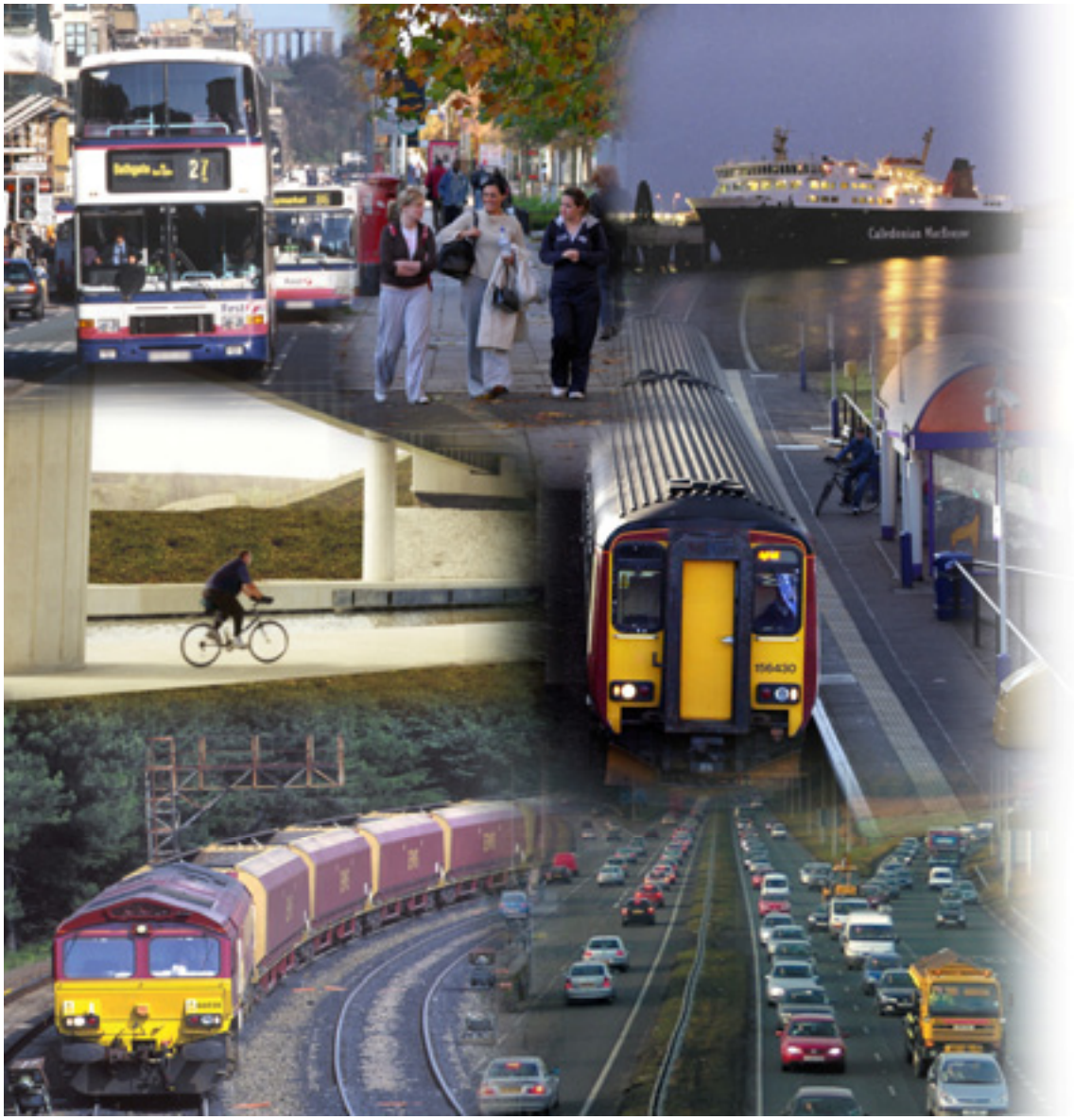
Strategic Transport Projects Review
Environmental Report

October 2008

TRANSPORT SCOTLAND



Environmental Report

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Authorisation

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Authorisation & Preparation	
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Version No.	Date	Change Details	Author	Approver
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B	11.07.08	Additional Chapters added	RF / VS / PG	RHC
C	18.07.08	Additional Chapters added	RF / VS/ PG/ SY	RHC
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E	09 10 08	Revisions made including Chapter deletion	RF / SY / LW / MB / SJ / PG / VS / GN	WAD
F	24.10.08	Client response update	LW/SY/VS	GLC
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H	03.11.08	Re-issue to incorporate Appendix 8	LW/SY/VS	GLC

Strategic Transport Projects Review

Environmental Report - Non – Technical Summary

Contents

Introduction

Transport Scotland is undertaking the Strategic Transport Projects Review (STPR) to make recommendations on a portfolio of land-based transport interventions, for the period 2012 to 2022. These would deliver a strategic transport network which will benefit the whole of Scotland and deliver on the priorities set out in the National Transport Strategy, the National Planning Framework and the Scottish Climate Change Bill.

As part of the STPR, a Strategic Environmental Assessment (SEA) is being carried out, in accordance with the requirements of the Environmental Assessment (Scotland) Act 2005. The purpose of an SEA is to consider the likely environmental effects of certain plans, programmes and strategies proposed by public sector organisations.

This Non -Technical Summary provides an overview of information and findings from the Environmental Report that has been prepared to describe and assess the likely significant environmental effects of the interventions considered in the STPR.

Consultation

The Environmental Report has been published for consultation. Copies are available on the STPR website (www.transportscotland.gsi.gov.uk/stpr) the Scottish Government's consultation webpage (www.scotland.gov.uk/consultations/current) or, for inspection only, at Buchanan House.

Consultation responses should be directed in writing to Transport Scotland, either by e-mail or by post to the address shown below. **Responses should be received by 6th February 2009.**

To obtain further copies of this non technical summary, or the summary information leaflet for STPR, please contact the e-mail address shown, leaving you details, or leave contact details on the telephone answer service provided. Further information can be found on the STPR website, at the address shown below;

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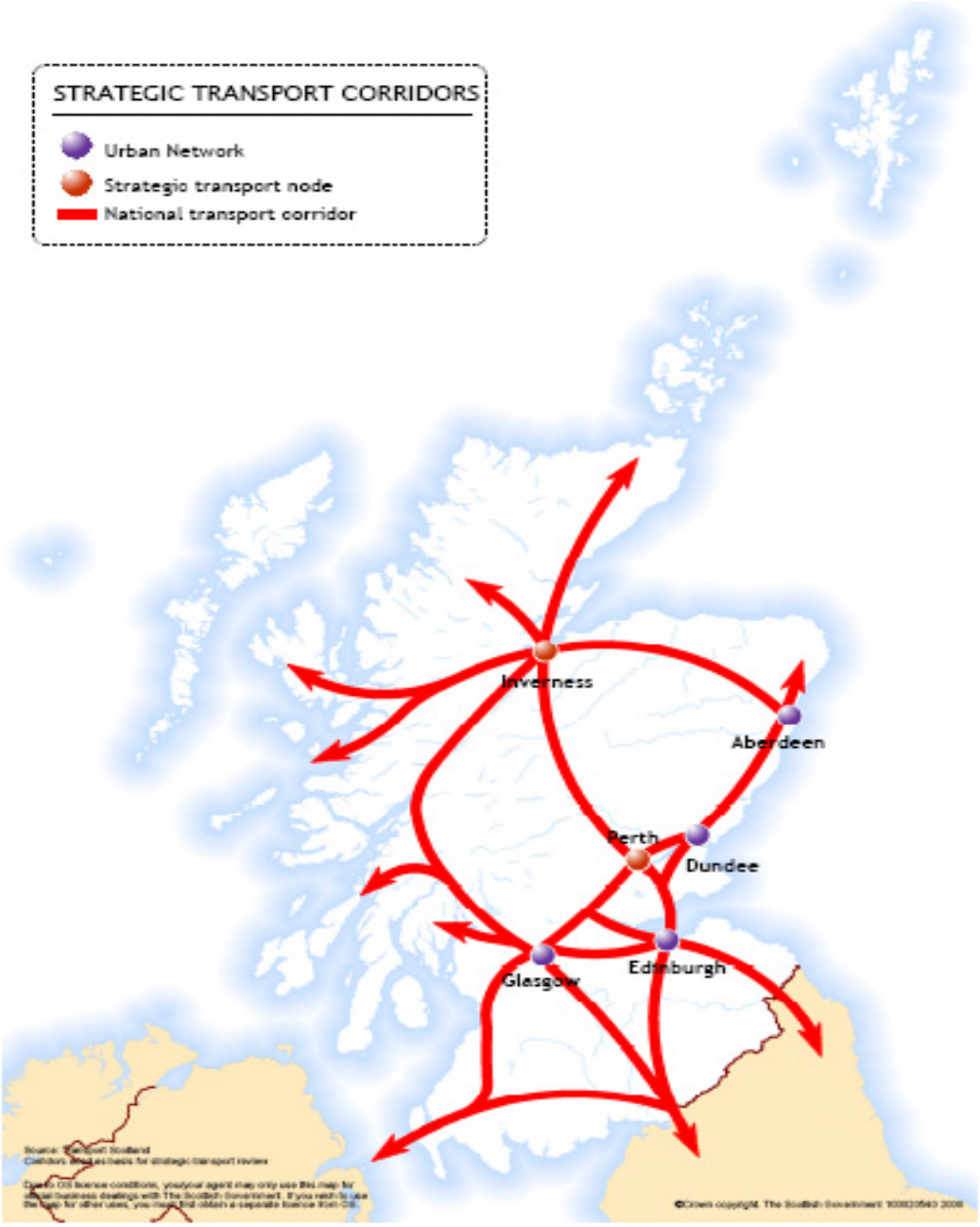
Summary of the Objectives and Content of the Strategic Transport Projects Review

The STPR has been conducted to review the strengths and weaknesses of the Scotland's strategic road and rail network. It aims to improve the network through identifying and prioritising road, rail and other interventions of national significance. The following diagram indicates the corridors, urban networks and strategic transport nodes covered by the STPR. The diagram is illustrative and does not represent a plan of the network in detail.



The interventions identified through this Review are intended to make a significant contribution to delivering the Government's Purpose and contribute to the three key strategic outcomes identified in the National Transport Strategy (NTS) as being essential for the Government's vision for the future of transport in Scotland. These are:

- To improve journey times and connections;
- To reduce transport related emissions; and
- To improve the quality, accessibility and affordability of transport.

The interventions have been assessed against the criteria in the Scottish Transport Appraisal Guidance (STAG), which measures the deliverability and feasibility of proposed interventions against a wide range of policy objectives, including transport and economic policy.

Stages of Assessment

SEA is a systematic method for considering the likely environmental effects of a programme, such as that developed through the STPR, and aims to integrate environmental factors into policy preparation and decision-making. It also has an important role to play in increasing public participation and facilitating openness and transparency in decision-making. The key steps of the SEA that have been undertaken so far are:

- **Scoping –** Deciding on the scope and level of detail of the Environmental Report, and the consultation period for the report (statutory consultees comprise Scottish Natural Heritage, Historic Scotland and the Scottish Environment Protection Agency). Health Scotland is also treated as a consultee for this SEA; and
- **Environmental Assessment –** Publication of Environmental Report on the likely significant environmental effects of implementing the STPR for consultation.

Following the consultation period, Scottish Ministers will review the consultation responses and decide whether to make changes before adopting the STPR programme. Further information on the next steps is described at the end of this non technical summary.

The Current State of the Scottish Environment and Objectives of the SEA

Information on Scotland's environmental characteristics has been gathered to help inform the SEA. Conclusions on the current state of the environment are summarised below. This information has informed the development of specific environmental objectives so that the impact of STPR on the current and future environment can be properly assessed. the current environmental baseline information is summarised below. It is presented more fully in Appendix 3 of the Environmental Report.

Biodiversity, Flora and Fauna

Scotland has a rich natural heritage, with many areas and features recognised and safeguarded for their special qualities. Over 20 per cent of the land area of Scotland is protected by natural heritage designations of international, national or local significance. A number of new sites are also expected to be designated over time.

Designations of international significance include Ramsar sites and, in addition to these, the Special Protection Areas (SPAs) and Special Areas of Conservation (SACs), which together form the Natura 2000 network. In addition to these internationally recognised sites, National Nature Reserves (NNRs) and Sites of Special Scientific Interest (SSSIs) are designated for their national significance for biodiversity.

Population

Scotland's population is predicted to continue to increase towards 5.33 million in 2021. The age structure of the population is also changing, with fewer younger people and a greater number of older people living in Scotland. Migration may assist to offset this and contribute towards overall population growth.

Transport systems have a significant effect on the quality of life for all people and the communities where they live. The availability, affordability and quality of transport systems affect a person's ability to access employment opportunities and key services. In Scotland, there continues to be a high level or reliance on travel by private car, particularly in rural areas where there is often less choice of public transport.

Noise

Noise pollution from transport can have a harmful effect on the quality of life of those exposed to it, for example through annoyance and sleep loss. In Scotland, transport related noise is primarily experienced in urban areas where there are higher concentrations both of people and traffic infrastructure (e.g. roads and railways).

Human Health

There are harmful health effects from transport including air pollution and traffic accidents. However there can also be beneficial effects; the promotion of travel by methods such as walking and cycling can contribute towards a healthier lifestyle.

Air pollution resulting from transport has been linked to an increase in levels of heart and respiratory illnesses. In general, however, air quality levels in Scotland are good and set to improve. This does not disguise the fact, however, that, particularly within the cities, air quality management is required to tackle levels of pollutants that are above or close to safe levels.

Road Traffic incidents are also important in terms of human safety. The number of all traffic accidents resulting in injury has reduced over recent years, although the more common types of accident are changing; for example the number of motorway accidents has increased by 25 per cent. There are also local variations between accident levels, and the severity of injuries.

Transport Scotland's Strategic Road Safety Plan (2007) highlights that targets set in 2000 aimed at reducing the number of casualties on Scotland's roads by 2010 are currently being achieved, although there is a need for further work to ensure that progress continues.

Water

Water quality is improving in Scotland, with a reduction in the length of poor or seriously polluted rivers in the country of 34 per cent. Water quality problems, however, do remain in some areas and the main water bodies affected include the River Clyde, Union Canal, River Kelvin, River Almond, River Eden and White Cart Water.

Transport can be a significant source of water pollution, potentially affecting rivers, lochs, estuaries and coastal areas. Pollution can arise from construction over or near water and from the run off of transport associated chemicals, oils and debris into drainage systems.

Flooding can cause significant damage to property, and affects the operation of the transport network. It is estimated that almost 100,000 properties in Scotland lie within areas susceptible to flooding, and that flooding will become more frequent in the future as a result of climate change.

Soils and Geology

Agriculture and forestry are important land uses in Scotland, and their productiveness relies on good quality soils. The most productive agricultural land can be found in the Southern, Central and Eastern parts of the country with farming in the North and West primarily restricted to sheep and cattle grazing. Approximately 17 per cent of the land area of Scotland is used for forestry of both native and non-native species.

Scotland also has a diverse geology, and many features are designated as Sites of Special Scientific Interest (SSSIs).

Air Quality

In general, air quality in Scotland is good. The North West is remote from air pollutant problems and, as would be expected, the more densely populated central belt has the highest concentrations of poor air quality. The major influence on local air quality in these areas is as a result of traffic emissions. This links to issues of human health. Many local authorities have designated areas and set out action plans where air quality requires improvement (Air Quality Management Areas).

Climatic Factors

The main human influence on the global climate is the emission of greenhouse gases including carbon dioxide (CO_2) methane and nitrous oxide. CO_2 accounts for the greatest proportion of greenhouse gases in the UK. Road transport emissions contribute to around 17 per cent of greenhouse gas emissions in Scotland.

The effect of climate change includes rising temperatures, increased rainfall, less snow, increased storms and high winds. There are harmful consequences for our environment, including increased flood risk, and loss of species and habitats.

Material Assets

Scotland's natural resources are its material assets. These mineral resources and aggregates are used for purposes such as fuel (e.g. coal), and construction (e.g. sand, gravel, rock). However, the quantity of the resources is limited and once used, cannot be replaced. Transport infrastructure, such as the trunk road system and public transport infrastructure is also an important material asset, and relies on the availability of other natural resources for its construction and operation.

Demand on Scotland's road and rail networks, both for passenger and freight travel, continues to increase. Improvements to the network, including new or replacement infrastructure, will also require the use of more aggregate materials. A relatively small proportion of the aggregate materials used in construction are from secondary or recycled sources, although it is expected that the proportion of use of these materials will increase.

Cultural Heritage

Scotland's history and culture is reflected in its many listed buildings, conservation areas, scheduled monuments and other built heritage and archaeological features, and a number of sites, such as the Antonine Wall, Edinburgh Old and New Towns, and New Lanark are designated as World Heritage Sites due to their international interest and significance.

Many other features are proposed and expected to be designated and safeguarded for their cultural heritage value in the future.

Transport can affect cultural heritage in a number of ways. Transport related air pollution in urban areas can increase the erosion rates of listed buildings. The success of cultural attractions is largely dependent on their accessibility. In addition, the construction of new transport infrastructure in urban or rural areas has the potential to result in the loss or damage of cultural heritage features.

Landscape and Visual

Scotland's landscape is diverse, ranging between lowland farming areas, mountains, moorland, woodland, coastal and urban. Its landscape and scenery is distinctive, and many areas are recognised and safeguarded for their landscape and scenic value. At a national level, approximately 13 per cent of the country is designated as a National Scenic Area (NSA). In recent years, two areas have been designated as National Parks; Loch Lomond and the Trossachs, and the Cairngorms, where additional levels of protection exist to safeguard the character of these areas.

The introduction of new transport infrastructure can have a potentially significant effect on the scenic qualities of the landscape.

Environmental Protection Objectives

The SEA has developed a series of strategic environmental assessment objectives for the STPR. Many of these objectives have been developed from and take into account objectives in the SEAs undertaken for the National Transport Strategy, and for the Regional Transport Strategies.

Strategic environmental objectives for the STPR are to:

- Protect the biodiversity of Scotland and minimise any harmful impact on its natural heritage, such as sites safeguarded for nature conservation, or valued species and habitats;
- Improve the environment of all communities, and reduce the harmful effects of transport, e.g. severing links between communities, visual intrusion, noise and pollution;
- Contribute towards the improvement of health in Scotland through the promotion of measures to reduce traffic related pollution and improve safety, and encourage healthier forms of travel such as cycling;
- Improving the ecological quality of water by protecting it from the harmful side effects of transport such as construction pollution and contamination from road drainage systems;
- Reduce and manage the potential of flood risk to land and transport infrastructure;
- Safeguard the quality of Scotland's soil and geology resources and minimise the effects of transport;
- Improve national and local air quality through the reduction of transport related air polluting emissions;
- Reduce national levels of carbon emissions from transport to contribute towards climate change targets;

- Make prudent use of natural resources such as minerals and aggregates in the improvement of transport infrastructure;
- Minimise waste by re-using and recycling materials where possible in the construction of transport infrastructure;
- Safeguard cultural heritage features and their settings, e.g. listed buildings, conservation areas from harmful impacts of transport and new infrastructure; and
- Safeguard the character and diversity of the Scottish landscape and minimise impacts on areas of valuable landscape.

Likely Significant Effects on the Environment

Summary of Assessment Methods

Following the assessment of the current state of the environment, the assessment defined a series of environmental criteria against which all of the interventions could be assessed. This consisted of a review of the wider policies and objectives that are relevant to STPR, and the development of environmental objectives specific to it.

The assessment process was undertaken in two stages; firstly, to conduct a high level review of all of the proposed interventions. This review was assessed by Transport Scotland, alongside other criteria such as cost effectiveness and technical feasibility, to identify those interventions which should progress to the second stage, and a more detailed environmental assessment.

At the first stage, where interventions were identified as having a potential adverse environmental impact, alternatives were proposed that would have an improved effect, and these were considered by Transport Scotland in the list of interventions to progress to the second, more detailed appraisal.

The effects of each transport intervention proposed were measured against criteria for each environmental topic, and an overall score to identify the significance of the environmental impact, and whether it would be beneficial, neutral or adverse.

Dealing with Uncertainty

STPR is a strategic programme and does not contain specific details of many interventions, for example the exact routeing of a new road or detail of the construction methods of a new railway. These circumstances lead to a degree of uncertainty in the environmental assessments of some of the interventions. Where this was the case, the SEA took a reasonable worst case scenario approach to ensure that the environmental effects were not understated.

This sometimes limited detail also meant that the scenario modelling software used to generate future noise, air and climatic baseline data ran with a degree of uncertainty. Results have therefore been subject to expert review to ensure robustness.

Modelling has been used to predict future baseline information where possible; however where data was unavailable for a number of baseline purposes, for instance, the estimation of the number of residential properties within 50 metres of a rail line, qualitative techniques based on expert judgement have been utilised.

Key Findings

The Strategic Environmental Assessment has assessed the likely consequences of delivering a range those interventions the STPR has identified as being most likely to support the Scottish Government's Purpose. These are set out in STPR Report 3 and are summarised in the annexes of STPR Report 4.

Overall, the assessment has demonstrated that the majority of the interventions will provide strategic environmental benefits. Of the remainder, 9 interventions were assessed as having adverse effects, while 8 interventions were assessed as having a neutral effect overall and 1 intervention was considered to have an uncertain effect overall.

The tables below summarise these findings, presenting first interventions with overall benefits, then adverse effects and lastly, neutral or uncertain effects.. The Intervention references and titles are taken from STPR Report 3 Appendix D and STPR Report 3 Appendix E.

Summary Environmental Assessment – Interventions with Benefits

Intervention Ref (taken from STPR Report 3)	Intervention Title	Overall Environmental Effect
D1	Delivery of the Strategic Road Safety Plan	Major National long term benefits
D2	Maintaining and Safely operating Scotland's Rail Network	Major National long term benefits
D3 part 1	Targeted Programme of Measures to Reduce Accident Severity on the A9 North of Inverness	Moderate Regional benefits
D3 part 2	Targeted Programme of Measures to Reduce Accident Severity on the A9 and A835 between Inverness and Ullapool	Minor to Moderate long term Regional benefits
D3 part 3	Targeted Programme of Measures to Reduce Accident Severity between Inverness, Fort William, Mallaig and Skye (A82, A87, A830, A887)	Minor to Moderate long term Regional benefits
D3 part 4	Targeted Programme of Measures to Reduce Accident Severity on the A96 between Aberdeen and Inverness	Minor to Moderate long term Regional benefits
D3 part 5	Route Management between: Aberdeen and North East Scotland (A90); Edinburgh and Dundee (A92); Ayrshire and Dumfries (A76); Edinburgh and North West England (A68/A7); Edinburgh and North East England (A1), the A83, A85, A828	Major National long term benefits

Intervention Ref (taken from STPR Report 3)	Intervention Title	Overall Environmental Effect
D4	Targeted Programme of Measures to improve the Trans European Network linkage to Loch Ryan port facilities	Minor Local long term Benefits
D5	Targeted Programme of Measures to improve road standards between Glasgow and Oban/Fort William (A82)	Neutral to Moderate long term Local benefits
D6	Using Intelligent Transport Systems on Parts of the Road Network to Enhance Capacity and Operations	Major long term Regional benefits
D7	Further Electrification of the Strategic Rail Network	Moderate long term Regional benefits
D8	Enhancing Rail System Capacity through Targeted Improvements	Major National long term benefits
D9	National Integrated Ticketing Scheme	Moderate National long term benefits
D10	Reconfiguration of the National Rail Timetable	Minor National long term benefits
D11	(Strategic) Park-&-Ride/Park-&-Choose Strategy	Moderate long term Regional Benefits
D19 option 1	Dundee Northern Relief Road: Bypass Scenario	Minor Local long term benefits
D23	Rail Enhancements in the East of Scotland	Moderate Local long term benefits
D25 (part 1)	West of Scotland Strategic Rail Enhancements: Glasgow Tunnel proposals	Moderate long term Local benefits
D27	Rail Enhancements between Inverclyde/Ayrshire and Glasgow	Moderate long term Regional benefits
D28	Upgrade Edinburgh Haymarket Public Transport Interchange	Moderate long term Local benefits
D29	Enhancements to Railfreight between Glasgow and the Border via West Coast Mainline	Minor long term Regional benefits
D30	Light Rapid Transit connections between Fife and Edinburgh	Minor or Moderate long term Local benefits
E1	Suburban Rail Services Across Dundee	Minor or Moderate long term Local benefits

Intervention Ref (taken from STPR Report 3)	Intervention Title	Overall Environmental Effect
E5	New Busway between Glasgow City Centre, Clydebank and Glasgow Airport	Moderate long term Local benefits
E8	New Rail Line between Perth and Inverkeithing	Moderate long term Regional benefits
E13	New LRT Line to SE Edinburgh	Minor or Moderate long term Local benefits
E14	Augment Far North Rail Line Rail Services with Express Coach Facilities	Minor long term Local and Regional benefits
E15	Reopen Rail Freight Connection to Greenock Port	Minor long term Local benefits
E18	Suburban Rail Services Across Aberdeen	Minor long term Local benefits
E19	Glasgow Subway Upgrade and Modernisation	Minor long term Local benefits
E20	New Motorway Link between the M73 and Coatbridge	Minor long term Local benefits

Summary Environmental Assessment – Interventions with Adverse Effects

Intervention Ref (taken from STPR Report 3)	Intervention Title (taken from STPR Report 3)	Overall Environmental Effect
D14 Part 1	A9 upgrading from Dunblane to Inverness	Moderate to Major short and long term Local and Regional Adverse
D14 part 2	A9 upgrading from Blair Atholl to Inverness	Moderate to Major short and long term Local and Regional Adverse
D16	Upgrade A96 to Dual Carriageway between Inverness and Nairn	Moderate long term, Local, Adverse
E2	Co-locate Dundee Bus Station with Rail Station	Minor long term Local Adverse
E6	Inverness Southern Bypass from the A9 to A82	Moderate long term Local Adverse

Intervention Ref (taken from STPR Report 3)	Intervention Title (taken from STPR Report 3)	Overall Environmental Effect
E9	Railfreight connections to the Port of Rosyth	Minor or Moderate long term Local Adverse
E10	Improved Road Links to Edinburgh Airport	Minor long term Local Adverse
E11	Improvements to the Trunk Road Network in Inverclyde	Minor or Moderate long term Local Adverse
E16	Extension of Glasgow Southern Orbital from East Kilbride to M73/M74	Minor or Moderate long term Local Adverse

Summary Environmental Assessment – Interventions with Neutral and Uncertain Effects

Intervention Ref (taken from STPR Report 3)	Intervention Title (taken from STPR Report 3)	Overall Environmental Effect
D15	Rail Enhancements on the Highland Mainline between Perth and Inverness	Neutral
D17	Rail Service Enhancements between Aberdeen and Inverness	Neutral
D18	Rail Enhancements between Aberdeen and the Central Belt	Neutral
D19 (part 2)	Dundee Northern Relief Road: A90 Upgrades Scenario	Neutral
D21	Grangemouth Road and Rail Access Upgrades	Neutral
D25	West of Scotland Strategic Rail Enhancements: Glasgow Central East	Neutral
D31	Inverkeithing to Halbeath Rail Line	Neutral
E7	Rail Freight Enhancements between Mossend, Grangemouth and Aberdeen/Inverness	Neutral
D25	West of Scotland Strategic Rail Enhancements: metro	Uncertain

In describing the overall effects, common themes emerged regarding the potential for interventions to affect different environmental components. These themes are presented below:

Biodiversity: Interventions in close proximity to Natura 2000 sites could affect site integrity. This is considered via Appropriate Assessment, which is presented in Appendix 8 of the Environmental Report.

Population: Interventions to tackle congestion could isolate some communities and reduce economic input from stop-off traffic.

Noise: Building of new transport infrastructure could increase the number of residential properties exposed to noise, both during construction and operation.

Water: Water bodies could be affected by any construction works carried out near to or over them.

Soils and Geology: Land-take from the construction of new infrastructure could affect soils, and cuttings for road and rail have the potential to alter geology.

Cultural Heritage: Proximity of interventions to designated cultural heritage sites could affect their integrity and setting.

Landscape: Construction of new infrastructure could affect townscapes, designated landscape areas such as country parks, and undesignated rural landscapes.

Material Assets: The construction of new roads and rail lines does not make use of existing infrastructure and requires the use of new resources.

Treatment of Adverse Environmental Effects

Where potentially adverse impacts have been identified, the SEA contributed to the development of measures to reduce the potential environmental effects of interventions. These include:

- Avoiding sensitive and important ecological and geologically designated sites;
- Shielding people from nuisance such as noise;
- Ensuring consideration of public access to essential services;
- Exploring the potential for energy saving transport techniques;
- Conforming to important water regulations;
- Designing and siting new infrastructure sensitively in areas of landscape and cultural value, and;
- Maximising the use of secondary and recycled materials for construction activities.

Where this happened, the environmental effects of each STPR intervention were re-assessed taking into account the implementation of such measures. This was then used to identify residual impacts (impacts that would remain).

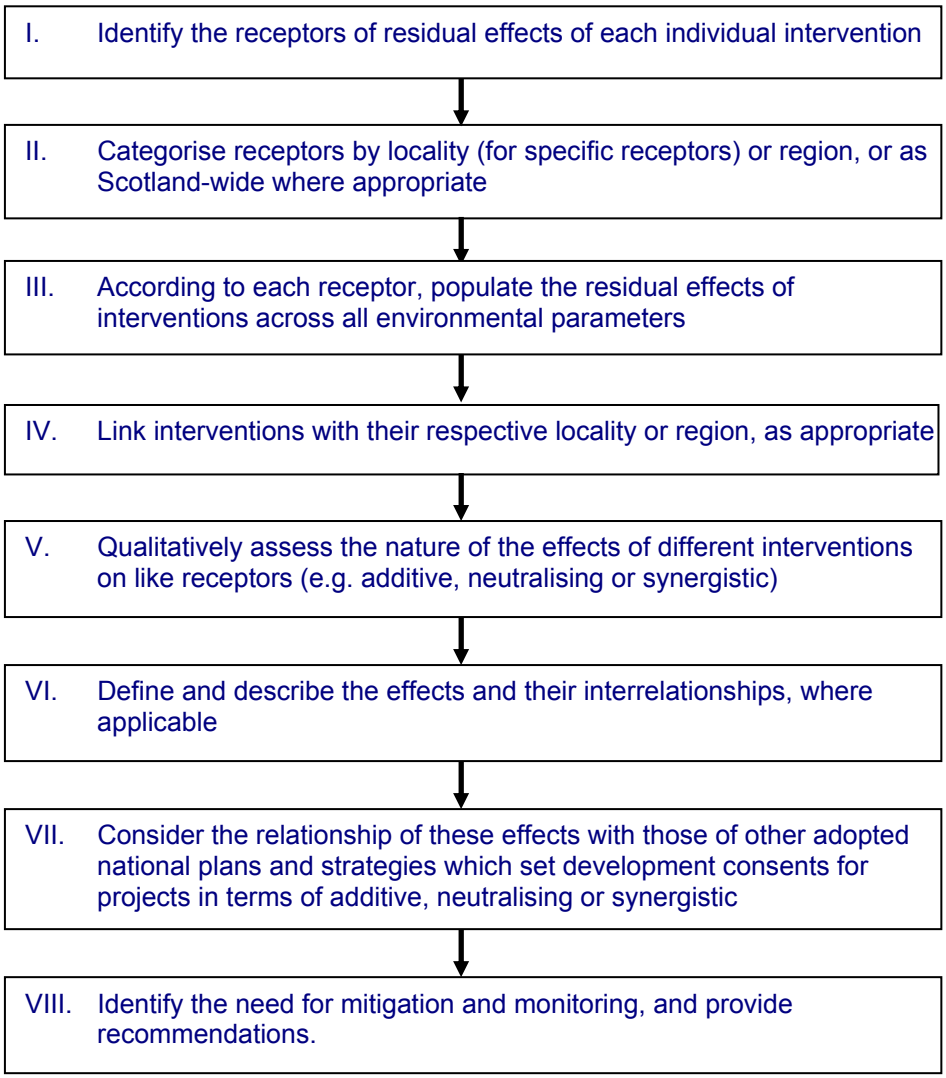
This process concluded that three STPR interventions still had the potential to create adverse effects on the environmental parameter of biodiversity. These were the 'A9 Upgrading from Dunblane to Inverness (Phase 1)', the 'A9 upgrading from Blair Atholl to Inverness (Phase 2)', and 'Rail Enhancements between Aberdeen and the Central Belt'. Whilst the intervention 'Rail Enhancements between Aberdeen and the Central Belt' has not been assessed as having an overall adverse effect, it was considered that the intervention would adversely affect biodiversity in its own right.

In addition to the SEA, an Appropriate Assessment has been carried out for all of the interventions identified as supporting the Scottish Government's Purpose. For the three interventions suggested as having residual impacts, an alternative solution has been identified which, at a strategic level, does offer potential to mitigate potential impacts upon designated biodiversity sites affected. In each case, therefore, it has been possible to conclude that the intervention may be delivered, subject to future monitoring and development.

Cumulative Effects Assessment

The SEA Directive requires an analysis of *"…the likely significant effects on the environment... These effects should include secondary, cumulative, synergistic... effects".* The aim of cumulative effects assessment is to identify, describe and evaluate cumulative effects, enabling them to be avoided, minimised or enhanced as appropriate.

The cumulative effects assessment of the STPR was built from the results of the assessment of the net beneficial effects and residual adverse effects of the individual interventions described earlier. The procedure undertaken is summarised in the flowchart.



Flowchart of Cumulative Effects Assessment Process[1]

[1] Adapted from: Department for Transport (2004), *Transport Analysis Guidance Unit 2.11: Strategic Environmental Assessment for Transport Plans and Programmes. Appendix 5: Cumulative Effects Assessment.* Available at: http://www.webtag.org.uk/webdocuments/2_Project_Manager/11_SEA/appendix.htm#5

Any beneficial or residual effects of interventions identified (including insignificant effects) were reviewed in order to identify the general receptors of these potential effects, normally expressed as areas or localities of various types of receptor such as landscape character areas and residents of conurbations. It was possible in some instances to identify specific receptors such as a particular SSSI. These receptors were then categorised as far as possible by locality or region, or as Scotland-wide.

The regions were defined as north of Scotland, east of Scotland and West of Scotland and to the south. Also as appropriate to strategic assessment, regional and national receptors of cumulative effects could only be expressed as environmental parameters, indicators or types of receptor. Following an iterative process, the residual effects of interventions were then linked with the receptors identified in order to identify which interventions were acting in combination.

Next, a review was conducted of the National Transport Strategy (NTS) and National Planning Framework 2 (NPF2) and their environmental assessments in order to identify further cumulative effects which focussed on:

- Any significant contributions to adverse effects of the STPR (potentially adverse situations);
- Relevant opportunities for offsetting adverse effects of STPR through relevant objectives or specific enhancements in relevant geographical areas; and
- Relevant opportunities for enhancing the benefits of STPR.

Finally, the need for mitigation and monitoring was reviewed, and recommendations made as appropriate to the potential cumulative effects.

The cumulative effects assessment has identified key receptors and effects on the local and regional environment. Receptors that have not been identified where not anticipated to have key cumulative effects. A number of the key findings are noted here.

Key Findings of Cumulative Effects Assessment

Inverness, Nairn, Perth, Aberdeen, Edinburgh, Fife, Perth, Dundee, Glasgow

Local Receptors: *Residents, Organisation and visitors*

Residents, organisations and visitors would generally experience cumulative moderate accessibility benefits, which can be particularly important for access to essential services and employment opportunities. They would also experience cumulative minor to moderate air quality improvements and health benefits, the latter resulting both from the improvements to air quality and from road safety improvements and modal shift (as it was considered that encouragement public transport use would increase opportunities for walking and cycling). Particular moderate benefits could occur to AQMAs within Perth, Aberdeen, Dundee and Glasgow. However, there could be localised community severance as a result of certain road improvement schemes, which can adversely affect accessibility and levels of walking and cycling.

Residents, organisations and visitors would also experience localised adverse noise effects, being cumulative in this case across different phases of road improvements, with the potential for combined effects resulting from new infrastructure on noise sensitive receptors (including those within Candidate Noise Management Areas, particularly within Glasgow).

Regional Receptors: *Landscapes, Cultural Heritage Resources and Biodiversity*

Regional landscapes character areas, including High Plateau Moorlands and Lowland Plateau and Plains, could be cumulatively minor adversely affected, particularly through new infrastructure requirements and new overhead power lines. This could also have indirect effects on the residents and visitors to these sites. Mitigation to avoid landscapes where possible could minimise adverse effects on regionally important landscape areas and joint-working is encouraged to avoid, and then minimise, any cumulative effects.

Regionally important cultural heritage features could also be minor adversely affected by Interventions within the region, largely through effects on setting and in-direct effects from noise. Indirect effects on the residents and visitors to these sites could result. Mitigation measures, including avoidance of sites, could minimise cumulative effects where adverse effects occur. Where adverse effects cannot be avoided, measures to potentially support cultural heritage enhancements in the region could be implemented.

Designated SSSIs and undesignated biodiversity sites, species and habitats were predicted to be cumulatively adversely affected, although it would be required that such effects be avoided, minimised or compensated for at the project level. Joint-working is encouraged to avoid, and then minimise, any cumulative effects.

Scotland-wide Cumulative Effects

Environmental Parameters: *Climatic Factors, Air Quality and Human Health*

Cumulatively, minor benefits were envisaged. The STPR was predicted to result in a reduction in road-based transport carbon emissions of between 100,000 and 150,000 tonnes CO_2 (e) per year. Given an estimated 9.7 Mt of CO_2 attributable to road transport in Scotland in 2005, this would be a reduction of around one per cent. Electrification of the rail network could reduce levels of rail-based carbon emissions.

This predicted reduction of traffic related emissions would be of importance on a national scale in terms of local air quality. Minor benefits were envisaged to national air quality through the cumulative effects of the interventions, this could benefit from strategic road improvements, as well as modal shift from private vehicles to public transport.

Aligning with accessibility benefits, there are potential health benefits across a number of community types, due to factors such as modal shift (as it was considered that encouragement public transport use would increase opportunities for countryside recreation) as well as secondary benefits relative to reduced traffic noise and air quality and road safety improvements. Overall minor benefits were predicted for the health of the population.

Conclusion

In conclusion, delivery of the interventions emerging from STPR would cumulatively bring a number of benefits to the local and regional areas of Scotland, as well as nationwide benefits. In particular, STPR would enhance accessibility throughout Scotland, linking key urban centres and communities. The health of Scotland could also be enhanced through air quality improvements and a reduction in the frequency and severity of accidents. The combination of interventions would however, also give rise to cumulative adverse effects on biodiversity, water, soils and geology, cultural heritage, and landscape resources largely as a result of those interventions that require new infrastructure. There would be opportunities to mitigate potential adverse effects by minimising individual adverse project effects in accordance with specific project assessments and employing good design and build practices such as minimising waste and recycling and recovering resources efficiently.

Monitoring of Effects

The purpose of SEA monitoring should be to ensure that mitigation is effective and that any early or unexpected effects are recognised and addressed so that appropriate remedial action can be taken. Environmental monitoring is important to inform future transport programmes and it should be viewed as an ongoing learning process.

Each intervention will have bespoke monitoring strategies designed for them at the project design stage. The SEA highlights environmental indicators to be monitored at this stage and relevant sources of data. The following sources of data have been identified to assist the monitoring of STPR effects on different environmental components:

Biodiversity: UK and Local Biodiversity Action Plans and Local Biodiversity Action Plans; Joint Nature Conservation Committee (JNCC); Scottish Natural Heritage (SNH)

Population: General Register Office for Scotland

Noise: Strategic Noise Maps and Action Plans

Human Health: Scottish Health Survey; Scottish Transport Statistics; Scottish Census Data; Office of National Statistics

Soils and Geology: Scottish Soil Monitoring Network; The Macaulay Institute; SNH

Water: Scottish Environment Protection Agency

Air: UK Air Quality Monitoring Archive

Climatic Factors: UK Climate Impacts Programme (UKCIP08)

Material Assets: The Waste and Resources Action Programme (WRAP)

Cultural Heritage: Historic Scotland

Landscape: SNH

Next Stages

This Non-Technical Summary and accompanying Environmental Report are available for public and statutory consultation for an eight week period commencing in late 2008. Upon completion of the consultation period relevant comments will be reviewed and responded to. It is anticipated that amendments could be required to the STPR report.

Following the incorporation of consultation responses, an SEA Post-Adoption Statement and Monitoring Strategy will be published in early 2009. This Post-Adoption Statement will document how the SEA has taken account of all consultation comments and how environmental implications have been taken into account in the STPR decision-making process. It will also provide detail on the strategy employed to monitor the environmental effects of STPR interventions.

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1 Introduction

Transport Scotland is undertaking a Strategic Transport Projects Review (STPR) to make recommendations on a portfolio of largely land-based transport investments, known as interventions, for the period 2012 to 2022, that would make a significant contribution to delivering the Government's *Overall Purpose* and the supporting National Transport Strategy (NTS).

The interventions are of a high-level strategic nature and are both infrastructure based and policy focussed. Consequently, in-depth details of proposed interventions are not available, as these remain to be developed and will be taken forward to subsequent tiers of decision-making.

A Strategic Environmental Assessment (SEA) is being undertaken for the STPR on behalf of Transport Scotland and in accordance with the Environmental Assessment (Scotland) Act 2005, also known as the 'SEA Act'[2].

SEA is a systematic method for considering the likely environmental effects of the STPR and aims to integrate environmental factors into policy preparation and decision-making. It also has an important role to play in increasing public participation and facilitating openness and transparency in decision-making. The key steps of the SEA comprise:

- **Scoping Report –** The scope and level of detail of the Environmental Report is informed through the publication of a Scoping Report and consultation processes involving stakeholders and other interested parties including statutory consultees: Scottish Natural Heritage (SNH), Historic Scotland (HS) and the Scottish Environment Protection Agency (SEPA). For the purposes of this SEA, Health Scotland was also treated as a statutory consultee.

- **Environmental Report –** An Environmental Report is published which describes the likely significant, strategic environmental effects of implementing the STPR. This is also subject to a period of publicity and consultation. The statutory consultees are required to comment upon the Report and its findings.

- **Adoption Statement–** An Adoption Statement is published which explains how the results of the environmental assessment of the SEA and consultation processes have been taken into account in determining the final list of candidate STPR interventions. The Statement also describes methods for monitoring the significant, strategic environmental effects of implementing the candidate STPR interventions to enable Transport Scotland to identify any unforeseen adverse effects at an early stage and undertake appropriate remedial action as well as monitoring the effectiveness of mitigation measures.

Details of the relationship between the STPR process and SEA processes are given in Chapter 3 of this Report. A fuller description of the SEA processes undertaken is also provided in Chapter 3, and detailed information relative to monitoring can be found in Chapter 9.

[2] Environmental Assessment (Scotland) Act 2005 (opsi, 2005)

1.1 SEA Activities

Table 1.1 summarises the SEA activities which have been undertaken to date. The remaining stages of the SEA relative to monitoring and consultation are described in Chapters 9 and 10 of this Report.

Table 1.1: Timetable of Summary SEA Activities

SEA Action / Activity	Timeframe	Comment
Screening to determine whether STPR requires SEA	N/A	This was not carried out as the STPR fell within the criteria for being subject to the SEA Act, Section 5(3).
STPR Meeting	Early October 2006	SEA Start up meeting between STPR Core Team/Transport Scotland and SEA Core Team
STPR Meeting	Mid October 2006	Introduction to STPR, explanation of how the SEA will integrate and influence the development of the programme.
Development of SEA methodology.	October 2006 – May 2007	The SEA methodology has been developed through a series of meetings between the SEA Core Team, the STPR Team and Transport Scotland.
Integration of Scottish Government's Scottish Transport Appraisal Guidance (STAG) and SEA methodology	November 2006 – May 2007	Meetings held with the STPR Core Team and Transport Scotland on the development of a suitable assessment framework for STAG, and consideration to how this integrates with SEA methodology.
Development of the baseline data	November 2006– August 2007	Environmental data sources for STPR gathered.
STPR Meeting	December 2006 – April 2007	Meetings to develop STPR appraisal framework and SEA compatibility.
Identification of Environmental Issues	January 2007 – May 2007	Relevant environmental issues have been identified through consultation with Transport Scotland.
STPR Meeting	February 2007 – July 2007	Development of SEA objectives and STPR objectives
STPR Meeting	February 2007 – May 2007	Environmental and transport modelling – CO_2, NO_2, Noise.
Development of the STPR Objectives, including environmental objectives.	March 2007 – July 2007	This followed extensive sessions with the STPR and SEA Core Teams and Transport Scotland.

SEA Action / Activity	Timeframe	Comment
STPR Internal Meetings		Regular meetings between the STPR Team and SEA Core Teams to ensure there are effective connections between the development of both the Programme and SEA, and that there is sufficient opportunity for the SEA to have a significant influence on the STPR.
Pre-Scoping Consultation Authority Meeting	11th May 2007	Meeting with the Consultation Authorities (SEPA, SNH and Historic Scotland) and Health Scotland to discuss objectives, key environmental issues, and methodology.
STPR Meeting	Mid May 2007	Scoping Report Review meeting
Scoping Report Consultation	October 2007	SEA scoping report submitted to the statutory Consultation Authorities (SNH, SEPA, and HS) via the Scottish Government's SEA Gateway for consultation.
Consultation Response Review and Report	December 2007 – January 2008	Consultation Report submitted to Transport Scotland
Draft Environmental Baseline	February 2008	Peer Review by Natural Capital
STPR Report 2: Determine Expectations, Gaps and Shortfalls	March - April 2008	Workshop based environmental assessments of Report 2 and SEA recommendations.
National Overview and Finalised Draft Environmental Baseline	April - June 2008	Transport Scotland Review
STPR Report 3: Identify Potential Interventions and Sift Options. Appraise Candidate Interventions	April - June 2008	Workshop based environmental assessments of Report 3 and SEA recommendations.
Environmental Baseline and STPR Report 1[3]	July 2008	Included in the Environmental Report as Appendix 3.
Cumulative Environmental effects	September 2008	Workshop based cumulative effects assessment of all proposed interventions and SEA recommendations.

[3] Given the iterative nature of the STAG processes, Reports 1 and 2 were compiled concurrently.

SEA Action / Activity	Timeframe	Comment
Peer Review	August 2008	Peer Review by Natural Capital.
Consultation on Environmental Report	December 2008 - February 2009	Consultation for the public and SEA consultation authorities.

1.2 Environmental Report

The purpose of this Environmental Report is to:

- Identify, describe and evaluate the likely significant effects on the environment of implementing the STPR; and
- Provide an early and effective opportunity for the Consultation Authorities and the public to offer views on any aspect of the SEA.

Further detail on the SEA approach and method are outlined in Chapter 3 of this Report. The key facts relating to the STPR are set out in Table 1.2. Further details on the STPR can be found within the related STPR documents which include:

- Report 1 Review of Current and Future Network Performance;
- Report 2 Determine Expectations, Gaps and Shortfalls.
- Report 3 Generation, Sifting and Appraisal of Interventions; and
- Report 4 Summary Report

1.3 Key Facts

The key facts relating to the SEA are detailed in Table 1.2.

Table 1.2: Key Facts

Key Fact	Detail
Responsible Authority	Transport Scotland
Title of Programme	The Strategic Transport Projects Review (STPR)
Programme Subject	Transport
Requirement for STPR	The then Scottish Executive, in the 2003 Partnership Agreement, made a commitment to undertake a strategic projects review. An SEA is required, because STPR falls under the scope of Section 5(3) of the SEA Act. The SEA is required by an administrative provision and because STPR has the potential to have significant environmental effects.
Period covered by the Programme	2012 – 2022
Frequency of updates	To be reviewed as appropriate
Area covered	Scotland
Purpose	To set out a programme of strategic road and rail based transport interventions for Scotland for the period 2012-2022.
STPR Objectives	Improved Journey Time and Connections Reduced Emissions Improved Quality, Accessibility and Affordability
STPR Team	Strategic Transport Projects Review Team Strategy & Investment Directorate Transport Scotland Buchanan House 58 Port Dundas Road Glasgow G4 0HF
Contact	Stuart Wilson Project Engineer - STPR Transport Scotland Strategy and Investment Directorate 6th Floor, Buchanan House 58 Port Dundas Road Glasgow G4 0HF Tel: Freephone 0845 680 1486 STPR@transportscotland.gsi.gov.uk

2 Context

2.1 Introduction

This Chapter outlines the context of the STPR. To this end, an overview of the content, nature, objectives and timescales of the STPR is provided followed by a description of the relationship of the STPR with other relevant policies, plans, programmes and strategies. In addition, a bespoke sustainability appraisal has been conducted on the STPR Key Strategic Outcomes (KSOs) to illustrate how these conform to overall Scottish sustainability aspirations.

2.2 Strategic Transport Projects Review

The STPR is a review which commenced in 2006 and appraises the strengths and weaknesses of Scotland's strategic road and rail transport networks. It is being undertaken on behalf of Transport Scotland by Jacobs Engineering UK Ltd, in partnership with Faber Maunsell and supported by Grant Thornton and Tribal. The overall aim of the STPR is to recommend a programme of largely land-based transport interventions proposed for the period 2012 – 2022 which would most effectively contribute to the Scottish Government's *Overarching Purpose* to create a more successful country, with opportunities for all of Scotland to flourish through increasing sustainable economic growth. This purpose would be supported through delivery of the three key strategic outcomes identified in the National Transport Strategy:

- **Improved journey times and connections** - to tackle congestion and the lack of integration and connections in transport;
- **Reduced emissions** - to tackle the issues of climate change, air quality and health improvement; and
- **Improved quality, accessibility and affordability** - to give people a choice of public transport, where availability means better quality transport services and value for money or an alternative to the car.

It should be noted that STPR is only one of a suite of initiatives and programmes aimed at supporting the Government's Overarching Purpose and accordingly, the interventions could focus on particular aspects of the three strategic outcomes rather than supporting the spectrum of strategic outcomes.

The *Overarching Purpose* of Government is supported by specific Strategic Objectives for Scotland: that it will be *Wealthier and Fairer, Smarter, Healthier, Safer and Stronger and Greener*.

In order to make best use of finite resources and to promote a sustainable transport network, it has been recognised that investment in the national strategic transport network should be targeted:

- **Firstly**, at maintaining and safely operating existing assets;
- **Secondly**, at promoting a range of measures, including innovative solutions, to make better use of existing capacity (Interventions may include technology based, fiscal and 'soft measures' in addition to engineering solutions); and
- **Thirdly**, at promoting targeted infrastructure improvement.

The forecast transport conditions in Scotland were assessed in the context of 20 route corridors, plus the urban networks of Aberdeen, Dundee, Edinburgh and Glasgow, and the strategic nodes of Perth and Inverness. The particular characteristics and future transport challenges for each of these areas provided evidence to define more specific objectives and identify those transport projects and interventions which might meet those objectives. The STPR Transport Corridors, Networks and Nodes are illustrated in

2.3 Emerging STPR Interventions

The STPR Summary Report (Report 4) outlines the interventions which are emerging from the appraisal underlying the Review. These interventions have been selected as they have been determined to overall be:

- consistent with meeting national strategic objectives;
- strategic in nature e.g. meeting national rather than local needs;
- focused on addressing identified strategic transport issues;
- assessed to be feasible and deliverable; and
- Deliverable by, or require significant support from, the Scottish Government.

The interventions identified have been assessed using the criteria in Scottish Transport Appraisal Guidance (STAG), which provides a rigorous, two-stage process for testing multi modal proposals. The criteria have been designed to consider the deliverability and feasibility of proposed interventions in the context of the objectives they seek to address. As STAG is a multi-modal assessment tool, it is able to appraise interventions on road and rail corridors, focussing on end to end journeys and strategic connections.

The interventions within the scope of the STPR provide only a part of the overall investment in transport in Scotland. Other schemes are outside the scope of the review, but provide a significant commitment to the improvement of transport provision in Scotland. These include local improvement schemes which are not strategic in nature. These could be prioritised by local or regional authorities through relevant single outcome agreements. It also includes UK wide schemes which could be delivered in partnership with the Department for Transport.

Figure 2.1: National Strategic Transport Network

Examples of the interventions which are emerging from the appraisal include:

Roads

- Deployment of measures to make most efficient use of the network: (for example Intelligent Transport Systems (ITS), High Occupancy Vehicle (HOV) Lanes or priority lanes, ramp metering and Active Traffic Management); and

- Specific proposals that improve journey time and/or journey time reliability, on the trunk road network (for example adding lanes, overtaking lanes, bypasses, some key strategic junction improvements).

Rail

- Programme for electrification; and

- New infrastructure required for enhanced passenger and freight services such as additional tracks, passing loops, platform lengthening and improving rolling stock.

Bus or Light Rapid Transit (LRT)

- Potential interventions that put in infrastructure on the strategic networks to support bus travel i.e. priority lanes, interchanges (interventions that are focused on local bus routes or on provision of buses are not considered).

Other outputs

- Specific measures that promote more effective transport mode interchange or reduce requirement for interchange; and

- Innovative measures that require national input for implementation.

For some corridors, interventions have emerged as part of a co-ordinated strategy consisting of a package of individual measures. STPR has identified the key strategic measures to be deployed across corridors, but does not necessarily specify every intervention that could be required along a particular route. In such cases, development of the particular corridor would be expected to refine the detail of measures proposed.

Interventions that progress could, in the future, be subject to project level Environmental Impact Assessment (EIA) or policy/programme level SEAs and project specific Appropriate Assessments, depending on the nature of the intervention and its stage of development.

In order to comply with the requirements of the STAG and SEA processes, the final output of the STPR should make recommendations on a monitoring and evaluation strategy, recognising the importance of effective evaluation to inform subsequent policy and programme reviews.

2.3.1 STPR National Objectives

A number of national objectives have been identified for the STPR. These are derived from the National Transport Strategy, outlined more fully in Section 2.4.1. The development of the STPR objectives is discussed in more detail in STPR Report 2. These are:

Improved Journey Times and Connections *- to tackle congestion and the lack of integration and connections in transport that impact on the potential for continued and sustainable economic growth.*

In particular, the STPR will generate options, based on current and forecast performance, by exploring the opportunities to:

- Promote 'competitive' inter-urban journey times;
- Reduce inter-urban journey time on public transport;
- Promote journey time reduction on the trunk road network for prioritised vehicles and users (e.g. high occupancy vehicles, freight, and bus) where STAG appraisal demonstrates that a strong economic case can be balanced with environmental objectives. Elsewhere on the trunk road network provide improvements to journey time reliability;
- Promote journey time reductions between the central belt[4] and Aberdeen/Inverness primarily to allow business to achieve an effective working day[5] when travelling between these centres;
- Maximise the labour catchment area in city regions where economic evidence demonstrates that this is required (favouring public transport and high occupancy vehicles and balancing with other policy measures that promote reduction in need to travel i.e. planning policy); and
- Support the development and implementation of relevant proposed national developments identified in the NPF2.

Reduced emissions *- to tackle the issues of climate change, air quality and health improvement. Recognising the challenges of reducing emissions, the overall objectives for the transport network is to adopt a stepped approach to reducing transport emissions towards 2050:*

- *Reduce CO_2 emissions per person km;*
- *Stabilise total CO_2 emissions; and*
- *Reduce CO_2 emissions in line with expectations from the emerging Climate Change Bill.*

[4] Central Belt is defined for the purposes of this report as being the area directly served by the Edinburgh and Glasgow urban networks, Corridor 13 and parts of Corridors 9, 10 and 18.
[5] Effective Working Day is defined for the purposes of this report as a day away from the usual place of work where at least half of the day (travel time + work time) is spent working at the destination.

Where appropriate, the objective "reduced emissions" would be supported by mitigation measures that would be within the devolved competency of the Scottish Government. It should be recognised that the role of each intervention would need to be considered along with other expectations in delivering the Government's Central Purpose of increasing sustainable economic growth. It should also be recognised that many of the potential measures to reduce emissions are reserved to the UK Government or are the responsibility of the European Union. This limits the extent to which the STPR could, in its own right, address these issues. A stepped approach to reducing transport emissions over the period to 2050 is, therefore, adopted for the strategic transport networks, starting with measures to reduce the intensity of transport emissions.

Improved Quality, Accessibility and Affordability *- to give people a choice of public transport, where availability means better quality transport services and value for money or an alternative to the car.*

In particular, the STPR will generate options, based on current and forecast performance, by exploring the opportunities to:

- Promote a continuing reduction in accident rates and severity rates across the strategic transport network, recognising the need to continue the work of the Strategic Road Safety Plan[6] through the STPR period;
- Promote seamless travel;
- Improve the competitiveness of public transport relative to the car; and
- Improve overall perceptions of public transport.

Below these are specific urban network, strategic nodes and corridor objectives. These objectives are detailed in Appendix 4, and SEA recommendations for changes to STPR objectives are outlined in Section 5.1.1. More information on the STPR objectives for the network, nodes and corridors can be found in STPR Report 3.

As has been outlined, the STPR objectives focus on addressing strategic rather than local issues. Interventions have been generated and sifted recognising this focus. At an early stage, a number of projects and ideas were sifted out for a variety of reasons, including:

- They are not deliverable in the time scale envisaged;
- They are contrary to current government policy;
- They are solutions to local problems and not contributing to the strategic corridor, network or node objectives set;
- They might be outwith Scottish Government powers to deliver; or
- They do not address the STPR objectives.

[6] http://www.transportscotland.gov.uk/reports/publications-and-guidance/road/j9041-00.htm

2.4 Relationship with Other Plans, Programmes and Strategies (PPS)

The SEA Act requires that the Environmental Report includes an outline of the programmes relationship with other relevant plans, programmes and strategies. This section provides an outline of the policy context within which the STPR operates and the constraints and targets that this context imposes on the programme. This review has helped to identify relevant environmental issues and problems pertinent to the STPR and will help form the basis from which the environmental assessments will be carried out in the later stages of this SEA.

2.4.1 National Policy Context

The policy documents within a national context of direct relevance to the STPR are detailed within Table 2.1 and explained in more detail overleaf.

Table 2.1: Relevant National Policy Documents

Policy Document	Date
Draft National Planning Framework 2 (NPF2)	January 2008
Scottish Government's Economic Strategy	November 2007
National Transport Strategy (NTS)	December 2006
National Planning Framework Monitoring Report (NPFMR)	September 2006
National Transport Strategy SEA Environmental Report (NTSSEA)	May 2006
Changing Our Ways - Scotland's Climate Change Programme	March 2006
Choosing our Future - Scotland's Sustainable Development Strategy (SDS)	December 2005
National Planning Framework (NPF)	April 2004
Framework for Economic Development in Scotland (FED)	June 2000 Updated in 2004

National Planning Framework

A key national strategy of major relevance to Scotland's transport network is the National Planning Framework (NPF) and National Planning Framework 2 (NPF2). The first NPF was published in April 2004 and set out a strategy for Scotland's development to 2025. Under the Planning etc (Scotland) Act 2006 the Framework became Statutory. The legislation requires Ministers to prepare the Framework with the objective of contributing to sustainable development and to review it every five years.

The second National Planning Framework (NPF 2) is well advanced and has been prepared over a similar timeframe to the STPR. It is expected that the final version of the National Planning Framework 2 will be published early in 2009. NPF 2 sets out ambitions Scotland's spatial development to 2030, setting out strategic development priorities to support the Scottish Government's central purpose to promote sustainable economic development. The Draft NPF2 states that Scotland needs an effective national transport infrastructure which would facilitate sustainable economic growth, explaining that breaking the line between economic growth, increased traffic and increased emissions is a key challenge. For more detail on NPF2, reference should be made to the Scottish Government website.

Scottish Government's Economic Strategy

The Scottish Government Economic Strategy was published in November 2007 and aims, "*…to focus the Government and public services on creating a more successful country, with opportunities for all of Scotland to flourish, through increasing sustainable economic growth*." Sustainable economic growth is defined as, "*building a dynamic and growing economy that will provide prosperity and opportunities for all, while ensuring that future generations can enjoy a better quality of life too."* The Scottish Government has set, "*challenging targets… to track progress in boosting Scotland's growth, productivity, population and participation, and in delivering on the desired characteristics of growth - solidarity, cohesion and sustainability*".[7]

With respect to the transport sector, one of the Government's Economic Strategy's Strategic Priorities relates to 'Infrastructure Development and Place'. The key strategic approaches pursued include:

- To focus investment on making connections across and within Scotland better, improving reliability and journey times, and seeking to maximise the opportunities for employment, business, leisure and tourism;
- To provide sustainable, integrated and cost-effective public transport alternatives to the car, connecting people, places and work across Scotland; and
- A planning and development regime which is joined up, and combines greater certainty and speed of decision making within a framework geared towards achieving good quality sustainable places and sustainable economic growth.

[7] The Scottish Government Economic Strategy Document, Scottish Government (2007)

National Transport Strategy (NTS)

The National Transport Strategy (NTS) (December 2006) was produced under a commitment presented in the 2004 Transport White Paper, "*Scotland's Transport Future*". It constitutes one of eight main delivery programmes for 'Choosing Our Future', Scotland's sustainable development strategy. The NTS has five high level objectives (first articulated in Scotland's Transport Future, 2004), which are as follows:

- Promote economic growth;
- Improve integration;
- Promote social inclusion;
- Improve safety of journeys; and
- Protect our environment and improve health.

One of the aims of the NTS is to deliver a world class transport system with the following three key strategic outcomes:

- **Improve journey times and connections;** to tackle congestion and the lack of integration and connections in transport which impact on high level objectives for economic growth; social inclusion; integration and safety;
- **Reduce emissions;** to tackle the issues of climate change, air quality and health improvement which impact on high level objectives for protecting the environment and improving health; and
- **Improve quality, accessibility and affordability;** to give people a choice of public transport, where availability means better quality transport services and value for money or an alternative to the car.

The NTS states that through the STPR, the effectiveness of key strategic transport corridors will be reviewed. This review will also be linked to the spatial priorities for housing, regeneration and planning, as identified through the NPF.

The STPR would also determine the need for improvements to rail, alongside other modes of transport, and identify the extent to which a programme of targeted structural investment is required. This would be in order to safeguard the structural integrity of the network and maintain its value, safety and serviceability.

Figure 2.2 is an extract from the NTS[8] and demonstrates the relationship and linkages between the NTS, the STPR and other transport strategies. The NTS sets the strategic direction for investment, but the specific details, both in terms of policy and the STPR, will be set by the level of funding agreed with the Scottish Government (through the Scottish Government Spending Review process).

[8] Figure 2.2 is taken from Figure 7 contained within the NTS.

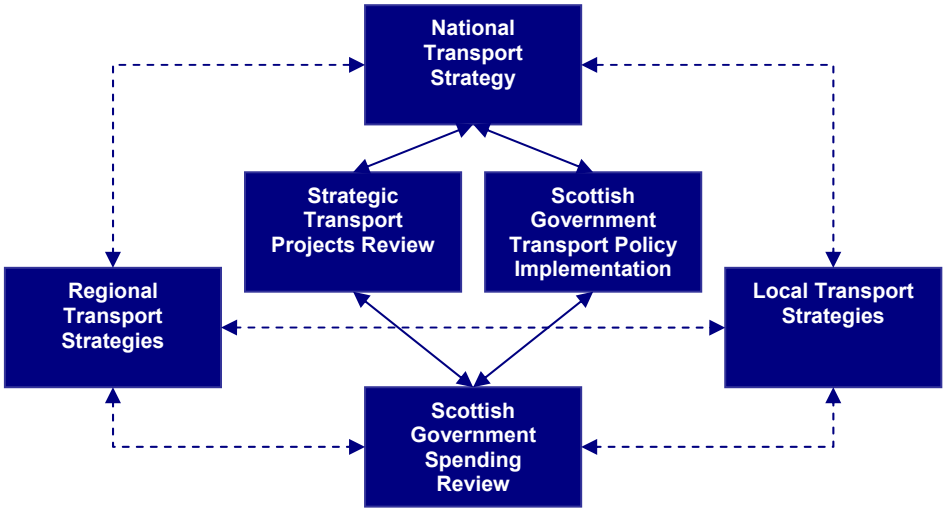

Figure 2.2: NTS Linkages

The STPR is listed within the NTS as one of its key commitments. At the time of its publication there was no legal requirement for an SEA of the NTS to be undertaken. It was considered however, that the SEA process was valuable to the development of the NTS and an SEA was, therefore, undertaken on a voluntary basis. Overall, on a regional and local level, the SEA found that the NTS has the potential to benefit the wider environment. It also stated however, that it is difficult to provide a detailed analysis where there are degrees of uncertainty regarding the location and exact nature of proposals which would arise from the measures put forward. On this basis the Environmental Report accompanying the NTS provides the context for more detailed environmental assessment which would be expected to be taken forward at the national level through the STPR and at the regional and local levels through relevant transport strategies. In the case of the regional transport strategies, SEAs have been undertaken for each, whilst local transport strategies in preparation will also be subject to SEA.

Scotland's Climate Change Programme

The Scottish Government's 2006 document "*Changing Our Ways - Scotland's Climate Change Programme*" is designed to: inform the NTS; support the UK's commitments to include aviation and surface transport emissions in EU Emissions Trading System; ensure five per cent of UK fuels sold are biofuels by 2010; promote new and cleaner vehicle technologies and fuels; and promote sustainable travel and modal shift.

In January 2008, the Scottish Government initiated consultation on the proposals and options for a Scottish Climate Change Bill. The consultation proposes a mandatory long-term target to achieve an 80 per cent reduction in carbon emissions by 2050 – equivalent to an emission reduction of three per cent each year. Key areas where this can be achieved from transport include modal shift encouraged by promotion of sustainable travel. A draft Scottish Climate Change Bill is expected to be introduced to parliament before the end of 2008.

Scotland's Sustainable Development Strategy

The common definition of sustainable development derived from the Brundtland Commission's 1987 report, 'Our Common Future', is, "*Development that meets the needs of the present without compromising the ability of future generations to meet their own needs*."[9]

The Sustainable Development Strategy (SDS) for Scotland was published in 2005 and is set against the background of the UK Sustainable Development Framework. Both 'Choosing Our Future' and the UK Framework also identified four priority areas for sustainable development. These are:

- Sustainable Production and Consumption;
- Climate Change and Energy;
- Natural Resource Protection and Environmental Enhancement; and
- Sustainable Communities.

The SDS document, 'Choosing Our Future' (2005) is significant in that it provides a coherent strategy to move Scotland towards sustainability for the first time. The key issue within the strategy, with regards to transport, is that business and commerce rely on transport to grow our economy. It is recognised that without freight transport, no goods would get to market or to consumers; without the ability for people to travel to work, it would be difficult for businesses to operate; and without international aviation, business and tourism would suffer.

"Choosing Our Future" also identifies the major health, environmental and well being benefits of sustainable travel choices such as walking and cycling and the importance of, "…*good transport links in helping places to function and communities to thrive*". The Strategy identifies the acute transport challenges and the significant associated social, economic and environmental effects to be faced in Scotland. These include: the risk of road traffic to health (accidents, poor local air quality); unrestricted increases in car usage (leading to congestion) and distances travelled per person per year; the greenhouse gas emissions from aviation; and the historic link between economic growth and growth of traffic. The Strategy provides eight clear transport 'Actions for the Future'[10] with the two main actions being the development of the National Transport Strategy (NTS) and Regional Transport Strategies by working with the Regional Transport Partnerships to provide guidance and support.

[9] 'Our Common Future', Australian Commission for the Future, World Commission on Environment and Development, Brundtland, G. (1990)
[10] 'Choosing Our Future: Scotland's Sustainable Development Strategy' Scottish Government (2005)

It is the intent of the Scottish Government to support the long-term economic future of the nation while taking full account of, and reducing, the environmental effect of the transport sector, including reducing the need for travel and encouraging more sustainable modes of transport. In addition, the SDS states that the Government would invest, substantially, in public transport infrastructure and services, invest in rail infrastructure projects, roll out the Scotland-wide free bus scheme, promote the uptake of sustainable travel plans and support initiatives to promote more efficient freight practices.

2.4.2 Regional Strategies

Regional Transport Strategies

The Regional Transport Strategies (RTSs), produced by the seven Regional Transport Partnerships (RTPs) are also of direct relevance and include the assessments and strategies set out in Table 2.2 on the following page.

Table 2.2: Assessment and Strategies of the RTPs

RTP	RTS	SEA
Highlands and Islands Transport Partnership	Consultation Draft, November 2006 Finalised Strategy, March 2007	Draft Environmental Report, October 2006
North-East of Scotland Transport Partnership	Consultation Draft, December 2006 Finalised Strategy, March 2007	Environmental Report, November 2006
RTP	**RTS**	**SEA**
South-East of Scotland Transport Partnership	Consultation Draft, November 2006 Finalised Strategy, March 2007	Environmental Report, November 2006
Zetland Transport Partnership	Consultation Draft, November 2006 Approved Final Draft, March 2007	Environmental Report, November 2006
South-West of Scotland Transport Partnership	Draft, December 2006 Finalised Strategy, March 2007	Environmental Report, December 2006

Strathclyde Partnership for Transport	Consultation Draft, December 2006 Finalised Strategy, March 2007	Consultation Draft Environmental Report, January 2007
Tayside and Central Scotland Regional Transport Partnership	Consultation Draft, January 2007 Finalised Strategy, March 2007	Environmental Report, January 2007

All seven of the RTSs have been submitted to the Scottish Government and each of these is accompanied by an SEA. National transport policy provides the context for the development of each RTS, which then provides an input into regional planning policy, local transport strategies and other relevant guidance, including the STPR. The purpose of each RTS is to provide a regional perspective on transport in Scotland and clearly set out a framework for the future direction of investment in, and management of, transport in each of the RTP areas for the next 10 to 15 years. The early stages of the development of interventions for the STPR were informed by the draft Regional Transport Strategies that were in preparation at the time.

2.4.3 Other Policies

The SEA of the STPR has also conducted a wider review of relevant PPSs which cover European, National, and Regional PPS. Where these PPSs set out environmental objectives, these have been taken into consideration in the STPR. A summary of the PPSs that have been reviewed and have been taken into account during the preparation of the SEA is included in Appendix 1.

2.4.4 National Sustainable Development Indicators (Transport)

National sustainable development indicators identified within 'Indicators of Sustainable Development for Scotland' 2005, allow for the measurement of progress towards achievement of national objectives. According to the Sustainable Development Commission (SDC), indicators "…*help create a picture of what sustainable development means in our everyday lives*." The Scottish Government currently uses four key indicators that relate to transport and travel in Scotland. These are:

- ***Indicator 14 Travel (distance):*** *Traffic on Scotland's roads measured in million vehicle-kilometres. Since 1990, total vehicle kilometres have increased and road traffic growth is forecast to rise by 27 per cent on 2001 levels by 2021. This is deemed unsustainable;*

- ***Indicator 15 Travel (industry):*** *Freight intensity (relationship between tonne kilometres moved and Gross Domestic Product). Since 1998, the volume of road freight moved on journeys originating in Scotland has declined relative to the expansion of the Scottish economy. Aim is to encourage more freight to be lifted by other modes to help to reduce traffic on Scotland's roads;*

- ***Indicator 16 Travel (mode):*** *Percentage of journeys to work not using car. Between 1990 and 2005, the figure remained static at 16 per cent. Furthermore, in Scotland, the percentage of miles travelled by walking or cycling halved from six per cent to three per cent between 1990 and 2005.*[11] *Cars do not use resources as efficiently as other forms of transport. Encouraging people to travel to work without using their car is a good way of using resources better, as well as cutting pollution, greenhouse gas emissions and congestion on our roads; and*

- ***Indicator 17 Travel (accessibility):*** *Percentage of Scottish households within a six minute walk of a bus stop. Scottish Household Survey figures suggest little change between 1999 and 2003 at 85per cent. Accessibility to transport is a key issue for sustainable development and social justice. Aim to ensure that more Scottish households are able to choose sustainable forms of transport.*[12]

2.4.5 Sustainable Development in Scotland: A Review of Progress by the Scottish Government

In a report titled 'Sustainable Development in Scotland: A Review of Progress by the Scottish Government (2007)', the Scottish Development Commission (SDC) reviewed progress made by the Scottish Government since December 2005, on delivery of 'Choosing Our Future'. With respect to the transport sector in Scotland, the high level SDC findings were as follows:

- NTS Performance against [the Sustainable Development] Strategy (Score 4/5): The NTS is based on a more sustainable approach than previous, although includes many policies that cannot be deemed sustainable;

- Performance as shown by Indicators (Score 1/5): significant deterioration in the total vehicle kilometres indicator since 1990; and

- Overall progress towards sustainable development (Score 2/5): improved support for rail and bus services, cycling and walking, along with a commitment to consider the potential to assess carbon effects of transport policies. However, still significant investment in road building.[13]

It recognises that the NTS, "…*committed the Executive to large scale investment in new infrastructure for road and air transport*." Inevitably, this will lead to increases in CO_2 emissions and result in negative social effects, "*in terms of noise, pollution and the dividing of communities through which new roads are built.*" Furthermore, "*investment in strategic road schemes appears to contradict the commitment to stabilise traffic levels by 2021 especially if greenhouse gas emission reduction targets are to be met*". With reference to the STPR developments, the SDC, "…*whilst recognising that some ongoing and future investment in strategic road schemes is necessary*," states that, "*sustainable development principles must be used rigorously to assess decision-making on individual proposals and to consider the overall impact of our transport system."*

[11] 'Indicators of Sustainable Development for Scotland: Progress Report 2005
[12] 'Indicators of Sustainable Development for Scotland: Progress Report 2005
[13] 'Sustainable Development in Scotland: A Review of Progress by the Scottish Government', SDC Scotland 2007

The SDC found that, "*the strategic outcomes and objectives are largely consistent with a sustainable approach to transport although they are not placed within an overarching goal of promoting sustainable transport*". In terms of policy, the SDC ascertained that the NTS contains a number of beneficial sustainability commitments including:

- Scotland-wide free bus scheme for over one million older and disabled people;
- Increasing uptake of sustainable travel plans;
- Expanding Safe Routes to School network;
- Retaining the target to stabilise road traffic volumes at 2001 levels by 2021; and
- Developing a carbon balance sheet to assess the effects of transport decisions.

2.5 Sustainability Appraisal of STPR Key Strategic Objectives

2.5.1 Objectives: Methodology

Although not enforced in the Environmental Assessment (Scotland) Act (2005) or the EIA Regulations (Scotland) (1999), it is also considered good practice, when undertaking environmental assessments, to conduct a sustainability appraisal. A sustainability appraisal of the national STPR objectives has therefore been conducted as part of the SEA of the STPR interventions. The objectives have been appraised against a bespoke set of key national sustainable development objectives, including the four Scottish Government transport-related indicators, in line with the Scotland's sustainable development strategy, "*Choosing Our Future*" (2005). The matrix covers national sustainability and planning issues and emphasises those of strategic national priority. The specific sustainability appraisal details are presented in a matrix format in Appendix 1 (B).

The STPR's Key Strategic Objectives (KSOs) were assessed against the following key Scottish sustainability policy objectives:

Supporting Thriving Communities

- Scottish Government Economic Strategy: To create a more successful country, with opportunities for all of Scotland to flourish, through increasing sustainable economic growth;
- Scottish Government Indicator 17 Travel (accessibility): To increase local bus passenger journeys by an average of 1 per cent per year; and
- Scottish Government Indicator 15 Travel (industry): To encourage more freight to be lifted by other modes to reduce traffic on roads.

Protecting Scotland's Natural Heritage

- Scottish Biodiversity Action Plan: To conserve biodiversity for the health, enjoyment and wellbeing of the people of Scotland now and in the future; and
- Water Framework Directive: To achieve 'good' ecological status by 2015.

The Well-being of Scotland's People

- Environmental Noise (Scotland) Regulations 2006: To reduce the impact of transport-related noise on individuals; and
- Air Quality Strategy (Scotland): To improve air quality and reduce risks to human health.

Scotland's Global Contribution

- Draft Climate Change Bill: To reduce overall CO_2e emissions across Scotland by 80 per cent by 2050 (transport sector specific reduction target to be confirmed);
- Scottish Government Indicator 14 Travel (distance): To strive to stabilise road traffic volumes at 2001 levels by 2021 (i.e. stabilise at 40,065 million vehicle-kms on all roads); and
- Scottish Government Indicator 16 Travel (mode): To increase the proportion of non-car travel to work.

2.5.2 Sustainability of STPR National Objectives

The STPR national objectives derived from the NTS have been assessed against the Key Strategic Outcomes (KSO) of the NTS itself.

KSO1: Improved Journey Times & Connections

Promote 'competitive' inter-urban journey times

This objective is compatible with wider sustainability objectives. While a clear economic advantage would result from the promotion of competitive inter-urban journey times, the associated economic growth must be balanced with a thorough impact assessment of environmental and social considerations, using STAG and environmental impact assessment methodologies. The sustainability effects of this objective could be questioned if the objective was not supported by objectives specifically aimed at improving and promoting public transport support (see STPR Report 2 for more detail).

Reduce inter-urban journey time on public transport

This is compatible with sustainability criteria since reduced inter-urban journey times via sustainable public transport would encourage modal shift from private car travel.

Promote journey time reduction on trunk road network for prioritised vehicles and users (e.g. HOV, freight, bus) where STAG appraisal demonstrates that strong economic case can be balanced with environmental objectives. Elsewhere on trunk road network provide improvements to journey time reliability

This is compatible. It is important to note that, within the STPR, emphasis on improving journey time for freight movements in particular should be based on rail based distribution networks.

Promote journey time reductions between the central belt and Aberdeen/ Inverness primarily to allow business to achieve an effective working day when travelling between these centres

Compatible but emphasis should be given to enhancements of the public transport infrastructure.

Maximise the labour catchment area in city regions where economic evidence demonstrates that this is required (favouring public transport and HOVs and balancing with other policy measures that promote reduction in need to travel i.e. planning policy)

This objective is compatible; increasing labour catchment areas would bring a benefit to the national economy. The emphasis in this objective on encouraging Public Transport and High Occupancy Vehicles would mitigate possible increases in private car use.

Support the development and implementation of relevant proposed national development identified in the NPF2

This objective is consistent with the NPF2, and therefore the Government's objective, which in itself is subject to an SEA. It is not within the remit of this SEA to comment on the sustainability of this document.

KSO2: Reduced Emissions

Reduce CO_2e emissions per person km.

This objective is compatible; the 'per person km' unit is a sophisticated measurement that would allow for comparison with other countries. Reduction targets would be preferable, however at this stage targets have not been quantified by the Scottish Government.

Stabilise total CO_2e emissions.

This objective is compatible; however in recognising future developments in the appraisal process it should refer to CO_2e emissions rather than CO_2 reduction targets. It is understood that the appraisal process adopted recognised this. Objectives should be in line with transport sector specific targets that have yet to be confirmed.

Reduce CO_2e emissions in line with expectations from the emerging climate change bill (overall 80 per cent reductions in Scotland by 2050)

This objective is compatible with wider sustainability objectives. It is envisaged that the transport sector would have a major role to play in achieving targets set out in the draft Climate Change Bill (overall 60 per cent reduction by 2020 / 80 per cent by 2050). It is envisaged however, that the role of the STPR in achieving CO2e reduction targets set for the transport sector would be minor due to CO2e production being more a function of how the internal combustion engine is employed in modern society than a result of transport infrastructure provision, the primary aim of which is to meet existing transport demands.

Achieving ambitious CO_2e reduction measures purely from a reduction in travel infrastructure could be detrimental to sustainability targets involving community access and economic growth.

KSO3: Improve Quality, Accessibility and Affordability

Improve the competitiveness of public transport relative to the car

This objective is compatible; a competitive, sustainable public transport system, as an alternative to the private car (in terms of cheaper price, efficiency, greater accessibility, reliability, functionality, design), is critical to developing a sustainable transport network.

Improve overall perceptions of public transport

This objective is compatible with sustainability criteria; improving the public perception of those public transport service quality aspects including price, accessibility, reliability, functionality and design, will encourage modal shift to sustainable forms of travel.

Promote seamless travel

This objective is compatible with sustainability criteria; a seamless travel network across Scotland will promote easier travel and create accessibility contributing to the creation of sustainable communities. Integrated ticketing will play a role.

To promote continuing reduction in accident rates and severity rates across the strategic transport network, recognising the need to continue the work of the Strategic Road Safety Plan through the STPR period

This objective is compatible; improved safety across the strategic transport network facilitates the creation of a healthy, sustainable Scotland.

2.5.3 Analysis

The nine STPR national objectives that were compatible *overall* with the above strategic sustainability objectives include the following (Appendix 1 (ii)):

- Reduce inter-urban journey time on public transport;
- Promote journey time reduction on trunk road network for prioritised vehicles and users (e.g. HOV, freight, bus) where STAG appraisal demonstrates that strong economic case can be balanced with environmental objectives. Elsewhere on trunk road network provide improvements to journey time reliability;
- Reduce CO_2e emissions per person km;
- Stabilise total CO_2e emissions;
- Reduce CO_2e emissions in line with expectations from the emerging climate change bill (60 per cent reduction by 2020 / 80 per cent reduction overall by 2050);
- Improve the competitiveness of public transport relative to the car;
- Improve overall perceptions of public transport;

- Promote seamless travel; and
- Promote continuing reduction in accident rates and severity rates across the strategic transport network, recognising the need to continue the work of the Strategic Road Safety Plan through the STPR period.

There are two STPR objectives that could conflict with sustainability objectives if their implementation is focused on the private transport sector. These are:

- The promotion of 'competitive' inter-urban journey times; and
- The promotion of journey time reductions between the central belt and Aberdeen and Inverness primarily to allow business to achieve an effective working day when travelling between these centres.

In these cases, it was recommended that the STPR focuses on providing sufficient public transport infrastructure that gives a realistic and economically compatible or advantageous alternative to private road transport.

There were no STPR national objectives that were deemed incompatible *overall* with strategic sustainability objectives. However, one incompatibility arose when assessing each STPR objective against each sustainability objective on an individual basis:

- *"Promote journey time reduction on trunk road network for prioritised vehicles and users (e.g. HOV, freight, bus) where STAG appraisal demonstrates that strong economic case can be balanced with environmental objectives. Elsewhere on trunk road network provide improvements to journey time reliability",*

  …is incompatible with,

  *"*Scottish Government *Indicator 15 Travel (industry): To encourage more freight to be lifted by other modes to reduce traffic on roads"*

  Reason: While perceived faster journey time by prioritised use of trunk roads would benefit freight service quality in the short and medium term, the long term priority should be to encourage freight movement by rail and water based distribution networks rather than by road.

It is evident that the STPR key strategic outcomes and national objectives are aligned with Scottish aspirations for sustainability. KSOs 1, 2 and 3 endeavour to create and promote a quality, accessible and affordable public transport network (via rail and road) that is efficient and aims to stabilise and reduce transport-related emissions (in line with a specific transport sector reduction target yet to be set out from the draft Climate Change Bill).

All of the sub-objectives set out in KSO2 and KSO3 are deemed sustainable overall. The alignment of two sub-objectives within KSO1 with the Scottish Sustainable Development Strategy is questionable however, and will depend on the implementation measures adopted. This stems from the uncertainty of the short, medium and long term sustainability effects of the operational activities required to achieve 'improved journey times and connections'.

3 SEA Approach and Method

3.1 Introduction

This Chapter sets out the procedural methodology for conducting the SEA and introduces the approach adopted to link the SEA to the decision making process employed within the STPR. Methods utilised at each of the SEA procedural stages to achieve an integrated and robust environmental assessment of the STPR are further detailed.

The description of the methodology is provided in sections which relate to SEA procedures required under The Environmental Assessment (Scotland) Act 2005.

3.2 SEA Procedures, Tasks, and Relationship to the STPR Process

According to the Scottish Government, SEA is a key component of sustainable development[14], establishing important new methods for protecting the environment and extending opportunities for participation in public policy decision making. SEA should:

- Systematically assess and monitor the significant environmental effects of public sector strategies, plans and programmes;
- Ensure that expertise and views are sought at various points in the process from SNH, SEPA, Historic Scotland and the public; and
- Require a public statement as to how opinions have been taken into account.

To achieve these aims the SEA Act sets out a 5 stage procedure for conducting an SEA which is accompanied by statutory periods of consultation. This Chapter explains in more detail the approach taken to complete SEA stages 1 to 3. These stages are illustrated in Table 3.1 which provides a chronological overview of the SEA stages, the SEA tasks undertaken, and the STPR procedures informed by SEA information at each stage. It should be noted that more tasks were undertaken at the scoping stage than required under the SEA Act. This was necessary to ensure that environmental considerations were effectively incorporated into the STPR intervention sifting stage, where there was no direct SEA input.

[14] Environmental Assessment (Scotland) Act 2005

Table 3.1: SEA Stages, SEA Tasks, and STPR Tasks Influenced

Stage No.	SEA Stage	SEA Tasks	Concurrent STPR Tasks
1	Screening	• Ascertain whether SEA is required for the STPR	N/A
2	Scoping	• Identification of relevant PPS • Identification of key environmental issues • Identification of set of draft SEA objectives • Identification of a draft set of Indicator Questions • Identification of baseline data sources • Description of SEA Assessment Method • Production of SEA Scoping Report	• Review Current and Future Network Performance • Determine expectations for network performance and identification of gaps and shortfalls
		Statutory Consultation	
		• Integration of Consultation responses into SEA methodology • Establishing current and future network performance for baseline • Production of a current and future baseline • Testing compatibility of STPR and SEA objectives • Assess Corridor Criteria • Review Performance Indicators	
STPR Task: Identify Potential Interventions and Sift Options			
3	Environmental Assessment	• Implementability Assessment of STPR interventions carried forwards • Initial Assessments of interventions • Detailed Assessments of interventions • Identification of mitigation measures • Identification of residual	• Appraise Candidate Interventions (Initial and detailed STAG Appraisals)

Stage No.	SEA Stage	SEA Tasks	Concurrent STPR Tasks
		effects • Cumulative Effects Assessment • Integrate findings of Appropriate Assessment	
4	Environmental Report	• Preparation of SEA Environmental Report	• Preparation of the Final STPR Report
Public and Statutory Consultation			
5	Post Adoption Statement	• Identification of key effects requiring monitoring • Identification of effective monitoring procedures • Preparation of Post Adoption Statement	N/A

3.3 Stage One: Screening

The then Scottish Executive, in the 2003 Partnership Agreement, made a commitment to undertake a strategic projects review (the STPR). The STPR is therefore required by an administrative provision and, because it has the potential to have significant environmental effects, an SEA is required under the scope of Section 5(3) of the SEA Act.

As it is accepted that all plans that fall under section 5(3) will require an SEA, screening is not necessary and the STPR therefore moved directly to the SEA Scoping process.

3.4 Stage Two: Scoping

The scoping stage of a SEA is a legislative requirement under the SEA Act and consists of the following iterative steps (Figure 3.1).

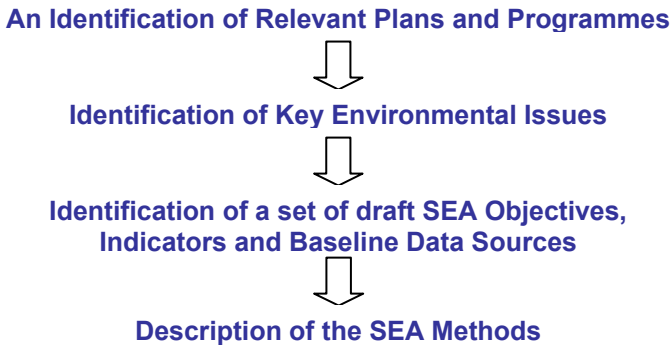

Figure 3.1: The Scoping Process

3.4.1 Identification of Relevant Plans and Programmes

A review of relevant plans, programmes and strategies that relate to the STPR was conducted. The review looked at all tiers of policy including International, European, UK national, Scottish national, regional and in certain cases local level. Policies and plans were described in terms of their significance to the STPR and how both the STPR and SEA will take onboard the key messages in these documents. The results of the policy review are described further in Chapter 2 and Appendix 1.

3.4.2 Identification of Key Environmental Issues

The findings of the policy review were used to identify a set of key environmental issues relevant to the STPR at a national level, (these were further refined on a corridor by corridor basis throughout the SEA). Environmental issues that were considered were categorised according to the following eleven environmental criteria which reflected those within the SEA Act:

- Biodiversity, Flora and Fauna;
- Noise
- Population;
- Human Health;
- Soils and Geology;
- Water;
- Air;
- Climatic Factors;
- Material Assets;
- Cultural Heritage;
- Landscape and Visual; and
- Interactions and Overall Effect.

3.4.3 Identification of Draft SEA Objectives, Indicators Questions and Baseline Data Sources.

SEA objectives and indicators in the form of SEA questions relevant to the STPR have been identified on a national scale and are presented in Section 3.4.6. SEA objectives have been developed from the National Transport Strategy (NTS) SEA objectives to ensure compatibility between the two SEAs. Where possible, the objectives have been designed to be SMART (Specific, Measurable, Accurate, Reliable, Targeted), and the SEA has developed these further to reflect changing environmental issues and the more detailed, strategic level of the STPR compared to the NTS. The resultant objectives also took on board the issues and objectives set out in the SEAs that accompany the Regional Transport Strategies (RTSs). From these objectives, a set of associated questions have been developed in order that the assessment of STPR intervention performance be focussed on key environmental issues.

In addition, these SEA objectives and indicator questions have been used to guide the identification of baseline data sources relevant to the STPR and associated key environmental issues. Baseline data was initially obtained at a national scale and further refined during the assessment on a corridor by corridor basis. Baseline data sources are presented in Chapter 4.

3.4.4 Description of the SEA Method

Due to the high-level nature of the STPR, a method for conducting the SEA was designed based on the Analytical Strategic Environmental Assessment[15] (ANSEA) framework, as devised under the 5th Framework Research Programme of the European Union. Additionally the SEA also recognised the guidance provided in the following documents:

- Scottish Government (2006) 'Strategic Environmental Assessment Tool Kit' (and Templates);
- Scottish Government (2003) 'Scottish Transport Appraisal Guidance' ; (and the updated version by The Scottish Government (2008));
- ODPM (2005) 'A Practical Guide to the Strategic Environmental Assessment Directive; and
- Department of Health (2007) 'Draft Guidance on Health in Strategic Environmental Assessment'.

The ANSEA framework was conceived specifically for strategic high level SEAs, such as the STPR, as opposed to plan level SEAs. This approach provides a credible method for fully integrating the SEA within the STPR framework by focusing on the types of decisions made throughout the evolution of the strategy rather than a descriptive end point. It provides a consistent framework for assessing very different issues at different spatial scales and tiers of the decision making process. The SEA assessed the potential environmental effects of decisions made in developing the STPR, to give advice on how to offset, minimise and avoid any potential adverse effects and enhance beneficial effects.

The ANSEA method breaks down the STPR/SEA programme into three discrete units:

The Functional System: the aim of defining the functional system is to identify the sequence of all the decisions and sub-decisions to be made in the process of STPR programme development. The "*Functional System*" identifies what the SEA is assessing.

Intervention Points: these are moments in the decision-making process as defined by the functional system, where critical choices are made that have environmental implications. They define when the SEA will intervene in the decision making process.

Procedural Framework: this sets out the proposed framework for the assessment of the Intervention Points. For each intervention point, the SEA will use an analytical framework where the SEA identifies environmental issues associated with intervention points and proposes actions to reduce any environmental effects.

[15] P. Caratti, H. Dalkmann, R. Jiliberto (2004) Analysing Strategic Environmental Assessment: Towards Better Decision-Making

STPR tasks outlined in Table 3.1 relate to the intervention points within the STPR functional system, and the SEA tasks relate to the procedural framework.

3.4.5 Scoping Report Publication and Consultation

The range of objectives, indicators and baseline data sources were described in the formal Scoping Report which was submitted for internal peer review within the STPR Team. It was then discussed at an informal pre-scoping meeting held with the statutory Consultation Authorities; SNH, SEPA and Historic Scotland on 11 May 2007. In addition to the three statutory consultees, it was recommended to the STPR Team that Health Scotland should also be consulted with regard to transport related health issues.

The Scoping Report was formally submitted to the statutory Consultation Authorities and Health Scotland via the Scottish Government's SEA Gateway in October 2007. As a result of the scoping consultation, the initial set of objectives, as well as the identified list of relevant environmental data, was revised and finalised. The Scoping Report consultation responses are presented in Appendix 2.

3.4.6 Finalised SEA Objectives and Indicator Questions

Following consultation, the SEA objectives used to develop a systematic, rigorous and consistent framework to assess environmental effects of the STPR were finalised. The final SEA objectives took cognisance of NTS SEA Objectives; RTS SEA Objectives; environmental issues and baseline relevant to the STPR; and a review of PPS (Appendix 1) in addition to consultation responses. These SEA objectives have been accompanied by a series of questions which help consider whether these objectives could be met. Table 3.2 details the outcomes of this process. The rationale regarding selection of SEA objectives is presented in Appendix 2.

Table 3.2: Finalised SEA Objectives and Indicator Questions

SEA Topics	SEA Objectives	SEA Indicators
Biodiversity, Flora and Fauna	To protect and conserve the biodiversity of Scotland. To minimise transport sector impacts on designated sites of nature conservation value. To minimise the adverse effects of transport on valued species and habitats.	Does the intervention have the potential to affect biodiversity? Does the intervention have the potential to affect any designated sites? Does the intervention have the potential to affect a Natura 2000 Site? Does the intervention have the potential to affect protected species and habitats?
Noise	To improve the environment by reducing the adverse effects of transport.	Could the intervention increase or reduce noise and vibrations?

SEA Topics	SEA Objectives	SEA Indicators
	To minimise nuisance from transport related noise and vibration on communities in Scotland. To reduce the potential effects of high traffic noise and vibration levels on sensitive human receptors.	Could the intervention result in an increase or decrease in the number of people exposed to noise and vibration in Scotland?
Population	Improve the environment of all communities by reducing the adverse effects of transport. To maximise the opportunity for community linkages and reduce severance effects of transport. To provide sustainable access to employment and essential services, and the countryside. To reduce the adverse visual impacts of transport infrastructure.	How could the intervention affect the community environment? How could the intervention affect community severance? Would the intervention provide sustainable access?
Human Health	To contribute to improving health in Scotland. To reduce the potential effects of transport generated emissions to air on sensitive human receptors. To support modes of transport which contribute to a healthier and safer lifestyle	Does the intervention have the potential to promote improved health in Scotland? Does the intervention have the potential to increase or decrease the number of people living in AQMAs? Does the intervention have the potential to promote healthier and safer lifestyles?
Water	To protect the water environment from the impacts of transport. To reduce and manage flood risks from transport infrastructure.	Does the proposed intervention have the potential to deteriorate the overall quality of the water environment? Does the intervention have the potential to affect flooding in terms of severity, duration or frequency?
Soils and Geology	To safeguard the quality of Scotland's geomorphological, geological, pedologic and peat resources.	Does the intervention have the potential to affect geomorphological, geological, and pedologic and/ or peat resources?

SEA Topics	SEA Objectives	SEA Indicators
	To minimise the effects of transport on sites designated for their geological interests.	Does the intervention have the potential to affect sites designated for their geological or pedologic resources?
Air	To contribute to an improvement in national and local air quality by reducing the level of transport related air pollution emissions per passenger km travelled.	Does the intervention have the potential to reduce or increase NO_2 and PM_{10} emissions?
Climatic Factors	To contribute towards the reduction of national carbon output from transport.	Does the intervention have the potential to contribute to an increase or decrease in transport related CO_2 emissions? Does the intervention have the potential to result in a shift to use of more sustainable modes of transport?
Material Assets	To promote the sustainable use of natural resources. To promote the effective use of existing infrastructure. To promote efficient use of resources in the development of new infrastructure. To minimise waste and recover and recycle resources efficiently.	Does the intervention promote efficient use of resources in the development of new infrastructure? Could the intervention recognise the principles of sustainable design planning and construction methods? Could the intervention be designed to minimise waste, recover and recycle resources efficiently?
Cultural Heritage, (inc. Architectural and Archaeological Heritage)	To safeguard cultural heritage features and their settings.	Does the intervention affect any features designated for their cultural heritage value?
Landscape (including Townscape)	To safeguard the character and diversity of the Scottish landscape and minimise the impact on valued landscape.	Would the intervention affect any designated areas? Does the intervention have the potential for adverse visual effects?

3.4.7 A Review of the Current and Future Network Performance and the Production of the SEA Environmental Baseline

The current and future performance of elements that could be modelled was assessed using the Transport Model for Scotland (TMfS). For the SEA, modelled data was used for air quality, noise and CO_2 assessments, alongside qualitative data to assist in decision making. For those elements for which modelling was inappropriate bespoke means were adopted to assess performance[16]. All elements were assessed against the three key strategic outcomes in the National Transport Strategy which seek to:

- Improve journey times and connections, to tackle congestion and the lack of integration and connections in transport;
- Reduce emissions, to tackle the issues of climate change, air quality and health improvement; and
- Improve quality, accessibility and affordability, to give people a choice of public transport, where availability means better quality transport services and value for money or an alternative to the car.

This process was complemented by the parallel production of the environmental baseline, which was informed by (and informed the process) of identifying the existing and potential performance of the Scottish Transport network, which was categorised into 20 corridors, four urban networks (Glasgow, Edinburgh, Dundee and Aberdeen), and two strategic nodes (Perth and Inverness).

The environmental baseline was developed for each of the transport corridors and then used to inform the assessment of their environmental performance. The baseline exercise also utilised the TMfS modelling exercise to describe the present and potential future effects of the transport network on transport generated noise, CO_2e emissions and air quality aspects of the environment (section 3.4.6).

The study area for the environmental baseline was based on a 15km buffer zone around each of the STPR corridors to ensure all potential environmental effects could be accounted for[17]. The environmental baseline information for each of the four urban networks and two strategic nodes is also contained in the appropriate SEA Transport corridors. The identified transport corridors are shown in Table 3.3.

[16] The review of the Current and Future Network Performance is described in detail in STPR Report 1

[17] Strategic Environmental Assessment and Biodiversity: Guidance for Practitioners (Countryside Council for Wales, English Nature, Environment Agency, Royal Society for the Protection of Birds, 2004).

Table 3.3: Transport Corridors Defined in the STPR

Corridor Number	Corridor Description
1	Inverness to Wick / Thurso and the Northern Isles
2	Inverness to Ullapool and Western Isles
3	Inverness to Fort William and Western Isles
4	Aberdeen to Inverness
5	Aberdeen to Dundee
6	Perth to Inverness
7	Glasgow to Oban / Fort William and the Western Isles
8	Aberdeen to North East Scotland
9	Glasgow to Perth
10	Edinburgh to Stirling
11	Perth to Dundee
12	Edinburgh to Perth
13	Glasgow to Edinburgh
14	Edinburgh to Dundee
15	Glasgow to Stranraer and South West
16	Stranraer to North West England and beyond
17	Glasgow to Inverclyde and Islands
18	Glasgow to North West England and beyond
19	Edinburgh to North West England and beyond
20	Edinburgh to North East England and beyond

For each of the transport corridors, the following environmental parameters were explored in terms of their present and likely state between 2012 and 2022, without the intervention of the STPR, to establish the present environmental baseline now and in the future:

- Biodiversity, Flora and Fauna;
- Noise
- Population;
- Human Health;
- Soils and Geology;
- Water;
- Air;
- Climatic Factors;
- Material Assets;
- Cultural Heritage; and
- Landscape and Visual.

Information used to describe the environmental baseline was gathered from a variety of sources, including national and local government sources, especially:

- SNH;
- Historic Scotland;
- SEPA;

- Joint Nature Conservancy Council (JNCC);
- Regional Transport Partnerships;
- British Geological Survey;
- Air Quality Archive;
- Scottish Government; and
- Network Rail.

A data filtering exercise was carried out with the aim of determining which sources of data would be useful for the baseline environmental report. The baseline methods and data sets contained within the full baseline are included in Appendix 3.

3.4.8 Defining STPR Objectives, and Testing for Compatibility with the SEA Objectives.

This exercise involved a consideration of the findings from the review of current and future network performance in the context of their potential effect on achieving national strategic objectives, derived from the Government's Economic Strategy, National Transport Strategy and other transport sector relevant policy documents. It assessed their significance and developed a portfolio of specific objectives for the corridors, nodes and networks. This process is described in detail in STPR Report 2.

As a part of the SEA process, it was important to determine whether the STPR objectives (available in Appendix 4) were consistent or conflicted with the SEA objectives (Section 3.4.6) as developed during the scoping exercise. This was done through a process of peer review, and expert judgment using a standard matrix approach. STPR objectives were assessed as compliant, non-compliant or unknown (in the case were insufficient information was available to adequately judge issues of compliance).

Once the compatibility assessment had been conducted, the degree of compatibility between specific STPR objectives against the SEA objectives was presented to the STPR Team. Incompatibilities were identified and suggestions for modifying the STPR objectives were presented. It was requested by the SEA Core Team that the STPR Team either adopted the modifications or gave a reasoned justification as to why they were not considered. The results of this process are presented in Section 5.1 and Appendix 4.

As well as the STPR objectives, policy expectations and investment hierarchy within STPR Report 2 were assessed against the SEA objectives and recommendations made, where appropriate. The policy expectations are used to assess the performance of the network of the STPR. In terms of the investment hierarchy, the approach adopted has been considered within the SEA to assess whether the accepted order is the most environmentally sound way of targeting investment. In developing and appraising options, it was recognised that investment in the national strategic transport network should be targeted.

3.5 Stage 3: Environmental Assessment

The Environmental Assessment stage of the STPR involved four distinct phases during which a large number of potential interventions were generated, then reduced and condensed. The SEA did not input into the generation and initial sifting stages, but did assess the interventions which progressed through the two stage STAG appraisal. A discussion of the initial intervention generation and sifting stages is included to provide

context for the SEA assessment methodology. All four stages and the linkages between the SEA and the STPR process are illustrated in Figure 3.1.

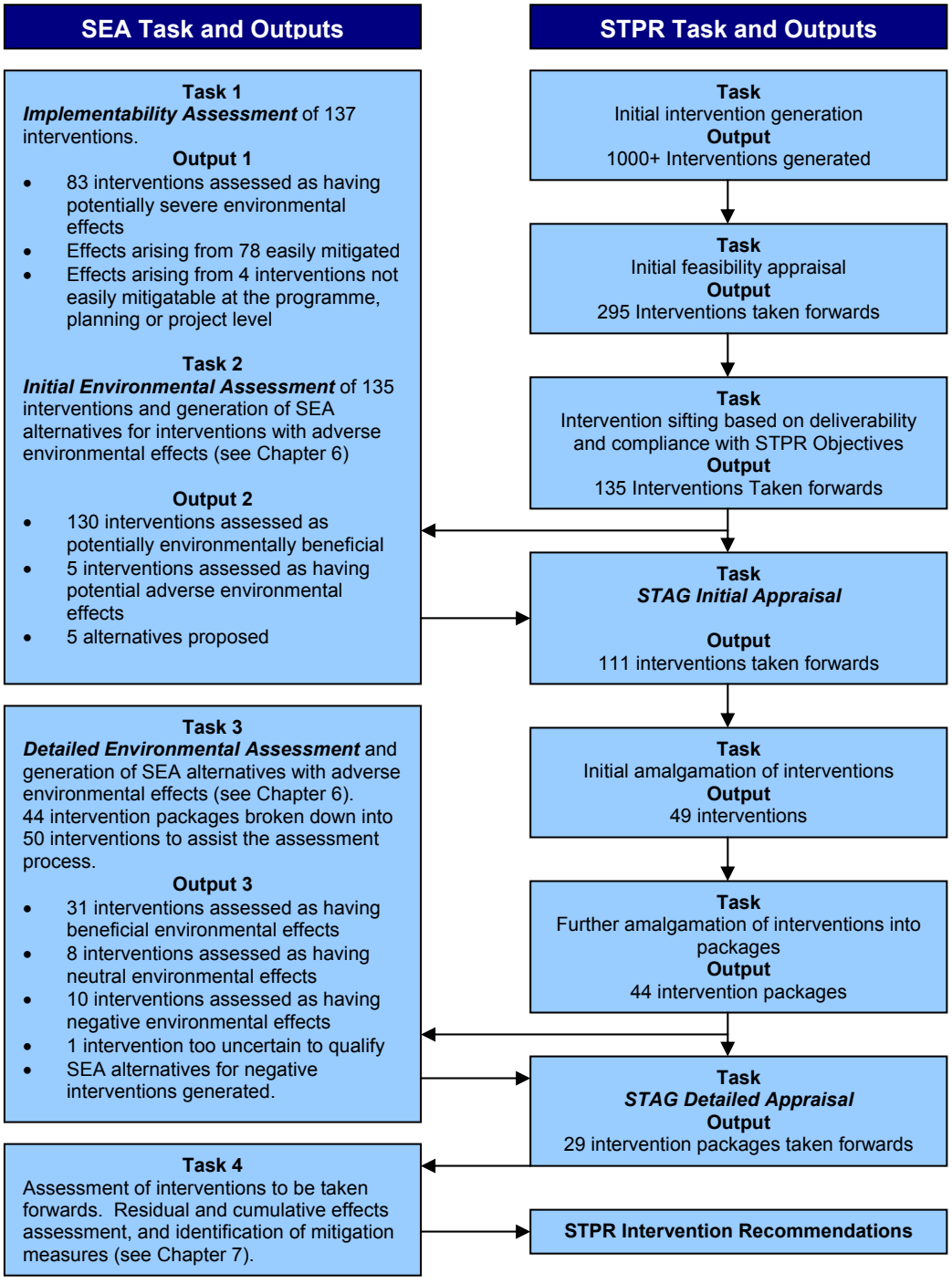

Figure 3.2: Linkages between STPR and SEA Assessment Processes and Associated Outputs

3.5.1 STPR Identification of Potential Interventions and Sifting of Options.

As part of the STPR, rather than the SEA process, an initial appraisal of over 1,000 potential transport interventions from a range of sources was conducted to demonstrate their potential to meet the corridor/network and strategic transport objectives and their consistency with overall Government policy. The interventions developed took cognisance, where appropriate, of those which had already been proposed in previous studies, such as the draft Regional Transport Strategies, supplemented by new proposals resulting from consultation with stakeholders and appraisal of the issues in each corridor by professional transport planners and engineers. Those interventions which met these sifting criteria were grouped into packages where appropriate, particularly where more than one intervention was required to deliver a corridor based objective. The 295 interventions resulting from this stage underwent a further sifting process based on their deliverability and compliance with STPR objectives. The output was a list of 137 potential interventions, many of which were expressed in very general terms, reflecting their current stage of development.

3.5.2 SEA Implementability Assessment.

The role of the SEA at this point was to carry out a brief initial assessment of each of the interventions presented within this package against potential major issues of regulatory compliance in relation to environmental constraints under each of the eleven SEA environmental parameters as outlined in Section 3.4.2. Within these parameters the following main potential constraints were considered:

- Any potential effect on the integrity of an internationally designated site of importance to biodiversity which could not be mitigated;
- Any potential moderate or major effect on a nationally ecologically designated site which could not be mitigated;
- Any potential moderate or major effect on water quality which could not be mitigated;
- Any potential moderate or major effect on a World Heritage Site which could not be mitigated;
- Any potential moderate or major effect on a Scheduled Monument which could not be mitigated; and
- Any potentially moderate or major effect on an Air Quality Management Area or an area prone to such a designation which could not be mitigated.

It should be noted that at this stage, the assessment was intended only to inform the STPR Team of the interventions which had such associated potential effects that, if they were to progress beyond option sifting stage, severe environmental constraints could be encountered as they continued through the decision making and licensing process. This is further explained in Chapter 5 and Appendix 4.

3.5.3 Initial and Detailed Environmental Assessment Procedure.

Initial and detailed environmental assessments have been integrated with the corresponding STPR Scottish Transport Appraisal Guidance (STAG) appraisal process, which provides a rigorous two-stage process for testing and measuring the deliverability and feasibility of proposed interventions in the context of the policy, economic and transport objectives which they seek to address. Figure 3.2 illustrates the linkages between the SEA and STPR STAG processes.

An initial environmental assessment has been conducted on the 135 interventions carried forwards in the STPR from the initial option development and sifting stages. This initial environmental assessment was carried out to inform the STPR STAG initial appraisal which is outlined in detail in STPR Report 3. The findings of the initial SEA environmental assessment were therefore considered within the initial STAG appraisal process alongside issues such as feasibility, affordability, and public acceptability. Considered together, these issues were the basis for selection of interventions to progress to the detailed STAG appraisal.

111 interventions were carried forwards from the initial STAG appraisal. These interventions were then combined, refined and fleshed out in a two stage process which resulted in 44 intervention packages considered at the detailed STAG appraisal and detailed environmental assessment stage. The detailed STAG appraisal appraised interventions against the transport planning objectives of environment, safety, economy, integration, and accessibility and social inclusion; in addition to incorporating SEA findings.

Whilst the methodology for conducting initial and detailed STAG appraisals differed, the methodology utilised within the initial and detailed SEA environmental assessments remained broadly the same. For both initial and detailed assessments alternative intervention options and mitigation measures were generated for interventions assessed as having adverse environmental effects, feedback on these options was gained through liaison with the STPR Team, and responses from the STPR Team and Transport Scotland were recorded (Chapter 6). The main difference surrounded the greater level of detail available on STPR interventions at the detailed STAG appraisal stage. The fleshing out of intervention detail following the initial STAG appraisal which reduced the level of uncertainty within SEA results at the detailed assessment stage. For this reason, assessment matrices for initial assessments contained within Appendix 5 contain question marks for uncertainty whilst for detailed assessment a more complex method for considering uncertainty was employed (discussed in more detail in Section 3.5.4). In addition, residual and cumulative effects resulting from interventions selected for progression following the detailed STAG appraisal were assessed in order that mitigation could be identified. The specific methodologies used within the initial and detailed SEA assessments are discussed in detail in Section 3.5.4. The results of the initial assessments are presented in Section 7.2 and those for the detailed assessment in Section 7.3. Assessments were presented in matrix format based on those identified with the SEA Scoping Report.

3.5.4 Initial and Detailed Environmental Assessment Methodology

Impact Prediction

Impact prediction methodologies for the SEA were based on recognised best practice guidelines produced by the Scottish Government[18], SNIFFER[19], and the UK Government Department for Transport[20].

The SEA was undertaken in parallel with the STAG appraisal to deliver consistency between the SEA environmental assessment and the environmental component of the STAG appraisal process. The eleven SEA environmental parameters comprise biodiversity, flora and fauna, noise, population, human health, water, soils and geology, air, climatic factors, material assets, cultural heritage, landscape and visual. A review of the overall environmental performance of the interventions has been made by assessing the potential interaction of each of these parameters. All assessments were undertaken through an internal workshop utilising professional judgement. The transport interventions were assessed against the environmental baseline conditions by applying the set of questions derived from the SEA objectives for each environmental issue (Appendix 5).

At the detailed appraisal stage further information was provided to aid the assessment process and to assist in decision making. This included additional package descriptions, modelling of noise, predicting NO_2 and CO_2e emissions for each intervention against the 2005 and 2022 baseline, and overlay GIS mapping. GIS mapping was produced for designated biodiversity, geological, cultural heritage and landscape sites using the position and locale of each transport intervention, with a buffer applied for each environmental parameter (Chapter 4 and Appendix 3). Where it was not possible to identify the location of the transport intervention approximate locations were used.

All interventions were assessed prior to mitigation assuming a realistic worst case scenario.

SEA and Environmental STAG Appraisals

To allow a high degree of consistency between the STAG appraisals and SEA assessments, the second phase of the SEA assessment utilised a STAG 7 point scale. A number of factors were taken into consideration during the assessment. These included: short or long term effects; direct and indirect effects; and the relationship between different environmental parameters. A final issue that was considered was the degree of certainty that could be applied to each assessment given the degree of information available for each intervention at this stage of the decision making process.

It should be noted that there is some variation between the detailed STAG environmental appraisals for each intervention and the detailed SEA assessments. This has occurred for two reasons:

[18] The Scottish Government (2008), Scottish Transport Appraisal Guidance (STAG). Available at: http://www.transportscotland.gov.uk/files/documents/reports/j9760/j9760.pdf

[19] SNIFFER (2008), DRAFT Practical Guidance for Practitioners on How to Take Account of SEA Topics Air, Water and Soil. Scotland & Northern Ireland Forum for Environmental Research. Available at: http://www.sniffer.org.uk/news/4075/Consultation-on-SEA-draft-practical-guidance.aspx

[20] Department for Transport (2004), Transport Analysis Guidance Unit 2.11: Strategic Environmental Assessment for Transport Plans and Programmes. Appendix 5: Cumulative Effects Assessment. Available at: http://www.webtag.org.uk/webdocuments/2_Project_Manager/11_SEA/appendix.htm#5

1. In some cases more detail has been made available to the SEA assessment than was available for the detailed STAG appraisal. This removed some degree of uncertainty and allowed more focus for the overall assessments of environmental effects; and

2. SEA objectives encompass a wider range than the detailed STAG appraisal environmental objectives; in particular SEA objectives include issues such as human health, population and material assets. While it is recognised that there is overlap with these issues and others looked at within the wider STAG Appraisal, it should be noted here that in some cases this has resulted in a minor variation in the two sets of environmental appraisals conducted on the transport interventions.

Identifying Impact Scale and Magnitude

In line with requirements of the SEA Act (Schedule 3.6), the assessment has considered and described effects in terms of the period over which they may occur (i.e. short-term or long-term), the spatial scale over which they may effect (i.e. international, national, regional, and local) and whether the effect will have a direct or indirect influence (for example a direct negative effect on air quality will also represent an indirect effect on the quality of the human environment). It should be noted that throughout the assessment process there is an assumption that effects are direct unless stated otherwise.

Temporality

Short-term effects have been identified where they are transient in nature and are, in the case of this SEA, essentially confined to construction effects for most interventions. Long-term effects are those that are expected to last over the life-span of the project, and in the case of most interventions covered here, tend to be effects incurred through project operation.

Spatial-Scale

Effects can act over a range of spatial scales from small scale localised effects to large scale national effects. In terms of this assessment, local effects have been considered to be those that would affect the local community or town, regional effects would be those that have the potential to affect a group of towns, a transport corridor (Section 2.2) or a wider area such as a county or region of Scotland (e.g. the central belt or Southern Uplands etc). National effects in terms of this SEA will cover Scotland.

Magnitude

In addition to the scale of effect, an effect could vary in the degree to which it affects a receptor. For the purpose of this SEA, magnitude has been defined as:

Severe effects – have the potential to:

- Permanently affect the integrity of a site or environmental feature;
- Result in breaches of internationally recognised Environmental standards, or change an environmental parameter that is in breach of international legislation so that a breach could be rectified; and
- Result in either short term or long term effects that may affect human health to a degree which is disabling or life threatening.

Moderate effects – have the potential to:

- Temporally affect the integrity of a site or have easily reversible but severe effects on the integrity of that site;
- Result in breaches of nationally recognised Environmental Standards, or change an environmental parameter to a point where an existing breach could be rectified;
- Permanently produce noticeable changes the character of an environmental parameter or environmental issue; and/or
- Result in either long term effects that may affect the healthiness of the human environment in terms of quality of life.

Minor effects – have the potential to:

- Temporally affect the character or setting of a site;
- Result in breaches of local standards or change an environmental parameter so that such a breach is rectified.
- Temporally produce noticeable changes in the character of an environmental parameter or environmental issue; and/or
- Result in short term minor health effects or effect on human quality of life.

Significance

Significance in terms of environmental assessment is often defined as a function of the magnitude of an environmental effect combined with the sensitivity or importance of the environmental receptor being affected[21]. While, as is the case for the assessment process in general, opinions as to significance were arrived at through peer reviewed professional judgement, this judgement was informed by using the approach to assigning significance adapted from the Transport SEA pilot study produced for the Somerset Pilot Cross Boundary Transport Strategy Study.

[21] Glasson, J., Therivel, R., and Chadwick, A. (2005), *Introduction to Environmental Impact Assessment (3rd Ed)*. Routledge: New York.

The approach to assigning significance took a cautionary stance and on the occasions where a lesser magnitude effect was recorded as well as a greater magnitude, the overall assessment of the magnitude of that effect was considered at the greatest level when considering the need and form of mitigation. The seven point assessment was used in accordance with the STAG guidelines that have been applied throughout the detailed assessment process. The significance of environmental effects are summarised in Table 3.4. Environmental effects are weighted as either:

- Major Adverse;
- Moderate Adverse;
- Minor Adverse;
- Neutral;
- Minor Benefit;
- Moderate Benefit; and
- Major Benefit.

Table 3.4: Significance of Environmental Effects

Significance	Effects
Major adverse	The Plans Policies and Strategies (PPS) or intervention would moderately adversely affect (e.g. effects on the setting of Character of) an internationally important site. The PPS or intervention would risk severe effects (e.g. compromising the integrity of) on a nationally or internationally designated site. The PPS or intervention could moderately compromise the character of multiple regionally or nationally important sites. The PPS or intervention would severely worsen an issue considered important at the international or national level. The PPS or intervention would have moderate adverse effects on an environmental standard, benchmark or issue considered important at the international level.
Moderate adverse	The PPS or intervention has the potential for severe adverse effects (e.g. fundamental impairment of the integrity of) on a regionally important site. The PPS or intervention has the potential to have a moderate adverse effect on the setting of nationally important site but does not affect the overall integrity of that site. The PPS or intervention could have moderate adverse effect on a regionally important site or issue. The PPS or intervention could cause cumulative effects that would have moderate effects on a related group of locally important sites or issues.
Minor adverse	The PPS or intervention could have minor or moderate effects to a locally important site or issue. The PPS or intervention could have minor effects on a

Significance	Effects
	regionally important site
Neutral	A change that is unlikely to affect site, standard, benchmark or issue.
Minor beneficial	The PPS or intervention would facilitate the minor or moderate restoration or enhancement of a locally important site.
	The PPS or intervention would facilitate the minor restoration or enhancement of regionally valued important site.
Moderate beneficial	The PPS or intervention would have a minor benefit an area that presently fails to meets international standards or benchmarks.
	The PPS or intervention would moderately benefit an area that presently fails to meets national or regional standards or benchmarks to meet those standards in the future.
	The PPS or intervention would facilitate the moderate restoration or the enhancement of a site at of regional value. The PPS or intervention would facilitate the minor restoration or the enhancement of a site at of national or international value.
Major beneficial	The PPS or intervention would facilitate the moderate or severe restoration or the enhancement of a site of international value. The PPS or intervention would severely benefit an area that presently fails to meet international standards to a point that that it may meet those standards in the future.

Dealing with Uncertainty

It is recognised that at this stage of the decision making process the specific details of many of the proposed interventions are yet to be determined, particularly in reference to their specific location, design and form. This clearly affects the ability for the SEA to produce detailed and robust predictions as to an intervention's effect on different environmental media and is an area of uncertainty within this SEA.

In order to facilitate an assessment this SEA has taken a precautionary approach to the assessment of environmental effects and adopts a methodology which defines a reasonable worse case scenario[22].

In order to apply this approach it is assumed that the following pre-mitigation measures have been adhered to:

[22] A reasonable worst case scenario approach enables the precautionary principle, a key facet of Sustainable Development, to be actioned in impact assessment where effects of a PPS are uncertain (Carroll, B., and Turpin, T. (2002), *Environmental Impact Assessment Handbook: A Practical Guide for Planners, Developers and Communities*. Thomas Telford Ltd.)

- All legislative environmental requirements would be complied with, such as requirements for Appropriate Assessment under the Conservation (Natural Habitats, &c.) Amendment (Scotland) Regulations 2007, The Water Environment (Controlled Activities) (Scotland) Regulations 2005, the Planning (Listed Buildings and Conservation Areas) (Scotland) Act 1997, and the Ancient Monuments and Archaeological Areas Act 1979.

- An intervention would be developed in accordance with, and in cognisance of, good environmental criteria as identified in the Scottish Transport Appraisal Guidance (STAG) and the Design Manual for Roads and Bridges (DMRB) environmental objectives[23].

In some cases it has been possible at this stage to ascertain that an intervention could have a beneficial or adverse effect, but it is not possible to ascertain with any surety the degree of that effect. Here the effect has been rated as beneficial (or adverse) uncertain using a realistic worst case scenario approach. Occasionally however, even when taking such an approach, the assessment has not been able to reach conclusions as to whether some interventions potentially have a beneficial or adverse effect on a particular environmental feature (for example, assessing whether a new road layout causes habitat fragmentation or enhances a wildlife corridor can come down to details such as specific location or even landscaping techniques adopted within the road boundary), and environmental effects are estimated to occur but the nature of these is so uncertain they have not been qualified and any qualification is postponed to a more detailed design stage.

Due to the main aim of transport interventions, which are essentially centred at solving human problems or those associated with emissions (including climate change issues), details surrounding these effects tend to be better defined at the conceptual stage than those that practicably impact on more natural environmental features. For example, whilst it is common for transport interventions to have improved accessibility as a core aim, it is rare that they convey enhanced biodiversity as a primary objective.

This can be a source of bias when it comes to environmental assessment in that it is easier to ascertain the benefits to the human environment than it is to gauge any potential disbenefits to the natural environment. This has been accounted for when assessing the environmental effects of intervention and it is noted that any disbenefits to the environment were picked up at the second more detailed stage of environmental assessment for those projects that were short listed. For those interventions that were not short listed this bias was unimportant because any adverse environmental effects that were not assessed at this preliminary stage would not be realised within the STPR since that intervention would not be progressed.

[23] As outlined in the DMRB Volume 10

Techniques used for assessing the Effects of Transport Interventions on Specific Environmental Issues

The specific techniques identified below have been used to assess the effects of proposed STPR interventions on relevant environmental media. Sources of data used in the assessment process are further detailed in Appendix 3. Within the assessments for noise, air quality and climate change, ENEVAL modelling based on Transport Model for Scotland data has been used. The use of ENEVAL modelling carries a degree of uncertainty therefore findings where supplemented with expert knowledge.

The SEA Indicator Questions used to guide the SEA methodology for each topic are also listed. These are explained in more detail in Section 3.4.6 and Appendix 2.

Biodiversity, Flora and Fauna

The SEA indicator questions developed for the topic of biodiversity, flora and fauna were:

- Does the intervention have the potential to affect biodiversity?
- Does the intervention have the potential to affect any designated sites?
- Does the intervention have the potential to affect a Natura 2000 Site? and
- Does the intervention have the potential to affect protected species and habitats?

As well as an SEA, the STPR has been subject to the requirements of the Habitats Directive as implemented by The Conservation (Natural Habitats, & Conservation) (Scotland) Regulations 2004 and 2007, 2008 amendments, the implications of which are fully examined in the Appropriate Assessment[24]. These Regulations require that information be provided to ascertain the potential for a programme to have a detrimental effect on the integrity of a European designated site of ecological importance. The potential for each intervention to affect such sites has therefore been ascertained and incorporated into the SEA assessment (Chapter 6 and Appendix 5) and is covered in detail within the accompanying Appropriate Assessment Report (Appendix 8a and 8b).

The assessment of less significant ecological effects (i.e. those designated at national to local level) was conducted by overlaying GIS maps illustrating spatial data relating to the extent of international, national, regional and local sites designated for their ecological importance, with maps highlighting the spatial extent of effects from proposed interventions. This process was used to establish the proximity of ecological sites with the proposed intervention so as to ascertain the potential of the intervention to affect the site through land-take, noise effects or other forms of disturbance.

Effects on non-designated ecological resources were also considered particularly with regards to issues such as land take and habitat fragmentation. Due to the high level nature of the SEA assessments however, no site visits were conducted and therefore the risk that each intervention could pose to protected species was assessed at a very generic level.

[24] Appropriate Assessment Screening and Assessment Report. (Jacobs 2008)

The assessment considered that minimum mitigation would be employed in line with DMRB in the design of the intervention in areas where biodiversity issues were relevant. This would require the design to:

- Protect, manage and enhance the nature conservation value of the highway estate and integrate with and protect adjacent habitats and locations containing protected species, or other locally important species or habitats.

Noise

The SEA indicator questions developed for the topic of noise included:

- Could the intervention increase or reduce noise and vibrations? and
- Could the intervention result in an increase or decrease in the number of people exposed to noise and vibration in Scotland?

The method for predicting noise resulting from transport interventions is outlined in detail in Appendix 3. The number of people subject to elevated noise levels (over 60dB (A)) were predicted for the reference case when an intervention was emplaced. During the assessment minimum mitigation is assumed in line with DMRB which, with regard to noise, has the objective that transport infrastructure should "*Reduce the adverse noise effect of highway traffic or construction on adjacent properties or publicly accessible areas by providing and maintaining measures to reduce noise pollution.*"

Population

The SEA indicator questions developed for the topic of population included:

- How could the intervention affect the community environment?
- How could the intervention affect community severance? and
- Would the intervention provide sustainable access?

The SEA questions necessitated that the SEA assessed potential effects of transport on population in terms of demography, employment figures and the nature of populated areas. In addition they also required that social inclusion effects of proposed transport interventions, including access to transport based public services such as buses, trains, ferries and airports; and the role of transport in providing linkages between communities, access to employment and essential services such as hospitals, were included in the assessment.

Data for assessment of general effects on the population have been gained from the 2001 National Statistics Census[25]. From this source, data relating to general population statistics, age profile and economic activity has been used to examine effects on population spread (i.e. population by settlement); population growth and decline; life expectancy; employment and unemployment levels; and access, including modal choice for travel. To ensure relevance, this data has been broken down geographically. Data is presented by towns and cities (population statistics, employment and accessibility) and per administrative area, i.e.

[25] General Register Office for Scotland, Office of National Statistics Census Data (2001).

Council area. However, there are limitations to this method. Data based on geographical areas, such as that for population growth and decline, life expectancy and projected population change does not align seamlessly with the 20 STPR corridors. For the majority of corridors the coverage of Council area(s) is greater than the area enclosed within the corridor. The result is while the data gives a good indication of means and trends associated with demographic parameters within a corridor, there will be an overestimation in absolute numbers relating to population information.

With regard to the social inclusion issue of access to transport and its subsequent implications for access to other communities, employment and essential services, relevant information is provided in STPR 'Report 1: Review of Current and Future Network Performance'. This data has been gained from a number of sources, including the Scottish Census Data (2001); Bus Users UK; the Confederation of Passenger Transport; Stagecoach Scotland; Scottish Railways and Scottish Citylink; and the Regional Transport Partnerships.

Human Health

The SEA indicator questions developed for the topic of human health were:

- Does the intervention have the potential to promote improved health in Scotland?
- Does the intervention have the potential to increase or decrease the number of people living in AQMAs? and
- Does the intervention have the potential to promote healthier and safer lifestyles?

The SEA questions necessitated the SEA topic of human health be considered in terms of three issues: general health, areas of raised NO_2 emissions, and accident statistics related to transport.

General health data has been obtained from the web pages of the Scottish Census On-Line[26], and information relating to possible links between transport emissions and ill-health, necessary for the assessment have been identified using the Health Impact Assessment of Transport Initiatives published by Health Scotland.

With regard to air pollution, the World Health Organisation (WHO) air quality guidelines[27], based on expert evaluation of current scientific evidence, have been used to inform potential health effects. The WHO guidelines focus on two primary pollutants; $PM_{10,}$ and NO_2. The threshold levels, set by WHO, over which health effects are likely are 20 ug/m^3 annual mean for PM_{10} and 40ug/m^3 annual mean for NO_2. Therefore areas which are either approaching or predicted to approach this level have been identified, in addition to those which already exceed the guidelines and have been designated as Air Quality Management Areas (AQMAs).

[26] http://www.census-online.com/links/Scotland/
[27] WHO, 2005, Air Quality Guidelines for Particulate Matter, Ozone, Nitrogen Dioxide and Sulphur Dioxide: Global Update 2005

Road based accident statistics have been obtained from the Scottish Government publication, 'Road Accidents Scotland 2006'. They are presented in the baseline of this report (Appendix 3) per Council area, and illustrate the number of road accidents in which one or more people are injured or killed in Scotland reported by the police. Each accident is classified according to the severity of the injury to the most seriously injured person involved in the accident. It should be noted that there is a slight bias in these statistics in that while severe accidents are usually reported, less severe accidents or accidents that don't involve injury are often not included.

Other accident statistics are supplied by Transport Scotland[28]. These have been reported in STPR '*Report 1: Review of Current and Future Network Performance*'. Information from this report, such as details of the number of accidents per 100 million vehicle kilometres (MVKm) on the main trunk roads within each corridor, has been used to inform the baseline. Severe accident clusters are also identified per road and location where applicable.

Rail safety data has been sourced from the Rail Safety and Standards Board Annual Safety and Performance Report, 2006[29].

Water Quality and Flooding

The SEA indicator questions developed for the topic of water were:

- Does the proposed intervention have the potential to deteriorate the overall quality of the water environment? and
- Does the intervention have the potential to affect flooding, either in terms of severity, duration or frequency?

The quality of water resources, including surface and groundwater, has been identified for each Transport Corridor. The potential for flooding has also been assessed for both proposed and existing road and rail networks and information relating to salmonid and cyprinid water bodies located in each corridor has been further utilised to inform the assessment.

Water data was gathered as detailed in Chapter 4 (Section 4.1). The potential of an intervention to impact on water quality was established using GIS overlay maps of the intervention on water quality features. Recognition was given to potential effects resulting from construction, for example through accidental spillage, as well as operation. It was assumed when assessing potential impacts that all interventions would be subject to the constraints of the Water Environment (Controlled Activities) (Scotland) Regulations 2005 and that the objective within DMRB, "…*to provide and maintain appropriate measures to mitigate the effect on areas that are sensitive to flooding or hydrological changes, local water courses and groundwaters from construction works, run-off from the road and spillages.",* would be employed.

Soils and Geology

The SEA indicator questions developed for the topic of soils and geology were:

[28] Transport Scotland SERIS Database
[29] http://www.rssb.co.uk/pdf/reports/ASPR_2006.pdf.

- Does the intervention have potential to affect geomorphological, geological, and pedologic and / or peat resources? and

- Does the intervention have the potential to affect sites designated for their geological or pedologic resources?

In response to the indicator questions, the assessment of soils and geology involved collating data on designated sites; underlying geology; soils types; peat deposits and agricultural land classifications.

To assess effects on Scotland's diverse soil types, soil classification maps produced by the Macaulay Institute[30] were used in conjunction with spatial maps of the transport corridors created through GIS software. The Macaulay Institute[31] has also produced maps illustrating classifications of Land Capability for Agriculture. Land Capability for Agriculture classifies land into seven categories according to the degree of limitation imposed by biophysical factors on agriculture. These GIS maps were therefore used to identify areas of high quality agricultural land to be avoided by proposed transport interventions.

Potential effects on geological and soil resources were estimated through the use of GIS overlay maps. Impacts on soil and geological resources were estimated to result from works and/or operational interventions that directly covered, bisected or sat adjacent to local resources or where the intervention could affect the setting or character of sites of particular geological interest.

Air Quality

The SEA indicator question developed for the topic of air quality was:

- Does the intervention have the potential to reduce or increase NO_2 or PM_{10} emissions?

The assessment of air quality was based on a primary indicator of transport emission, nitrogen dioxide (NO_2). European threshold limits and regulations governing this pollutant are detailed in the EC Air Quality Framework Directive (96/62/EC) and Daughter Directive 99/30/EC, and transposed in Scotland in the Air Quality Standards (Scotland) Regulations 2007. As a result of these regulations, air pollution monitoring and prediction is widely established in Scotland due to the requirement for Air Quality Management Areas (AQMA's) [32] to be established in areas where pollutant levels exceed set health based thresholds.

[30] http://www.macaulay.ac.uk/explorescotland/soils1.html
[31] http://www.macaulay.ac.uk/MRCS/ssle/ssle2_2.html
[32] UK Air Quality Archive, 2007

Air quality effects resulting from road transport interventions were estimated as a result of the predicted influence each intervention would have on traffic flows, speeds and congestion levels and how this would in turn affect the baseline air quality conditions. Specific attention was given to areas where air quality standards were being breached resulting in the declaration of local air quality management areas. General assumptions used when making the assessment were that air emissions would change proportionately with changes in traffic flows and that increase speed on roads where the national speed limit applies would also decrease fuel efficiency and lead to increased air pollution per kilometre travelled. It was assumed that reducing congestion would produce reductions in air quality emissions against a do minimum baseline.

Railway interventions were modelled using ENEVAL to estimate the degree of model from private to public transport. It was assumed that a significant modal shift would achieve a 20 to 40 per cent gain in efficiency for air quality emission per passenger kilometre travelled[33] and a corresponding reduction in air emissions. Unless otherwise stated, it was assumed that rail interventions would employ diesel rolling stock as a worst case scenario.

Climatic Factors

The SEA indicator questions developed for the topic of climatic factors included:

- Does the intervention have the potential to contribute to an increase or decrease in transport related CO_2e emissions? and
- Does the intervention have potential to result in a shift to use of more sustainable modes of transport?

The main human influence on global climate is emission of the key greenhouse gases carbon dioxide (CO_2), methane (NH_4) and oxides of nitrogen (NO_x).

The combined effect of all greenhouse gas emissions has been accounted for through the use of carbon dioxide equivalent (CO_2e) emission data. This takes into account the emissions from various greenhouse gases based upon their global warming potential (GWP).

The contribution (total and percentage) of each SEA Transport Corridor to the overall national road based vehicle transport CO_2e emissions has been calculated using ENEVAL projections based on 2005 data obtained from the Transport Model for Scotland. The outputs of this CO_2e emissions model are reported in STPR 'Report 1'.

During the assessment process it was considered that the impact on CO_2e emissions for a number of the modelled interventions did not appear to be logical. The approach that followed therefore, adopted the same method applied for the interventions that could not be modelled. This method follows guidance within Volume 11 of DMRB. These assessments produced logical results and have been grouped into bands. The banding system presented in Table 3.5 was applied when estimating significance of transport interventions in terms of increasing CO_2e outputs. In practice no significance ratings greater than minor benefits were recorded.

[33] Assuming and average 1.476 persons per car

Table 3.5: Description of CO_2e Bandings

Significance Rating	Estimated CO_2e tpa Change from Baseline	% Change from Baseline
Major Benefit	-400,000	-5
Moderate Benefit	-80,001 to -400,000	-1 to -5
Minor Benefit	-10,001 to -80,000	Up to -1
Neutral	+ or – 10,000t	0
Minor Adverse	+ 10,001 to + 80,000	Up to +1
Moderate Adverse	+ 80,001 to 400,000	1 to 5
Major Adverse	+400,000	+5

Since the ENEVAL model does not contain parameters specifying emissions from non-road based transport modes an alternative approach was devised for preparing the environmental baseline for non-road transport modes (Chapter 4). The approach used emissions data from the AEA (2001) Rail Emission Model Final Report, in conjunction with train frequencies obtained from the National Rail Enquiries website and route mileage data obtained from the Network Rail website.

The overall effect of a railway intervention on CO_2e emissions was based on a comparison of modelled CO_2e with and without the intervention. The modelled changes in CO_2e were based on the effect on the frequency of rail services and, the potential model shift from road based transport. Due to the problems within the modelling methods identified above a common sense approach to the effect that an intervention could have on CO_2e emissions was also employed and the modelled changes were used to indicate variance in CO_2e emissions rather than as an absolute indication.

It was assumed unless specifically stated that railway interventions would employ diesel stock as a worst case scenario.

Material Assets

The SEA indicator questions developed for the topic of material assets were:

- Does the intervention promote efficient use of resources in the development of new infrastructure?
- Could the intervention recognise the principles of sustainable design planning and construction methods? And
- Could the intervention be designed to minimise waste, recover and recycle resources efficiently?

Material assets were considered within this SEA to comprise the main transport infrastructure, key constraints and congestion points (identified using TMfS), and natural resources such as minerals and aggregates.

The data for major committed infrastructure improvements to the road and rail network was sourced from the 'STPR Report 1: Review of Current and Future Network Performance'. However, it must be noted that specific detailed locational information was not available for the majority of potential infrastructure, and therefore there is uncertainty regarding this issue with respect to the assessment of many of the interventions.

The location and extent of mineral reserves, including location and type of any quarries and, where applicable, use of recycled aggregates, have been ascertained by Council area through examination of Council Local Plans.

Limited data is available to identify future trends with regards to aggregates. However, natural resources in particular may be of a finite nature (e.g. minerals and aggregates), so sustainable and efficient use is important in order to retain materials for future development.

Cultural Heritage

The SEA indicator question developed for the topic of cultural heritage was:

- Does the intervention affect any features designated for their cultural heritage value?

The STPR SEA aims to safeguard cultural features and their settings through responsible design and location of transport infrastructure.

Scottish cultural heritage is diverse and several official designations exist. Designation categories include World Heritage Sites, Scheduled Monuments (SMs), Listed Buildings, Conservation Areas, and Historic Gardens and Designed Landscapes.

To establish the baseline and enable preservation of these designated sites, cultural heritage features for each corridor have been mapped and transport corridors transposed using GIS software. The majority of information informing this process has been sourced from Historic Scotland[34]. One assumption made in this process relates to Listed Buildings. Due to the high number of Listed Buildings and the strategic nature of the assessment, the SEA has focussed on those which are 'A' Listed and considered to be of national importance.

In terms of future predictions, the UK Tentative List has been used to provide information relating to proposed World Heritage Sites, whilst Local Area Plans have informed the likely locations of future Conservation Area designations. However, due to the nature of archaeology, it has not been possible to predict future locations of cultural remains.

[34] Information sourced from: http://www.historic-scotland.gov.uk/

The effects of the interventions on cultural heritage resources have been assessed by overlaying proposed intervention routes on the cultural heritage resource maps and using expert judgement to assess whether the intervention could produce or reduce effects on this resource direct land-take or interference during construction, through changes in the areas visual profile.

Landscape (including Townscape)

The SEA indicator questions developed for the topic of landscape included:

- Would the intervention affect any designated areas? and
- Does the intervention have the potential for adverse visual effects?

In order to assess potential effects of STPR interventions on important landscapes, GIS maps of designated landscape areas within transport corridors have been compiled (Chapter 4). These incorporate the national Scottish landscape designations, National Parks and National Scenic Areas (NSAs), local and regional designations such as Areas of Great Landscape Value (AGLVs). GIS Map data relating to national designations is complete; however, due to the varied and inconsistent use of titles and status of local and regional designations, it has not been possible to record these with complete accuracy.

To complement the data on designated sites, the landscape character of each Transport Corridor has also been mapped using landscape character areas identified by SNH for the whole of Scotland, established through Landscape Character Assessment (LCA). LCA is a tool that is used to understand and articulate the character of the landscape.

The potential of an intervention was to affect a landscape type was assessed from overlaying the intervention on the selected landscape map using GIS. Peer reviewed expert judgement was used to estimate the potential effect of the intervention on the landscape

These judgements involved an assessment of the extent to which a particular type of change could be accommodated without unacceptable adverse effects on the actual and perceived landscape character, or compromise of values attached to it, being incurred. This process recognised that a valued landscape, whether nationally designated or not, does not automatically have high sensitivity. The assessments also assumed basic mitigation as laid out in DMRB which would:

- *Ensure mitigation against adverse visual effects by screening views of the Highway and associated infrastructure from properties and public viewpoints, including rights of way and public open space;*
- *Integrate the Highway with the character of the surrounding landscape by maintaining the matrix of local vegetation patterns, blending with local landform and softening views of the highway, its infrastructure and its traffic;*
- *Enhance the landscape and built elements of the highway with surrounding features, to reflect the scale, character and materials of the local townscape or community through which the highway passes;*

- *Maintain interest, variety and an acceptable visual appearance for both road users and adjacent public viewers by creating/maintaining views to the wider landscape, providing seasonal variation and creating a 'sense of place' via landmark features, either plant species, landform/geology, the design and materials used for structures and furniture, and the spatial arrangements; and*
- *Conserve and enhance the physical nature and appearance and setting of existing features within and adjacent to the highway, where they are either afforded statutory protection, or make a material contribution to the quality and character of the local area.*

Interaction and Overall Assessment

The STAG seven point scale was used to grade the potential effect of an intervention, from major beneficial to major adverse, on each environmental media (Section 3.4.2). This process resulted in interventions receiving a variety of different grades and therefore it was necessary to generate an overall score for each intervention. To achieve this, expert judgement was used to consider the interrelationships between effects on environmental media resulting from an intervention.

Expert judgement, rather than an additive approach, was adopted to counter the failure of matrix based assessments to account for the complexity of interactions between environmental media[35]. For example, whilst an intervention may have been assessed as having a range of effects on different environmental media from beneficial to adverse, expert judgement could determine that the interaction between these effects is such that a neutral effect is achieved in reality.

Mitigation

The approach to mitigation employed in this document reflects best practice and considers approached that can firstly avoid adverse environmental effects, then minimise adverse effects and if necessary offset adverse environmental effects (Section 7.3).

The detailed assessment conducted on the selected interventions assumed basic mitigation would be employed in line with statutory requirements and the environmental objectives as outlined in DMRB. In some cases however, even when considering this level of mitigation, there were a number of interventions that could still pose a risk of having an adverse effect on the environment. In these cases, the SEA had initially suggested a range of generic mitigation techniques which should be employed as best practice and highlighted how these could reduce the either the risk or severity of the adverse effect.

Where adverse effects were considered to be possible after applying generic best practice to mitigation, the specific mitigation measures were identified as being important to the particular intervention. While these were suggested at the strategic level it would be expected to be formally adopted at the project stage through specific codes of practice.

[35] Glasson. J., Therivel, R., and Chadwick, A (2005), *Introduction to Environmental Impact Assessment* (3rd Ed). Routledge: New York

Residual Effects

The results of the environmental assessment indicate that a number of residual effects remain after generic and specific mitigation measures have been taken into account and are shown in tables 7.9 and 7.10 (Section 7.4). Appendix 6 provides an overview of the residual environmental assessment. Residual effects are briefly described, and are assessed with regard to their temporality (short or long term effects), spatial effect (local, regional or national scale), and severity (beneficial or adverse). Section 7.3 and Appendix 6 provides this residual environmental assessment information by environmental media (such as residual effects on biodiversity), and by STPR intervention.

Cumulative Effects Assessment

The SEA Directive requires an analysis of *"…the likely significant effects on the environment... These effects should include secondary, cumulative, synergistic... effects".* The aim of cumulative effects assessment is to identify, describe and evaluate cumulative (including synergistic) effects, enabling them to be avoided, minimised or enhanced as appropriate. The cumulative effects assessment for the SEA of the STPR was undertaken based on guidance from the UK Government Department for Transport[36].

Cumulative effects assessment asks whether the total effects on a given receptor of all actions, no matter who carries them out, forms a significant effect. There are three potential outcomes arising from the consideration of cumulative effects. These are summarised as:

- **Additive:** the simple sum of all the effects (e.g. overcoming community severance in more than one distinct location);
- **Neutralising:** where effects counteract each other to reduce the overall effect (e.g. a new road on the left bank of a river encroaches on the floodplain, but equivalent flood storage capacity is provided by another project on the right bank); and
- **Synergistic:** where effects interact to produce a total effect greater than the sum of the individual effects. Negative synergistic effects often happen as habitats and resources get close to capacity: for instance a wildlife habitat can become progressively fragmented with limited effects on a particular species until the last fragmentation makes the areas too small to support the species at all.

The cumulative effects assessment of the STPR was built from the results of the assessment of the net beneficial effects and residual adverse effects of the individual interventions (as described above). The procedure undertaken is summarised in the flowchart (Figure 3.1) on the following page, and described in the paragraphs that follow. The process was iterative, with previous tasks being revisited as appropriate as new information or assessment results were brought to bear.

[36] Department for Transport (2004), *Transport Analysis Guidance Unit 2.11: Strategic Environmental Assessment for Transport Plans and Programmes. Appendix 5: Cumulative Effects Assessment.* Available at: http://www.webtag.org.uk/webdocuments/2_Project_Manager/11_SEA/appendix.htm#5

Any beneficial or residual effects of interventions identified (including insignificant effects) were reviewed in order to identify the general receptors of these potential effects. Given the strategic nature of SEA, they could normally only be expressed as areas or localities of various types of receptor (e.g. landscape character areas, residents of conurbations, habitats not nationally designated), but in some cases specific receptors were possible (e.g. a particular SSSI). As is appropriate to strategic assessment, indicators can also represent receptors (e.g. greenhouse gas emissions representing the various global receptors of climate change). Also as appropriate to strategic assessment, regional and national receptors of cumulative effects could only be expressed as environmental parameters, indicators or types of receptor.

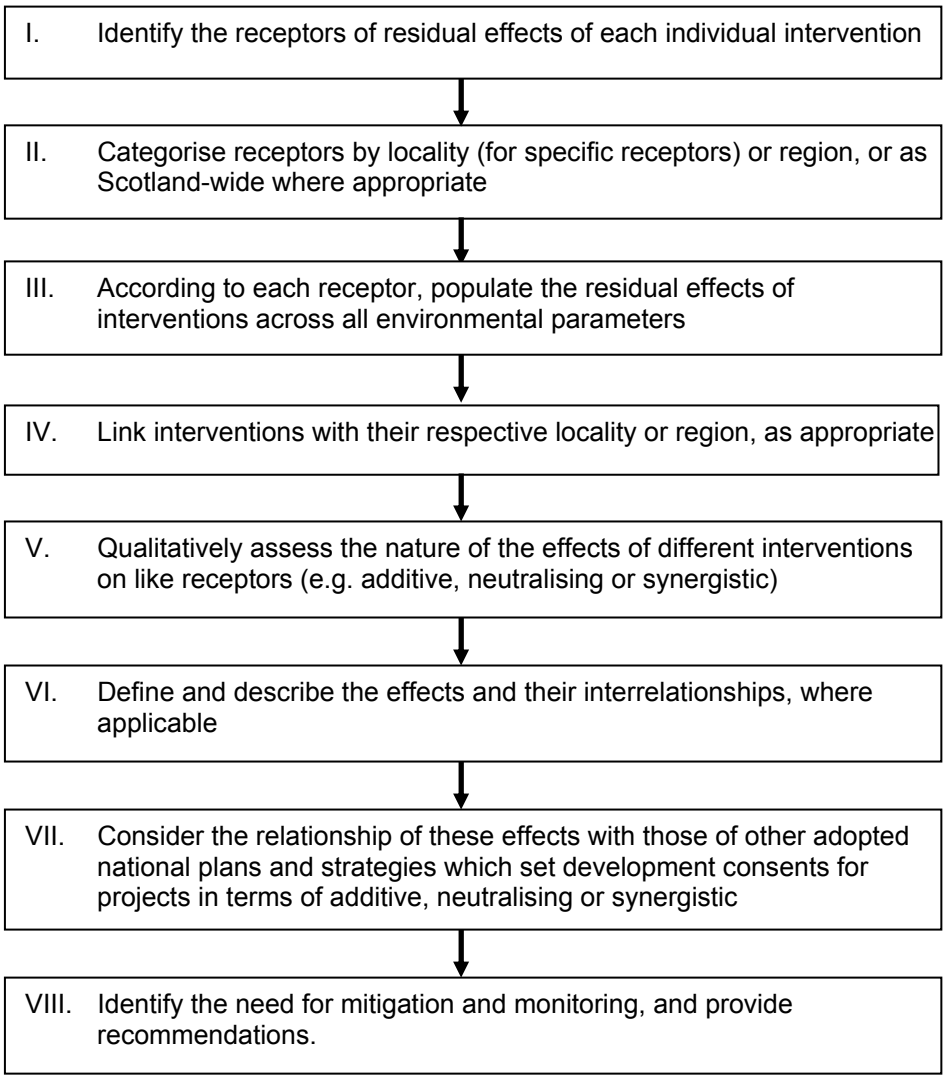

Figure 3.3: Flowchart of Cumulative Effects Assessment Process[37]

[37] Adapted from: Department for Transport (2004), *Transport Analysis Guidance Unit 2.11: Strategic Environmental Assessment for Transport Plans and Programmes. Appendix 5: Cumulative Effects Assessment.* Available at: http://www.webtag.org.uk/webdocuments/2_Project_Manager/11_SEA/appendix.htm#5

These receptors were then categorised as far as possible by locality or region, or as Scotland-wide. The process of identifying receptors then became iterative with the assessment of cumulative effects – new receptors being identified as the assessment was undertaken.

It is worth highlighting that the beneficial effects and residual effects as described in Chapters 6 and 7 and Appendices 5 and 6 were categorised as local, regional or national. However, it is more appropriate for a cumulative effects assessment (which is more receptors-focused) to categorise the receptors, and not the nature of the effects themselves. As such, although there is much consistency, these categories do not necessarily match. Also, there is some repetition of effects where regional or national effects had both "broad" receptors (e.g. an indicator or receptor type within these geographical boundaries) and specific receptors (e.g. residents of a particular place).

The residual effects of interventions were then linked with the receptors identified in order to identify which interventions were acting in combination. From this information, interventions were then associated with each relevant receptor locality or region, which was mainly dictated by proximity given the nature and scope of effects.

The assessment cumulative effects on these common receptors among interventions were then carried out. This firstly involved consideration of the nature of effects (additive, neutralising or synergistic), defining the effect itself, and describing how different effects interrelate with respect to the common receptor.

Next, a review was conducted of the National Transport Strategy (NTS) and National Planning Framework 2 (NPF2) and their environmental assessments in order to identify further cumulative effects. Certain policies contained within these two key development documents are not specific to receptors, but rather apply as overarching objectives to be implemented at lower tiers of planning and the specific actions and procedures of various bodies / organisations. As such, it has been appropriate to restrict this assessment to identify, where relevant:

- Any significant contributions to adverse effects of the STPR (potentially adverse situations);
- Relevant opportunities for offsetting adverse effects of STPR through relevant objectives or specific enhancements in relevant geographical areas; and
- Relevant opportunities for enhancing the benefits of STPR.

Finally, pursuant to the adverse situations and opportunities identified from the previous task, the need for mitigation and monitoring was reviewed, and recommendations made as appropriate to the potential cumulative effects.

The results of the cumulative effects assessment are reported in Chapter 8 and Appendix 7.

3.6 Future Stages

3.6.1 Monitoring

Residual effects from each intervention, outputs from the cumulative effects assessment, and mitigation programmes identified will be incorporated into a monitoring programme. This monitoring strategy has been designed to monitor the implementation of the STPR to ensure that any unforeseen environmental effects are identified and mitigated at the earliest opportunity and a recommendation for incorporating the monitoring into the Scottish Government's wider environmental monitoring strategy will be proposed. In depth monitoring details will be available in the SEA Post Adoption Statement (Chapter 10).

3.6.2 STPR Timetable

The anticipated high level STPR timetable is detailed in Table 3.6. A more detailed discussion of programme is given in Chapter 10.

Table 3.6: STPR Timetable

STPR Document	Date
STPR summary report to Scottish Ministers	Autumn 2008
Consultation on Environmental Report	Late 2008 / early 2009
Adoption of STPR Report & Post Adoption Statement	Early 2009

4 Characteristics of the Environment

Schedule 3 of the Environmental Assessment (Scotland) Act 2005 (the SEA Act) requires that this Environmental Report includes a description of the environmental characteristics of areas likely to be significantly affected by the STPR. This Chapter provides an overview of the environmental baseline for the SEA that has been used to inform the environmental assessments. Section 4.1 provides a summary of the baseline data that has been used to inform the assessment process, and its sources. The section examines data collected for the current and future baselines independently due to reduced data availability and specialist techniques utilised in future predictions, which are therefore discussed in more detail. This Chapter also includes a discussion of the standard Reference Case and 'Do-Minimum' scenarios used within ENEVAL modelling of future noise, air quality, and climatic factors (STPR Report 1). Section 4.2 provides an overview of the national current and predicted future baseline derived from the sources outlined in Section 4.1. More detail regarding the information contained in this Chapter is provided in Appendix 3.

4.1 Baseline Data and Sources

This section presents a summary of the features considered and the organisations which hold the relevant data for each environmental topic, in terms of the current and predicted future baseline. Information relating to the current baseline is outlined in Table 4.1 and the future in Table 4.2. Full data references and a detailed description of the method used are contained in Appendix 3 (B).

4.1.1 Current Baseline

Table 4.1 provides on overview of the environmental features reviewed for each SEA topic. It also includes the sources of data on environmental features used to inform the national and corridor baselines.

Table 4.1: Summary of Environmental Issues Considered within the Current Baseline and Organisations Approached for Data

Environmental Feature	Features Reviewed	Organisation holding the Data
Biodiversity, Flora & Fauna	Statutory Designated sites: SPAs, SACs, Ramsar, SSSIs, NNRs, Biogenetic Reserves, Biosphere Reserves; Biodiversity Species and Habitats (UK Biodiversity Action Plan), Priority Species	Scottish Natural Heritage (SNH), Joint Nature Conservation Committee (JNCC)
	State of Scotland's Environment (2003 & 2006)	Scottish Environment Protection Agency (SEPA)
Population	General population statistics, age profile, economic activity	General Register Office for Scotland, Office of National Statistics Census Data (2001).

Environmental Feature	Features Reviewed	Organisation holding the Data
	Accessibility – community linkages, commuting patterns and access to public transport	Scottish Census Data (2001); Public transport - Bus Users UK, the Confederation of Passenger Transport, Stagecoach Scotland, Scottish Railways and Scottish Citylink, Regional Transport Partnerships.
Noise	Noise including: Scottish Noise Map, Candidate Noise Management Areas and Quiet Areas. ENEVAL emission modelling software adapted from the TMfS (see Appendix 3).	Hamilton and Macgregor/Scottish Government, Transport Model for Scotland (TMfS)
Human Health	Areas of high NO_2 and PM_{10} emission levels	Health Scotland, World Health Organisation (WHO), Scottish Air Quality
	Accident statistics, accident clusters	Scottish Government (Road Accidents Scotland 2006); Transport Scotland SERIS database (1996-2005)
Soils and Geology	Statutory Designated Sites; Geological and geomorphological SSSIs	SNH, Geological Conservation Review
	Geology	Scottish Geology
	Soils and peat deposits, Scotland's Soil Resource, Current State and Threats (2006)	Macaulay Land Use Research Institute, Scottish Executive
	Land Capability for Agriculture	Macaulay Land Use Research Institute
Water	Main rivers and associated biodiversity designations River basins and catchments and Plans, Water Quality Classification (2006 Data); River Basin Management Plan Characterisation Reports (2005), State of Scotland's Environment (2006) Indicative River and Coastal Flood Map (Scotland) (2006), including estuaries	SEPA

Environmental Feature	Features Reviewed	Organisation holding the Data
Water	Major aquifers and groundwater vulnerability mapping	SEPA
Air Quality	Air Quality Management Areas in Scotland, Ambient Air Quality, Emissions Maps 2004	Scottish Government (Scottish Air Quality Archive) and Transport Model for Scotland (TMFS)
Climatic Factors	Carbon emissions by transport mode/ Carbon Dioxide Emissions by Source (Scotland)	National Atmospheric Emissions Inventory; TMfS
Material Assets	Main transport infrastructure including: ferry routes, rail and airports Constraints and congestion points	Transport Scotland, Structure Plans Transport Model for Scotland (TMfS)
	Existing mineral resources and aggregates	Local Plans; Local Authorities
Cultural Heritage	World Heritage Sites; Scheduled Monuments; Category 'A' listed buildings; Gardens and Designed landscapes	Historic Scotland; UNESCO
	Conservation Areas	Local Plans; Local Authorities
Landscape	National Parks	Loch Lomond and the Trossachs and the Cairngorms National Park Authorities, SNH
	National Scenic Areas	SNH
	Areas of Great Landscape Value	Local Plans; Local Authorities
	Landscape Character Assessment	SNH

4.1.2 Future Baseline

The future situation describes how each baseline topic is expected to develop up to 2022 (although in some cases it goes beyond this depending on the nature of the source data). Information on the future baseline mainly comprises a qualitative description of the key issues, and is limited due to the existence of a number of data gaps. Quantitative data however is provided for noise, air quality (NO_2 and PM_{10}), and Climatic Factor (CO_2e) parameters, based on ENEVAL TMfS data predictions.

Quantitative Modelling Techniques: 'Reference Case' and 'Do Minimum' Scenarios

Where ENEVAL modelling based on TMfS data has been used, the future environmental baseline has been ascertained through the use of 'Do-Minimum' and 'Reference Case' scenarios. The 'Do-Minimum' scenario illustrates the results reached by ENEVAL modelling for 2005, whilst the 'Reference Case' scenario illustrates the ENEVAL modelling results in the absence of STPR interventions in 2022. The use of these scenarios enabled the environmental effects resulting from an intervention to be ascertained through a comparison of the modelling outcomes for each.

To obtain the most representative assessment results, the 'Do-Minimum' and 'Reference Case' scenarios incorporated the committed and most likely known changes to the transport network between 2005 and each of the assessment years (2012, 2017 and 2022).

The committed and likely transport changes were presented in Transport Scotland's "Scottish Motorway and Trunk Road Programme - June 2007"[38], and the High Level Output Specification (HLOS)[39] for Scotland. These were included within the 'Do Minimum' and 'Reference Case' scenarios defined by Transport Scotland in early 2007 and subsequently incorporated into TMfS: 05.

However, Transport Scotland amended the list of committed schemes in August 2007 and new 'Do Minimum' and 'Reference Case' scenarios have been incorporated in the revised version of the transport model, TMfS:05A, which became available for use in November 2007. This is the version of the model used to assess intervention packages against the baseline.

Overview of Data and Sources used to Predict the Future Baseline

The following is a summary of the features considered within the future baseline and according sources of data. The information is presented by environmental topic, and an overview is available in Table 4.2.

Biodiversity

Natura 2000 sites which have been submitted to the European Commission by Government, but not yet formally adopted by the Commission, are referred to as candidate Special Protection Areas (cSPAs) and candidate Special Areas of Conservation (cSACs). These two designations, along with proposed Ramsar sites have been identified through JNCC and SNH databases.

[38] http://www.transportscotland.gov.uk/road/motorway-and-trunk-road-programme
[39] http://www.transportscotland.gov.uk/reports/publications-and-guidance/rail/high-level-output-specification-report

Population

Projected demographic changes were obtained from the General Register Office for Scotland[40]. Information relating to future accessibility, where available, was obtained from the Scottish Government, and predictions of future employment, where available, were obtained from Council adopted Local Plans.

Noise

Population forecasts, required to ascertain the number of properties close to roads and railways, were obtained from the General Register of Scotland. For road schemes, ENEVAL data projections were used to provide predicted baseline noise levels for 2022. Using this data, it was also possible to predict the number of noise sensitive receptors within 50 metres of roads producing a reference noise level at 10 metres of over 60 dB (A) for 2022. For rail schemes, property counts using GIS data have been undertaken for 2022 incorporating future rail schemes that have been approved for development.

Human Health

Future predictions for the environmental topic of human health were based on the health effects resulting from transport related air pollutants. Therefore data on predicted future NO_2 and PM_{10} levels was use in conjunction with information on potential future AQMAs. Information on AQMAs was gained from the Air Quality Archive, and future NO_2 levels were predicted using the ENEVAL system based on TMfS data.

Soils and Geology

A review of potential geological and geomorphological SSSIs was undertaken to determine any likely future designations. Information from SNH and the Geological Conservation Review was used to carry out this assessment. However, actual future predictions are difficult to assess for soil and geology beyond specific localised projects, e.g. for peat land restoration identified in local authority plans. This situation may be improved on completion of the Scottish Soil Strategy in 2008. However, predictions relating to the future state of soil are currently unavailable.

Water

There are no specific data projections relating to the future quality of the water environment in Scotland. Therefore, predictions have been based on a review of the likely effects of recently introduced legislation, most notably the EC Water Framework Directive (WFD) (2000/60/EC) which has been transposed in Scotland in the Water Environment (Controlled Activities) (Scotland) Regulations 2005 (CAR).

[40] General Register Office for Scotland, 2006, 2004 based Population Projections for Scottish Areas

The key regulatory conditions taken into account include the requirement under the WFD that natural water features must achieve 'good ecological status' by 2015; the subsequent CAR objectives relate to the protection, enhancement, restoration, and prevention of further deterioration of water bodies in Scotland; and CAR measures, such as the licensing of discharges to, and abstractions from, all wetlands, surface waters and groundwaters, implemented to achieve these objectives. In addition, the WFD requirement for River Basin Management Plans are to be put in place by 2009[41] has also been considered.

To effectively monitor the water environment and observe changes in respect to legislative targets, SEPA has devised a river classification scheme. Current river classifications have been utilised to highlight water bodies likely to improve or retain their current status.

Air Quality

Information used to predict future air quality includes Local Authority applications for new AQMAs. This information has been obtained from the Scottish Governments Air Quality Archive. ENEVAL Scenario modelling has also been used to project NO_2 road related emissions for 2022. The ENEVAL modelling system has been based on data from the Transport Model for Scotland (TMfS) and the TMfS Highland Model.

Climatic Factors

CO_2e road transport emissions have been predicted using ENEVAL projections for 2012 and 2022. Whilst it was not possible to model CO_2e emissions from the rail network, a qualitative analysis has been undertaken based on committed and likely rail projects outlined in the 'Do-Minimum' scenario.

Material Assets

In relation to major committed and likely infrastructure, road, and rail development, data was sourced from the 2007 and 2008 Transport Scotland commissioned report; STPR Report 1: 'Review of Current and Future Network Performance'.

Identification of future trends with regards to aggregates was problematic due to limited data availability. However, Local Plans have been reviewed to ascertain likely extensions to current quarries and any proposed new workings. In addition, to identify and prevent the potential loss of future resources through over-building, a review of aggregate maps produced by the Royal Geological Survey has been undertaken.

Cultural Heritage

Information has been ascertained in relation to features likely to become World Heritage Sites through an examination of the UK Tentative List; a list comprised of sites nominated for World Heritage Inscription over the next five to 10 years.

[41] Scottish Executive, 2005, The Water Environment (Controlled Activities) (Scotland) Regulations 2005

Conservation Areas, and Proposed Historic Gardens and Landscapes, planned or proposed for the future have also been ascertained through a study of Local Area Plans. However, due to the nature of archaeology, other types of cultural remains have not been possible to predict.

Landscape and Visual

Local Area Plans and SNH were consulted to identify any proposed landscape designations.

Table 4.2: Summary of Environmental Issues Considered within the Future Baseline and Organisations Approached for Data

Environmental Feature	Features Reviewed	Organisation holding the Data
Biodiversity, Flora & Fauna	Candidate Special Protection Areas (cSPAs);Candidate Special Areas of Conservation (cSACs); Proposed Ramsar sites	SNH; JNCC
Population	Projected population changes; Future accessibility and employment	General Register Office for Scotland[42]; Edinburgh Council; Fife Council;[43] Hamilton and Macgregor/ Scottish Government Transport Model for Scotland (TMfS)
Noise	Population forecasts; Baseline noise levels for 2022; Number of noise sensitive receptors within 50m of roads producing a reference noise level at 10m of over 60 dB (A); Properties in proximity of rail schemes in 2022	General Register of Scotland; Hamilton and Macgregor/ Scottish Government Transport Model for Scotland (TMfS)
Human Health	cAQMAs; Levels of NO_2 likely to exceed WHO guidelines by 2022	Hamilton and Macgregor/ Scottish Government Transport Model for Scotland (TMfS); Scottish Government Air Quality Archive
Soils and Geology	Peat land restoration; Potential geological and geomorphological SSSIs	Local Authority plans SNH Geological Conservation Review
Water	Water Quality Regulations	Scottish Government
Air Quality	NO_2 road related emissions for 2022;	Hamilton and Macgregor/ Scottish Government Transport

[42] General Register Office for Scotland, 2006, 2004 based Population Projections for Scottish Areas
[43] Employment predictions were only available for Fife and Edinburgh Council areas

Environmental Feature	Features Reviewed	Organisation holding the Data
	Potential AQMAs	Model for Scotland (TMfS); TMfS Highland Model; Scottish Government Air Quality Archive
Climatic Factors	CO_2e road transport emissions for 2012 and 2022	Hamilton and Macgregor/ Scottish Government Transport Model for Scotland (TMfS); TMfS Highland Model
Material Assets	Likely future infrastructure, road, and rail projects; Location of mineral and aggregate reserves	STPR report 1: Review of Current and Future Network Performance; Royal Geological Survey
Cultural Heritage	Planned future World Heritage Sites and Conservation Areas	UK Tentative List; Local Area Plans
Landscape and Visual	Sites proposed for Landscape and Visual Designations	Local Area Plans; SNH

4.2 National Overview

This Section provides a national overview of the current and predicted future baseline environmental conditions for the STPR by environmental topic.

4.2.1 Biodiversity

There are many areas within Scotland that are important for biodiversity. Many of these receive protected status under international and national legislation. Indeed, in Scotland, areas protected for their biodiversity value form approximately 20 per cent of the nation's land cover.

Figure 4.1 illustrates the internationally and nationally important areas for biodiversity in Scotland.

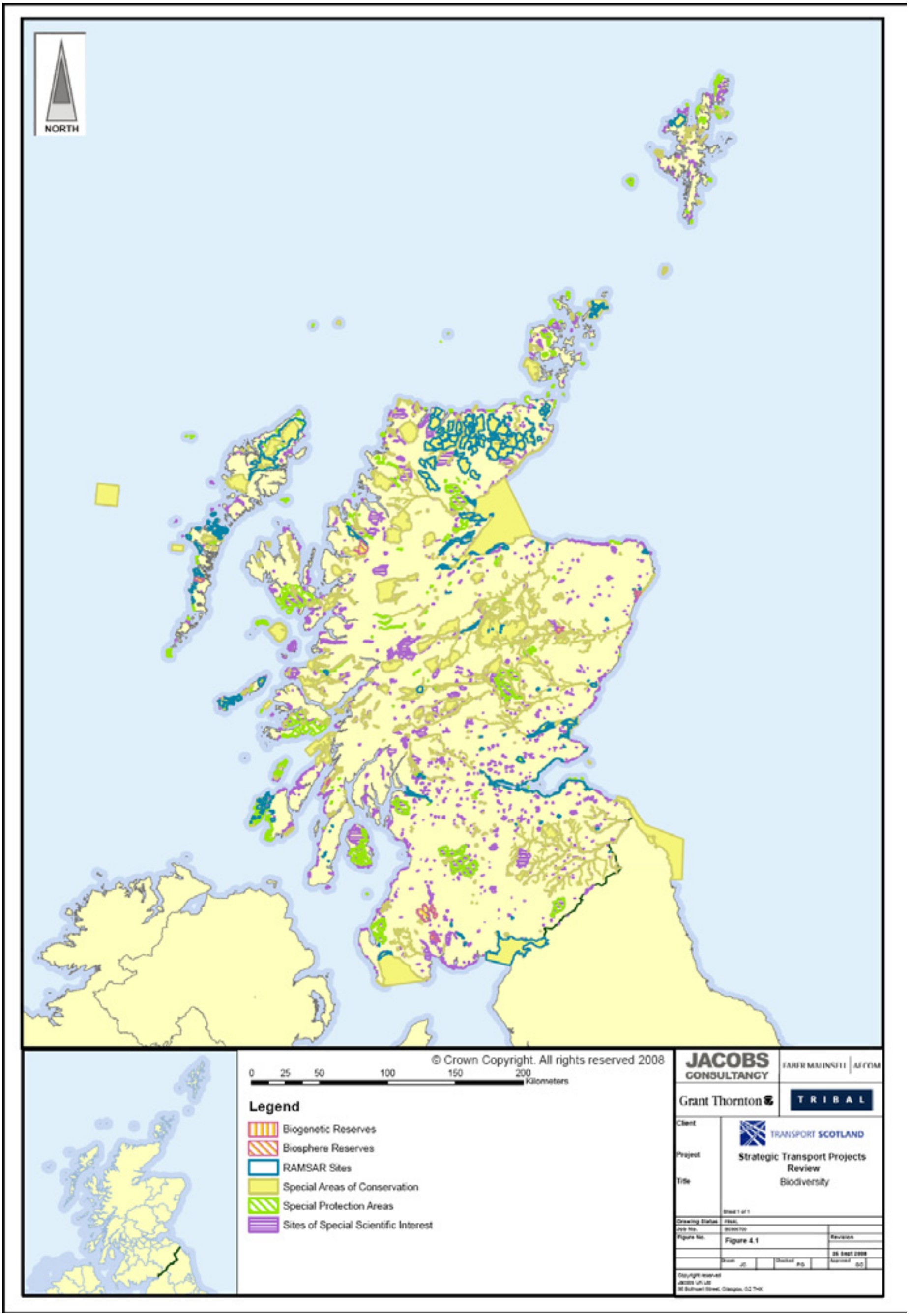

Figure 4.1: Internationally and Nationally Important Areas for Biodiversity

Designation of ecological sites is tiered in terms of importance with the most valued and/or sensitive sites designated at the European level through the habitats directive[44]. These sites include Special Protection Areas (SPAs) and Special Areas of Conservation (SACs), universally referred to as Natura 2000 sites, and Ramsar sites which are wetlands of international importance.

A slightly lesser but still significant designation is also made at the national level for sites that are considered as important to the UK natural biodiversity and these include Sites of Special Scientific Interest (SSSI), National Nature Reserves (NNRs) as well as Biogenetic and Biosphere Reserves.

Due to the strategic nature and national coverage of the STPR, the SEA considered only those sites of international and national importance designated for their nature conservation value (Table 4.3 and Figure 4.1). These along with protected species that are associated with each transport corridor are identified in detail for each transport corridor in Appendix 3.

Table 4.3: Designated Areas

Type of Designation	Number	Area (ha)	Percent Land Area of Scotland
Special Areas of Conservation (SAC)	238	962,667	9.6
Special Protection Areas (SPA)	137	624,780	7.8
Ramsar Sites	51	313,208	3.9
(Natural) World Heritage Sites (WHS)	1	853	0.01
Biogenetic Reserves	2	2,388	0.03
Biosphere Reserves	5	11,840	0.2
Sites of Special Scientific Interest (SSSI)	1,451	1,005,152	12.5
National Scenic Areas (NSA)	40	1,001,800	12.5
National Nature Reserves (NNR)	66	117,228	1.5

Future Trends

At a national level, information available on candidate Natura 2000 and Ramsar sites indicates that a number of new sites will be designated in Scotland. These include West Inverness-shire Lochs SPA and Loch of Strathbeg SAC.

4.2.2 Population

Scotland's population is estimated to be 5,078,400 (2004). The main urban centres include Glasgow City (575,200), Edinburgh (435,500) Aberdeen (176,690), Dundee (141,400) and Inverness (40,900)[45].

[44] Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora

Employment information includes main industries and employment rates. Employment rates in Scotland stand at 58 per cent and unemployment at 3.9 per cent according to the 2001 Scottish Census. Table 4.4 highlights the percentage of people employed in different sectors across the whole of Scotland.

Table 4.4: Employment by Sector

Employment Sector	Percentage
Manufacturing	14
Wholesale, Retail, Trade and Repairs	12
Health and Social Work	13
Real Estate	11
Construction	8
Education	7
Public Administration, Defence and Social Security	7
Transport and Storage	7
Hotels and Restaurants	5
Finance Intermediaries	4
Agriculture, Hunting and Fishing	2

There are many areas in Scotland that currently have significant numbers of people at risk of social exclusion, who do not have access to a car and are subject to lower than average levels of public transport access to key services. Areas in Scotland where poor transport access contributes to social exclusion include: East Ayrshire, North Ayrshire, East Renfrewshire, South Lanarkshire, Inverclyde, Falkirk, Stirling, Alloa and areas of Fife.

Statistics are provided for the different transport modes used by the working Scottish population (based on national average travelling to and from work): 64 per cent use the car 15 per cent use trains or buses; 15 per cent use other modes; and five per cent mainly work from home[46]. Rural Scotland accounts for almost 20 per cent of the population. Rural households have greater access to cars than those in the rest of Scotland and people who live in rural areas are more likely to drive to work or education than people in the rest of Scotland. The average travel to work time in Scotland is 25 minutes and average commuting distances are quite short. About 60 per cent of car and nearly 80 per cent of bus journeys to work are less than 10 kilometres.

[45] General Register Office for Scotland Mid-2004 population estimates for town/city populations: http://www.gro-scotland.gov.uk/files1/stats/04mid-year-estimates-localities-table3.xls
[46] Scottish Census, 2001, Employment Statistics

Future Trends

Recent forecasts from 2006 predict a four per cent increase in population from 5.12 million in 2006 to 5.33 million in 2021[47]. The majority of this increase is expected to be in South East Scotland, with a small increase in the Highlands and Islands. However, within this overall rise, the areas of Aberdeen, Angus, Dundee City, Glasgow, Renfrewshire, West Dunbartonshire, East Dunbartonshire, Eilean Siar, Orkney, Shetland, North Lanarkshire, Clackmannanshire, Dumfries and Galloway, East Ayrshire, and Midlothian are expected to experience population decline.

As regards age structure, between 2006 and 2031, the number of younger people in Scotland is projected to decrease whilst the number of older people is projected to increase significantly. The most dramatic change is projected to be in the 75 plus age group, which is predicted to increase by about 80 per cent from 0.38 million in 2006 to 0.69 million by 2031[48].

Information on future trends regarding connectivity and accessibility was not available on a nationwide scale. However, where information is available it suggests that the great variation in access experienced in different localities will continue at present levels, with little change in the balance between car use and public transport. The car is likely therefore to remain competitive against public transport. Within this general picture, accessibility is forecast to decline in Aberdeen, and increase in the central belt, West Lothian, South Lanarkshire, Midlothian, the Scottish Borders, and some areas of East Lothian.

Employment predictions were only available for Fife and Edinburgh. Employment is predicted to increase in both areas, most notably in the construction and service sectors in Fife, and the financial, insurance, and business services sectors in Edinburgh.

4.2.3 Noise

Road traffic, trains and aircraft are some of the main contributors to noise pollution. Noise from road traffic, in particular, is perceived as having the greatest affect on people's disturbance levels, when compared to other noise sources. Information concerning noise information has been obtained from the noise maps released by the Scottish Government and through the use of ENEVAL and GIS resources (see Chapter 3).

The major areas of transport related noise in Scotland are along the main road and rail networks, with cumulative effects within the towns and cities.

Noise action plans are being developed for all large urban areas, major roads, major railways and airports to preserve environmental quality with regards to noise levels. The action plans will set out a number of interventions to tackle noise. At the time of writing, noise action plans for Edinburgh and Glasgow are out for consultation; both have 'Candidate Noise Management Areas' (CNMAs) and 'Candidate Quiet Areas'.

[47] Projected population of Scotland (2006 based), General Register Office for Scotland, published 23/10/2007 page: 2
[48] Projected population of Scotland (2006 based), General Register Office for Scotland, published 23/10/2007 page: 5

Under the European Noise Directive (END), a Quiet Area in an agglomeration is an urban area that is delineated as such by a competent authority and, for example, is not exposed to noise levels above a certain limit.

Future Trends

Future environmental trends are set out in the environmental baseline assessment and are included in Appendix 3 (A).

Candidate Noise Management Areas and Quiet Areas

Edinburgh Agglomeration: The agglomeration comprises approximately 261 km^2. The largest local authority within the agglomeration is the City of Edinburgh Council. A small part of Midlothian Council and a small part of East Lothian Council fall within the agglomeration boundary. The areas are deliberately not precisely defined. The noise management areas are based on strategic noise maps. Some areas identified may not be included in the Final Edinburgh Noise Action Plan.

In the Edinburgh agglomeration there are 25 cNMAs, 19 of which are associated with road traffic and six with railway noise[49]. Each of these areas will be examined in more detail prior to any decision to promote it as a Noise Management Area (NMA).

There are 11 Candidate Quiet Areas in the Edinburgh agglomeration.

Glasgow Agglomeration: There are 53 cNMAs that have been identified, 42 of which are associated with road traffic and 11 with rail noise. All of these lie within the boundary of the Glasgow agglomeration and are spread throughout the area. The Glasgow Noise Action Plan also identifies 59 Candidate Quiet Areas within the Glasgow agglomeration[50].

General

The projected number of residential properties within 50 meters of roads producing reference noise levels at 10 meters from the road, in excess of 60 dB LA10, 18hr, are predicted to increase over the period 2005-2022 in all transport corridors except for corridor 16, where no change is expected.

4.2.4 Human Health

Issues of human health include general health, areas of elevated nitrogen dioxide (NO_2) and particulate matter (PM_{10}) emissions and accident statistics related to transport.

Health Scotland[51] provides some information on the possible links between transport emissions and ill-health. Increased air pollution has been linked to cardiac hospital admissions and cardiovascular morbidity, and there is evidence it can worsen the symptoms of pre-existing asthma but not cause asthma. Links have been made to high levels of particulate matter (PM_{10}) which is estimated to increase the number of daily deaths by 0.6 percent, particularly for those with existing cardio-respiratory disease.

[49] Scottish Government, 2008, Noise Action Plan for Edinburgh Agglomeration
[50] Scottish Government, 2007, Noise Action Plan for Edinburgh Agglomeration
[51] Health Scotland, 2007, A guide to the Health Impact Assessment of Transport Initiatives

In terms of general health, the Scottish Census 2001 national figures show that 68 per cent of the population are in good health; 22 per cent in fairly good health; and 10 per cent in not good health. The highest levels of poor health are indicated for Glasgow (16 per cent), Greenock (13 per cent) and Falkirk (12 per cent) however, there is no direct link to transport related issues.

In general, air quality in Scotland is good and is forecast to improve; however, there are several locations where elevated levels of air emissions have the potential to have adverse effects on the health of the population. The World Health Organisation (WHO) identifies PM_{10} and NO_2 as two of the main pollutants that can have adverse effects on health and sets a guideline value of 20 ug/m^3 annual mean for PM_{10} emissions and 40 ug/m^3 annual mean to protect the public from the health effects of gaseous NO_2. In Scotland, the main areas of concern are within the urban networks of Glasgow, Edinburgh, Dundee and Aberdeen and the strategic nodes of Inverness and Perth with the highest levels located within the Air Quality Management Areas (AQMAs). The air quality section provides further information on these locations.

The average number of Injury Road Accidents per year between 2002 and 2006 was 13,744. This is significantly lower than the average number of corresponding accidents between 1994 and 1998. The average number of accidents on all road types has also decreased for the same periods, with the exception of Motorways where there has been a 25 per cent increase. However some of these accidents may be attributed to an increase in vehicle kilometres travelled on motorways in recent years. Travel by motorcycle is the only mode which has seen an increase in the number of killed and seriously injured casualties when comparing 2002 to 2006 average year against 1994 to 1998. Regarding accident statistics in Police Force/Council areas, only Dumfries and Galloway has had an increase in accidents when comparing the average accidents per year 2002 to 2006 against 1994 to 1998. However in the Grampian, Fife and Central areas the number of fatal accidents has increased when comparing the same time periods.

Transport Scotland's Strategic Road Safety Plan (2007), highlights targets set in 2000 aimed at reducing the number of casualties on Scotland's roads by 2010 include a 40 per cent reduction in the number of people killed or seriously injured; a 50 per cent reduction in child deaths and serious injuries; and a 10 per cent reduction in the slight casualty rate. On Scotland's trunk road network these targets are being met, with reductions consistently below the current pro-rata target, year-on-year. Although there has been a downward trend in terms of accidents on the road network, there were 28 more people killed on Scotland's roads in 2006 than in 2005. Further work is therefore required to ensure safety targets and aspirations are met and the current downward trend continues.

Future Trends

Future predictions for the environmental topic of human health were based on the health effects resulting from transport related air pollutants, and the likely establishment of further AQMAs. Whilst the overall air quality in Scotland is predicted to improve, areas of Inverness, Aberdeen, Dundee, Perth, areas of Glasgow and the M8 corridor, Stirling, and Edinburgh are predicted to experience increases in NO_2 levels which may exceed WHO guidelines by 2022, therefore creating more health problems for residents. However, where current AQMAs are in place due to high NO_2 levels, such as Edinburgh, there could be a decrease in pollution levels through action plans implemented to improve air quality within the specified areas.

As a result, it is likely that further AQMAs will be established in Glasgow and Edinburgh for NO_2 and PM_{10}.

4.2.5 Water Quality and Flooding

Water quality is currently improving on a national scale and is subject to a regular monitoring programme. Between 1999 and 2005, the length of poor or seriously polluted rivers in Scotland reduced by 34 per cent[52]. However, water quality problems remain in some areas. The main waterways in Scotland which currently have water quality problems include the River Clyde (good, moderate and poor quality at various stages), the Union Canal (small sections of good, mostly moderate and poor water quality), the River Kelvin (moderate and poor quality), the River Almond (moderate and poor quality), the River Eden (poor quality), and the White Cart Water (poor, moderate and good at various stages).

Flood risk to the transport network within each SEA Transport Corridor has been assessed through examination of the Indicative River and Coastal Flood Maps, available from SEPA (2006)[53]. The map shows areas of land in Scotland estimated to be at risk of flooding from either rivers or the sea (or both), with an annual probability of 0.5 per cent (1:200) or greater. According to the most recent flood maps, almost 100,000 properties in Scotland are either at risk of fluvial flooding or lie within coastal flood zones[54] and flooding can also have significant adverse effects on the transport network.

In terms of groundwater supplies, there are around 30,000 private supplies in Scotland which are protected by European and national legislation. The legislation requires that these resources are managed in a sustainable way and that pollution of these groundwaters must be prevented.

The main bedrock aquifers of very high or high productivity are located around Dumfries and along the border; from the Clyde diagonally across the country to Perth and Montrose; along the lowland coast from Inverness to Banff and between Tayport and Cupar. The central belt is a mixed area of moderate productivity with some bands of high productivity. Areas of greatest groundwater vulnerability, that is the tendency and likelihood for general contaminants to reach the water table after introduction at the ground surface, include the west coast of Scotland and the Highlands; the least vulnerable areas include the central belt and lowland coastal areas[55].

Future Trends

It is predicted that almost one third of water bodies in the Scottish River Basin District will not reach required 'good ecological status' by 2015. However, whilst this target may not be fully achieved, it is predicted that the quality of water bodies currently graded at C or below will still improve. Where water bodies are already graded B or above, it is predicted that these fair to excellent grades will be maintained.

[52] SEPA (2006), State of Scotland's Environment 2006. Available at: http://www.sepa.org.uk/scotlands_environment/data_and_reports/state_of_the_environment.aspx
[53] SEPA, 2006, Indicative River and Coastal Flood Map (Scotland)
[54] Scottish Government, 2008, The Future of Flood Risk Management in Scotland: A Consultation Document
[55] SEPA, 2006, http://www.sepa.org.uk/water/groundwater.aspx

Climate change scenarios predict that flooding will become more frequent in the future. The UK Climate Impacts Programme (UKCIP) has formulated scenarios to look at possible future climate change, dependent on predicted future global greenhouse emissions. This research provides Scotland with the best available information on predicted changes in climate over the next century and indicates that, over the coming decades, Scotland will experience more severe rainfall events, particularly in the east of the country[56] leading to increased flood risk.

4.2.6 Soils and Geology

Scotland possesses a wide variety of different soil types due to its diverse geology and climate. The diverse topography gives rise to further local-scale variation in soils linked to changes in slope and landform. Soil types are covered in more detail in the corridor baseline descriptions in Appendix 3.

Scottish soils are in general more organic, more leached and wetter than those of most other European countries, because of the maritime climate. Scotland contains greater proportions of podzols (24 per cent of the land area), peat soils (histosols, 23 per cent) and gleys (21 per cent) than Europe as a whole. There are contrasts between soil types in the Midland Valley and those in the Highlands and Southern Uplands. The Midland Valley is dominated by mineral soils whereas the Highlands and Southern Uplands are dominated by peaty soils (peat, peaty gleys and peaty podzols) especially in the west[57].

The Land Capability for Agriculture information provided by the Macaulay Institute classifies land according to the capability to produce crops and ranges from Class 1 (land capable of producing a very wide range of crops) to Class 7 (land of very limited agricultural value). The principal agricultural areas in Scotland (Class 2 and 3) are mainly in the Southern, Central and Eastern parts of the country with farming in the North and West restricted to sheep and cattle grazing on unimproved and semi-improved uplands.

Forestry is an important land use in Scotland, using both native and non-native tree species. There are 1.33 million hectares of woodland in Scotland which represents 17 per cent of the land area in 2006.

The geology across Scotland is diverse and varied according to location. Designated sites include geological and geomorphological Sites of Special Scientific Interest (SSSIs) which are of national importance. There are 321 of these sites in Scotland, which are distributed throughout the country with further details given in Appendix 3.

Geology in Scotland can be roughly divided into five distinct parts: the Lewisian Gneiss and Torridonian of the North West; the Moine rocks of the Central and Northern Highlands west of the Great Glen Fault; the Moine and Dalradian of the Central and Grampian Highlands; the Midland Valley and the Southern Uplands.

[56] Scottish Government, 2008, The Future of Flood Risk Management in Scotland: A Consultation Document
[57] Scottish Government, 2006, Scotland's Soil Resource – Current State and Threats

Future Trends

On a national level, no potential geological or geo-morphological designated SSSIs have been identified.

4.2.7 Air Quality

In general, air quality in Scotland is good. The North West is remote from air pollutant problems and, as would be expected, the more densely populated central belt has the highest concentrations of poor air quality. The major influence on local air quality in these areas is as a result of traffic emissions; particularly oxides of nitrogen (NO_X), and particulates (PM_{10}).

Both of these pollutants have been linked to lung dysfunction as well as other health conditions and it is thought that continued or frequent exposure to concentrations that are typically much higher than those normally found in the ambient air may cause increased incidence of acute respiratory illness in children.

In light of this, 12 Air Quality Management areas (AQMAs) have been declared in Scotland and these fall within eight Council areas, namely; City of Edinburgh, Falkirk, North Lanarkshire, East Dunbartonshire, Glasgow City, Renfrewshire, Dundee City, Perth and Kinross and Aberdeen City. All of these, with the exception of the one in Falkirk, have been declared because of transport related emissions.

Future Trends

National road based nitrogen dioxide (NO_2) emissions are forecast to fall from around 30,000 tonnes in 2005, to around 16,500 tonnes in 2022. However, increases are forecast in the cities of Inverness, Aberdeen, Perth, Dundee, Glasgow, Stirling, the M8 corridor, and Edinburgh. Further AQMAs have been requested for Edinburgh and Glasgow, and NO_2 levels in current Edinburgh AQMAs could exceed EU 2010 targets should the measures contained in the Action Plan fail to be implemented.

Future changes to rail based NOx emissions are not possible to forecast on a national level, although data relating to some areas is available. In Edinburgh, rail based NO_x emissions are predicted to remain static, although this could be increased as a result of the Stirling-Alloa-Kincardine Rail Link and increased Glasgow-Edinburgh capacity. The following developments considered within the 'Do-Minimum' scenario also have the potential to increase NO_X emission levels; the Glasgow Airport Rail Link, Gourock Transport Interchange, Waverley Route Reopening, and Haymarket Rail Interchange. Within the prediction model, currently electrified rail lines are not considered to produce NO_x emissions.

With regard to PM_{10}, National annual road based particulate pollutant (PM_{10}) emissions are forecast by ENEVAL using outputs from TMfS to be halved from around 1,000 tonnes in 2005 to around 500 tonnes in 2022, with this being primarily attributed to improvements in engine technology. However, whilst in general levels remain low, NAQS and EC 2010 targets are predicted to be exceeded in a number of cities and towns, including areas in Forfar, Dundee, Perth and Coatbridge. There is also the possibility that the entire road network/city of Glasgow could be declared an AQMA for PM_{10} as it is predicted NAQS targets for 2010 will not be achieved in these areas.

4.2.8 Climatic Factors

The main human influence on the global climate is the emission of the key greenhouse gases, which include carbon dioxide (CO_2), methane (NH_4) and nitrous oxide (N_2O). It is the accumulation of these gases in the atmosphere that enhances the overall greenhouse effect. CO_2 accounts for the greatest proportion of greenhouse gas emissions in the UK. For the purpose of this SEA, carbon dioxide equivalent (CO_2e) emissions have been used as an indicator for the contribution from the transport network to climate change which is released as a result of fossil fuel use. CO_2e takes into account the emissions from various other greenhouse gases based upon their global warming potential (GWP).

In January 2008, the Scottish Government initiated consultation on the proposals and options for a Scottish Climate Change Bill. The consultation proposes a mandatory long-term target to achieve an 80 per cent reduction in carbon emissions by 2050, equivalent to an emission reduction of three per cent each year.

Nationally, transport accounts for 19 per cent of the total carbon dioxide (CO_2) emissions which are allocated to Scotland in the Greenhouse Gas Inventories when aviation emissions are excluded. The total CO_2e emissions from road vehicle transport (excluding public transport) are approximately 8.5 million tonnes per year[58]. The greatest contribution to CO_2e emissions are the cities, with the highest being Glasgow, followed by Edinburgh and then Aberdeen.

Future Trends

Future CO_2e emissions data is only available for road transport. It is forecast that a slight increase in CO_2e emission levels will be experienced nationally, from around 8,500,000 tonnes in 2005 to 9,100,000 tonnes in 2022. This is a result of the increase in vehicle kilometres offsetting a reduction in CO_2e emissions brought about by increased vehicle efficiency. CO_2e per person kilometres on the road based network are actually forecast to fall from approximately 210 tonnes/million person kilometres in 2005 to 180 tonnes per million person kilometres by 2022. Whilst it was not possible to forecast CO_2e emissions for rail transport, it is likely that the developments considered in the Do-Nothing scenario will affect levels.

4.2.9 Material Assets

Material assets considered in this SEA include Scotland's main road and public transport infrastructure, and natural resources, such as minerals and aggregates. In terms of the future trends identified for each of infrastructure topics, only the major committed and likely projects have been detailed. For a complete overview of all projects, please refer to STPR Report 1, and the detailed corridor analysis in Appendix 3.

Roads

In 2005, Scotland had a total of 54,800 kilometres of road, including 3,400 kilometres of trunk and 43,910 kilometres of minor roads.

Although the volume of traffic on Scotland's roads has grown since 1993, the rate of growth

[58] Based on modelled data derived from the TMfS (see Appendix 3)

has slowed considerably over time. Traffic grew by 18 per cent between 1993 and 2005, or by around an average of 1.5 per cent per year, while in 2005, the total volume of traffic was 42.7 million vehicle kilometres, a rise of only 0.03 per cent on the 2004 figure. However, during this period investment has been made in sustainable transport modes, like trains, buses, light rapid transit, cycling and walking, to help to stimulate modal shift away from cars. Targeted improvements on the motorway and trunk road network have also tackled some of the critical congestion spots while freight facilities grants are being used to stimulate modal shift in freight from road to rail and water.

Motorways link the major cities in the Central Belt with the South West and with England. The main east coast route, including the A1 for about 15 miles east of Edinburgh, the A720 Edinburgh Bypass and the M90 / A90 to Aberdeen, is mostly dual carriageway. Outside of these corridors, the predominant standard is single carriageway with some local dualling at strategic locations and on the approaches to the main urban centres. This includes the A9 between Perth and Inverness.

Future Trends

By 2022 the Transport Model for Scotland (TMfS) forecasts that private car use will increase by about 19 per cent; however the largest expected increase is in goods vehicles which are forecast to increase by over 30 per cent.

Major committed and likely road projects include the upgrade to the A8, the M77 extension, the final section of the M74 into Glasgow, construction of the Clackmannanshire Bridge, an upgrade to sections of the M876 and A876, an upgrade of the A80 to motorway, and a replacement for the Forth Road Bridge.

Rail

The rail network in Scotland has been improved and extended over the last 20 years, with rail passenger journeys originating in Scotland growing from 55 million in 1991, to 66 million in 2003 and 73 million in 2004. It comprises 4,214 track kilometres of which significant parts are secondary or rural in nature. Approximately 258 kilometres (0.6 per cent) of track are currently designated for freight only use. Less than 30 per cent of the Scottish rail network is currently electrified, and electrification is concentrated around Glasgow and on the West and East Coast Main Lines. The highest track capacity is found on lines which serve the English border, and in the Central Belt.

Railway assets include both fixed and mobile (trains) assets. Fixed assets include track, structures, signalling, earthworks, operational land and depots. Each asset category will have a distinctive life cycle, with its own maintenance and renewal profile.

The Scottish franchise fleet is a mixture of diesel and electric trains (multiple units), which divide into those built for British Rail (pre-1992), and those built more recently (1999 - 2004). The latter are also referred to as ‘new generation vehicles’. About 55 per cent of the fleet comprises British Rail vehicles and 45 per cent new generation vehicles. Reliability is a problem, with about half of the fleet in the lower half of the UK-wide reliability rankings; indeed, the oldest rolling stock dating from 1979 is at the very bottom of the rankings.

Future Trends

In the future, TMfS forecasts that by 2022 rail patronage will have grown by around 68 per cent, reflecting the continued demand to travel by rail as a result of increased congestion on the road network.

In terms of the rail stock, only the oldest vehicles would need to be replaced by 2020 as the usual life of railway passenger trains is 35 to 40 years. However, the Disability Discrimination Act 2005 extended the requirement for trains to have disabled access, from new vehicles only to all vehicles. This must be completed by 2020. It is unlikely to be economic to retrofit the British Rail vehicles for disabled access. Therefore, when the Scottish franchise comes up for renewal in 2014, it is likely that there will be a substantial additional cost to be paid for modernisation of over 50 per cent of the rail passenger fleet.

Major improvements to the rail network that are committed or are currently under construction include Edinburgh to Glasgow rail improvements (EGIP), the reopening of the Airdrie to Bathgate line, the Glasgow Airport Rail Link, and the Waverley Line (Edinburgh to Galashiels and Tweedbank).

Freight

In 2004, 173 million tonnes of freight were transported by road. This compares with just 11 million tonnes of freight moved by rail, much of which was the movement of coal, mainly from Hunterston as well as opencast mines in Ayrshire, Lanarkshire and Fife to power stations at Longannet, Cockenzie and in England. A significant proportion of the rest was cement from Dunbar to terminals in Leith and Glasgow.

Future Trends

Progress has been made in restoring rail freight services to the Highlands over the last 10 years with large quantities of timber and oil now being moved by rail and consumer goods being transported by rail container as far north as Caithness. However, the potential for viable rail freight services north of the central belt is limited by train weight and length restrictions.

Bus

The bus industry in Scotland is deregulated. While there are over 280 bus operators in Scotland, just six of the operators serve 94 per cent of the bus market. These operators include many of the biggest operators in the UK. These operators tend to dominate bus operations in the major Scottish cities.

Improvements to bus passenger priority and traffic management in city centres have been implemented. These include bus-only road lanes, guided busways, traffic signal control systems biased towards bus use and improved information systems, and an increasing number of Park-&-Ride sites on the edges of cities. Measures to improve the performance of bus services through the implementation of bus priority measures have had an impact on the competitive position of bus travel in some locations, such as Edinburgh[59].

[59] The City of Edinburgh Local Transport Strategy, 2007 - 2012

The overall trend in bus travel in Scotland over the last 30 years has been somewhat erratic, although since 1998 there has been a steady annual increase in passenger numbers. The total number of bus journeys made under concessionary fare schemes increased from about 103 million in 2001 / 2002 to over 147 million in 2005 / 2006[60]. There was a further increase to over 158 million in 2006 / 2007, following the introduction in 2006 of the free, Scotland-wide bus travel (with no restriction at 'peak' times) for over 60s and disabled people[61]. Overall the number of local bus journeys (boardings) being made in Scotland in 2005 was approximately 477 million.

Between 1998 and 2003, Strathclyde (including Glasgow) and East of Scotland (including Edinburgh) showed growth of 18 per cent and 16 per cent, respectively. Since then, there has been a slight decline. In all other areas there has been little change in passengers carried since 1997 / 98.

Future Trends

In the future, the TMfS forecasts an overall decline in bus patronage by 2022 of around 10 per cent, some of which is in part due to increased congestion in urban areas and some is partly due to increased use of the Tram network in the Edinburgh area.

Mineral Resources, Aggregates and Waste

Transport infrastructure falls within the construction and demolition sector, which is a major waste contributor. Around 20 million tonnes of waste is produced in Scotland each year, mostly from commerce and industry, of which 7.2 million tonnes is construction and demolition waste. Data from 2003 to 2006 indicates that the landfill rate has settled at about eight million tonnes per year.

Scotland has rich and varied mineral resources including material suitable for construction aggregate (sand and gravel and crushed rock), silica sand and brick clay and other, less abundant resources which include limestone and slate[62].

The total consumption of aggregates in Scotland in 2003 was estimated at approximately 36 million tonnes. Of this, 0.54 million tonnes were secondary aggregates and 4.86 million tonnes were recycled. Secondary aggregates include by-product waste, synthetic materials and soft rock used with or without processing as a secondary aggregate. Recycled aggregates are derived from reprocessing materials previously used in construction.

[60] STS No. 25 (2006) Table 12.31
[61] STS No. 26 (2007) Table 12.31
[62] Scottish Executive, 2006, SPP4 – Planning for Minerals

Future Trends

Forecasted trends for use of aggregates in Scotland indicate that primary aggregate use will rise by 0.73 per cent per year from 2003 to 2018, whereas the combined use of secondary and recycled aggregates will rise by 2.3 per cent per year over the same period[63].

4.2.10 Cultural Heritage

Scottish cultural heritage is diverse, with Scheduled Monuments (SMs) reflecting a rich evidence of human settlement from Neolithic stone circles to the canals of the Industrial Revolution. Scotland also has a wealth of Listed Buildings; Conservation Areas; Historic and Designed Landscapes; and marine archaeological features. A number of sites have also received international designation as World Heritage Sites, recognising their important cultural or natural interest on a global level.

Currently, there are five World Heritage Sites at St Kilda, Edinburgh Old and New Towns, New Lanark, the Heart of Neolithic Orkney and the recently designated Antonine Wall.

There are currently 46,600 listed buildings in Scotland. Approximately eight per cent are Category A, 56 per cent are Category B, with the remainder are Category C. Sites are generally clustered around towns and cities and close to the transport network, in particular around Orkney and the North West, Perth, Aberdeen, Dundee, across the Central Belt and down to the borders.

Future Trends

The Forth Rail Bridge is proposed for world heritage status for cultural reasons, while the Cairngorm Mountains and Flow Country are proposed Natural World Heritage Sites.

In addition, the following Conservation Areas are also proposed within recent Council Local Plans: Keiss Harbour, Lybster Conservation area extension, and Wick Conservation Area (Caithness); Inverurie, Kintore, Auchenblae, Benholm, Downies, Gourdon, Stonehaven, and Kirktown of Fetteresso (Aberdeenshire); Fladdabister, Maywick, Netherton, Leebitton, Hoswick, and extension of Lerwick Town Conservation Area (Shetland); Thistle Foundation Estate (Edinburgh); Bow of Fife Hamlet (Cupar and Fife); Powfoot, Carsethorn, and Penpoint (Dumfries and Galloway).

Proposed Historic Gardens and Landscapes include Fountain Gardens (Renfrewshire); Tankerness House, Kirkwall, Woodwick House, and Rendall and Binscarth Woods (Orkney); Japanese Garden in Cowden and The Gear in Alloa (Clackmannanshire).

4.2.11 Landscape

Approximately 13 per cent of Scotland is designated as a National Scenic Area (NSA)[64]. Loch Lomond and the Trossachs and the Cairngorms are Scotland's two National Parks (Figure 4.2). A landscape character assessment (LCA) was undertaken for Scotland in the mid 1990s. This identified more than 3,900 different units of landscape character

[63] Wrap, 2007, The sustainable use of resources for the production of aggregates in Scotland
[64] SNH, 2004, National Scenic Areas

throughout Scotland which group into over 360 distinct landscape character types. Scotland's landscape is inherently diverse, ranging from lowland farmland, mountainous, moorland and woodland to urban. Landscape character change during the mid 1990s was attributed to expansion of the built environment, farming and forestry.

Future Trends

No information on future designations is available for inclusion within the environmental baseline.

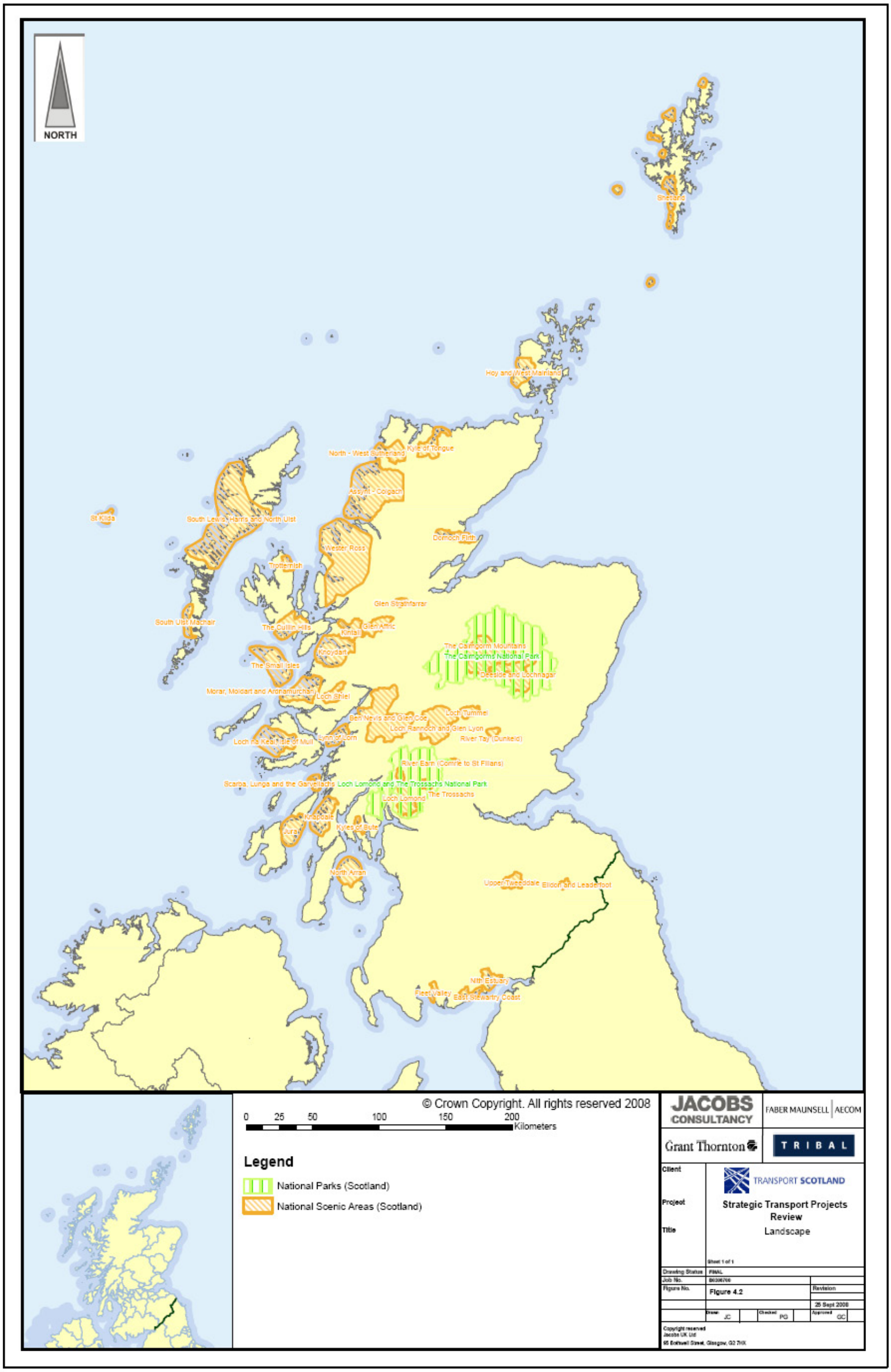

Figure 4.2: Landscape Designations

5 Compatibility Assessment, Investment Hierarchy and Implementability Assessment

This Chapter sets out the results and recommendations which resulted from the preliminary stages of the environmental assessment. It also includes an assessment of the compatibility between the proposed objectives and policy expectations contained within the STPR Report 2 and the established SEA objectives (Chapter 3). The Chapter concludes by describing how the main environmental constraints identified by the SEA Core Team were identified and incorporated into the initial intervention sifting exercise as described in STPR Report 3 (Appendices D and E) and detailed in SEA Appendix 4.

5.1 Compatibility Assessment

In accordance with the requirements of Section 3.3[65] of the Environment Assessment (Scotland) Act 1995, a compatibility assessment has been undertaken of the STPR objectives and policy expectations (as identified in STPR Report 2) against the SEA objectives in order to ensure integration of the SEA and the STPR design processes. The SEA objectives and associated questions are set out in Appendix 2 (Table 2.2) and Section 3.4.6. The purpose of this Chapter is to present the results of the compatibility assessment, the SEA recommendations and how the recommendations have been incorporated into STPR Report 2.

Report 2 of the STPR sets national objectives centred on the Key Strategic Outcomes (KSOs) identified in the National Transport Strategy. These have then been used to develop specific objectives at an urban network, strategic node and transport corridor level (STPR Report 1). The STPR objectives are contained in Appendix 4 of this Report. The compatibility assessment determined whether these STPR objectives comply or conflict with the objectives set in the SEA.

The following components of STPR Report 2 have been assessed:

- STPR objectives;
- STPR Policy Expectations; and
- The Investment Hierarchy described briefly in Section 5.1.3 of STPR Report 2.

The compatibility assessment process identified both consistencies and inconsistencies, along with cases where there is no clear link. When coming to the decision on whether a link could be established and whether compatibility could be assessed (either beneficially or adversely), consideration was given to the extent to which the information available was sufficiently robust to make a determination. Where there are clear inconsistencies, further options have been recommended and these have either been accepted or rejected by the STPR Team and Transport Scotland with justification for their response. The matrix in Appendix 4 gives the full assessment including the responses, with reasoning, from Transport Scotland.

[65] Environmental Assessment (Scotland) Act, 2005

5.1.1 STPR Objectives

The SEA Core Team made several recommendations for alterations to the STPR objectives. The recommendations include modification to three of the national objectives, three of the strategic node objectives and seven of the corridor objectives. The recommendations were aimed at improving the compatibility of the SEA and STPR objectives. All of the recommendations and responses are detailed in Appendix 4 and the main issues are discussed in this Chapter.

The compatibility assessment of the STPR national objectives found that those designed to meet the KSO to 'Reduce Emissions', only addressed carbon dioxide (CO_2) emissions and did not fully consider other transport-related emissions concerning air quality, such as nitrogen dioxide (NO_2) and particulates (PM_{10}). Consequently, it was suggested that the STPR objectives relating to managing transport related emissions be changed from:

- Reduce CO_2 emissions per person km;
- Stabilise total CO_2 emissions; and
- Reduce CO_2 emissions in line with expectations from the emerging Climate Change Bill.

To:

- 'Reduce CO_2e emissions per person km';
- 'Stabilise total CO_2e emissions', and
- 'Reduce CO_2e and other emissions to air in line with expectations from the emerging Climate Change Bill, the UK Air Quality Strategy and the Air Quality Scotland Regulations'

The SEA Core Team's recommendation was accepted and integrated into the STPR objectives. As a result, the new objective: *'to reduce* CO_2e *and other emissions to air in line with expectations from the emerging climate change bill and the UK Air Quality Strategy and the Air Quality Scotland Regulations'* has been re-assessed against the SEA objectives. It was found the new objective was found to be compatible with five of the SEA objectives, namely Biodiversity, Flora and Fauna, Soil, Water, Air, and Climatic Factors. There was no clear relationship identified however between the STPR emissions related objectives and the other SEA objectives. The detailed results can be found in Appendix 4, Table 1.3.

The STPR objectives relating to the national developments (transport) which are set out in the Draft NPF2 were assessed as being incompatible with some of the SEA objectives. A primary function of the STPR is to support implementation of the NPF2 and it is recognised that the national developments, described by NPF2, have been subject to an SEA. This SEA Core Team has therefore made recommendations relative to potential environmental enhancements of interventions which would support NPF2 implementation. At the time of writing, the national developments comprised:

- Forth Replacement Crossing;
- Edinburgh Airport Enhancement;
- Glasgow Airport Enhancement;
- Grangemouth Freight Hub;
- Rosyth International Container Terminal;
- Scapa Flow Container Transhipment Facility;
- Grid Reinforcements to Support Renewable Energy Development;
- Glasgow Strategic Drainage Scheme; and
- Commonwealth Games Facilities and Infrastructure.

It was recommended that the specific STPR objectives that relate to these national developments could be improved by emphasising support for public or sustainable transport modes when considering improving links to them. Transport Scotland decided not to adopt this amendment as the original objective *'…reflects the status and development of NPF2. The STPR is a supporting strategy of NPF2 and should be seen in this light.*[66]*'*.

5.1.2 STPR Policy Expectations

Policy expectations set out in STPR Report 2 have also been assessed against the SEA objectives and recommendations have been made, where appropriate. The expectations are used to assess the performance of the network of the STPR. Expectations are to:

- Link major urban centres;
- Provide links to airports and ports;
- Provide links to international gateways and cross borders;
- Link peripheral communities;
- Link areas of population change;
- Facilitate freight routes;
- Link key tourist areas; and
- Link areas of economic growth and regeneration areas of national significance.

[66] Appendix 4 Table 1.3.

It was found through the initial compatibility assessment that the expectation to '*provide links to airports and ports'* was not compatible with the SEA water, air, climate or human health objectives. While developing access to airports may facilitate or even promote airport use, giving rise to increased air and noise pollution, it is recognised that the management and development of airports falls outside the remit of the STPR. The STPR, however, is committed to provide access to these facilities and therefore the re-assessment of this objective was viewed within this constraint and considered how (not whether) access to these facilities should be provided. The re-assessment was found to be compatible with the SEA objectives.

5.1.3 STPR Approach to Targeting Investment (Investment Hierarchy)

The overall approach to developing and appraising options for transport interventions within the STPR is discussed in Section 2.3.2 of STPR Report 2 (Investment Hierarchy). This approach recognises that in developing and appraising options, investment should be targeted in the following order of hierarchy:

- Firstly, at **maintaining and safely operating** existing assets;
- Secondly, at promoting a range of measures, including innovative solutions, to **make better use of existing capacity** (Interventions may include technology based, fiscal and 'soft measures' in addition to engineering solutions); and
- Thirdly, at promoting **targeted infrastructure improvements**.

Options for transport interventions are therefore considered by first determining whether issues can be addressed through the use of existing assets, secondly by building on existing capacity and lastly through infrastructure improvements. As discussed in Report 2, the STPR does therefore not bring forward recommendations for infrastructure improvements without first considering the requirement for, and effectiveness of, interventions in the first two categories.

The approach adopted has been considered within the SEA to assess whether the accepted order is the most environmentally sound way of targeting investment.

This approach has, as its aims, to maintain the existing infrastructure and ensure its safety and improve the current infrastructure with innovative solutions which may include technology based, fiscal and 'soft measures'. Maintaining the existing network and, where necessary, improving conditions will reduce congestion as well as accident black spots in targeted areas, therefore improving air quality and human health. Finally, where issues cannot be resolved by the first two steps, targeted infrastructure improvements will be considered which would likely have adverse effects on biodiversity, soil, water, cultural heritage and landscape but would possibly benefit isolated communities through improved linkages, and also have the potential to further reduce congestion on existing roads and railways.

This option only considers the provision of new infrastructure where it can be clearly demonstrated that it is necessary and avoids related potentially adverse environmental effects. The hierarchy considered is therefore considered to be an environmentally sound approach to targeting investment.

The two alternative approaches; Alternative Option 1 and Alternative Option 2 along with the Accepted Approach are discussed below:

5.1.4 Alternative Option 1

1. *Maintaining and safely operating existing assets*

This option limits investment to the maintenance and safe operation of existing assets without the introduction of any other type of measure. Public transport provision remains broadly the same with no significant increase in service or capacity. With this scenario, existing issues of congestion may persist, inhibiting attempts to improve air quality in many places, particularly the urban nodes with corresponding primary and secondary negative effects on human health. However, it is possible that the option could result in behavioural changes such as increased working from home, walking or cycling as a result of increased journey times. The option would not tackle the problems of isolation experienced by some Scottish communities, links between these communities, essential services and employment would not be improved.

5.1.5 Alternative Option 2

1. *Maintaining and safely operating existing assets; and*
2. *Promoting a range of measures, including innovative solutions, to make better use of existing capacity (Interventions may include technology based, fiscal and 'soft measures' in addition to engineering solutions).*

This option considers targeting investment at the maintenance and safe operation of existing assets before giving any consideration to measures which would build on existing capacity, but does not consider targeted infrastructure improvements.

Beyond the compulsory need to maintain and ensure the safe operation of existing assets, this option considers improvements to the existing infrastructure capacity through innovative engineering solutions, which may also include technology based, fiscal and 'soft measures'. This would allow for the improvement of many current congestion problems and so have secondary benefits to air quality, with corresponding improvements in health. However, it fails to address the isolation of some communities, the continuation of severe congestion problems and the difficulty of promoting modal shift in areas where public transport infrastructure (for example railways) is inadequate or absent.

Accepted Approach

1. *Maintaining and safely operating existing assets;*
2. *Promoting a range of measures, including innovative solutions, to make better use of existing capacity (Interventions may include technology based, fiscal and 'soft measures' in addition to engineering solutions); and*
3. *Promoting targeted infrastructure improvements.*

The primary aims of this approach are to maintain the existing infrastructure, ensure its safety and improve the current infrastructure with innovative solutions which may include technology based, fiscal and 'soft measures'. Maintaining the existing network and, where necessary, improving conditions will reduce congestion as well as accident black spots in targeted areas, therefore improving air quality and human health. Finally, where issues cannot be resolved by the first two steps, targeted infrastructure improvements will be considered which would likely have adverse effects on biodiversity, soil, water, cultural heritage and landscape but would possibly benefit isolated communities through improved linkages, and also have the potential to further reduce congestion on existing roads and railways.

This option only considers the provision of new infrastructure where it can be clearly demonstrated that it is necessary and avoids related potentially adverse environmental effects. It can therefore be said to be the most environmentally-sound option of the three put forward.

SEA Recommendations to the Investment Hierarchy

It is recommended that the Accepted Approach is the most environmentally sound option in comparison to Alternative Options 1 and 2 and this option was taken forward in the STPR.

Through the assessment, a recommendation for re-wording was made for the second level of the hierarchy in Accepted Approach, from the following original wording of;

'Promoting a range of measures, including innovative solutions, to make better use of existing capacity (interventions may include technology based, fiscal and 'soft measures' in addition to engineering solutions)'.

To the following alternative of;

'*Promoting a range of measures, including innovative solutions, to make better use of existing capacity (interventions may include technology based, fiscal and 'soft measures considered on an equal basis with engineering solutions)*'

The recommendation was made so that technology based, fiscal and 'soft measures' are considered on a par with engineering solutions. However, this was not accepted as it was considered that the original statement implicitly gave equal weighting to each type of intervention.

5.1.6 Compatibility Conclusions

The SEA Core Team's recommendations have been considered and incorporated into the STPR Objectives, where agreed. The main change is to the wording of the STPR Reduce Emissions objective, which now reads:

- 'Reduce CO_2e emissions per person km';
- 'Stabiliise total CO_2e emissions'; and

- 'Reduce CO_2e and other emissions to air in line with expectations from the emerging Climate Change Bill, the UK Air Quality Strategy and the Air Quality Scotland Regulations'.

Where the SEA recommendations have not been accepted, a justification was provided. Where changes have been incorporated, a re-assessment of the compatibility of these with the SEA objectives has been completed. In light of the responses it has only been necessary to re-assess the compatibility of one STPR objective and one policy expectation. All of the assessments are detailed in Appendix 4 (Tables 1.3 and 1.4).

5.2 Implementability Assessment

Initially, the STPR considered over 1,000 potential transport interventions generated from a range of sources. The list of interventions was subject to an initial sifting process to ensure consistency with the overarching STPR objectives. The output from this initial assessment was a list of 137 potential interventions, which were then developed further and 135 taken forward for more detailed STAG appraisal as shown by Figure 3.2 (Chapter 3).

At this point, as part of the SEA, a brief initial assessment was undertaken of each of the 135 interventions against potential major environmental issues that could severely constrain the implementability of the intervention. At this stage, these constraints concentrated on issues of compliance with international and national environmental legislation relevant to the environmental parameters being explored in the SEA. The main pieces of environmental legislation identified as relevant were:

- The EU Habitats Directive as implemented by the Conservation (Natural Habitats, &c.) Amendment (Scotland) Regulations 2004;
- The Water Framework Directive as Implemented by the Water Environment and Water Services (Scotland) Act 2003 and Water Environment (Controlled Activities) (Scotland) Regulations 2005 (The CAR Regulations);
- The EU Air Quality Directive as implemented by the Air Quality Standards (Scotland) Regulations 2007; and
- Ancient Monuments and Archaeological Areas Act 1979.

Each intervention was assessed using expert judgement as to ascertain whether it could be implemented while meeting the requirements laid down by these Acts and Regulations (allowing for the any necessary mitigation techniques to be employed).

Further details on the method used are provided in Section 3.5.2. The full results of the assessment are detailed in Appendix 4 (Table 4.2.1) and the main conclusions are discussed in this section.

In total, 83 of the 137 potential interventions were identified as having potential significant environmental effects such as compromising the integrity of Scheduled Monuments or their setting, degrading water quality or deteriorating air quality. Of these 83 interventions, 78 had potential effects that could be mitigated at the policy level.

Overall, it was considered that 27 interventions could have adverse affects upon Natura 2000 sites. At this stage in the development of the integrated STPR and SEA processes however, it was recognised that the likely effects would need to be determined through an Appropriate Assessment in accordance with the EU Habitats Directive as implemented by the Conservation (Natural Habitats, &c.) Amendment (Scotland) Regulations 2004.

The matrix (Table 4.2.1) presented in Appendix 4 highlights initial requirements for an Appropriate Assessment and contains additional information in light of the findings of the Appropriate Assessment where applicable. Of the 27 initial interventions, 22 were taken forward to more detailed stages and subject to an Appropriate Assessment

Five of the initial interventions identified as requiring an Appropriate Assessment at the implementability assessment stage were not taken forward and so an Appropriate Assessment was not conducted. These included:

126: *Rail Infrastructure and Service Enhancements on the Far North Line*;

8: *Upgrade of the A96 to Duel Carriageway between Inverness and Aberdeen*;

172: *New Road Link between the M74 and M8*;

69: *Cross Forth Ferry Facilities*; and

171: *Online Trunk Road Improvements on the A75*.

Intervention 175: *New River Clyde Rail Crossing and Glasgow Outer-Suburban Circular Rail Service*, taken forward to the more detailed stage as E3: *Construction of Glasgow Crossrail,* was screened out of the Appropriate Assessment as it was not considered to have any significant effects on Natura 2000 or Ramsar sites.

The implementability assessment identified four of these 27 interventions likely to have significant adverse effects on biodiversity and/or biodiversity and landscape which could not be mitigated at the policy level. Further details relative to these four interventions and subsequent outcomes of the Appropriate Assessment are outlined in Table 5.1.

Table 5.1: Interventions identified with potential significant adverse effects

Intervention	Subsequent Detailed Intervention	Designations	Screening Stage (Appropriate Assessment)
9 - Online Trunk Road Improvements on the A82 between Fort William and Inverness, A87, A887 and A830	D3: *Targeted Programme of Measures to Reduce Accident Severity between Inverness, Fort William, Mallaig and Skye.*	This intervention has the potential to affect Natura 2000 sites including: the West Inverness-shire Lochs SPA, River Moriston SAC, Lochs Duich, Long and Alsh Reefs SACs, Cuillins SPA and Sligachan Peatlands SAC which are located adjacent to the A82 and therefore could be adversely affected by the widening of this road.	Appropriate Assessment screening considered the potential risk that each intervention poses to each Natura 2000 or Ramsar site within a 15 km radius, due to the following effects: • Habitat loss and fragmentation; • Noise and vibration; • Changes in air quality; and • Changes in hydrology and/or water quality. When deciding whether an intervention could result in a likely significant effect on a Natura 2000 site, it was necessary to consider what particular effects the intervention could have and over what distance the effects have the potential to affect a Natura 2000 site. It could be possible to mitigate the potential effects of D3 and D15 the project design stage through a combination of measures such as avoidance and an ecological management plan. The findings to the strategic level Appropriate Assessment are described in more detail in Chapter 7.
13 - Rail Service Enhancements on the Highland Mainline	D15: *Rail Enhancements on the Highland Mainline between Perth and Inverness.*	This intervention has the potential to affect Natura 2000 sites including: River Tay SAC; Tulach Hill SAC and Glen Fender Meadows; Drumochter SPA; River Spey SAC; River Spey SPA; Insh Marshes; Ramsar and SPA; Kinveachy Forest SPA and SAC; Slochd SAC which are located adjacent to the rail line.	

Intervention	Subsequent Detailed Intervention	Designations	Screening Stage (Appropriate Assessment)
10 - Upgrade A9 to Dual Carriageway from Perth to Inverness	D14: *A9 upgrading from Dunblane to Inverness (Phase 1)* and *A9 upgrading from Blair Atholl to Inverness (Subsequent phases)*).	This intervention has potential effects on both Natura 2000 sites and the proposed World Heritage Site in the Cairngorms including: the River Tay SAC; Tulach Hill SAC and Glen Fender Meadows SAC; Drumochter SAC and SPA; River Spey SAC; River Spey SPA and Insh Marshes Ramsar; Kinveachy Forest SAC and SPA; and Slochd SAC which are located adjacent to the A9. The proposed corridor cuts through the northwest of the Cairngorms. This is a proposed World Heritage Site and its integrity and potential for designation could potentially be adversely affected. An assessment of the visual implications of the works would need to be considered in addition to the ecological effects.	The Appropriate Assessment findings could not conclude at the strategic level that a preferred engineering solution to the interventions relating to the A9, 10: *Upgrade A9 to Dual Carriageway from Perth to Inverness*; and 11: *Selective Upgrades to the A9 Between Perth and Inverness* (taken forward into D14) would not adversely affect the integrity of Natura 2000 or Ramsar sites. An alternative solution was proposed for both which, at a strategic level, would offer possibilities to mitigate potential effects upon the affected designated sites.
11 - Selective Upgrades to the A9 Between Perth and Inverness	D14: *A9 upgrading from Dunblane to Inverness (Phase 1)* and *A9 upgrading from Blair Atholl to Inverness (Subsequent phases)*).	This intervention has potential effects on Natura 2000 sites including: the River Tay SAC between Perth and Pitlochry. Between Dalwhinnie to Dalnaspital: Drumochter SAC and SPA; River Spey SAC and SPA and Insh Marshes Ramsar. Between Pitlochry and Bruar: River Tay SAC; Tulach hill SAC and Glen Fender Meadows SAC.	

6 Initial and Detailed Environmental Assessments

6.1 Introduction

This Chapter presents the results of the environmental assessment of the STPR transport interventions. The assessment has been undertaken at two levels:

1. An initial high level assessment was conducted on 135 potential transport interventions and this was fed into the initial STAG appraisal process.

2. A more detailed assessment was carried out of 50 interventions selected for further study in the STPR. These included a number of single interventions brought forward from the initial assessment stage as well as a number of combined interventions. Intervention D14 and Intervention D19 were assessed in two parts within the detailed environmental assessment as these interventions involved different 'options' or 'phases' as detailed within STPR Report 3 Appendix D. Appendix 5 outlines these final interventions, overall there where 31 interventions that where assessed as having beneficial effects and 10 interventions that were assessed as having adverse effects after further study. 8 Interventions were assessed as having a neutral effect overall and 1 intervention has been assessed as uncertain.

The reasons why some interventions were not taken forward to the detailed assessment stage are:

- The intervention would not contribute significantly to the Government's overarching Purpose and the complementary objectives of the National Transport Strategy and National Planning Framework;

- The intervention would not contribute significantly to the STPR objectives relative to corridors, networks and nodes in light of resource limits; and

- The intervention would need to overcome significant implementability constraints including possible adverse environmental effects, technical or operational constraints and legislative processes.

A description of the methodology used to undertake the environmental assessment is provided within Chapter 3, Section 3.5.4.

As part of the SEA process, alternatives to interventions which presented an overall adverse environmental effect were proposed at both levels of assessment. The alternatives for the initial assessments and their acceptability are discussed in this chapter. Detailed assessments of SEA alternatives are discussed in Chapter 7.

6.2 Initial Environmental Assessment

A summary of the initial environmental assessments conducted are presented below according to the predicted overall level of environmental effects; beneficial or adverse. 130 interventions where assessed as having a beneficial effect on the environment and 5 interventions were assessed as neutral. This Chapter describes which interventions were progressed to the detailed assessment stage, and provides justification for those that were not selected. Alternatives were put forward for those interventions identified as having an adverse environmental effect (Section 6.2.3). Full rationale and intervention details can be found within STPR Report 3.

The environmental benefits of several interventions were considered to be minor or uncertain and thus it is considered that when compared with issues such as best value or their ability to be implemented, these benefits are sometimes harder to commend. Further details of the initial assessment, including the assessment matrix, are located within Appendix 5 of this Report.

6.2.1 Beneficial Effects

The key environmental benefits identified for many interventions related to potential improvements to air quality and a contribution towards the reduction of emissions of greenhouse gases (CO_2e), with associated possible benefits to human health. Many new schemes are also seen as beneficial because they could improve accessibility to key destinations.

130 schemes were considered to have inherent beneficial environmental effects, with the caveat that there is a very high level of uncertainty at this strategic level of assessment (Appendix 5: Table 5.1.1).

Beneficial Interventions

At the initial assessment stage, there was a substantial amount of uncertainty surrounding the environmental effects on various parameters due to the lack of detail available. The large degree of uncertainty tended to skew the assessments in that beneficial effects, especially upon human health (in terms of accident reduction and population in terms of improved accessibility) were more apparent that any adverse effects relative to, for example, biodiversity or cultural heritage resources. The purpose of this initial assessment was only to inform the process of sifting to a more detailed assessment process where adverse effects would be considered more thoroughly.

Major road improvement schemes typically lead to improved road safety and access to employment areas and services however, they could also have potential adverse effects (for example, through construction and effects on the landscape and visual setting). Any new infrastructure is expected to have the potential to create adverse effects on biodiversity, water quality, soils and geology, cultural heritage, material assets, and the local landscape. It was not possible to assess the magnitude of these effects at such an early stage in the design process, as the location and form of improvements was generally not known. It is anticipated that, in most cases, effects could be avoided through sensitive design and employment of best practice mitigation measures during construction.

Non-intrusive or minor improvements to the road network (for example, speed enforcement, safety improvements and demand management) mainly have neutral effects on environmental assets as they generally require little or no new infrastructure. Reduced traffic volumes and speed can lead to improvements in air quality and reductions in carbon dioxide emissions (CO_2e). There are also general improvements to road safety.

Rail improvement schemes are expected to improve accessibility and encourage modal shift therefore potentially reducing traffic on the road network. This would lead to improved air quality and reduced emissions of carbon dioxide with subsequent benefits to human health. New links or increased level of services could however increase noise levels to local communities. Any new infrastructure could have the potential for adverse effects on the SEA objectives of biodiversity, water quality, soils and geology, cultural heritage, material assets and the local landscape.

Public transport improvements mainly have minor beneficial effects on the SEA objectives as they generally require little or no new infrastructure. They could improve accessibility and encourage modal shift to public transport, taking cars off the roads with a corresponding improvement in air quality and reduction in carbon dioxide emissions. These would improve human health and road safety levels.

Beneficial Interventions Not Progressed

The following 23 interventions have been assessed as having an overall beneficial effect on the environment; however these interventions have not been progressed through to the detailed assessment phase for the reasons outlined above. More detailed information is given in Appendix 5 (Table 5.1.1). Whilst these interventions have been assessed as beneficial in terms of the environment, it is common that effects are only assessed as minor and in such cases; environmental benefits are often outweighed by issues of cost effectiveness or implementability. Many of the environmental benefits also have a high level of uncertainty associated with them which also needs to be measured against more practical issues. Summaries of each intervention are set out below.

17 – Lengthen Trains and Platforms between Edinburgh and Dunblane

Only modest environmental benefits were envisaged to material assets, population, noise, air quality and CO_2e emissions as a result of this intervention. This intervention did not progress to the detailed assessment stage as it is considered that more considerable benefits could be delivered through alternative interventions.

23 – Upgrade of M80 Junction 1

Only modest environmental benefits were envisaged to air quality and CO_2e emissions as a result of this intervention. The beneficial effects however, were not considered to outweigh the potential implementability constraints and accordingly, the intervention was not progressed to the next stage of the assessment process.

32 – New Light Rapid Transit Line between Edinburgh and Livingston

Beneficial effects on population, human health, air quality and CO_2e emissions were considered possible as there was the potential for adverse effects on cultural heritage. Whilst this intervention was thought to have a beneficial effect on the environment and contribute towards increased capacity between Livingston and Edinburgh, the beneficial effects were not considered to outweigh the potential implementability constraints and accordingly, the intervention was not progressed to the next stage of the assessment process.

51 – Lengthen Trains and Platforms in Strathclyde

Only modest environmental benefits were predicted to material assets, population, human health, air quality and CO_2e emissions as a result of this intervention. The beneficial effects however, were not considered to outweigh the potential implementability constraints and accordingly, the intervention was not progressed to the next stage of the assessment process.

67 – Aberdeen Airport Public Transport Interchange

The intervention would lead to beneficial effects on population, human health, material assets, air quality and CO_2e emissions but there was the potential for adverse effects on the noise environment. The beneficial effects however, were not considered to outweigh the potential implementability constraints and accordingly, the intervention was not progressed to the next stage of the assessment process.

69 – Cross Forth Ferry Terminal Facilities at Edinburgh, Burntisland and Kirkcaldy

Whilst this intervention was envisaged to have beneficial effects on the population, human health, air quality and CO_2e emission reductions, there was potential to adversely affect biodiversity and water quality through increased usage of the Firth of Forth. It was considered that an Information to Inform Appropriate Assessment would be required to confirm that, at a strategic level, the intervention would not affect the integrity of any Natura 2000 site if this potential intervention was taken forward however, this intervention was not progressed to the next stage of assessment because the expected modal shift would be modest at a regional scale.

77 – Edinburgh Waverley Public Transport Interchange

This intervention would lead to potential benefits to the population, improve air quality, contribute to CO_2e emission reductions and make good use of existing infrastructure as well as modest benefits to human health. There could be potential adverse effects relative to noise sensitive receptors and cultural heritage resources. The beneficial effects however, were not considered to outweigh the potential implementability constraints and accordingly, the intervention was not progressed to the next stage of the assessment process.

80 – New Light Rapid Transit Line between Edinburgh and Haddington

Beneficial effects to population, human health, air quality and CO_2e emissions were envisaged however, there was uncertainty regarding the significance of effects on cultural heritage. Whilst this intervention was envisaged to have a beneficial effect on the environment and contribute towards improving public transport, the beneficial effects were not considered to outweigh the potential implementability constraints and accordingly, the intervention was not progressed to the next stage of the assessment process.

83 – New Rail Line from the East Coast Mainline between Longniddry and Haddington

Beneficial effects on the population, human health, material assets, air quality and CO_2e emissions were considered possible however; there was also the potential for adverse effects upon cultural heritage. Whilst this intervention was envisaged to have an overall beneficial effect on the environment, and contribute towards improving public transport, it was considered that the beneficial effects would not be outweighed by potential implementability constraints. Accordingly, the intervention was not progressed to the next stage of the assessment process.

90 – New Bypass around Greenock

Whilst this intervention was envisaged to have modest benefits to the population, human health, noise and air quality it was also likely to have adverse effects on material assets and potentially biodiversity, soils and geology, cultural heritage and landscape as a result of the associated land-take. The beneficial effects were not considered to contribute significantly towards the corridor's public transport objectives and accordingly, the intervention was not progressed to the next stage of the assessment process.

108 – New Rail Connections in Fife

It was considered that this intervention would only contribute to one Key Strategic Objective; the reduction of CO_2e emissions. Whilst this intervention has moderate beneficial effects to air and population and modest benefits to reducing CO_2e emissions, the potential effects on material assets and human health were uncertain. Potential land-take could have an adverse effect upon the natural environment. The beneficial effects were not considered to outweigh the potential implementability constraints and accordingly, the intervention was not progressed to the next stage of the assessment process.

114 – Suburban Rail Services across Edinburgh

Environmental benefits were likely to material assets, population, human health, air quality and CO_2e emissions as a result of this intervention. Whilst this intervention was thought to partly address some of the accessibility constraints in Edinburgh City Centre, it was not considered to fully contribute to STPR objectives and did not possess sufficient environmental benefit to justify the cost involved.

120 – New Rail Line from the Borders Rail Link between Penicuik and Shawfair

Whilst this intervention was thought to have benefits to the population, human health, air quality and CO_2e emissions, potential adverse effects were expected relative to noise, material assets and landscape and visual setting. There was also the potential for adverse effects on biodiversity, water quality, soils and geology and cultural heritage as a result of associated land take for the new rail line. There was a high degree of uncertainty surrounding these environmental benefits and accordingly, the beneficial effects were not considered to outweigh the potential implementability constraints. For this reason, the intervention was not progressed to the next stage of the assessment process.

126 – Rail Service Enhancements on the Far North Line

Whilst this intervention was envisaged to benefit the population, human health, material assets, air quality and CO_2e emissions, there was the potential for adverse effects on biodiversity, water, soils and geology and cultural heritage. It was considered that an Information to Inform Appropriate Assessment would be required to confirm that, at a strategic level, the intervention would not affect the integrity of any Natura 2000 site, if this intervention was taken forward however, the beneficial effects were not considered to outweigh the potential implementability constraints. Accordingly, the intervention was not progressed to the next stage of the assessment.

130 – Rail Freight Enhancements between Glasgow and the Border via Dumfries

It was found that there were modest environmental benefits of this intervention through improvements to air quality, material assets, human health and reductions in CO_2e emissions. Effects on the other environmental parameters were considered uncertain. The intervention did not progress to the more detailed assessment stage as it was thought that other interventions aimed at providing more competitive rail freight opportunities in this corridor presented a more effective and cost efficient alternative.

135 – New Rail Line between Wemyss Bay and Largs

Only modest environmental benefits were expected to material assets, noise, air quality and CO_2e emissions as a result of this intervention. Furthermore this intervention had the potential for modest adverse effects on noise and uncertain effects on the natural environment. This intervention did not progress to the detailed assessment stage as it was considered to have minimal benefits to the rail network at the strategic level.

152 – Express Coach Service Facilities between Aberdeen and Inverness

Only modest environmental benefits were envisaged to material assets, population, noise, air quality and CO_2e emissions as a result of this intervention. This intervention did not progress to the next stage as it was considered that greater benefits could be delivered through alternative interventions.

165 – Double-deck trains between Glasgow and the Ayrshire Coast

Only modest environmental benefits were envisaged to material assets, population, human health, air quality and CO_2e emissions as a result of this intervention. As the potential benefits were considered to be modest, this intervention was not progressed to the next stage due to technical and operational constraints.

166 – Double-deck trains between Glasgow and Kilmarnock

Only modest environmental benefits were likely to material assets, population, human health, air quality and CO_2e emissions as a result of this intervention. The beneficial effects were not considered to outweigh the potential implementability constraints and accordingly, the intervention was not progressed to the next stage of the assessment.

167 – Extensive Rail Freight Enhancements between Mossend, Grangemouth and Aberdeen/Inverness via Perth

Only modest environmental benefits were envisaged to material assets, human health, air quality and CO_2e emissions as a result of this intervention. It was identified that land-take had the potential to affect the natural environment. It was considered that the potential environmental benefits of this intervention did not outweigh the cost constraints, and the intervention was not progressed to the next stage.

172 – New road link between the M8 and M74

Only modest environmental benefits were envisaged to material assets and population as a result of this intervention. Furthermore land take had the potential to adversely affect the natural environment. At this stage of the environmental assessment effects on biodiversity, noise, cultural heritage, landscape and visual, water quality and geology and soils had the potential to be adverse but effects were uncertain at the initial stage of assessment.

174 – Extensive Rail Freight Enhancements between Stranraer, Kilmarnock and the Border

Only modest environmental benefits were envisaged to material assets, human health, air quality and CO_2e emissions as a result of this intervention. Furthermore land take has the potential to affect natural environment parameters. In addition to the uncertainty regarding environmental benefits, this intervention did not progress to the detailed assessment stage as extensive works would be required.

6.2.2 Adverse Effects

Five schemes were considered to have overall adverse effects on the environment, for one of two main reasons:

- Schemes that run through sensitive environmental areas, notably nature conservation sites designated at national or international level, National Parks and National Scenic Areas. Those affecting international sites would need an Appropriate Assessment to prove that there is no loss to the integrity of these designations.

- Schemes that were considered to introduce new traffic, therefore increasing overall vehicle flows in the area. These would result in reduced air quality and increased CO_2e emissions, with adverse effects on human health and climate change.

The interventions with adverse effects are listed below:

- 8 – Upgrade A96 to Dual Carriageway between Inverness and Aberdeen;
- 10 – Upgrade A9 to Dual Carriageway Between Perth and Inverness;
- 11 – Selective Upgrades of the A9 from Perth between Perth and Inverness;
- 134 – New Motorway Link between the M8 and Edinburgh Airport; and
- 174 – New Road Link between the Glasgow Southern Orbital and M74.

One of these interventions, *The Upgrade of the A96 to Dual Carriageway between Inverness and Aberdeen,* was not progressed through to the detailed assessment stage. A decision to remove this intervention was taken on the basis of a wider assessment outwith the SEA in which it was considered that the dualling of the entire route would not provide value for money. A full justification can be found within Appendix 5, Table 5.1.2 of the Environmental Report.

6.2.3 Initial Assessment of Alternatives

As part of the SEA process, alternatives have been proposed for interventions with adverse effects. Details of the alternatives identified for each intervention, along with a justification as to why the alternative has been progressed through to the detailed assessment stage are set out below. The Initial Assessment Alternatives matrix is provided in Appendix 5, Table 5.3.2 of this Report.

8 - Upgrade A96 to Dual Carriageway between Inverness and Aberdeen

Three alternatives with overall beneficial environmental effects have been considered for this intervention including; New Bypasses around Nairn, Keith and Elgin; A96 Road Safety Improvements and Rail Improvements between Inverness and Aberdeen. All three alternatives were accepted and carried through to the detailed assessment stage.

10 - Upgrade A9 to Dual Carriageway between Perth and Inverness

One alternative was suggested for this Intervention 13 - Rail Service Enhancements on the Highland Mainline. The alternative was accepted and carried through to the detailed assessment stage. The road scheme however was also taken forward to the detailed assessment stage as it has not been possible to determine, at the initial stage of assessment, whether Intervention 13 would fully address the corridors objectives.

11 - Selective Upgrades of the A9 from Perth between Perth and Inverness

One alternative was suggested for this intervention - Highland Mainline Improvements. The alternative was accepted and carried through to the detailed assessment stage however, the intervention titled 'Selective Upgrades to the A9 between Perth and Inverness' has also been taken forward to the detailed assessment stage as it has not been possible to determine at the initial stage whether Highland Mainline Improvements would fully address the corridors objectives.

134 - New Road Link between the M8 and Edinburgh Airport

One alternative was considered for this intervention; Edinburgh Airport interchange, with increased public transport opportunities to the airport. This has however been committed to under the Edinburgh to Glasgow rail improvements intervention (EGIP – as set out in the Ministerial Statement on the 27 September 2007) and would allow for a good quality interchange with services. This intervention would not be removed from the detailed assessment as the potential demand for travel to Edinburgh Airport is unlikely to be fully accommodated by the committed public transport schemes. The intervention was therefore carried forward to allow a robust assessment of possible options.

173 - New Road Link between the Glasgow Southern Orbital and M74

One alternative was considered for this intervention - Improvements to the existing A725. This alternative was not carried forward to the detailed assessment stage as it was not expected to deliver the necessary linkage and connectivity across the trunk corridor. The intervention was therefore carried through to the detailed assessment stage.

6.3 Detailed Environmental Assessments

Following the initial assessments, detailed assessments were undertaken on the interventions selected for further study. A methodology relating to the detailed assessments can be found within Chapter 3 (Section 3.5.4). The results of the detailed assessment are presented within this section. The assessment findings relate to the predicted level of environmental effect, overall, taking account of the inter-relationship between all of the environmental parameters. The detailed assessment matrix is provided within Appendix 5 of the SEA Environmental Report within Table 5.3.3.

A fuller description of these interventions is contained in Appendices D and E of STPR Report 3. Appendix E of STPR Report 3 presents details of interventions not taken forward (labelled E) by the STPR process and the reasons that these interventions were not forward through the STPR process. Appendix D of the STPR Report 3 identifies those interventions to be taken forward and these are referenced as D Interventions.

6.3.1 Beneficial Effects

The assessment has demonstrated that 31 of the transport interventions are considered to be overall beneficial from an environmental perspective.

Appendix 5, Table 5.2.1 contains details of the interventions assessed as having an overall beneficial effect and its significance. A summary of the SEA detailed assessment for each intervention with overall beneficial effects is set out below.

D1 – Delivery of the Strategic Road Safety Plan

The delivery of a strategic road safety plan would have major long term benefits for the whole of Scotland's environment. It was envisaged that the measures would have major long term benefits associated with human health through a substantial improvement to accident rates in the country. The implementation of the road safety plan (beyond interventions identified in the STPR) was not envisaged to require any new infrastructure or result in any physical effects and therefore would not have adverse effects on the natural environment or population. The intervention was not expected to result in any changes to the noise environment and no upgrades or improvements to material assets were envisaged. In addition, the Plan was not expected effect levels of NO_2 or CO_2e emissions.

D2 – Maintaining and Safely Operating Scotland's Rail Network

Through a commitment to implement measures associated with maintaining and safely operating Scotland's rail network, it was considered that the Scottish population and its health, air quality, CO_2e emissions and material assets could be improved. These improvements included a safer rail network with reduced accidents and enhanced access to essential services maintaining moderate benefits to communities in Scotland. This could also encourage more people to use the rail network, creating a modal shift from the private car, leading to minor reductions in NO_2 and CO_2e emissions. Major benefits to national material assets would result from the utilisation of the existing network to its full potential through maintenance and safe operating of the whole network.

The measures to maintain and safely operate the rail network were not likely to require land-take or new infrastructure and therefore effects on biodiversity, water bodies, soils and geology, cultural heritage features and the landscape and its visual amenity were not expected. Furthermore, maintaining the rail network would have a limited adverse effect on noise sensitive receptors.

Overall, this intervention was considered to have long term major benefits to the environment of Scotland with no adverse effects envisaged.

D3a – Targeted Programme of Measures to Reduce Accident Severity on the A9 North of Inverness

Reducing accident severity on the A9 north of Inverness would have long term benefits to the natural and built environment of the region. There was a degree of uncertainty surrounding the significance of this benefit but it was considered that an improvement would be on a minor to moderate scale.

Reducing the severity and incidence of accidents on this route would have significant major benefits to the regional population's health. The A9 is an important tourist route, and the severity of accidents on the Inverness to Thurso section of the A9 is marginally worse than the national average. It was not expected that the measures would deliver substantial health effects in relation to air quality however, some short term; potentially negligible, adverse effects due to construction works were thought possible.

There were a series of potential adverse effects on some environmental features and there was a high degree of uncertainty surrounding these as the actual nature of the works employed as a result of this intervention was not specified.

Depending on the actual form and location of works there could be minor, adverse effects on regional biodiversity, geological and water resources and cultural heritage resources however it was expected that these would be minimised through sensitive siting and design in line with environmental legislative requirements (The Transport and Works (Scotland) Act, 2007 (Consents under Enactments) Regulations, 2007) and best practice according the DMRB as explained in more detail in Chapter 7. It was also proposed that due to restrictions placed on the form and siting of works by the requirements of the Habitats Directive, that all potential adverse effects on European designated sites could be avoided. This has been confirmed by the Information to Inform Appropriate Assessment findings which can be found in Appendix 8a.

Some adverse effects on the regional landscape were envisaged but these were expected to be minor due to the fact that most works would be at grade and within the present road footprint. The intervention was not expected to have any substantial effects on air quality, CO_2e emissions, community linkages or the noise environment in this area.

Based on the available detail, it was considered that the potential substantial contribution to health presented by this intervention outweighed the minor and adverse effects which could be mitigated. Accordingly, the intervention was considered to have a potential minor to moderately beneficial environmental effect along the whole of the A9.

D3b – Targeted Programme of Measures to Reduce Accident Severity on the A9 and A835 between Inverness and Ullapool

The main benefits of this intervention related to the long term effects on health along the whole corridor as a result of reduced accident frequency and severity, representing a moderate benefit. Regional material assets are also improved since this intervention would improve the performance of the existing routes which are quantified as minor benefits.

There were several potentially minor to moderate adverse effects on several of the environmental parameters including biodiversity, local soils and geological interests and cultural heritage sites. Neutral to minor adverse effects on the local water quality, regional landscape and its visual amenity were also thought possible. A high level of uncertainty surrounded these effects as the nature of works to be employed was not defined.

It is possible that these adverse effects would be minimised through sensitive siting and design in line with environmental legislative requirements (The Transport and Works (Scotland) Act, 2007 (Consents under Enactments) Regulations, 2007) and best practice according the DMRB (as explained in more detail in Chapter 7). It was also proposed that, due to restrictions placed on the form and siting of works by the requirements of the Habitats Directive, potential adverse effects on European designated sites could be avoided, this has been confirmed by the Information to Inform Appropriate Assessment findings which can be found in Appendix 8a.

The intervention was not expected to have any substantial effects on air quality, CO_2e emissions, community linkages or the noise environment in this area.

Based on the available detail, it was considered that the beneficial effects of the intervention outweigh the minor and adverse effects which could be mitigated. Accordingly, this intervention was considered to have a potential long term minor to moderately beneficial effect on the regional environment.

D3c – Targeted Programme of Measures to Reduce Accident Severity between Inverness, Fort William, Mallaig and Skye (A82, A87, A830, and A887)

This intervention contains a programme of measures similar to those for the A9 and A835 relating to a focus on the reduction of accidents and their severity along the A82, A87, A830 and A887. Minor to moderate long term benefits to the region's environment were expected with particular regard to the region's health and also material assets. Major benefits to human health result from a reduction in accident rates and severity on these heavily utilised tourist routes. Regional material assets were also improved through the enhanced performance of the existing routes, leading to minor benefits.

The measures proposed could have minor to moderate adverse effects to several of the environmental parameters including biodiversity, soils and geological regions, local cultural heritage features and the region's landscape and its visual amenity. Further potentially neutral to minor adverse effects could affect local waterbodies. A high level of uncertainty surrounds these effects as the nature of works to be employed was not defined.

It is possible that these adverse effects would be minimised through sensitive siting and design, in line with environmental legislative requirements (The Transport and Works (Scotland) Act, 2007 (Consents under Enactments) Regulations, 2007) and best practice according the DMRB as explained in more detail in Chapter 7. It was also proposed that due to restrictions placed on the form and siting of works by the requirements of the Habitats Directive, potential adverse effects on European designated sites could be avoided, this has been confirmed by the Information to Inform Appropriate Assessment findings which can be found in Appendix 8a.

The intervention was not expected to have any significant effects on air quality, CO_2e emissions, community linkages or the noise environment in this area.

Based on the available detail, regional, long term minor to moderately beneficial effects were expected and at this stage in the decision-making process, it was considered that the substantial contribution to health presented by this intervention outweigh the minor and adverse effects which could be mitigated.

D3d – Targeted Programme of Measures to Reduce Accident Severity on the A96 between Aberdeen and Inverness

Regional minor to moderate benefits were possible through the measures to reduce accident severity on the A96 between Aberdeen and Inverness. In particular these related to the regional major beneficial effects on health which are envisaged to improve through enhanced safety measures. The region's material assets were also expected to improve through the enhanced performance of the existing routes which are quantified as minor benefits.

There could be adverse effects on several environmental parameters resulting from the implementation of the measures proposed. These included minor to moderate adverse effects on regional biodiversity sites, local soil and geological interests and local cultural heritage features. Further potentially neutral to minor adverse effects upon local waterbodies and the regional landscape and its visual amenity were expected. A high level of uncertainty surrounded these effects as the nature of works to be employed was not defined at this time.

It is possible that these adverse effects would be minimised through sensitive siting and design in line with environmental legislative requirements (The Transport and Works (Scotland) Act, 2007 (Consents under Enactments) Regulations, 2007) and best practice according the DMRB as explained in more detail in Chapter 7. It was also expected that due to restrictions placed on the form and siting of works by the requirements of the Habitats Directive, potential adverse effects on European designated sites could be avoided. This has been confirmed by the Information to Inform Appropriate Assessment findings which can be found in Appendix 8a.

The intervention was not expected to have substantial effects on air quality, CO_2e emissions, community linkages or the noise environment in this area.

Based on the available detail, long term regional minor to moderately beneficial effects were expected due to the potential substantial contribution to improved health which would outweigh the minor and adverse effects which could be mitigated.

D3e – Route Management between: Aberdeen and North East Scotland (A90); Edinburgh and Dundee (A92); Ayrshire and Dumfries (A76); Edinburgh and North West England (A68/A7/A702); Edinburgh and North East England (A1), the A83, A85, A828

The measures for route management on the specified roads would have a major long term benefit to the Scottish environment with notable moderate long term beneficial effects to the health of the national population. Further minor benefits were envisaged to material assets as the improvements relate to existing peripheral routes throughout Scotland.

It was not expected that substantial new infrastructure would be introduced through the route management measures and therefore, effects on biodiversity, water bodies, soils and geology, cultural heritage sites, the landscape and its visual setting are considered to be neutral. It was not thought that there would be any effects on the noise environment, the population, air quality and CO_2e emissions.

Based on the available detail, it was expected therefore that the overall effects of this intervention would be long term, major beneficial at a national scale. The Information to Inform Appropriate Assessment findings have confirmed that the intervention could be progressed without adversely affecting any designated sites as explained in Appendix 8a.

D4 – Targeted Programme of Measures to Improve Links to the Loch Ryan Port Facilities

Improving links to Loch Ryan port facilities from the Trans European Network (A75) would have long term minor benefits to the local area, in particular, the health of the local population through improvements to road safety which was thought to have moderate benefits in the long term. Access for commuters along this route to Stranraer would also be enhanced, leading to minor benefits for the local population. Further minor benefits were envisaged to local material assets as the improvements would improve and support the utilisation of the existing road network.

Several adverse effects were considered possible as a result of these measures including minor to moderate adverse effects on regional biodiversity sites, local soils and geological interests and local cultural heritage features. Further potentially neutral to minor adverse effects could affect local waterbodies and the regional landscape and its visual amenity at a regional level. Uncertainty surrounds these effects as the nature of works to be employed is not specified at this time. It is therefore possible that these adverse effects could be minimised through sensitive siting and design in line with environmental legislative requirements (The Transport and Works (Scotland) Act, 2007 (Consents under Enactments) Regulations, 2007) and best practice according to the DMRB. It is also expected that due to restrictions placed on the form and siting of works by the requirements of the Habitats Directive, potential adverse effects on European designated sites could be avoided.

The intervention was not expected to have any significant effects on air quality, CO_2e emissions or the noise environment in this area.

Based on the available detail, it was considered that the significant contribution to health presented by this intervention outweighed the minor and adverse effects which could be mitigated. Accordingly, this intervention was thought to have a potential long term, minor beneficial effects on the local environment.

D5 – Targeted Programme of Measures to improve road standards between Glasgow and Oban/Fort William (A82)

Improving road standards between Glasgow and Oban / Fort William on the A82 would have regional, long term, potentially moderate benefits. These effects were considered particularly relevant in terms of the health of the population which could benefit through reductions in accident rates and severity on this busy tourist route. Further minor benefits were envisaged to local material assets as the improvements to infrastructure would improve and support the utilisation of the existing road network.

Several adverse effects were thought possible through these measures including a moderate effect on the regional landscape. This was due to the presence of several nationally designated sites covering almost the entire route including Ben Nevis and Glen Coe NSA, Loch Lomond NSA, and Loch Lomond and the Trossachs National Park which could be affected by low grade offline works, such as localised road widening in unspecified locations.

Other adverse effects included minor to moderate adverse effects on regional biodiversity sites, local soils and geological interests and local cultural heritage features. Further potentially long term neutral to minor adverse effects could affect the local waterbodies. Uncertainty surrounds these effects as the nature of works to be employed was not specified at the time. It is possible that these adverse effects would be minimised through sensitive siting and design in line with environmental legislative requirements (The Transport and Works (Scotland) Act, 2007 (Consents under Enactments) Regulations, 2007) and best practice according the DMRB. It is also possible that due to restriction placed on the form and siting of works by the requirements of the Habitats Directive, potential adverse effects on European designated sites could be avoided. This has been confirmed by the Information to Inform Appropriate Assessment findings which can be found in Appendix 8a.

There were not envisaged to be any adverse effects to noise, population, air quality and CO_2e emissions.

Based on the available detail, it was considered that a substantial contribution to health presented by this intervention outweighed the adverse effects and accordingly, this intervention was considered to have a potential long term, neutral to moderate beneficial effects on the regional environment.

D6 – Using Intelligent Transport Systems on Parts of the Road Network to Enhance Capacity and Operations

The intervention would have major long term benefits to the central belt region, with particular regard to the health of the population in this area, regional air quality and material assets. The population of the central belt would benefit in the long term from minor access enhancements and improved efficiency of the road network. The use of Intelligent Transport Systems was envisaged to contribute to reductions in NO_2 emissions and reduce congestion, bringing moderate regional benefits to air quality with indirect effects on health. Further health benefits could occur as a result of enhanced safety. It was thought, however, that levels of CO_2e per person kilometre travelled would be unlikely to be substantially reduced in the context of Scottish transport's overall contribution to CO_2e emissions.

It was not envisaged that there would be adverse effects upon noise, biodiversity, water, soils and geology, cultural heritage or the landscape and its visual amenity.

Based on the available detail, it was not expected that the use of Intelligent Transport Systems would raise adverse effects on the natural or built environment and accordingly, it was considered that there would be long term, major environmental benefits at a regional level.

D7 – Further Electrification of the Strategic Rail Network

Further electrification of the strategic rail network would have moderate, long term benefits to the regional environment. Within the STPR programme period, it was expected that Phases 1 and 2 of the electrification would be completed. This assessment therefore assumes that only the central belt would be affected, raising potential regional adverse and beneficial effects.

The main benefits of this intervention related to the moderate benefits to material assets as electrification promotes the utilisation and upgrading of the existing rail infrastructure including rolling stock as well as implementing a continued adaptation to new technologies. Further minor benefits to regional air quality and national CO_2e emissions could occur with the potential for a general reduction in NO_2 emissions as a result of electrification. A 20 per cent reduction in energy use by a major transport sector would play a role in achieving the national CO_2e emissions reduction target of 80 per cent between all sectors by 2020. Electrification would reduce journey times on strategic rail routes in the central belt, resulting in modest improvements in accessibility.

Based on the available detail, it was expected that the overhead lines required for electrification could affect the regional landscape and its visual setting although this will be contained within the existing rail corridor, leading to a potential minor adverse effect, however, the scale of effects cannot be determined exactly until more information on the design of the intervention is available.

Overall, it was envisaged that the beneficial effects associated with this intervention would outweigh the potential for adverse effects on the landscape leading to regional moderate benefits to the environment.

D8 – Enhancing Rail System Capacity through Targeted Improvements

The enhancement of the rail system capacity would have major long term benefits on the Scottish environment. These benefits are due to the effects that the intervention is likely to have on the country's population and the material assets of Scotland. Reduced journey times and better reliability would improve accessibility and community connectivity giving moderate benefits over a long time period. Furthermore, it would lead to a substantial improvement in rail infrastructure by reducing conflict between services and providing room for growth as well as improving reliability and resilience.

It was thought that the enhancements would not have any adverse effects on any other environmental parameters and therefore it was considered that there would be overall long term minor benefits to the national environment.

D9 – National Integrated Ticketing Scheme

The main beneficial effects of a national integrated ticketing scheme were associated with the environmental issues of the population, its health, air quality, climatic factors and material assets. These all represent a minor long term benefit to the Scottish environment, leading to overall moderate benefits. Integrated ticketing could promote easier access to public transport, which would be beneficial for people who have no access to private transport, such as the elderly or economically constrained members of society. Integrated travel could result in improved accessibility between communities and result in modal shift from private cars to public transport, which would also potentially contribute to reductions in CO_2e and NO_2 emissions.

In terms of human health an integrated ticketing system would allow public transport to become more accessible, allowing people (particularly those without access to private transport such as the elderly or economically constrained members of society) improved access to recreational assets and green spaces, therefore potentially promoting healthier lifestyles. The national ticketing system utilises and promotes the use of existing public transport infrastructure, therefore brings indirect benefits through capital investment through patronage, leading to the benefits associated with Scotland's material assets.

Overall, it was considered that this intervention would have a long term moderate national benefit to the human environment in Scotland.

D10 – Reconfiguration of the National Rail Timetable

Reconfiguration of the National Rail timetable would the potential for long term minor benefits to the environment of Scotland. The intervention was considered to affect few of the environmental parameters and those benefiting include air quality and climatic factors with the potential for further benefits to the population. A small degree of modal shift could be possible from the private car onto rail leading to minor benefits to national air quality. It is possible that this could also contribute to a reduction in CO_2e emissions; however, the magnitude of this is uncertain in relation to transport's overall CO_2e contribution.

Regional benefits to the population associated with reduced journey times and improved access to services and employment could occur but it is possible that there could also be adverse effects on smaller communities due to decreased frequency of train services for shorter distance trips using main line services.

Effects on all other environmental parameters were considered to be neutral and so overall, minor long term benefits to the whole of Scotland were envisaged.

D11 – (Strategic) Park-&-Ride/Park-&-Choose Strategy

Introduction of integrated park and ride schemes was considered to have overall long term, regional, moderate beneficial effects. Encouraging people to park out of town and use public transport was expected to reduce traffic congestion within the urban areas, improving accessibility to the centres and reducing journey times. Potential moderate benefits to air quality were also expected. There were potential adverse effects on biodiversity, landscape, cultural heritage, soils and geology and the water environment however, any such effects were expected to be negligible or minor in scale although it was not possible to fully assess the potential significance of the effects until the exact locations of these facilities have been decided.

D19 – Dundee Northern Relief Road – Bypass Option

A new Northern Peripheral Bypass road around Dundee was envisaged to have a long term minor benefit to the local environment. The main benefits of the intervention relate to effects on the local population as a result of reduced severance within Dundee City Centre and improved connectivity between the centre and surrounding rural areas. Minor to moderate benefits were possible in relation to the health of the local population through an overall reduction in the number of accidents on the road. Local air quality may also experience moderate benefits as the removal of vehicles from the existing A90 through Dundee could result in an improvement to air quality within the AQMA, however the degree of improvement was uncertain. Some benefits in terms of cultural heritage were considered possible as traffic could be moved away from Conservation Areas, Scheduled Monuments and A listed buildings however, this potential effect could be offset by adverse effects on Scheduled Monuments along the route of the new bypass.

The intervention could have a potential adverse effect on some environmental features in Dundee and its surrounding area; however, there was a degree of uncertainty, mainly due to the fact that the exact route of the bypass was not specified at the time. Minor adverse effects in terms of noise levels and the number of noise sensitive receptors (short and long term) and local material assets (short term) were considered possible. In terms of material assets, the intervention does not promote the use of the existing infrastructure, and would place a short term increased demand for aggregates in the Dundee area. Depending on the exact route, there would be the potential for minor to moderate adverse effects to the local landscape and minor adverse effects to local biodiversity and water bodies.

It is possible that these adverse effects would be minimised through sensitive siting and design in line with environmental legislative requirements (The Transport and Works (Scotland) Act, 2007 (Consents under Enactments) Regulations, 2007) and best practice according to the DMRB. It is also proposed that due to restriction placed on the form and siting of works by the requirements of the Habitats Directive, that all potential adverse effects on European designated sites would be avoided. The Information to Inform Appropriate Assessment findings have confirmed that the planned intervention would not adversely affect designated sites as explained by Appendix 8a.

It was considered that there would be overall minor long term benefits to the environment of Dundee and its surrounding area.

D23 – Rail Enhancements in the East of Scotland

Long term benefits to the local environment were envisaged through the rail enhancements in the East of Scotland resulting from the significant effects that the measures could have to the local population and its health, local air quality, material assets and on levels of CO_2e emissions.

Through the enhancements it was considered that the local population would see major benefits due to the improved rail services and extension of services from Edinburgh to the surrounding settlements. This would particularly benefit commuters travelling from outside of Edinburgh into the city and potentially could see a five per cent modal shift from the private car to rail as a result. The secondary effects of this are an improvement in the local air quality, modest reductions in CO_2e emission levels and a potential reduction in the accident rates on the roads, leading to health benefits.

Local material assets were also considered to moderately benefit in the long term from this intervention as it represents improvements to the existing rail infrastructure and service, with limited requirement for new resources.

The rail enhancements were not considered to have any significant effects on any of the other environmental parameters such as biodiversity, water, soils and geology and the landscape as very little physical works is required. These have therefore been assessed as being neutral.

The intervention was considered to have a moderately beneficial effect on the environment in the local area. The Information to Inform Appropriate Assessment findings have confirmed that the planned intervention could be progressed in a way which would not adversely affect designated sites as explained by Appendix 8a.

D25 – West of Scotland Strategic Rail Enhancements: Glasgow Cross City Tunnel

The main beneficial effects of this intervention were associated with the long term moderate benefits to the local population, its health and local air quality. Provision of a new rail tunnel beneath Glasgow city centre would play an important role in terms of linking public transport services from the south of the city with those from the north, particularly benefiting people travelling through the city.

The reduction in journey times for cross-Glasgow services was expected to encourage modal shift from private cars, particularly on the M8, to rail, with an associated improvement to local air quality. It was possible that this could also reduce CO_2e emissions; however, these were unlikely to be substantial in relation to Scotland's overall CO_2e emission targets. Secondary effects of this were thought to occur in relation to the health of the population with further benefits resulting from a potential reduction in accident rates.

Adverse effects of the new rail tunnel were considered possible to some environmental features. Minor adverse effects to local material assets were possible as substantial new resources would be required to construct the tunnel. The significance of other adverse effects was uncertain as the actual nature of the works to be employed as a result of this intervention is not defined at this stage.

Depending on the actual form and location of works, there may be some short and long term neutral to moderate adverse effects to the cultural heritage features within Glasgow and further neutral to minor adverse effects to the River Clyde. Effects on biodiversity, soils and geology and the landscape and its visual amenity were also uncertain but at this stage were thought to be neutral. There were not envisaged to be any adverse effects in terms of noise.

It was possible that these adverse effects would be minimised through sensitive siting and design in line with environmental legislative requirements (The Transport and Works (Scotland) Act, 2007 (Consents under Enactments) Regulations, 2007) and best practice according the DMRB.

At this stage, it was considered that the benefits to the local population, its health and air quality presented by this intervention outweighed the adverse effects and so intervention was considered to have a potential long term moderate beneficial effect on the local environment.

D27 – Rail Enhancements between Inverclyde/Ayrshire and Glasgow

It was considered that the rail enhancements between Inverclyde, Ayrshire and Glasgow would have moderate long term beneficial effects to the region's population, its health, air quality and the material assets with further possible benefits in terms of a reduction in CO_2e emissions. The proposed enhancements would increase availability of rail services on existing routes, to the benefit of commuters travelling to Glasgow and towns along the route through more frequent services. The enhanced services could encourage more people to travel by rail leading to a possible reduction in road transport and therefore reducing vehicular emissions. This could have secondary effects to the region's health which could be further enhanced through reduced accident rates on roads. The intervention comprises a notable upgrade to a regionally important railway line, promoting utilisation of existing assets with minimal requirement for new resources.

There were potential adverse effects on some environmental features however, there was a degree of uncertainty surrounding these, mainly because the exact location and extent of works required was not defined. Depending on the actual form and location of works, there could be neutral to minor adverse effects to local waterbodies and cultural heritage sites in the short and long term. It is possible that these adverse effects would be minimised through sensitive siting and design in line with environmental legislative requirements (The Transport and Works (Scotland) Act, 2007 (Consents under Enactments) Regulations, 2007).

There were not envisaged to be any adverse effects in terms of biodiversity, noise environment, soils and geology or the regional landscape and its visual setting.

At this stage, it was considered that the benefits to the region's population, its health, material assets and air quality presented by this intervention would outweigh the possible adverse effects and so the intervention was considered to have a long term moderate beneficial effect on the regional environment.

D28 – Upgrade Edinburgh Haymarket Public Transport Interchange

The main beneficial effects of this intervention were associated with the environmental benefits to the local population, its health, local air quality and the material assets. Benefits to the population were thought to be moderate in nature and long term. It was thought that the upgrade to Haymarket public transport interchange would improve connections to outlying communities and Edinburgh Airport resulting in a modal shift to public transport with associated moderate benefits to the local air quality. There would also be a secondary long term effect to the health of the local population as air quality is improved. There will be a minor benefit to the region's material assets as the use of existing infrastructure would be maximised with minimal additional resources required for construction.

There were several potentially adverse effects on some environmental features; however, there is a degree of uncertainty surrounding these, as the actual nature of works required was not defined.

Depending on the actual architectural design and form of works to be implemented, there could be minor to moderate adverse effects to the cultural heritage sites surrounding Haymarket. There could also be neutral to minor adverse effects in terms of the appearance of the townscape.

It was possible that these adverse effects would be minimised through sensitive siting and architectural design in line with environmental legislative requirements (The Transport and Works (Scotland) Act, 2007 (Consents under Enactments) Regulations, 2007) and best practice according the DMRB.

There were not envisaged to be any adverse effects in terms of biodiversity, noise environment, soils and geology, the water environment or the level of CO_2e emissions.

At this stage it was considered that the benefits to the local population, its health, regional material assets and air quality presented by this intervention outweighed the possible adverse effects and so intervention was considered to have a long term moderate beneficial effect on the local environment.

D29 – Enhancements to Rail Freight between Glasgow and the Border via West Coast Mainline

The main environmental benefits of this intervention related to the long term benefits to the regional material assets as the enhancements comprise a notable upgrade to the regionally important West Coast Mainline, which would promote utilisation of existing assets with minimal requirement for new resources. Further possible benefits could occur to regional air quality as rail improvements could encourage modal shift from road based freight on the M74 to rail. This could relieve traffic congestion and contribute to an improvement in air quality through a reduction in HGV emissions. It was possible that this could also lead to a reduction in the level of CO_2e emissions and minor improvements to the region's health as a consequence of reduced exposure to transport-related emissions.

There could be neutral to moderate adverse effects to cultural heritage sites in the region, however, there was a degree of uncertainty surrounding this, as the actual nature of works required is not defined at present. These effects would be minimised through sensitive siting in line with The Town and Country Planning (Listed Buildings and Buildings in Conservation Areas) (Amendment) (Scotland) Regulations 2006 and The Transport and Works (Scotland) Act 2007 (Consents under Enactments) Regulations 2007.

The enhancements were not expected to have any significant effects on the landscape or its visual amenity, soils and geology, the water environment, population or noise.

Based on the available detail, it was not expected that the enhancements to rail freight would raise adverse effects on the natural or built environment and accordingly, it was considered that there would be long term, minor environmental benefits at a regional level.

D30 – Light Rapid Transit connections between Fife and Edinburgh

The main beneficial effects of a new Light Rapid Transit (LRT) line were associated with the moderate long term effects on the local population through a marked increase in public transport capacity, enhancing connections between Fife and West Edinburgh which would increase linkages and accessibility on a key commuter route, particularly for people without access to private transport. This could result in a beneficial effect on the community environment. Further beneficial effects to the local material assets were associated with the provision of a dedicated bus route on the new Forth Crossing which would maximise utilisation of the proposed infrastructure, with no requirement for additional resources. Local minor to moderate benefits in terms of improvements to local air quality with associated modal shift could benefit the local population's health.

The intervention was not expected to have any substantial effects on biodiversity, water environment, soils and geology, cultural heritage features or the local landscape and its visual amenity. There were also unlikely to be any substantial effects on CO_2e emissions as the proposed LRT line is only over a short stretch of road. The Information to Inform Appropriate Assessment findings have confirmed that the planned intervention could be progressed in a way that would not adversely affect designate sites as explained in Appendix 8a.

Based on the available detail, it was not expected that the new LRT connections would raise adverse effects on the natural or built environment and accordingly, it was considered that there would be long term, minor or moderate environmental benefits at a local level.

E1 – Suburban Rail Services across Dundee

The main beneficial effects of the intervention were associated with the environmental issues of the local population as a result of improved accessibility and community linkages in and around Dundee. Provision of a new station at Dundee West would increase accessibility to the rail network for people in the local area, and improve links to Ninewells Hospital and surrounding areas. Further minor benefits to local air quality through a modest modal shift from road to rail, particularly for commuters would likely reduce road based vehicle emissions in Perth and Dundee, with potential moderate benefits, given that both of these towns have declared AQMAs. This would have secondary effects to the health of the local population. Although new materials would be required for a new station, improved frequency of services would encourage utilisation of the track with local minor long term benefits to material assets.

Some potential neutral to minor adverse effects on some environmental features including local cultural heritage sites and water bodies were possible however, there was a degree of uncertainty surrounding these effects as, at present, the actual nature of the works necessary as a result of this intervention are not currently defined. It is possible that these adverse effects would be minimised through sensitive siting and design in line with environmental legislative requirements (The Transport and Works (Scotland) Act, 2007 (Consents under Enactments) Regulations, 2007). The Information to Inform Appropriate Assessment findings have confirmed that that the planned intervention could be progressed in a way which would not adversely affect designated sites as explained in Appendix 8b.

Although there have been several adverse effects identified through the assessment of this intervention, it was thought that the long term benefits outweigh these so the intervention is considered to have a long term beneficial effect on the local environment. There was some uncertainty surrounding the significance of these benefits which were considered to be either minor or moderately beneficial.

E5 – New Busway between Glasgow City Centre, Clydebank and Glasgow Airport

The beneficial effects of a new busway between Glasgow city centre, Clydebank and Glasgow Airport were associated with moderate benefits to the local population due to the introduction of new public transport link, improving accessibility and community linkages across Glasgow by bus. Further moderate benefits were considered possible to the local material assets as the new busway service on existing roads was considered to make efficient use of existing infrastructure, with limited use of new resources.

The intervention was not expected to have any significant effects on the noise environment, biodiversity, air quality, CO_2e emissions, health, the water environment, soils and geology, cultural heritage sites or the local landscape and its visual amenity.

Based on the available detail, it was not expected that the new busway would raise adverse effects on the natural or built environment and accordingly, it was considered that there would be long term, moderate environmental benefits at a local level.

E8 – New Rail Line between Perth and Inverkeithing

The main beneficial effects of this intervention were associated with the moderate environmental issues of the regional population as a result of substantial improvements to linkages between Edinburgh and Perth, and the reduction in travel time. Furthermore, this intervention was expected to result in a modal shift from private car to rail, relieving congestion, particularly on the M90 during peak hours. This could lead to a moderate improvement in regional air quality and minor reductions in CO_2e emissions with secondary effects to the region's health. A reduction in the number of accidents on the roads could occur through this modal shift with further beneficial effects to health leading to moderate long term effects.

There could be some adverse effects on some environmental features; however, there is a high degree of uncertainty surrounding these, as the actual nature of works required is not currently defined.

Depending on the actual form and location of works there may be regional moderate to major adverse effects to cultural heritage features in the short and long term and further potential minor adverse long and short term regional effects to biodiversity. Neutral to minor adverse effects were anticipated to the water environment.

It is possible that these adverse effects would be minimised through sensitive siting and design in line with environmental legislative requirements (The Transport and Works (Scotland) Act, 2007 (Consents under Enactments) Regulations, 2007). It is also proposed that due to restrictions placed on the form and siting of works by the requirements of the Habitats Directive, that all potential adverse effects on European designated sites would be avoided. This has been confirmed by the findings of the Information to Inform Appropriate Assessment which is explained in Appendix 8b

Some adverse effects to regional material assets were envisaged due to the construction of a new rail line which would not make efficient use of existing infrastructure, however, implementation of this line would comprise a substantial upgrade of this regionally important rail network, providing a route that is likely to be well used.

Based on the available detail, it was considered that the adverse substantial contribution to the region's population, its health and air quality presented by this intervention outweighed the potentially mitigatable adverse effects and so the overall effects on the regional environment was considered to be of a long term moderate beneficial nature.

E13 – New LRT Line to SE Edinburgh

The main beneficial effects of the new LRT line were associated with the environmental issues of the local population as a result of improved accessibility and community linkages within the city centre of Edinburgh and to the southeast of the city. These effects are expected to be of minor to moderate significance in the long term. A reduction in road traffic could lead to moderate benefits to local air quality with minor improvements to the local population's health and a potential decline in noise levels. The intervention would also provide a minor benefit in terms of material assets by making efficient use of the existing infrastructure with little need for new resources.

There were a series of potential adverse effects on some environmental features; however, there was a high degree of uncertainty surrounding these as the actual extent and nature of works to be employed are not currently defined.

Depending on the actual form, location and extent of works required, there may be neutral to moderate adverse effects to cultural heritage features and the historic townscape of Edinburgh and its visual amenity. Further details of these effects can be found in Appendix 5. The intervention was not expected to have any significant effects on biodiversity or the water environment. It is thought that these effects can be minimised through sensitive siting and design in line with environmental legislative requirements (The Transport and Works (Scotland) Act, 2007 (Consents under Enactments) Regulations, 2007).

At this stage, it was considered that the significant contribution to the local population, its health, air quality, material assets and potential reductions in noise and CO_2e emission levels presented by this intervention, would outweigh the potentially adverse effects which could be mitigated and therefore, the intervention was considered to have an overall minor to moderate beneficial effect on the environment.

E14 – Augment Far North Rail Line Rail Services with Express Coach Facilities

The main beneficial effects of this intervention relate to the regional environmental issues of the population as a result of the provision of a fast and frequent service along the A9 from remote rural areas to Inverness leading to enhanced accessibility and community linkages. The intervention also provided a minor long term benefit to material assets by utilising existing infrastructure to its full potential. The intervention could also provide modest improvements to the air quality through a modest modal shift away from the private car leading to reduced vehicular emissions; the extent of this effect was uncertain and likely to be very minor.

There were several potentially adverse effects on some environmental features; however, there was a degree of uncertainty surrounding these, due to the fact that, at present, the actual nature of works required is unclear. Depending on the actual form and location of works there could be some mainly minor adverse effects on the regional biodiversity, local waterbodies such as the River Thurso, regional geological features and regional cultural heritage sites in close proximity. These adverse effects can be minimised through sensitive siting and design in line with environmental legislative requirements (The Transport and Works (Scotland) Act, 2007 (Consents under Enactments) Regulations, 2007) and best practice according the DMRB (further mitigation is described in Chapter 7). The Information to Inform Appropriate Assessment has concluded that E14 would not adversely affect the integrity of any European Site as explained in Appendix 8b.

The intervention was not expected to have any significant effects on the noise environment, CO_2e emissions or the region's landscape and its visual amenity.

At this stage, it was considered that this intervention would have overall long term minor benefits on the local and regional environment.

E15 – Re-open Rail Freight Connection to Greenock Port

The main beneficial effects of the intervention were associated with the local material assets as a result of the re-opening of a closed rail branch which utilises the existing infrastructure to its full potential. Further minor benefits to local human health were envisaged as it possible that road freight could be shifted onto the rail network leading to minor improvements to local air quality. This modal shift could also contribute to some very minor reductions in the levels of CO_2e emissions.

There is the potential for a neutral to minor adverse effect to the local population as there would be limited effects on community accessibility and the intervention could affect accessibility due to the increased number of freight services operating over the congested section of line between Paisley Gilmour Street and Shields Junction. It was not envisaged that there would be any substantial effects to the local biodiversity, noise environment, waterbodies, soils and geology, cultural heritage features or the local landscape and its visual amenity.

Overall, it was envisaged that the benefits of the intervention would outweigh the possible minor adverse effects to the population and so it was likely that the intervention would have long term minor benefits to the local environment.

E18 – Suburban Rail Services across Aberdeen

The measures associated with this intervention were likely to have several significant benefits to the environment including moderate effects to the local population as a result of the introduction of new stations and local access improvements to rail services combined with enhanced frequency. Further benefits to the local material assets could occur due to locally substantial upgrades to existing track and rail infrastructure as a whole. Possible minor to moderate benefits to the local air quality are associated with potential modal shift to rail within Aberdeen and surrounding areas, reducing the level of vehicular emissions. This could also cause modest reductions in CO_2e emissions; however, this depends on the extent of modal shift that occurs. Improvements to air quality were envisaged to have minor long term benefits to the local population's health.

There were a series of potential adverse effects on some environmental features and there was a high degree of uncertainty surrounding these. There could be minor adverse effects to the local biodiversity, cultural heritage features close to the rail line and the surrounding local coastal landscape and its visual amenity.

These adverse effects could be minimised through sensitive siting and design in line with environmental legislative requirements (The Transport and Works (Scotland) Act, 2007 (Consents under Enactments) Regulations, 2007). It was also proposed that due to restriction placed on the form and siting of works by the requirements of the Habitats Directive, that all potential adverse effects on European designated sites would be avoided. At the strategic level, the Information to Inform the Appropriate Assessment concludes that the planned intervention would not adversely affect the integrity of any European site as explained in Appendix 8b.

It was not thought that there would be any significant effects on the noise environment, water bodies or soils and geological features through this intervention.

Overall it was thought that the significant contribution to the local population, its health, air quality and local material assets outweighed the mainly minor adverse effects and therefore the intervention was considered to have long term minor benefits to the local environment.

E19 – Glasgow Subway Upgrade and Modernisation

The main beneficial effects of this intervention were associated with the environmental issues relating to the local population as a result of increased frequency of services and improvements to existing facilities leading to enhanced connectivity within Glasgow. Further minor benefits are possible to the local material assets as the measures would encourage utilisation of the existing subway network, requiring minimal additional resources for station upgrade.

It was considered that there would not be any substantial effects occurring on any other environmental parameters as a result of these subway upgrades. Therefore, long term minor beneficial effects were envisaged for the local environment.

E20 – New Road Link between the M73 and Coatbridge

A new motorway link between the M73 and Coatbridge could have several environmental benefits. Minor to moderate beneficial effects to local air quality were associated with the intervention through improved journey times to the freightliner terminal, encouraging transfer of freight from road to rail. Given the long distances over which these journeys occur, even a modest modal shift to rail was considered to result in a potential reduction in emissions of NO_2 with accompanying indirect benefits to human health. This could also lead to reductions in national CO_2e emissions depending on the level of modal shift achieved. Potential minor benefits to the population could indirectly result as the new road link is envisaged to divert road freight traffic away from Coatbridge town centre, benefiting the local community. There were potential noise benefits nationally, regionally or locally depending on the level of HGV modal shift to rail. There could be locally adverse noise effects due to the new motorway link creating new noise sensitive receptors. Therefore, in terms of the noise environment, both beneficial and adverse effects were possible.

There were several, mainly minor, adverse effects on some environmental features, however, including effects on local material assets as the new road link does not make the best use of existing infrastructure because the freight terminal is already accessible by road.

A degree of uncertainty surrounded other adverse effects as the precise nature and scale of works required through this intervention was unclear. Depending on the actual form and location of works, there could be minor adverse effects on the local biodiversity and the water environment such as Woodend Loch. These effects would be minimised through sensitive siting and design in line with environmental legislative requirements (The Transport and Works (Scotland) Act, 2007 (Consents under Enactments) Regulations, 2007) and best practice according the DMRB (further mitigation is described in Chapter 7). It was also proposed that due to restriction placed on the form and siting of works by the requirements of the Habitats Directive, that all potential adverse effects on European designated sites would be avoided. The Information to Inform Appropriate Assessment has concluded that there would be no adverse effect on the integrity of Natura 2000 or Ramsar sites as explained by Appendix 8b.

The intervention was not expected to have significant effects to soils and geological resources, cultural heritage sites of the local landscape and its visual amenity.

Based on the available detail, it was expected that the beneficial effects of the new road link would outweigh the adverse effects on the natural or built environment and accordingly, it was considered that there would be long term, minor environmental benefits at a local level.

6.3.2 Neutral Effects

This section describes the 8 interventions that were considered to have an overall neutral effect. The majority of these interventions have mixed beneficial and adverse environmental effects that are considered to off-set each other with resulting overall neutral effects.

D15 – Rail Enhancements on the Highland Mainline between Perth and Inverness

The main beneficial effects of this intervention were associated with the environmental issues of population (through producing a sustainable commuting alternative to the car between the centres of Perth and Inverness) and material assets (through utilising and enhancing existing rail infrastructure), which provided a moderate benefit. The intervention also represented a minor benefit in terms of human health and air quality, through potentially reducing the number of cars, and thus air pollution and accidents, on the A9. Very minor benefits were also expected in terms of CO_2e emissions as a result of the modal shift from road to rail.

There were a series of potential adverse effects on some environmental features. However, there is a high degree of uncertainty surrounding these was currently undefined.

Depending on the actual form and location of works associated with Phase 2 (additional freight improvements) of this intervention there could be minor to moderate adverse effects on biodiversity, the water environment, soils and geology, cultural heritage and landscape and visual setting. These would be minimised through sensitive siting and design in line with environmental legislative requirements, such as the Water Environment (Controlled Activities) (Scotland) Regulations 2005. In addition, many mitigation measures for roads outlined in DMRB could be utilised for Rail construction. It was also proposed that due to restrictions placed on the form and siting of works by the requirements of the Habitats Directive, that all potential adverse effects on European designated sites would be avoided. This has been confirmed by the Information to Inform Appropriate Assessment findings which conclude that the planned intervention could be implemented in a way that would not adversely affect designated sites as explained in Appendix 8a.

This intervention was not expected to have any significant effects on noise receptors.

At this stage of the development process it was considered that the minor to moderate beneficial effects would offset the minor to moderate adverse effects. Therefore the intervention was considered to have a neutral effect on the environment.

D17 – Rail Service Enhancements between Aberdeen and Inverness

The main beneficial effects of this intervention were associated with the environmental issues of population (through improved community and accessibility linkages between Aberdeen and Inverness), and material assets (through utilisation and improvement of existing rail infrastructure), which provided a moderate benefit. The intervention also represented a minor benefit in terms of human health and air quality, through potentially reducing the number of cars, and thus air pollution and accidents, on the A96 and A9. Very minor benefits were also expected in terms of CO_2e emissions as a result of the modal shift from road to rail.

There were a series of potential adverse effects on some environmental features. However, there was a high degree of uncertainty surrounding the significance of these, mainly due to the fact that the actual nature of the works employed as a result of this intervention were unclear at the time.

Depending on the actual form and location of works there could be minor adverse effects on regional biodiversity, flora and fauna, soils and geology, water, and cultural heritage resources. However these could be minimised through sensitive siting and design in line with environmental legislative requirements and mitigation measures which has been confimed by the Information to Inform Appropriate Assessment findings that conclude that the planned intervention would not adversely affect designated sites as explained by Appendix 8b.

The intervention was not expected to have any significant effects on the noise environment or the landscape and visual setting.

At this stage of detail it was considered that potential minor to moderate adverse effects on the natural environment would be offset by the beneficial effects on population, material assets, human health and air quality. The overall assessment of this intervention on the environment was therefore considered to be neutral.

D18 – Rail Enhancements between Aberdeen and the Central Belt

The rail enhancements between Aberdeen and the Central Belt were considered to have several environmental benefits associated with the environmental issues of population (through improved community and accessibility linkages between Aberdeen and the Central Belt), and material assets (through utilisation and improvement of existing rail infrastructure), which represented a moderate benefit.

The intervention also represented a minor benefit in terms of human health and air quality, through potentially reducing the number of cars and HGV's, and thus air pollution and accidents, on major routes. Other minor benefits were also expected in terms of CO_2e emissions through the modal shift from road to rail, although due to a lack of certainty regarding the extent of this modal shift, the significance of this was uncertain.

There were a series of potential adverse effects on some environmental features that had a high level of uncertainty attached to them at that stage of the design process. These included neutral to moderate effects on regional biodiversity, soils and geology, water, and cultural heritage resources. These could be minimised through sensitive siting and design in line with environmental legislative requirements such as the Water Environment (Controlled Activities) (Scotland) Regulations 2005. In addition, many mitigation measures for roads outlined in DMRB could be utilised for Rail construction (further mitigation is described in Chapter 7). It was also proposed that due to restrictions placed on the form and siting of works by the requirements of the Habitats Directive, that all potential adverse effects on European designated sites would be avoided. This has been confirmed by the Information to Inform Appropriate Assessment findings which can be found in Appendix 8a.

The intervention was not expected to have any significant effects on the noise environment or the landscape and visual setting.

At this stage of detail it was considered that the potential adverse effects to the natural environment would be offset by beneficial effects on the human environment. Therefore this intervention was envisaged to have an overall neutral effect on the environment.

D19 – Dundee Northern Relief Road - A90 Upgrade Option

The main beneficial effects of this intervention were associated with the environmental issues of population (through improved traffic accessibility through Dundee, and improved community linkages resulting from identified mitigation measures), human health (through accident reduction and promotion of healthier travel options such as walking and cycling), material assets (through utilisation of existing A90 infrastructure), and biodiversity (through habitat creation and enhancement in association with the scheme, and the absence of Natura 2000 sites), which represent minor benefits. However, it was noted that there was a high degree of uncertainty regarding the effects on traffic accident rates.

It was envisaged that there would be moderate adverse effects on cultural heritage due to the close proximity of several Scheduled Monuments and A Listed Buildings to the proposed Grade Separated Junctions, and minor to moderate adverse effects on the landscape and visual quality of the rural landscape.

The degree and nature of any effects would depend on the route and design of this intervention; however it is assumed that good practice guidelines in line with the environmental objectives (as outlined in DMRB) would ensure screening and high quality design would be employed to minimise these.

The intervention was not expected to have any significant effects on noise, the water environment, soils and geology, air quality or CO_2e emissions.

Overall it was envisaged that the beneficial effects would offset the adverse effects, with an overall neutral effect on the environment.

D21 – Grangemouth Road and Rail Access Upgrades

Upgrading of the road and rail access to Grangemouth was thought to have several beneficial effects associated with the environmental issue of human health, as a result of reduced accident frequency and severity rates which represent a moderate benefit. The intervention also represented a minor benefit in terms of noise (due to reduction in road freight and limited number of noise receptors), air quality (through electric rail traction and reduction in road freight), and material assets (through improvements to and use of existing infrastructure). Effects on CO_2e emissions (as a result of the modal shift from road to rail freight) were expected to have either a neutral or minor benefit to the environment.

There were a series of potential adverse effects on some environmental features which had a high level of uncertainty attached to them at the stage of the design process and these included effects on local biodiversity, waterbodies such as the River Avon and cultural heritage (potential moderate to major effects). However, these would be minimised through sensitive siting and design in line with environmental legislative requirements as specified previously.

Some adverse effects on the local landscape could be apparent but these were expected to be minor due to the absence of designated landscapes within the area, and use of design and construction techniques in line with the landscape and visual objectives of DMRB.

Overall, the intervention was assessed as having a neutral effect on the local environment with the beneficial effects potentially offsetting the adverse effects.

D25 – West of Scotland Strategic Rail Enhancements: Glasgow Central East

Benefits of this package related to improved community accessibility, which represented a minor benefit. There was the potential for further benefits to several other environmental parameters due to the high degree of uncertainty surrounding the actual nature of the works employed as a result of the intervention these were assessed as uncertain. With regard to air quality, increased use of diesel trains would have a minor adverse effect, whilst an electrified rail stock would have a minor beneficial effect. Effects on local health with regard to accident rates and air quality effects resulting from a modal shift from road to rail are uncertain to the extent that the balance of effects could be adverse or beneficial.

The proposed station would create a new noise source for local noise sensitive receptors, both in the short term during construction, and in the long term during operation, with new and increased frequency of services leading to minor adverse effects on the noise environment. Further adverse effects on material assets in the local area were possible as the new station and potential rail links or other infrastructure would require substantial new resources to construct, and would not make the most efficient use of existing resources.

There were a series of potential adverse effects on some environmental features which had a high level of uncertainty attached to them at this stage of the design process and these included neutral to minor adverse effects on local biodiversity, waterbodies and cultural heritage (potential moderate to major effects). However, these would likely be minimised through sensitive siting and design in line with environmental legislative requirements as specified previously.

The intervention was not considered to have any significant effects on soils and geology or CO_2e emissions, although again this assessment was subject to a high degree of uncertainty.

At this stage, the effects were envisaged to be neutral when considering the inter-relationship between all parameters, partly due to the amount of uncertainty surrounding the significance of effects on many of the environmental topics.

D31 – Inverkeithing to Halbeath Rail Line

The main beneficial effect of this intervention was associated with the environmental issue of population, through improved links between Halbeath, Inverness, Aberdeen, Perth and Edinburgh, and public transport accessibility from Park & Ride, which represented a moderate benefit to the local population. The intervention also represented a minor benefit in terms of air quality and human health through an encouragement of modal shift from road to rail, with associated traffic related emission and accident reductions. In addition, effects on CO_2e emissions were, although subject to a high degree of uncertainty, expected to have either a neutral or minor benefits.

Several minor adverse effects were thought to be likely as a result of the new rail line. Minor adverse effects to local biodiversity were possible as the Firth of Forth SPA, Ramsar and SSSI lie close to the proposed rail line. The construction required would also not make efficient use of the existing infrastructure, and it would require utilisation of new raw materials thereby adversely affecting material assets in the area. Further adverse effects could occur to the local landscape and its visual amenity. The Information to Inform Appropriate Assessment findings have confirmed that the planned intervention would not adversely affect designated sites as explained by Appendix 8a.

There was a high degree of uncertainty surrounding other potential adverse effects mainly because, at present, the nature of the works employed provided in this intervention are unclear. There was the potential for neutral to minor adverse effects to the noise environment, local waterbodies and soils and geological resources. Further moderate to major adverse effects were envisaged to occur to cultural heritage features. These effects could be minimised through sensitive siting and design in line with legislative requirements as identified previously.

At this stage, the effects were envisaged to be neutral when considering the inter-relationship among all parameters, partly due to the amount of uncertainty surrounding the significance of effects on many of the environmental topics.

E7 – Rail Freight Enhancements between Mossend, Grangemouth and Aberdeen/Inverness

The main beneficial effects of this intervention were associated minor benefits to material assets as a result of the improvements to the existing rail infrastructure which would have minimal requirements for new resources.

Further beneficial effects of a minor nature relate to human health, air quality and CO_2e emissions due to the expected / anticipated reduced road vehicle emissions and accident

rates, however, the significance of these were uncertain due to the lack of operational detail relating to the intervention at this stage of the development process.

Neutral to moderate adverse effects on aspects of the natural environment were considered possible, cultural heritage features, soils and geology, the water environment and the regional landscape and visual amenity. These effects would be highly dependent on the location of the final works, therefore the degree of effect remains uncertain at this stage. There is the potential for minor to major effects on biodiversity. It should be noted that if it was decided to consider this proposal in the future this intervention would be subject to the requirements of regulation 48 of the Habitats Directive.

At this level of intervention definition, the effects of the rail freight enhancements were envisaged to be neutral when considering the inter-relationship among all parameters, however this would need further analysis at a more detailed stage due to the level of uncertainty surrounding the significance of effects on many of the environmental topics.

6.3.3 Adverse Effects

A summary of the environmental assessment for the 10 interventions that have been assessed as having an overall adverse effect are set out below. Appendix 5, Table 5.2.2 contains detail of the interventions assessed as having an overall adverse effect, and the significance of this effect.

D14 – A9 Upgrading from Dunblane to Inverness (Phase 1)

This intervention was considered to have several environmental benefits through its moderate effects on the population in the region and its health as the upgrading would strengthen links and improve community accessibility leading to a reduction in the frequency and severity of accidents. A predicted reduction in congestion could also enhance local air quality leading to further benefits to health. The proposed dualling and road improvements would generally utilise existing road infrastructure and therefore make best use of existing assets.

There were a series of potential adverse effects on some environmental features but a high degree of uncertainty surrounded these, as the exact nature of the works employed in providing this intervention was not certain.

Depending on the actual form and location of works there were expected to be minor to major short and long term adverse effects to regional biodiversity, soils and geological designations and cultural heritage features such as Scheduled Monuments. Further minor to moderate adverse effects were possible in terms of the local water bodies such as the River Tay, the noise environment and to the region's landscape and visual amenity.

It was envisaged that these effects would be minimised through sensitive siting and design in line with legislative requirements (The Transport and Works (Scotland) Act 2007; (Consents under Enactments) Regulations 2007; Water Environment (Controlled Activities) (Scotland) Regulations 2005) and best practice outlined in the DMRB (further mitigation is described in chapter 7). It was also proposed that due to restrictions placed on the form and siting of works by the Habitats Directive, that all potential adverse effects on European designated sites would be avoided.

Based on the information currently available however, the Information to Inform Appropriate Assessment could not conclude that, at a strategic level, it would be possible to carry out the proposed intervention without adversely affecting the integrity of designated sites including: River Spey - Insh Marshes SPA & Ramsar and Insh Marshes SAC and Drumochter Hills SPA & SAC. Accordingly, the Appropriate Assessment proposes two alternative engineering solutions to address the potential effects on Natura 2000 sites which are explained more fully in Appendix 8a. It should be noted that there are two alternative engineering solutions which would not involve permanent or temporary land-take within the sites. This is discussed further in Chapter 7 and Table 7.9.

The intervention was not expected to have a significant effect on CO_2e emissions.

At this stage of detail it was considered that the potentially significant adverse effects of the intervention on a number of environmental media outweighed the contribution to human health, population, material assets and air quality. Therefore the intervention was envisaged to have a moderate to major adverse effect.

D14 – A9 upgrading from Dunblane to Inverness – Subsequent Phases

The main beneficial effects of this intervention were associated with the environmental issues of population through improved linkages and accessibility between Perth, Inverness, and the Central Belt, human health through reducing the frequency and severity of accidents, and material assets through utilisation of existing road infrastructure, which all represented minor benefits.

There were a series of potential adverse effects on some environmental features but with a high degree of uncertainty surrounded these as the exact nature of works is not currently defined.

Depending on the actual form and location of works there were likely to be adverse effects on the regional resources of biodiversity (of a minor, moderate or major nature depending on effectiveness of mitigation measures to protect nationally designated sites); cultural heritage (of a minor, moderate or major nature); soils and geology (of a major nature due to the proposed route passing through Glen Garry SSSI and quality of soils surrounding current road); landscape and visual (of a major nature due to the route passing through the Cairngorms National Park and National Scenic Area); water (nature of adverse effects currently uncertain due to lack of detail); and noise (of a minor to moderate adverse nature due to potentially increased traffic flows).

It was envisaged that these effects would be minimised through sensitive siting and design in line with legislative requirements (The Transport and Works (Scotland) Act 2007; (Consents under Enactments) Regulations 2007; Water Environment (Controlled Activities) (Scotland) Regulations 2005) and best practice outlined in the DMRB. Specifically, it was also proposed that due to restrictions placed on the form and siting of works by the Habitats Directive, that all potential adverse effects on European designated sites would be avoided.

Based on the information currently available however, the Information to Inform Appropriate Assessment could not conclude that, at a strategic level, it would be possible to carry out the proposed intervention without adversely affecting the integrity of designated sites including: River Spey - Insh Marshes SPA & Ramsar and Insh Marshes SAC and Drumochter Hills SPA & SAC. Accordingly, the Appropriate Assessment proposes two alternative engineering solutions to address the potential effects on Natura 2000 sites which are explained more fully in Appendix 8a. It should be noted that there are two alternative engineering solutions which would not involve permanent or temporary land-take within the sites. This is discussed further in Chapter 7 and Table 7.9.

The intervention was not expected to have any significant effects on air quality and CO_2e emissions.

It was considered that, at this stage of the development process, the potentially substantial adverse effects of the intervention on a number of environmental media outweighed the contribution to human health, population, and material assets. Therefore the intervention was envisaged to have a moderate to major adverse effect.

D16 – Upgrade A96 to Dual Carriageway between Inverness and Nairn

The main beneficial effect of this intervention was associated with the environmental issue of human health due to potential reductions in accident rates and improvements in air quality, which represent a moderate benefit. The intervention also represented a minor benefit in terms of population through improving accessibility and linkages between Inverness, Nairn, and Aberdeen.

The upgrade of the A96 was considered to have several adverse effects, many of which were uncertain in significance due to a high degree of uncertainty (except for material assets) because the actual nature of the works employed as a result of this intervention were unclear.

Minor adverse effects to material assets in the local area could occur as the measures involve creation of additional carriageways, with use of new resources in their construction. The intervention also includes a new road link, which does not make the most efficient use of existing infrastructure, and would be constructed from new resources. Minor to major adverse effects on biodiversity and local soils and geological resources could occur with minor to moderate effects on the noise environment and the local landscape and its visual amenity. Cultural heritage features in the surrounding area between Inverness and Nairn were thought have moderate to major effects upon them and neutral to minor adverse effects on the water environment were also considered possible.

It was envisaged that these effects would be minimised to an extent through sensitive siting and design in line with legislative requirements (The Transport and Works (Scotland) Act 2007; (Consents under Enactments) Regulations 2007; Water Environment (Controlled Activities) (Scotland) Regulations 2005) and best practice outlined in the DMRB and due to restrictions placed on the form and siting of works by the Habitats Directive, all potential adverse effects on European designated sites would be avoided. This has been confirmed by the Information to Inform the Appropriate Assessment which concludes that the planned intervention could be implemented without adversely affecting designated sites as explained in Appendix 8a.

The intervention was not expected to have any substantial effects on air quality or CO_2e emissions as whilst the proposed dualling would reduce congestion in some locations along the route, especially around Calvine which could lead to a minor improvement in local air quality, an increase in vehicle related emissions generally over the entire route from Blair Atholl to Inverness could be generated through the expected increase in the volume and speed of vehicles.

At this stage of detail it was considered that the potentially substantial adverse effects of the intervention on a number of environmental media outweighed the contribution to human health and population. Therefore the intervention was envisaged to have a moderately adverse effect.

D24 –Targeted Road Congestion / Environmental Relief Schemes

The main beneficial effect of this intervention was associated with the environmental issue of human health, as a result of improved safety in urban areas due to targeted road congestion relief, which represented a minor benefit. The intervention also represented a neutral or minor benefit in terms of air quality in localised urban areas arising through reduced congestion.

Further potential beneficial effects of a minor nature relating to population and noise were subject to a high degree of uncertainty due to conflicting reports of effects of measures in relation to component issues such as community severance, accessibility, and community linkages resulting from bypasses, and the dispersion of noise between existing and new receptors. Both environmental parameters could have minor adverse effects and therefore were recorded as uncertain. The same assessment was true for the environmental topic of cultural heritage which could have either minor to moderate adverse effects (attributed to potential effects on designations on the outskirts of towns) or minor beneficial effects (attributed to relief of pressure on designated sites within towns).

There were further potential adverse effects on seven of the environmental features which were also subject to a high degree of uncertainty as the actual nature of the works employed as a result of this intervention were not defined.

Depending on the actual form and location of works there were likely to be adverse effects on the regional resources of biodiversity (of a neutral to major nature due to the range of potentially affected designated sites); soils and geology (of a neutral to major nature due to the proximity of a SSSI and permanent land take); water (of a neutral or minor nature due to presence of high grade rivers and potential for localised pollution from construction); local landscape and visual setting (of a neutral to moderate nature due to the introduction of new road infrastructure on a rural landscape); and material assets (of a minor nature due to inefficient use of existing infrastructure and requirement for additional resource use).

These adverse effects could be minimised to an extent through sensitive siting and design in line with legislative requirements (The Transport and Works (Scotland) Act 2007; (Consents under Enactments) Regulations 2007; Water Environment (Controlled Activities) (Scotland) Regulations 2005) and best practice outlined in the DMRB. Restrictions placed on the form and siting of works by the Habitats Directive would mean potential adverse effects on European designated sites would be avoided. This has been confirmed by the Information to Inform the Appropriate Assessment which concludes that the planned intervention could be implemented without adversely affecting designated sites as explained in Appendix 8a.

The intervention was not expected to have any substantial effects on CO_2e emissions.

Recognising the particularly high degree of uncertainty associated with the assessment of this intervention, it was considered that the potentially substantial adverse effects of the intervention on a number of environmental media outweighed the contribution to human health. Therefore the intervention was envisaged to have a minor adverse effect.

E2 – Co-locate Dundee Bus Station with Rail Station

There are few environmental benefits associated with co-locating Dundee bus station and rail station. It was considered that there could be very minor enhancements to the townscape of the City, depending on the design of the new building; however the extent of these effects is uncertain.

There were several minor adverse effects of this intervention. The local population would be adversely affected in the long term because the new station would remove the existing connection between local and strategic bus services. Dundee is adequately served with a station for national bus services and the provision of a new building would not provide any new infrastructure that is missing from the town. It would simply replace the existing building, with the requirement for use of new natural resources which would have adverse effects on local material assets. Further possible minor adverse effects to the cultural heritage features in Dundee could occur depending on the siting and design of the new station.

There were considered to be very few benefits on the local environment through this package and therefore it was considered that, overall, long term minor adverse effects were considered to occur.

E6 – Inverness Southern Bypass from the A9 to A82

Implementation of this intervention would have limited benefits to the environment. It was considered that minor benefits could occur in terms of local health through a reduction in the frequency of accidents. Both beneficial and adverse effects were expected in terms of the local population. Benefits arose as a result of improved community linkages and accessibility, by diverting strategic traffic out of the city centre and reducing conflict with local traffic, however, the bypass could divert tourist traffic around the southern part of Inverness, reducing stop-off traffic in the centre, with a potential adverse effect on local economy.

There were several potential adverse effects due to this intervention. Major adverse effects to local soils and geological resources could occur with further moderate adverse effects to the landscape and its visual amenity. Uncertainty surrounded the nature of all other potential adverse effects. Depending on the actual form and location of works there were likely to be minor to moderate adverse effects on local biodiversity, the noise environment through the creation of new noise sensitive receptors, local water bodies (of a neutral to minor nature), material assets (of a minor to moderate nature due to building of new infrastructure) and moderate to major effects on local cultural heritage features. At the strategic level the Information to Inform the Appropriate Assessment concludes that the planned intervention would not adversely affect the integrity of any European site as explained by Appendix 8b. There were potential effects from the new bridges on the character and nature of the River Ness and Caledonian Canal, which may affect the overall quality of these watercourses. The Caledonian Canal is also designated as a Scheduled Monument. Further details on this can be found in Table 5.3.3 in Appendix 5.

It was envisaged that these effects would be minimised to an extent through sensitive siting and design in line with legislative requirements.

At this stage of detail, recognising the particularly high degree of uncertainty associated with the assessment of this intervention it was considered that the potentially substantial adverse effects of the intervention on a number of environmental media outweighed the contribution to human health and population. Therefore the intervention was envisaged to have a moderate adverse effect over a long time period.

E9 – Railfreight connections to the Rosyth Port

The main beneficial effect of this intervention were associated with the environmental issues of human health and air quality as a result of reduced road freight and contributes to improved road safety and air quality. The intervention could also provide neutral to minor benefits in terms of noise due to a reduction in road of freight travel.

There were a series of potential adverse effects on some environmental features which were subjected to a high degree of uncertainty the exact nature of the works employed are currently not defined.

Depending on the actual form and location of works there are likely to be adverse effects on: biodiversity, of a moderate nature due to land take that could affect the integrity nationally designated sites; the water environment, of a neutral to minor nature due to the proximity of works to both minor burns and European designated sites which rely on

maintenance of high water quality; and the landscape and visual setting, of a minor to moderate nature due to the introduction of a new infrastructure feature in the landscape.

It was envisaged that these effects would be minimised to an extent through sensitive siting and design in line with legislative requirements. At the strategic level the Information to Inform the Appropriate Assessment concludes that the planned intervention would not adversely affect the integrity of any European site as explained in Appendix 8b.

In addition, there was greater certainty surrounding potential adverse effects on the environmental features of material assets (of a minor nature at a local scale over the long term due to the building of new infrastructure and associated use of resources), cultural heritage (of a moderate nature at a local scale over the short and long term, due to land take that could affect designated sites), and soils and geology (of a minor nature at a local scale over a long term time period, due to proximity to a designated site, and the effects of land take from new infrastructure).

The intervention was overall considered to have minor to moderate adverse effects at a local scale over a long time period as the potentially substantial adverse effects of the intervention outweighed the potential benefits to human health, air quality and noise.

E10 – Improved Road Links to Edinburgh Airport

Improving the road links to Edinburgh Airport was considered to have minor benefits associated with the environmental features of local health as a result of reduced accident frequency.

In addition, there were considered to be minor adverse effects on material assets in the local area due to the building of new infrastructure and use of resources in construction and the local landscape and visual setting. Major adverse effects to cultural heritage features are envisaged with the potential for neutral to minor effects on local biodiversity. The Information to Inform the Appropriate Assessment concluded that there were no potential effects on the integrity of a Natura 2000 or Ramsar site as explained in Appendix 8b.

The intervention was not expected to have any substantial effects on noise, population, water, soils and geology, air quality, or CO_2e emissions. Overall, this intervention was assessed as having a minor adverse effect on the local area over a long time period.

E11– Improvements to the Trunk Road Network in Inverclyde

Few environmental benefits were expected as a result of the improvements to the trunk roads in Inverclyde. Upgrading junctions and the introduction of enforcement measures would make efficient use of the existing road infrastructure thereby having minor benefits to local material assets.

All other effects were considered to be potentially adverse in nature. There was a high level of uncertainty surrounding the effects on some of these environmental features, mainly due to the fact that the actual nature of works required was unclear.

Depending on the actual form of works required, there may be some mainly minor adverse effects on local biodiversity, the local population, its health, effects on the Inner Clyde and

local air quality. More substantial moderate to major adverse effects were considered to cultural heritage features such as A-Listed buildings. Further details can be found within Appendix 5.

These adverse effects can be minimised through sensitive siting and design in line with environmental legislative requirements (The Transport and Works (Scotland) Act, 2007 (Consents under Enactments) Regulations, 2007) and best practice according the DMRB (further mitigation is described in Chapter 7). It was also proposed that due to restriction placed on the form and siting of works by the requirements of the Habitats Directive, that all potential adverse effects on European designated sites would be avoided. This has been confirmed by the findings of the Information to Inform Appropriate Assessment which concludes that the planned intervention would not adversely affect designated sites as explained by Appendix 8b.

The intervention was not expected to have any substantial effects on the noise environment, geological resources or the local landscape and its visual amenity. Reduction in levels of CO_2e emissions were also not considered to be substantial.

At this stage, it was considered that the upgrades would have overall long term minor to moderate adverse effects on the local environment with very few benefits.

E16 – Extension of Glasgow Southern Orbital from East Kilbride to M73 / M74

The main beneficial effect of this intervention was associated with the environmental issue of population, as a result of improved community accessibility and linkages, and reduced congestion and journey times, which represented a minor long term benefit to the local population.

Depending on the actual form and location of works, there are likely to be adverse effects on the resources of cultural heritage (of a neutral to moderate nature at a local scale over a long time period, due to the proximity of a number of designated sites), the water environment (of a minor or moderate nature at a local scale over the short or long term, due to the proximity of the intervention to a number of water courses and potential effects arising from construction), and air quality (of a neutral to minor nature at a local scale, due to increased traffic speeds and promotion of car ownership). It is envisaged that some of these effects would be minimised to an extent through sensitive siting and design in line with legislative requirements and best practice outlined in the DMRB.

In addition, there was a greater certainty surrounding potential adverse effects on the resources of local biodiversity (of a minor nature long term, due to the possible proximity of a SSSI to the route, and land take from rural areas of local ecological interest), soils and geological resources (of a minor nature due to land take and severance of agricultural resources), the local landscape and its visual setting (of a minor nature over short and long term periods), local noise levels (of a minor nature over a long time period, due to introduction of new noise receptors along the new route), and material assets (of a moderate nature at a local level over the long term).

At this stage of detail it was considered that the potentially substantial adverse effects of the intervention on a number of environmental media outweighed the contribution to the population. Therefore the intervention was envisaged to have minor to moderate adverse effect at a local scale over a long time period.

6.3.4 Uncertain Effects

This Section describes the one intervention that has been considered to have an overall uncertain effect and inter-relationship. This is because the details of the intervention have not been fully defined and it is not considered possible to provide an overall assessment.

D25 – West of Scotland Strategic Rail Enhancements: Glasgow Metro

Whilst the effects of this intervention were determined to be uncertain overall due to a lack of detail, effects on each environmental feature have been assessed as far as possible.

There was a degree of certainty surrounding the potential moderate benefit of the intervention on the local population but it was thought the intervention would result in improved community accessibility and linkages. A minor adverse effect over the long term on material assets was possible due to the introduction of new infrastructure and resource consumption during construction.

Due to the lack of detail regarding the actual nature of the works employed by the intervention, there was a high degree of uncertainty surrounding adverse effects on other environmental resources. Depending on the actual form and location of works there may be minor to major adverse effects on local cultural heritage features, neutral to minor effects on local biodiversity and minor to moderate adverse effects on the local water bodies in the short and long term. Minor adverse effects on the local landscape and visual setting were also possible.

It was envisaged that these effects would be minimised to an extent through sensitive siting and design in line with legislative requirements (The Transport and Works (Scotland) Act 2007; (Consents under Enactments) Regulations 2007; Water Environment (Controlled Activities) (Scotland) Regulations 2005) and best practice outlined in the DMRB.

In addition, there was also a high degree of uncertainty surrounding proposed neutral effects on soils and geology due to the envisaged limited requirement for land take or for construction on agricultural soils. The effects of the intervention on human health, air quality, and noise were too uncertain to be categorised at the present time as the technologies to be used in the public transport system and location of the network have not been defined.

It was considered that there was the potential for modal shift to rail which could contribute towards a reduction in emissions of CO_2e, however any potential change in CO_2e output was not expected to be substantial in the context of Scotland's overall CO_2e emission targets.

Based on the available detail, it was considered that the there was insufficient information to determine an overall assessment of the effects likely to be created by this intervention.

6.4 Detailed Assessment Conclusions

In conclusion, the detailed SEA assessment has identified five interventions with major national and regional beneficial effects:

- **D1** – Strategic Road Safety Plan;
- **D2** – Maintaining and Safely Operating Scotland's Rail Network;
- **D3e** – Route Management between: Aberdeen and North East Scotland (A90), Edinburgh and Dundee (A92), Ayrshire and Dumfries (A76), Edinburgh and North West England (A68/A7), Edinburgh and North East England (A1), the A83, A85, A828;
- **D6** – Using Intelligent Transport Systems on Parts of the Road Network to Enhance Capacity and Operations; and
- **D8** – Enhancing the Rail System Capacity through Targeted Improvements.

None of the interventions were found to have major adverse effects, however, those with moderate adverse effects identified included:

- **D14** – A9 Upgrading from Dunblane to Inverness Phase 1;
- **D14** – A9 Upgrading from Dunblane to Inverness subsequent phases;
- **D16** – Upgrade of the A96 to Dual Carriageway between Inverness and Nairn; and
- **E6** – Inverness Southern Bypass from the A9 to the A82.

SEA alternatives to those detailed interventions to be taken forward (D referenced) and identified as having adverse effects are assessed as part of the SEA and STPR process. These included alternative interventions as well as both generic and intervention specific mitigation to address the potential adverse effects which can then be carried forward to subsequent intervention design and assessment stages.

The interventions, referenced E and identified in Appendix D of the STPR Report 3, did not have alternatives proposed for them as these were interventions identified as not progressing through to the next stage of the STPR process.

SEA alternatives to the detailed interventions, mitigation proposed and any residual effects identified after mitigation are provided in Chapter 6.

6.5 Environmental Implications of Interventions Not Recommended after Detailed Appraisal

The interventions listed within this section are those contained within STPR Report 3, Appendix E as interventions not recommended after detailed appraisal. This Section looks at the potential environmental implications of not recommending an intervention that has been assessed in the SEA as having an overall benefit and highlights other interventions taken forward (see STPR Report 3, Appendix D) that could offset any outstanding environmental issues.

A detailed description of the environmental assessment for each intervention can be found in Section 6.3.

E1 – Suburban Rail Services across Dundee

Whilst minor to moderate beneficial environmental effects were envisaged as a result of this intervention, the proposed 30 minute stopping service would require substantial and costly track and operational changes to occur. Therefore, the environmental effects were not considered to outweigh the constraints of cost and implementability.

As described in Appendix 3 of the Environmental Report, Dundee has an Air Quality Management Area which is declared for high levels of NO_2 and there is the potential for exceedence of annual mean objective (2010) for PM_{10} close to the Kingsway/Forfar Road junction. This intervention has the potential to contribute to an improvement in air quality, however, the intervention titled 'Dundee Northern Relief Road', would have similar, if not greater, benefits to local air quality with associated enhancements to human health and therefore the rejection of this intervention was not a substantial concern in terms of the environment. Dundee does not have any particular issues regarding accessibility for the population and the proposed Dundee bypass or upgrading of the A90 included in the 'Dundee Northern Relief Road' intervention has the potential to enhance linkages and accessibility further.

E5 – New Busway between Glasgow City Centre, Clydebank and Glasgow Airport

This intervention was likely to have moderate beneficial environmental benefits through improved accessibility, community linkages and utilisation of local material assets. However, it was considered that an intervention of this type that is largely affecting the local and regional level could not contribute as effectively as other alternative interventions.

It was noted that the Glasgow Airport Rail Link would provide a high frequency public transport service between the airport and Central Station, which would reduce the business case for connecting this intervention to the airport and would also have similar environmental benefits.

E7 – Rail Freight Enhancements between Mossend, Grangemouth and Aberdeen / Inverness

Whilst moderate beneficial environmental effects were envisaged as a result of this intervention, the costs of the intervention were high compared with the benefits, particularly as the proposed improvements to the line to Aberdeen via Dundee would include bi-directional signalling to provide system resilience, thereby limiting the need for an alternative via Inverness. The environmental benefits of this intervention, including improvements to noise levels, local air quality and climatic factors, were therefore addressed within the aforementioned intervention.

E8 – New Rail Line between Perth and Inverkeithing

Moderate beneficial environmental effects were envisaged as a result of this intervention through improvements to human health, the population, air quality and climatic factors, however, this intervention would not provide value for money given the costs of this intervention relative to the benefits. The intervention titled 'Inverkeithing to Halbeath Rail Line' was considered to represent a greater value for money through improved access to Rosyth and journey time reductions between Inverkeithing to Halbeath, north Fife and beyond. The Inverkeithing to Halbeath Rail Line was likely to have similar environmental benefits to this intervention and therefore it was considered that there would be no substantial environmental benefits lost from the rejection of this intervention.

E13 – New LRT Line to South East Edinburgh

This intervention was assessed as having minor to moderate beneficial effects on the environment through its benefits to the noise, population, human health, noise, air quality, CO_2e emissions and material assets of the area. Although this intervention performs well effects are largely at a local level, therefore the intervention would not be taken forward at this stage

There is no train link to Dalkeith, Shawfair and Penicuik or the Edinburgh Royal Infirmary at present and therefore these areas would benefit from the new LRT line. Edinburgh in general, however, is well served by public transport with no substantial issues of accessibility for the population so, despite the benefits, it was not thought that there would be any substantial environmental issues resulting through intervention rejection. The intervention titled 'Rail Enhancements in the East of Scotland' has similar benefits to the environment but it does not serve all of the same locations as this intervention.

E14 – Augment Far North Rail Line Rail Services with Express Coach Facilities

The intervention would have benefits to the population and its health, material assets and air quality. Whilst the intervention has a minor benefit to the environment overall it was considered that provision of infrastructure to facilitate express coaches may increase the level of subsidy required. Currently, the rail services north of Inverness are amongst the lowest levels of passengers on the Scottish rail network, with a consequential high level of subsidy required. The intervention improves accessibility and linkages in rural areas currently reliant on the car due to the dispersed and remote nature of the population. There are limited public transport services and this intervention would go some way to addressing this issue, particularly where there are additional stops at Black Isle and Dornoch.

The 'Targeted Programme of Measures to Reduce Accident Severity on the A9 North of Inverness' as part of intervention D3 would go some way to addressing constraints on the A9 and reducing accident rates thereby enhancing journey times with associated benefits to the population.

If the intervention was not implemented it was not thought that there would be any substantial environmental benefits lost that could not be addressed through other interventions.

E15 – Re-open Rail Freight Connection to Greenock Port

Benefits to the material assets, air quality, CO_2e emissions and human health were envisaged through this intervention. Whilst minor beneficial environmental effects were likely overall, it was not considered to be cost-effective compared with other surface access interventions to ports such as Grangemouth. The level of freight moved through Greenock Port is substantially less than that moved through Grangemouth, and given the location of the port within Greenock; it was unlikely that it would be able to expand to any substantial degree. In addition Grangemouth has been included as a national development within the draft NPF2.

Due to the limited capacity and level of freight moved through Greenock Port, it was unlikely that any substantial environmental issues would continue without this intervention being taken forward.

E18 – Suburban Rail Services across Aberdeen

Benefits to the population, human health, air quality, CO_2e emissions and material assets are likely to result from this intervention. Whilst minor beneficial environmental effects are envisaged overall, it was considered that a combination of the interventions titled 'Rail enhancements between Aberdeen and Inverness' and 'Rail enhancements between Aberdeen and the Central Belt' would enhance cross city services, as well as providing additional benefits in terms of improving better connections between the cities.

The combination of these interventions would have greater benefits to the population through better public transport provision and enhanced community linkages as well as to local air quality and climatic factors through the associated modal shift to rail, thus reducing reliance on the private car. This would have secondary beneficial effects on human health. It was therefore unlikely that there would be any substantial environmental issues resulting from the rejection of this intervention.

E19 – Glasgow Subway Upgrade and Modernisation

Benefits to the population and material assets were likely as a result of this intervention, with minor beneficial effects overall. It was considered that whilst this intervention increases rail capacity, the benefits are localised and are not considered to be value for money.

Benefits relating to this intervention were considered to be minor, and as the subway service already exists in Glasgow it was unlikely that there would be any major adverse environmental effects as a result of this intervention not being recommended.

E20 – New link between the M73 and Coatbridge

Benefits to noise, the population, human health, air quality and CO_2e emissions were likely as a result of this intervention. It was considered that relative to the cost of this proposal, this intervention was not considered to offer value for money.

Benefits relating to this intervention were considered to be minor, and adverse effects to biodiversity, water and material assets were also envisaged as a result of this intervention. Without the implementation of this intervention there is the potential for stagnation of the AQMA in Coatbridge, as freight will continue to utilise the road network, however it was not envisaged that there would be any substantial effects as a result of the rejection of this intervention.

6.6 Summary

This chapter has described the potential environmental effects of the transport interventions taken through to the detailed appraisal stage. The interventions (both D and E referenced) with the greatest environmental effects (beneficial and adverse) were identified in section 6.4. Furthermore, the interventions not progressing within the STPR process that were found to have beneficial environmental effects were discussed further in section 6.5.

Those interventions being taken forward by the STPR process (D referenced) which were found to have adverse effects following the implementation of mitigation measures outlined in legislation such as the Water Framework Directive, and generic best practice mitigation measures outlined in DMRB, have been taken forward into Chapter 6 to identify possible alternatives and mitigation measures along with the identification of any residual effects.

7 Proposed Alternatives and Mitigation

7.1 Introduction

This section considers those interventions that have been recommended for inclusion with the next stage of the STAG appraisal processes, following detailed appraisal (listed in Tables 4.2 and 4.3 in STPR Report 3) and which were assessed to have overall adverse effects on the environment through the SEA process (Appendix 5, Tables 2.2 and 2.3). A range of alternatives to the interventions were identified by the SEA Core Team.

The identified SEA alternatives were developed during the appraisal process and assessed by the STPR Team. This Team made recommendations on the implementability of these interventions as the STPR progressed into the detailed appraisal stage. Mitigation measures were also identified for interventions with adverse or uncertain adverse effects, which were taken forward as the intervention progressed to subsequent stages of the decision making process. The identification of SEA alternatives and their consideration in the STPR process was undertaken in accordance with the requirements of the SEA Act (Schedule 3)[1].

7.2 Alternatives

This Section provides details of the alternatives identified for each intervention, along with a justification as to whether the intervention and its alternative have been retained. The detailed assessment alternative matrix is provided in Appendix 5, Table 3.4. Five interventions, considering all phases of D14 as a single intervention, were identified following the detailed assessment as having an overall adverse effect but have been retained. SEA alternatives for three of these interventions were identified and are discussed in this Section: *Intervention D14 A9 Upgrading from Dunblane to Inverness*, *Intervention D16 Upgrade A96 to Dual Carriageway between Inverness and Nairn*, and *Intervention D24 Targeted Road Congestion/ Environmental Relief Schemes*,. It is important to note that alternative options were not identified for Intervention *D17 Rail Service Enhancements between Aberdeen and Inverness*, and the A90 upgrade scenario of intervention D19 Dundee Northern Relief Road although they were assessed as having adverse effects (Appendix 5). This reflects the iterative nature of the STAG appraisal processes. Details of these interventions are provided within STPR Report 3.

The SEA has also considered a 'Do-Minimum' alternative in relation to each intervention with overall adverse effects as noted above. The do-minimum scenario for each intervention considered the likely effects on the environment if the intervention was not implemented.

D14 - A9 Upgrading from Dunblane to Inverness

The upgrading of the A9 consists of a number of phases incorporating widening selected sections of the A9 between Perth and Blair Atholl to dual carriageway standards and accompanying junction upgrades, and improvements to the road between Blair Atholl and Inverness. The intervention also includes the grade separation of junctions between Dunblane and Perth.

This intervention aims to address STPR objectives, which include addressing driver frustration and accident severity, promoting a reduction in journey times particularly in relation to public transport, reducing emissions, and improving the operational effectiveness of the A9. As discussed in Chapter 6, the intervention is assessed as having an overall moderate adverse environmental effect, although the significance is uncertain, ranging from moderate to major. This is mainly due to the potential major adverse effects, particularly in respect to biodiversity, noise, soils and geology, cultural heritage features, landscape and visual interests. The uncertainty results from details not being exact at this stage of the intervention development.

An SEA alternative to the intervention as a whole involves a move away from a road based solution to one that focuses on enhancing public transport options and comprises the following four elements:

- The provision of additional coach services between Perth and Inverness;
- Improving the rail infrastructure on the Highland Mainline between Perth and Inverness, to improve passenger and freight rail services (which was considered under D15 Rail Enhancements on the Highland Mainline between Perth and Inverness);
- Improving the rail infrastructure for freight between freight terminals in the Central Belt (such as Grangemouth and Mossend) and Inverness (which was considered under E7 Rail Freight Enhancements between Mossend, Grangemouth and Aberdeen/Inverness); and
- Speed enforcement cameras on the A9.

The SEA alternative would have involved enhancements to existing public transport opportunities between Perth and Inverness in the form of both coach and rail services as well as enhancements to the existing rail infrastructure to allow more freight services to use rail over road as a viable means of transport. It was considered that the public transport elements of the alternative would address STPR objectives to promote journey time reductions and increase opportunities to travel between Perth and Inverness. Speed enforcement cameras were considered to assist in reducing accident severity.

This SEA alternative was assessed as having an overall minor beneficial environmental effect (Appendix 5, Table 3.4). It was considered improvements to public transport and the rail infrastructure would encourage greater use of these services, which could contribute to a modal shift away from private car and HGV use, and a corresponding decrease in road based vehicle emissions. In comparing potential effects of the alternative with the A9 upgrade, road related vehicle noise and CO_2e emissions were considered to be reduced, due to the envisaged modal shift and because the implementation of speed cameras would encourage reduced road vehicle speeds.

Effects of the SEA alternative on population and human health were considered to be similar, with moderate beneficial effects envisaged for population, and minor beneficial effects for human health. There were considered to be slightly greater benefits in terms of population as improved coach and rail services could strengthen links between communities. The SEA alternative would also improve community linkages by reducing journey times. There was however, less of a focus on supporting these links through public transport measures. The effect on human health with the SEA alternative was considered to be beneficial with improvements in air quality and an expected reduction in accidents through the implementation of speed enforcement cameras on the A9, in addition to the anticipated reduction in HGVs on the A9 and connecting roads. The human health effect was considered to be slightly more beneficial in comparison due to the anticipated reduction in accident rates. The use of material assets was also considered to be beneficial for both options, although the SEA alternative is more beneficial as it does not include the construction of a second carriageway and as the existing rail infrastructure is utilised rather than road only.

For the significance of effects on biodiversity, there was an element of uncertainty associated with the SEA alternative. New rail infrastructure required for improvements to the Highland Main Line and connections between the Central Belt and Inverness, such as new rail loops, could adversely affect designated nature conservation sites, depending on where they are located. A similar level of uncertainty was associated with the A9 upgrading in terms of locations for road widening and the effects on biodiversity for both alternatives were assessed as being adverse, of either minor to major significance and of a regional nature. In either case, the design and development processes would be subject to the constraints of regulation 48 of the Habitats Directive. It is envisaged, however that there would be more scope to avoid adverse effects under the SEA alternative

With respect to the regional landscape, new rail infrastructure associated with the SEA alternative could also have both short and long term adverse effects, particularly where the Highland Mainline runs through sensitive landscapes. This would again depend on the location of new infrastructure and, in comparison to dualling sections of the A9, the laying of additional track was not considered to be as potentially adverse in terms of visual effect.

Potential effects on soils and geology, water and cultural heritage were assessed as adverse but their significance was uncertain for both the intervention and the SEA alternative, as the location of infrastructure to be upgraded was not specified at this stage of assessment for either intervention. It was considered that these uncertain adverse effects have the potential to be mitigated through the measures identified in Section 7.3.

Three parts of the proposed alternative were not taken forward for the following reasons:

- **Additional Coach Services between Perth and Inverness:** Would not meet the STPR objectives in the same way as the proposed rail service enhancements on the Highland Mainline between Perth and Inverness (considered in Intervention D15 of Appendix D in STPR Report 3);

- **Railfreight Enhancements between Mossend, Grangemouth and Inverness:** Would not meet STPR objectives in the same cost effective manner as the proposed alternative of rail freight enhancements on the Highland Mainline between Perth and Inverness (considered in Intervention D15 of Appendix D in STPR Report 3); and

- **On the A9 between Dunblane and Inverness:** There were several key reasons why accidents occur. None of these were solely related to the speed of the vehicles and where appropriate speed cameras are already installed on this section of the A9. As such it is considered that speed management measures in isolation would not fully address the STPR objectives. The reasoning for this was that on the A9 between Perth and Inverness accident issues largely relate to driver frustration incidents at grade junctions and at the change over between dual and single carriageway sections, unfamiliarity with the route as they attempt to overtake slow moving vehicles.

The second part of the alternative, *Improvements to Services on the Highland Mainline* (considered in D15 of Appendix D in STPR Report 3) is being retained, however although it contributed to STPR objectives the alternative on its own does not fully meet them. It was therefore considered necessary for the A9 Upgrading from Dunblane to Inverness (Intervention D14 of Appendix D in STPR Report 3) to progress as it was able to address the objectives related to: operation and design standard on the A9 (particularly on the approaches to Perth), improve road safety and lead to journey time reductions between Inverness, Perth and the Central Belt. In order to fully address the established STPR objectives, both the A9 upgrading from Dunblane to Inverness (Intervention D14 of Appendix D in STPR Report 3) and the part of the proposed alternative involving improvements to the Highland Mainline, have been retained following detailed appraisal.

Only part of the SEA alternative has been taken forward in the STPR and an assessment has been undertaken of the environmental effects that the intervention (A9 upgrade Phase 1) and part of the proposed alternative (rail service enhancements between Aberdeen and Inverness) would have when taken forward together. Details of the assessment can be found within Table 5.3.4 of Appendix 5.

At this stage, although, the A9 upgrade and Highland Mainline rail improvements combined intervention alternative reduces the overall effect, it was considered to be minor adverse. There was however, uncertainty relating to the location of new road and rail infrastructure and the combined effects. In addition, the adverse effects associated with the A9 partial upgrading cannot be balanced out through taking forward the rail improvements.

The combination of the upgrade of the A9 and the improvements to the Highland Mainline were envisaged to improve accessibility and community linkages through improvements to both rail services and the A9. The upgrade of the A9 was also envisaged to improve road safety, and in addition a model shift encouraged by rail improvements could further reduce the number of people exposed to road vehicle emissions. The combination of these alternative interventions would result in beneficial effects on human health. In addition, the upgrades of the A9 and the rail enhancements would make efficient use of the existing road and rail infrastructure and would have a moderate beneficial effect on material assets.

Rail enhancements are likely to have a minor beneficial effect on local air quality, whereas the A9 upgrade is not expected to affect local air quality. It was therefore envisaged that any increase in CO_2e through decreased journey time would be offset through a modal shift to rail as result of rail service enhancements. The combined assessment for CO_2e emissions is therefore considered neutral.

Effects on the regional landscape, and on noise, remained adverse as originally assessed within both the A9 partial upgrade assessment, although a certain degree of uncertainty surrounded their significance. Effects on landscape were assessed as being of a short and long term scale and of moderate to major adverse significance as a result of the A9 between Perth and Blair Atholl passing though a National Scenic Area. Rail infrastructure also has the potential to affect the landscape. It is envisaged however that the combined effect on the landscape would remain as moderate to major adverse. Effects on noise were assessed as moderate to major adverse as noise sensitive receptors within the vicinity of the A9 could be adversely affected through the upgrading. Uncertainty over the exact location of new rail and road infrastructure means that the combined effects on biodiversity, water, soils and geology and cultural heritage were adverse but with a large degree of uncertainty surrounding the significance of these effects. It was possible that effects could be mitigated as discussed in Section 7.3.

The do-minimum alternative for the A9 upgrade was considered against the STPR corridor objectives, detailed in Appendix 4. The do-minimum scenario would not: reduce journey times between Inverness and Perth; improve the operational effectiveness of the A9; address issues of driver frustration relating to inconsistent road standards; and promote journey time reductions between the central belt and Inverness primarily to allow business to achieve an effective working day when travelling between these centres. There would be no effect on biodiversity, soils and geology, water, landscape, material assets and cultural heritage as no new infrastructure would be required. The effects on noise would be minor adverse because baseline traffic levels could continue to increase. The effects on the population would be minor adverse because increased traffic levels would reduce accessibility between Inverness and Perth. Accident levels could potentially increase as a result of increased traffic which would have a minor adverse effect on human health. There would be an increase in congestion around Perth which could contribute to an increase in vehicle related emissions with minor adverse effects on local air quality and the Perth AQMA. The effect on CO_2e would be neutral because there would be no substantial change in emission levels. The environmental effects of the do-minimum alternative have been assessed as overall minor adverse. The do-minimum alternative would not produce any substantial benefits and therefore has not been considered as a realistic alternative to the original intervention.

D16 - Upgrade A96 to Dual Carriageway between Inverness and Nairn

The intervention would provide a new dual carriageway on the A96 corridor between Nairn and Inverness and a new link road connecting the A96 and the A9 south of Inverness. This intervention would address the STPR objectives, "*to improve connectivity, journey time and opportunities to travel*, and *to reduce accident rate and severity*." The dualling of the A96 between Inverness and Nairn has been assessed as having an overall moderate adverse effect on the environment (Chapter 6). An SEA alternative has been considered for this intervention which aims to promote public transport improvements rather than the implementation of a new dual carriageway and comprises the following three elements:

- The introduction of rail Park & Ride facilities at Inverness and Nairn, to provide a public transport alternative to car travel;

- Improvements to the rail infrastructure between Aberdeen and Inverness to improve passenger services and provide a public transport alternative to car travel (considered in Package D17 of Appendix D in STPR Report 3: Rail Enhancements between Aberdeen and Inverness); and

- Implement speed enforcement measures on the A96 between Inverness and Nairn to reduce accident rates.

It was proposed that the SEA alternative could address the objectives associated with D16 of Appendix D in STPR Report 3 with improvements to rail services, improving connectivity and journey time by public transport between Aberdeen and Inverness and safety concerns through the introduction of speed enforcement cameras. The SEA alternative has been assessed as having an overall minor beneficial effect on the environment.

The SEA alternative would promote better accessibility between Inverness and Aberdeen, as well as better access to key services through public transport measures which would result in moderate benefits for the population. There were also minor benefits in terms of human health from improvements to air quality brought about by encouraging a modal shift away from the private car. In comparison, the upgrade of the A96 was also expected to benefit the population and human health, as upgrading the A96 would facilitate greater accessibility and improve community linkages between Inverness and Nairn and also reduce accident rates and severity.

By facilitating greater use of public transport, the SEA alternative has the potential to encourage a modal shift from road to rail, which was assessed as having minor benefits to air quality and minor benefits in terms of CO_2e emissions. The A96 upgrade however, does not promote a modal shift and is predicted to have no significant effect on CO_2e emissions.

The upgrade of the A96 was predicted to have further minor to major adverse effects on noise sensitive receptors, material assets and cultural heritage. Noise emissions are expected to increase as a result of higher vehicle speeds on the A96. In comparison, the SEA alternative was not envisaged to have an adverse effect on local noise sensitive receptors. The A96 upgrade was also likely to have an adverse effect on material assets due to the use of additional resources to construct the dual carriageway. The alternative however, would utilise the existing rail infrastructure of the A96 and it would moderately benefit material assets. In terms of cultural heritage, the A96 upgrade has the potential to affect a number of Scheduled Monuments and 'A' listed buildings that are situated within close proximity to the A96. The SEA alternative would also require the construction of rail infrastructure and park and ride facilities. Although there was a high degree of uncertainty surrounding the significance of these effects, however it is envisaged that any effects would be mitigated at the design stage.

An element of uncertainty regarding the significance of effects on biodiversity, water, and cultural heritage, the landscape and soils and geology also applies to the upgrading of the A96 between Inverness and Nairn (D16 of Appendix D in STPR Report 3) as the location of infrastructure required was undetermined. The adverse effect on geology could be addressed by avoiding Kildrummie Kames mixed SSSI. Potential adverse effects on the same environmental parameters were also uncertain in terms of significance for the SEA alternative however, it was envisaged that the SEA alternative would require less infrastructure and land-take than the upgrade of the A96 and that effects would be mitigated through measures such as those identified in Section 7.3.

After consultation with the STPR Team, it was considered that the proposed alternative would contribute to the STPR objective of "*Improved Connectivity, Journey Time and Opportunity to Travel by Public Transport*"; the alternative was not regarded as fully addressing the safety related objectives on the A96 east of Inverness. The alternative Park-&-Choose element could contribute to the objective but it was considered that the proposed Park-&-Choose as part of a new Dalcross Station (considered in part of D11 of Appendix D in STPR Report 3) would address the objective more fully. The speed enforcement measures are not expected to fully address the STPR safety objective. It was therefore considered that the A96 Upgrade (D16 of Appendix D in STPR Report 3), Rail Service Enhancements between Aberdeen and Inverness (D17 of Appendix D in STPR Report 3) and also Intervention Targeted Road Congestion / Environmental Relief schemes (D24 of Appendix D in STPR Report 3) would better contribute to all of the STPR objectives. Intervention D16 (A96 Upgrade) and part of the suggested alternative (considered in D17) were both been accepted. The SEA alternative as a whole was not accepted as an alternative to the upgrading of the A96.

Only part of the SEA alternative (improvements to rail services between Inverness and Aberdeen) was taken forward in the STPR and an assessment was undertaken of the environmental effects that the intervention and part of the proposed alternative would have when taken forward together. Details of the assessment can be found in Appendix 5; Table 5.3.4.

The combined intervention (D16 and D17 of Appendix D in STPR Report 3) was assessed as having an overall minor benefit to the environment. This was largely due to the beneficial effects associated with population, human health, air quality and material assets that would occur if the intervention and the rail service improvements were taken forward together. The assessment of the combined intervention and the alternative taken forward was overall more beneficial than the original assessment for the intervention (D16) although some adverse effects associated with the assessment remain.

The do-minimum scenario was considered as an alternative to the dualling of the A96 between Inverness and Nairn. The do-minimum scenario was considered against the STPR objectives for Corridor 4 that are detailed within Appendix 4. It was envisaged that without the implementation of this intervention none of the relevant corridor objectives would be met given that connectivity, journey times and opportunities to travel between Aberdeen and Inverness would not be improved and accident numbers and severity rates would not be reduced.

Minor adverse effects on the local population may result as the predicted increase in traffic could potentially decrease accessibility between Inverness and Nairn, particularly at the Raigmore Interchange. Additionally, the predicted traffic increase could potentially increase accident levels on this stretch of road and would have minor adverse effects on human health. Minor adverse effects on the noise environment could also result from the rise in traffic levels, increasing noise levels for existing receptors in the vicinity of the A96. There could be an increase in congestion on the A96 approaches to Inverness, particularly at the Raigmore Interchange, there is no AQMA declared within Inverness, however the baseline predicts potential increases in NO_2 levels within Inverness and as a result minor adverse effects on air quality were envisaged. There would be no effect on biodiversity, soils and geology, water, landscape, material assets and cultural heritage as no new infrastructure would be required for the do-minimum alternative. Effects on CO_2e emissions were also considered to be neutral as no substantial rise in emission levels is considered.

Overall the do-minimum alternative have been assessed as minor adverse, and as there are no substantial benefits to the environment, and the intervention does not meet any corridor objectives, this alternative is not considered to be a realistic alternative to intervention D16.

D24: Targeted Road Congestion / Environmental Relief Schemes

This intervention examines a number of strategies such as the potential for bypasses, junction improvements, and carriageway upgrades, which could be implemented to reduce conflicts between strategic and local traffic. As such there is a high degree of uncertainty surrounding this intervention. At the detailed appraisal stage however, it was assessed as having a potentially moderate adverse effect on the local environment. This was mainly due to possible adverse effects on the environmental media of biodiversity, landscape and visual amenity, water environment, cultural heritage and soils and geology. The intervention addresses the STPR objectives *to "improve connectivity, reduce journey times and opportunities particularly by public transport"* and "*to reduce accident rates and severity"*. The SEA alternative to this intervention focuses on enhancing passenger and freight rail services as opposed to the construction of new bypasses. This alternative comprises the following three elements;

- Improvements to rail freight services to increase the opportunity for freight to utilise rail;
- Improvements to rail passenger services to improve service frequency (this was considered under D17 – Rail); and
- Speed enforcement measures.

The assessment of the intervention (Chapter 6) considers that the reduction of traffic in a number of towns would benefit noise sensitive receptors, contribute to local air quality improvements, and benefit the population and its health through reducing severance effects and accident rates associated with town based traffic movements. Therefore although the intervention was not envisaged to encourage a modal shift, bypasses were considered to benefit noise receptors and local air quality within towns along the routes. The possible construction of relief schemes that could include bypasses involving new road infrastructure, with associated adverse long term effects on soils and geology and material assets.

The SEA alternative has been assessed as having an overall minor benefit to the environment. It was considered that improvements to rail services would encourage greater use of rail by both passenger and freight and were therefore likely to encourage a modal shift. The modal shift was envisaged to have moderate benefits for human health, and minor local benefits to air quality and CO_2e emissions. In addition, the implementation of speed enforcement cameras would encourage reduced road vehicle speeds and an associated reduction in CO_2e emissions, in contrast to the lack of significant change resulting from the introduction of new bypasses.

In the event that an environmental relief scheme was constructed around Nairn, for example, there would be improved accessibility to services between Aberdeen and Inverness, and a reduction in community severance which would benefit the population. In addition, a reduction in accident rates was envisaged, considered to present a moderate benefit to human health. No effects on noise sensitive receptors were envisaged as a result of the SEA alternative. In terms of material assets, the SEA alternative was considered to have a more beneficial effect as it promotes the use of the existing rail and road infrastructure rather than construction of new road infrastructure. It therefore avoids effects of land take and resource use associated with new road construction.

The adverse effects on the environmental parameters of biodiversity, water, landscape and cultural heritage were assessed as uncertain in terms of significance for bypass options as the exact location of these has not yet been determined. This is similar for the SEA alternative, which has uncertain adverse effects on biodiversity, water, soils and geology and cultural heritage. This was due to the location of any infrastructure requirements associated with rail enhancements requiring determination during intervention evolution. Any adverse effects would need to be mitigated using measures such as those set out in Section 7.3.

One element of the alternative, comprising improvements to rail services between Aberdeen and Inverness (also considered in D17), was accepted in order to assist in meeting corridor objectives. This was not however, considered to address safety issues through towns along the A96. Speed enforcement cameras were likely to contribute to the safety objectives but not to provide any journey time reduction. In response to the SEA alternative, intervention D24 was retained. Whilst the STPR acknowledged that the alternative would contribute to addressing safety issues and offer benefits to users of the rail service, it would not address the objective to reduce journey times on the A96.

Only part of the SEA alternative (improvements to rail services between Inverness and Aberdeen) has been taken forward within the STPR. An assessment was made of the combined environmental effects that this and the intervention would have when taken forward together. Details of this assessment can be found within Table 5.3.4 of Appendix 5.

The combination of D17 and D24 was assessed as having an overall minor benefit to the environment. This was largely due to the combined long term benefits associated with the parameters of noise, population, human health, air quality and material assets that the intervention and the rail service improvements would have when taken forward together. Adverse effects associated with soils and geology and the potential for effects on biodiversity, water, cultural heritage and landscape would remain.

It was envisaged that the combination of the A96 improvements and rail improvements would improve accessibility and community linkages between Inverness and Aberdeen. The provision of bypasses was envisaged to improve road safety and accident rates on the A96. In addition, reductions to both road traffic emissions and the number of people exposed to road vehicle emissions, meant the intervention was considered to have associated minor local benefits to human health. Although the rail enhancements were not envisaged to effect noise receptors, bypasses could move traffic away from local noise sensitive receptors and it was thought that properties currently affected by road traffic noise would decrease. There was also the potential for new noise sensitive receptors to be affected by potential bypasses. Material assets would benefit as the intervention would make maximum use of the existing rail infrastructure between Inverness and Aberdeen.

The envisaged reduction in congestion within the towns on the A96 and the modal shift from road to rail was considered to contribute towards an improvement in local air quality. It was also considered that an increase in CO_2e emissions through decreased journey time on the A96 as a result of bypasses would be offset by a modal shift to rail encouraged by the rail service enhancements, with neutral effects on CO_2e emissions.

Bypasses could adversely affect Kildrummie Kames SSSI and as a result, effects on soils and geology were assessed as adverse with an uncertain significance at this stage. Uncertainty over the exact location of new rail and road infrastructure meant that effects on biodiversity, water, landscape and cultural heritage were assessed as adverse with uncertain significance. Many of the adverse effects could be mitigated as discussed in Section 7.3.

The do-minimum scenario for this intervention was assessed against the SEA objectives as detailed in Appendix 4. This do-minimum approach would not improve road safety or journey reliability, nor would it reduce emissions. It would fail to reduce the conflict between strategic and local traffic which is integral to the intervention and fail to reduce congestion at critical points on the national road network, such as that at the outlined proposals in Ayrshire and Edinburgh.

As no new infrastructure would be constructed, a do-minimum approach would constitute a neutral impact on biodiversity, soils and geology, landscape and visual setting, the water environment, material assets, population and cultural heritage. Climate is also considered to be neutral, as the original intervention did not promote modal shift or a reduction in car usage. Also, as there would be no new infrastructure then there would no longer be the potential for new noise receptors. This, in addition to baseline predictions of a decrease in housing within 50m of roads producing greater than 60dBA against the 2005 and the 2022 figures, indicates that a do-minimum approach would have minor benefits to noise levels. A do-minimum approach could have a minor adverse impact on human health, as the construction of bypasses can often lead traffic away from populated areas and thus improve the air quality in and around the settlement. However, if no bypasses were built, then it was assessed that the do-minimum approach would not alleviate poorer air quality caused by congestion, thus causing a minor adverse impact on both human health and air quality. Overall, a do minimum approach would have a neutral effect on the environmental parameters.

7.3 Mitigation

This section considers mitigation for those interventions retained after detailed STPR appraisal (listed in Table 4.2, 4.3 and 4.4 of STPR Report 3) and assessed in Chapter 6 of this report. Mitigation measures are identified for impacts assessed as adverse or uncertain. Mitigation is intended to be taken forward as the intervention progresses to further stages of the decision making process. The first section establishes generic mitigation measures and the second section identifies any residual effects after mitigation. The mitigation follows the hierarchy of avoidance, reduction and remedy in line with the EIA Handbook[98].

- **Avoidance** aims to avoid any adverse impacts, including alternative or 'do nothing' options;
- **Reduction** aims to reduce unavoidable adverse impacts of the project;
- **Remedy** or Compensatory measures or compensation aim to offset or compensate for residual adverse effects which cannot be avoided or further reduced; and
- **Enhancement / Net Benefit / New Benefit** is the enhancement of the natural heritage interest of a site or area because adverse effects are limited in scope and scale, and the programme includes improved management or new habitats or features, which are better than the prospective management, or the habitats or features present there now.

[98] SNH (2005) EIA Handbook

Each intervention would be developed from the high level concept presented in STPR through various stages until a final scheme evolves. It is envisaged that some form of environmental assessment would be undertaken at each of these stages, with the majority of interventions subject to EIA at the appropriate stage. EIA should consider for all of the SEA objectives. As the intervention develops, each of these stages would consider the impacts and any remaining uncertainties identified in the STPR SEA and address these further through appropriate mitigation and by following the mitigation hierarchy of avoidance, reduction and offsetting. Taking this into consideration, the development of each intervention should address how best to avoid, in the first instance, the potential impacts associated with it as identified within this SEA, at each of the various development stages. High level avoidance strategies within this SEA were presented in the alternatives section (Section 7.2).

Further mitigation measures, in some case avoidance or reduction strategies, are detailed by SEA topics in the remainder of this section. Where mitigation measures are appropriate at the next stage of assessment and decision-making such as EIA, these have also been identified in this section. They have been recorded due to their envisaged importance within the reduction of residual effects. Some difficulty in implementing these measures could therefore be experienced at the STPR level. For mitigation of residual effects to be successful however, these measures should inform subsequent EIA mitigation.

Depending on the actual form and location of works there could be some mainly minor, adverse impacts on regional biodiversity, geological and water resources and cultural heritage resources. These would however be minimised through sensitive siting and design in line with environmental legislative requirements (The Transport and Works (Scotland) Act, 2007 (Consents under Enactments) Regulations, 2007) and best practice according to the DMRB.

Biodiversity

There are a number of mitigation measures, detailed below, which if implemented, are envisaged to avoid or reduce adverse effects on the biodiversity topic.

- During the development of the interventions, areas of recognised biodiversity importance should, where practicable, be avoided and the location of new infrastructure should recognise the presence of any protected species and habitats. It is also proposed that due to restrictions placed on the form and siting of works by the requirements of the Habitats Directive, all potential adverse effects on European designated sites would be avoided. Where species or habitats are likely to be effected, a Phase 1 habitat and species survey would be required. Where possible land take from greenfield land should be avoided; All works should be undertaken in full accordance with DMRB. There are no conceived difficulties in implementing this mitigation measure;

- The Appropriate Assessment details specific mitigation measures for those interventions with a potential effect on Natura 2000 Sites. The mitigation measures are detailed on a site by site basis. The assessment indicates that, at a strategic level, it could be possible to carry out the proposed intervention in such a way that there would be no adverse effects on the integrity of the designation, if the proposed mitigation is implemented. If these interventions are carried forward to an advanced stage, the design and development process would also be subject to Regulation 48 of the Habitats Directive. The general areas covered by the Appropriate Assessment Mitigation include: disturbance of species during construction and operation; pollution control and land take from habitats;

- Landscape maintenance should be undertaken by means that conserve, and where possible enhance, the development of species and their habitats which are protected or of high nature conservation interest in or adjacent to interventions;

- Land drainage characteristics necessary to support a diverse flora and fauna or particular species of interest already found on the site should be conserved; and

- Habitats, including without limitation native woodland, woodland edge, wetlands, species rich grassland and heathland, rock and scree should be managed so as to conserve, and where possible enhance their nature conservation value. All underpasses and over structures should be designed and located so as to maximise the opportunity for wildlife crossing whilst not impairing the function of the structure. The provision of vegetated margins should be considered and all opportunities should be taken for locating the structures as close as practicable to likely wildlife crossing points. The mitigation measures would be applied to the following interventions detailed in Table 7.1.

Table 7.1: Interventions Requiring Mitigation for Adverse Biodiversity Effects

Intervention (taken from STPR Report 3)	Title
D3a	Targeted programme of measures to reduce accident severity on the A9 North of Inverness
D3b	Targeted Programme of Measures to Reduce Accident Severity on the A9 and A835 between Inverness and Ullapool:
D3c	Targeted Programme of Measures to Reduce Accident Severity between Inverness, Fort William, Mallaig and Skye:
D3d	Targeted Programme of Measures to Reduce Accident Severity on the A96 between Aberdeen and Inverness:
D4	Targeted Programme of measures to improve the Trans European Network linkage to Loch Ryan port facilities
D5	Targeted Programme of Measures to improve road standards between Glasgow and Oban/Fort William (A82):
D11	(Strategic) park & Ride / Park & choose strategy

Intervention (taken from STPR Report 3)	Title
D14	A9 Upgrading from Dunblane to Inverness (phase 1)
D14	A9 Upgrading from Blair Atholl to Inverness (Subsequent phases)
D15	Rail enhancements on the Highland Mainline between Perth and Inverness
D16	Upgrade A96 to Dual carriageway between Inverness and Nairn
D17	Rail enhancements between Aberdeen and Inverness
D18	Rail enhancements between Aberdeen and the Central Belt
D19	Dundee Northern Relief Road: Bypass Scenario
D19	Dundee Northern Relied Road: A90 upgrade Scenario
D21	Grangemouth road and rail access upgrades
D24	Targeted road congestion / environmental relief schemes
D31	Inverkeithing to Halbeath rail line
D25c	Addressing rail terminal in Glasgow

Population

There two mitigation measures detailed below, which if implemented, are envisaged to avoid or reduce adverse effects on the population topic. There are no conceived difficulties in implementing the mitigation measures:

- Fully consider community linkages and accessibility at all subsequent stages of decision making; and
- Consultation with local communities over proposed transport interventions.

The mitigation measures for population would be applied to the following interventions in Table 7.2.

Table 7.2: Interventions Requiring Mitigation for Adverse Population Effects

Intervention (taken from STPR Report 3)	Title
D10	Reconfiguration of national rail timetable
D24	Targeted road congestion / environmental relief schemes

Noise

A number of mitigation measures have been identified, which if implemented, would avoid or reduce adverse effects relating to the environmental topic of noise. There are no conceived difficulties in implementing the following mitigation measures:

- Noise reduction mitigation should include road surfaces which generate lower levels of traffic noise and / or noise barriers, where adjacent properties could be affected; and

- The routing of construction traffic around the north of Dundee should be detailed in a transport management plan before construction to reduce effects on sensitive receptors.

The mitigation measures for noise apply to the following interventions in Table 7.3.

Table 7.3: Interventions Requiring Mitigation for Adverse Noise Effects

Intervention (taken from STPR Report 3)	Title
D24	Targeted road congestion / environmental relief schemes
D31	Inverkeithing to Halbeath Rail Line
D14	A9 upgrading from Dunblane to Inverness (phase 1)
D14	A9 upgrading from Blair Atholl to Inverness (Subsequent phases)
D19	Dundee Northern Relief Road: Bypass Scenario
D25b	Addressing rail terminal in Glasgow: Glasgow Central East
D25c	Addressing rail terminal in Glasgow: Glasgow Metro

Water

A number of mitigation measures have been identified detailed below, which if implemented, would avoid or reduce adverse effects relating to the environmental topic of water. There are no conceived difficulties in implementing these mitigation measures:

- All activities associated with interventions would be carried out in accordance with the CAR Regulations[99]. The regulations relate both to construction and operational impacts. In order to ensure proportionate controls over activities, the Regulations provide for three levels of control: General Binding Rules (GBR), Registrations and Water Use Licences. If site-specific controls are required and in particular if constraints upon the activity are to be imposed then the activity should be authorised using a licence;

[99] The Water Framework Directive as Implemented by the Water Environment and Water Services (Scotland) Act 2003 and Water Environment (Controlled Activities) (Scotland) Regulations 2005 (The CAR Regulations).

- A detailed drainage design incorporating SUDS should be undertaken to address flooding and potential drainage issues as a result of constructing the intervention, where this is considered appropriate;

- Water pollution control measures should be provided to ensure that pollutant concentrations in receiving waters remain within the limits for the appropriate water quality objective for the watercourse or where this is not available, for the current water quality classification; and

- For discharges to ground water, pollution control and containment measures should be designed and installed as necessary to ensure compliance of discharges with the Groundwater regulations.

The mitigation measures for water apply to the following interventions in Table 7.4.

Table 7.4: Interventions Requiring Mitigation for Adverse Water Effects

Intervention (taken from STPR Report 3)	Title
D3a	Targeted programme of measures to reduce accident severity on the A9 North of Inverness
D3b	Targeted Programme of Measures to Reduce Accident Severity on the A9 and A835 between Inverness and Ullapool:
D3c	Targeted Programme of Measures to Reduce Accident Severity between Inverness, Fort William, Mallaig and Skye:
D3d	Targeted Programme of Measures to Reduce Accident Severity on the A96 between Aberdeen and Inverness:
D4	Targeted programme of measures to improve the Trans European Network linkage to Loch Ryan Port facilities
D5	Targeted Programme of Measures to improve road standards between Glasgow and Oban/Fort William(A82):
D14	A9 Upgrading from Dunblane to Inverness (phase 1)
D15	Rail Enhancements on the Highland Mainline between Perth and Inverness
D16	Upgrade A96 to Dual carriageway between Inverness and Nairn
D17	Rail Enhancements between Aberdeen and Inverness
D18	Rail Enhancements between Aberdeen and the central belt
D19	Dundee Northern Relief Road: Bypass Scenario
D21	Grangemouth road and rail access upgrades
D24	Targeted road congestion / environmental relief schemes
D27	Rail Enhancements between Inverclyde / Ayrshire and Glasgow
D25a	Addressing rail terminal in Glasgow: Cross City Tunnel
D25b	Addressing rail terminal in Glasgow: Glasgow Central East

Intervention (taken from STPR Report 3)	Title
D25c	Addressing rail terminal in Glasgow: Glasgow Metro
D31	Inverkeithing to Halbeath Rail Line

Soils and Geology

Two mitigation measures have been identified which if implemented, would avoid or reduce adverse effects relating to the environmental topic of soils and geology. There are no conceived difficulties in implementing the following mitigation measures:

- The development of interventions should, wherever practicable, avoid crossing or adversely affecting geologically designated sites or valuable soil resources including geological SSSIs and Regionally Important Geological Sites; and
- Consultation at the local level to avoid fragmentation of agricultural resources.

The mitigation measures for soil and geology apply to the interventions in Table 7.5.

Table 7.5: Interventions Requiring Mitigation for Adverse Geology and Soil Effects

Intervention (taken from STPR Report 3)	Title
D3a	Targeted programme of measures to reduce accident severity on the A9 North of Inverness
D3b	Targeted Programme of Measures to Reduce Accident Severity on the A9 and A835 between Inverness and Ullapool
D3c	Targeted Programme of Measures to Reduce Accident Severity between Inverness, Fort William, Mallaig and Skye
D3d	Targeted Programme of Measures to Reduce Accident Severity on the A96 between Aberdeen and Inverness
D4	Targeted programme of measures to improve the trans European Network linkage to Loch Ryan Port facilities
D5	Targeted Programme of Measures to improve road standards between Glasgow and Oban/Fort William (A82)
D11	(Strategic) Park & Ride / Park & choose strategy
D15	Rail Enhancements on the Highland Mainline between Perth and Inverness
D14	A9 Upgrading from Dunblane to Inverness (phase 1)
D14	A9 Upgrading from Blair Atholl to Inverness (subsequent phases)
D16	Upgrade A96 to Dual carriageway between Inverness and Nairn

Intervention (taken from STPR Report 3)	Title
D17	Rail enhancements between Aberdeen and Inverness
D18	Rail enhancements between Aberdeen and the central belt
D24	Targeted road congestion / environmental relief schemes
D31	Inverkeithing to Halbeath Rail Line

Cultural Heritage

A number of mitigation measures have been identified, which if implemented, would avoid or reduce adverse effects relating to the environmental topic of Cultural Heritage. There are no conceived difficulties in implementing the following mitigation measures:

- The development of intervention should consider the potential for interventions to affect, either by crossing or affecting the setting of, internationally or nationally important cultural heritage features, including designated or proposed World Heritage Sites, archaeological sites, Scheduled Monuments or A Listed Buildings;
- Specific consideration of siting and design should be taken at locations where sensitive cultural heritage and features are present; and
- Interventions would be carried out in line with the Transport & Works (Scotland) Act, the Memorandum of Guidance on Listed Buildings and Conservation Areas (revised 1998) (the Memorandum) and NPPG18 Planning and the Historic Environment.

The mitigation measures apply to the following interventions, detailed in Table 7.6.

Table 7.6: Interventions Requiring Mitigation for Adverse Biodiversity Effects

Intervention (taken from STPR Report 3)	Title
D3a	Targeted programme of measures to reduce accident severity on the A9 North of Inverness
D3b	Targeted Programme of Measures to Reduce Accident Severity on the A9 and A835 between Inverness and Ullapool
D3c	Targeted Programme of Measures to Reduce Accident Severity between Inverness, Fort William, Mallaig and Skye
D3d	Targeted Programme of Measures to Reduce Accident Severity on the A96 between Aberdeen and Inverness
D4	Targeted programme of measures to improve the trans European Network linkage to Loch Ryan Port facilities

Intervention (taken from STPR Report 3)	Title
D5	Targeted Programme of Measures to improve road standards between Glasgow and Oban/Fort William(A82)
D14	A9 upgrading from Dunblane to Inverness (phase 1)
D14	A9 upgrading from Blair Atholl to Inverness (Subsequent phases)
D15	Rail Enhancements on the Highland Mainline between Perth and Inverness
D16	Upgrade A96 to Dual carriageway between Inverness and Nairn
D17	Rail enhancements between Aberdeen and Inverness
D18	Rail enhancements between Aberdeen and the central belt
D19	Dundee Northern Relief Road: Bypass Scenario
D21	Grangemouth road and rail access upgrade
D24	Targeted road congestion / environmental relief schemes
D25a	Addressing rail terminal capacity in Glasgow: Cross City Tunnel
D25b	Addressing rail terminal capacity in Glasgow: Glasgow Central East
D25c	Addressing rail terminal capacity in Glasgow: Glasgow Metro
D27	Rail Enhancements between Inverclyde / Ayrshire and Glasgow
D28	Upgrade Edinburgh Haymarket Public Transport Interchange
D29	Enhancements to rail freight between Glasgow and the Border via the West Coast Mainline
D31	Inverkeithing to Halbeath Rail Line

Material Assets

The mitigation measure for material assets is detailed below, which if implemented, would reduce adverse effects. There are no conceived difficulties in implementing the following mitigation measure:

- Fully consider the use of secondary or recycled aggregates in the construction of interventions. There are no construction and demolition recycling targets detailed in the Scottish National Waste Strategy, however in England the Government (DEFRA[100]) is considering a target to halve the amount of construction, demolition and excavation waste going to landfill by 2012, as a result of waste reduction, reuse and recycling. Scotland could also introduce a similar target.

The mitigation measure applies to the following interventions, detailed in Table 7.7.

[100] DEFRA (2007) E-Digest Statistics – Waste and Recycling

Table 7.7: Interventions Requiring Mitigation for Adverse Material Assets Effects

Intervention (taken from STPR Report 3)	Title
D16	Upgrade A96 to Dual carriageway between Inverness and Nairn
D19	Dundee Northern Relief Road: Bypass Scenario
D24	Targeted road congestion / environmental relief scheme
D25a	Addressing rail terminal capacity in Glasgow: Cross City Tunnel
D25b	Addressing rail terminal capacity in Glasgow: Glasgow Central East
D25c	Addressing rail terminal capacity in Glasgow: Glasgow Metro
D31	Inverkeithing to Halbeath Rail Line

Landscape

A number of mitigation measures have been identified detailed below, which if implemented, would avoid or reduce adverse effects relating to the environmental topic of Landscape:

- All works should consider the surrounding landscape and carrying out appropriate planting, ground modelling and fencing. Structural treatments should be carried out so as to soften the appearance of any works, environmental barriers or engineering features of the intervention with regard to views from the surrounding landscape and the intervention itself. This mitigation measure however, does not fall within the remit of STPR;

- Hard landscape and materials should be selected and maintained to suit local character and retain visual amenity. This mitigation measure however does not fall within the remit of STPR; and

- Visual screening should be used to reduce visual effects on the population. There are no conceived difficulties in implementing this mitigation measure.

The mitigation measures apply to the following interventions, detailed in Table 7.8.

Table 7.8: Interventions Requiring Mitigation for Adverse Landscape Effects

Intervention (taken from STPR Report 3)	Title
D3a	Targeted programme of measures to reduce accident severity on the A9 North of Inverness
D3b	Targeted Programme of Measures to Reduce Accident Severity on the A9 and A835 between Inverness and Ullapool

Intervention (taken from STPR Report 3)	Title
D3c	Targeted Programme of Measures to Reduce Accident Severity between Inverness, Fort William, Mallaig and Skye
D3d	Targeted Programme of Measures to Reduce Accident Severity on the A96 between Aberdeen and Inverness
D4	Targeted programme of measures to improve the trans European Network linkage to Loch Ryan Port facilities
D5	Targeted Programme of Measures to improve road standards between Glasgow and Oban/Fort William (A82)
D7	Further electrification of the strategic rail network
D11	(Strategic) park & Ride / Park & choose strategy
D15	Rail Enhancements on the Highland Mainline between Perth and Inverness
D16	Upgrade A96 to Dual carriageway between Inverness and Nairn
D19	Dundee Northern Relief Road: Bypass Scenario
D21	Grangemouth road and rail access upgrade
D24	Targeted road congestion / environmental relief schemes
D25b	Addressing rail terminal capacity in Glasgow: Glasgow Central East
D25c	Addressing rail terminal capacity in Glasgow: Glasgow Metro
D28	Upgrade Edinburgh Haymarket Public Transport Interchange
D31	Inverkeithing to Halbeath Rail Line

Those interventions with potential adverse effects progressed to subsequent stages of decision making should adopt and apply these measures. The interventions with adverse impacts that would be fully mitigated (i.e. have a resultant neutral effect) are summarise below (see Appendix 6, Table 6.2.1).

- **D3a: Targeted Programme of Measures to Reduce Accident Severity on the A9 North of Inverness:** Water, soils and geology, cultural heritage and landscape mitigation results in a neutral effect;

- **D3b: Targeted Programme of Measures to Reduce Accident Severity on the A9 and A835 between Inverness and Ullapool:** Water, soils and geology, cultural heritage and landscape mitigation results in a neutral effect;

- **D3c: Targeted Programme of Measures to Reduce Accident Severity between Inverness, Fort William, Mallaig and Skye:** Water, soils and geology, cultural heritage, and landscape mitigation results in a neutral effect;

- **D3d: Targeted Programme of Measures to Reduce Accident Severity on the A96 between Aberdeen and Inverness:** Water, soils and geology, cultural heritage and landscape mitigation results in a neutral effect;

- **D4: Targeted Programme of measures to improve the Trans European Network linkage to loch Ryan port facilities:** Water, soils and geology, cultural heritage and landscape mitigation result in a neutral effect;

- **D5: Targeted Programme of Measures to improve road standards between Glasgow and Oban/Fort William (A82):** Water, soils and geology cultural heritage and landscape mitigation results in a neutral effect;

- **D11: (Strategic) Park-&-Ride/Park-&-Choose Strategy:** Biodiversity, soils and geology, cultural heritage and landscape mitigation results in a neutral effect;

- **D14: A9 Upgrading from Dunblane to Inverness (Phase 1 and Subsequent Phases):** Water mitigation results in a neutral effect;

- **D15: Rail enhancements on the Highland Mainline between Perth and Inverness:** Water, soils and geology and cultural heritage mitigation results in a neutral effect;

- **D16: Upgrade A96 to Dual carriageway between Inverness and Nairn:** Noise, water, soils and geology, material assets and landscape mitigation results in a neutral effect;

- **D17: Rail Enhancements between Aberdeen and Inverness:** Water, soils and geology and cultural heritage mitigation results in a neutral effect;

- **D18: Rail Enhancements between Aberdeen and the Central Belt:** Water, soils and geology and cultural heritage mitigation results in a neutral effect;

- **D19: Dundee Northern Relief Road: Bypass Scenario:** Biodiversity, water, material assets and cultural heritage mitigation results in a neutral effect;

- **D19: Dundee Northern Relief Road: A90 Upgrades Scenario:** Biodiversity and landscape mitigation results in a neutral effect;

- **D21: Grangemouth road and rail access upgrades:** Biodiversity and water mitigation results in a neutral effect;

- **D24: Targeted road congestion / environmental relief schemes:** Biodiversity, noise, water, soils, material assets, cultural heritage and landscape mitigation result in a neutral effect;

- **D25a: Addressing rail terminal in Glasgow: Cross City Tunnel:** Water and material assets mitigation result in a neutral effect;

- **D25b: Addressing rail terminal in Glasgow: Glasgow Central East:** Water, material assets, cultural heritage and landscape mitigation result in a neutral effect; and
- **D25c: Addressing rail terminal in Glasgow: Glasgow Metro:** Water, material assets, cultural heritage and landscape mitigation result in a neutral effect.
- **D27: Rail Enhancements between Inverclyde/Ayrshire and Glasgow:** Water and cultural heritage mitigation result in a neutral effect;
- **D28: Upgrade Edinburgh Haymarket Public Transport Interchange:** Cultural heritage and landscape mitigation result in a neutral effect;
- **D29: Enhancements to rail freight between Glasgow and the Border via the West Coast Mainline:** Cultural heritage mitigation results in a neutral effect; and
- **D31: Inverkeithing to Halbeath Rail Line:** Noise, water, material assets and landscape mitigation result in a neutral effect.

7.4 Residual Effects

Residual effects were identified for interventions after consideration of the mitigation outlined previously. It is important to note that the interventions with residual adverse environmental effects include interventions with an overall adverse, uncertain, neutral or beneficial assessment. There are 20 interventions with adverse residual effects of which four (D14 (Phase 1), D14 (Subsequent Phases), D18 and D31) have major residual effects which cannot be mitigated at this stage. Where specific mitigation has been considered, this is identified and discussed in this section. The interventions with major adverse residual effects after mitigation are summarised in the following tables and are detailed in Appendix 6, Table 6.1.1. The beneficial effects, described in Chapter 6 and Appendix 5, were deemed to be beneficial residual effects.

Those interventions assessed as having major or minor adverse residual effects are discussed further in the cumulative effect assessment (Reference: Chapter 8).

7.4.1 Potential Major Adverse Residual Effects

The following interventions are considered to have potential major effects after the adoption of generic and specific mitigation measures. A full explanation of why mitigation measures were not able to neutralise these effects is provided in Appendix 6, Table 1.1. The interventions with major adverse effects are detailed in Table 7.9 on the following page.

Table 7.9: Interventions with Major Adverse Residual Effects

Intervention (taken from STPR Report 3)	Major Residual Effects after Mitigation
D14 - A9 Upgrading from Dunblane to Inverness (Phase 1).	The Appropriate Assessment Report [101] identifies mitigation for each Natura 2000 site which could be affected by the intervention. The full Report provides further details on the background and proposed mitigation. The specific mitigation measures described in the report cover the topics of: disturbance during construction and operation; pollution control; and land-take. The Appropriate Assessment concludes that when considering mitigation, it is possible to carry out the proposed intervention in a way that there will be no adverse impact on the integrity of River Tay SAC, River Spey SAC, Kinveachy Forest SAC and SPA, River Spey - Insh Marshes SPA & Ramsar, Insh Marshes SAC, Drumochter Hills SPA and SAC and Slochd SAC. It should be noted however that, based on the information currently available, the Appropriate Assessment could not conclude at the strategic level that a preferred engineering solution would not adversely affect the integrity of River Spey - Insh Marshes SPA & Ramsar and Insh Marshes SAC through land-take for bridge construction. An alternative solution has been proposed as outlined below which, at a strategic level, does offer potential to mitigate potential impacts upon these designated sites. It is recognised that continued refinements of the alternative solution could be required should this intervention proceed to the more detailed design stage. It should be further noted that, based on the information currently available, it has not been possible to conclude at the strategic level that the preferred engineering solution does not adversely affect the integrity of Drumochter Hills SPA & SAC through land-take for carriageway construction. Therefore, if this proposal is to be taken forward, further appraisal is required to establish that it would not adversely affect the integrity of the site. Due to the strategic nature of the STPR, it has not been possible at this stage to identify any further specific mitigation measures which would address the residual effects on of River Spey - Insh Marshes SPA & Ramsar and Insh Marshes

[101] STPR Appropriate Assessment: Screening and Scoping Report (22nd September 2008).

Intervention (taken from STPR Report 3)	Major Residual Effects after Mitigation
	SAC and on Drumochter Hills SPA & SAC. The project would only be progressed if it can be developed in such a way that there would be no damage to the integrity of the Natura 2000 site, if this cannot be ascertained the alternative engineering solutions would be adopted. The effects of this are discussed below.
D14: Alternative	**Alternative Engineering Solutions:** The Appropriate Assessment proposes two alternative engineering solutions to address the potential effects on Natura 2000 sites. At the River Spey - Insh Marshes SPA & Ramsar and Insh Marshes SAC, an alternative option which could be adopted is to construct the carriageway utilising the existing embankment and a single-span bridge. At Drumochter Hills SPA & SAC the alternative option is constructing the carriageway within a narrower footprint which does not involve land-take within the site. The two alternative engineering solutions would not involve permanent or temporary land-take within the sites, so no reasonable scientific doubt remains as to the absence of significant effects of land-take as a result of adopting the alternative solutions. The alternative solutions would reduce the overall residual effect to minor adverse, as the potential disturbance to nationally designated habitats and species during construction would remain.
D14 - A9 Upgrading from Blair Atholl to	The Appropriate Assessment has determined that at the strategic level the intervention will not affect the integrity of Cairngorms SAC; Shingle Islands SAC; Moray Firth SAC; Inner Moray Firth Ramsar; Kinveachy Forest SAC; Slochd SAC;

Intervention (taken from STPR Report 3)	Major Residual Effects after Mitigation
Inverness (Subsequent Phases).	and Longman and Castle Stuart Bays SAC. The Appropriate Assessment has identified a number of sites that require outlined mitigation measures to be implemented. The Appropriate Assessment Report[102] should be referred to for background and further detail on proposed mitigation. The specific mitigation measures cover the topics of: disturbance during construction and operation; pollution control; and land-take. Taking the mitigation into account, the Appropriate Assessment concluded that it is possible to carry out the proposed interventions in a way that there would be no adverse impact on the integrity of Tulloch Hills and Glen Fender Meadows SAC, River Tay SAC, River Spey SAC, Loch Vaa SPA, Kinveachy Forest SAC and SPA, River Spey - Insh Marshes SPA & Ramsar, Insh Marshes SAC, and Drumochter Hills SPA and SAC.. It should be noted however, that the Appropriate Assessment could not conclude at the strategic level that a preferred engineering solution would not adversely affect the integrity of River Spey - Insh Marshes SPA & Ramsar and Insh Marshes SAC through land-take for bridge construction. Therefore, if this engineering proposal is to be taken forward, further appraisal is required to establish that it would not adversely affect the integrity of the site. An alternative solution has been proposed as outlined below which, at a strategic level, does offer potential to mitigate potential impacts upon these designated sites. It is recognised that continued refinements of the alternative solution could be required should this intervention proceed to the more detailed design stage. It should also be noted that the Appropriate Assessment could not conclude at the strategic level that the preferred engineering solution would not adversely affect the integrity of Drumochter Hills SPA & SAC through land-take for carriageway construction. Therefore, if this proposal is to be taken forward, further appraisal is required to that it would not adversely affect the integrity of the site. If this is not achievable, an alternative option of constructing the carriageway within a narrower footprint which does not involve land-take within the site could be adopted.

[102] STPR Appropriate Assessment: Screening and Scoping Report (22nd September 2008).

Intervention (taken from STPR Report 3)	Major Residual Effects after Mitigation
	Due to the strategic nature of the STPR, it has not been possible at this stage to identify any further specific mitigation measures which would address the residual effects on of River Spey - Insh Marshes SPA & Ramsar and Insh Marshes SAC and on Drumochter Hills SPA & SAC. The project would only be progressed if it can be developed in such a way that there would be no damage to the integrity of the Natura 2000 site, if this cannot be ascertained the alternative engineering solutions would be adopted. The effects of this are discussed below.
D14: Alternative	**Alternative Engineering Solutions:** The Appropriate Assessment proposes two alternative engineering solutions to address the potential effects on Natura 2000 sites. At the River Spey - Insh Marshes SPA & Ramsar and Insh Marshes SAC the alternative option is constructing the carriageway utilising the existing embankment and a single-span bridge, could be adopted. At Drumochter Hills SPA & SAC the alternative option is constructing the carriageway within a narrower footprint which does not involve land-take within the site could be adopted. The two alternative engineering solutions would not involve permanent or temporary land-take within the sites, so no reasonable scientific doubt remains as to the absence of significant effects of land-take as a result of adopting the alternative solutions. The alternative solutions would reduce the overall residual effect to minor adverse, with potential disturbance to nationally designated habitats and species during construction.
D14 - A9 upgrading from Dunblane to Inverness (Phase 1 and Subsequent	Potential major adverse effects on the landscape, especially River Tay and Tummel National Scenic Areas and National Park. The effect on landscape pre-mitigation for these interventions is considered to be short and long term, regional, moderate to major adverse as the A9 upgrade passes through two National Scenic Areas and the Cairngorms National Park. The mitigation measure considered to be appropriate to reduce the effects upon the landscape is: To avoid

Intervention (taken from STPR Report 3)	Major Residual Effects after Mitigation
Phases)	development that does beneficially contribute to the landscape character of the National Park by virtue of its location, siting and design in accordance with Policy 7: Landscape of the Cairngorms National Park Local Plan • To make sure that development which could have a significant adverse effect on the landscape character of the Park, including its distinctive landscape features, scenic qualities, natural beauty, amenity, historic landscape elements or qualities of wildness would only be permitted where there is no alternative solution; and where the adverse effects have been minimised and mitigated to the satisfaction of the planning authority through appropriate siting, layout, design and construction in accordance with Policy 7: Landscape of the Cairngorms National Park Local Plan. The recommended mitigation reduced the severity of the residual effect on landscape however major adverse effects would remain. The effect is still major because a nationally designated sites could be affected, the current location of the A9 means that the upgrade cannot avoid this sensitive location. Accordingly, residual effects are therefore expected at this stage.
D18 - Rail Enhancements between Aberdeen and the Central Belt.	The Appropriate Assessment Report[103] identifies mitigation for each Natura 2000 site which could be affected by the intervention. The full Report should be referred to for background and further detail on proposed mitigation. The measures include: **Land-Take:** Given the size of the site, the permanent and temporary loss of, and potential damage to, up to 0.2ha from the total area could be insignificant in terms of its effect on the conservation objectives of the site. This cannot be confirmed however, without further analysis of the actual habitats which could be affected and the extent of bird activity in the area. **Disturbance: Construction:** The species for which the site is designated are migratory. It would be possible to schedule the most intrusive works for those months when these birds are absent. Where required, seasonal and spatial constraints could be imposed on piling activities to avoid disturbance.

[103] STPR Appropriate Assessment: Screening and Scoping Report (22nd September 2008).

Intervention (taken from STPR Report 3)	Major Residual Effects after Mitigation
	Barrier to Migration: Design of the new bridge could be developed in a way which avoids significant impacts on the main channel flow and allows fish to pass normally at all stages of the tide. Seasonal and spatial constraints could be imposed on activities such as piling in order to avoid disturbance. Where necessary, low-impact engineering techniques, such as drilling instead of pile-driving, could be deployed to minimise noise and vibration transmission into the basin. Given these precautions and the temporary nature of the construction phase, it would be possible to conduct the works in a way which reduces barrier effects to an acceptable level with no lasting damage to migrating fish. The Appropriate Assessment concludes that it is possible to carry out the proposed interventions in a way that there would be no adverse impact on the integrity of the River South Esk SAC. It must be noted however that, based on the information currently available, it has not been possible to conclude at the strategic level that the preferred engineering solution would not adversely affect the integrity of Montrose basin SPA and Ramsar through land-take for bridge construction. Therefore, if this proposal is to be taken forward, further appraisal is required to establish that it would not adversely affect the integrity of the site. An alternative solution has been proposed as outlined below which, at a strategic level, does offer potential to mitigate potential impacts upon these designated sites. It is recognised that continued refinements of the alternative solution could be required should this intervention proceed to the more detailed design stage. Due to the strategic nature of the STPR, it has not been possible at this stage to identify any further specific mitigation measures which would address the residual effects on Montrose basin SPA and Ramsar site. The project would only be progressed if it can be developed in such a way that there would be no damage to the integrity of the Natura 2000, if this cannot be ascertained the alternative engineering solutions would be adopted. The effects of this are discussed below.
D18: Alternative	**Alternative Engineering Solution:** The effects of this are discussed below. An alternative solution proposed in the Appropriate Assessment is for constructing the line to the east of the site could be

Intervention (taken from STPR Report 3)	Major Residual Effects after Mitigation
	adopted. As the site is already bounded on the eastern side by the rail line and two rail bridges, it could be assumed that the species for which the site is designated have successfully adapted to the impact of rail traffic. It is reasonable to assume that they would be tolerant of a proportionate increase in traffic. Therefore, no reasonable scientific doubt remains as to the absence of effects on their distribution and viability as a component of the site as a result of operation of the rail line. The alternative solution would not involve permanent or temporary land-take within the site, so no reasonable scientific doubt remains as to the absence of significant effects of land-take as a result of adopting the alternative solution.
D31 - Inverkeithing to Halbeath Rail line	Potential major effects on the historic designation of Fordell Castle HGDL. The effect on cultural heritage pre-mitigation from the rail line was considered long term, local, moderate to major adverse. The rail line could cut through or within 100m of Fordell Castle Historic garden and Designed Landscape, which contains two A listed buildings. Loss of land within Fordell Castle could compromise the sites integrity. The mitigation measures considered to reduce the effects on cultural heritage are: • Avoid designated areas especially Fordell Castle Historic Garden and Designed Landscape. • To make sure that development which would adversely affect the character and all features which have led to the designation would be safeguarded in accordance with Policy BE14 of the Dunfermline and the Coast Local Plan 2002. The mitigation reduces the severity of the effect although the effect remains major adverse because the setting of Fordell Castle and the listed buildings could be compromised, especially during construction. Due to the strategic nature of the STPR, it has not been possible to identify any further specific measures which further mitigate these effects. If this intervention is taken forward, then it should be recognised that moderate adverse effects could result on cultural heritage.

7.4.2 Potential Minor Adverse Residual Effects

The following interventions are considered to have minor effects after the adoption of generic mitigation measures. A full explanation of why mitigation measures are not able to neutralise these effects is provided in Appendix 6. The interventions with minor adverse effects are outlined in table in Table 7.10.

Table 7.10: Interventions with Minor Adverse Residual Effects

Intervention (taken from STPR Report 3)	Minor Residual Effects after Mitigation
D3a – Targeted Programme of Measures to Reduce Accident Severity on the A9 North of Inverness	**Biodiversity:** Disturbance of species and potential loss of nationally important habitat.
D3b – Targeted Programme of Measures to Reduce Accident Severity on the A9 and A835 between Inverness and Ullapool	**Biodiversity:** Disturbance of species and potential loss of nationally important habitat.
D3c – Targeted Programme of Measures to Reduce Accident Severity between Inverness, Fort William, Mallaig and Skye (A82, A87, A830, A887)	**Biodiversity:** Disturbance of species and potential loss of nationally important habitat.
D3d – Targeted Programme of Measures to Reduce Accident Severity on the A96 between Aberdeen and Inverness	**Biodiversity:** Disturbance of species and potential loss of nationally important habitat.
D4 – Targeted Programme of Measures to Improve the Trans European Network Linkage to loch Ryan Port Facilities.	**Biodiversity:** Disturbance of species and potential loss of nationally important habitat.
D5 – Targeted Programme of Measures to improve road standards between Glasgow and Oban/Fort William(A82)	**Biodiversity:** Disturbance of species and potential loss of nationally important habitat. **Landscape and Visual:** Integration of the intervention into the landscape would reduce potential impacts however, minor regional effects would remain.
D7 – Further electrification of the Strategic Rail network	**Landscape and Visual:** Construction of new overhead power lines would have a residual effect on sensitive landscapes.
D10 – Reconfiguration of national rail timetable	**Population:** Decreased frequency of train services for shorter distance trips that currently use main line service.
D14 – A9 Upgrading from Dunblane to Inverness (Phase 1)	**Noise:** Increased disturbance from noise. **Soils and Geology:** Potential effect on soils, especially blanket peat deposits to the south of Inverness and north of Blair Atholl. **Cultural Heritage:** Potential effects on the setting of a number of A listed buildings and on Historic Gardens and Designed Landscapes along the A9.

Intervention (taken from STPR Report 3)	Minor Residual Effects after Mitigation
D14 – A9 Upgrading from Dunblane to Inverness (Subsequent 2)	**Noise:** Potential noise effects at: Kingussie, Aviemore, Tomatin, Dalnacardoch, Calvine, Cairngorms National Park, Blair Atholl and other smaller communities. **Soils and Geology:** Potential effect on soils, especially blanket peat deposits to the south of Inverness and north of Blair Atholl. **Cultural Heritage:** Potential effects on the setting of a number of A listed buildings and on Historic Gardens and Designed Landscapes along the A9.
D15 – Rail enhancements on the Highland Mainline between Perth and Inverness	**Biodiversity:** Disturbance of species and potential loss of nationally important habitat. **Landscape:** Effects on sensitive landscapes
D16 – Upgrade A96 to Dual Carriageway between Inverness and Nairn	**Biodiversity:** Disturbance of species and potential loss of nationally important habitat. **Cultural heritage:** Short term temporary disturbance from construction and long term effects from land take and change in setting.
D17 – Rail Service Enhancements between Aberdeen and Inverness	**Biodiversity:** Disturbance of species and potential loss of nationally important habitat.
D18 – Rail Enhancements between Aberdeen and the Central Belt	**Biodiversity:** Disturbance of species and potential loss of nationally important habitat.
D19 - Dundee Northern Relief Road: Bypass Scenario	**Landscape:** Minor residual effects envisaged as the bypass would affect the rural landscape around Dundee. **Noise:** Potential minor residual effects in rural property north of Dundee.
D19 – Dundee Northern Relief Road: A90 Upgrade Scenario	**Cultural heritage:** Potential effects on the Scheduled Monument Gourdie Stone Circle, during construction, and risks to the integrity of the site from disturbance or accidental damage.
D21 – Grangemouth Road and Rail access Upgrades	**Landscape:** Dualling of the A801 across a rural landscape would require a viaduct over the Avon Gorge, with potential for short term, local, moderate adverse effects as a result of construction. Potential long term minor effects on culturally designated sites, notably the Antonine Wall WHS and the Union Canal. Due to the close proximity (2km) of the Antonine Wall World Heritage Site and numerous Scheduled Monuments to the intervention. There is the potential that construction could affect the setting of the designations. To address this specific mitigation was considered: • Avoid designated sites and their setting and integrate sensitive design and layout of new

Intervention (taken from STPR Report 3)	Minor Residual Effects after Mitigation
	infrastructure proposals. • Avoid the buffer zone that has been identified in the Antonine Wall Policy 2 which seeks to "*protect the landscape that is visually and perceptively linked to the perception of the World Heritage Site and that can still be practically protected or managed*." • In the event that the intervention would encroach upon the defined buffer zone, reference should be made to Supplementary Planning Guidance prepared jointly by Historic Scotland and its partner councils (Antonine Wall Policy 3) The mitigation reduced the residual effect on cultural heritage to short term, minor adverse.
D24 – Targeted Road Congestion / Environmental Relief Schemes	**Population:** Potential minor effects on the local economy.
D25a – Addressing rail terminal in Glasgow: Cross City Tunnel	**Cultural heritage**: Potential effects on Cowlairs and Shields.
D25b – Addressing rail terminal in Glasgow: Glasgow Central East	**Noise:** Residual effects to properties if the metro is located above ground.
D25c – Addressing rail terminal in Glasgow: Glasgow metro	**Biodiversity:** Disturbance of species and potential loss of local species. **Noise:** residual effects to properties if the metro is located above ground
D31 – Inverkeithing to Halbeath Rail Line	**Biodiversity**: Disturbance of species and potential loss of nationally important habitat. **Soils and geology**: Minor land take.

7.5 Summary

Prior to mitigation, 26 interventions were assessed as having adverse effects on at least one environmental parameter. In total, this amounted to 116 separate adverse effects. Following mitigation, adverse effects arising from four interventions, D11, D27, D28, and D29, were neutralised entirely. In total, 77 potential adverse effects on environmental media were neutralised across 23 interventions.

Adverse effects remaining following mitigation occur across 22 interventions, with 39 potential adverse effects on environmental media remaining. These adverse effects were categorised according to whether they were of major or minor significance. Four interventions, D14 (Phase 1), D14 (Subsequent Phases), D18 and D31 were considered to have adverse effects of major significance. Adverse effects relating to the remaining 18 interventions were of a minor nature following mitigation.

The assessed reduction in environmental effects that could be achieved through the mitigation measures outlined however can only be achieved if measures are successfully implemented. The application of certain mitigation measures is a legislative requirement under The Transport and Works (Scotland) Act 2007, (Consents under Enactments) Regulations 2007, the Water Environment (Controlled Activities) (Scotland) Regulations 2005, and the Habitats Directive, whilst best practice techniques for minimising environmental disturbance from transport infrastructure development is located in DMRB. The techniques outlined in these documents should be utilised to ensure mitigation measures outlined in this SEA are successfully implemented.

It has not been possible to neutralise, at this strategic level of detail, all adverse effects. Many of the proposed interventions would be subject to a project-level environmental impact assessment, for projects this would involve an EIA, for policies this may involve a separate and specific SEA. As interventions are progressed they may, if required, be subject to a project-level Appropriate Assessment.

8 Cumulative Assessment

8.1 Introduction

Schedule 3 of the Environmental Assessment (Scotland) Act 2005 identifies that cumulative effects are required to be considered within the Environmental Report. The cumulative assessment allows for effects which could arise from an accumulation of minor to major, effects both adverse and beneficial, to be identified so that these effects can be avoided, minimised or enhanced, as appropriate.

A fuller description of the methodology and definition of cumulative effects relative to STPR interventions is provided within Chapter 3 of this Report (Section 3.5.4).

An assessment of the potential cumulative effects of the STPR interventions taken forward(D interventions) after detailed appraisal has been undertaken, using a mix of professional judgment, mapped information (Figure 8.1) and the other key national strategies that set out a development framework for projects and their associated SEAs. This allowed different interventions and other projects to be overlain in order to identify which developments could potentially interact.

All 23 D interventions have been included in the cumulative effects assessment as all were found to have either beneficial (Appendix 7, Table 7.2.1) or residual adverse effects (Appendix 6, Table 6.1.1).

Based upon the findings, the interventions and potential receptors were grouped geographically into three 'areas' (but taking account of Scotland-wide interventions that encompass all areas). In this way, it was possible to take cognisance of the spatial nature of the relevant interventions through the cumulative assessment, and of equal importance, to break the cumulative effects assessment into 'digestible' components.

The three 'areas' are:

- North of Scotland – the part of Scotland extending northward from the Central Belt, with interventions including those north of the A811, the A91 between Stirling and Perth, and the Dundee area);
- East of Scotland – the eastern part of the Central Belt and southward, extending south from Dundee and Falkirk, and east from Falkirk and an approximate line in the area between the A74 and A7; and
- West of Scotland and to the south – the western part of the Central Belt and southward, extending south from Stirling and Dumbarton, and west from Falkirk and an approximate line in the area between the A74 and A7.

Details of the interventions that have been assessed within each area can be found within Appendix 7.

Given the transient nature of construction works and uncertainty relative to implementation timescales, short-term residual adverse effects have been excluded from the cumulative assessment because these have been assumed to be temporal effects which could be addressed successfully by mitigation.

The cumulative effects assessment is focused on the receptors of residual and beneficial effects. Given the strategic nature of SEA, receptors could normally only be expressed as areas or localities of various types of receptor (e.g. landscape character areas, residents of conurbations, habitats not nationally designated), but in some cases specific receptors were possible to identify (e.g. a particular SSSI). As is appropriate to strategic assessment, indicators can also represent receptors (e.g. greenhouse gas emissions representing the various global receptors of climate change). .

Due to the nature of transport interventions, in general STPR's cumulative effects follow similar themes across localities and regions. Appendix 7 provides the detailed results of the cumulative effects assessment for Scotland, its localities and regions along with their significance (see Chapter 3, Table 3.4 for the method of assessing significance).

The sections below provide a summary of key interactions amongst residual and beneficial effects, and the key conclusions and recommendations. The cumulative effects assessment has identified key receptors and effects on the local and regional environment. Receptors that have not been identified where not anticipated to be subject to key cumulative effects.

8.2 Summary of the Local and Regional Assessment of Cumulative Effects

8.2.1 Local Receptors

Key areas: Inverness, Nairn, Perth, Aberdeen, Edinburgh, Fife, Dundee, Glasgow

Residents, organisations and visitors would generally experience cumulative moderate accessibility benefits, which can be particularly important for access to essential services and employment opportunities. They would also experience cumulative minor to moderate air quality improvements and health benefits, the latter resulting both from the improvements to air quality and from road safety improvements and modal shift (as it was considered that encouragement public transport use would increase opportunities for walking and cycling). Particular moderate benefits could occur to AQMAs within Perth, Aberdeen, Dundee and Glasgow. However, there could be localised community severance as a result of certain road improvement schemes, which can adversely affect accessibility and levels of walking and cycling.

Residents, organisations and visitors would also experience localised adverse noise effects, being cumulative in this case across different phases of road improvements, with the potential for combined effects resulting from new infrastructure on noise sensitive receptors (including those within Candidate Noise Management Areas, particularly within Glasgow).

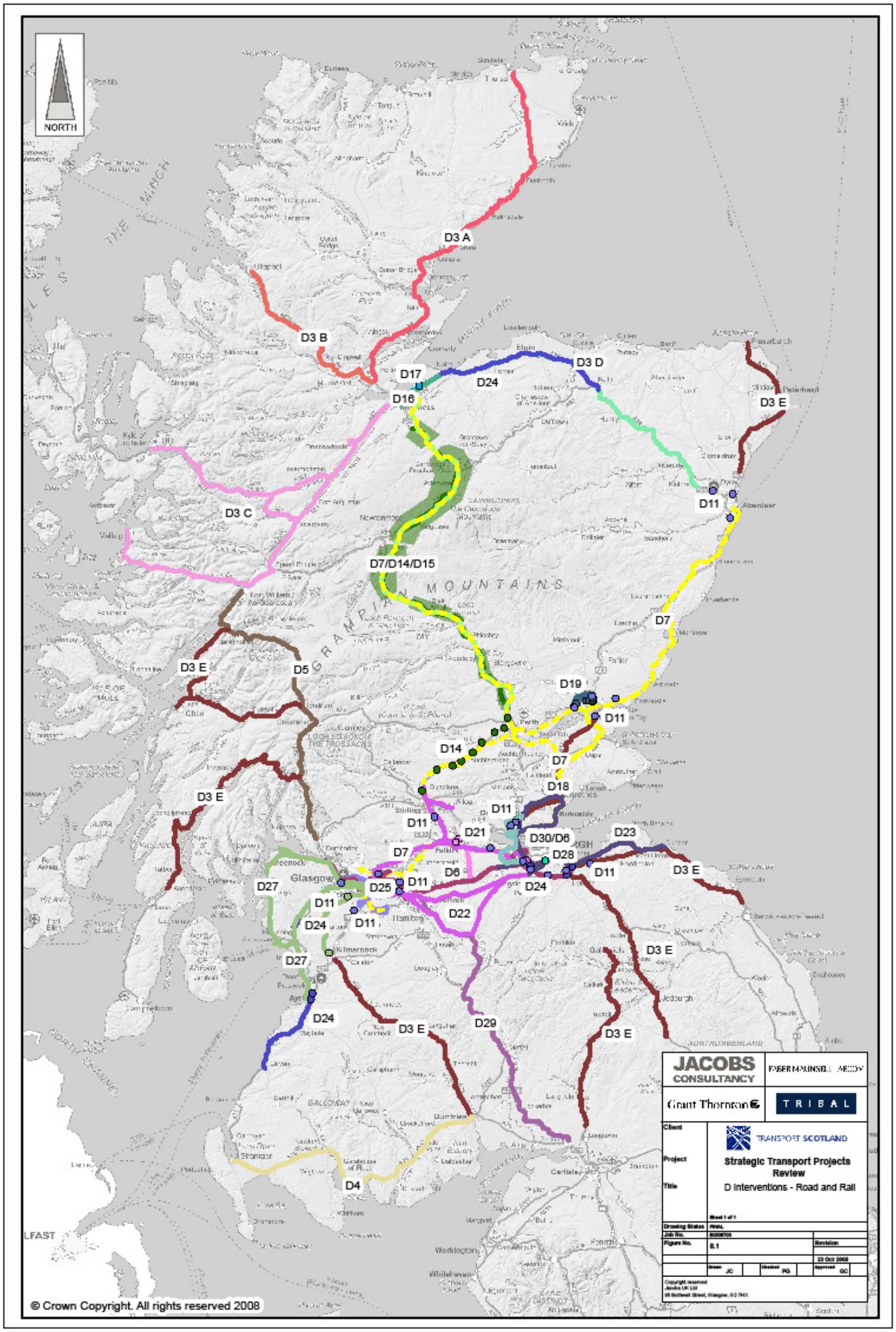

Figure 8.1: STPR D Interventions

The potential for uncertain major cumulative adverse effects of original intervention engineering solutions upon Natura 2000 sites (River Spey and Insh Marshes SPA and Ramsar, the Insh Marshes SAC) has been identified. The Appropriate Assessment has identified that further appraisal is required to show that it can be ascertained that the integrity of affected sites would not be adversely affected. If this is not achievable, alternative engineering solutions have been identified which would mitigate any impacts. Therefore no cumulative impacts on Natura 2000 or Ramsar sites are anticipated.

The potential for cumulative moderately adverse effects upon a number of SSSIs (including Kildrummie Kames and Creag Dhubh) has been identified and it was predicted that there would also be the potential for minor cumulative adverse effects on local biodiversity through the disturbance or the permanent loss of locally important biodiversity, species and habitats as a result of infrastructure requirements. These should be managed in the detailed design stage and on a project by project basis.

There are a few designated landscapes (Cairngorms National Park, and the National Scenic Areas of the Cairngorms, Loch Tummel, River Tay) and landscape character areas (including High Plateau Moorlands and Lowland Plateau and Plains) that would experience major cumulative adverse effects, which could be minimised by individual developments through project-level mitigation. This could have indirect effects on the residents and visitors to these sites. Adverse effects on the landscape would also affect visitors and residents of these areas through effects on landscape character and views.

Locally important heritage resources (including Blair Castle HGDL and sites at Shields and Cowlairs) are also predicted to receive cumulative uncertain moderate adverse effects either by the combination of effect types (e.g. potential direct effects, and such indirect effects as noise or deterioration of setting), or through the effects of more than one development. Avoidance and/or mitigation would be possible at the project level, although further recommendations are made in the form of advice to future design and implementation teams (see below). Adverse effects on local heritage sites would also have adverse effects on visitors to these sites.

Local soils and geology (including peat deposits, agricultural land and designated sites Glen Garry SSSI and Kildrummie Kames SSSI) could experience moderate cumulative adverse effects as a result of the implementation of new infrastructure. Avoidance and/or mitigation would be possible at the project level.

8.2.2 Regional Receptors

Residents, organisations and visitors would generally experience moderate cumulative accessibility benefits, particularly on strategic road and rail routes within the north, east and south of Scotland. They would also have minor to moderate benefits through improvements to air quality and health, as a result of modal shift from private vehicle to public transport, as well as rail electrification. Air quality would particularly moderately benefit within the AQMA's in the regions. Health benefits include an improvement in road safety and a reduction in exposure to vehicle related emissions to air.

The regional material assets would also have generally moderate cumulative benefits through the majority of interventions utilising and upgrading existing infrastructure requiring minimal new regional resources. Some interventions however would require new infrastructure with adverse effects on the regional assets. These effects could be reduced through encouraging use of reused or recycled materials during construction.

Regional landscapes character areas, including High Plateau Moorlands and Lowland Plateau and Plains, could be cumulatively minor adversely affected, particularly through new infrastructure requirements and new overhead power lines. This could also have indirect effects on the residents and visitors to these sites. Mitigation to avoid landscapes where possible could minimise adverse effects on regionally important landscape areas and joint-working is encouraged to avoid, and then minimise, any cumulative effects.

Regionally important cultural heritage features could also be minor adversely affected by Interventions within the region, largely through effects on setting and in-direct effects from noise. Indirect effects on the residents and visitors to these sites could result. Mitigation measures, including avoidance of sites, could minimise cumulative effects where adverse effects occur. Where adverse effects cannot be avoided, measures to potentially support cultural heritage enhancements in the region could be implemented.

Designated (SSSIs) and undesignated biodiversity sites, species and habitats were predicted to be cumulatively adversely affected, although it would be required that such effects be avoided, minimised or compensated for at the project level. Joint-working is encouraged to avoid, and then minimise, any cumulative effects.

8.3 Summary of the Assessment of Scotland-wide Cumulative Effects

Biodiversity

The effects on Scottish biodiversity were considered to be of a major adverse nature. There are a number *Natura 2000* sites and SSSIs that have the potential to be adversely affected by STPR interventions. Alternative engineering solutions have been identified during the course of Appropriate Assessment under the Habitats Regulations which are judged to mitigate effects on individual Natura 2000 sites. The Appropriate Assessment has identified that there is scope to manage cumulative effects through zoning, timing and coordination of operations at strategic level.

Noise

Minor adverse effects to noise levels in Scotland were possible. Localised effects on noise levels are predicted, and given trade-offs at local / regional level, it was predicted unlikely that there would be substantial net cumulative adverse noise effects to national indicators.

Population

Minor benefits to the Scottish population were considered through the cumulative effects of the interventions. Overall, there are potential accessibility benefits across a number of community types, including access to essential services and employment opportunities. There is some potential for localised severance due to certain road schemes.

Human Health

Overall minor benefits were predicted for the health of the population. Aligning with accessibility benefits, there are potential health benefits across a number of community types, due to factors such as modal shift (encouragement of walking and cycling in combination with public transport), the secondary implications of key noise and air quality benefits, and road safety improvements.

Water

No national cumulative effects were predicted and therefore effects were considered to be neutral.

Soils and Geology

Moderate adverse effects cumulatively were likely to Scottish soils and geology. Geological and mixed SSSI's are important on a national scale. There are several SSSIs that could be adversely affected by transport interventions including Glen Garry SSSI which is designated for geological importance, and could be adversely affected through the cumulative effects of new infrastructure requirements.

Air

Minor benefits were envisaged to national air quality through the cumulative effects of the interventions, this could benefit from strategic road improvements, as well as modal shift from private vehicles to public transport.

Climatic Factors

Cumulatively, minor benefits were envisaged. The STPR was predicted to result in a reduction in road-based transport carbon emissions of between 100,000 and 150,000 tonnes CO_2 (e) per year. Given an estimated 9.7 Mt of CO_2 attributable to road transport in Scotland in 2005, this would be a reduction of around one per cent. Electrification of the rail network could reduce levels of rail-based carbon emissions.

Material Assets

There were predicted to be minor additive benefits to material assets. The benefits of the various interventions include increasing the investment into, and thus efficiency and appropriateness of, existing road and rail assets.

Cultural Heritage

The cumulative effects on national cultural heritage features were uncertain but had the potential to be of a moderate adverse nature. Of national significance is the potential effect of D14 (Phases 1 and 2 of the A9 improvements) to Blair Castle Historic Garden and Designated Landscape. There could be additive effects upon national indicators for the overall cultural heritage resource (e.g. status of Listed Buildings).

Landscape

It was considered that overall there would be major adverse cumulative effects on the landscape. There were predicted potential cumulative adverse effects to Cairngorms National Park and the National Scenic Areas of the Cairngorms, Loch Tummel and the River Tay, as well as the potential for additive effects upon national indicators for overall landscape quality.

8.4 Conclusions and Recommendations

The STPR would cumulatively bring a number of benefits to the local and regional areas of Scotland, as well as nationwide benefits. In particular benefits to Scotland's population, human health, air quality, climatic factors, and material assets were predicted as a result of the cumulative effect of Interventions taken forward by the STPR. However the combination of interventions would also give rise to cumulative adverse effects on biodiversity, water, soils and geology, cultural heritage, and landscape predominantly as a result of those interventions that require new infrastructure.

The STPR interventions would undergo further planning and development stages prior to implementation. A number of recommendations have been identified to minimise the cumulative effects of these interventions on the environmental parameters. These are detailed below:

- Biodiversity - National policy would prevent net adverse effects to Natura 2000 sites. It would be required that any net adverse effects to SSSIs are mitigated (avoided where possible, then minimised), with compensation habitat provided as a last resort. Joint-working at the project level and with Scottish Natural Heritage would be encouraged in order to address cumulative effects effectively.

- Noise - At the project level, noise mitigation should be proportionate to any identified combined effects.

- Population - The STPR largely represents a beneficial contribution to the population.

- Human Health - No recommendations proposed - the STPR represents a beneficial contribution to human health.

- Water - Minimise cumulative effects as per water pollution control measures.

- Soils and Geology - National policy would prevent net adverse effects to Natura 2000 sites and SSSIs. It would be required that any net adverse effects to SSSIs are mitigated (avoided where possible, then minimised), with compensation habitat provided as a last resort. Joint-working at the project level and with Scottish Natural Heritage is encouraged in order to address cumulative effects effectively.

- Air - No recommendations proposed - STPR represents a beneficial contribution to national emissions to air.

- Climatic Factors - No recommendations proposed - STPR represents a beneficial contribution to national emissions.

- Material Assets – Ensure the sustainable use of natural resources and encourage opportunities to minimise waste, recycle and recover resources efficiently.

- Cultural Heritage - At the project level, it would be important to recognise and provide a more detailed assessment of the repercussions of any combined effects on any one heritage resource. The focus should be on both end-users of that resource and local, regional and national heritage contexts (i.e. such characteristics as rarity of resource type, educational value and recreational value). The potential for thresholds past which any effects are magnified should be considered. Joint-working would be encouraged to avoid, and then minimise, any cumulative effects.

- Landscape - The national picture and SEA of NPF2 highlight the importance of seeking landscape enhancements and synergies with geographically related habitat and landscape enhancement projects. The priorities are to avoid where possible, then minimise adverse individual and cumulative project effects on the landscape through individual project assessments; and then to support landscape enhancements elsewhere using a proximity principle.

9 Monitoring Strategy

9.1 Introduction

Section 19 of the Environmental Assessment (Scotland) Act 2005 requires Transport Scotland to monitor the significant environmental effects of the implementation of the recommendations from the STPR. The purpose of SEA monitoring should be to ensure that mitigation is effective and that any early or unexpected effects are recognised and addressed so that appropriate remedial action can be taken. Environmental monitoring is important to inform future transport programmes and it should be viewed as an ongoing learning process.

Each intervention would have bespoke monitoring strategies designed for them at the project design stage. The monitoring targets are identified per SEA topic and highlighted below.

Biodiversity, Flora and Fauna

There are a number of indicators which require monitoring. Potential indicators include:

- Potential disturbance of species and loss of nationally and internationally important habitats; and
- Adverse effects on noise sensitive ecological sites.

There are a number of strategies already in place to monitor adverse effects on biodiversity within each corridor. These include the UK and Local Biodiversity Action Plans and Local Biodiversity Action Plans. The Joint Nature Conservation Committee (JNCC) undertakes monitoring of international sites through the Common Standards Monitoring programme and Scottish Natural Heritage (SNH) also undertakes a Site Condition Monitoring (SCM) Programme within Scotland. This is a standardised programme of assessing the condition of notified species on SSSIs. The first assessment in the six-yearly cycle was concluded in 2005. SNH also monitors the abundance of bird groups including terrestrial breeding birds, wintering waterbirds and breeding seabirds as well as monitoring of other species such as the diversity of vascular plants and estuarine fish.

An example of where these could be used to monitor effects on the biodiversity is through the implementation of the intervention, ***Targeted Programme of Measures to Reduce Accident Severity on the A9 North of Inverness***, which could have minor to moderate adverse effects on biodiversity designations. There is the possibility that the River Thurso SSSI would be affected by the measures proposed in the intervention. Monitoring of this site would be covered by the SNH SCM programme and through the Caithness Biodiversity Action Plan in order to identify any unanticipated changes in the environmental baseline and address them early through remedial action. The intervention, ***Targeted Programme of Measures to improve the Trans European Network linkage to Loch Ryan Port Facilities***, was assessed as having minor to moderate adverse effects upon sites such as River Bladnoch SAC. The monitoring of any changes to the biodiversity baseline relevant to this area would be undertaken by JNCC through the Common Monitoring Standards Programme to assess any deviations from the baseline conditions within the SAC.

Population

There are a number of indicators which require monitoring. Potential indicators include:

- Population growth or decline by region and community;
- Percentage of the population travelling by private and by public transport in each transport corridor; and
- Employment rates for the main areas of population.

The General Register Office for Scotland is responsible for monitoring the populations of Scotland as well as conducting the census of Scotland's population every 10 years with a Review of Demographic Trends published annually. A Scottish Household Survey is also undertaken every two years providing information on the composition, characteristics, attitudes and behaviour of households and individuals at national and sub-national level. The Scottish Government website contains datasets of the results of these surveys including statistics of population growth and decline (including census data), modes of transport undertaken and employment figures.

An example of where these could be used to monitor effects on the population resulting from the implementation of an intervention is through implementation of the intervention, ***Reconfiguration of National Rail timetable*** which could have the potential to adversely affect particular communities. This is due to the potential for a reduction in the direct accessibility of major centres via mainline services and a greater need for interchange. The effects of the measures to the baseline conditions within the intervention could be monitored through the Scottish Household Survey to discover whether the use of public transport, specifically rail, has declined through the implementation of the intervention.

Noise

There are a number of indicators which require monitoring. Potential indicators include:

- An increase in the levels of road vehicle noise emissions;
- Number of residential properties within 50m of roads producing reference noise levels in excess of 60dB(A);
- Number of residential properties within 50 m of rail line; and
- Possible effect on Noise Management Areas.

As a result of the EU Directive on environmental noise 2002/49/EC all Member States have to draw up Strategic Noise Maps and Action Plans aimed at preventing and reducing environmental noise and these are required to be updated every five years. The Environmental Noise (Scotland) Regulations 2006 were published by the Scottish Government to deliver the requirements of the directive.

With reference to the interventions with potential adverse effects on noise sensitive receptors, an example of noise monitoring requirements would be through the implementation of ***Inverkeithing to Halbeath Rail Line***. This intervention could create new noise sensitive receptors located in close proximity to the line at Crossgates, Inverkeithing and other isolated properties. A further intervention that noise monitoring would relate to is the ***West of Scotland Strategic Rail Enhancements: Glasgow Central East*** as the potential new station would create a new noise source for local noise sensitive receptors. Updates to the Strategic Noise Maps could identify where there are changes to the baseline conditions however; this could be too strategic an overview to assess the extent of effects resulting from these interventions alone and would need to be augmented by modelled data.

Human Health

There are a number of indicators which require monitoring. Potential indicators include:

- Changes in respiratory and / or cardiac disease related to transport derived air pollution;
- The number and severity of road accidents; and
- Percentage of the population considered to be in good health.

The Scottish Health Survey is responsible for the monitoring of health in Scotland. The survey provides reliable information on the health and health-related behaviours of people living in private households. The Scottish Government website contains data relating to the number of road accidents and their severity from Road Accidents Scotland[73] published each year and Scottish Transport Statistics[74]. Further datasets, as identified in the SEA Scoping Report (p14) include the Scottish Census Data 2001 and the Office of National Statistics.

In general, no interventions have been identified as having substantial adverse effects to the health of the population.

Soils and Geology

There are a number of indicators which require monitoring. Potential indicators include:

- Adverse effects on geological SSSIs within the Transport corridors,
- Changes in Class 1 and 2 land capability for agriculture within the SEA corridors; and
- Changes in the quality and extent of soils types within the corridors.

[73] Road Accidents Scotland (2006) http://www.scotland.gov.uk/Topics/Statistics/Browse/Transport-Travel/TablesPublications/RoadAccidentsScotland
[74] Scottish Transport Statistics (2007), Injury Road Accidents, www.scotland.gov.uk/Topics/Statistics/Browse/Transport-Travel

The Consultation Draft of the Scottish Soil Framework was published in June 2008 and the final report will provide a framework for the protection of soil in Scotland. The SEA for the Scottish Soil Framework identifies that key / priority work areas outlined for the Scottish Soil Framework include the development of a Scottish Soil Monitoring Network, which is intended to improve the collation, availability and accessibility of soils data. The development of appropriate soil indicators is being progressed through the work of the UK Soil Indicators Consortium (UKSIC)[75] and Scottish Government funded research. Work is due to be completed in 2008.

The Macaulay Institute undertakes monitoring of soils and peat resources as part of the Soil Survey of Scotland conducted annually[76]. The institute also holds data for the capability of land for agriculture however; this is to be updated in light of the Scottish Soil Framework which highlights that the Scottish Government will review the Land Capability for Agriculture Assessment in the light of the implications of climate change.

In terms of geology, a Site Condition Monitoring is undertaken by SNH to record the condition of geological SSSIs at least once every six years.

Examples of the usage of this monitoring data includes the assessment of the effects of several of the transport interventions identified as having potentially adverse effects to the soils and geology of Scotland. Examples of interventions with potentially adverse effects include ***Rail Enhancements on the Highland Mainline between Perth and Inverness*** and ***Rail Enhancements between Aberdeen and Inverness***. This is due to the proximity of the rail lines to geological and mixed SSSIs and, in the case of the Highland Mainline upgrades, several blanket peat resources are in close proximity to the rail route. Site Condition Monitoring would assess the condition of the SSSIs and from this any deviations from the baseline environmental baseline could be identified. The soils indicators to be identified in the Scottish Soil Framework will aid the monitoring of peat deposits associated with these interventions.

Water

There are a number of indicators which require monitoring. Potential indicators include:

- Changes in the number of areas at risk of flooding within the corridors;
- Quality of the water bodies located within or adjacent to transport corridors; and
- Extent of transport infrastructure at risk of flooding.

SEPA, in conjunction with the Scottish Government, is responsible for the monitoring of Scotland's water quality. The Scottish Monitoring Strategy was developed by SEPA with partners such as SNH, Scottish Water, British Waterways and Fisheries Research Services. Classifications of water quality for rivers and estuaries in Scotland are carried out by SEPA and shown on their Water Quality Classification Map which is updated annually.

[75] DEFRA (2008) UK Soil Indicators Consortium, http://www.defra.gov.uk/Environment/land/soil/research/indicators/consortium/index.htm
[76] MRCS (2008) Soil Surveys and Land Evaluation, http://www.macaulay.ac.uk/MRCS/ssle/ssle.html

Further monitoring of water quality and the state of the water bodies in Scotland is undertaken by SEPA and contained within the 'Significant Water Management Issues Reports for the Scotland and Tweed River Basin Districts'.

The Scottish Flood Risk Management Bill is due to be published later in 2008. This will specifically consider sustainable flood risk management and contain indicators for measuring flood risk. Further monitoring of flood risk is undertaken by SEPA through Indicative River and Coastal Flood maps which are linked with the UKCIP08 Climate Change Predictions and updated annually.

In relation to the transport interventions, several have been identified as having adverse effects on the water environment in Scotland. An example of these include: ***A9 Upgrading from Dunblane to Inverness (Phase 1)****;* and ***Grangemouth Road and Rail Access Upgrades***. These interventions have the potential to affect a number of water bodies in close proximity to the upgrades such as the River Tay (A9 upgrades) and River Avon (where crossed by the A801). The quality of these rivers would be annually monitored by SEPA and any changes from the baseline conditions would be identified and remediated, where required.

Air

There are a number of indicators which require monitoring. Potential indicators include:

- Changes in annual mean levels of NO_2 within the corridors ; and
- Quality of air within designated AQMAs.

DEFRA, the Scottish Government and Local Authorities are responsible for monitoring air quality in Scotland and the data is held in the UK Air Quality Monitoring Archive. The Scottish Air Quality database contains tables of measured concentration data and statistics from the air quality monitoring sites operated by DEFRA, the Scottish Government and Local Authorities. Pollutants are measured hourly, daily, weekly or monthly depending on the methods of collection. Estimates of emissions - the amount of pollution produced by a range of activities is obtained from the National Atmospheric Emissions Inventory (NAEI).

At this stage, it is not considered that the transport interventions would have significant adverse effects to national, regional or local air quality however; monitoring would ensure that any deviations from the environmental baseline could be highlighted and any adverse effects remediated.

Climatic Factors

There are a number of indicators which require monitoring. Potential indicators include:

- Changes to rail-related CO_2 equivalent emissions within the SEA Corridors; and
- Changes to road-related CO_2 equivalent emissions within the SEA Corridors.

As illustrated in the SEA Scoping Report (p20), there are several datasets available for the monitoring of potential climate change and CO_2e emissions including the UK Climate Impacts Programme (UKCIP08). The UKCIP's Measuring Progress identifies climate change effects and the adaptation report integrates findings from studies. It provides a national picture of the effects of climate change and emerging adaptation options. UKCIP08 enables the consideration of scenarios to identify drivers of change at this monitoring stage to identify drivers of change for the next STPR. The NAEI contains monitoring data and also estimates of emissions to the atmosphere from UK sources such as cars, trucks, power stations and industrial plant. These emissions are estimated to help to find ways of reducing the effect of human activities on the environment and health.

There are also further monitoring arrangements to be put in place alongside the emerging Scottish Climate Change Bill.

In relation to the STPR, no transport interventions have been identified as having significant adverse effects to levels of CO_2e however, it would be important to undertaken monitoring to assess any unexpected changes from the environmental baseline.

Material Assets

There are a number of indicators which require monitoring. Potential indicators include:

- Proportion of recycled or secondary aggregates used in the construction of transport infrastructure within each corridor.

The Waste and Resources Action Programme (WRAP) is funded by the Scottish Executive for an Aggregates Programme in Scotland. The Programme aims to increase Scotland's production and use of secondary and recycled aggregates through promoting and facilitating the more sustainable use of materials in the construction industry

An example of where this monitoring measure could be utilised is through the implementation of intervention, ***Upgrade A96 to Dual Carriageway between Inverness and Nairn.*** The environmental assessment found potential adverse effects relative to the need to use new resources in construction rather than exploiting the most efficient use of existing infrastructure.

Cultural Heritage

There are a number of indicators which require monitoring. The suggested indicator is:

- Number of listed buildings, SMs, and conservation areas potentially lost or affected by proposals

Historic Scotland is responsible for monitoring the cultural heritage of Scotland. Scotland's Historic Environment Audit (SHEA) is an ongoing project conducted by Historic Scotland. The long-term aim of the audit is to provide statistical information about the state of the historic environment, including the extent and condition of our assets, the threats they face and the contribution they make to our economy and quality of life. Other organizations involved in the audit include local authorities, Scottish Government and heritage organisations.

An example of where the audit could be used to monitor the possible effects on cultural heritage in Scotland is through the implementation of intervention, ***Targeted Programme of Measures to Reduce Accident Severity on the A9 and A835 between Inverness and Ullapool.*** This stretch of the A9 has a number of Grade A listed buildings which could be adversely affected by land-take and visual intrusion. Monitoring of the potential effects of this intervention would be covered by the Scotland's Historic Environment Audit.

Landscape

There are a number of indicators which require monitoring. Potential indicators include:

- Number of significant visual effects of new interventions;
- Adverse effects on landscape designations; and
- Adverse effects on landscape character.

Landscape Character Assessments (LCAs) have been developed by SNH in partnership with local authorities to provide more detailed information on aspects of the Scottish landscape. The LCA is important in assisting the UK with the European Landscape Convention (ELC). The ELC is the first international convention on landscape, dedicated exclusively to the protection, management and planning of all landscapes in Europe. Historic Landscape Assessments are also available for use through SNH.

An example where these assessments could be used to monitor possible effects on the landscape is through implementation of the intervention, ***A9 Upgrading from Blair Atholl to Inverness (Phase 2).*** This has the potential to adversely affect the integrity of the Cairngorm National Park and National Scenic Area. The LCA could be used to monitor any effects that arise as a result of the implementation of the intervention.

9.2 Summary

The Post-Adoption SEA statement would provide further details of the monitoring framework in relation to the Environmental Report. This framework would provide further information on time periods for monitoring activities and reporting requirements.

10 Consultation and Next Steps

10.1 Overview

Under the Environmental Assessment (Scotland) Act 2005 (the SEA Act), it is a statutory requirement to consult with statutory bodies and the public at certain stages in the development of an SEA. In Scotland, Consultation Authorities (CAs) comprise Scottish Natural Heritage (SNH), Scottish Ministers (Historic Scotland (HS)) and the Scottish Environment Protection Agency (SEPA). Health Scotland has also been consulted in relation to the SEA. Consultation for the STPR involves engagement with statutory bodies and others with an interest in the environment at key stages in the decision-making process. Stakeholder and public participation in this process aims to facilitate consensus on the STPR, giving the opportunity for wider ownership. This Chapter details the consultation strategy for the SEA.

10.2 Consultation to Date

10.2.1 Scoping Report

A Strategic Environmental Assessment (SEA) Scoping Report was undertaken for the STPR by Jacobs on behalf of Transport Scotland. The purpose of the SEA Scoping Report was to set out sufficient information on the STPR to enable the Consultation Authorities to form a view on the consultation period, scope and level of detail that would be appropriate for the SEA Environmental Report.

In accordance with the requirements of the Environmental Assessment (Scotland) Act 2005, the Scoping Report and accompanying appendices were issued for comment to the Consultation Authorities. The report was issued via the SEA Gateway on 11 October 2007 with a date of 16 November 2007 for receipt of comments. This deadline was extended by one week to 23 November. Copies of the Report and appendices were also issued directly to Health Scotland, an additional consultee.

Comments from the Consultation Authorities were received on the 16 November 2007 via the SEA Gateway, with comments from Health Scotland received on 15 November 2007. These responses can be viewed in Appendix 2.

In general, comments received were positive overall, with the proposed approach and methodology for the SEA supported by the Consultation Authorities. Further comments made suggested minor modifications to a number of SEA objectives, and further information and clarification with respect to environmental issues and the environmental baseline. A Scoping Consultation Responses Report was sent out to the Consultation Authorities and Health Scotland, setting out how the STPR would consider and respond to each of the comments received and this is provided in Appendix 2.

Before the Scoping Report was submitted to the SEA Gateway, two consultation meetings were held: the first meeting with the STPR Reference Group which includes members from the Consultation Authorities and the involvement of Environment Link; and the second meeting with the Consultation Authorities and Health Scotland.

10.3 Further Consultation

10.3.1 Environmental Report

The Environmental Report will be issued along with the relevant STPR Report. These will form the consultation documents subject to statutory consultation with the Consultation Authorities and the public under Section 16 of the SEA Act. Although there is no statutory consultation period defined in the SEA Act relative to the Environmental Report, the consultation period agreed with the Scottish Ministers is eight weeks commencing during late 2008 or early 2009.

Section 16 of the SEA Act requires that the Environmental Report and Draft Programme (the final STPR Report) are sent to the Consultation Authorities, inviting them to express opinion on the documents.

Details on the consultation period and how to access copies of the Reports will be published by Transport Scotland. Any interested parties will be able to read the Reports online by accessing Transport Scotland's website (www.transportscotland.gov.uk). The published details will explain how, and when, to respond.

Environmental Report Comments

The purpose of the Environmental Report is to inform the public, Consultation Authorities, Health Scotland and other interested parties of the potential effects that the STPR could have on the environment. The Consultation Authorities, Health Scotland, other interested bodies and the public are welcome to make comment on the issues raised within this report.

Comments will be accepted during the eight week consultation period, commencing later 2008 or early 2009

These should be addressed by letter or email through the contact details below:

STPR TEAM
Transport Scotland
Strategy and Investment Directorate
6th Floor, Buchanan House
58 Port Dundas Road
Glasgow
G4 0HF
Tel: Freephone
STPR@transportscotland.gsi.gov.uk

Transport Scotland Website: www.transportscotland.gov.uk

Additionally, an advert will be placed within a national newspaper indicating the date of approval of the STPR Report, and the address (including website) at which a copy of the STPR Report and its accompanying Environmental Report, and Post-Adoption Statement can be inspected or obtained. Transport Scotland will also inform the Consultation Authorities of the adoption of the STPR and provide each Authority with a copy of relevant documents.

10.3.2 Consultation Programme

A summary of the proposed timescales for the SEA consultation process is below (Table 10.1).

Table 10.1: Proposed Consultation and Adoption Timescales

Consultation	Oct	Nov	Dec	Jan	Feb	Mar	Apr onwards
Environmental Report							
Review							
Adoption							
Post Adoption Statement							

10.4 Next Steps

Upon completion of the consultation period, relevant comments made in relation to the SEA will be reviewed and responded to within, approximately, a two to four week period. In light of consultation processes, it is anticipated that amendments could be required to the STPR Report. Comments in relation to the Environmental Report will be addressed and detailed in the Post-Adoption Statement.

10.4.1 Post-Adoption Statement and Monitoring

The Post-Adoption Statement will include the following information:

- How environmental considerations have been integrated into the STPR;
- How the Environmental Report has been taken into account in finalising the STPR;
- How the opinions expressed in response to the consultation processes have been taken into account;
- The reasons for choosing the STPR programme in light of other reasonable alternatives considered; and
- The measures that will be taken to monitor the significant environmental effects of the implementation of the STPR

The monitoring strategy will be designed to monitor the implementation of the STPR to ensure that any unforseen environmental effects are identified and mitigated at the earliest opportunity throughout the implementation of the STPR.

In accordance with the SEA Act, as soon as reasonably practical after the approval of the STPR Report, Transport Scotland will make a copy of the STPR Report and the Environmental Report and Post-Adoption Statement available to the public. It is anticipated that the Post-Adoption Statement will be published early 2009.

11 Glossary and References

11.1 Abbreviations

AGLV	Area of Great Landscape Value
ANSEA	Analytical Strategic Environmental Assessment
AQMA	Air Quality Management Areas
CAR	Controlled Activities Regulations
CNMAs	Candidate Noise Management Areas
CQAs	Candidate Quiet Areas
EIA	Environmental Impact Assessment
EGIP	Edinburgh to Glasgow rail improvements
END	European Noise Directive
ENEVAL	Environmental Evaluation Model
FED	Framework for Economic Development
GIS	Geographic Information Systems
GWP	Global Warming Potential
HGDL	Historic Garden and Designed Landscapes
HGV	Heavy Goods Vehicles
HOV	High Occupancy Vehicle
HS	Historic Scotland
ITS	Intelligent Transport Systems
JNCC	Joint Nature Conservancy Council
LCA	Landscape Character Assessment
LRT	Light Rapid Transit
NMA	Noise Management Area

NNR	National Nature Reserves
NPF	National Planning Framework
NPFMR	National Planning Framework Monitoring Report
NSA	National Scenic Areas
NTS	National Transport Strategy
NTS SEA	National Transport Strategy SEA Environmental Report
PPS	Plans, Programmes and Strategies
RTP	Regional Transport Partnerships
RTS	Regional Transport Strategies
SAC	Special Area of Conservation
SDS	Sustainable Development Strategy
SEA	Strategic Environmental Assessment
SEPA	Scottish Environment Protection Agency
SM	Scheduled Monuments
SNH	Scottish Natural Heritage
SPA	Special Protection Area
SSSI	Site of Special Scientific Interest
STAG	Scottish Transport Appraisal Guidance
STPR	Strategic Transport Projects Review
TMfS	Transport Model for Scotland
UNESCO	United Nations Educational, Scientific and Cultural Organisation
WFD	Water Framework Directive
WHO	World Health Organisation
WHS	World Heritage Sites

11.2 Glossary

AQMA - An Air Quality Management Area is an area where one or more of the air quality objectives are not expected to be met, unless action is taken to improve air quality.

Appropriate Assessment - The Habitats Directive[77] requires that an Appropriate Assessment is carried out for any plan or project with the potential for significant effects on a Natura 2000 site (a Special Protection Area (SPA) or Special Area of Conservation (SAC) and in Scotland, Ramsar sites, Wetlands of International Importance).

Consultation Authority – A specialist body with environmental expertise that can consider plans and programmes submitted by a Responsible Authority. The consultation Authorities are; Scottish Ministers (Historic Scotland), Scottish Environmental Protection Agency and Scottish Natural Heritage[78]

ENEVAL – Environmental software modelling system using 2005 data from the Transport Model for Scotland to obtain data for noise and NO_2emissions.

GIS - A geographic information system (GIS), also known as a geographical information system, is an information system for capturing, storing, analyzing, managing and presenting data which is spatially referenced.

HS- Historic Scotland cares for 345 historic attractions across Scotland spanning over 5000 years of Scotland's history and culture.

NTS – Scotland's National Transport Strategy sets out the Scottish Government's long term vision for transport, together with our objectives, priorities and plans.

NPF – National Planning Framework. The legislation requires Ministers to prepare the Framework with the objective of contributing to sustainable development and to review it every 5 years. The NPF2 will guide Scotland's spatial development to 2030, setting out strategic development priorities to support the Scottish Government's central purpose – promote sustainable economic development.

PPS – Plans, Programmes and Strategies.

Ramsar – Wetlands of International Importance. Protected sites originating from the Convention on Wetlands signed in Ramsar, Iran in 1971. This is an intergovernmental treaty which provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources.

RTS – Regional Transport Strategies provide a regional perspective on transport in Scotland and clearly set out a framework for the future direction of investment in, and management of, transport in each of the RTP areas for the next 10 – 15 years.

SAC - Special Areas of Conservation (SACs) are strictly protected sites designated under the EC Habitats Directive.

[77] Council Directive 92/43/EEC on the Conservation of natural habitats and of wild fauna and flora
[78] Scottish Government (2008)

SEA – Strategic Environmental Assessment is a systematic method for considering the likely environmental effects of a plan, programme or strategy and aims to integrate environmental factors into policy preparation and decision-making. It also has an important role to play in increasing public participation and facilitating openness and transparency in decision-making.

SEA Core Team – Team of SEA and other specialists drawn from Jacobs UK Ltd

SEA Gateway – The Scottish Government SEA Gateway is the Scottish Government's central administrative unit dealing with SEA matters.

SEPA – Scottish Environment Protection Agency. Scotland's environmental regulator and adviser, responsible to the Scottish Parliament through Ministers. As well as their role in controlling pollution, they also work with others to protect and improve our environment[79].

SNH – Scottish Natural Heritage has a role to look after the natural heritage, help people to enjoy and value it, and encourage people to use it sustainably.

SPA - Special Protection Areas (SPAs) are strictly protected sites classified in accordance with the bird's directive.

SSSI - A Site of Special Scientific Interest or SSSI is a conservation designation denoting a protected area

STAG – Scottish Transport Appraisal Guidance outlines a process that assists transport planners and decision-makers in the development of multi modal transport policies, plans, programmes and projects.

STPR – Strategic Transport Projects Review defines the most appropriate investment in Scotland's national transport network from 2012 until 2022 and will make recommendations on a portfolio of land-based strategic transport interventions to be taken forward between 2012 and 2022.

STPR Team – Team of policy and other specialist drawn from Transport Scotland

TMfS – Transport Model for Scotland is a multi-modal transport demand and assignment model that incorporates an integrated Transport and Economic Land Use Model.

[79] SEPA (2008) http://www.sepa.org.uk/about_us.aspx

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Appendices

Appendix 1 (A) – Plans, Programmes and Strategies Review and Environmental Objectives

Appendix 1 (B) – National STPR vs. Scottish Strategic Sustainability Objectives Matrix

Appendix 2 – Scoping Report Consultation Responses and Finalised SEA Objectives and Indicator Questions

Appendix 3 (A) – Overview of Corridor Baseline

Appendix 3 (B) – Environmental Baseline

Appendix 4 – Compatibility Assessment of Objectives

Appendix 5 – Environmental Assessment

Appendix 6 – Residual Effects

Appendix 7 – Cumulative Effects

Appendix 8 – (A) Appropriate Assessment: Screening and Assessment Report – Interventions Recommended from STPR

Appendix 8 – (B) Appropriate Assessment: Screening and Assessment Report – Additional Interventions Supporting the Government's Purpose