through trips. This element of the package is seen as a key enabler to maximising the benefits associated with Active Communities in these towns. As noted above, the provision of a bypass at Nairn is not included within this package as it forms part of the A96 Inverness to Nairn (including Nairn Bypass) scheme.

10.1.6 Targeted safety improvements also form part of this package, aiming to address both real and perceived safety concerns on the A96 Trunk Road. It is envisaged that this would be achieved through the provision of improved overtaking opportunities, junction improvements and improvements to the alignment of the carriageway at targeted locations along the route.

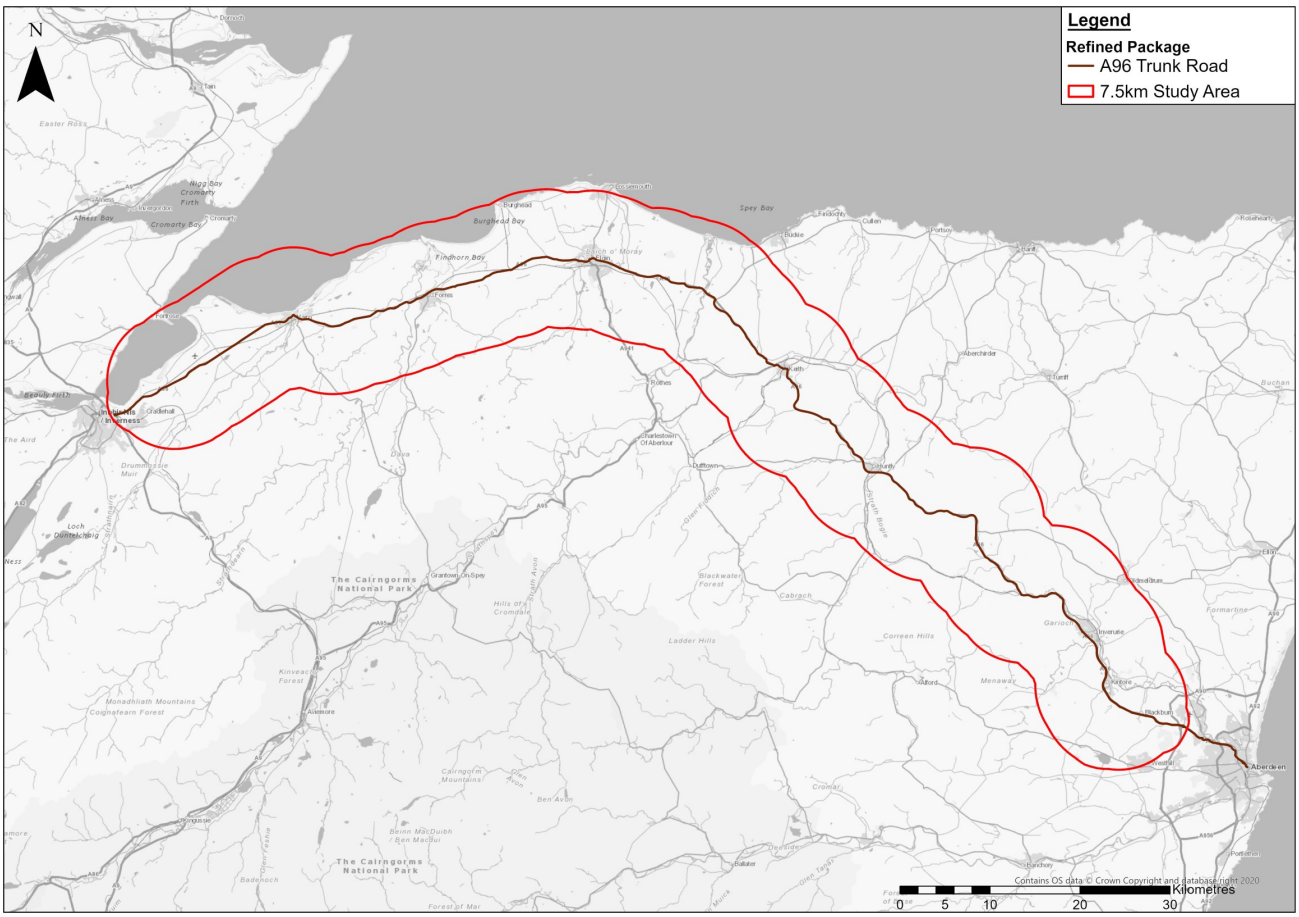
10.1.7 A number of public transport interventions targeted at delivering faster and more reliable journey times, as well as improving the overall passenger experience also form part of this package. Journey time and reliability improvements would be achieved through rail improvements delivered by means of linespeed and reliability interventions on the Aberdeen to Inverness rail line, reducing end-to-end journey times to two hours (currently approximately two hours and 25 minutes). This would be facilitated through the provision of passing loops, new rolling stock and improving passenger service frequencies and freight opportunities.

10.1.8 This package also includes interventions to improve accessibility and quality of public transport interchange facilities such as bus and railway stations throughout the corridor. Improvements are likely to include smaller scale interventions such as placemaking enhancements, improved wayfinding, enhancements to the waiting environment and/or improved accessibility, including lifts and step-free access. However, it may also include the construction of new interchange facilities.

10.1.9 Improvements to the public transport network coverage are also proposed through the use of flexible services, such as Demand Responsive Transport (DRT) or Community Transport (CT), supported by Mobility as a Service (MaaS) or smart technology where appropriate, at a corridor level.

10.1.10 Development of the A96 Electric Corridor is also included within this package to encourage a shift away from internal combustion engine (ICE) vehicles. This intervention would seek to improve the provision of alternative refuelling infrastructure and facilities along the full A96 corridor and its interfacing local roads.

Figure 10.1.1 The Refined Package study area (high resolution versions in Appendix E)



10.2 Criterion 1

Criterion and success factors

10.2.1 Criterion 1 is:

- Extent to which the package supports adaptation for and/or resilience to current and predicted future impacts of climate change.

10.2.2 Success factors:

- 1a. Supports adaptation for and/or resilience to predicted increases in sea levels and storm surge.
- 1b. Supports adaptation for and/or resilience to predicted changes in temperatures.
- 1c. Supports adaptation for and/or resilience to predicted increase in likelihood and severity of fluvial and pluvial flooding.
- 1d. Supports adaptation for and/or resilience to predicted increase in likelihood and severity of storms and high winds.

Geographic and environmental context

10.2.3 **Table 10.1**, **Table 10.2**, **Table 10.3** and **Table 10.4** outline the geographic and environmental context against criterion 1 within a 7.5km boundary (unless otherwise stated, for example, when using the MET Office Data) of the route.

Table 10.1: Geographic and environmental context of the Refined Package study area against Criterion 1, Success Factor 1a. Supports adaptation for and/or resilience to predicted increases in sea levels and storm surge

Refined Package Study Area	Geographic and Environmental Context
Full Corridor	SEPA Coastal Hazard Maps identify a 0.1% chance of coastal flooding each year during a 1 in 1,000-year return period, and a 0.5% chance during a 1 in 200-year period. This risk is confined to the coastal settlements within the wider study area of Findhorn, Burghead and Lossiemouth, although the estuary at Findhorn does allow for a greater extent of coastal flood risk inland. There is also potential coastal flood risk for Nairn, the estuary at Spey Bay and Burghead Bay - though Burghead Bay coastal flooding is largely centred around the beach and does not extend significantly further inland (compared with Findhorn Bay and Spey Bay).

Table 10.2: Geographic and environmental context of the Refined Package study area against Criterion 1 Success Factor 1b. Supports adaptation for and/or resilience to predicted changes in temperatures

Refined Package Study Area	Geographic and Environmental Context
Full Corridor	Change in mean annual air temperature is predicted to range between +0.87C (2020-2049) and +3.05°C (2070-2099) within a geographical boundary of 25km around the corridor (50% probability). Change in maximum summer air temperature is predicted to range between +0.74°C (2020-2049) and +3.46°C (2070-2099) and change in minimum winter air temperature is predicted to range between +0.83°C (2020-2049) and +3.08°C (2070-2099) (50% probability).

Table 10.3: Geographic and environmental context of the Refined Package study area against Criterion 1, Success Factor 1c. Supports adaptation for and/or resilience to predicted increase in likelihood and severity of fluvial and pluvial flooding

Refined Package Study Area	Geographic and Environmental Context
Full Corridor	<u>Fluvial Flooding</u> SEPA Coastal Hazard Maps identify a 10% chance of river flooding each year during a 1 in 10-year return period; 0.5% chance during a 1 in 200-year return period; and 0.1% chance during a 1 in 1,000-year return period. In addition, the geographical area at risk of flooding increases between 10 and 1,000-year return periods, with flood depths ranging between 0.3m and 1.0m. Given the significant number of watercourses, the main risk of flooding within the A96 corridor is from river flooding. This risk follows the following watercourses: ▪ the River Lossie and associated waterways; ▪ the River Isla and associated waterways; ▪ the River Urie and associated waterways; ▪ the River Don and associated waterways; ▪ the River Findhorn, Muckle Burn and tributaries of Findhorn Bay; ▪ the River Spey, associated waterways tributaries of Spey Bay; and ▪ tributaries of Burghead Bay; the River Deveron and associated waterways. The flood mapping illustrates that the River Don poses significant flood risk to roads and settlements between Old Rayne and Dyce, with Kintore and Inverurie at significant risk. Keith however, is deemed to be at low risk. The other main settlements within the corridor of Nairn, Forres, Elgin, Fochabers, Huntly and Blackburn show significant areas of flood risk from various watercourses, including the River Spey and River Deveron. Flood protection schemes have been implemented within the corridor, including at Forres, Elgin, and Huntly, and a flood study for Inverurie and Port Elphinstone is underway. <u>Pluvial Flooding</u> The average change in annual precipitation (50% probability) is predicted to be +4.65% (2020-2049), +4.59% (2040-2069) and +6.27% (2070-2099). Change in summer precipitation rate (50% probability) is predicted to be -0.59% (2020-2049), -7.74% (2040-2069) and -15.28% (2070-2099) while the change in winter precipitation rate (50% probability) is predicted to be +11.88% (2020-2049), +17.06% (2040-2069) and +27.69% (2070-2099). More frequent, high-intensity rainfall will increase the risk of flash flooding from surface water or sewers for inland communities, especially during winter months.

Table 10.4: Geographic and environmental context of the Refined Package study area against Criterion 1, Success Factor 1d. Supports adaptation for and/or resilience to predicted increase in likelihood and severity of storms and high winds

Refined Package Study Area	Geographic and Environmental Context
Full Corridor	There was a total of 11 weather-related incidents (flooding, snow or landscaping/fallen/overhanging branches) between 2016-2021 along the Refined Package study area.

Refined Package criterion 1 assessment

10.2.4 The Refined Package is at an early stage of development with limited design details on which to base an assessment. The assessment is based on potential impacts and interactions the options could have with aspects considered within this criterion.

10.2.5 The geographic and environmental context for the full A96 corridor forecasts that annual temperatures will increase across the corridor, with drier, warmer summers and wetter, milder winters. This means that the settlements that fall within the A96 corridor will potentially have to account for a wider range of annual temperatures and be resilient to higher peak summer temperatures (which could potentially warp surfaces, impact electronic and electrical equipment and cause heatstroke for operational users or construction workers).

10.2.6 Current standards for designing and constructing transport infrastructure are maintained and updated regularly to account for climate factors. This process should ensure that each option is designed and built to adapt to the predicted future impacts of climate change across the full A96 corridor. Any resulting infrastructure that is built to adapt to future impacts of climate change has the potential to increase the overall resilience of the transport network in and around the settlements.

10.2.7 The Refined Package includes options to improve public transport facilities, including linespeed, passenger and freight capacity improvements on the Aberdeen to Inverness rail line, and investment in DRT and MaaS. These options will make the settlements within the A96 corridor more resilient as these options aim to provide a more reliable public transport service throughout the corridor, cutting journey times and providing a more frequent rail passenger service.

10.2.8 The Refined Package includes alternative refuelling infrastructure as part of the A96 Electric Corridor which is not noted to be particularly prone to the identified effects of climate change, however there may be locations that may be more vulnerable to the effects impacting the existing A96, for example, future flooding that may occur in and around specific settlements.

10.2.9 The Refined Package includes the option of the bypasses of Elgin and Keith and the option of targeted road safety improvements which will be developed in accordance with the Design Manual for Roads and Bridges including DMRB LA 114 Climate standard, which assesses the resilience and adaptation of proposed road infrastructure assets at detailed design stage. DMRB LA 114 states '*the scoping assessment shall identify whether anticipated changing climate conditions and weather events are likely to have significant adverse effects on the project (or elements of the project) during construction and operation*'.

10.2.10 Examples of potential climate impacts cited in DMRB LA 114 during construction and operation include increased frequency of extreme weather; increased temperatures; increased precipitation; increased sea level rise and wave height; and gales. Therefore, it is assumed that the bypasses will be designed in accordance with DMRB LA 114 to ensure resilience against extreme weather and to minimise the potential effects of climate change, to reduce the vulnerability of the infrastructure.

Refined Package criterion 1 recommendations

10.2.11 All relevant design, construction and maintenance guidance, standards, processes, and assessments should be kept up to date with the latest climate change forecasts and associated best practice and applied to the development of all options.

10.2.12 If the Refined Package is taken forward it is recommended that any potential impacts on the climate resilience of the full corridor are understood at the earliest design stage and accounted for within the design. Technologies to counteract the impacts of climate change and provide resilience for each option within the Refined Package should be considered. The design for each option should embed measures for adaptation against climate-related hazards where practicable, to reduce the significance levels of any adverse impacts.

10.2.13 The vulnerability of all the options included in the Refined Package to climate change across the full corridor should be appropriately scoped to understand the potential impacts on the associated assets during construction and operation – for example on electronic equipment; construction workers; end users; site facilities; structures; earthworks; verges; drainage; and construction plant.

10.2.14 Consideration should be made during the site selection process for options that require construction of new facilities or infrastructure to prioritise locations across the full corridor which are more resilient to the potential effects of climate change. For example, selecting a location for the infrastructure on naturally higher ground levels and building away from coastal areas and/or floodplains that are anticipated to be subject to flooding. Additionally, the drainage capabilities of the infrastructure should be designed to deal with more intense rainfall events and flooding.

10.2.15 Active travel provisions should include elements that will support adaptation for and/or resilience to current and predicted future impacts of climate change. For example, the use of porous pavements for pedestrianised areas and cycling routes and the use of higher solar reflectance/cool pavements in pedestrianised areas and cycling lanes should be considered. Additionally, road salt and snow removal should be prioritised in pedestrianised areas and cycling routes.

10.2.16 It is recommended that during the design development of the options within this package, consideration is given to including structural adaptation measures, for example, selecting materials that are resistant to the expected extremes of both low and high temperatures, building protective infrastructure such as flood defences; and using permeable paving surfaces to reduce run-off during heavy rainfalls. Nature-based solutions should also be considered to further enhance natural resilience and adaptation measures.

10.2.17 Finally, the selection of materials used within the construction of the transport options should be based on their resilience to extreme weather, for example, preference should be given to corrosion-resistant materials rather than utilising metals and treating them with a non-corrosive powder coating.

10.3 Criterion 2

Criterion and success factor

10.3.1 Criterion 2 is:

- Extent to which the package supports the surrounding area to adapt and/or become more resilient to current and predicted future impacts of climate change.

10.3.2 Success factors:

- 2a. Supports adaptation for and/or resilience to current and future impacts of climate change within the study area outside of the package boundary.
- 2b. Supports the natural environment to adapt for and/or increase resilience to current and predicted future impacts of climate change.

Geographic and environmental context

10.3.3 **Table 10.5** and **Table 10.6** outline the geographic and environmental context against criterion 2 within a 7.5km boundary (unless otherwise stated, for example, when using the MET Office Data) of the Refined Package.

Table 10.5: Geographic and environmental context of the Refined Package study area against Criterion 2, Success Factor 2a. Extent to which the package supports the surrounding area to adapt and/or become more resilient to current and predicted future impacts of climate change

Refined Package Study Area	Geographic and Environmental Context
Full Corridor	The geographic and environmental context for the full corridor are described in Refined Package Criterion 1 (Section 10.2).

Table 10.6: Geographic and environmental context of the Refined Package study area against Criterion 2, Success Factor 2b. Supports the natural environment to adapt for and/or increase resilience to current and predicted future impacts of climate change

Refined Package Study Area	Geographic and Environmental Context
Full Corridor	Ecological designations fall either completely or partially within the study area of the A96 corridor include: • 43 Sites of Special Scientific Interest (SSSI); • Eight Special Protection Areas (SPA); • Seven Special Areas of Conservation (SAC); • Four Ramsar sites; • One Local Nature Reserves (LNR); • Two Royal Society for the Protection of Birds (RSPB) Reserves; and • 20 Conservation Areas. The number, frequency and density of environmental designations is notably higher at the western end (particularly between Inverness and Huntly). The full extent of the Moray Firth coastline within the study area has environmental protection.

Refined Package criterion 2 assessment

10.3.5 The Refined Package is at an early stage of development with limited design details on which to base an assessment. The assessment is based on potential impacts and interactions the options could have with aspects considered within this criterion.

10.3.6 The construction of the options included in the Refined Package could impact the surrounding area's ability to adapt to climate change. This could be either positive or negative depending on how the options are designed and delivered.

10.3.7 The design and construction of all options included in the Refined Package would be developed in accordance with relevant standards including DMRB. A risk that would need to be managed through design would be the interaction that the option would have with the drainage of the surrounding area. DMRB requires that schemes developed in accordance with the relevant standards should not increase flood risk to the surrounding area. The design should take account of existing risks such as communities that already experience flooding. For example, between 2016-2021, a total of eleven weather-related incidents involving either rain with/without high winds or snow with/without high winds causing A96 road closure. Development of the option could have a net positive impact on the area's ability to adapt to climate change if designed and delivered to go beyond mitigating risks and identify and take advantage of potential opportunities. This could include appropriate drainage features and flood defence systems – including outside of the option boundary.

10.3.8 The delivery of the options included in the Refined Package could positively or negatively impact the ecosystem services provided by the surrounding area, depending on how the options are designed and delivered. The ecosystem services provided by the area surrounding the study area and which may be impacted by the delivery of the transport options include (but are not limited to):

- **Regulating services**: such as soil conservation and the carbon sequestration service provided by peatland, for example, between Fochabers and Keith where there are 20 pockets of Class 1 peatland which are nationally important carbon-rich soils, deep peat and priority peatland habitat.
- **Supporting services**: including nutrient cycling, soil formation and photosynthesis provided by the natural environment along the A96 corridor such as High Wood near Forres; Kirkhill and Birkenhill woods near Elgin; Bennachie Forest near Inverurie; Moray Monster Trails near Fochabers; Crooked Wood near Lhanbryde; and Tyrebagger Hill near Blackburn.
- **Provisioning services**: fresh water; timber and other forest products processed by companies such as Linnorie Firewood Services and Jewson Huntly timber merchants both in Huntly; Robertson Timber Engineering in Elgin; and Chas Smith Sawmill between Huntly and Keith.

- **Cultural services**: the recreational and aesthetic sites within the study area including (but not limited to) Garioch Heritage Centre in Inverurie; Huntly Castle; museums including the Moray Motor Museum; the many distilleries in the area including Strathisla Distillery and Strathmill Distillery (both in Keith) and Glen Moray Distillery in Elgin; Gordon Castle Estate near Mosstodloch; Benromach Distillery near Forres; Marshall's Farm Shop and Forest Farm The Organic Dairy both near Blackburn; Huntly Castle; Coxton Tower near Lhanbryde; the Coach House Caravan and Campsite and Dunnideer Castle, both between Inverurie and Huntly; and Threaplands Garden Centre between Lhanbryde and Mosstodloch.

10.3.9 Collectively the options included in the Refined Package have the potential to support the communities within the study area to become more resilient to current and predicted future impacts of climate change through provision of additional transport options. For example, the Refined Package includes improved public transport passenger interchange facilities and linespeed, passenger and freight capacity improvements on the Aberdeen to Inverness rail line. If one of these modes of public transport experiences travel disruption due to adverse weather conditions then the improvements made to other facilities have the potential to provide an alternative transport option.

10.3.10 The Refined Package includes alternative refuelling infrastructure as part of the A96 Electric Corridor and investment in DRT and MaaS options. The impact of these options on the surrounding area's ability to adapt to climate change could be positive depending on how the options are designed and delivered.

10.3.11 The Refined Package study area includes land designated as environmentally sensitive, including 43 SSSI, seven SAC, eight SPA and 20 Geological Conservation Review Sites, which present a risk and opportunity regarding their future management. As such, there may be impact on the designated land and its ability to adapt to current and predicted future impacts of climate change.

Refined Package criterion 2 recommendations

10.3.12 All relevant design, construction and maintenance guidance, standards, processes, and assessments should be kept up to date with the latest climate change forecasts and associated best practice and applied to the development of all options.

10.3.13 Options should be designed, constructed and maintained to maximise the opportunities to improve the resilience and adaption of the surrounding area to the future impacts of climate change and local conditions. This could include appropriate drainage features and flood defence systems – including outside of the option boundary.

10.3.14 Consideration should be given to the interdependency of the transport options and their ability to function if one or more of the transport modes is interrupted due to adverse weather conditions.

10.3.15 Options should be designed, constructed and maintained to maximise the opportunities to improve the ecosystem services of the surrounding area and the natural environments resilience to the future impacts of climate change. This should include the potential impacts listed in paragraph 10.3.8

10.4 Criterion 3

Criterion and success factor

10.4.1 Criterion 3 is:

- Extent to which the package supports the decarbonisation of the transport network in Scotland, including supporting transition from higher to lower emission modes, and the modal shift to greater public transport and active travel options.

10.4.2 Success factors:

- 3a. The net change in user carbon emissions sit appropriately within the calculated emissions envelope for Scotland, taking account of changing legislation and targets (including any Climate Change Plan update for Scotland) (assumed current target of 2045).
- 3b. Supports the transition to low carbon modes of transport: transition from higher emissions to lower emissions modes, the modal shift to public transport and the modal shift to active travel for shorter everyday journeys.

Geographic and environmental context

10.4.3 Table 10.7 and Table 10.8 outline the geographic and environmental context against criterion 3 within a 7.5km boundary (unless otherwise stated, for example, when using the MET Office Data) of the Refined Package.

Table 10.7: Geographic and environmental context of the Refined Package study area against Criterion 3, Success Factor 3a. The net change in user carbon emissions sit appropriately within the calculated emissions envelope for Scotland, taking account of changing legislation and targets (including any Climate Change Plan update for Scotland) (assumed current target of 2045)

Refined Package Study Area	Geographic and Environmental Context
Full Corridor	No additional context required - the net change calculations are shown in the Refined Package Criterion 3 Assessment section below (Table 10.9 and Table 10.10).

Table 10.8: Geographic and environmental context of the Refined Package study area against Criterion 3 Success Factor 3b. Supports the transition to low carbon modes of transport: transition from higher emissions to lower emissions modes, the modal shift to public transport and the modal shift to active travel for shorter everyday journeys.

Refined Package Study Area	Geographic and Environmental Context
Full Corridor	There are several on and off-road walking and cycling corridors in the study area, many being local networks, alongside a network of long-distance cycle routes that form part of the National Cycle Network (NCN). Though NCN routes are not always adjacent to the A96, they are important long-distance connections between the rural and urban communities within the wider study area. These include: ▪ NCN 1 – Between Aberdeen and Inverness within the confines of this study area via Torduff, Elgin and Nairn. ▪ NCN 195 – Route from Ballater (south of study area) to Aberdeen. ▪ NCN 7 – Route from the south of Inverness following the general alignment of the A9 Trunk Road. Long sections of the NCN routes in the study area are on-road and therefore require interactions with traffic. Traffic-free parts of the routes exist in small sections but for longer travel between settlements and towns it is necessary to travel on-road. The entire A96 route is covered by a bus route between Aberdeen and Inverness, with local services available in the larger towns along the route including Elgin and Inverurie. The regional bus network is primarily underpinned by supported public and school transport services run by Stagecoach, as well as First Bus in Aberdeen City, alongside smaller coach operators and local authority run services. Community transport and demand responsive transport services are operated within each of the local authorities although coverage is limited, with membership often required. Transport Accessibility (TRACC) Travel Time Analysis has been used to indicate frequency of bus services along the A96 corridor. This analysis indicates that the smaller towns in the more rural sections of the study area, including Huntly, Keith, and Fochabers have a very infrequent bus service at peak times for commuting to employment or education. There are more than 320 EV charging points along the entire A96 route, with 73% of those charging points made up of fast charging points. The largest cluster of EV charging points is at the town of Blackburn which has 173 charging points including slow charging, fast charging, rapid charging and ultra-rapid charging points. The EV charging points are largely centred around communities across the A96 route, with very few charging locations across the wider, remoter network.

Refined Package criterion 3 assessment

10.4.4 Table 10.9 and Table 10.10 below show the net change in road user emissions with and without the package, under both the 'With Policy' and 'Without Policy' transport behaviour scenarios.

Table 10.9: The net change in road user emissions with and without the package, under the 'With Policy' scenario. The target emissions reduction, and annual carbon emissions envelope have been set as per the Climate Compatibility Assessment methodology

Year	% Emissions reduction from baseline year	Annual carbon emissions envelope (Mt CO2e)	Without package (Do Nothing) (tCO2e)	With package (Do-Something) (tCO2e)	Net change (tCO2e)	Net tCO2e as % of the annual carbon emission envelope
1990	**Baseline**	**75.7**	N/A	N/A	N/A	N/A
2030	**75%**	**18.93**	212639.8	212984.5	344.70	0.002%
2031	**76.50%**	**17.79**	198463.8	198785.5	321.72	0.002%
2032	**78.00%**	**16.65**	184287.8	184586.6	298.74	0.002%
2033	**79.50%**	**15.52**	170111.8	170387.6	275.76	0.002%
2034	**81.00%**	**14.38**	155935.9	156188.6	252.78	0.002%
2035	**82.50%**	**13.25**	141759.9	141989.7	229.80	0.002%
2036	**84.00%**	**12.11**	127583.9	127790.7	206.82	0.002%
2037	**85.50%**	**10.98**	113407.9	113591.7	183.84	0.002%
2038	**87.00%**	**9.84**	99231.9	99392.8	160.86	0.002%
2039	**88.50%**	**8.71**	85055.9	85193.8	137.88	0.002%
2040	**90%**	**7.57**	70879.9	70994.8	114.90	0.002%
2041	**92.00%**	**6.06**	56703.9	56795.9	91.92	0.002%
2042	**94.00%**	**4.54**	42528.0	42596.9	68.94	0.002%
2043	**96.00%**	**3.03**	28352.0	28397.9	45.96	0.002%
2044	**98.00%**	**1.51**	14176.0	14199.0	22.98	0.002%
2045	**100%**	**0**	0.0	0.0	0	N/A

Table 10.10: The net change in road user emissions with and without the package, under the 'Without Policy' scenario. The target emissions reduction, and annual carbon emissions envelope have been set as per the Climate Compatibility Assessment methodology

Year	% Emissions reduction from baseline year	Annual carbon emissions envelope (Mt CO2e)	Without package (Do Nothing) (tCO2e)	With package (Do-Something) (tCO2e)	Net change (tCO2e)	Net tCO2e as % of the annual carbon emission envelope
1990	**Baseline**	**75.7**	N/A	N/A	N/A	N/A
2030	**75%**	**18.93**	318601.7	319901.4	1299.63	0.007%
2031	**76.50%**	**17.79**	311750.3	313079.5	1329.23	0.007%
2032	**78.00%**	**16.65**	304898.9	306257.7	1358.83	0.008%
2033	**79.50%**	**15.52**	298047.4	299435.9	1388.42	0.009%
2034	**81.00%**	**14.38**	291196.0	292614.0	1418.02	0.010%
2035	**82.50%**	**13.25**	284344.6	285792.2	1447.61	0.011%
2036	**84.00%**	**12.11**	277493.2	278970.4	1477.21	0.012%
2037	**85.50%**	**10.98**	270641.7	272148.5	1506.80	0.014%
2038	**87.00%**	**9.84**	263790.3	265326.7	1536.40	0.016%
2039	**88.50%**	**8.71**	256938.9	258504.9	1565.99	0.018%
2040	**90%**	**7.57**	250087.5	251683.0	1595.59	0.021%
2041	**92.00%**	**6.06**	243236.0	244861.2	1625.18	0.027%
2042	**94.00%**	**4.54**	236384.6	238039.4	1654.78	0.036%
2043	**96.00%**	**3.03**	229533.2	231217.6	1684.38	0.056%
2044	**98.00%**	**1.51**	222681.8	224395.7	1713.97	0.113%
2045	**100%**	**0**	215830.3	217573.9	1743.57	N/A

10.4.5 The Refined Package includes options that sit across the Sustainable Travel Hierarchy and have varying contribution to decarbonisation of the transport network. The options map to the Sustainable Travel Hierarchy is as below in **Figure 10.3.1**.

Figure 10.3.1: Overview of Refined Package options and their alignment with the Sustainable Travel Hierarchy

		The Refined Package Options						
		Active communities	**Linespeed, passenger, and freight capacity improvements on the Aberdeen to Inverness rail line**	**Investment in DRT and MaaS**	**A96 Electric Corridor**	**Targeted road safety improvements**	**Bypasses of Elgin and Keith**	**Improved public transport passenger interchange facilities**
Sustainable Travel Hierarchy Tier	**Walking and wheeling**	Strong alignment	No direct alignment	No direct alignment	No direct alignment	No direct alignment	No direct alignment	Strong alignment
	Cycling	Strong alignment	No direct alignment	No direct alignment	No direct alignment	Partial alignment	Partial alignment	Strong alignment
	Public transport	No direct alignment	Strong alignment	Strong alignment	Partial alignment	Partial alignment	Partial alignment	Strong alignment
	Taxis and shared transport	No direct alignment	No direct alignment	Strong alignment	Strong alignment	Strong alignment	Strong alignment	Strong alignment
	Private car	No direct alignment	No direct alignment	No direct alignment	Strong alignment	Strong alignment	Strong alignment	Strong alignment

10.4.6 The carbon emissions have been calculated for the whole of the traffic model and are predicted to increase over the traffic carbon emissions assessment period for both the 'With Policy' and 'Without Policy' scenarios. This increase is due to an increase in internal combustion engine vehicle kilometres travelled across the entirety of the traffic model.

Walking, wheeling and cycling

10.4.7 The Active Communities option included in the Refined Package would help to facilitate a modal shift from car to active modes and would thus lead to a modest reduction in carbon emissions. These options sit high in the Sustainable Travel Hierarchy and could encourage the reduced use of non-renewable energy fuelled modes of transport, supporting the decarbonisation of the transport network in and around the settlements. The improved public transport passenger interchange facilities option also supports walking, wheeling and cycling as the improvements are likely to encourage the use of alternative, low carbon modes of transport.

Public transport

10.4.8 The options included in the public transport tier of the Sustainable Travel Hierarchy include investment in DRT and MaaS; improved public transport passenger interchange facilities; and linespeed, passenger and freight capacity improvements on the Aberdeen to Inverness rail line.

10.4.9 Collectively, these options have the potential to increase the attractiveness of public transport and could encourage a modal shift away from private car use over time. This may contribute to a decrease in associated carbon emissions during the operation of the proposed measures, thus contributing to the Scottish Government's net zero emissions target.

10.4.10 The extent of change in carbon emissions from affected buses and cars will depend on the fuel being used. Delivering faster and more reliable journey times for bus passengers could increase the attractiveness of bus as a mode of transport, resulting in mode shift from car.

Taxis, shared transport and private car

10.4.11 The delivery of the bypasses and the targeted road safety improvements at selected locations between Hardmuir, to the east of the town of Nairn, and Craibstone Roundabout west of Aberdeen is likely to improve the reliability of the A96 road corridor since it will primarily consist of improvements to highway infrastructure. As such these improvements may make the A96 a more attractive route for private vehicles to use. The road safety improvements to the A96 may also make it a more attractive route for residents to use public transport travelling on the route. As the provision of the targeted road safety improvements may improve attractiveness of the A96 for private vehicles this may have a counter effect on modal shift. However, the delivery of the A96 Electric Corridor option will improve the overall network coverage and capacity for electric vehicles in and around the study area. This is expected to increase the overall attractiveness and reliability of using low/zero-emission vehicles along the A96. Through this option, it is expected that there will be a reduction in tailpipe carbon emissions, particularly over the long-term as the uptake of low and zero emission vehicles increases.

10.4.12 In the longer term, the Refined Package could help to facilitate a modal shift to public transport and active travel through options such as improved public transport interchange facilities. If this was achieved, it would support decarbonisation of the transport network in Scotland and the transition from higher to lower emission modes of transport.

Refined Package criterion 3 recommendations

10.4.13 All relevant design, construction and maintenance guidance, standards, processes, and assessments should be kept up to date with the latest climate change forecasts and associated best practice and applied to the development of all options.

10.4.14 All the options in the Refined Package should be designed to maximise alignment with the Sustainable Travel Hierarchy and careful consideration should be given to how the options can work together to optimise the lowest carbon option, for example, for different journeys and shorter routes.

10.4.15 As part of the Active Communities option, improvements could include suitable surfacing for all user types (including wheelchair users); few slopes/no stairs wherever possible; improved crossing points to promote safety; and suitably secure bike storage in and around the settlements.

10.4.16 The impact on carbon emissions, of the options in the public transport tier of the Sustainable Travel Hierarchy (improved public transport passenger interchange facilities, and linespeed, passenger and freight capacity improvements on the Aberdeen to Inverness rail line), will depend on the fuel being used by buses and trains. It is therefore recommended that low-carbon modes of buses and trains are considered. It is envisaged that low carbon/zero carbon alternatives will become more cost efficient as technologies improve.

10.4.17 To fully support decarbonisation of the transport network, the following should be considered for all rail and transport hub improvement options: suitable provisions for bike storage at any improved/new stations; suitable station facilities to minimise private car miles; and improved local walking/cycling connections to promote the train facilities as a suitable, sustainable mode of transport. It is important that consideration is given to how the public transport options can work together to optimise use of the lowest carbon options.

10.4.18 The development of the A96 Electric Corridor option should include the distribution of electric and hydrogen-based fuel sources in addition to other alternative fuels such as HVO and Ammonia. The dispensaries should be placed strategically across the rural sections of the A96 corridor so that they are highly accessible to both road users and rural local communities. Consideration should also be given to demountable and mobile infrastructure.

10.4.19 The bypasses of Elgin and Keith and the targeted road safety improvements would be designed to DMRB standards and therefore the design will be obligated to consider the provision of facilities for non-motorised users of the A96 corridor. The bypasses and the road safety improvements should be designed to maximise associated active travel and opportunities for public transport. It is important that consideration is given to how the active travel and public transport options can work together to optimise use of the lowest carbon options.

10.5 Criterion 4

Criterion and success factor

10.5.1 Criterion 4 is:

- Extent to which the package supports the decarbonisation of the construction sector in Scotland and maximises reduction in whole life carbon emissions.

10.5.2 Success factor:

- 4a. Supports transition from higher emission to lower emission materials and technologies during construction, operation, and maintenance.

Geographic and environmental context

10.5.3 **Table 10.11** outlines the geographic and environmental context against criterion 4 within a 7.5km boundary (unless otherwise stated, for example, when using the MET Office Data) of the Refined Package.

Table 10.11: Geographic and environmental context of the Refined Package study area against Criterion 4, Success Factor 4a. Supports transition from higher emission to lower emission materials and technologies during construction, operation and maintenance

Refined Package Study Area	Geographic and Environmental Context
Full Corridor	UK Built Environment is responsible for 25% of total UK carbon emissions including buildings and infrastructure (UK Green Building Council, 2021). In relation to operation of their network Transport Scotland, as part of the Scottish Government, use renewable or zero carbon electricity tariffs for the electricity used to power the road network (such as for the use in lighting).

Refined Package criterion 4 assessment

10.5.4 The Refined Package is at an early stage of development with limited design details on which to base an assessment. The assessment is based on potential impacts and interactions the options could have with aspects considered within this criterion.

10.5.5 Since there are limited design details, the carbon emissions impact is estimated from the capital cost forecast by applying the Scottish Government 'Supply, Use and Input-Output Tables' figure for construction. This provides an estimate of between 140,600tCO_2e and 280,600tCO_2e for the capital stage carbon emissions impact.

10.5.6 The construction stage carbon emissions will vary between the options in the package. The variability is likely to depend on the level of new infrastructure required to implement the options – with the greater the level of construction resulting in greater levels of associated carbon emissions.

10.5.7 The Refined Package as described makes no commitments to how the carbon emissions impact from construction, maintenance and operation would be minimised and so any resulting benefits or carbon reduction measures cannot be specifically considered within this assessment.

10.5.8 The operational element of the carbon emissions impact is reduced in part through the use of renewable/zero carbon electricity tariffs, if that approach is continued.

10.5.9 If the Refined Package is developed, the bypasses and the targeted road safety improvements would be subject to relevant standards and assessment procedures for the type of transport infrastructure. For example, for road development this would include the Design Manual for Roads and Bridges. Where the latest version of the DMRB climate change assessment standard (LA 114) is applied it requires the assessment of carbon emissions at detailed design stage.

Refined Package criterion 4 recommendations

10.5.10 All relevant design, construction and maintenance guidance, standards, processes, and assessments should be kept up to date with the latest best practice on carbon emission reductions and applied to the development of all options.

10.5.11 If the Refined Package was taken forward it there would be an opportunity as a major infrastructure project in Scotland to strongly support decarbonisation of the construction sector. Application of PAS2080: Carbon Management in Buildings and Infrastructure to all schemes and all suppliers will help to systematically address whole life carbon emissions. This should include stretching carbon emissions reduction targets for suppliers, and consideration of carbon neutral standards (such as PAS 2060 - Carbon Neutrality Standard and Certification) for any suppliers managing the network beyond 2045.

10.5.12 The impact of the Refined Package on carbon emissions will depend on the methods used during construction. It is therefore recommended that innovative techniques and technologies are used where relevant to reduce emissions. These should be focused on optimising the design to build less and to consume less carbon intensive materials (such as asphalt, concrete and steel). This could include lower temperature mixes for asphalt, concrete with high cement replacement, and steel with high recycled content.

10.5.13 During construction, opportunities to reduce carbon emissions should be maximised, such as local sourcing, construction and logistics efficiencies, and alternative modes of transport – for example rail rather than road, low emission vehicles, and low carbon fuels.

10.5.14 With regards maintenance, more resilient technology could be installed in the first instance to withstand climatic factors, subsequently making the option more resilient and requiring less maintenance. As techniques and technologies improve, it is recommended that these are adopted at the earliest possible stage, subject to a cost/benefit analysis being undertaken.

10.5.15 The principles of the circular economy should be applied during design, construction, and maintenance. For example, material reduction and reuse should be prioritised to comply with the waste management hierarchy, and opportunities should be sought to recondition and use existing transport infrastructure where appropriate.

10.6 Criterion 5

Criterion and success factor

10.6.1 Criterion 5 is:

- Extent to which land use change associated with the package mitigates carbon emissions and contributes to carbon storage and sequestration.

10.6.2 Success factor:

- 5a. Supports the protection and development of carbon sinks, and takes appropriate measures to maximise carbon sequestration, taking account of wider ecosystem services/natural capital.

Geographic and environmental context

10.6.3 **Table 10.12** outlines the geographic and environmental context against criterion 5 within a 7.5km boundary (unless otherwise stated, for example, when using the MET Office Data) of the Refined Package.

Table 10.12: Geographic and environmental context of the Refined Package study area against Criterion 5. Success Factor 5a. Supports the protection and development of carbon sinks, and takes appropriate measures to maximise carbon sequestration, taking account of wider ecosystem services/natural capital

Refined Package Study Area	Geographic and Environmental Context
Full Corridor	There are several pockets of peatland across the study area for the A96 Corridor: ▪ 118 pockets of Class 1 peatland (nationally important carbon-rich soils, deep peat and priority peatland habitat. Areas likely to be of high conservation value). ▪ 32 pockets of Class 2 peatland (nationally important carbon-rich soils, deep peat and priority peatland habitat). ▪ 193 pockets of Class 3 peatland (Dominant vegetation cover is not priority peatland habitat but is associated with wet and acidic type). ▪ 1763 pockets of Class 4 peatland (Area unlikely to be associated with peatland habitats or wet and acidic type. Area unlikely to include carbon-rich soils). Within the A96 Study Corridor, there are approximately 32,400 hectares of Ancient Woodland (AWI) (919 counts) and 12,150 hectares of woodland recorded in the Native Woodland of Scotland Survey (NWSS) (3,325 counts).

Refined Package criterion 5 assessment

10.6.4 The Refined Package is at an early stage of development with limited design details on which to base an assessment. The assessment is based on potential impacts and interactions the options could have with aspects considered within this criterion.

10.6.5 The transport options within the Refined Package are solely infrastructure-led and do not explicitly include the provision of public realm improvements to green space, or blue or green infrastructure assets. Therefore, it is not possible to confirm if the Refined Package would have a positive impact on land use change, carbon storage and sequestration.

10.6.6 All the options would be developed in accordance with the relevant standards and relevant Scottish Government and Transport Scotland policies and plans. The scale of the effects would be subject to detailed design and the location of the options being determined.

10.6.7 The Refined Package has the potential for negative environmental effects on the storage and sequestration of carbon within natural ecosystems. The scale and location of the interventions would be subject to detailed design and therefore at this stage the extent of effects is uncertain.

10.6.8 The area within the full corridor includes land designated as environmentally sensitive which present a risk and opportunity to be managed in terms of how they are impacted on/or supported in terms of their ability to sequester and store carbon.

Refined Package criterion 5 recommendations

10.6.9 All relevant design, construction and maintenance guidance, standards, processes, and assessments should be kept up to date with the latest climate change forecasts and associated best practice and applied to the development of all options.

10.6.10 Consideration should be made during the site selection process to prioritise locations where there are likely to be minimal potential adverse effects on carbon storage and sequestration.

10.6.11 Existing carbon sinks should be enhanced wherever possible, to increase potential carbon sequestration as an integral part of the schemes, particularly relating to peatland restoration and wetland enhancement.

11. Conclusion

11.1 The climate compatibility assessment was informed by available best practice and the criteria developed are representative of the relevant Scottish polices, plans and strategies and the commitments and priorities within them. This assessment does not consider aspects outside of its scope such as the economic or social impacts of the A96 Full Dualling and packages.

11.2 The list titled 'Observations from the climate compatibility assessment' (outlined at the end of this section) provides the climate compatibility assessment themes, criteria and success factors and associated observations from the narrative assessments and recommendations from the A96 Full Dualling and each package. The recommendations for the A96 Full Dualling and packages are focused on how the alignment of the A96 Full Dualling and packages could be improved to the specific climate change criteria.

11.3 The recommendations are available for the development organisation (Transport Scotland or other relevant organisations) to consider for inclusion in future development of the A96 Full Dualling or any package taken forward.

11.4 Public bodies are subject to the duties placed upon them by Part 4 of the Climate Change (Scotland) Act 2009. These duties require that a public body must, in exercising its functions, act in the way best calculated to contribute to the delivery of the targets set in Part 1 of the Act, in the way best calculated to help deliver any statutory programme under section 53 of the Act, and in a way that it considers is most sustainable.

11.5 The way we develop and use our transport network is critical to our response to climate change and is recognised by the National Transport Strategy 2 (NTS2) objective "Takes climate action," and reflected in its Sustainable Travel Hierarchy.

11.6 Designing and building new transport infrastructure and refurbishing existing transport infrastructure can lead to an increase in carbon emissions and contribute to the degradation of the natural environment through construction and operation. This is particularly the case where the A96 Full Dualling and packages are forecasted to have a net increase in internal combustion engine road traffic over their lifecycle. However, building and refurbishing transport infrastructure can be compatible with climate change commitments if they are designed, procured, constructed and managed in a way that minimises the environmental impact and directly encourages and enables more sustainable transportation options at the upper tiers of the Sustainable Travel Hierarchy.

11.7 The existing transport appraisal and assessment processes, including the associated Transport Planning Objectives (TPOs) applied to the A96 Corridor Review, shows a strong correlation with the climate compatibility assessment criteria developed. The TPOs are informed by the second Strategic Transport Projects Review objectives, which were based on the updated NTS2 priorities and NTS2 Sustainable Investment and Travel Hierarchies.

11.8 Where options are taken forward that have combined outcomes, such as where options affect the same settlement, they should be developed to optimise for lowest carbon and best climate resilience and adaptation outcome.

11.9 It is important that for all options that are further developed that cumulative impacts are assessed and considered in their development. This should include relevant schemes that are already consented such as the A96 Dualling Inverness to Nairn (including Nairn Bypass)

11.10 A stand-alone climate compatibility assessment, such as shown in this report, is not considered necessary for future stages of transport infrastructure development if:

- The transport appraisal and assessment processes are applied in a way which genuinely reflects the STPR2 objectives and NTS2 priorities and hierarchies which encompass climate change criteria.
- All relevant design, construction and maintenance guidance, standards, processes, and assessments are kept up to date with best practice approaches for considering both climate change adaptation and mitigation and applied to the development of all options.
- Cumulative impacts of new options and those already consented are assessed and actively considered in the development of any options taken forward.
- Relevant guidance, standards, processes, and assessments are used to inform decision making on transport development and provision.
- Public bodies discharge the duties placed upon them by Part 4 of the Climate Change (Scotland) Act 2009.

Observations from the climate compatibility assessment

Theme: Climate change adaptation and resilience

Criterion 1: Extent to which the package supports adaptation and/or resilience to current and predicted future impacts of climate change.

Criterion 2: Extent to which the package supports the surrounding area to adapt and/or become more resilient to current and predicted future impacts of climate change.

Assessment observations: Assessments are limited to high-level commentary due to the early stage of design. Provision of additional transport systems and infrastructure have the potential to increase the resilience of the transport network to climate change, if current standards for designing and constructing transport infrastructure are maintained and updated regularly to account for climate factors. The A96 Full Dualling and all six packages have the potential to both positively and negatively impact on wider resilience, including the natural environment. To minimise the negative and maximise the positive impacts their consideration would need to directly influence all relevant design and construction activities.

Recommendation observations: All relevant design, construction and maintenance guidance, standards, processes, and assessments should be kept up to date with the latest climate change forecasts and associated best practice and applied to the development of all options. The A96 Full Dualling and all six packages should leverage full benefit from investment to maximise the opportunities to increase resilience of the transport infrastructure and the surrounding area.

Theme: Climate change mitigation

Criterion 3: Extent to which the package supports the decarbonisation of the transport network in Scotland, including supporting transition from higher to lower emission modes, and the modal shift to greater public transport and active travel options.

Assessment observations: Carbon emissions calculated for the A96 Full Dualling and all six packages are based on associated traffic model outputs. Where the A96 Full Dualling and packages are forecasted to result in a net increase in road traffic, this translates to an associated increase in carbon emissions over their life. Conversely, where a net decrease in road traffic is forecasted there is a decrease in carbon emission over their life. As a percentage of the calculated carbon emission envelope for Scotland, the net increase or decrease in carbon emissions across the A96 Full Dualling and all six packages, and all years (up to 2045), range from +1.85% to -0.019%. The A96 Full Dualling and all six packages incorporate a range of options across the Sustainable Travel Hierarchy. At this stage it is unclear if those options which are lower on the hierarchy are balanced appropriately by those higher on the hierarchy.

Recommendation observations: The A96 Full Dualling and all six packages should be designed to maximise alignment with the Sustainable Travel Hierarchy. Where anticipated to result in a net increase in road traffic, the A96 Full Dualling and packages should be avoided or minimised. Careful consideration should be given to how the options can work together to

optimise the lowest carbon emission solution (including facilitating modal shift to lower carbon options at the earliest opportunity).

Criterion 4: Extent to which the package supports the decarbonisation of the construction sector in Scotland and maximises reduction in carbon emissions.

Assessment observations: The carbon emissions from construction (direct and indirect) are estimated by applying a Scottish Government tCO2e/£1m figure for construction activity to the estimated cost of delivering the A96 Full Dualling and packages. The carbon emissions estimates range from around 140,600 tCO2e to 1,403,000 tCO2e.

Recommendation observations: Infrastructure projects in Scotland should support the decarbonisation of the construction sector. The principles and approaches of PAS2080: Carbon Management in Buildings and Infrastructure should be applied to all relevant design and construction projects. Projects should maximise impact on the wider construction industry through specification and application of best practice and incentivising and offering test beds for innovative techniques for construction decarbonisation.

Criterion 5: Extent to which land use change associated with the package mitigates carbon emissions and contributes to carbon storage and sequestration.

Assessment observations: Assessments are limited to high-level commentary due to the early stage of design. The A96 Full Dualling and all six packages present risks to, and opportunities to impact positively on, potential carbon sinks if this is actively considered throughout all design and construction activities.

Recommendation observations: Consideration should be made during the site selection and assessment process to prioritise locations which avoid or minimise potential adverse impacts, and where there are opportunities to maximise beneficial impacts on natural capital, carbon storage and sequestration. There is potential for the A96 Full Dualling and all six packages to incorporate carbon sequestration opportunities to balance potential carbon impacts of construction or operation as part of an integrated solution.

Appendices

Appendix A. Relevant national policies, plans and strategies relating to climate change

Appendix A outlines the relevant national policies, plans and strategies relating to climate change.

Policy, plan and strategy	Climate change context
A National Mission with Local Impact: Infrastructure Investment Plan for Scotland 2021-22 to 2025-26	Sets out the delivery plan and spending priorities for the Scottish Government's National Infrastructure Mission commitment to increase annual investment in infrastructure, boosting inclusive economic growth. The vision of the plan is that 'our infrastructure supports Scotland's resilience and enables inclusive, net zero, and sustainable growth'. Core themes of the plan include: ▪ Enabling transition to net zero emissions and environmental sustainability. ▪ Building resilient and sustainable places. Investment priorities highlighted in the plan include various measures to: ▪ Support the decarbonisation of transport and increase in active travel. ▪ Improve natural capital (new forestry planting and investment in supporting the reuse of vacant and derelict land). ▪ Boost resilience and adaptation, including £60M for climate adaptation and resilience measures on the trunk road network, and an additional £150M for flood risk management.
Climate Change Plan Third Report on Proposals and Policies 2018-2032 and Update to the Climate Change Plan 2018-2032 (Securing a Green Recovery on a Path to Net Zero)	These plans provide the policy framework and sectoral pathways for meeting the statutory commitments of the Climate Change Acts in respect of the transition to net zero. The 2020 update was published to reflect the new targets set out in the 2019 Act, and also takes into account the impact of the COVID-19 pandemic. The vision for 2045 is a society that prioritises the environment and wellbeing of its people, reaching net zero in a way that is fair and just to all. Outcomes for 2032 in relation to transport are: ▪ Scotland's electricity system, already largely decarbonised, will be increasingly important as a power source for heat and transport. ▪ Scotland will have phased out the need to buy petrol and diesel engine cars and vans, implemented LEZ in the largest cities and made significant progress in reducing emissions from buses, HGVs and ferries. The plans state that the land use sector will increasingly act as a net carbon sink; Scotland will have restored 250,000 ha of degraded peatland by 2030, and Scotland's woodlands will be delivering a greater level of ecosystem services, such as natural flood management and biodiversity enhancement. Policy objectives include enhancing the electric vehicle charging network, reducing car kilometres by 20% by 2030, and decarbonisation of rail services by 2035.
Climate Ready Scotland: Climate Change Adaptation Programme 2019-2024	This sets out the Scottish Government's five-year programme for climate change adaptation. It refers to cross cutting policies and programmes which support the following outcomes: ▪ Communities are inclusive, empowered, resilient and safe in response to the changing climate. ▪ The people in Scotland who are most vulnerable to climate change are able to adapt, and climate justice is embedded in climate change adaptation policy. ▪ Scotland's inclusive and sustainable economy is flexible, adaptable and responsive to the changing climate. ▪ Scotland's society's supporting systems are resilient to climate change. ▪ Scotland's natural environment is valued, enjoyed, protected and enhanced and has increased resilience to climate change. ▪ Scotland's coastal and marine environment is valued, enjoyed, protected and enhanced and has increased resilience to climate change. ▪ Scotland's international networks are adaptable to climate change. The Climate Change Committee (CCC) undertook an independent assessment of progress against the goals outlined in the Scottish Government' five-year programme for climate change adaptation (Climate Change Committee, 2022). The report concluded that although Scotland's vision is welcomed, more measures are required to translate ambition into actions that are correspondent with the scale of the challenge. CCC recommended actions include the setting of clear, time-bound quantitative targets with Government ownership; improvement of monitoring and evaluation of climate-related risks; and development of the adaptation response to be delivered fairly across society.
Just Transition Commission	The Scottish Government set out its commitment that ending the contribution to climate change should be in a way that is fair and leaves no-one behind. An independent Just Transition Commission reported to the Scottish Government in March 2021, providing a series of recommendations to deliver on this commitment. This included that Scottish Government, local authorities and developers must 'commit to creating communities that embed low carbon lifestyles, while improving our health and wellbeing'.

Policy, plan and strategy	Climate change context
	Scottish Government policies which are intended to support a just transition include improvements for priority bus infrastructure and improving connectivity for people in lower socio-economic groups. In 2023, the Scottish Government published a draft Energy Strategy and Just Transition Plan, which reaffirmed the commitment to reduce car kilometre by 20%.
Evidence for the third UK Climate Change Risk Assessment (CCRA3) – Summary for Scotland	The UK Government is required by the Climate Change Act (2008) to conduct a UK Climate Change Risk Assessment every five years to inform the UK National Adaptation Plans for England, Scotland, Northern Ireland and Wales. The third assessment (CCRA3) reviewed 61 specific risks and opportunities from climate change to Scotland, including business, housing, the natural environment, health, and risks from the impacts of climate change internationally. In summary, risks in Scotland that require more action now to address them include: ▪ Impacts of climate change on the natural environment, including terrestrial, freshwater, coastal and marine species, forests and agriculture. ▪ An increase in the range, quantities and consequences of pests, pathogens and invasive species, negatively affecting terrestrial, freshwater and marine priority habitats species, forestry and agriculture. ▪ The risk of climate change impacts, especially more frequent flooding and coastal erosion, causing damage to our infrastructure services, including energy, transport, water and Information and Communication Technologies (ICT). ▪ The impact of extreme temperatures, high winds and lightning on the transport network. ▪ The impact of increasing high temperatures on people's health and wellbeing and changes in household energy demand due to seasonal temperature changes. ▪ Increased severity and frequency of flooding of homes, communities and businesses. ▪ The viability of coastal communities and the impact on coastal businesses due to sea level rise, coastal flooding and erosion. ▪ Damage to our cultural heritage assets as a result of temperature, precipitation, groundwater and landscape changes. ▪ Impacts internationally that may affect the UK, such as risks to food availability, safety and security, risks to international law and governance from climate change that will affect the UK, international trade routes, public health and the multiplication of risks across systems and geographies.
National Transport Strategy 2 (NTS2)	NTS2 sets out the vision for Scotland's transport system for the next 20 years, protecting and improving lives through a sustainable, inclusive and accessible transport system. The strategy advocates a vision for Scotland's transport system and includes four priorities to support the vision: 1) Reduces inequalities 2) Takes climate action 3) Helps deliver inclusive economic growth 4) Improves health and wellbeing Policies on climate action include: ▪ Reduce emissions generated by the transport system to mitigate climate change and improve air quality. ▪ Support demand management to encourage more sustainable transport choices. ▪ Facilitate shift to sustainability and providing space – efficient modes of transport for people and goods. ▪ Improve quality and availability of information to enable all to make more sustainable transport choices. ▪ Ensure transport system adapts to projected climate impacts. ▪ Reduce the negative impacts which transport has on the safety, health and wellbeing of people. NTS2 sets out the Sustainable Travel Hierarchy, and the Sustainable Investment Hierarchy which are to be used to inform investment decisions on transport options and are integral to prioritising investments which support the transition to net zero and considering the whole lifecycle of transport.
Strategic Transport Projects Review 2 (STPR2)	STPR2 will inform the Scottish Government's transport investment programme in Scotland for the next 20 years. The output from STPR2 will help to deliver the vision, priorities and outcomes for transport set out in the NTS2 and aligns with other national plans such as the Climate Change Plan and the fourth National Planning Framework (NPF4).

Policy, plan and strategy	Climate change context
A Route Map to achieve a 20% reduction in car kilometres by 2030	This route map supports the commitment in the Climate Change Plan Update for reduction in car km by 20% by 2030. It provides the context for encouraging behaviour change, by reducing the need to travel, living well locally, switching modes, and combining or sharing car trips. Various interventions are recommended, including adoption of NPF4 (see below), extending superfast broadband across Scotland, embedding the Place Principle and 20-minute neighbourhoods into plans, guidance on mobility hubs for integrating shared modes, and investment in active travels and freeways.
Rail Services Decarbonisation Action Plan	This action plan supports NTS2 and sets out the programme and approach for decarbonisation of rail across Scotland by 2035, which is a commitment as part of the transition to net zero by 2045. With regards Inverness to Aberdeen, the action plan concludes electrification between Aberdeen and Inverurie by 2035, and full electrification of the route by 2030 dependent on the development of innovative approaches.
National Planning Framework 4 (NPF4)	NPF4 is based around three themes: Sustainable, liveable, and productive places. With regards to sustainable places, the ambition is "Our future net zero, nature-positive places will be more resilient to the impacts of climate change and support the recovery of our natural environment". NPF4 proposes a number of principles that influence spatial planning at regional and local level. These are: ▪ compact growth ▪ local living (promoting 20-minute neighbourhoods) ▪ balancing development between areas of high demand and decline ▪ urban and rural synergy ▪ meeting climate ambitions through just transition across all sectors of economy and society Proposed policies which are relevant to climate compatibility include: ▪ Policy 1 (Tackling the climate and nature crises) ▪ Policy 2 (Climate Mitigation and Adaptation) ▪ Policy 3 (Biodiversity) ▪ Policy 4 (Natural Places) ▪ Policy 6 (Forestry, Woodland and Trees) ▪ Policy 7 (Historic Assets and Place) ▪ Policy 10 (Coastal Development) ▪ Policy 11 (Energy) ▪ Policy 12 (Zero Waste) ▪ Policy 13 (Sustainable Transport) ▪ Policy 15 (Local Living and 20 Minute Neighbourhoods) ▪ Policy 19 (Heating and Cooling) ▪ Policy 20 (Blue and green infrastructure) ▪ Policy 22 (Flood Risk and Water Management)

Appendix B. Relevant regional and local policies, plans and strategies relating to climate change

Appendix B outlines the relevant regional and local policies, plans and strategies relating to climate change.

Policy, plan and strategy	Climate change context
The Highland Wide Local Development Plan 2012	The vision of the plan is for the Highlands to be one of Europe's leading regions by 2030. This will be realised by creating sustainable communities, balancing population growth, economic development, safeguarding of the environment across the area, and having built a fairer and healthier Highlands. Objectives include safeguarding the environment by taking a lead in reducing the amount of greenhouse gases released into the air, adapting to the effects of climate change.
Moray Local Development Plan 2020 (Moray Council, 2022a)	The vision of the plan is to encourage people to live, work and invest in Moray because of the outstanding quality of the environment. Objectives include encouraging efficient use of land and promotion of low carbon and sustainable development, and to improve resilience of the natural and built environment to climate change.
Moray Council Climate Change Strategy 2020-2030 (Moray Council, 2022b)	The vision of this plan includes supporting a just transition to a low carbon economy, becoming carbon neutral by 2030, ensuring the Council and partners are prepared to deal with current and future impacts of climate change, retaining/protecting/enhancing biodiversity, developing policy and actions to address gaps in approach, and embedding climate mitigation and adaptation to be integral to operation of the Council. The plan is supported by the Moray Council Climate Change Action Plan (Moray Council, 2022c).
Aberdeen City and Shire Strategic Development Plan 2020 (Aberdeenshire Council, 2020)	The vision of this plan is, by 2040, Aberdeen City and Shire will have grown and evolved to become an even more attractive, prosperous, resilient and sustainable European City Region. It will be an excellent place to live, visit and do business. The plan states that both Council's approach to development that encourages the sustainable use of natural resources, living within environmental capacity, tackling climate change, and creating a more open and inclusive society. An Objective is for the City Region to take the lead in reducing emissions and pollutants and mitigating and adapting to the effects of climate change.
Aberdeenshire Local Development Plan 2023 (Aberdeenshire Council, 2023)	This plan will direct decision-making on all land use planning issues and planning applications in Aberdeenshire. The plan aims to help develop a strong and resilient economy, while maintaining a high quality of life and exceptional environment in Aberdeenshire. The four outcomes are: Outcome 1 – A successful, sustainable place; Outcome 2 – A low carbon place; Outcome 3 – A natural, resilient place; and Outcome 4 – A more connected Place.
NESTRANS Regional Transport Strategy 2040 (NESTRANS, 2021)	The vision of this strategy is to provide a safer, cleaner, more inclusive, accessible and resilient transport system in the North-east, which protects the natural environment and contributes to healthier, more prosperous and fairer communities. The vision is supported by four pillars, including climate – 'reducing our impact on climate change and protecting the environment'. Key priorities include reduced carbon emissions to support net zero; a step change in public transport and active travel enabling a 50:50 mode split; and air quality that is cleaner than World Health Organisation (WHO) standards for transport emissions.
HITRANS Regional Transport Strategy (HITRANS, 2017)	The vision of this strategy is to deliver connectivity across the region which enables sustainable economic growth and helps communities to actively participate in economic and social activities. Protecting the environment and mitigating adverse impacts of transport and travel are strategic outcomes.

Appendix C. Justification of the alignment between the relevant national policies, plans and strategies relating to the climate compatibility assessment criteria

Appendix C outlines the justification of the alignment between the relevant national policies, plans and strategies relating to the climate compatibility assessment criteria.

Theme of Climate Change Adaptation and Resilience – National policies, plans and strategies relating to the climate compatibility assessment criteria

Criteria	1. Extent to which the package supports adaptation and/or resilience to current and predicted future impacts of climate change.	1. Extent to which the package supports adaptation and/or resilience to current and predicted future impacts of climate change.	1. Extent to which the package supports adaptation and/or resilience to current and predicted future impacts of climate change.	1. Extent to which the package supports adaptation and/or resilience to current and predicted future impacts of climate change.	2. Extent to which the package supports the surrounding area to adapt and/or become more resilient to current and predicted future impacts of climate change.	2. Extent to which the package supports the surrounding area to adapt and/or become more resilient to current and predicted future impacts of climate change
Success Factors	a. Supports adaptation for and/or resilience to predicted increases in sea levels and storm surge	b. Supports adaptation for and/or resilience to predicted changes in temperatures	c. Supports adaptation for and/or resilience to predicted increase in likelihood and severity of fluvial and pluvial flooding	d. Supports adaptation for and/or resilience to predicted increase in likelihood and severity of storms and high winds	a. Supports adaptation for and/or resilience to current and future impacts of climate change within the study area outside of the package boundary	b. Supports the natural environment to adapt for and/or increase resilience to current and predicted future impacts of climate change
A National Mission with Local Impact: Infrastructure Investment Plan for Scotland 2021-22 to 2025-26	Strong correlation since criterion topic captured in: Theme 1: Enabling the Transition to Net Zero Emissions and Environmental Sustainability; and Theme 3: Building Resilient and Sustainable Places. The plan outlines investment intentions in coastal change adaptation.	Partial correlation since criterion topic is outlined in: Theme 1: Enabling the Transition to Net Zero Emissions and Environmental Sustainability; and Theme 3: Building Resilient and Sustainable Places. However, the plan does not explicitly outline investment intentions for resilience to temperature changes.	Strong correlation since the criterion topic is outlined in: Theme 1: Enabling the Transition to Net Zero Emissions and Environmental Sustainability; and Theme 3: Building Resilient and Sustainable Places. The plan outlines investment intentions for flood risk management.	Partial correlation since the criterion topic is outlined in: Theme 1: Enabling the Transition to Net Zero Emissions and Environmental Sustainability; and Theme 3: Building Resilient and Sustainable Places. The plan does not explicitly outline investment intentions for resilience to increase and severity of storms and high winds.	Strong correlation since the criterion topic is outlined in: Theme 1: Enabling the Transition to Net Zero Emissions and Environmental Sustainability; and Theme 3: Building Resilient and Sustainable Places. The plan outlines the investment intentions for supporting climate adaptation and resilience measures on the trunk road network. The plan highlights climate resilience as a key priority over the coming years.	Strong correlation since the criterion topic is outlined in: Theme 1: Enabling the Transition to Net Zero Emissions and Environmental Sustainability. The plan outlines investment intentions for investing in natural capital including peatland restoration, forest cover and reuse of existing derelict land and links these plans to biodiversity challenges.
Climate Change Plan Third Report on Proposals and Policies 2018-2032	Not applicable since the plan does not include plans for resiliency to sea levels and storm surge.	Not applicable since the plan does not include plans for resiliency to changes in temperature.	Not applicable since the plan does not include plans for resiliency to flooding.	Not applicable since the plan does not include plans for resiliency to storms and high winds.	Not applicable since the plan does not include plans for resiliency.	Not applicable since the plan does not include plans for biodiversity protection and enhancement; ecosystem services; or habitat

Criteria	1. Extent to which the package supports adaptation and/or resilience to current and predicted future impacts of climate change.	1. Extent to which the package supports adaptation and/or resilience to current and predicted future impacts of climate change.	1. Extent to which the package supports adaptation and/or resilience to current and predicted future impacts of climate change.	1. Extent to which the package supports adaptation and/or resilience to current and predicted future impacts of climate change.	2. Extent to which the package supports the surrounding area to adapt and/or become more resilient to current and predicted future impacts of climate change.	2. Extent to which the package supports the surrounding area to adapt and/or become more resilient to current and predicted future impacts of climate change
Success Factors	a. Supports adaptation for and/or resilience to predicted increases in sea levels and storm surge	b. Supports adaptation for and/or resilience to predicted changes in temperatures	c. Supports adaptation for and/or resilience to predicted increase in likelihood and severity of fluvial and pluvial flooding	d. Supports adaptation for and/or resilience to predicted increase in likelihood and severity of storms and high winds	a. Supports adaptation for and/or resilience to current and future impacts of climate change within the study area outside of the package boundary	b. Supports the natural environment to adapt for and/or increase resilience to current and predicted future impacts of climate change
						fragmentation and creation.
Update to the Climate Change Plan 2018-2032 (Securing a Green Recovery on a Path to Net Zero)	Strong correlation since adaptation investment is outlined in the plan. The plan includes reference to coastal change adaptation to help with adapting to the threat of sea level rise and protection of natural coastal defences from erosion.	Partial correlation since the plan refers to predicted changes in temperature and includes climate adaptation ambitions. However, the plan does not include any actions or ambitions for reducing vulnerability to temperature changes.	Strong correlation as the chapters on Land Use, Land Use Change and Forestry prioritise nature-based solutions	Not applicable as the plan does not include plans for resiliency to storms and high winds.	Partial correlation since the plan references resiliency and the outcomes of the plan will contribute to national climate resilience. However, the plan does not detail local resilience.	Strong correlation as the plan outlines actions to restore biodiversity through nature-based solutions including the expansion of Scotland's forests and woodlands to contribute to reduced greenhouse gas emissions and improve biodiversity.
Scottish Climate Change Adaptation Programme 2019-2024	Strong correlation as the criterion topic is captured in: Outcome 6: Our coastal and marine environment is valued, enjoyed, protected, and enhanced and has increased resilience to climate change – policies and research. The programme includes reference to ongoing research on vulnerabilities to climate change including effects of sea level rise on coasts.	Strong correlation as the criterion topic is captured in: Outcome 1: Our communities are inclusive, empowered, resilient and safe in response to the changing climate. Includes sub-outcome on resiliency of places and assets. Outcome 2: The people in Scotland who are most vulnerable to climate change can adapt and climate justice is embedded in climate change adaptation policy.	Strong correlation as the criterion topic is captured in: Outcome 2: The people in Scotland who are most vulnerable to climate change can adapt and climate justice is embedded in climate change adaptation policy. Sub-outcomes include actions and plans relating to flood risk management and assessments at a local and national level.	Strong correlation as the criterion topic is captured in: Outcome 1: Our communities are inclusive, empowered, resilient and safe in response to the changing climate. Includes sub-outcome on recovery following extreme events including flooding following rainstorm events.	Strong correlation as the criterion topic is captured in: Outcome 1: Our communities are inclusive, empowered, resilient and safe in response to the changing climate. Includes sub-outcome on resiliency of places and assets. Outcome 2: The people in Scotland who are most vulnerable to climate change can adapt, and climate justice is embedded in climate change adaptation policy.	Strong correlation as the criterion topic is captured in: Outcome 5: Our natural environment is valued, enjoyed, protected and enhanced, and has increased resilience to climate change. Includes plans to regulate and support ecosystem services.

Criteria	**1. Extent to which the package supports adaptation and/or resilience to current and predicted future impacts of climate change.**	**1. Extent to which the package supports adaptation and/or resilience to current and predicted future impacts of climate change.**	**1. Extent to which the package supports adaptation and/or resilience to current and predicted future impacts of climate change.**	**1. Extent to which the package supports adaptation and/or resilience to current and predicted future impacts of climate change.**	**2. Extent to which the package supports the surrounding area to adapt and/or become more resilient to current and predicted future impacts of climate change.**	**2. Extent to which the package supports the surrounding area to adapt and/or become more resilient to current and predicted future impacts of climate change**
Success Factors	a. Supports adaptation for and/or resilience to predicted increases in sea levels and storm surge	b. Supports adaptation for and/or resilience to predicted changes in temperatures	c. Supports adaptation for and/or resilience to predicted increase in likelihood and severity of fluvial and pluvial flooding	d. Supports adaptation for and/or resilience to predicted increase in likelihood and severity of storms and high winds	a. Supports adaptation for and/or resilience to current and future impacts of climate change within the study area outside of the package boundary	b. Supports the natural environment to adapt for and/or increase resilience to current and predicted future impacts of climate change
Just Transition Commission: A National Mission for a fairer, greener Scotland	Not applicable as the plan references the need to raise awareness of the challenges a changing climate will bring to the farming sector, such as more extreme weather, flooding, droughts, crop and livestock health. However, the plan does not make specific reference to the criterion topic in relation to other sectors.	Not applicable as the plan references the need to raise awareness of the challenges a changing climate will bring to the farming sector, such as more extreme weather, flooding, droughts, crop and livestock health, but does not make reference to this in relation to other sectors.	Not applicable as the plan references the need to raise awareness of the challenges a changing climate will bring to the farming sector, such as more extreme weather, flooding, droughts, crop and livestock health, but does not make reference to this in relation to other sectors.	Not applicable as the plan references the need to raise awareness of the challenges a changing climate will bring to the farming sector, such as more extreme weather, flooding, droughts, crop and livestock health, but does not make reference to this in relation to other sectors.	Not applicable as the plan references the need to raise awareness of the challenges a changing climate will bring to the farming sector, such as more extreme weather, flooding, droughts, crop and livestock health, but does not make reference to this in relation to other sectors.	Partial correlation as the plan makes reference to the importance of biodiversity enhancements and protection. However, the plan does not outline any intentions or outcomes for biodiversity protection and enhancement; ecosystem services; or habitat fragmentation.
Evidence for the third UK Climate Change Risk Assessment (CCRA3) - Summary for Scotland	Strong correlation as the assessment notes and gives evidence that Scotland has experienced rising sea levels over previous decades and identifies related risks such as saltwater intrusion, coastal flooding and erosion, storms and high waves, poor water quality and household water supply. The assessment includes recommendations on adaptation action and mitigation against all identified risks.	Strong correlation as the assessment identifies that annual temperatures as well as extreme temperature events in Scotland are expected to rise and supplies supporting evidence. The assessment includes recommendations on adaptation action and mitigation against risk of extreme temperature change.	Strong correlation as the assessment notes the risk of flooding to people, communities and buildings remaining amongst the most severe risk for Scotland and is the costliest hazard to businesses. The assessment identifies the intensity of rainfall to increase over time. The assessment includes recommendations on adaptation action and mitigation against risks.	Strong correlation as the assessment includes recommendations on adaptation action and mitigation against risks associated with storms and high winds. This includes further investigation into the future impact of high winds on infrastructure.	Strong correlation as the assessment details more action is needed to adapt and/or mitigate against the impact on communities from flooding and sea level rise. Possible adaptation actions are included.	Strong correlation as the assessment includes evidence of the current and likely future effects of climate change and associated drivers on land-dwelling biodiversity in Scotland - includes impacts on individuals such as changes in physiology or phenology (the timing of life cycle events), changes in population composition and abundance, and the distribution of species. The assessment identifies that more action is

Criteria	1. Extent to which the package supports adaptation and/or resilience to current and predicted future impacts of climate change.	1. Extent to which the package supports adaptation and/or resilience to current and predicted future impacts of climate change.	1. Extent to which the package supports adaptation and/or resilience to current and predicted future impacts of climate change.	1. Extent to which the package supports adaptation and/or resilience to current and predicted future impacts of climate change.	2. Extent to which the package supports the surrounding area to adapt and/or become more resilient to current and predicted future impacts of climate change.	2. Extent to which the package supports the surrounding area to adapt and/or become more resilient to current and predicted future impacts of climate change
Success Factors	a. Supports adaptation for and/or resilience to predicted increases in sea levels and storm surge	b. Supports adaptation for and/or resilience to predicted changes in temperatures	c. Supports adaptation for and/or resilience to predicted increase in likelihood and severity of fluvial and pluvial flooding	d. Supports adaptation for and/or resilience to predicted increase in likelihood and severity of storms and high winds	a. Supports adaptation for and/or resilience to current and future impacts of climate change within the study area outside of the package boundary	b. Supports the natural environment to adapt for and/or increase resilience to current and predicted future impacts of climate change
						required to reduce impact and further adaptation actions are included.
[National Transport Strategy 2 (NTS2)]	Partial correlation as the strategy does not include plans for resiliency to sea levels and storm surge. However, priorities include to take climate action, with an associated outcome to adapt to the effects of climate change; adapt the transport system to remain resilient; and reduce the harmful effects on future generations.	Partial correlation as the strategy priorities include to take climate action, with an associated outcome to adapt to the effects of climate change; ensure the resilience of the transport network is enhanced, so that future transport projects deal effectively with the predicted changes; and that the existing transport system is adapted to deal with increased rainfall, more frequent high winds and rising temperatures. However, the strategy does not include specific plans for resiliency to changes in temperature.	Partial correlation as the strategy priorities include to take climate action, with an associated outcome to adapt to the effects of climate change; ensure the resilience of the transport network is enhanced, so that future transport projects deal effectively with the predicted changes; and that the existing transport system is adapted to deal with increased rainfall, more frequent high winds and rising temperatures. However, the strategy does not include specific plans for resiliency to flooding.	Partial correlation as the strategy priorities include to take climate action, with an associated outcome to adapt to the effects of climate change; ensure the resilience of the transport network is enhanced, so that future transport projects deal effectively with the predicted changes; and that the existing transport system is adapted to deal with increased rainfall, more frequent high winds and rising temperatures. However, the strategy does not include specific plans for resiliency to storms and high winds.	Partial correlation as the strategy priorities include to take climate action, with an associated outcome to adapt to the effects of climate change; adapt the transport system to remain resilient; and reduce the harmful effects on future generations. However, the strategy does not include specific plans to enhance local resiliency.	Not applicable as does not include plans for biodiversity protection and enhancement; ecosystem services; or habitat fragmentation and creation.
[Strategic Transport Projects Review 2 (STPR2)]	Partial correlation as the strategy does not include plans for resiliency to sea levels and storm surge. The Strategic Environmental Assessment (SEA) aims to 'future proof'	Partial correlation as the strategy refers to climate change already having a far-reaching impact on Scotland's weather systems, with heatwaves, intense rainfall and floods of	Partial correlation as the strategy refers to climate change already having a far-reaching impact on Scotland's weather systems, with heatwaves, intense rainfall and floods of increasing scale and	Partial correlation as the strategy highlights that measures are to be developed to protect the operation of the network from severe weather-related events associated	Strong correlation as STPR2 recommends building on existing evidence around vulnerable locations to develop a fuller picture of those areas on the trunk	Partial correlation as STPR2 states that it is aligned with NPF4 seeking to develop and create sustainable places and reduce emissions and restore and better

Criteria	1. Extent to which the package supports adaptation and/or resilience to current and predicted future impacts of climate change.	1. Extent to which the package supports adaptation and/or resilience to current and predicted future impacts of climate change.	1. Extent to which the package supports adaptation and/or resilience to current and predicted future impacts of climate change.	1. Extent to which the package supports adaptation and/or resilience to current and predicted future impacts of climate change.	2. Extent to which the package supports the surrounding area to adapt and/or become more resilient to current and predicted future impacts of climate change.	2. Extent to which the package supports the surrounding area to adapt and/or become more resilient to current and predicted future impacts of climate change
Success Factors	a. Supports adaptation for and/or resilience to predicted increases in sea levels and storm surge	b. Supports adaptation for and/or resilience to predicted changes in temperatures	c. Supports adaptation for and/or resilience to predicted increase in likelihood and severity of fluvial and pluvial flooding	d. Supports adaptation for and/or resilience to predicted increase in likelihood and severity of storms and high winds	a. Supports adaptation for and/or resilience to current and future impacts of climate change within the study area outside of the package boundary	b. Supports the natural environment to adapt for and/or increase resilience to current and predicted future impacts of climate change
	STPR2 in relation to the projected impacts of climate change, including sea level rise. However, the strategy does not include specific plans for sea level rise.	increasing scale and frequency. However, the strategy does not include specific plans for this criteria topic.	frequency. However, the strategy does not include specific plans for this criteria topic.	with climate change (high winds). However, the strategy does not include specific plans for resilience to high winds and storms.	road and motorway network most at risk of disruption due to weather events. This would provide a basis for identifying, prioritising and implementing improvements to strengthen the resilience of the network.	connect biodiversity. However, the strategy does not include specific plans for biodiversity protection and enhancement; ecosystem services; or habitat fragmentation.
A Route Map to achieve a 20% reduction in car kilometres by 2030	Not applicable as the route map does not include plans for resiliency to sea levels and storm surge.	Not applicable as the route map refers to car use contributing to climate change impacting on health and wellbeing through extreme weather events such as heatwaves. However, no further detail on actions to reduce vulnerability to changes in temperature.	Partial correlation as the route map refers to car use contributing to climate change impacting on health and wellbeing through extreme weather events such as heatwaves and flooding. No further detail on actions to reduce vulnerability to flooding.	Not applicable as the route map does not include plans for resiliency to storms and high winds.	Partial correlation as the route map identifies activities such as the planting of street trees to provide shade and help combat urban heat island effects, giving more space to nature and pedestrians and offering greater resilience to extreme weather events. However, no further detail on actions to enhance local resiliency.	Not applicable as the route map does not include plans for biodiversity protection and enhancement; ecosystem services; or habitat fragmentation and creation.
Rail Services Decarbonisation Action Plan	Not applicable as the action plan does not include plans for resiliency to sea levels and storm surge.	Not applicable as the action plan does not include plans for resiliency to changes in temperature.	Not applicable as the action plan does not include plans for resiliency to flooding.	Partial correlation as the action plan mentions the requirement to consider wind loading when designing for electrification. No further detail on	Partial correlation as the action plan includes the rationale for electrification, being improved network resilience through electrification of	Not applicable as the action plan does not include plans for biodiversity protection and enhancement; ecosystem services; or

Criteria	1. Extent to which the package supports adaptation and/or resilience to current and predicted future impacts of climate change.	1. Extent to which the package supports adaptation and/or resilience to current and predicted future impacts of climate change.	1. Extent to which the package supports adaptation and/or resilience to current and predicted future impacts of climate change.	1. Extent to which the package supports adaptation and/or resilience to current and predicted future impacts of climate change.	2. Extent to which the package supports the surrounding area to adapt and/or become more resilient to current and predicted future impacts of climate change.	2. Extent to which the package supports the surrounding area to adapt and/or become more resilient to current and predicted future impacts of climate change
Success Factors	a. Supports adaptation for and/or resilience to predicted increases in sea levels and storm surge	b. Supports adaptation for and/or resilience to predicted changes in temperatures	c. Supports adaptation for and/or resilience to predicted increase in likelihood and severity of fluvial and pluvial flooding	d. Supports adaptation for and/or resilience to predicted increase in likelihood and severity of storms and high winds	a. Supports adaptation for and/or resilience to current and future impacts of climate change within the study area outside of the package boundary	b. Supports the natural environment to adapt for and/or increase resilience to current and predicted future impacts of climate change
				resiliency to storms and high winds.	diversionary routes - improving the network's performance and reliability.	habitat fragmentation and creation. Mentions the consideration of ecological surveys and minimising ecological impacts.
National Planning Framework 4 (NPF4)	Strong correlation as NPF4 outlines the need to anticipate and mitigate risk from coastal erosion, flood risk and storm surges, with a focus on natural solutions. Sea level rise is outlined as a regional spatial priority and is covered in Policy 10 (Coastal Development). This policy supports adaptation for and/or resilience to predicted increases in sea levels and storm surge, outlining that development proposals in developed coastal areas will only be supported where they are anticipated to be supportable in the long-term, taking into	Strong correlation as NPF4 supports adaptation for and/or resilience to predicted changes in temperatures though Policy 19 (Heating and Cooling). This policy aims to encourage, promote and facilitate development that supports decarbonised solutions to heat and cooling demand, and ensure adoption to more extreme temperatures. The policy outcomes aim to ensure that buildings and places are adapted to more extreme temperatures.	Strong correlation as NPF4 recognises the importance of making places more resilient to flooding. In particular, Policy 10 (Coastal Development) aims to protect coastal communities and assess and support resilience to the impacts of climate change, hence development proposals will only be supported where the proposal does not increase the risk of people to coastal flooding or coastal erosion. Policy 22 (Flood Risk and Water Management) also aims to strengthen resilience to flood risk by promoting avoidance as a first principle and reducing the vulnerability of existing and future development to flooding.	Strong correlation as NPF4 recognises the need to anticipate and mitigate risk from storm surges. This is predominately recognised within Policy 10 (Coastal Development) which supports adaptation for and/or resilience to predicted increases in sea levels and storm surge, outlining that development proposals in developed coastal areas will only be supported where they are anticipated to be supportable in the long-term, taking into account projected climate change.	Strong correlation as NPF4 recognises the need to reduce GHG emissions and adapt to the future impacts of climate change. Climate change is outlined as a cross-cutting theme, prioritised across all policies in the plan. In particular, Policy 1 (tackling the climate and nature crisis) and Policy 2 (climate mitigation and adaptation), go into depth on the need to encourage, promote and facilitate development that minimises emissions and adapts to the current and future impacts of climate change. As such, the outcome of the polices are to make places more resilient to climate change	Strong correlation as NPF4 Policies 4 (Natural Places), 5 (Soils), and 6 (Forestry, Woodland and Trees), aim to protect, restore and enhance natural environments, making the best use of nature-based solutions. Throughout these policies, key connections are made to climate mitigation and adaptation (Policy 2), as well as the need to tackle the climate and nature crisis (Policy 1).

Criteria	1. Extent to which the package supports adaptation and/or resilience to current and predicted future impacts of climate change.	1. Extent to which the package supports adaptation and/or resilience to current and predicted future impacts of climate change.	1. Extent to which the package supports adaptation and/or resilience to current and predicted future impacts of climate change.	1. Extent to which the package supports adaptation and/or resilience to current and predicted future impacts of climate change.	2. Extent to which the package supports the surrounding area to adapt and/or become more resilient to current and predicted future impacts of climate change.	2. Extent to which the package supports the surrounding area to adapt and/or become more resilient to current and predicted future impacts of climate change
Success Factors	a. Supports adaptation for and/or resilience to predicted increases in sea levels and storm surge	b. Supports adaptation for and/or resilience to predicted changes in temperatures	c. Supports adaptation for and/or resilience to predicted increase in likelihood and severity of fluvial and pluvial flooding	d. Supports adaptation for and/or resilience to predicted increase in likelihood and severity of storms and high winds	a. Supports adaptation for and/or resilience to current and future impacts of climate change within the study area outside of the package boundary	b. Supports the natural environment to adapt for and/or increase resilience to current and predicted future impacts of climate change
	account projected climate change.				impacts and ensure emissions from development are minimised.	

Theme of Climate Change Adaptation and Resilience – Local policies, plans and strategies relating to the climate compatibility assessment criteria

Criteria	1. Extent to which the package supports adaptation and/or resilience to current and predicted future impacts of climate change.	1. Extent to which the package supports adaptation and/or resilience to current and predicted future impacts of climate change.	1. Extent to which the package supports adaptation and/or resilience to current and predicted future impacts of climate change.	1. Extent to which the package supports adaptation and/or resilience to current and predicted future impacts of climate change.	2. Extent to which the package supports the surrounding area to adapt and/or become more resilient to current and predicted future impacts of climate change.	2. Extent to which the package supports the surrounding area to adapt and/or become more resilient to current and predicted future impacts of climate change
Success Factors	a. Supports adaptation for and/or resilience to predicted increases in sea levels and storm surge	b. Supports adaptation for and/or resilience to predicted changes in temperatures	c. Supports adaptation for and/or resilience to predicted increase in likelihood and severity of fluvial and pluvial flooding	d. Supports adaptation for and/or resilience to predicted increase in likelihood and severity of storms and high winds	a. Supports adaptation for and/or resilience to current and future impacts of climate change within the study area outside of the package boundary	b. Supports the natural environment to adapt for and/or increase resilience to current and predicted future impacts of climate change
The Highland Wide Local Development Plan 2012	Strong correlation as the plan refers to how by 2030, the Inner Moray Firth will have safeguarded its settlements against coastal flooding and sea-level rise: 'The environmental limits of the area will have been respected, particularly in the countryside around its towns and along its coast, where the effect of sea level rising from climate change has been allowed for in the location of new development'.	Not applicable as the plan does not include plans for resiliency to changes in temperature.	Strong correlation as the plan refers to how, by 2030, the Inner Moray Firth will reduce flood risk: 'The risk of flooding from all sources is likely to increase with projected climate change (including sea level rise) and therefore it is important to have an overall aim of avoiding and reducing flood risk. Adequate flood management and mitigation will be important in the limited circumstances where avoidance is not possible. Flood risk is now an integral factor in the Council's choice of which areas of land to allocate for development'.	Not applicable as the plan does not include plans for resiliency to high winds and storms.	Not applicable as the plan does not include plans for resiliency to current and future climate changes.	Strong correlation as the plan supports the natural environment to adapt to climate change: 'Trees and woodlands are a resource of multiple benefits with substantial contributions to landscape character and distinctiveness, biodiversity, the climate change agenda, and opportunities for recreation, economic development, and community spin offs. We will encourage the protection and enhancement of green networks. These are multi-functional in benefit including for biodiversity, species, and habitats.
Moray Local Development Plan 2020	Strong correlation as the plan's Environment Policy 17 covers coastal change and actions to adapt to coastal change and defence.	Not applicable as the plan refers to climate change but does not include plans for	Strong correlation as the plan's Environment Policy 12 covers management	Not applicable as the plan does not include actions for resiliency to storms and high winds.	Partial correlation since one of the overall aims of the plan is to 'Improve resilience of the natural and built	Strong correlation as biodiversity is the main topic of Environmental Policy 2. All development proposals

Criteria	1. Extent to which the package supports adaptation and/or resilience to current and predicted future impacts of climate change.	1. Extent to which the package supports adaptation and/or resilience to current and predicted future impacts of climate change.	1. Extent to which the package supports adaptation and/or resilience to current and predicted future impacts of climate change.	1. Extent to which the package supports adaptation and/or resilience to current and predicted future impacts of climate change.	2. Extent to which the package supports the surrounding area to adapt and/or become more resilient to current and predicted future impacts of climate change.	2. Extent to which the package supports the surrounding area to adapt and/or become more resilient to current and predicted future impacts of climate change
Success Factors	a. Supports adaptation for and/or resilience to predicted increases in sea levels and storm surge	b. Supports adaptation for and/or resilience to predicted changes in temperatures	c. Supports adaptation for and/or resilience to predicted increase in likelihood and severity of fluvial and pluvial flooding	d. Supports adaptation for and/or resilience to predicted increase in likelihood and severity of storms and high winds	a. Supports adaptation for and/or resilience to current and future impacts of climate change within the study area outside of the package boundary	b. Supports the natural environment to adapt for and/or increase resilience to current and predicted future impacts of climate change
		resiliency to temperature changes.	and enhancement of the water environment		environment to climate change'.	must, where possible, retain, protect and enhance features of biological interest and provide for their appropriate management.
Moray Council Climate Change Strategy 2020-2030	Not applicable as the strategy does not include plans for resiliency to sea levels and storm surge.	Not applicable as the strategy does not include plans for resiliency to changes in temperature.	Not applicable as the strategy does not include plans for resiliency to flooding.	Not applicable as the strategy does not include plans for resiliency to storms and high winds.	Partial correlation as the strategy supports the topic but does not make clear commitments: 'Through the Local Development Plan, supported by supplementary guidance prepared on Sustainable Design and Construction, the strategy aims to protect and enhance the environment and improve resilience of the natural and built environment to climate change. For example, a greater priority being placed upon the re-use of brownfield land over greenfield and town centre master-planning	Partial correlation as the strategy supports the topic but does not make clear commitments: 'Protect and enhance the environment. Improve the resilience of the natural and built environment to climate change. Through the Local Development Plan, supported by supplementary guidance prepared on Sustainable Design and Construction, the strategy states that 'we will protect and enhance the environment and improve resilience of the natural and built environment to climate change'. However, little

Criteria	1. Extent to which the package supports adaptation and/or resilience to current and predicted future impacts of climate change.	1. Extent to which the package supports adaptation and/or resilience to current and predicted future impacts of climate change.	1. Extent to which the package supports adaptation and/or resilience to current and predicted future impacts of climate change.	1. Extent to which the package supports adaptation and/or resilience to current and predicted future impacts of climate change.	2. Extent to which the package supports the surrounding area to adapt and/or become more resilient to current and predicted future impacts of climate change.	2. Extent to which the package supports the surrounding area to adapt and/or become more resilient to current and predicted future impacts of climate change
Success Factors	a. Supports adaptation for and/or resilience to predicted increases in sea levels and storm surge	b. Supports adaptation for and/or resilience to predicted changes in temperatures	c. Supports adaptation for and/or resilience to predicted increase in likelihood and severity of fluvial and pluvial flooding	d. Supports adaptation for and/or resilience to predicted increase in likelihood and severity of storms and high winds	a. Supports adaptation for and/or resilience to current and future impacts of climate change within the study area outside of the package boundary	b. Supports the natural environment to adapt for and/or increase resilience to current and predicted future impacts of climate change
					to promote behavioural change'.	detail is given on how exactly this will happen."
Aberdeen City and Shire Strategic Development Plan 2020	Strong correlation to criteria as the plan outlines the need for development which avoids areas of flood risk and which improves surface water management - important in adapting to climate change. Local Development Plans should consider ways to ensure new development can be appropriately 'future-proofed' to take into account climate change effects relating to extreme weather. Both Councils will need to work together to deliver a coordinated approach to flood prevention. Strategy also considers the need to monitor and take account of the scale of these changes. Adaptation strategies will need to be considered, particularly where new	Not applicable as the plan does not include plans for resiliency to changes in temperature.	Strong correlation to criteria: Sub heading of 'Flooding, Water Supply and the Coast'. Policy outlines the need for development which avoids areas of flood risk and which improves surface water management. . Local Development Plans should consider ways to ensure new development can be appropriately 'future-proofed' to take into account climate change effects relating to extreme weather. Both Councils will need to work together to deliver a coordinated approach to flood prevention. Examples of flood prevention measure are given, including walls, embankments, new channels and flood storage areas to try and	Partial correlation as plans for resilience to storms is outlined in the 'Flooding, Water Supply and the Coast' section. Policy outlines the need for development which avoids areas of flood risk and which improves surface water management. Local Development Plans should consider ways to ensure new development can be appropriately 'future-proofed' to take into account climate change effects relating to extreme weather. Resiliency to storms and high winds/extreme weather is not however a focal point of the report and limited information is given on resilience against it.	Partial correlation as little mention is given to climate resilience. Instead, focus placed on climate mitigation in new developments. All new developments must be designed and built to use resources more efficiently and be located in places with as little negative effect on the environment as possible	Partial correlation as both Councils will protect and enhance biodiversity, wildlife habitats, landscape, green and water networks and other sensitive areas, and prevent habitat fragmentation, in identifying land for development, preparing masterplans and assessing development proposals. Local Development Plans will identify existing and proposed green networks and, where possible, identify opportunities for enhancement and priorities for implementation.

Criteria	1. Extent to which the package supports adaptation and/or resilience to current and predicted future impacts of climate change.	1. Extent to which the package supports adaptation and/or resilience to current and predicted future impacts of climate change.	1. Extent to which the package supports adaptation and/or resilience to current and predicted future impacts of climate change.	1. Extent to which the package supports adaptation and/or resilience to current and predicted future impacts of climate change.	2. Extent to which the package supports the surrounding area to adapt and/or become more resilient to current and predicted future impacts of climate change.	2. Extent to which the package supports the surrounding area to adapt and/or become more resilient to current and predicted future impacts of climate change
Success Factors	a. Supports adaptation for and/or resilience to predicted increases in sea levels and storm surge	b. Supports adaptation for and/or resilience to predicted changes in temperatures	c. Supports adaptation for and/or resilience to predicted increase in likelihood and severity of fluvial and pluvial flooding	d. Supports adaptation for and/or resilience to predicted increase in likelihood and severity of storms and high winds	a. Supports adaptation for and/or resilience to current and future impacts of climate change within the study area outside of the package boundary	b. Supports the natural environment to adapt for and/or increase resilience to current and predicted future impacts of climate change
	developments should be built.		prevent a site from flooding.			
Aberdeenshire Local Development Plan 2023	Not applicable as the plan does not include plans for resiliency to sea levels and storm surge.	Not applicable as the LDP does not include plans for resiliency to predicted changes in temperature.	Strong correlation as the LDP includes commitments for resiliency to flooding. This is covered in Policy C4 Flooding, whereby Flood Risk Assessments should be undertaken in accordance with SEPA Technical Flood Risk Guidance. Further measures for resilience are to be integrated into development plans, including buffer stripes for enhancement of the watercourse and any necessary maintenance.	Partial correlation as the plan outlines in HE3 the need to safeguard historic buildings to the impacts of climate change. In particular, assistance is required in making listed buildings both wind and watertight, hence more resilient to the predicted increase in likelihood and severity of storms and high winds. However, the strategy does not include specific plans for resilience to high winds and storms.	Partial correlation as makes reference to criteria topic but no commitments: 'Outcome 3 - A natural, resilient place, helping to protect and enhance our natural and cultural assets and facilitating their sustainable use'. Climate change section (Section 13) outlines that 'For Aberdeenshire, this means reducing the use of energy (both in the distribution of development and within developments themselves), conserving water, promoting energy generation by renewable sources, sustaining existing carbon stores (such as peat and wood), and dealing with long-term flood risks'.	Partial correlation as makes reference to criteria topic but no commitments. Outlines that all proposals will need to address, amongst other considerations, the effect on natural heritage, habitat and biodiversity, as well as habitat enhancement and restoration measures. Policy EI - Natural Heritage also outlines the importance of considering protected species, nature conservation sites, wider biodiversity, and geodiversity.

Criteria	1. Extent to which the package supports adaptation and/or resilience to current and predicted future impacts of climate change.	1. Extent to which the package supports adaptation and/or resilience to current and predicted future impacts of climate change.	1. Extent to which the package supports adaptation and/or resilience to current and predicted future impacts of climate change.	1. Extent to which the package supports adaptation and/or resilience to current and predicted future impacts of climate change.	2. Extent to which the package supports the surrounding area to adapt and/or become more resilient to current and predicted future impacts of climate change.	2. Extent to which the package supports the surrounding area to adapt and/or become more resilient to current and predicted future impacts of climate change
Success Factors	a. Supports adaptation for and/or resilience to predicted increases in sea levels and storm surge	b. Supports adaptation for and/or resilience to predicted changes in temperatures	c. Supports adaptation for and/or resilience to predicted increase in likelihood and severity of fluvial and pluvial flooding	d. Supports adaptation for and/or resilience to predicted increase in likelihood and severity of storms and high winds	a. Supports adaptation for and/or resilience to current and future impacts of climate change within the study area outside of the package boundary	b. Supports the natural environment to adapt for and/or increase resilience to current and predicted future impacts of climate change
NESTRANS Regional Transport Strategy 2040	Not applicable as although there is a short description that outlines how existing infrastructure is exposed to flood events and/or more extreme tidal events, it does not include plans for resiliency to sea levels and storm surge.	Not applicable as the strategy does not include plans for resiliency to changes in temperature. Only a brief description given on how infrastructure assets are exposed to high temperatures.	Not applicable as the strategy does not include plans for resiliency to flooding.	Not applicable as the strategy does not include plans for resiliency to storms and high winds.	Partial correlation as there is an overarching aim to identify where upgrades and enhancements are required to fulfil the aspirations of the region in terms of economic development and growth, resilience and casualty reduction targets. Explicitly discusses the role of resilience and adaptation to the effects of climate change.	Not applicable as the strategy does not include plans for biodiversity protection and enhancement; ecosystem services; or habitat fragmentation and creation.
HITRANS Regional Transport Strategy	Not applicable since the strategy does not include plans for resiliency to sea levels and storm surge.	Not applicable since the strategy does not include plans for resiliency to changes in temperature.	Not applicable since the strategy does not include plans for resiliency to flooding.	Not applicable since the strategy does not include plans for resiliency to storms and high winds.	Not applicable since there is no explicit reference to climate change resilience.	Not applicable since the strategy does not include plans for biodiversity protection and enhancement; ecosystem services; or habitat fragmentation and creation.

Theme of Climate Change Mitigation – National policies, plans and strategies relating to the climate compatibility assessment criteria

Criteria	3. Extent to which the package supports the decarbonisation of the transport network in Scotland, including supporting transition from higher to lower emission modes, and the modal shift to greater public transport and active travel options.	3. Extent to which the package supports the decarbonisation of the transport network in Scotland, including supporting transition from higher to lower emission modes, and the modal shift to greater public transport and active travel options.	4. Extent to which the package supports the decarbonisation of the construction sector in Scotland and maximises reduction in whole life greenhouse gas emissions.	5. Extent to which land use change associated with the package mitigates greenhouse gas emissions and contributes to carbon storage and sequestration.
Success Factors	a. The net change in user greenhouse gas emissions sit appropriately within the national emissions envelope for Scotland, taking account of changing legislation and targets (for any Climate Change Plan update for Scotland) (assumed current target of 2045)	b. Supports the transition to low carbon modes of transport: transition from higher emissions to lower emissions modes, the modal shift to public transport and the modal shift to active travel for shorter everyday journeys.	a. Supports transition from higher emission to lower emission materials and technologies during construction, operation and maintenance.	a. Supports the protection and development of carbon sinks, and takes appropriate measures to maximise carbon sequestration, taking account of wider ecosystem services/natural capital
A National Mission with Local Impact: Infrastructure Investment Plan for Scotland 2021-22 to 2025-26	Strong correlation since the criterion topic is outlined in: Theme 1: Enabling the Transition to Net Zero Emissions and Environmental Sustainability. The plan outlines the investment intentions for decarbonising industry and also to support a circular economy.	Strong correlation since the criterion topic is outlined in: Theme 1: Enabling the Transition to Net Zero Emissions and Environmental Sustainability. The plan outlines investment plans for low carbon modes of travel, decarbonising rail, zero-emission buses and active travel.	Strong correlation since the criterion topic is outlined in: Theme 1: Enabling the Transition to Net Zero Emissions and Environmental Sustainability. The plan outlines investment intentions for decarbonising the industry and transitioning to low carbon technologies.	Strong correlation since the criterion topic is outlined in: Theme 1: Enabling the Transition to Net Zero Emissions and Environmental Sustainability. The plan sets out investment intentions for natural capital schemes including increasing forest cover and supporting reuse of vacant and derelict land as part of a fair, green recovery. The plan also outlines investment in peatland restoration.
Climate Change Plan Third Report on Proposals and Policies 2018-2032	Strong correlation since the plan shows the emissions reductions pathway to 2032 and the crucial roles that will be played by local authorities and the wider public sector (and the planning system). Part Three of the Plan provides detailed information on the emissions envelopes and emissions reduction trajectories for each sector.	Partial correlation since the plan does not include direct plans for the transition to low carbon modes of transport, however, there is some commentary on this theme.	Partial correlation since the plan does not include direct plans for supporting the transition to decarbonising construction, operation and maintenance, however there is some commentary on this theme.	Strong correlation since the plan includes opportunities for the Land Use, Land-Use Change and Forestry (LULUCF) Sector including peatland restoration. The plan introduces the Scottish TIMES model, covering the entire Scottish energy system, as well as non-energy sectors, including agriculture, Land Use, Land Use Change and Forestry, and waste.
Update to the Climate Change Plan 2018-2032 (Securing a Green Recovery on a Path to Net Zero)	Strong correlation as the plan sets out actions to decarbonise transport which are aligned with the National Transport Strategy. The actions focus on technological advances and also	Strong correlation as the plan commits to actions that support the transition to low carbon modes of transport such as: reducing car kilometres by 20% by 2030; phase out	Partial correlation since the plan includes actions to decarbonise transport and industry including using low carbon technologies. However, it is not specific to the different phases of	Strong correlation as the plan includes actions associated with Land Use, Nature Based Solutions and carbon sinks, including the restoration of peatland and investing in natural

Criteria	3. Extent to which the package supports the decarbonisation of the transport network in Scotland, including supporting transition from higher to lower emission modes, and the modal shift to greater public transport and active travel options.	3. Extent to which the package supports the decarbonisation of the transport network in Scotland, including supporting transition from higher to lower emission modes, and the modal shift to greater public transport and active travel options.	4. Extent to which the package supports the decarbonisation of the construction sector in Scotland and maximises reduction in whole life greenhouse gas emissions.	5. Extent to which land use change associated with the package mitigates greenhouse gas emissions and contributes to carbon storage and sequestration.
Success Factors	a. The net change in user greenhouse gas emissions sit appropriately within the national emissions envelope for Scotland, taking account of changing legislation and targets (for any Climate Change Plan update for Scotland) (assumed current target of 2045)	b. Supports the transition to low carbon modes of transport: transition from higher emissions to lower emissions modes, the modal shift to public transport and the modal shift to active travel for shorter everyday journeys.	a. Supports transition from higher emission to lower emission materials and technologies during construction, operation and maintenance.	a. Supports the protection and development of carbon sinks, and takes appropriate measures to maximise carbon sequestration, taking account of wider ecosystem services/natural capital
	the mode-shift. The plan includes several outcomes relating to decarbonising the transport sector.	the need for new petrol and diesel cars and vans by 2030; public bodies to lead the way by phasing out the need for new petrol and diesel light commercial vehicles by 2025; establish a Zero Emission Heavy Duty Vehicle programme; Scotland's rail services will be decarbonised by 2035; and support transformational active travel projects.	construction, operation, and maintenance. The plan includes some specific actions such as 'In the construction sector, we will encourage businesses to recognise the advantages of using sustainably sourced wood fibre and make more use of wood products'.	capital. The plan includes the following outcome: Outcome 3: To enhance the contribution of peatland to carbon storage, we will support an increase in the annual rate of peatland restoration.
Scottish Climate Change Adaptation Programme 2019-2024	Strong correlation as across the programme there are a clear set of priorities and outcomes that support decarbonising of the transport sector.	Strong correlation as across the programme there are a clear set of priorities and outcomes that support decarbonising the transport sector.	Strong correlation as across the programme there are a clear set of priorities and outcomes that support decarbonising the transport sector. Outcome 3: Our inclusive and sustainable economy is flexible, adaptable and responsive to the changing climate This includes sub-outcomes and priorities relating to use of low carbon technologies and materials.	Strong correlation as the criterion topic is outlined in: Outcome 5: Our natural environment is valued, enjoyed, protected and enhanced and has increased resilience to climate change. This includes sub-outcomes on ecosystem service regulation and support include peatlands, forests and woodlands.
Just Transition Commission: A National Mission for a fairer, greener Scotland	Strong correlation as the plan outlines a goal to pursue an orderly, managed transition to net zero that creates benefits and opportunities for people across Scotland. Delivery of this must be a national mission.	Strong correlation as the plan outlines a goal to pursue an orderly, managed transition to net zero that creates benefits and opportunities for people across Scotland. Delivery of this must be a national mission.	Strong correlation as the plan outlines a goal to pursue an orderly, managed transition to net zero that creates benefits and opportunities for people across Scotland. Delivery of this must be a national mission.	Partial correlation as the plan references the need to ensure investment in carbon sequestration, however, does not outline any actions or outcomes.

Criteria	3. Extent to which the package supports the decarbonisation of the transport network in Scotland, including supporting transition from higher to lower emission modes, and the modal shift to greater public transport and active travel options.	3. Extent to which the package supports the decarbonisation of the transport network in Scotland, including supporting transition from higher to lower emission modes, and the modal shift to greater public transport and active travel options.	4. Extent to which the package supports the decarbonisation of the construction sector in Scotland and maximises reduction in whole life greenhouse gas emissions.	5. Extent to which land use change associated with the package mitigates greenhouse gas emissions and contributes to carbon storage and sequestration.
Success Factors	a. The net change in user greenhouse gas emissions sit appropriately within the national emissions envelope for Scotland, taking account of changing legislation and targets (for any Climate Change Plan update for Scotland) (assumed current target of 2045)	b. Supports the transition to low carbon modes of transport: transition from higher emissions to lower emissions modes, the modal shift to public transport and the modal shift to active travel for shorter everyday journeys.	a. Supports transition from higher emission to lower emission materials and technologies during construction, operation and maintenance.	a. Supports the protection and development of carbon sinks, and takes appropriate measures to maximise carbon sequestration, taking account of wider ecosystem services/natural capital
Evidence for the third UK Climate Change Risk Assessment (CCRA3) - Summary for Scotland	Partial correlation as the assessment makes note of the requirement to achieve net-zero status by 2045. All suggested adaptation actions would directly or indirectly support that goal, but there are no specific actions outlined relating to reducing greenhouse gas emissions/reaching net zero.	Partial correlation as the assessment addresses the use of increased active travel and public transport in support of net zero. However, no further detail is included to support the transition to low carbon modes of transport.	Partial correlation as the assessment notes the requirement to achieve the 2045 net-zero goal. All suggested adaptation actions would directly or indirectly support that goal, however there are no specific plans relating to lower emission materials and technologies during construction, operation and maintenance.	Strong correlation as the assessment outlines the risk associated with soils and carbon stores/sequestration, and the impact of climate change on said habitats, with adaptation actions recommended. Scotland's Net Zero emissions target not only involves mitigation, but also offers the potential to build climate change adaptation into land management and increase ecological resilience, with peatland restoration a particular opportunity for mitigation and adaptation co-benefits.
National Transport Strategy 2 (NTS2)	Strong correlation as the strategy outcomes include: - Reduce emissions generated by the transport system to mitigate climate change. - Reduce emissions generated by the transport system to improve air quality. - Ensure the transport system adapts to the projected climate change impacts. - Support management of demand to encourage more sustainable transport choices.	Strong correlation as the strategy 'Take climate action' outcomes include: - Support management of demand to encourage more sustainable transport choices. - Facilitate a shift to more sustainable and space-efficient modes of transport for people and goods. - Improve the quality and availability of information to enable all to make more sustainable transport choices. The strategy aims to make sure that public transport and active travel	Partial correlation as the strategy details the support of the net-zero 2045 target by decarbonising Scotland's passenger railway by 2035 - this includes investment in battery-powered trains and working with developers of hydrogen fuel cell trains to accelerate their development and deployment through practical trials in Scotland. The 2045 target is also supported by decarbonising scheduled flights within Scotland by 2040. There are no specific plans on	Not applicable as does not include plans for carbon storage and sequestration.

Criteria	3. Extent to which the package supports the decarbonisation of the transport network in Scotland, including supporting transition from higher to lower emission modes, and the modal shift to greater public transport and active travel options.	3. Extent to which the package supports the decarbonisation of the transport network in Scotland, including supporting transition from higher to lower emission modes, and the modal shift to greater public transport and active travel options.	4. Extent to which the package supports the decarbonisation of the construction sector in Scotland and maximises reduction in whole life greenhouse gas emissions.	5. Extent to which land use change associated with the package mitigates greenhouse gas emissions and contributes to carbon storage and sequestration.
Success Factors	a. The net change in user greenhouse gas emissions sit appropriately within the national emissions envelope for Scotland, taking account of changing legislation and targets (for any Climate Change Plan update for Scotland) (assumed current target of 2045)	b. Supports the transition to low carbon modes of transport: transition from higher emissions to lower emissions modes, the modal shift to public transport and the modal shift to active travel for shorter everyday journeys.	a. Supports transition from higher emission to lower emission materials and technologies during construction, operation and maintenance.	a. Supports the protection and development of carbon sinks, and takes appropriate measures to maximise carbon sequestration, taking account of wider ecosystem services/natural capital
	- Facilitate a shift to more sustainable and space-efficient modes of transport for people and goods. - Improve the quality and availability of information to enable all to make more sustainable transport choices.	options are the preferred choice for people making short journeys. Key investments will be made to encourage the modal shift to public transport (e.g., smart ticketing or payment options).	transition to decarbonising construction, operation, and maintenance.	
Strategic Transport Projects Review 2 (STPR2)	Strong correlation as interventions emerging from STPR2 contribute to supporting the wider Scotland Net Zero by 2045 commitment (outlining a range of targeted measures to achieve fundamental change in overall travel demand, a shift to more sustainable modes such as walking, cycling and public transport, and in transitioning to a net zero economy). Transport Planning Objective 1 details 'A sustainable strategic transport system that contributes significantly to the Scottish Government's net zero emissions target'. STPR2 recommendations include decarbonising transport.	Strong correlation as the strategy outlines that TPO1 will be achieved by reducing the consumption of fossil fuels through a shift to more sustainable modes of transport; increase the mode share of active travel for shorter everyday journeys; increase the mode share of public transport by providing viable alternatives to single occupancy private car use; and reduce emissions generated by the strategic transport system. STPR2 recommendations including improving active travel infrastructure, and enhancing access to affordable public transport.	Partial correlation as STPR2 recommendations include demand management measures, including use of technology, innovation and behavioural change; and public transport improvements, including interchanges, road space allocation, technology, and ticketing; and decarbonisation of the transport system to support the transition to net zero operation and maintenance. However, there are no specific plans on transition to decarbonising construction, operation, and maintenance.	Not applicable as the strategy considers enhancement opportunities for other environmental topics, for example the protection of high-carbon soils, and the implementation of biodiversity enhancements, will also benefit climate change mitigation and adaptation. However, the plan does not include specific plans for carbon storage and sequestration.
A Route Map to achieve a 20% reduction in car kilometres by 2030	Strong correlation as the route map is published in response to the Scottish Government's Climate Change Plan update commitment to reduce car kilometres by 20 per cent by 2030, to meet Scotland's statutory obligations	Strong correlation as the route map outlines travel reduction interventions, including ''to help people switch modes''. Activities include (not limited to): - Publishing the Cycling Framework	Not applicable as the route map does not reference the transition to lower emission materials and technologies - comments include 'Carbon reduction modelling has concluded that it will not be possible to reach net zero	Not applicable as the route map does not include plans for carbon storage and sequestration.

Criteria	3. Extent to which the package supports the decarbonisation of the transport network in Scotland, including supporting transition from higher to lower emission modes, and the modal shift to greater public transport and active travel options.	3. Extent to which the package supports the decarbonisation of the transport network in Scotland, including supporting transition from higher to lower emission modes, and the modal shift to greater public transport and active travel options.	4. Extent to which the package supports the decarbonisation of the construction sector in Scotland and maximises reduction in whole life greenhouse gas emissions.	5. Extent to which land use change associated with the package mitigates greenhouse gas emissions and contributes to carbon storage and sequestration.
Success Factors	a. The net change in user greenhouse gas emissions sit appropriately within the national emissions envelope for Scotland, taking account of changing legislation and targets (for any Climate Change Plan update for Scotland) (assumed current target of 2045)	b. Supports the transition to low carbon modes of transport: transition from higher emissions to lower emissions modes, the modal shift to public transport and the modal shift to active travel for shorter everyday journeys.	a. Supports transition from higher emission to lower emission materials and technologies during construction, operation and maintenance.	a. Supports the protection and development of carbon sinks, and takes appropriate measures to maximise carbon sequestration, taking account of wider ecosystem services/natural capital
	for greenhouse gas emissions reduction by 2045. Interventions to achieve the 2045 net zero goal include: 1. To reduce the need to travel 2. To help people live well locally 3. To help people switch modes 4. To help people combine trips or share journeys 5. Further interventions to discourage car use	and Delivery Plan for Active Travel in Scotland in 2022. - Increasing investment in active travel (by 2024-25, at least £320 million or 10% of total transport budget allocated to active travel) - Investing £50 million on Active Freeways - Improving access to cycles and the transportation of cycles - Introducing Low Emission Zones in Aberdeen, Dundee, Edinburgh and Glasgow	emissions through technological solutions alone'. The plan mentions the decarbonisation and electrification of rail services (maintenance and enhancement of network), however does not provide any action/plans to achieve this outcome.	
Rail Services Decarbonisation Action Plan	Strong correlation as the action plan focuses on decarbonising transport through modal shift to rail, and decarbonising rail traction energy through the removal of diesel passenger trains from the Scottish network by 2035.	Strong correlation as the decarbonisation action plan includes the activity to maximise all opportunities for modal shift to rail from private vehicles and heavy goods vehicles.	Strong correlation as the plan sets out an initial indicative programme to decarbonise Scotland's railway network through: 1. electrification of the rail infrastructure (adequate decarbonised power supply/source; overhead wires to supply electricity; appropriate rolling stock); and, 2. use of alternative traction technologies.	Not applicable as the action plan does not include plans for carbon storage and sequestration.
National Planning Framework 4 (NPF4)	Strong correlation as NPF4 is aimed at reducing, minimising, or avoiding GHG emissions in accordance with Scotland's Climate Change Plan. The overall strategy itself and supporting policies aims to support development	Strong correlation as NPF4 refers to Scotland's Climate Change Plan and the requirement to make significant progress towards achieving net zero emissions by 2045. This includes reducing car kilometres travelled by	Strong correlation as the National Spatial Strategy outlines that a sustainable recovery will be achieved through low and zero emissions technologies. Policy 11 (Energy) advocates this further through the	Strong correlation as NPF4 supports investment in nature-based solutions to benefit natural capital and contribute to net zero. In particular, Policy 3 (Biodiversity) aims to strengthen nature networks, build

Criteria	3. Extent to which the package supports the decarbonisation of the transport network in Scotland, including supporting transition from higher to lower emission modes, and the modal shift to greater public transport and active travel options.	3. Extent to which the package supports the decarbonisation of the transport network in Scotland, including supporting transition from higher to lower emission modes, and the modal shift to greater public transport and active travel options.	4. Extent to which the package supports the decarbonisation of the construction sector in Scotland and maximises reduction in whole life greenhouse gas emissions.	5. Extent to which land use change associated with the package mitigates greenhouse gas emissions and contributes to carbon storage and sequestration.
Success Factors	a. The net change in user greenhouse gas emissions sit appropriately within the national emissions envelope for Scotland, taking account of changing legislation and targets (for any Climate Change Plan update for Scotland) (assumed current target of 2045)	b. Supports the transition to low carbon modes of transport: transition from higher emissions to lower emissions modes, the modal shift to public transport and the modal shift to active travel for shorter everyday journeys.	a. Supports transition from higher emission to lower emission materials and technologies during construction, operation and maintenance.	a. Supports the protection and development of carbon sinks, and takes appropriate measures to maximise carbon sequestration, taking account of wider ecosystem services/natural capital
	that helps to meet GHG emissions targets.	20% by reducing the need to travel and promoting more sustainable transport. Policy 13 (Sustainable Transport) draws on this by aiming to encourage, promote and facilitate developments that prioritise walking, wheeling, cycling and public transport for everyday travel and reduce the need to travel unsustainably. As such, development proposals will be supported where it can be demonstrated that the transport requirements generated have been considered in line with the sustainable travel and investment hierarchies.	integration of emerging low-carbon and zero emissions technologies, including hydrogen and carbon capture utilisation and storage (CCUS). Therefore, the intended policy outcomes are the expansion of renewable, low-carbon and zero emissions technologies. The NPF4 section on Circular Economy Materials Management Facilities further supports the transition from higher emission to lower emission materials in order to reduce GHG emissions.	resilience and safeguard ecosystem services. Policy 5 (Soils) aims to protect carbon-rich soils, restore peatlands and minimise disturbance to soils from development. As such, a peat management plan will be required in development proposals to demonstrate that a functioning peatland system capable of achieving carbon sequestration will be achieved .

Theme of Climate Change Mitigation – Local policies, plans and strategies relating to the climate compatibility assessment criteria

Criteria	3. Extent to which the package supports the decarbonisation of the transport network in Scotland, including supporting transition from higher to lower emission modes, and the modal shift to greater public transport and active travel options.	3. Extent to which the package supports the decarbonisation of the transport network in Scotland, including supporting transition from higher to lower emission modes, and the modal shift to greater public transport and active travel options.	4. Extent to which the package supports the decarbonisation of the construction sector in Scotland and maximises reduction in whole life greenhouse gas emissions.	5. Extent to which land use change associated with the package mitigates greenhouse gas emissions and contributes to carbon storage and sequestration.
Success Factors	a. The net change in user greenhouse gas emissions sit appropriately within the national emissions envelope for Scotland, taking account of changing legislation and targets (for any Climate Change Plan update for Scotland) (assumed current target of 2045)	b. Supports the transition to low carbon modes of transport: transition from higher emissions to lower emissions modes, the modal shift to public transport and the modal shift to active travel for shorter everyday journeys.	a. Supports transition from higher emission to lower emission materials and technologies during construction, operation and maintenance.	a. Supports the protection and development of carbon sinks, and takes appropriate measures to maximise carbon sequestration, taking account of wider ecosystem services/natural capital
The Highland Wide Local Development Plan 2012	Partial correlation as the plan references the criteria topic, though doesn't commit to any actions: Section 72 of the Climate Change (Scotland) Act 2009 says that planning authorities must include in local development plans policies requiring all developments to be designed to ensure that all new buildings avoid a specified and rising proportion of the projected greenhouse gas emissions from their use, through the installation and operation of low and zero-carbon generating technologies. Policy 28 sets out the requirement for all development to be designed in the context of sustainable development and climate change.	Strong correlation as the plan states 'We will have supported a Competitive, Sustainable and Adaptable Highland Economy by: • helping to deliver, in partnership with Transport Scotland and other transport bodies, transport infrastructure improvements across the area in line with the Council's Local Transport Strategy and the Scottish Government's Strategic Transport Projects Review; • promoting a positive and innovative approach to master planning new developments that contribute towards reducing the need to travel and encourage people to walk, cycle or use public transport'.	Partial correlation as the plan references the criteria topic but does not commit to specific actions: 'The Council will support developments which promote and enhance the social, economic and environmental wellbeing of the people of the Highlands. Proposed developments will be assessed on the extent to which they: - demonstrate that they have sought to minimise the generation of waste during the construction and operational phases. (This can be submitted through a Site Waste Management Plan)'.	Strong correlation as the plan references the criteria topic and outlines the strategy to implement action: 'Trees and woodlands are a resource of multiple benefits with substantial contributions to landscape character and distinctiveness, biodiversity, the climate change agenda, and opportunities for recreation, economic development, and community spin offs. They play a vital role in integrating any new development into the surrounding area. The Highland Forest and Woodland Strategy 2006 seeks to maximise the opportunities for new and existing forest and woodland and will be a material planning consideration when assessing a proposal's impact on woodland and forestry'.
Moray Local Development Plan 2020	Not applicable as the plan refers to reducing carbon emissions but is not specific to the transport sector.	Not applicable as the plan refers to low carbon in objectives but does not set out any plans or outcomes relating to low carbon modes of transport.	Not applicable as the plan refers to low carbon in objectives but does not set out any plans or outcomes relating to low carbon modes of transport.	Strong correlation as the plan's Environment Policy 7 focuses on Forestry, Woodlands and Trees and covers a woodland and tree retention strategy.

Criteria	3. Extent to which the package supports the decarbonisation of the transport network in Scotland, including supporting transition from higher to lower emission modes, and the modal shift to greater public transport and active travel options.	3. Extent to which the package supports the decarbonisation of the transport network in Scotland, including supporting transition from higher to lower emission modes, and the modal shift to greater public transport and active travel options.	4. Extent to which the package supports the decarbonisation of the construction sector in Scotland and maximises reduction in whole life greenhouse gas emissions.	5. Extent to which land use change associated with the package mitigates greenhouse gas emissions and contributes to carbon storage and sequestration.
Success Factors	a. The net change in user greenhouse gas emissions sit appropriately within the national emissions envelope for Scotland, taking account of changing legislation and targets (for any Climate Change Plan update for Scotland) (assumed current target of 2045)	b. Supports the transition to low carbon modes of transport: transition from higher emissions to lower emissions modes, the modal shift to public transport and the modal shift to active travel for shorter everyday journeys.	a. Supports transition from higher emission to lower emission materials and technologies during construction, operation and maintenance.	a. Supports the protection and development of carbon sinks, and takes appropriate measures to maximise carbon sequestration, taking account of wider ecosystem services/natural capital
Moray Council Climate Change Strategy 2020-2030	Strong correlation as the strategy makes commitments to reduce emissions: 'Raise the standards of the built environment and associated infrastructure to net zero carbon. The Strategy commits the Council to reduce its own carbon emissions to net zero by 2030. Carbon reduction will be pursued by applying the energy hierarchy, particularly in relation to the built environment. This will include identifying and implementing opportunities to reduce carbon emissions, increasing renewable energy generation, specifying appropriate low carbon design in future work and encouragement of similar measures in the wider community'.	Strong correlation as the strategy includes reference to the criteria topic and outlines plans to implement action: 'Transport is set out as an overarching 'climate change theme'. Approach - Transition to non-fossil fuel transport system. Promote, develop and encourage active travel. Transport is the fastest-growing contributor to greenhouse gas emissions. Moving away from carbon-intensive, private transport towards decarbonised, more efficient, more active forms of travel offers a wide variety of benefits environmentally, socially and economically'.	Partial correlation as the strategy does not include direct plans for supporting transition to decarbonising construction, operation and maintenance, however this is a brief mention of the importance of using low carbon materials in the construction of buildings.	Partial correlation as land use, biodiversity and adaptation is set out as an overarching 'climate change theme'. However, does not include plans for carbon storage and sequestration.
Aberdeen City and Shire Strategic Development Plan **2020**	Not applicable as the plan does not include plans for decarbonisation and requirements for achieving net zero.	Strong correlation as the plan outlines the role of transport set out as an overarching theme in the report. Aim to make sure that all new developments contribute towards reducing the need to travel long distances and encourage people to walk, cycle or use public transport by making these attractive options. This Plan will help to promote the link between land use and transport to	Strong correlation as the plan includes details on supporting transition to decarbonising construction, operation and maintenance. Outlines that new developments should not adversely impact on water quality either during construction or at operational phase. Wherever possible, new developments should contribute to developing and enhancing blue/green networks and habitat improvement. Recognition is	Partial correlation as the strategy outlines that 'The City Region remains committed to Carbon Capture and Storage and the development of hydrogen opportunities, both to maximise the benefits from existing energy resources and energy infrastructure available. The development of Carbon Capture and Storage (CCS) Technology at Peterhead Power Station (Boddam),

Criteria	3. Extent to which the package supports the decarbonisation of the transport network in Scotland, including supporting transition from higher to lower emission modes, and the modal shift to greater public transport and active travel options.	3. Extent to which the package supports the decarbonisation of the transport network in Scotland, including supporting transition from higher to lower emission modes, and the modal shift to greater public transport and active travel options.	4. Extent to which the package supports the decarbonisation of the construction sector in Scotland and maximises reduction in whole life greenhouse gas emissions.	5. Extent to which land use change associated with the package mitigates greenhouse gas emissions and contributes to carbon storage and sequestration.
Success Factors	a. The net change in user greenhouse gas emissions sit appropriately within the national emissions envelope for Scotland, taking account of changing legislation and targets (for any Climate Change Plan update for Scotland) (assumed current target of 2045)	b. Supports the transition to low carbon modes of transport: transition from higher emissions to lower emissions modes, the modal shift to public transport and the modal shift to active travel for shorter everyday journeys.	a. Supports transition from higher emission to lower emission materials and technologies during construction, operation and maintenance.	a. Supports the protection and development of carbon sinks, and takes appropriate measures to maximise carbon sequestration, taking account of wider ecosystem services/natural capital
		make sure that all new development is conveniently located and designed in such a way as to encourage walking, cycling and the use of public transport. Improving bus and train services and maximising the opportunities for charging and refuelling network for electric and hydrogen vehicles will make sure that people will be encouraged to use more environmentally friendly forms of transport and secure the City Region as a world leader in transport and energy technologies.	also given to the role of construction materials, such as sand and gravel and hard rock. Where this supply is in proximity to development this reduces transport haulage distances and costs, both carbon and environmental. It is also important to achieve recycling of secondary aggregate (materials from redundant built structures) wherever feasible, for example when the conversion of traditional buildings is not possible. Where materials are available or capable of being made available for re-use, then re-use should be a priority. Recycling of buildings and materials can make a significant contribution to sustainable development and reduce waste.	with a potential pipeline extension to St Fergus is identified within the Local Development Plan'. No further information is provided on the criteria topic than this.
Aberdeenshire Local Development Plan 2023	Strong correlation as gives reference to the NPF and SPP. Outcome 2: A low carbon place – reducing our carbon emissions and adapting to climate change. All developments must be designed to reduce carbon-dioxide emissions and reduce energy costs. For all development the target is to at least meet the current Scottish building regulations Target Emissions Rate (TER) and as a minimum achieve the sustainability rating 'Gold' level for	Strong correlation as makes goal related to the criteria topic: Goal 'to make efficient use of the transport network, reduce the need to travel and promote walking, cycling, and public transport'. The commitment to having sustainable locations for development and promoting efficient use of transport, particularly public transport and active travel routes remains	Partial correlation as refers to criteria topic but no commitments. Outlines 'six qualities of successful places'. Under the 'efficiency' heading, reference is given to the use of recycled materials and materials with low embodied energy. It is also expected that that any materials that can be salvaged from the existing home or non-domestic building(s) will be incorporated into the new development either through use in the	Strong correlation as makes goal related to the criteria topic: Policy C3 - Carbon Sinks and Stores (same as 2017 policy). We will protect carbon sinks and stores, such as woodland and high-carbon peat rich soils (defined by Scottish Natural Heritage's Carbon and Peatland map 2016) as Class 1, 2 and 5, and greater than 0.5m depth), from disturbance or destruction. Development proposals that may result in the loss of, or

Criteria	3. Extent to which the package supports the decarbonisation of the transport network in Scotland, including supporting transition from higher to lower emission modes, and the modal shift to greater public transport and active travel options.	3. Extent to which the package supports the decarbonisation of the transport network in Scotland, including supporting transition from higher to lower emission modes, and the modal shift to greater public transport and active travel options.	4. Extent to which the package supports the decarbonisation of the construction sector in Scotland and maximises reduction in whole life greenhouse gas emissions.	5. Extent to which land use change associated with the package mitigates greenhouse gas emissions and contributes to carbon storage and sequestration.
Success Factors	a. The net change in user greenhouse gas emissions sit appropriately within the national emissions envelope for Scotland, taking account of changing legislation and targets (for any Climate Change Plan update for Scotland) (assumed current target of 2045)	b. Supports the transition to low carbon modes of transport: transition from higher emissions to lower emissions modes, the modal shift to public transport and the modal shift to active travel for shorter everyday journeys.	a. Supports transition from higher emission to lower emission materials and technologies during construction, operation and maintenance.	a. Supports the protection and development of carbon sinks, and takes appropriate measures to maximise carbon sequestration, taking account of wider ecosystem services/natural capital
	carbon dioxide reduction and energy efficiency through the installation of low and zero carbon generating technologies. This should include consideration of alternative fuel vehicles including electric and hydrogen refuelling.	necessary, even with the forecast rise in alternative fuel vehicles.	design, or construction of new home(s) or building(s), landscaping or as a development feature. To accord with the Scottish Government Zero Waste Plan and the Circular Economy Strategy, a Site Waste Management Plan will be submitted to demonstrate that developers have minimised the generation of waste and maximised reuse and recycling during the construction and operational phases of new development.	disturbance to, peat will only be permitted if tools such as the "Carbon Calculator" demonstrate that the development will, within its lifetime, have no net effect on CO2. Removal of woodland will only be permitted if an equal area is replanted, preferably as part of the open space requirement and as part of the green-blue network in the settlement, to maintain the carbon balance.
NESTRANS Regional Transport Strategy 2040	Strong correlation as there is an overarching aim to significantly reduce carbon and other harmful emissions from transport for the benefit of the global climate and the health and well-being of the local population and environment through: a) An overall reduction in car kilometres to reduce emissions; b) An increased mode share for public transport, active travel and shared transport; and c) Decarbonisation of the transport fleet.	Strong correlation as the strategy outlines that: 'Nestrans will work with partners to deliver safe cycling and walking opportunities, by consistent application of the Sustainable Travel Hierarchy, putting the needs of pedestrians and cyclists first. We will work with partners including the local authorities, Sustrans and others to deliver segregated provision for vehicles, pedestrians and cyclists where possible, traffic calming and other measures to enhance safety across our networks'.	Not applicable as the strategy makes minimal reference to plans included for transition to lower emission materials and technologies. Makes brief comment that 'greater consideration will need to be given going forward to construction methods, materials used and location of development in the context of climate change'. Brief recognition of operational efficiency enhancements to both urban and rural corridors. Also notes that maintenance of the transport network is a key issue for transport authorities and requires significant investment for the future.	Not applicable as the strategy does not include plans for carbon storage and sequestration.

Criteria	3. Extent to which the package supports the decarbonisation of the transport network in Scotland, including supporting transition from higher to lower emission modes, and the modal shift to greater public transport and active travel options.	3. Extent to which the package supports the decarbonisation of the transport network in Scotland, including supporting transition from higher to lower emission modes, and the modal shift to greater public transport and active travel options.	4. Extent to which the package supports the decarbonisation of the construction sector in Scotland and maximises reduction in whole life greenhouse gas emissions.	5. Extent to which land use change associated with the package mitigates greenhouse gas emissions and contributes to carbon storage and sequestration.
Success Factors	a. The net change in user greenhouse gas emissions sit appropriately within the national emissions envelope for Scotland, taking account of changing legislation and targets (for any Climate Change Plan update for Scotland) (assumed current target of 2045)	b. Supports the transition to low carbon modes of transport: transition from higher emissions to lower emissions modes, the modal shift to public transport and the modal shift to active travel for shorter everyday journeys.	a. Supports transition from higher emission to lower emission materials and technologies during construction, operation and maintenance.	a. Supports the protection and development of carbon sinks, and takes appropriate measures to maximise carbon sequestration, taking account of wider ecosystem services/natural capital
HITRANS Regional Transport Strategy	Strong correlation as the strategy outlines the following Delivery Plan Item - Implementation of Low Carbon Strategy. HITRANS role within more established framework at CPP level to progress best practice pilots e.g., Intelligent Transport Systems, driverless vehicle technology, Low Carbon, integrated transport and information provision.	Strong correlation as the strategy outlines that HITRANS has developed a Regional Active Travel Strategy. The strategy sets out priorities for improving active travel across the region. Increasing mode share for walking and cycling on journeys under 5km remains a priority but the strategy also identifies how more people can be encouraged to walk and cycle to work or as part of a longer public transport journey.	Not applicable since the strategy makes no reference to plans included for transition to lower emission materials and technologies during construction, operation, and maintenance.	Not applicable since the strategy does not include plans for carbon storage and sequestration.

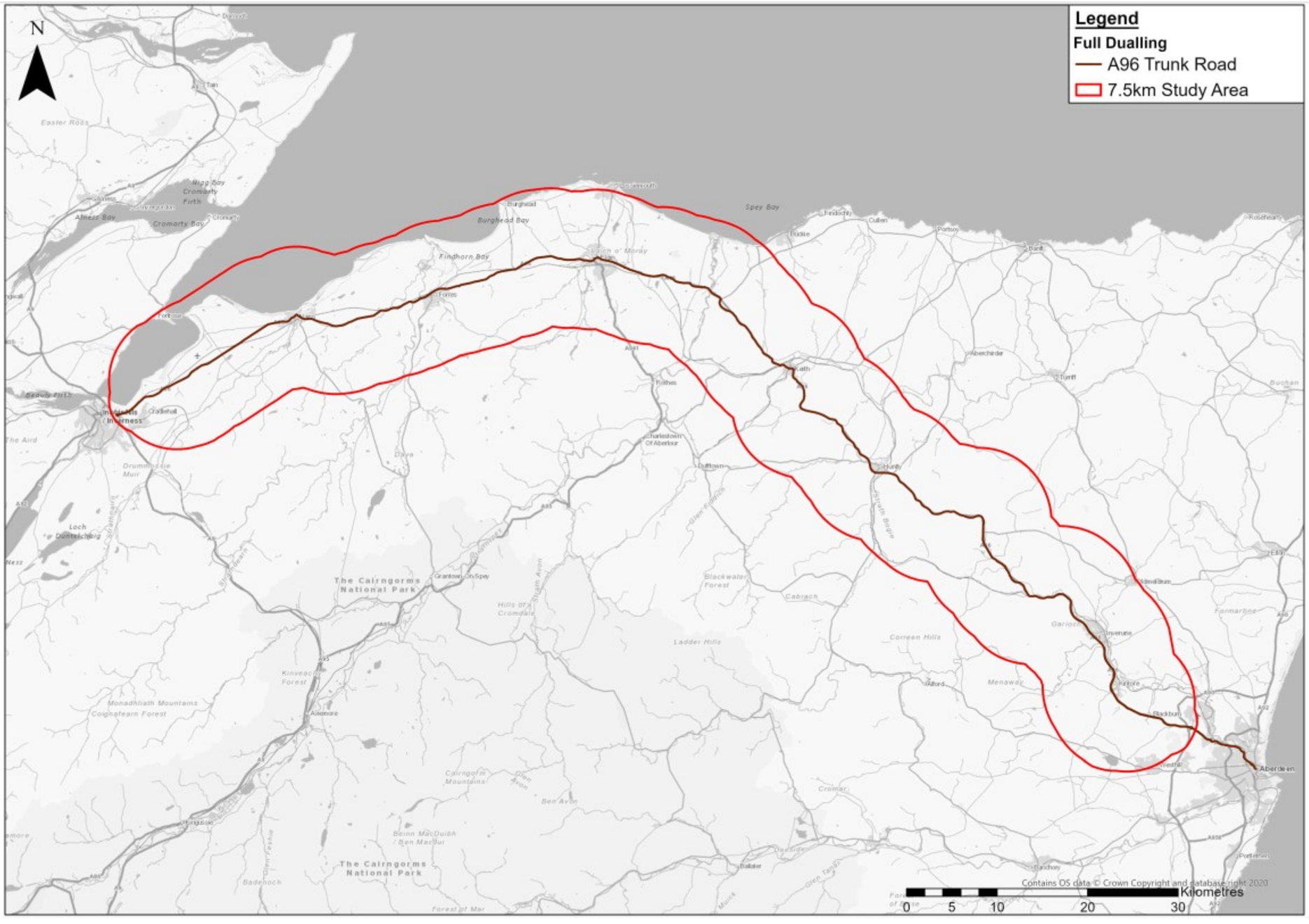
Appendix D. Package options and their associated mode of transport/descriptions

Appendix D outlines the A96 Corridor Review options, for all packages, including the refined package, and their associated mode of transport/descriptions.

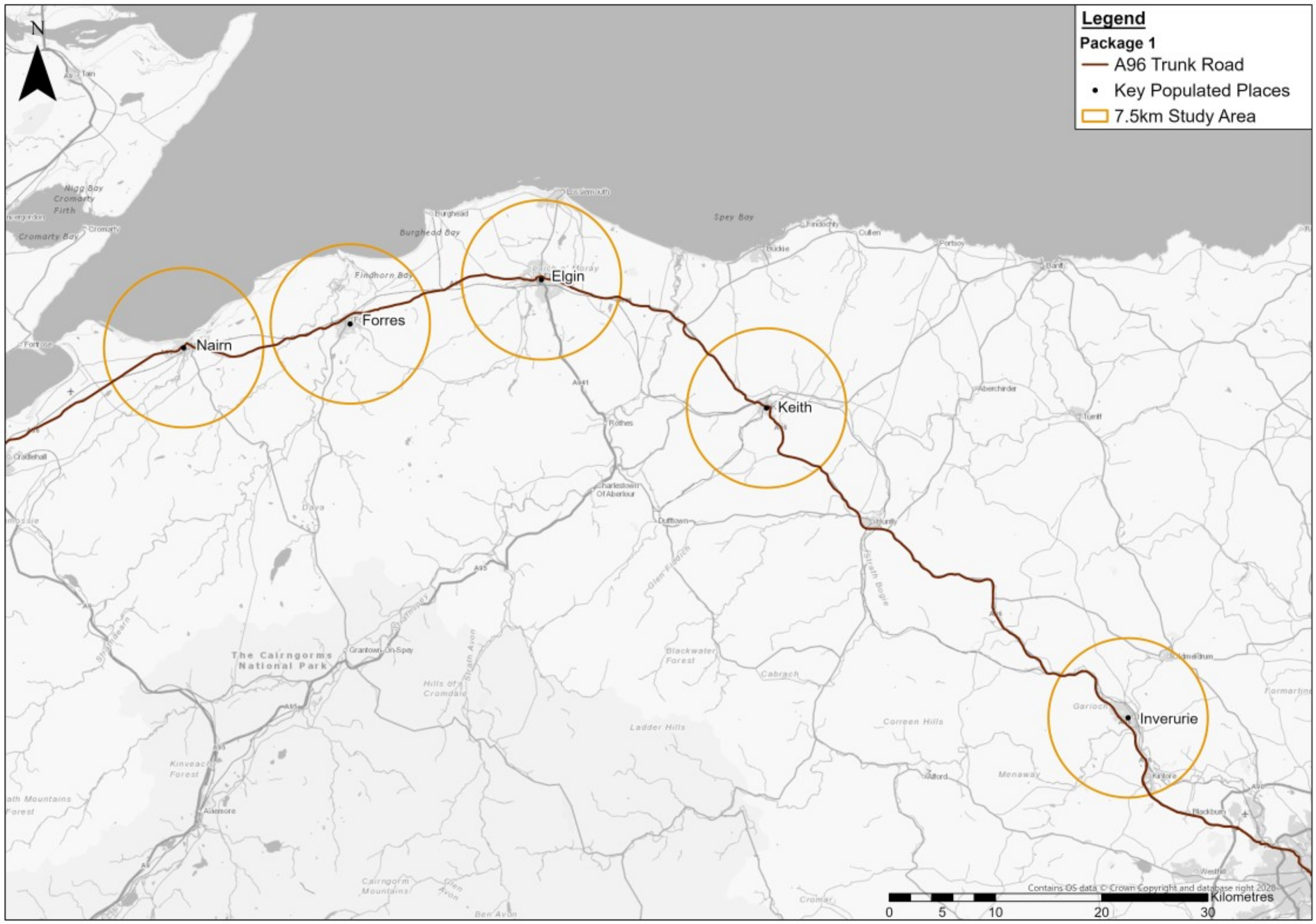
Option	Mode of transport	Description
Active Communities	Active Travel	Deliver networks of high-quality active travel routes and placemaking improvements within key communities along the A96 corridor such as Nairn, Forres, Elgin, Fochabers, Keith, Huntly and Inverurie.
Active Connections	Active Travel	Deliver high quality active travel linkages for people walking, wheeling and cycling between settlements along the A96 corridor, which would combine to form a continuous traffic-free path all the way from Inverness to Aberdeen, either directly adjacent to, or close to, the A96.
Active Hubs	Multimodal	The creation of a strategy for the delivery of active hubs within communities across the length of the A96 corridor.
Improved Public Transport Passenger Interchange Facilities	Multimodal	Improve public transport passenger facilities, including accessibility and quality enhancements at bus stations and railway stations.
Bus Priority Measures	Bus	Implement schemes targeted at delivering faster and more reliable journey times for bus passengers.
Investment in Demand Responsive Transport (DRT) and Mobility as a Service (MaaS)	Public Transport	Improve access to travel opportunities in locations with low bus network connectivity or where conventional fixed route services may not be suitable or viable. In these areas, flexible services, such as Demand Responsive Transport (DRT) or Community Transport (CT), may be able to provide improved public transport links.
Introduction of Rail Freight Terminals	Freight	Facilitate the introduction, development and operation of rail freight terminals by the private sector at Inverness, Elgin and Keith, to facilitate freight movements to/from these locations by rail.
Linespeed, Passenger and Freight Capacity Improvements on the Aberdeen to Inverness Rail Line	Rail	Three distinct improvements to the railway between Aberdeen and Inverness; linespeed improvements to cut journey times, the provision of passing loops to enable a more frequent passenger service and the provision of freight facilities to enable intermodal freight to operate.
Improved Parking Provision at Railway Stations	Rail	Enhance parking facilities at railway stations between Aberdeen and Inverness with the aim of encouraging the use of existing low carbon infrastructure for medium and long-distance travel along the corridor.
A96 Full Dualling (plus Targeted Trunk Road Improvements)	Road	Full dualling of the A96 between Hardmuir to Craibstone to address road safety concerns and provide resilience and reliability improvements for a key connection between Inverness and Aberdeen.
Targeted Road Safety Improvements	Road	Improving the safety performance of the A96 Trunk Road to address both real and perceived road safety concerns (with potential measures ranging from minor improvements through to partial dualling).
Elgin Bypass	Road	Improve the safety, resilience, and reliability of the A96 within the vicinity of Elgin through the provision of a bypass of the town.
Keith Bypass	Road	Improve the safety, resilience, and reliability of the A96 within the vicinity of Keith through the provision of a bypass of the town.
Inverurie Bypass	Road	Improve the safety, resilience, and reliability of the A96 within the vicinity of Inverurie through the provision of a bypass of the town.
Forres Bypass	Road	Improve the safety, resilience, and reliability of the A96 in Forres through the provision of a bypass within the vicinity of the town
A96 Electric Corridor	Technology	Provision of alternative refuelling infrastructure and facilities along the A96 corridor, its interfacing local roads as well as, where appropriate, strategic economic and transport hubs. This option will directly facilitate the dispensation of alternative sources of fuel for various modes of sustainable transport although it is recognised that the option is likely to focus on road vehicles.

Appendix E. High resolution figures showing the study areas for each Package and the A96 Full Dualling

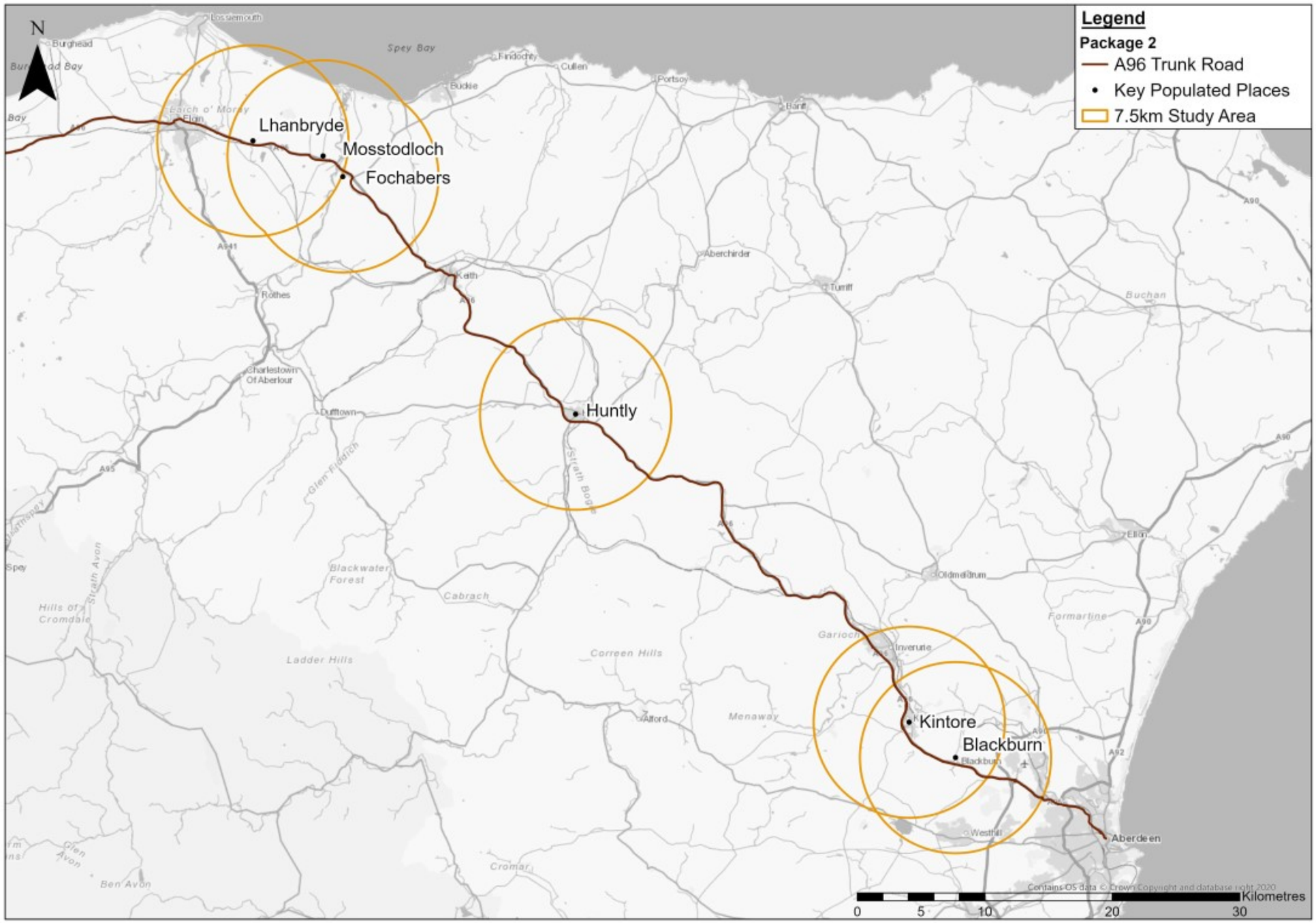
A96 Full Dualling



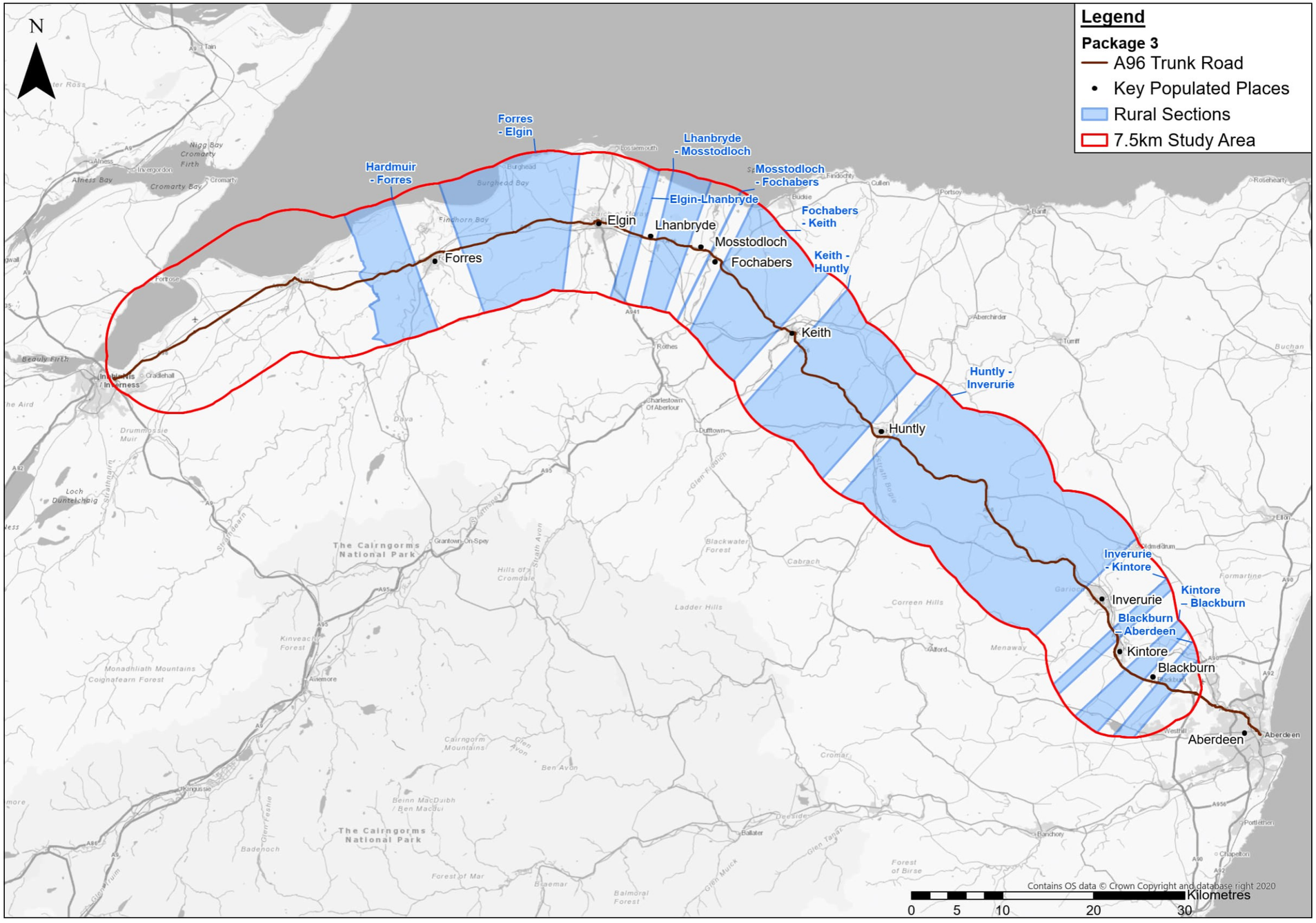
Package 1


N
Legend
Package 1
A96 Trunk Road
Key Populated Places
7.5km Study Area
Elgin
Forres
Nairn
Keith
Inverurie
Grantown-on-Spey
The Cairngorms National Park
Aviemore
Contains OS data © Crown Copyright and database right 2020
0
5
10
20
30
Kilometres

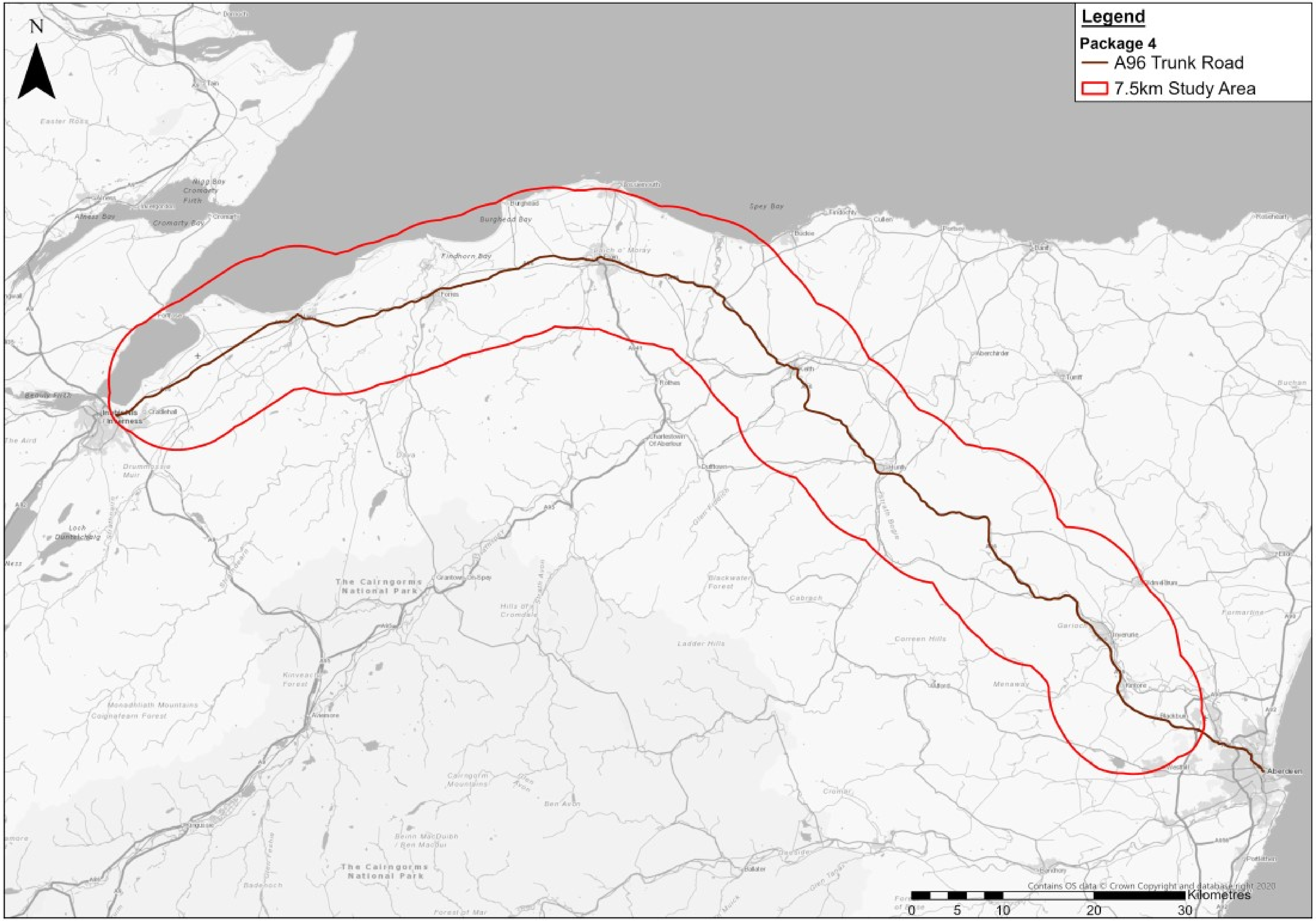
Package 2


N
Legend
Package 2
A96 Trunk Road
Key Populated Places
7.5km Study Area
Lhanbryde
Mosstodloch
Fochabers
Huntly
Kintore
Blackburn
Aberdeen
Inverurie
Elgin
Keith
Rothes
Aberchirder
Turriff
Banff
Portsoy
Cullen
Findochty
Buckie
Lossiemouth
Burghead
Spey Bay
Charlestown Of Aberlour
Dufftown
Glen Fiddich
Strath Spey
Blackwater Forest
Cabrach
Correen Hills
Ladder Hills
Hills of Cromdale
Strath Avon
Glen Avon
Ben Avon
Cromar
Garioch
Formartine
Buchan
Menaway
Oldmeldrum
Ellon
Westhill
Contains OS data © Crown Copyright and database right 2020
0
5
10
20
30
Kilometres

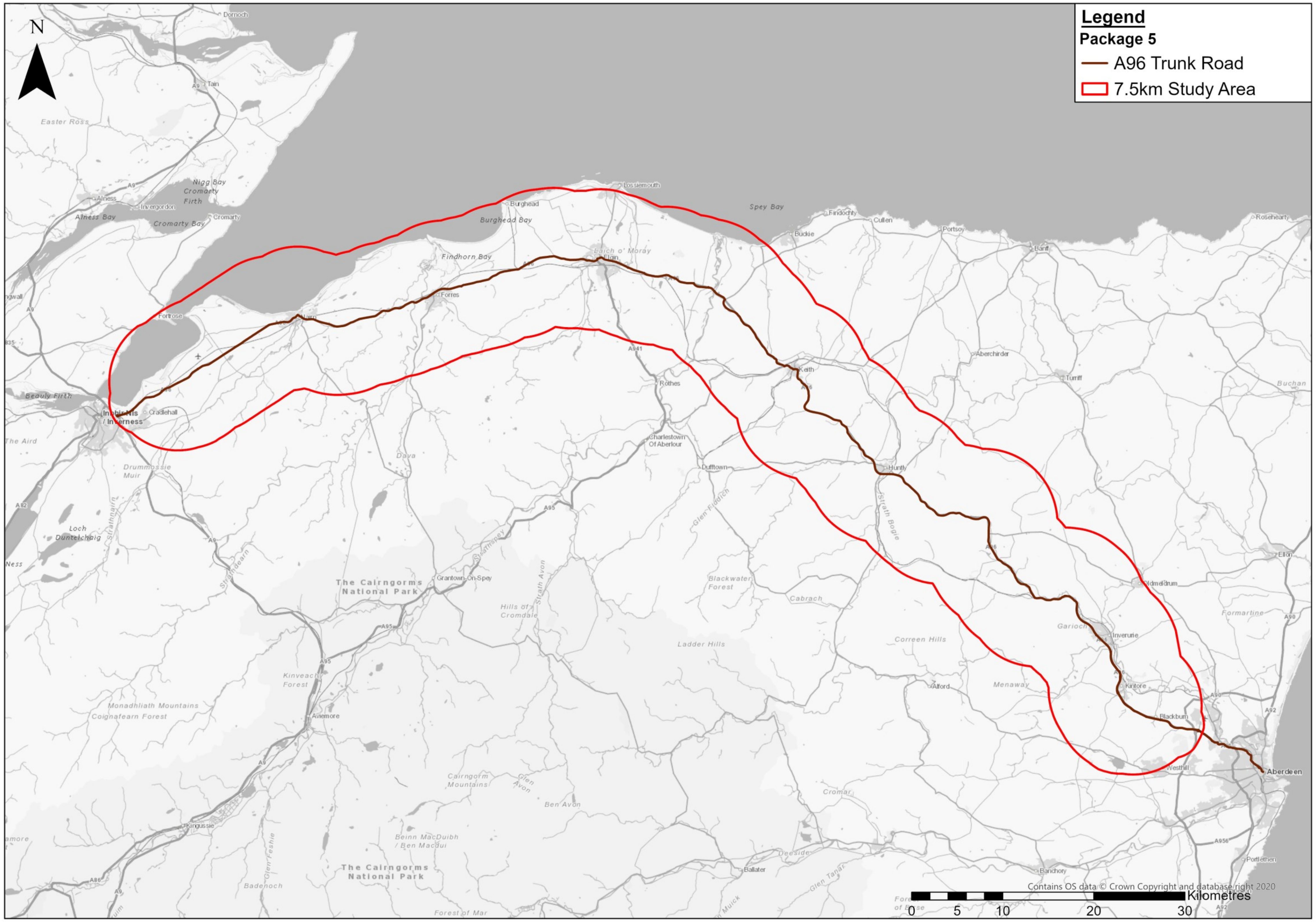
Package 3


N
Legend
Package 3
A96 Trunk Road
Key Populated Places
Rural Sections
7.5km Study Area
Forres - Elgin
Hardmuir - Forres
Lhanbryde - Mosstodloch
Mosstodloch - Fochabers
Elgin-Lhanbryde
Fochabers - Keith
Keith - Huntly
Huntly - Inverurie
Inverurie - Kintore
Kintore – Blackburn
Blackburn – Aberdeen
Elgin
Lhanbryde
Mosstodloch
Fochabers
Forres
Keith
Huntly
Inverurie
Kintore
Blackburn
Aberdeen
Contains OS data © Crown Copyright and database right 2020
0 5 10 20 30 Kilometres

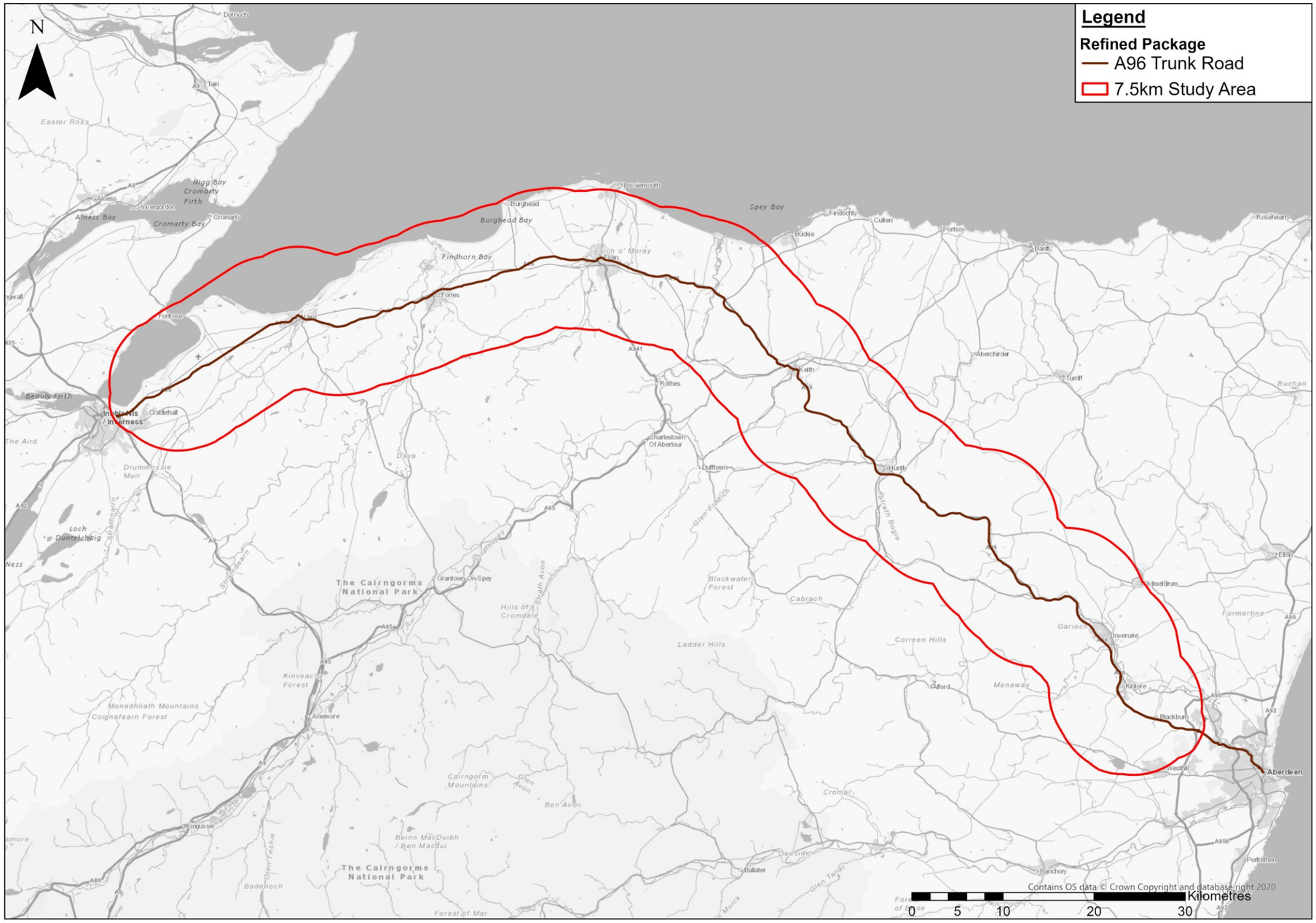
Package 4


Legend
Package 4
A96 Trunk Road
7.5km Study Area
N
Contains OS data © Crown Copyright and database right 2020
Kilometres
0
5
10
20
30

Package 5


N
Legend
Package 5
A96 Trunk Road
7.5km Study Area
Contains OS data © Crown Copyright and database right 2020
0 5 10 20 30
Kilometres
Inverness
Nairn
Forres
Elgin
Keith
Huntly
Inverurie
Kintore
Blackburn
Aberdeen
Spey Bay
Burghead Bay
Findhorn Bay
Moray Firth
Cromarty Firth
The Cairngorms National Park

Refined Package



References

Aberdeenshire Council, 2017. Aberdeenshire Local Development Plan 2023. Available online at: Aberdeenshire Local Development Plan 2023 – Aberdeenshire Council.

British Standards Institution, 2023. PAS 2080:2023 Carbon management in buildings and infrastructure. Available online at: https://www.bsigroup.com/en-GB/standards/pas-2080/

Design Manual for Roads and Bridges (DMRB), 2022. CG 501 Design of Highway Drainage Systems. Available online at: CG 501 Design of Highway Drainage Systems.

Design Manual for Roads and Bridges (DMRB), 2019. GG 103 Introduction and General Requirements for Sustainable Development and Design. Available online at: GG 103 Introduction and General Requirements for Sustainable Development and Design.

Design Manual for Roads and Bridges (DMRB), 2019. LA 105 Air Quality. Available online at: LA 105 Air Quality.

Design Manual for Roads and Bridges (DMRB), 2020. DMRB LA 113 Road Drainage and the Water Environment. Available online at: LA 113 Road Drainage and the Water Environment.

HITRANS, 2017. HITRANS Regional Transport Strategy. Available online at: Regional Transport Strategy.
Jacobs and AECOM, 2022. A96 Corridor Review Strategic Environmental Assessment (SEA): SEA Screening Report. Available online at: A96 Corridor Review Strategic Environmental Assessment (SEA): SEA Screening Report.

Jacobs and AECOM, 2022. Strategic Transport Projects Review 2 (STPR2) Draft Technical Report. Available online at: Strategic Transport Projects Review 2: Draft Technical Report.

Moray Council, 2022a. Moray Local Development Plan 2020. Available online at: Moray Local Development Plan 2020 – Moray Council.

Moray Council, 2022b. Moray Council Climate Change Strategy 2020-2030. Available online at: Climate Change Strategy 2020-2030 (moray.gov.uk)

NESTRANS, 2021. Regional Transport Strategy for the North-East of Scotland. Available online at: NESTRANS – Regional Transport Strategy.

The Highland Council, 2012. The Highland Wide Local Development Plan 2020. Available online at: Highland-wide Local Development plan.

The Scottish Government. Climate Change, Reducing greenhouse gas emissions. Available online at: https://www.gov.scot/policies/climate-change/reducing-emissions/The Scottish Government, 2018. Climate Change Plan Third Report on Proposals and Policies 2018-2032. Available online at: Supporting documents – Climate Change Plan: Third Report on Proposals and Policies 2018-2032 (RPP3).

The Scottish Government, 2019. Climate Ready Scotland: Climate Change Adaptation Programme 2019-2024. Available online at: Publications – strategy/plans.

The Scottish Government, 2020. National Transport Strategy 2. Available online at: Publications – National Transport Strategy 2.

The Scottish Government, 2023. National Planning Framework 4tional Planning Framework – Draft. Available online at: National Planning Framework 4

The Scottish Government, 2021b. Just Transition Commission. A National Mission for a Fairer, Greener Scotland. Available online at: Supporting documents – Just Transition Commission: A National Mission for a Fairer, Greener Scotland.

The Scottish Government, 2021c. A National Mission with Local Impact: Infrastructure Investment Plan for Scotland 2021-22 to 2025-26. Available online at: Supporting documents – A National Mission with Local Impact: Infrastructure Investment Plan for Scotland 2021-22 to 2025-26.

The Scottish Parliament, 2005. Environmental Assessment (Scotland) Act 2005. Available online at: Environmental Assessment (Scotland) Act 2005.

The Scottish Parliament, 2009. Climate Change (Scotland) Act 2009. Available at: Climate Change (Scotland) 2009.

The Scottish Parliament, 2019. Climate Change (Emissions REDUCTION Targets) Act 2019. Available online at: Climate Change (Emissions Reduction Targets) (Scotland) Act 2019.

Transport Scotland, 2008a. Strategic Transport Projects Review. Available online at: Scottish Transport Projects Review.

Transport Scotland, 2008b. Scottish Transport Appraisal Guidance. Available online at: Scottish Transport Appraisal Guidance.

Transport Scotland, 2020. Rail Services Decarbonisation Action Plan. Available online at: Rail Services Decarbonisation Action Plan.

Transport Scotland, 2022. Reducing Car Use for a Healthier, Fairer and Greener Scotland: A Route Map to Achieve a 20% reduction in Car Kilometres by 2030. Available online at: Reducing Car Use for a Healthier, Fairer and Greener Scotland.

UK Green Building Council, 2021. Net Zero Whole Life Carbon Roadmap for the UK Built Environment: Pathway Report. Available online at: https://ukgbc.s3.eu-west-2.amazonaws.com/wp-content/uploads/2021/11/28194152/UKGBC-Whole-Life-Carbon-Roadmap-A-Pathway-to-Net-Zero.pdf


ELGIN
FORRES
NAIRN
A96
INVERNESS
A96
KEITH
HUNTLY
INVERURIE
A96
ABERDEEN