

Strategic Transport Projects Review (STPR2)



STRATEGIC TRANSPORT PROJECTS REVIEW

PROTECTING OUR CLIMATE
AND IMPROVING LIVES



SEA Environmental Report Appendix D – Regional Environmental Summaries

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ABBREVIATIONS	
AQMA	Air Quality Management Area
GCR	Geological Conservation Review
GDL	Gardens and Designed Landscape
LNR	Local Nature Reserve
MPA	Marine Protected Area
NCN	National Cycle Network
NNR	National Nature Reserve
NSA	National Scenic Area
RSPB	Royal Society for the Protection of Birds
SAC	Special Area of Conservation
SPA	Special Protection Area
SSSI	Site of Special Scientific Interest



1. Introduction

For STPR2, Scotland has been split into 11 Regional Transport Working Group areas, as indicated in Figure 1 below. This appendix presents a high-level, constraints-based environmental summary for each of the 11 Scottish STPR2 regions shown in Figure 1. The figures of Appendix A show the key national and regional environmental constraints and opportunities. The regional assessment summaries are based on the assessments of draft STPR2 interventions. The assessment is provided in full in Appendix F.

The regional baseline summaries for the 11 regions include the following environmental constraints:

- Internationally designated habitats, comprising Special Areas of Conservation (SAC), Special Protection Areas (SPA) (the 'Natura 2000' network of sites) and Ramsar wetlands
- Marine Protected Areas (MPA) – designated for biodiversity or cultural heritage
- Sites of Special Scientific Interest (SSSI)
- RSPB Reserves – identified by the RSPB as conservation areas with a wide range of species
- Geological Conservation Review (GCR) sites
- Marine Consultation Areas – identified by Scottish Natural Heritage as areas to be conserved due to the quality and sensitivity of the marine environment
- National Nature Reserves – designated sites deemed of national importance by NatureScot
- Local Nature Reserves – nature reserves designated as locally important by the local authority
- Information on soil types, highlighting significant peat deposits and derelict land
- Sensitive landscapes - National Parks, National Scenic Areas (NSA) and Gardens and Designed Landscapes (GDL). Although these designations are important for biodiversity and other SEA topics, they have been included under the Landscape / Visual topic in this appendix, to avoid any duplication
- World Heritage Areas and cultural heritage designations, including listed buildings, Scheduled Monuments, historic MPAs, battlefield sites, conservation areas, UNESCO World Heritage Sites, UNESCO Global Geoparks and gardens and designed landscapes
- Active travel, green and blue infrastructure, core paths, National Cycle Network (NCN) Routes and Heritage Paths
- Key infrastructure in each region (SEA topic of Material Assets)
- Populous areas at high risk of flooding
- Key trends in greenhouse gas emissions
- Areas or infrastructure vulnerable to the projected impacts of climate change
- Air Quality Management Areas (AQMA)



The assets listed in this appendix provide a number of benefits to Scotland's economy and society, including:

- place-making – by improving the setting of a place and giving it a distinctive identity and sense of place, which in turn can raise property values and foster economic investment;
- flooding and water management – by protecting against flooding and providing resilience to climate change (e.g. through the absorption of water by large trees or soft landscape areas);
- energy and carbon management – by saving energy costs (e.g. trees can shade offices thereby reducing the need for air conditioning, and natural habitats can store carbon);
- clean air and tranquillity – by improving air quality and reducing noise levels;
- health and wellbeing – by providing opportunities to access the nature and the outdoors for exercise and recreation; and
- education – by providing an outdoor learning resource. Sustainable transport networks can help to improve these benefits by, for example, reducing emissions and the consumption of fossil fuels through a shift to more sustainable modes of transport, reducing transport poverty through increased travel choice, and increasing sustainable access to key centres for employment, education and training and outdoor areas.

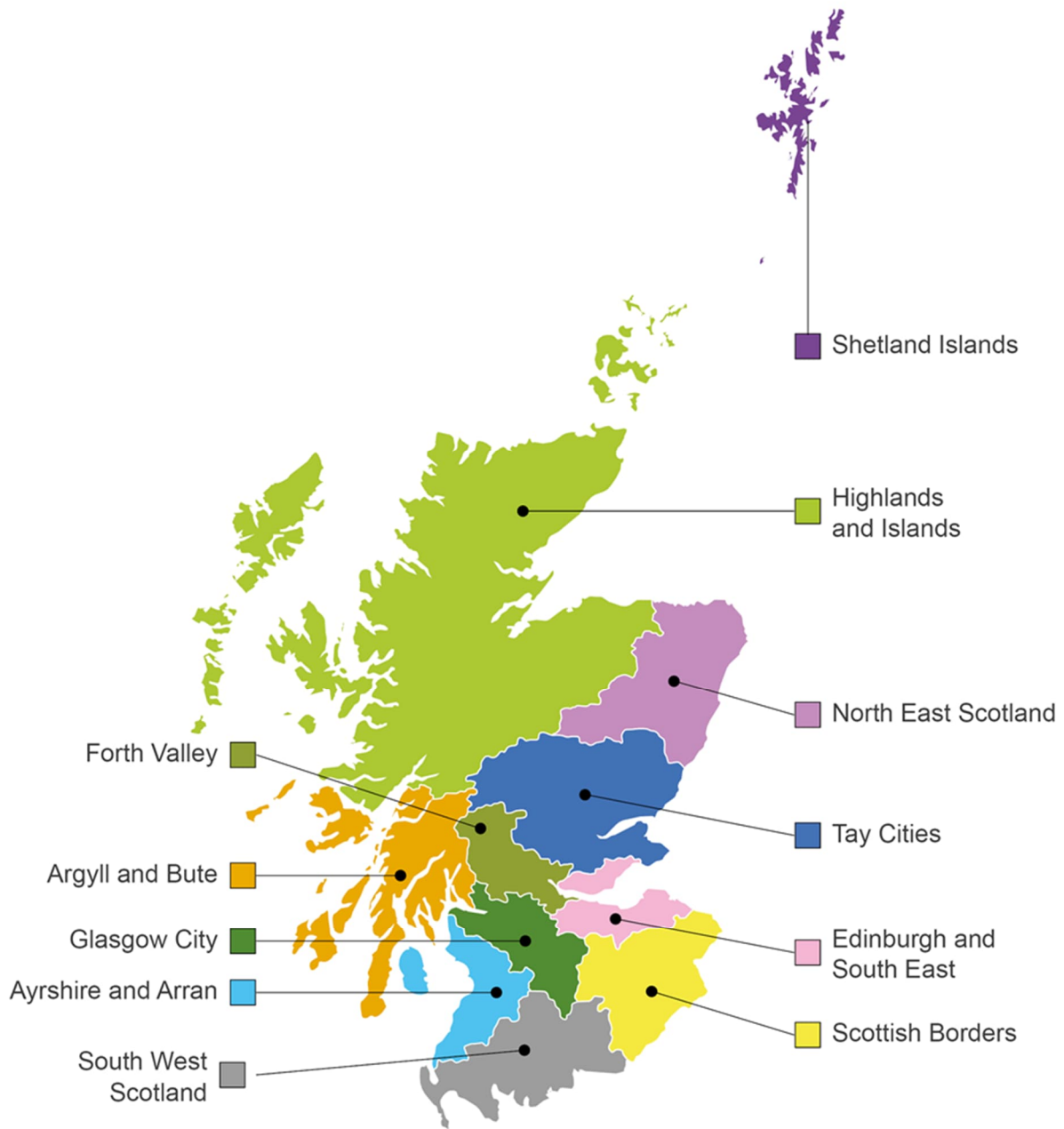


Figure 1: Location of the 11 Regional Transport Working Group areas within Scotland



2. Highlands and Islands

2.1. Highlands and Islands Baseline

The Highlands and Islands is the largest land area of all the regional working groups and is a predominantly rural area with low density development that contains a rich diversity of land and marine species and designations. It includes the Local Authority areas of Comhairle nan Eilean Siar, The Highland Council, Moray Council and Orkney Islands. Population centres tend to be sporadically located, with the islands in particular being located in remote areas that are accessible only by lifeline ferry and flight services. Inverness and Fort William are the primary populous areas. The region has a significant tourism industry, particularly in the north-west and on the islands as a result of the hugely popular North Coast 500 road tour.

The designated environmental sites are located throughout the region, with particularly high concentrations on the coastal areas and the islands. The region has significant peatland reserves. Peatland acts as a major carbon sink and its preservation is key to the national climate mitigation strategy. The area has significant natural beauty and contains 20 NSAs. Due to the rural nature of the region, air quality is not considered a significant environmental issue, except in Inverness city centre, which has the region’s only declared AQMA. SEPA indicate potentially vulnerable areas to flooding on the coast to the north-east of Inverness. The city of Inverness is the main population centre in the region and has a high fluvial flood risk from the River Ness. The region contains an array of designated cultural heritage assets, with high concentrations of listed buildings in and around Inverness and on the north-east coast. There are two World Heritage Sites in the region including St Kilda situated in the Outer Hebrides and the Heart of Neolithic Orkney situated on the Mainland of the Orkney Islands.

HIGHLANDS AND ISLANDS	
SEA TOPIC	ENVIRONMENTAL CONSIDERATIONS
Biodiversity	<p>The region contains a significant number of biodiversity designations, including¹:</p> <ul style="list-style-type: none"> • 116 SACs • 81 SPAs • 481 SSSIs • 19 Ramsar Sites • 14 MPAs • 22 NNRs • Five LNRs • One Demonstration and Research MPA • One UNESCO Biosphere Reserve (Wester Ross) • 16 Marine Consultation Areas • 35 RSPB Reserves

¹ NatureScot (2021) SiteLink [Online] Available at: <https://sitelink.nature.scot/home> (accessed 02/07/2021).
Strategic Transport Projects Review (STPR2)
Consultancy Support Services Contract



HIGHLANDS AND ISLANDS	
SEA TOPIC	ENVIRONMENTAL CONSIDERATIONS
Soils/ Contaminated land	<ul style="list-style-type: none"> • There is a significant peat resource in the region, particularly in the north and west. • The region has 3206ha of derelict land across 112 sites, accounting for >1% of the regional land area. • A significant number of GCR sites.
Landscape / Visual	<ul style="list-style-type: none"> • Cairngorms National Park • 20 NSAs² • 58 Gardens and Designed Landscapes³
Climatic Factors	<ul style="list-style-type: none"> • Road transport accounts for 34% of total regional CO₂ emissions⁴ • Frequency and intensity of hot extremes projected to increase in all future climate scenarios.⁵ • Wetter and warmer winters projected, with increased likelihood of pluvial flooding and extreme rainfall.⁶ • Increased soil moisture fluctuations will lead to increased risk of landslips.⁷ • Under a high emission scenario, peak river flows for some areas could increase by more than 50% by the 2080s.⁸ • Inverness will very likely see a sea level rise of nearly 1 metre between 2019 and 2100.⁹ • Projected increases to extreme coastal water levels increases the risk of coastal flooding and erosion.¹⁰ • Coastal erosion is a recognised issue for the Orkneys, where the low-lying land is very exposed to storms. • Additional changes in storm surges are possible but difficult to predict.¹¹ • The economically important North Coast 500 route has various exposure zones to coastal erosion.¹²
Air Quality	<ul style="list-style-type: none"> • One AQMA (Inverness City Centre)

² Scottish Government (2010) National Scenic Areas of Scotland [Online] Available at: <https://www.gov.scot/publications/national-scenic-areas-of-scotland-maps/> (accessed 15/07/2021)

³ HES (2021) Historic Environment Portal [Online] Available at: <http://portal.historicenvironment.scot/> (accessed 16/07/2021).

⁴ BEIS (2019). Greenhouse Gas Inventories for England, Scotland, Wales & Northern Ireland: 1990-2017, National Atmospheric Emissions Inventory.

⁵ IPCC (2021) IPCC AR6 WGI Regional Fact Sheet Europe 2021 [Online] Available at: https://www.ipcc.ch/report/ar6/wg1/downloads/factsheets/IPCC_AR6_WGI_Regional_Fact_Sheet_Europe.pdf

⁶ UKCP18 (2021) UK Climate Projections: Headline Findings July 2021 [Online] Available at: https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/research/ukcp/ukcp18_headline_findings_v3.pdf

⁷ CCRA (2021) Third UK Climate Change Risk Assessment Technical Report: Summary for Scotland [Online] Available at: <https://www.ukclimaterisk.org/independent-assessment-ccra3/national-summaries/>

⁸ Adaptation Scotland (2021) Climate Projections for Scotland summary [Online] Available at: <https://www.adaptationscotland.org.uk/why-adapt/climate-trends-and-projections>

⁹ NatureScot (2019) Guidance: Planning ahead for coastal change [Online] Available at <https://www.nature.scot/guidance-planning-ahead-coastal-change> (accessed 16/08/2021).

¹⁰ CCC (2021) The Adaptation Committee's Independent Assessment of UK Climate Risk [Online] Available at: <https://www.theccc.org.uk/publication/independent-assessment-of-uk-climate-risk/>

¹¹ UKCP18 (2018) UKCP18 Factsheet: Sea level rise and storm surge [Online] Available at: <https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/research/ukcp/ukcp18-fact-sheet-sea-level-rise-and-storm-surge.pdf>

¹² Dynamic Coast (2021) Webmaps [Online] Available at: <https://www.dynamiccoast.com/webmap>

HIGHLANDS AND ISLANDS	
SEA TOPIC	ENVIRONMENTAL CONSIDERATIONS
Material Assets	<p>Key transport infrastructure within the study area includes:</p> <ul style="list-style-type: none"> • 11 A roads on the trunk road network¹³ • Five rail lines¹⁴ • 62 railway stations¹⁵ • Six airports¹⁶ • 70 ports¹⁷
Water / Flood risk	<ul style="list-style-type: none"> • The region holds the UK's highest proportion of freshwater resources by a large margin. There has been considerable hydro-electric development of watercourses in the region. There are 1,370 surface water features in the region, which includes rivers, lochs and coastal waterbodies.¹⁸ • SEPA identifies flood risk from river and coastal flooding at medium and high likelihood of flooding within the region. • Mainland settlements at greatest risk of coastal flooding include Inverness, Nairn, Cromarty, Golspie, Thurso, Lochinver, Fort William and Wick Airport. Coastal island communities are also affected, including the northern coast of Isle of Skye and communities within the Outer Hebrides and Orkney. • Areas at highest risk of river flooding are the rivers within the catchments of River Thurso, River Alness, River Ewe, River Peffery and Mill Lade. The main receptors at risk include Thurso, Alness, Kinlochewe, Wick and Dingwall and the surrounding rural areas¹⁹.

¹³ Transport Scotland (2021) Scottish trunk road network map [Online] Available at: <https://www.transport.gov.scot/publication/scottish-trunk-road-network-map/> (accessed 16/07/2021).

¹⁴ ScotRail (n.d.) Live Network Map [Online] Available at: https://www.scotrail.co.uk/sites/all/modules/interactive_map/assets/index.html (accessed 16/07/2021).

¹⁵ ScotRail (n.d.) Stations and facilities [Online] Available at: <https://www.scotrail.co.uk/plan-your-journey/stations-and-facilities> (accessed 16/07/2021).

¹⁶ Traffic Scotland (2021) Freight Information [Online] Available at: <https://trafficscotland.org/map/freight/index.aspx?type=204&latitude=57.1424253981371&longitude=-2.07668803884522&zoom=10> (accessed 30/06/2021).

¹⁷ ibid

¹⁸ SEPA (2021) Water Environment Hub [Online] Available at: <https://www.sepa.org.uk/data-visualisation/water-environment-hub> (accessed 07/10/2019).

¹⁹ SEPA (2020) Flood Maps. [Online] Available at: <https://www.sepa.org.uk/environment/water/flooding/flood-maps/> (accessed 25/02/2020).

HIGHLANDS AND ISLANDS	
SEA TOPIC	ENVIRONMENTAL CONSIDERATIONS
Cultural Heritage	<p>The region contains a significant number of historic assets, including²⁰:</p> <ul style="list-style-type: none"> • Two World Heritage Sites (St. Kilda in the Hebridean Islands and The Heart of Neolithic in Orkney) • 7,362 Category A-C Listed buildings • 1,934 Scheduled Monuments • 10 designated Battlefield Sites • Four historic MPAs • 58 Conservation Areas^{21,22,23,24} <p>Many cultural heritage resources on low-lying coastline in this region are vulnerable to coastal erosion. This includes the Neolithic site at Skara Brae, first revealed by coastal erosion caused by a powerful storm in 1850.²⁵</p>
Population and Human Health	<ul style="list-style-type: none"> • Three NCN Routes (NCN1, NCN7 and NCN78)²⁶ • Six of Scotland's Great Trails (Dava Way, Great Glen Canoe Trail, Great Glen Way, Moray Coast Trail, Speyside Way and West Highland Way)²⁷ • 169 Heritage Paths²⁸ • An extensive network of Core Paths

2.2. Highlands and Islands Regional Assessment Summary

The package supports modal shift to more sustainable modes of transport. Improved sustainable access to major port and airports the creation of mobility hubs/interchanges, strategic rail improvements and the improvements to passengers' services and facilities seeks to encourage modal shift, and, as a result, reduce levels of transport related air pollution and carbon emissions. The decarbonisation of the ferry, rail and bus network and freight deliveries will also support a reduction in greenhouse gas emissions and improvement in air quality.

²⁰ HES (2021) Historic Environment Portal [Online] Available at: <http://portal.historicenvironment.scot/> (accessed 16/07/2021).

²¹ The Highland Council (n.d.) Conservation areas [Online] Available at: https://www.highland.gov.uk/info/192/planning_-_listed_buildings_and_conservation_areas/167/conservation_areas/2 (accessed 16/07/2021).

²² Moray Council (n.d.) List of Conservation Areas [Online] Available at: http://www.moray.gov.uk/moray_standard/page_86282.html (accessed 16/07/2021).

²³ Comhairle nan Eilean Siar (n.d.) Building Heritage Conservation: Conservation Areas and Listed Buildings [Online] Available at: <https://www.cne-siar.gov.uk/planning-and-building/conservation/building-conservation/building-heritage-conservation/> (accessed 16/07/2021).

²⁴ Orkney Islands Council (n.d.) Conservation Areas [Online] Available at: <https://www.orkney.gov.uk/Service-Directory/C/Conservation-Areas.htm> (accessed 16/07/2021).

²⁵ NatureScot (2019) Guidance: Planning ahead for coastal change [Online] Available at <https://www.nature.scot/guidance-planning-ahead-coastal-change> (accessed 16/08/2021).

²⁶ Ordnance Survey (2021) National Cycle Network map [Online] Available at: <https://osmaps.ordnancesurvey.co.uk/ncn> (accessed 16/07/2021).

²⁷ Scotland's Great Trails (n.d.) Home [Online] Available at: <https://www.scotlandsgreattrails.com/> (accessed 16/07/2021).

²⁸ ScotWays (n.d.) Heritage Paths [Online] Available at: <http://www.heritagepaths.co.uk/mapsearch.php#zoom=6&lat=56.7820&lon=-4.9000> (accessed 16/07/2021).



The package provides an opportunity to adapt the transport network to the predicted effects of climate change, with one recommendation focused on this adaptation, promoting more sustainable usage of the existing transport network.

Positive effects are anticipated on Population and Human Health due to an expected increase in sustainable access to essential services, increased travel choice and improved connectivity and planning for the future capacity of public transport.

Active travel interventions will have positive outcomes for the SEA Population and Human Health topic - for example through expected improvements in air quality and increased uptake of physical exercise through walking, wheeling and cycling.

Road interventions are anticipated to have positive effects on safety. Trunk road improvements which are focused on junction improvements, realignment / widening and overtaking opportunities are also not anticipated to have a notable impact on traffic volumes or mode share and subsequently transport-based emissions in the majority of locations. The construction and operation of these interventions may result in minor negative effects on population and human health with the potential for an increase in noise and vibration during construction and operation. This is dependent on the location and design of individual schemes. There is also potential for a negative effect on material assets due to the use of natural resources.

The freight interventions are anticipated to result in minor negative effects on material assets as several interventions proposed involve enhancements to rail freight, terminals and facilities and therefore will require the use of natural resources.

The creation of fixed links will help adapt the transport network to the direct / indirect risks associated with climate change and maintain / improve access to and within isolated island communities at risk from climate change effects, however it is anticipated that there is the potential for negative effects on biodiversity, soil, landscape, water, historic environment, and material assets.

Where other new infrastructure is required, including, harbour upgrade requirements and road and rail interventions this could result in negative effects on biodiversity, soil, landscape, water, historic environment and material assets however the magnitude of effect is uncertain at this stage and will be determined by the design (and physical footprint) of the interventions.



3. North-East Scotland

3.1. North-East Scotland Baseline

The North-East Scotland region includes the Aberdeenshire and Aberdeen City local authority areas, which incorporates the city of Aberdeen as well as several inland and coastal villages. There are fishing communities around the coast, with Peterhead port being the country’s main white fish landing port.

The area contains designated biodiversity sites but not to the same extent as other regions. The main concentrations are found in the western area of the region around the Cairngorms National Park. Peat deposits are not as extensive as in the north-west but there are large peat deposits inland. The rural nature of the region results in air quality not being a pressing environmental issue, except from the three AQMAs that are all located within Aberdeen city centre. SEPA flood-maps do not indicate any particularly vulnerable areas with population centres except from the River Dee to the West of Aberdeen. Assets of cultural heritage interest are found throughout the region, with the highest concentration of designated buildings within Aberdeen.

NORTH-EAST SCOTLAND	
SEA TOPIC	ENVIRONMENTAL CONSIDERATIONS
Biodiversity	<p>The region contains a significant number of biodiversity designations, including²⁹:</p> <ul style="list-style-type: none"> • 21 SACs • 14 SPAs • 90 SSSIs (incl. the majority of the north Aberdeenshire coast) • Five Ramsar Sites • Nine NNRs • Six LNRs • Six RPSB Reserves
Soils/ Derelict land	<ul style="list-style-type: none"> • The region contains peat resource, particularly inland • The region has 56ha of derelict land across 44 sites, accounting for <1% of the regional land area. <p>Areas of contaminated land include:</p> <ul style="list-style-type: none"> • Blackdog landfill site and surrounding area • Queen’s Gardens Huntly <p>There are also a significant number of GCR sites</p>
Landscape / Visual	<ul style="list-style-type: none"> • Cairngorms National Park • Two NSAs (The Cairngorm Mountains, and Deeside and Lochnagar)³⁰ • 33 Gardens and Designed Landscapes³¹

²⁹ NatureScot (2021) SiteLink [Online] Available at: <https://sitelink.nature.scot/home> (accessed 02/07/2021).

³⁰ Scottish Government (2010) National Scenic Areas of Scotland [Online] Available at: <https://www.gov.scot/publications/national-scenic-areas-of-scotland-maps/> (accessed 15/07/2021).

³¹ HES (2021) Historic Environment Portal [Online] Available at: <http://portal.historicenvironment.scot/> (accessed 20/07/2021).



NORTH-EAST SCOTLAND	
SEA TOPIC	ENVIRONMENTAL CONSIDERATIONS
Climatic Factors	<ul style="list-style-type: none"> • Road transport accounts for 39% of all CO₂ emissions in the region. • Sea level recorded at the Aberdeen tide gauge rose by 8cm between 1900 and 1990, and is likely to have risen by a similar amount by 2030. Inverness will very likely see a sea level rise of nearly 1 metre between 2019 and 2100.³² • Frequency and intensity of hot extremes projected to increase in all future climate scenarios.³³ • Wetter and warmer winters projected, with increased likelihood of pluvial flooding and extreme rainfall.³⁴ • Increased soil moisture fluctuations will lead to increased risk of landslips.³⁵ • Under a high emission scenario, peak river flows for some areas could increase by more than 50% by the 2080's.³⁶ • Projected increases to extreme coastal water levels increases the risk of coastal flooding and erosion.³⁷ • Additional changes in storm surges are possible but difficult to predict.³⁸ • Aberdeen Train Station and City area, including A90 River Dee Crossing, within a 'potentially vulnerable to flooding' area.³⁹ • Montrose Railway Station and nearby track particularly exposed to flooding.
Air Quality	<ul style="list-style-type: none"> • Three AQMAs (all located within Aberdeen city centre area)⁴⁰

³² NatureScot (2019) Guidance: Planning ahead for coastal change [Online] Available at <https://www.nature.scot/guidance-planning-ahead-coastal-change> (accessed 16/08/2021).

³³ IPCC (2021) IPCC AR6 WGI Regional Fact Sheet Europe 2021 [Online] Available at: https://www.ipcc.ch/report/ar6/wg1/downloads/factsheets/IPCC_AR6_WGI_Regional_Fact_Sheet_Europe.pdf

³⁴ UKCP18 (2021) UK Climate Projections: Headline Findings July 2021 [Online] Available at: https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/research/ukcp/ukcp18_headline_findings_v3.pdf

³⁵ CCRA (2021) Third UK Climate Change Risk Assessment Technical Report: Summary for Scotland [Online] Available at: <https://www.ukclimaterisk.org/independent-assessment-ccra3/national-summaries/>

³⁶ Adaptation Scotland (2021) Climate Projections for Scotland summary [Online] Available at: <https://www.adaptationscotland.org.uk/why-adapt/climate-trends-and-projections>

³⁷ CCC (2021) The Adaptation Committee's Independent Assessment of UK Climate Risk [Online] Available at: <https://www.theccc.org.uk/publication/independent-assessment-of-uk-climate-risk/>

³⁸ UKCP18 (2018) UKCP18 Factsheet: Sea level rise and storm surge [Online] Available at: <https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/research/ukcp/ukcp18-fact-sheet-sea-level-rise-and-storm-surge.pdf>

³⁹ SEPA (2021) Flood Risk Management Maps [Online] Available at: <https://map.sepa.org.uk/floodmap/map.htm>

⁴⁰ Air Quality in Scotland (2021) Air Quality Management Areas [Online] Available at: <http://www.scottishairquality.scot/laqm/aqma?id=9999> (accessed 16/07/2021).

NORTH-EAST SCOTLAND	
SEA TOPIC	ENVIRONMENTAL CONSIDERATIONS
Material Assets	Key transport infrastructure within the study area includes: Four roads on the trunk road network (A90, A92, A96 and A956) ⁴¹ <ul style="list-style-type: none"> • Three rail lines⁴² • 11 railway stations⁴³ • Aberdeen International Airport⁴⁴ • 11 ports⁴⁵
Water / Flooding	<ul style="list-style-type: none"> • 210 surface water features in the region • The River Dee has a high likelihood of fluvial flood risk, particularly on the western periphery of Aberdeen.
Cultural Heritage	The region contains a significant number of historic assets, including ⁴⁶ : <ul style="list-style-type: none"> • 6,326 Category A-C Listed buildings • 580 Scheduled Monuments • Four designated battlefield sites • 52 Conservation Areas^{47,48}
Population and Human Health	<ul style="list-style-type: none"> • Two NCN Routes (NCN1 and NCN195)⁴⁹ • Formartine and Buchan Way (one of Scotland's Great Trails)⁵⁰ • 28 Heritage Paths⁵¹ • An extensive network of Core Paths.

3.2. North East Scotland Regional Assessment Summary

The package supports modal shift to more sustainable modes of transport. An enhanced rail network and the creation of mobility hubs/interchanges and Aberdeen Rapid Transit seeks to encourage modal shift, and, as a result, reduce levels of transport related air pollution and carbon emissions. The decarbonisation of the rail and bus network and

⁴¹ Transport Scotland (2021) Scottish trunk road network map [Online] Available at: <https://www.transport.gov.scot/publication/scottish-trunk-road-network-map/> (accessed 16/07/2021).

⁴² ScotRail (n.d.) Live Network Map [Online] Available at: https://www.scotrail.co.uk/sites/all/modules/interactive_map/assets/index.html (accessed 16/07/2021).

⁴³ ScotRail (n.d.) Stations and facilities [Online] Available at: <https://www.scotrail.co.uk/plan-your-journey/stations-and-facilities> (accessed 16/07/2021).

⁴⁴ Traffic Scotland (2021) Freight Information [Online] Available at: <https://trafficscotland.org/map/freight/index.aspx?type=204&latitude=57.1424253981371&longitude=-2.07668803884522&zoom=10> (accessed 30/06/2021).

⁴⁵ ibid

⁴⁶ HES (2021) Historic Environment Portal [Online] Available at: <http://portal.historicenvironment.scot/> (accessed 21/07/2021).

⁴⁷ Aberdeen City Council (n.d.) Conservation areas [Online] Available at: <https://www.aberdeencity.gov.uk/services/planning-and-building/building-conservation-and-heritage/conservation-areas> (accessed 21/07/2021).

⁴⁸ Aberdeenshire Council (n.d.) Conservation areas [Online] Available at: <https://www.aberdeenshire.gov.uk/planning/built-heritage/conservation-area/> (accessed 21/07/2021).

⁴⁹ Ordnance Survey (2021) National Cycle Network map [Online] Available at: <https://osmaps.ordnancesurvey.co.uk/ncn> (accessed 16/07/2021).

⁵⁰ Scotland's Great Trails (n.d.) Home [Online] Available at: <https://www.scotlandsgreattrails.com/> (accessed 16/07/2021).

⁵¹ ScotWays (n.d.) Heritage Paths [Online] Available at: <http://www.heritagepaths.co.uk/mapsearch.php#zoom=6&lat=56.7820&lon=-4.9000> (accessed 16/07/2021).



freight deliveries will also support a reduction in greenhouse gas emissions and improvement in air quality.

The package provides an opportunity to adapt the transport network to the predicted effects of climate change, with one recommendation focused on this adaptation and promotes a more sustainable usage of the existing transport network.

Positive effects are anticipated on Population and Human Health due to an expected increase in sustainable access to essential services, increased travel choice and improved connectivity and planning for the future capacity of public transport. Active travel interventions will have positive outcomes for the SEA Population and Human Health topic - for example through expected improvements in air quality and increased uptake of physical exercise through walking, wheeling and cycling.

Road interventions are anticipated to have positive effects on safety. Trunk road improvements which are focused on junction improvements, realignment / widening and overtaking opportunities are also not anticipated to have a notable impact on traffic volumes or mode share and subsequently transport-based emissions in the majority of locations. The construction and operation of these interventions may result in minor negative effects on population and human health with the potential for an increase in noise and vibration during construction and operation. This is dependent on the location and design of individual schemes. There is also potential for a negative effect on material assets due to the use of natural resources.

There is potential for negative environmental effects during construction and operation of the Aberdeen Rapid Transit, port upgrades and rail network improvements on the Population and Human Health (noise and vibration, public realm, safety), the Water Environment, Biodiversity, Soil, Historic Environment and Landscape and Visual Amenity. In addition, significant quantities of materials and construction related trips would be required. Depending on the source and type of materials/natural resources used, there is the potential for negative effects on Material Assets.

The Freight interventions are anticipated to result in minor negative effects on material assets as several interventions proposed involve enhancements to rail freight, terminals and facilities and therefore will require the use of natural resources.

Where any new infrastructure is required this could result in negative effects on biodiversity, soil, landscape, water, historic environment and material assets. However, the magnitude of effect is uncertain at this stage and will be determined by the design (and physical footprint) of the interventions.

4. Shetland Islands

4.1. Shetland Islands Baseline

The Shetland Islands region includes the Shetland Islands Council, which is situated approximately 100 miles north of the Scottish mainland.

The majority of designated biodiversity sites are located in the north of the isles around the Yell Sound. The soil type is dominated by peat of varying types, which act as a significant carbon sink. Due to the remote, rural nature of the region, air quality is not identified as an environmental concern. The SEPA flood maps do not indicate any population centres that are particularly at risk from fluvial or coastal flooding. Designated assets of cultural heritage interest are scattered throughout, with the main concentration in Lerwick.

SHETLAND ISLANDS	
SEA TOPIC	ENVIRONMENTAL CONSIDERATIONS
Biodiversity	<p>The region contains a significant number of biodiversity designations, including:⁵²</p> <ul style="list-style-type: none"> • 13 SACs • 12 SPAs • Three proposed SPAs • 78 SSSIs • One Ramsar site • Two NNRs • Five MPAs • One Demonstration and Research MPA • Four Marine Consultation Areas • One RSPB Reserve • One UNESCO Global Geopark <p>The region also has more than 10% of the UK's total seabird population and is home to 21 species.⁵³</p>
Soils/ Contaminated land	<ul style="list-style-type: none"> • The Shetland Islands contain vast peat deposits of various types, covering the majority of the land. • The region has 6ha of derelict land across six sites, accounting for <1% of the regional land area. • There is also a significant number of GCR sites
Landscape / Visual	<ul style="list-style-type: none"> • The region has one NSA ('Shetland') made up of several discrete locations, which is unusual for an NSA.⁵⁴ • Four Gardens and Designed Landscapes⁵⁵

⁵² NatureScot (2021) SiteLink [Online] Available at: <https://sitelink.nature.scot/home> (accessed 02/07/2021).

⁵³ Shetland Heritage (2013) Seabirds [Online] Available at: <https://www.shetland-heritage.co.uk/assets/files/brochures/themedleaflets/Seabirds.pdf> (accessed 21/07/2021).

⁵⁴ Scottish Government (2010) National Scenic Areas of Scotland [Online] Available at: <https://www.gov.scot/publications/national-scenic-areas-of-scotland-maps/> (accessed 15/07/2021).

⁵⁵ HES (2021) Historic Environment Portal [Online] Available at: <http://portal.historicenvironment.scot/> (accessed 20/07/2021).



SHETLAND ISLANDS	
SEA TOPIC	ENVIRONMENTAL CONSIDERATIONS
Climatic Factors	<ul style="list-style-type: none"> • Road transport accounts for 18% of all CO₂ emissions in the region • Frequency and intensity of hot extremes projected to increase in all future climate scenarios.⁵⁶ • Wetter and warmer winters projected, with increased likelihood of pluvial flooding and extreme rainfall.⁵⁷ • Increased soil moisture fluctuations will lead to increased risk of landslips.⁵⁸ • Under a high emission scenario, peak river flows for some areas could increase by more than 50% by the 2080's.⁵⁹ • Projected increases to extreme coastal water levels increases the risk of coastal flooding and erosion.⁶⁰ • Additional changes in storm surges are possible but difficult to predict.⁶¹ • Lifeline ferry crossings such as to Lerwick particularly exposed to storm surges.⁶²
Air Quality	<ul style="list-style-type: none"> • No AQMAs
Material Assets	<p>Key transport infrastructure within the study area includes:</p> <ul style="list-style-type: none"> • Two airports (Sumburgh Airport and Unst (Ordale) Airport) plus several smaller airports, airfields and airstrips located throughout the islands.⁶³ • 19 ports⁶⁴

⁵⁶ IPCC (2021) IPCC AR6 WGI Regional Fact Sheet Europe 2021 [Online] Available at:

https://www.ipcc.ch/report/ar6/wg1/downloads/factsheets/IPCC_AR6_WGI_Regional_Fact_Sheet_Europe.pdf

⁵⁷ UKCP18 (2021) UK Climate Projections: Headline Findings July 2021 [Online] Available at:

https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/research/ukcp/ukcp18_headline_findings_v3.pdf

⁵⁸ CCRA (2021) Third UK Climate Change Risk Assessment Technical Report: Summary for Scotland [Online] Available at:

<https://www.ukclimaterisk.org/independent-assessment-ccra3/national-summaries/>

⁵⁹ Adaptation Scotland (2021) Climate Projections for Scotland summary [Online] Available at:

<https://www.adaptationscotland.org.uk/why-adapt/climate-trends-and-projections>

⁶⁰ CCC (2021) The Adaptation Committee's Independent Assessment of UK Climate Risk [Online] Available at:

<https://www.theccc.org.uk/publication/independent-assessment-of-uk-climate-risk/>

⁶¹ UKCP18 (2018) UKCP18 Factsheet: Sea level rise and storm surge [Online] Available at:

<https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/research/ukcp/ukcp18-fact-sheet-sea-level-rise-and-storm-surge.pdf>

⁶² Crichton (2003) The Shetland Islands [Online] Available at: <http://www.islandvulnerability.org/ShetlandCrichton.pdf>

⁶³ Traffic Scotland (2021) Freight Information [Online] Available at:

<https://trafficscotland.org/map/freight/index.aspx?type=204&latitude=57.1424253981371&longitude=-2.07668803884522&zoom=10>

(accessed 30/06/2021)

⁶⁴ ibid



SHETLAND ISLANDS	
SEA TOPIC	ENVIRONMENTAL CONSIDERATIONS
Water / Flooding	<ul style="list-style-type: none"> • There are 87 surface water features in the region. • SEPA identifies the chance of flood from river and coastal flooding at medium and high likelihood of flooding. • Areas at risk of coastal flooding predominantly along the northern coastline; the likelihood of flooding in these areas are high. • There are several areas at risk of river flooding, however these tend to be localised in nature. • Areas at risk of coastal and river flooding are rural in nature, with no major settlements or infrastructure at risk.
Cultural Heritage	<p>The region contains a significant number of historic assets, including:⁶⁵</p> <ul style="list-style-type: none"> • 515 Category A-C Listed buildings • 390 Scheduled Monuments • Two historic MPAs • Three Conservation Areas⁶⁶
Population and Human Health	<ul style="list-style-type: none"> • NCN1 traverses the entire Island from north to south, however, is classified as an on-road route not on the NCN.⁶⁷ • Eight Heritage Paths⁶⁸ • An extensive network of Core Paths.

4.2. Shetland Islands Regional Assessment Summary

The package supports modal shift to more sustainable modes of transport. Improved access to airports and ports and the creation of mobility hubs / interchanges and the improvements to passengers’ services and facilities seeks to encourage modal shift to more sustainable modes of transport, and, as a result, reduce levels of transport related air pollution and carbon emissions.

Decarbonisation of ferry service, bus network and freight deliveries will also support a reduction in greenhouse gas emissions and improvement in air quality.

Positive effects are anticipated on Population and Human Health due to an expected increase in sustainable access to essential services, increased travel choice and improved connectivity and planning for the future capacity of public transport.

There is potential for a negative effect on material assets as some freight interventions proposed involve enhancements to freight, terminals and facilities and therefore will

⁶⁵ HES (2021) Historic Environment Portal [Online] Available at: <http://portal.historicenvironment.scot/> (accessed 21/07/2021).

⁶⁶ Shetland Islands Council (n.d.) Conservation Areas [Online] Available at: <https://www.shetland.gov.uk/natural-historic-environment/conservation-areas?documentId=175&categoryId=20076> (accessed 21/07/2021).

⁶⁷ Ordnance Survey (2021) National Cycle Network map [Online] Available at: <https://osmaps.ordnancesurvey.co.uk/ncn> (accessed 16/07/2021).

⁶⁸ ScotWays (n.d.) Heritage Paths [Online] Available at: <http://www.heritagepaths.co.uk/mapsearch.php#zoom=6&lat=56.7820&lon=-4.9000> (accessed 16/07/2021).



require the use of natural resources.

Where new infrastructure is required this could result in negative effects on biodiversity, soil, landscape, water, historic environment; however, the magnitude of effect is uncertain at this stage and will be determined by the design (and physical footprint) of the interventions.

Many of the interventions in this region, particularly the active travel ones, will have positive outcomes for the SEA Population and Human Health topic - for example through expected improvements in air quality and increased uptake of physical exercise through walking, wheeling and cycling.



5. Argyll and Bute

5.1. Argyll and Bute Baseline

The Argyll and Bute region includes the Argyll and Bute local authority area, covering a land area of approximately 6,900km². There are several medium-sized settlements on the coast along the A82 trunk road and a number of island communities connected by ferry services, with Oban as the key terminus.

Designated biodiversity sites can be found throughout the region, with the highest concentrations in coastal areas and on the islands of the Inner Hebrides. Peat soils dominate throughout the region on the mainland and the islands. The region is renowned for its natural beauty, and eight NSAs are either wholly or partly within the region. The region is largely rural and coastal and does not have any particular air quality issues.

SEPA flood maps indicate populated areas at high risk of fluvial flooding around Rothesay, Lochgilphead, Dunoon (Milton Burn), Campbeltown, Ardrishaig (Crinan Canal) and Bridgend (River Add). Designated cultural heritage assets can be found throughout the region with notable concentrations on the Isle of Jura, around Lochgilphead and on the coast to the South of Jura.

ARGYLL AND BUTE	
SEA TOPIC	ENVIRONMENTAL CONSIDERATIONS
Biodiversity	<p>The region contains a significant number of biodiversity designations, including:⁶⁹</p> <ul style="list-style-type: none"> • 31 SACs • 21 SPAs • Seven Ramsar sites • 120 SSSIs • Five MPAs • Six NNRs • Two LNRs • One National Park: Loch Lomond and the Trossachs National Park • Seven Marine Consultation Areas • 10 RSPB Reserves
Soils/ Contaminated land	<ul style="list-style-type: none"> • The soil type is dominated by peat soils. • The region has 42ha of derelict land across 14 sites, accounting for <1 of the regional land area. • There is a significant number of GCR sites

⁶⁹ NatureScot (2021) SiteLink [Online] Available at: <https://sitelink.nature.scot/home> (accessed 02/07/2021).
Strategic Transport Projects Review (STPR2)
Consultancy Support Services Contract



ARGYLL AND BUTE	
SEA TOPIC	ENVIRONMENTAL CONSIDERATIONS
Landscape / Visual	<ul style="list-style-type: none"> • The study area has eight designated NSAs that are either entirely within the region or overlap with neighbouring regions.⁷⁰ • The Loch Lomond and Trossachs National Park extends into the east of the study area. • 24 Gardens and Designed Landscapes⁷¹
Climatic Factors	<ul style="list-style-type: none"> • Road transport accounts for 18% of all CO₂ emissions in the region • Frequency and intensity of hot extremes projected to increase in all future climate scenarios.⁷² • Wetter and warmer winters projected, with increased likelihood of pluvial flooding and extreme rainfall.⁷³ • Increased soil moisture fluctuations will lead to increased risk of landslips.⁷⁴ • Under a high emission scenario, peak river flows for some areas could increase by more than 50% by the 2080s.⁷⁵ • Projected increases to extreme coastal water levels increases the risk of coastal flooding and erosion.⁷⁶ • Additional changes in storm surges are possible but difficult to predict.⁷⁷ • The West Highland Line and A83 remain exposed to coastal storm surges.⁷⁸
Air Quality	<ul style="list-style-type: none"> • No AQMAs

⁷⁰ Scottish Government (2010) National Scenic Areas of Scotland [Online] Available at: <https://www.gov.scot/publications/national-scenic-areas-of-scotland-maps/> (accessed 15/07/2021).

⁷¹ HES (2021) Historic Environment Portal [Online] Available at: <http://portal.historicenvironment.scot/> (accessed 20/07/2021).

⁷² IPCC (2021) IPCC AR6 WGI Regional Fact Sheet Europe 2021 [Online] Available at:

https://www.ipcc.ch/report/ar6/wg1/downloads/factsheets/IPCC_AR6_WGI_Regional_Fact_Sheet_Europe.pdf

⁷³ UKCP18 (2021) UK Climate Projections: Headline Findings July 2021 [Online] Available at:

https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/research/ukcp/ukcp18_headline_findings_v3.pdf

⁷⁴ CCRA (2021) Third UK Climate Change Risk Assessment Technical Report: Summary for Scotland [Online] Available at:

<https://www.ukclimaterisk.org/independent-assessment-ccra3/national-summaries/>

⁷⁵ Adaptation Scotland (2021) Climate Projections for Scotland summary [Online] Available at:

<https://www.adaptationscotland.org.uk/why-adapt/climate-trends-and-projections>

⁷⁶ CCC (2021) The Adaptation Committee's Independent Assessment of UK Climate Risk [Online] Available at:

<https://www.theccc.org.uk/publication/independent-assessment-of-uk-climate-risk/>

⁷⁷ UKCP18 (2018) UKCP18 Factsheet: Sea level rise and storm surge [Online] Available at:

<https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/research/ukcp/ukcp18-fact-sheet-sea-level-rise-and-storm-surge.pdf>

⁷⁸ SEPA (2021) Flood Risk Management Maps [Online] Available at: <https://map.sepa.org.uk/floodmap/map.htm>



ARGYLL AND BUTE	
SEA TOPIC	ENVIRONMENTAL CONSIDERATIONS
Material Assets	<p>Key transport infrastructure within the study area includes:</p> <ul style="list-style-type: none"> • Three A roads on the trunk road network (A82, A83 and A85)⁷⁹ • One rail line (West Highland Line (Glasgow to Oban))⁸⁰ • 13 railway stations and one rail halt⁸¹ • Six airports (Campbeltown Airport, Oban Airport and Islay Airport) plus several local authority/private operated airports⁸² • 45 ports⁸³
Water / Flooding	<ul style="list-style-type: none"> • 283 surface water features within the region. • SEPA identifies flood risk from river and coastal flooding at medium and high likelihood of flooding. • There are a high number of areas at risk of coastal flooding throughout the region, however, these tend to be localised in nature and away from major settlements. • The highest risk of river flooding is from rivers within the catchments of Loch Awe and Loch Lomond. The main receptors at risk include the settlement of Dalmally and road and rail infrastructure. • There are also populated areas at high risk of fluvial flooding flooding around Rothesay, Lochgilphead, Dunoon (Milton Burn), Campbeltown, Ardrishaig (Crinan Canal) and Bridgend (River Add).
Cultural Heritage	<p>The region contains a significant number of historic assets, including:⁸⁴</p> <ul style="list-style-type: none"> • 2,812 Category A-C Listed buildings • 803 Scheduled Monuments • One historic MPA • 32 Conservation Areas⁸⁵

⁷⁹ Transport Scotland (2021) Scottish trunk road network map [Online] Available at: <https://www.transport.gov.scot/publication/scottish-trunk-road-network-map/> (accessed 16/07/2021).

⁸⁰ ScotRail (n.d.) Live Network Map [Online] Available at: https://www.scotrail.co.uk/sites/all/modules/interactive_map/assets/index.html (accessed 16/07/2021).

⁸¹ ScotRail (n.d.) Stations and facilities [Online] Available at: <https://www.scotrail.co.uk/plan-your-journey/stations-and-facilities> (accessed 16/07/2021).

⁸² Traffic Scotland (2021) Freight Information [Online] Available at: <https://trafficscotland.org/map/freight/index.aspx?type=204&latitude=57.1424253981371&longitude=-2.07668803884522&zoom=10> (accessed 30/06/2021)

⁸³ ibid

⁸⁴ HES (2021) Historic Environment Portal [Online] Available at: <http://portal.historicenvironment.scot/> (accessed 20/07/2021).

⁸⁵ Argyll and Bute Council (n.d.) Conservation Areas [Online] Available at: <https://www.argyll-bute.gov.uk/conservation-areas> (accessed 21/07/2021).



ARGYLL AND BUTE	
SEA TOPIC	ENVIRONMENTAL CONSIDERATIONS
Population and Human Health	<ul style="list-style-type: none"> • One NCN Route (NCN78)⁸⁶ • Six of Scotland Great Trails (Loch Lomond and Cowal Way, John Muir Way, Kintyre Way, Three Lochs Way, West Highland Way and West Island Way)⁸⁷ • 31 Heritage Paths⁸⁸ • An extensive network of Core Paths

5.2. Argyll and Bute Regional Assessment Summary

The package supports modal shift to more sustainable modes of transport. Improved access to airports and ports and the creation of mobility hubs/interchanges, rail improvements and the improvements to passengers’ services and facilities seeks to encourage modal shift, and, as a result, reduce levels of transport related air pollution and carbon emissions. The decarbonisation of the ferry, rail and bus network and freight deliveries will also support a reduction in greenhouse gas emissions and improvement in air quality.

Positive effects are anticipated on Population and Human Health due to an expected increase in sustainable access to essential services, increased travel choice and improved connectivity and planning for the future capacity of public transport. Active travel interventions will have positive outcomes for the SEA Population and Human Health topic - for example through expected improvements in air quality and increased uptake of physical exercise through walking, wheeling and cycling.

Road interventions are anticipated to have positive effects on safety. Trunk road improvements which are focused on junction improvements, realignment / widening and overtaking opportunities are also not anticipated to have a notable impact on traffic volumes or mode share and subsequently transport-based emissions in the majority of locations. The construction and operation of these interventions may result in result in minor negative effects on population and human health with the potential for in an increase in noise and vibration during construction and operation. This is dependent on the location and design of individual schemes. There is also potential for a negative effect on material assets due to the use of natural resources.

The Freight interventions are anticipated to result in minor negative effects on material assets as several interventions proposed involve enhancements to rail freight, terminals and facilities and therefore will require the use of natural resources.

The creation of fixed links will help adapt the ferry network to the direct / indirect risks associated with climate change and maintain / improve access to and within isolated island communities at risk from climate change effects, however it is anticipated that there is the

⁸⁶ Ordnance Survey (2021) National Cycle Network map [Online] Available at: <https://osmaps.ordnancesurvey.co.uk/ncn> (accessed 16/07/2021).

⁸⁷ Scotland’s Great Trails (n.d.) Home [Online] Available at: <https://www.scotlandsgreattrails.com/> (accessed 16/07/2021).

⁸⁸ ScotWays (n.d.) Heritage Paths [Online] Available at: <http://www.heritagepaths.co.uk/mapsearch.php#zoom=6&lat=56.7820&lon=-4.9000> (accessed 16/07/2021).



potential for negative effects on biodiversity, soil, landscape, water, historic environment and material assets.

Where other new infrastructure is required, including, harbour upgrade requirements and road and rail interventions this could result in negative effects on biodiversity, soil, landscape, water, historic environment and material assets however the magnitude of effect is uncertain at this stage and will be determined by the design (and physical footprint) of the interventions.



6. Tay Cities

6.1. Tay Cities Baseline

The Tay and Cities Region includes the local authorities of Angus, Dundee, Perth, Kinross and the north-east of Fife. The main population centres are Dundee and Perth. There are several smaller towns and villages throughout the region, particularly on the Fife coast towards St Andrews and north of Dundee. The geography is a mix of coastal towns and villages along the Firths of Forth and Tay, as well as inland communities at the southern extents of the highlands.

There is a range of biodiversity designated sites within the region with the highest concentration in the north west towards the Grampian Mountains and the Cairngorms National Park. The region contains six NSAs, particularly in the north-west. AQMAs have been identified in four urban areas of Perth, Crieff, Bonnygate (central Cupar) and Dundee.

The region contains populated areas at high risk of fluvial flooding around the Howe of Fife, on the tributaries of the Tay towards Bridge of Earn and Madderty. Perth is also classified as having high flood risk from the Tay and has experienced significant flooding events in the recent past. Designated cultural heritage assets are located throughout the region with several concentrations in and around Perth and in the A9 corridor.

TAY CITIES	
SEA TOPIC	ENVIRONMENTAL CONSIDERATIONS
Biodiversity	<p>The region contains a significant number of biodiversity designations, including:⁸⁹</p> <ul style="list-style-type: none"> • 26 SACs • 15 SPAs • 184 SSSIs • Nine Ramsar Sites • One MPA • Seven NNRs • Eight LNRs • Three RSPB Reserves
Soils/ Contaminated land	<ul style="list-style-type: none"> • The soil types in the region are mainly mineral gleys, brown soils and mineral podzols • There is minimal presence of peat in the region. • The region has 389ha of derelict land across 125 sites, accounting for >1% of the regional land area. • There is also a significant number of GCR sites

⁸⁹ NatureScot (2021) SiteLink [Online] Available at: <https://sitelink.nature.scot/home> (accessed 02/07/2021).
Strategic Transport Projects Review (STPR2)
Consultancy Support Services Contract

TAY CITIES	
SEA TOPIC	ENVIRONMENTAL CONSIDERATIONS
Landscape / Visual	<ul style="list-style-type: none"> • Two National Parks: parts of both the Cairngorms National Park and Loch Lomond and Trossachs National Park • One Regional Park: part of the Lomond Hills Regional Park • There are six NSAs either wholly or partly in the study area⁹⁰ • 72 Gardens and Designed Landscapes⁹¹
Climatic Factors	<ul style="list-style-type: none"> • Road transport accounts for 40% of all CO₂ emissions in the region across the relevant local authorities. • Frequency and intensity of hot extremes projected to increase in all future climate scenarios.⁹² • Wetter and warmer winters projected, with increased likelihood of pluvial flooding and extreme rainfall.⁹³ • Increased soil moisture fluctuations will lead to increased risk of landslips.⁹⁴ • Under a high emission scenario, peak river flows for some areas could increase by more than 50% by the 2080's.⁹⁵ • Projected increases to extreme coastal water levels increases the risk of coastal flooding and erosion.⁹⁶ • Additional changes in storm surges are possible but difficult to predict.⁹⁷
Air Quality	<ul style="list-style-type: none"> • Four AQMAs in the area: Perth, Crieff, Bonnygate (central Cupar) and Dundee city⁹⁸

⁹⁰ Scottish Government (2010) National Scenic Areas of Scotland [Online] Available at: <https://www.gov.scot/publications/national-scenic-areas-of-scotland-maps/> (accessed 15/07/2021).

⁹¹ HES (2021) Historic Environment Portal [Online] Available at: <http://portal.historicenvironment.scot/> (accessed 20/07/2021).

⁹² IPCC (2021) IPCC AR6 WGI Regional Fact Sheet Europe 2021 [Online] Available at: https://www.ipcc.ch/report/ar6/wg1/downloads/factsheets/IPCC_AR6_WGI_Regional_Fact_Sheet_Europe.pdf

⁹³ UKCP18 (2021) UK Climate Projections: Headline Findings July 2021 [Online] Available at: https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/research/ukcp/ukcp18_headline_findings_v3.pdf

⁹⁴ CCRA (2021) Third UK Climate Change Risk Assessment Technical Report: Summary for Scotland [Online] Available at: <https://www.ukclimaterisk.org/independent-assessment-ccra3/national-summaries/>

⁹⁵ Adaptation Scotland (2021) Climate Projections for Scotland summary [Online] Available at: <https://www.adaptationscotland.org.uk/why-adapt/climate-trends-and-projections>

⁹⁶ CCC (2021) The Adaptation Committee's Independent Assessment of UK Climate Risk [Online] Available at: <https://www.theccc.org.uk/publication/independent-assessment-of-uk-climate-risk/>

⁹⁷ UKCP18 (2018) UKCP18 Factsheet: Sea level rise and storm surge [Online] Available at: <https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/research/ukcp/ukcp18-fact-sheet-sea-level-rise-and-storm-surge.pdf>

⁹⁸ Air Quality in Scotland (2021) Air Quality Management Areas [Online] Available at: <http://www.scottishairquality.scot/laqm/aqma?id=9999> (accessed 16/07/2021).



TAY CITIES	
SEA TOPIC	ENVIRONMENTAL CONSIDERATIONS
Material Assets	<p>Key transport infrastructure within the study area includes:</p> <ul style="list-style-type: none"> • One motorway (M90) and five A roads (A9, A85, A90, A92) on the trunk road network⁹⁹ • Five rail lines¹⁰⁰ • 20 railway stations¹⁰¹ • 10 Airports¹⁰² • Three ports¹⁰³
Water / Flooding	<ul style="list-style-type: none"> • 283 surface water features within the region. • SEPA identifies flood risk from surface water, river and coastal flooding at medium and high likelihood of flooding. • Settlements at greatest risk of coastal flooding are located along the Firth of Tay, St Andrew's Bay and Montrose Bay and include Perth, St Andrews, Newburgh, Leuchars, Newport-on-Tay, Dundee and Montrose. • Areas at medium and high risk of river flooding are predominantly located in the vicinity of River Earn, River Tay, River Isla, River South Esk and their tributaries. Settlements at risk include Forfar, Cupar and Auchtermuchty. • Areas at high and medium risk of surface flooding are typically associated with lochs within the east of the region where population density is typically low, including Kinross (Loch Leven).

⁹⁹ Transport Scotland (2021) Scottish trunk road network map [Online] Available at: <https://www.transport.gov.scot/publication/scottish-trunk-road-network-map/> (accessed 16/07/2021).

¹⁰⁰ ScotRail (n.d.) Live Network Map [Online] Available at: https://www.scotrail.co.uk/sites/all/modules/interactive_map/assets/index.html (accessed 16/07/2021).

¹⁰¹ ScotRail (n.d.) Stations and facilities [Online] Available at: <https://www.scotrail.co.uk/plan-your-journey/stations-and-facilities> (accessed 16/07/2021).

¹⁰² Traffic Scotland (2021) Freight Information [Online] Available at: <https://trafficscotland.org/map/freight/index.aspx?type=204&latitude=57.1424253981371&longitude=-2.07668803884522&zoom=10> (accessed 30/06/2021).

¹⁰³ Traffic Scotland (2021) Freight Information [Online] Available at: <https://trafficscotland.org/map/freight/> (accessed 15/09/2021).



TAY CITIES	
SEA TOPIC	ENVIRONMENTAL CONSIDERATIONS
Cultural Heritage	<p>The region contains a significant number of historic assets including¹⁰⁴:</p> <ul style="list-style-type: none"> • 11,078 Category A-C Listed buildings • 1,231 Scheduled Monuments • Five designated Battlefield Sites ¹⁰⁵ • One historic MPA • 97 Conservation Areas^{106,107,108,109}
Population and Human Health	<ul style="list-style-type: none"> • Eight NCN Routes (NCN1, NCN7, NCN77, NC83, NC766, NCN775, NCN777 and NCN776)¹¹⁰ • Three of Scotland's Great Trails (Fife Coastal Path, Catevan Trail and Rob Roy Way)¹¹¹ • 41 Heritage Paths¹¹² • An extensive network of Core Paths

6.2. Tay Cities Regional Assessment Summary

The package supports modal shift to more sustainable modes of transport. Improved access to airports and ports and the creation of mobility hubs/interchanges, improvements to the strategic rail network and the improvements to passengers' services and facilities seeks to encourage modal shift, and, as a result, reduce levels of transport related air pollution and carbon emissions. The decarbonisation of the rail and bus network and freight deliveries will also support a reduction in greenhouse gas emissions and improvement in air quality.

The package provides an opportunity to adapt the transport network to the predicted effects of climate change, with one recommendation focused on this adaptation and promotes a more sustainable usage of the existing transport network.

Positive effects are anticipated on Population and Human Health due to an expected increase in sustainable access to essential services, increased travel choice and improved connectivity and planning for the future capacity of public transport.

¹⁰⁴ HES (2020) Historic Environment Portal. [Online] Available at: <http://portal.historicenvironment.scot/> (accessed 21/07/21).

¹⁰⁵ Pastmap (n.d.) Exploring Scotland's Historic Scotland [Online] Available at: arcgiswebv.uk/LocalViewEXT/Sites/BuiltHeritagePublic/

¹⁰⁶ Angus Council (n.d.) Conservation areas [Online] Available: https://www.angus.gov.uk/planning_and_building/conservation/conservation_areas (accessed 21/07/2021).

¹⁰⁷ Dundee City Council (n.d.) Conservation Areas in Dundee [Online] Available at: <https://www.dundee.gov.uk/service-area/city-development/planning-and-economic-development/development-management/conservation-areas-in-dundee> (accessed 21/07/2021).

¹⁰⁸ Fife Council (n.d.) Conservation areas [Online] Available at: <https://www.fife.gov.uk/kb/docs/articles/planning-and-building2/built-and-natural-heritage/conservation-areas> (accessed 21/07/2021).

¹⁰⁹ Perth and Kinross Council (2018) Conservation areas [Online] Available at: <https://www.pkc.gov.uk/conservationareas> (accessed 21/07/2021).

¹¹⁰ Ordnance Survey (2021) National Cycle Network map [Online] Available at: <https://osmaps.ordnancesurvey.co.uk/ncn> (accessed 16/07/2021).

¹¹¹ Scotland's Great Trails (n.d.) Home [Online] Available at: <https://www.scotlandsgreattrails.com/> (accessed 16/07/2021).

¹¹² ScotWays (n.d.) Heritage Paths [Online] Available at: <http://www.heritagepaths.co.uk/mapsearch.php#zoom=6&lat=56.7820&lon=-4.9000> (accessed 16/07/2021).



Active travel interventions will also have positive outcomes on Population and Human Health through expected improvements in air quality and increased uptake of physical exercise through walking, wheeling and cycling.

Road interventions are anticipated to have positive effects on safety. Trunk road improvements which are focused on junction improvements, realignment / widening and overtaking opportunities are also not anticipated to have a notable impact on traffic volumes or mode share and subsequently transport-based emissions in the majority of locations. The construction and operation of these interventions may result in result in minor negative effects on population and human health, with the potential for in an increase in noise and vibration during construction and operation. This is dependent on the location and design of individual schemes. There is also potential for a negative effect on material assets due to the use of natural resources.

The Freight interventions are anticipated to result in minor negative effects on material assets as several interventions proposed involve enhancements to rail freight, terminals and facilities and therefore will require the use of natural resources.

Where new infrastructure is required this could result in negative effects on biodiversity, soil, landscape, water, historic environment and material assets. However, the magnitude of effect is uncertain at this stage and will be determined by the design (and physical footprint) of the interventions.



7. Forth Valley

7.1. Forth Valley Baseline

The Forth Valley region covers the towns and cities in the central belt between Edinburgh and Glasgow, including the urban areas of Stirling and Falkirk. The local authority areas of Clackmannanshire, Falkirk and Stirling are included. The southern area around Falkirk and Grangemouth contains significant industrial areas, including the Grangemouth oil refinery.

The region contains some designated sites which tend to be concentrated in the north and west, towards the Loch Lomond and Trossachs National Park. There are a variety of soil types in the region including mineral gleys, brown and calcareous soils. The region also contains a low concentration of peat deposits. The west of the region contains valuable landscape areas within the Loch Lomond and Trossachs National Park. There are four AQMAs in the region, concentrated in the industrial region around the Grangemouth refinery and the cement and plastics factories.

SEPA flood maps indicate a high risk of coastal flooding in the Grangemouth area and a high risk of fluvial flooding on the River Forth towards Stirling and Bridge of Allan. The area has an array of cultural heritage assets, particularly within Stirling and the surrounding land, which has large designated battlefield sites.

FORTH VALLEY	
SEA TOPIC	ENVIRONMENTAL CONSIDERATIONS
Biodiversity	<p>The region contains a significant number of biodiversity designations, including:¹¹³</p> <ul style="list-style-type: none"> • 12 SACs • Four SPAs • 92 SSSIs • Two Ramsar Sites • One MPA • Four NNRs • Five LNRs • Four RSPB Reserves
Soils/ Contaminated land	<ul style="list-style-type: none"> • A variety of soil types are present with the region, with mineral gleys, brown and calcareous soils being prevalent. • There are no significant peat deposits. • The region has 398ha of derelict land across 76 sites, accounting for <1% of the regional land area. • There is also a significant number of GCR sites

¹¹³ NatureScot (2021) SiteLink [Online] Available at: <https://sitelink.nature.scot/home> (accessed 02/07/2021).
Strategic Transport Projects Review (STPR2)
Consultancy Support Services Contract



FORTH VALLEY	
SEA TOPIC	ENVIRONMENTAL CONSIDERATIONS
Landscape / Visual	<ul style="list-style-type: none"> Loch Lomond and Trossachs National Park, which occupies a significant area in the north-west of the region Three NSAs (The Trossachs, Loch Lomond, and Loch Rannoch and Glen Lyon) which are located either wholly or partly within the study area¹¹⁴ 21 Gardens and Designed Landscapes¹¹⁵
Climatic Factors	<ul style="list-style-type: none"> Road transport accounts for 16% of all CO₂ emissions in the region. Frequency and intensity of hot extremes projected to increase in all future climate scenarios.¹¹⁶ Wetter and warmer winters projected, with increased likelihood of pluvial flooding and extreme rainfall.¹¹⁷ Increased soil moisture fluctuations will lead to increased risk of landslips.¹¹⁸ Under a high emission scenario, peak river flows for some areas could increase by more than 50% by the 2080s.¹¹⁹ Projected increases to extreme coastal water levels increases the risk of coastal flooding and erosion.¹²⁰ Additional changes in storm surges are possible but difficult to predict.¹²¹
Air Quality	<ul style="list-style-type: none"> Four AQMAs located in Grangemouth, Haggs, Falkirk Centre and Banknock¹²²

¹¹⁴ Scottish Government (2010) National Scenic Areas of Scotland [Online] Available at: <https://www.gov.scot/publications/national-scenic-areas-of-scotland-maps/> (accessed 15/07/2021).

¹¹⁵ HES (2020) Historic Environment Portal. [Online] Available at: <http://portal.historicenvironment.scot/> (accessed 21/07/21).

¹¹⁶ IPCC (2021) IPCC AR6 WGI Regional Fact Sheet Europe 2021 [Online] Available at: https://www.ipcc.ch/report/ar6/wg1/downloads/factsheets/IPCC_AR6_WGI_Regional_Fact_Sheet_Europe.pdf

¹¹⁷ UKCP18 (2021) UK Climate Projections: Headline Findings July 2021 [Online] Available at: https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/research/ukcp/ukcp18_headline_findings_v3.pdf

¹¹⁸ CCRA (2021) Third UK Climate Change Risk Assessment Technical Report: Summary for Scotland [Online] Available at: <https://www.ukclimaterisk.org/independent-assessment-ccra3/national-summaries/>

¹¹⁹ Adaptation Scotland (2021) Climate Projections for Scotland summary [Online] Available at: <https://www.adaptationscotland.org.uk/why-adapt/climate-trends-and-projections>

¹²⁰ CCC (2021) The Adaptation Committee's Independent Assessment of UK Climate Risk [Online] Available at: <https://www.theccc.org.uk/publication/independent-assessment-of-uk-climate-risk/>

¹²¹ UKCP18 (2018) UKCP18 Factsheet: Sea level rise and storm surge [Online] Available at: <https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/research/ukcp/ukcp18-fact-sheet-sea-level-rise-and-storm-surge.pdf>

¹²² Air Quality in Scotland (2021) Air Quality Management Areas [Online] Available at: <http://www.scottishairquality.scot/laqm/aqma?id=9999> (accessed 16/07/2021).

FORTH VALLEY	
SEA TOPIC	ENVIRONMENTAL CONSIDERATIONS
Material Assets	<p>Key transport infrastructure within the study area includes:</p> <ul style="list-style-type: none"> • Three motorways (M9, M876 and M80) and six A roads (A9, A82, A84, A85, A876, A985) on the trunk road network¹²³ • Three rail lines¹²⁴ • 12 railway stations¹²⁵ • Grangemouth Port (Scotland's largest container port)¹²⁶
Water / Flooding	<ul style="list-style-type: none"> • 129 surface water features within the region. • SEPA identifies flood risk from surface water, river and coastal flooding at medium and high likelihood of flooding. • Settlements at greatest risk of coastal flooding are located along the Firth of Forth and River Forth, including Stirling, Grangemouth and Culross. • Areas at medium and high risk of river flooding are predominantly located in the vicinity of the River Forth, River Devon and River Teith. These include Stirling, Aberfoyle, Callander and Alloa. • Areas at high and medium risk of surface water flooding are typically associated with Lochs within the Loch Lomond and the Trossachs National Park where population density is typically low.
Cultural Heritage	<p>The region contains a significant number of historic assets including¹²⁷:</p> <ul style="list-style-type: none"> • The Antonine Wall (designated World Heritage Site) is located within the study area. It stretches across the central belt of Scotland from the Clyde to the Forth, and is the largest relic of the Roman occupation of Scotland. • 2,690 Category A-C Listed buildings • 277 Scheduled Monuments • Seven designated Battlefield Sites • 52 Conservation Areas^{128,129,130}

¹²³ Transport Scotland (2021) Scottish trunk road network map [Online] Available at: <https://www.transport.gov.scot/publication/scottish-trunk-road-network-map/> (accessed 16/07/2021).

¹²⁴ ScotRail (n.d.) Live Network Map [Online] Available at: https://www.scotrail.co.uk/sites/all/modules/interactive_map/assets/index.html (accessed 16/07/2021).

¹²⁵ ScotRail (n.d.) Stations and facilities [Online] Available at: <https://www.scotrail.co.uk/plan-your-journey/stations-and-facilities> (accessed 16/07/2021).

¹²⁶ Traffic Scotland (2021) Freight Information [Online] Available at: <https://trafficscotland.org/map/freight/index.aspx?type=204&latitude=57.1424253981371&longitude=-2.07668803884522&zoom=10> (accessed 30/06/2021).

¹²⁷ HES (2020) Historic Environment Portal. [Online] Available at: <http://portal.historicenvironment.scot/> (accessed 21/07/21).

¹²⁸ Clackmannanshire Council (n.d.) Conservation Area Maps [Online] Available at: <https://www.clacks.gov.uk/site/documents/heritage/conservationareamaps/> (accessed 21/07/2021).

¹²⁹ Falkirk Council (n.d.) Conservation areas [Online] Available at: <https://www.falkirk.gov.uk/services/planning-building/development-management/conservation-areas.aspx> (accessed 21/07/2021).

¹³⁰ Stirling Council (n.d.) Conservation Areas [Online] Available at: <https://my.stirling.gov.uk/planning-building-the-environment/planning/development-planning/conservation/conservation-areas/> (accessed 21/07/2021).



FORTH VALLEY	
SEA TOPIC	ENVIRONMENTAL CONSIDERATIONS
Population and Human Health	<ul style="list-style-type: none"> • Eight NCN Routes (NCN7, NCN76, NCN754, NCN755, NCN764, NCN767 and NCN768)¹³¹ • Five of Scotland's Great Trails (Rob Roy Way, Great Trossachs Path, John Muir Way, West Highland Way and Forth Clyde Canal/Union Canal Towpath)¹³² • 41 Heritage Paths¹³³ • An extensive network of Core Paths

7.2. Forth Valley Regional Assessment Summary

The package supports modal shift to more sustainable modes of transport. The creation of mobility hubs/interchanges, improvements to the strategic rail network and the improvements to passengers' services and facilities seeks to encourage modal shift, and, as a result, reduce levels of transport related air pollution and carbon emissions. The decarbonisation of the rail and bus network and freight deliveries will also support a reduction in greenhouse gas emissions and improvement in air quality.

The package provides an opportunity to adapt the transport network to the predicted effects of climate change, with one recommendation focused on this adaptation and promotes a more sustainable usage of the existing transport network.

Positive effects are anticipated on Population and Human Health due to an expected increase in sustainable access to essential services, increased travel choice and improved connectivity and planning for the future capacity of public transport. Active travel interventions will also have positive outcomes on Population and Human Health through expected improvements in air quality and increased uptake of physical exercise through walking, wheeling and cycling.

There is potential for a negative effect on material assets as some freight interventions proposed involve enhancements to rail freight, terminals and facilities and therefore will require the use of natural resources.

Road interventions are anticipated to have positive effects on safety. Trunk road improvements which are focused on junction improvements, realignment / widening and overtaking opportunities are also not anticipated to have a notable impact on traffic volumes or mode share and subsequently transport-based emissions in the majority of locations. The construction and operation of these interventions may result in minor negative effects on population and human health with the potential for an increase in noise and vibration during construction and operation. This is dependent on the location

¹³¹ Ordnance Survey (2021) National Cycle Network map [Online] Available at: <https://osmaps.ordnancesurvey.co.uk/ncn> (accessed 16/07/2021).

¹³² Scotland's Great Trails (n.d.) Home [Online] Available at: <https://www.scotlandsgreattrails.com/> (accessed 16/07/2021).

¹³³ ScotWays (n.d.) Heritage Paths [Online] Available at: <http://www.heritagepaths.co.uk/mapsearch.php#zoom=6&lat=56.7820&lon=-4.9000> (accessed 16/07/2021).



and design of individual schemes. There is also potential for a negative effect on material assets due to the use of natural resources.

Where new infrastructure is required this could result in negative effects on biodiversity, soil, landscape, water, historic environment however the magnitude of effect is uncertain at this stage and will be determined by the design (and physical footprint) of the interventions.

8. Glasgow City Region

8.1. Glasgow City Region Baseline

The Glasgow City region includes the local authorities of Glasgow City, East Dunbartonshire, East Renfrewshire, Renfrewshire, North & South Lanarkshire and Inverclyde. Due to the predominantly urban area of Greater Glasgow, there are a limited number of designated sites, as displayed in the table below. The Loch Lomond NSA is partly located in the north of the region as well as the Loch Lomond and Trossachs National Park. Due to the urban nature of the city of Glasgow, air quality is a prevalent issue within the city, resulting in three designated AQMAs existing within the city boundary. There are populated areas within the region that are at high risk of fluvial flooding, particularly in the south around Hamilton and Dalmarnock, and around Inverkip in Inverclyde. The River Kelvin to the north also causes high fluvial flood risks. The city of Glasgow has a high concentration of designated cultural heritage assets. The village of New Lanark is a designated World Heritage Site for its village, industrial heritage and cotton mill.

GLASGOW CITY	
SEA TOPIC	ENVIRONMENTAL CONSIDERATIONS
Biodiversity	<p>The region contains a significant number of biodiversity designations, including:¹³⁴</p> <ul style="list-style-type: none"> • 12 SACs • Six SPAs • 101 SSSIs • Two Ramsar sites • Two NNRs • 31 LNRs • Five RSPB Reserves
Soils/ Contaminated land	<ul style="list-style-type: none"> • The national soil map does not have soil type classification for the city of Glasgow due to its urban setting. • South Lanarkshire contains a mix of soil types, including mineral gleys and peat lands. • The region has 2472ha of derelict land across 910 sites, accounting for 1% of the regional land area. • There is also a significant number of GCR sites
Landscape / Visual	<ul style="list-style-type: none"> • Loch Lomond and Trossachs National Park, which is partly located in the north-west of the region. • The Loch Lomond NSA is located within the regional boundary at the northern extent¹³⁵ • 22 Gardens and Designed Landscapes¹³⁶

¹³⁴ NatureScot (2021) SiteLink [Online] Available at: <https://sitelink.nature.scot/home> (accessed 02/07/2021).

¹³⁵ Scottish Government (2010) National Scenic Areas of Scotland [Online] Available at: <https://www.gov.scot/publications/national-scenic-areas-of-scotland-maps/> (accessed 15/07/2021).

¹³⁶ HES (2020) Historic Environment Portal. [Online] Available at: <http://portal.historicenvironment.scot/> (accessed 21/07/21).

GLASGOW CITY	
SEA TOPIC	ENVIRONMENTAL CONSIDERATIONS
Climatic Factors	<ul style="list-style-type: none"> • Road transport accounts for 33% of all CO₂ emissions in the region. • Using the UKCP09 High Emissions scenario at 95% confidence, sea-level rise by 2080 is projected to be 0.47m in the Firth of Clyde (base year 2008)¹³⁷ • Frequency and intensity of hot extremes projected to increase in all future climate scenarios.¹³⁸ • Wetter and warmer winters projected, with increased likelihood of pluvial flooding and extreme rainfall.¹³⁹ • Increased soil moisture fluctuations will lead to increased risk of landslips.¹⁴⁰ • Under a high emission scenario, peak river flows for some areas could increase by more than 50% by the 2080s.¹⁴¹ • Projected increases to extreme coastal water levels increases the risk of coastal flooding and erosion.¹⁴² • Additional changes in storm surges are possible but difficult to predict.¹⁴³
Air Quality	<ul style="list-style-type: none"> • Three AQMAs, located in Glasgow City Centre, Parkhead Cross and Byres Road¹⁴⁴

¹³⁷ SNH (2017) Impacts of sea-level rise and storm surges due to climate change in the Firth of Clyde. SNH Commissioned Report No. 891. [Online] Available at: <https://www.nature.scot/naturescot-commissioned-report-891-impacts-sea-level-rise-and-storm-surges-due-climate-change-firth> (accessed 16/08/2021).

¹³⁸ IPCC (2021) IPCC AR6 WGI Regional Fact Sheet Europe 2021 [Online] Available at: https://www.ipcc.ch/report/ar6/wg1/downloads/factsheets/IPCC_AR6_WGI_Regional_Fact_Sheet_Europe.pdf

¹³⁹ UKCP18 (2021) UK Climate Projections: Headline Findings July 2021 [Online] Available at: https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/research/ukcp/ukcp18_headline_findings_v3.pdf

¹⁴⁰ CCRA (2021) Third UK Climate Change Risk Assessment Technical Report: Summary for Scotland [Online] Available at: <https://www.ukclimaterisk.org/independent-assessment-ccra3/national-summaries/>

¹⁴¹ Adaptation Scotland (2021) Climate Projections for Scotland summary [Online] Available at: <https://www.adaptationscotland.org.uk/why-adapt/climate-trends-and-projections>

¹⁴² CCC (2021) The Adaptation Committee's Independent Assessment of UK Climate Risk [Online] Available at: <https://www.theccc.org.uk/publication/independent-assessment-of-uk-climate-risk/>

¹⁴³ UKCP18 (2018) UKCP18 Factsheet: Sea level rise and storm surge [Online] Available at: <https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/research/ukcp/ukcp18-fact-sheet-sea-level-rise-and-storm-surge.pdf>

¹⁴⁴ Air Quality in Scotland (2021) Air Quality Management Areas [Online] Available at: <http://www.scottishairquality.scot/laqm/aqma?id=9999> (accessed 16/07/2021).

GLASGOW CITY	
SEA TOPIC	ENVIRONMENTAL CONSIDERATIONS
Material Assets	<p>Key transport infrastructure within the study area includes:</p> <ul style="list-style-type: none"> • Seven motorways (M73, M74, M77, M8, M80, M898, M8 Monklands and 10 A roads on the trunk road network (A702, A725, A726, A737, A77, A78, A8, A82, A89 and A898)¹⁴⁵ • 21 rail lines¹⁴⁶ • 155 railway stations (including Glasgow Central station, Scotland's busiest station)¹⁴⁷ • Glasgow International Airport¹⁴⁸ • Four ports (Greenock, Gourock, Port Glasgow and King George V Dock)¹⁴⁹
Water / Flooding	<ul style="list-style-type: none"> • 21 surface water features within the region. • SEPA identifies flood areas and likelihood for river, coastal and surface flooding at medium and high extents. • Settlements at greatest risk of coastal flooding are located along the Firth of Clyde, River Leven and River Clyde. These include Greenock, Port Glasgow, Dumbarton and Clydebank. • Areas at medium and high risk of river flooding are predominantly located in the vicinity of River Endrick, River Kelvin, North Calder Water, River Clyde, White Cart Water, Black Cart Water and Gryfe Water. This region is highly populated and there are a number of settlements at risk, including Balfron, Kirkintilloch, Coatbridge, Hamilton, Paisley, Pollockshields, Kilmacolm, Clydebank and Dumbarton. • Areas at high and medium risk of surface water flooding are scattered throughout. These are typically associated with surface water features, such as lochs, and are located predominantly within less populated areas.

¹⁴⁵ Transport Scotland (2021) Scottish trunk road network map [Online] Available at: <https://www.transport.gov.scot/publication/scottish-trunk-road-network-map/> (accessed 16/07/2021).

¹⁴⁶ ScotRail (n.d.) Live Network Map [Online] Available at: https://www.scotrail.co.uk/sites/all/modules/interactive_map/assets/index.html (accessed 16/07/2021).

¹⁴⁷ ScotRail (n.d.) Stations and facilities [Online] Available at: <https://www.scotrail.co.uk/plan-your-journey/stations-and-facilities> (accessed 16/07/2021).

¹⁴⁸ Traffic Scotland (2021) Freight Information [Online] Available at: <https://trafficscotland.org/map/freight/index.aspx?type=204&latitude=57.1424253981371&longitude=-2.07668803884522&zoom=10> (accessed 30/06/2021)

¹⁴⁹ *ibid*



GLASGOW CITY	
SEA TOPIC	ENVIRONMENTAL CONSIDERATIONS
Cultural Heritage	<p>The region contains a significant number of historic assets, including¹⁵⁰:</p> <ul style="list-style-type: none"> • The Antonine Wall, a designated World Heritage Site, located in the northern extent of the region. • The village of New Lanark, a World Heritage Site, located to the south-east of the Glasgow. • 8,209 Category A-C Listed buildings • 371 Scheduled Monuments • Five designated Battlefield Sites • One historic MPA • 103 Conservation Areas^{151,152,153,154,155,156,157,158}
Population and Human Health	<ul style="list-style-type: none"> • Seven NCN Routes (NCN7, NCN74, NCN75, NCN753, NCN754, NCN755 and NCN756)¹⁵⁹ • Five of Scotland's Great Trails (Clyde Walkway, Forth Clyde Canal/Union Canal Towpath, John Muir Way, West Highland Way and Three Lochs Way)¹⁶⁰ • 36 Heritage Paths¹⁶¹ • An extensive network of Core Paths

8.2. Glasgow City Regional Assessment Summary

The package supports modal shift to more sustainable modes of transport. Rail interventions including Clyde Metro increase resilience to climate change effects and promoting a modal shift to more sustainable transport options. As a result, there is an expected reduction in air pollution and carbon emissions. The creation of mobility hubs/interchanges and improved passenger facilities would also support a modal shift. The

¹⁵⁰ HES (2020) Historic Environment Portal [Online] Available at: <http://portal.historicenvironment.scot/> (accessed 21/07/21).

¹⁵¹ Glasgow City Council (n.d.) Conservation Areas in Glasgow [Online] Available at: <https://glasgow.gov.uk/article/17163/Conservation-Areas-in-Glasgow> (accessed 22/07/2021).

¹⁵² East Dunbartonshire Council (n.d.) Listed Buildings and Conservation Areas [Online] Available at: <https://www.eastdunbarton.gov.uk/residents/planning/advice-services/listed-buildings-and-conservation-areas> (accessed 22/07/2021).

¹⁵³ West Dunbartonshire Council (n.d.) Conservation areas [Online] Available at: <https://www.west-dunbarton.gov.uk/planning-building-standards/conservation-areas/> (accessed 22/07/2021).

¹⁵⁴ East Renfrewshire Council (n.d.) Conservation areas [Online] Available at: <https://www.eastrenfrewshire.gov.uk/article/1768/Conservation-areas> (accessed 22/07/2021).

¹⁵⁵ Renfrewshire Council (n.d.) Listed Buildings and Conservation Areas [Online] Available at: <https://www.renfrewshire.gov.uk/article/2486/Listed-Buildings-and-Conservation-Areas> (accessed 22/07/2021).

¹⁵⁶ North Lanarkshire Council (n.d.) Conservation areas [Online] Available at: <https://www.northlanarkshire.gov.uk/planning-and-building/heritage/conservation-areas> (accessed 22/07/2021).

¹⁵⁷ South Lanarkshire Council (n.d.) Listed building planning constraints [Online] Available at: https://www.southlanarkshire.gov.uk/info/200145/planning_and_building_standards/1095/listed_building_planning_constraints/2 (accessed 22/07/2021).

¹⁵⁸ Inverclyde Council (n.d.) Conservation Areas [Online] Available at: <https://www.inverclyde.gov.uk/planning-and-the-environment/planning-policy/conservation/conservation-areas> (accessed 22/07/2021).

¹⁵⁹ Ordnance Survey (2021) National Cycle Network map [Online] Available at: <https://osmaps.ordnancesurvey.co.uk/ncn> (accessed 16/07/2021).

¹⁶⁰ Scotland's Great Trails (n.d.) Home [Online] Available at: <https://www.scotlandsgreattrails.com/> (accessed 16/07/2021).

¹⁶¹ ScotWays (n.d.) Heritage Paths [Online] Available at: <http://www.heritagepaths.co.uk/mapsearch.php#zoom=6&lat=56.7820&lon=-4.9000> (accessed 16/07/2021).



decarbonisation of bus and rail networks and freight deliveries will reduce greenhouse gas emissions and improvement in air quality.

Positive effects are anticipated on Population and Human Health due to an expected increase in sustainable access to essential services, increased travel choice and improved connectivity and planning for the future capacity of public transport. There is potential for negative environmental effects during construction and operation of the interventions particularly Clyde Metro and High Speed 2 on the Population and Human Health (noise and vibration, public realm, safety), the Water Environment, Biodiversity, Soil, Historic Environment and Landscape and Visual Amenity. In addition, significant quantities of materials and construction related trips would be required. Depending on the source and type of materials/natural resources used, there is the potential for negative effects on Material Assets.

Road interventions to anticipated to have positive effects on safety. Trunk road improvements which are focused on junction improvements, realignment / widening and overtaking opportunities are also not anticipated to have a notable impact on traffic volumes or mode share and subsequently transport-based emissions in the majority of locations. The construction and operation of these interventions may result in result in minor negative effects on population and human health with the potential for in an increase in noise and vibration during construction and operation. This is dependent on the location and design of individual schemes. There is also potential for a negative effect on material assets due to the use of natural resources.

Many of the interventions in this region, particularly the active travel ones, will have positive outcomes for the SEA Population and Human Health topic - for example through expected improvements in air quality and increased uptake of physical exercise through walking, wheeling and cycling.

9. Ayrshire and Arran

9.1. Ayrshire and Arran Baseline

The Ayrshire and Arran region includes the local authorities North, East and South Ayrshire, with the Isle of Arran falling within the North Ayrshire local authority. There are a number of towns spread throughout the area, with the main populations in Kilmarnock, Ayr and Irvine. The region has a low concentration of designated biodiversity sites. Soils in the area are dominated by mineral gleys, with peaty deposits sporadically found throughout the region. The North Arran NSA covers the northern half of the Isle of Arran. Due to the rural and coastal nature of the landscape, with a lack of densely populated urban areas, there are no designated AQMAs within the region. SEPA flood maps indicate a high risk of fluvial flooding around the populous areas of Irvine and Prestwick. The highest density of cultural heritage assets are around Kilwinning, Dalry, Prestwick and on Arran.

AYRSHIRE AND ARRAN	
SEA TOPIC	ENVIRONMENTAL CONSIDERATIONS
Biodiversity	<p>The region contains a significant number of biodiversity designations, including:¹⁶²</p> <ul style="list-style-type: none"> • Six SACs • Five SPAs • 81 SSSIs • Three LNRs • One MPA • Two Marine Consultation Areas • Five RSPB Reserves • One UNESCO Biosphere Reserve (Galloway and Southern Ayrshire)
Soils/ Contaminated land	<ul style="list-style-type: none"> • Soil types are predominantly mineral gleys in the northern/central area on the coast and various peaty soils in the southern half of the area. • The region has 2,851ha of derelict land across 249 sites, accounting for 1% of the regional land area. . • There is also a significant number of GCR sites
Landscape / Visual	<ul style="list-style-type: none"> • One Regional Park • One NSA (North Arran) situated on the Isle of Arran¹⁶³ • 20 Gardens and Designed Landscapes¹⁶⁴

¹⁶² NatureScot (2021) SiteLink [Online] Available at: <https://sitelink.nature.scot/home> (accessed 02/07/2021).

¹⁶³ Scottish Government (2010) National Scenic Areas of Scotland [Online] Available at: <https://www.gov.scot/publications/national-scenic-areas-of-scotland-maps/> (accessed 15/07/2021).

¹⁶⁴ HES (2020) Historic Environment Portal. [Online] Available at: <http://portal.historicenvironment.scot/> (accessed 21/07/21).

AYRSHIRE AND ARRAN	
SEA TOPIC	ENVIRONMENTAL CONSIDERATIONS
Climatic Factors	<ul style="list-style-type: none"> • Road transport accounts for approximately 40% of all CO₂ emissions in the region. • Frequency and intensity of hot extremes projected to increase in all future climate scenarios.¹⁶⁵ • Wetter and warmer winters projected, with increased likelihood of pluvial flooding and extreme rainfall.¹⁶⁶ • Increased soil moisture fluctuations will lead to increased risk of landslips.¹⁶⁷ • Under a high emission scenario, peak river flows for some areas could increase by more than 50% by the 2080s.¹⁶⁸ • Projected increases to extreme coastal water levels increases the risk of coastal flooding and erosion.¹⁶⁹ • Additional changes in storm surges are possible but difficult to predict.¹⁷⁰
Air Quality	<ul style="list-style-type: none"> • There are no AQMAs in the study area.
Material Assets	<p>Key transport infrastructure within the study area includes:</p> <ul style="list-style-type: none"> • One motorway (M77) and five A roads (A76, A77, A78, A738 and A737) on the trunk road network¹⁷¹ • Three rail lines¹⁷² • 27 railway stations¹⁷³ • Glasgow Prestwick Airport¹⁷⁴ • 11 ports¹⁷⁵

¹⁶⁵ IPCC (2021) IPCC AR6 WGI Regional Fact Sheet Europe 2021 [Online] Available at: https://www.ipcc.ch/report/ar6/wg1/downloads/factsheets/IPCC_AR6_WGI_Regional_Fact_Sheet_Europe.pdf

¹⁶⁶ UKCP18 (2021) UK Climate Projections: Headline Findings July 2021 [Online] Available at: https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/research/ukcp/ukcp18_headline_findings_v3.pdf

¹⁶⁷ CCRA (2021) Third UK Climate Change Risk Assessment Technical Report: Summary for Scotland [Online] Available at: <https://www.ukclimaterisk.org/independent-assessment-ccra3/national-summaries/>

¹⁶⁸ Adaptation Scotland (2021) Climate Projections for Scotland summary [Online] Available at: <https://www.adaptationscotland.org.uk/why-adapt/climate-trends-and-projections>

¹⁶⁹ CCC (2021) The Adaptation Committee's Independent Assessment of UK Climate Risk [Online] Available at: <https://www.theccc.org.uk/publication/independent-assessment-of-uk-climate-risk/>

¹⁷⁰ UKCP18 (2018) UKCP18 Factsheet: Sea level rise and storm surge [Online] Available at: <https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/research/ukcp/ukcp18-fact-sheet-sea-level-rise-and-storm-surge.pdf>

¹⁷¹ Transport Scotland (2021) Scottish trunk road network map [Online] Available at: <https://www.transport.gov.scot/publication/scottish-trunk-road-network-map/> (accessed 16/07/2021).

¹⁷² ScotRail (n.d.) Live Network Map [Online] Available at: https://www.scotrail.co.uk/sites/all/modules/interactive_map/assets/index.html (accessed 16/07/2021).

¹⁷³ ScotRail (n.d.) Stations and facilities [Online] Available at: <https://www.scotrail.co.uk/plan-your-journey/stations-and-facilities> (accessed 16/07/2021).

¹⁷⁴ Traffic Scotland (2021) Freight Information [Online] Available at: <https://trafficscotland.org/map/freight/index.aspx?type=204&latitude=57.1424253981371&longitude=-2.07668803884522&zoom=10> (accessed 30/06/2021).

¹⁷⁵ ibid



AYRSHIRE AND ARRAN	
SEA TOPIC	ENVIRONMENTAL CONSIDERATIONS
Water / Flooding	<ul style="list-style-type: none"> • 117 surface water features within the region. • SEPA identifies flood risk from river and coastal flooding at medium and high likelihood of flooding within the region. • Settlements at greatest risk of coastal flooding are located along the Firth of Clyde and include coastal communities along the eastern extents of Arran, including Brodick, and within Great Cumbrae, in addition to towns along the Ayrshire coast such as Prestwick, Ayr, Troon and Largs. • The highest risk of river flooding within the region is from rivers within the catchments of Noddsdale Water, River Garnock, River Irvine, River Ayr, Pow Burn, River Doon, Muck Water and Water of Girven. The main receptors at risk of river flooding in the region include the settlements of Dalry, Kilmarnock, Irvine, Kilwinning, Auchinleck, Ayr and Dalmellington, as well as Glasgow Prestwick International Airport.
Cultural Heritage	<p>The region contains a significant number of historic assets, including:¹⁷⁶</p> <ul style="list-style-type: none"> • 3,315 Category A-C Listed buildings • 206 Scheduled Monuments • One designated Battlefield Site • 62 Conservation areas^{177,178,179}
Population and Human Health	<ul style="list-style-type: none"> • Three NCN Routes (NCN7, NCN753 and NCN73, the latter of which is located on both the mainland and the Isle of Arran)¹⁸⁰ • Four of Scotland's Great Trails (Arran Coastal Way, Ayrshire Coastal Path, River Ayr Way and Mull of Galloway Trail)¹⁸¹ • Seven Heritage Paths¹⁸² • An extensive network of Core Paths

¹⁷⁶ HES (2020) Historic Environment Portal. [Online] Available at: <http://portal.historicenvironment.scot/> (accessed 21/07/21).

¹⁷⁷ East Ayrshire Council (n.d.) Conservation in East Ayrshire [Online] Available at: <https://www.east-ayrshire.gov.uk/PlanningAndTheEnvironment/Conservation/Conservation.aspx> (accessed 22/07/2021).

¹⁷⁸ North Ayrshire (n.d.) Conservation areas and conservation area consent [Online] Available at: <https://www.north-ayrshire.gov.uk/planning-and-building-standards/conservation-historic-environment/conservation-areas-and-consent.aspx> (accessed 22/07/2021).

¹⁷⁹ South Ayrshire Council (n.d.) Conservation Areas [Online] Available at: <https://www.south-ayrshire.gov.uk/planning/conservation-areas.aspx> (accessed 22/07/2021).

¹⁸⁰ Ordnance Survey (2021) National Cycle Network map [Online] Available at: <https://osmaps.ordnancesurvey.co.uk/ncn> (accessed 16/07/2021).

¹⁸¹ Scotland's Great Trails (n.d.) Home [Online] Available at: <https://www.scotlandsgreattrails.com/> (accessed 16/07/2021).

¹⁸² ScotWays (n.d.) Heritage Paths [Online] Available at: <http://www.heritagepaths.co.uk/mapsearch.php#zoom=6&lat=56.7820&lon=-4.9000> (accessed 16/07/2021).



9.2. Ayrshire and Arran Regional Assessment Summary

The package supports modal shift to more sustainable modes of transport. Improved access to airports and ports and the creation of mobility hubs/interchanges and the improvements to passengers' services and facilities seeks to encourage modal shift, and, as a result, reduce levels of transport related air pollution and carbon emissions. The decarbonisation of the ferry, rail and bus network and freight deliveries will also support a reduction in greenhouse gas emissions and improvement in air quality.

The package provides an opportunity to adapt the transport network to the predicted effects of climate change, with one recommendation focused on this adaptation and promotes a more sustainable usage of the existing transport network

Positive effects are anticipated on Population and Human Health due to an expected increase in sustainable access to essential services, increased travel choice and improved connectivity and planning for the future capacity of public transport. Active travel interventions will have positive outcomes for the SEA Population and Human Health topic - for example through expected improvements in air quality and increased uptake of physical exercise through walking, wheeling and cycling.

Road interventions are anticipated to have positive effects on safety. Trunk road improvements which are focused on junction improvements, realignment / widening and overtaking opportunities are also not anticipated to have a notable impact on traffic volumes or mode share and subsequently transport-based emissions in the majority of locations. The construction and operation of these interventions may result in minor negative effects on population and human health with the potential for an increase in noise and vibration during construction and operation. This is dependent on the location and design of individual schemes. There is also potential for a negative effect on material assets due to the use of natural resources.

The freight interventions are anticipated to result in minor negative effects on material assets as several interventions proposed involve enhancements to rail freight, terminals and facilities and therefore will require the use of natural resources.

Where other new infrastructure is required, including, harbour upgrade requirements and road and rail interventions this could result in negative effects on biodiversity, soil, landscape, water, historic environment and material assets however the magnitude of effect is uncertain at this stage and will be determined by the design (and physical footprint) of the interventions.



10. Scottish Borders

10.1. Scottish Borders Baseline

The Scottish Borders region includes the local authorities the Scottish Borders and the eastern extents of Dumfries and Galloway. The landscape is dominated by rural farmland with towns and villages spread throughout the region. There are few designated biodiversity sites present in the region. The soil type is a mixture of brown soils and mineral gleys, with some areas of peat. A significant amount of the land is used for arable farming and livestock grazing. The two NSAs of Eildon & Leaderfoot and Upper Tweeddale are situated in the area surrounding Galashiels. Due to the rural nature of the region, air quality is not considered a prevalent issue.

SEPA flood maps indicate populated areas within the region that are at high risk of fluvial flooding. High risk areas along the River Tweed include Coldstream, Kelso, Peebles, Melrose and Innerleithen. Designated cultural heritage assets can be found throughout the region, with concentrations in the vicinity of Jedburgh, Galashiels, Eyemouth and Kelso.

SCOTTISH BORDERS	
SEA TOPIC	ENVIRONMENTAL CONSIDERATIONS
Biodiversity	<p>The region contains a significant number of biodiversity designations, including:¹⁸³</p> <ul style="list-style-type: none"> • 10 SACs • Six SPAs • 100 SSSIs • Three Ramsar Sites • Two NNR • One Marine Consultation Area
Soils/ Contaminated land	<ul style="list-style-type: none"> • Brown soils and mineral gleys are the main soil types, with areas of peat deposits spread around the region. • The region has 52ha of derelict land across 59 sites, accounting for <1% of the regional land area. • There is also a significant number of GCR sites
Landscape / Visual	<ul style="list-style-type: none"> • There are two NSAs in the region: Eildon & Leaderfoot to the east of Selkirk, and Upper Tweeddale to the west of Peebles¹⁸⁴ • 33 Gardens and Designed Landscapes¹⁸⁵

¹⁸³ NatureScot (2021) SiteLink [Online] Available at: <https://sitelink.nature.scot/home> (accessed 02/07/2021).

¹⁸⁴ Scottish Government (2010) National Scenic Areas of Scotland [Online] Available at: <https://www.gov.scot/publications/national-scenic-areas-of-scotland-maps/> (accessed 15/07/2021).

¹⁸⁵ HES (2020) Historic Environment Portal. [Online] Available at: <http://portal.historicenvironment.scot/> (accessed 21/07/21).

SCOTTISH BORDERS	
SEA TOPIC	ENVIRONMENTAL CONSIDERATIONS
Climatic Factors	<ul style="list-style-type: none"> • Road transport accounts for 54% of all CO₂ emissions in the region. • Frequency and intensity of hot extremes projected to increase in all future climate scenarios.¹⁸⁶ • Wetter and warmer winters projected, with increased likelihood of pluvial flooding and extreme rainfall.¹⁸⁷ • Increased soil moisture fluctuations will lead to increased risk of landslips.¹⁸⁸ • Under a high emission scenario, peak river flows for some areas could increase by more than 50% by the 2080's.¹⁸⁹ • Projected increases to extreme coastal water levels increases the risk of coastal flooding and erosion.¹⁹⁰ • Additional changes in storm surges are possible but difficult to predict.¹⁹¹
Air Quality	<ul style="list-style-type: none"> • There are no AQMAs in the study area.
Material Assets	<p>Key transport infrastructure within the study area includes:</p> <ul style="list-style-type: none"> • Five A roads (A1, A7, A68, A702 and A6091) on the trunk road network¹⁹² • One rail line (Edinburgh to Tweedbank)¹⁹³ • Three railway stations¹⁹⁴ • One port (Eyemouth Harbour)¹⁹⁵
Water / Flooding	<ul style="list-style-type: none"> • 189 surface water features within the region. • SEPA indicate a high risk of fluvial flooding from the River Tweed, particularly in the town of Melrose.

¹⁸⁶ IPCC (2021) IPCC AR6 WGI Regional Fact Sheet Europe 2021 [Online] Available at:

https://www.ipcc.ch/report/ar6/wg1/downloads/factsheets/IPCC_AR6_WGI_Regional_Fact_Sheet_Europe.pdf

¹⁸⁷ UKCP18 (2021) UK Climate Projections: Headline Findings July 2021 [Online] Available at:

https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/research/ukcp/ukcp18_headline_findings_v3.pdf

¹⁸⁸ CCRA (2021) Third UK Climate Change Risk Assessment Technical Report: Summary for Scotland [Online] Available at:

<https://www.ukclimaterisk.org/independent-assessment-ccra3/national-summaries/>

¹⁸⁹ Adaptation Scotland (2021) Climate Projections for Scotland summary [Online] Available at:

<https://www.adaptationscotland.org.uk/why-adapt/climate-trends-and-projections>

¹⁹⁰ CCC (2021) The Adaptation Committee's Independent Assessment of UK Climate Risk [Online] Available at:

<https://www.theccc.org.uk/publication/independent-assessment-of-uk-climate-risk/>

¹⁹¹ UKCP18 (2018) UKCP18 Factsheet: Sea level rise and storm surge [Online] Available at:

https://www.metoffice.gov.uk/binaries/content/as_sets/metofficegovuk/pdf/research/ukcp/ukcp18-fact-sheet-sea-level-rise-and-storm-surge.pdf

¹⁹² Transport Scotland (2021) Scottish trunk road network map [Online] Available at: <https://www.transport.gov.scot/publication/scottish-trunk-road-network-map/> (accessed 16/07/2021).

¹⁹³ ScotRail (n.d.) Live Network Map [Online] Available at: https://www.scotrail.co.uk/sites/all/modules/interactive_map/assets/index.html (accessed 16/07/2021).

¹⁹⁴ ScotRail (n.d.) Stations and facilities [Online] Available at: <https://www.scotrail.co.uk/plan-your-journey/stations-and-facilities> (accessed 16/07/2021).

¹⁹⁵ Traffic Scotland (2021) Freight Information [Online] Available at:

<https://trafficscotland.org/map/freight/index.aspx?type=204&latitude=57.1424253981371&longitude=-2.07668803884522&zoom=10> (accessed 30/06/2021).

SCOTTISH BORDERS	
SEA TOPIC	ENVIRONMENTAL CONSIDERATIONS
Cultural Heritage	<p>The region contains a significant number of historic assets, including:¹⁹⁶</p> <ul style="list-style-type: none"> • 4,151 Category A-C Listed buildings • 828 Scheduled Monuments • Three designated battlefield sites • 45 Conservation areas¹⁹⁷
Population and Human Health	<ul style="list-style-type: none"> • Two NCN Routes (NCN1 and NCN10)¹⁹⁸ • Seven of Scotland's Great Trails (Berwickshire Coastal Path, Southern Upland Way, Borders Abbeys Way, Roman and Reivers Way, Annandale Way, Cross Borders Drove Road and St Cuthbert's Way)¹⁹⁹ • 43 Heritage Paths²⁰⁰ • An extensive network of Core Paths

10.2. Scottish Borders Regional Assessment Summary

The package supports modal shift to more sustainable modes of transport. Enhanced rail network and the creation of mobility hubs/interchanges and the improvements to passengers' services and facilities seeks to encourage modal shift, and, as a result, reduce levels of transport related air pollution and carbon emissions. The decarbonisation of the rail and bus network and freight deliveries will also support a reduction in greenhouse gas emissions and improvement in air quality.

The package provides an opportunity to adapt the transport network to the predicted effects of climate change, with one recommendation focused on this adaptation and promotes a more sustainable usage of the existing transport network

Positive effects are anticipated on Population and Human Health due to an expected increase in sustainable access to essential services, increased travel choice and improved connectivity and planning for the future capacity of public transport. Active travel interventions will have positive outcomes for Population and Human Health - for example through expected improvements in air quality and increased uptake of physical exercise through walking, wheeling and cycling.

Road interventions are anticipated to have positive effects on safety. Trunk road improvements which are focused on junction improvements, realignment / widening and overtaking opportunities are also not anticipated to have a notable impact on traffic volumes or mode share and subsequently transport-based emissions in the majority of

¹⁹⁶ HES (2020) Historic Environment Portal [Online] Available at: <http://portal.historicenvironment.scot/> (accessed 21/07/21).

¹⁹⁷ Scottish Borders Council (n.d.) Conservation areas [Online] Available at: https://www.scotborders.gov.uk/directory/69/conservation_areas (accessed 22/07/2021).

¹⁹⁸ Ordnance Survey (2021) National Cycle Network map [Online] Available at: <https://osmaps.ordnancesurvey.co.uk/ncn> (accessed 16/07/2021).

¹⁹⁹ Scotland's Great Trails (n.d.) Home [Online] Available at: <https://www.scotlandsgreattrails.com/> (accessed 16/07/2021).

²⁰⁰ ScotWays (n.d.) Heritage Paths [Online] Available at: <http://www.heritagepaths.co.uk/mapsearch.php#zoom=6&lat=56.7820&lon=-4.9000> (accessed 16/07/2021).



locations. The construction and operation of these interventions may result in minor negative effects on population and human health with the potential for an increase in noise and vibration during construction and operation. This is dependent on the location and design of individual schemes. There is also potential for a negative effect on material assets due to the use of natural resources.

There is potential for negative environmental effects during construction and operation of the rail network enhancement including Borders Railway Extension and High Speed 2 interventions on the Population and Human Health (noise and vibration, public realm, safety), the Water Environment, Biodiversity, Soil, Historic Environment and Landscape and Visual Amenity. In addition, significant quantities of materials and construction related trips would be required. Depending on the source and type of materials/natural resources used, there is the potential for negative effects on Material Assets

The Freight interventions are anticipated to result in minor negative effects on material assets as several interventions proposed involve enhancements to rail freight, terminals and facilities and therefore will require the use of natural resources.

Where any new infrastructure is required this could result in negative effects on biodiversity, soil, landscape, water, historic environment and material assets however the magnitude of effect is uncertain at this stage and will be determined by the design (and physical footprint) of the interventions.



11. Edinburgh and South East Scotland Region

11.1. Edinburgh and South East Scotland Baseline

The Edinburgh and South East Scotland region includes the local authorities of the City of Edinburgh Council, East Lothian Council, Midlothian Council, Scottish Borders Council, West Lothian Council and the southern section of Fife council. Compared to other STPR2 regions, there are not many designated biodiversity sites. The soil type in the Lothians area surrounding the city is mainly comprised of mineral gleys and brown soils. The city of Edinburgh is identified as having air quality issues, and there are six AQMAs within the city boundaries. Road transport is responsible for 31% of total CO₂ emissions on average across Edinburgh and the Lothians.

SEPA flood maps indicate areas along the Water of Leith as being at medium risk of fluvial flooding in urban areas, particularly in Roseburn around Murrayfield and in the east around Prestonfield. The Musselburgh area also has areas identified as being at high risk from fluvial flooding. Edinburgh has a rich cultural heritage, with a significant number of listed assets. Edinburgh city centre itself is a designated World Heritage Site, as is the Forth Bridge between North and South Queensferry. The city centre of Edinburgh and the Old Town have a high concentration of listed buildings.

EDINBURGH AND SOUTH EAST SCOTLAND	
SEA TOPIC	ENVIRONMENTAL CONSIDERATIONS
Biodiversity	<p>The region contains a significant number of biodiversity designations, including:²⁰¹</p> <ul style="list-style-type: none"> • 12 SACs • 10 SPAs • 164 SSSIs • Six Ramsar Site • Three NNR • 19 LNRs • Three RSPB Reserves • One MPA • One Marine Consultation Area
Soils/ Contaminated land	<ul style="list-style-type: none"> • The soils within the region are mostly mineral gleys and brown soils. • The region has 1195ha of derelict land across across 312 sites, accounting for >1% of the regional land area. argyll. • There is also a significant number of GCR sites
Landscape / Visual	<ul style="list-style-type: none"> • Two Regional Parks • 2 NSAs²⁰²

²⁰¹ NatureScot (2021) SiteLink [Online] Available at: <https://sitelink.nature.scot/home> (accessed 02/07/2021).

²⁰² Scottish Government (2010) National Scenic Areas of Scotland [Online] Available at: <https://www.gov.scot/publications/national-scenic-areas-of-scotland-maps/> (accessed 15/07/2021).

EDINBURGH AND SOUTH EAST SCOTLAND	
SEA TOPIC	ENVIRONMENTAL CONSIDERATIONS
	<ul style="list-style-type: none"> 100 Gardens and Designed Landscapes²⁰³
Climatic Factors	<ul style="list-style-type: none"> Road transport accounts for 31% of all CO₂ emissions in the region. Edinburgh will very likely see a sea level rise of nearly 1 metre between 2019 and 2100. In Leith, a 0.3 metre increase in mean sea level would change the 1% annual flood probability to 16%. With this probability, residents and businesses would be likely to be flooded once in any six year period.²⁰⁴ Frequency and intensity of hot extremes projected to increase in all future climate scenarios.²⁰⁵ Wetter and warmer winters projected, with increased likelihood of pluvial flooding and extreme rainfall.²⁰⁶ Increased soil moisture fluctuations will lead to increased risk of landslips.²⁰⁷ Under a high emission scenario, peak river flows for some areas could increase by more than 50% by the 2080's.²⁰⁸ Projected increases to extreme coastal water levels increases the risk of coastal flooding and erosion.²⁰⁹ Additional changes in storm surges are possible but difficult to predict.²¹⁰
Air Quality	<ul style="list-style-type: none"> 11 AQMAs (located in Edinburgh city centre, Inverleith Row, St. Johns Road, Great Junction Street, Salamander Street, Glasgow Road, High Street Musselburgh, Appin Crescent Dunfermline, Broxburn, Linlithgow, Newtown)²¹¹

²⁰³ HES (2020) Historic Environment Portal [Online] Available at: <http://portal.historicenvironment.scot/> (accessed 21/07/21).

²⁰⁴ NatureScot (2019) Guidance: Planning ahead for coastal change [Online] Available at <https://www.nature.scot/guidance-planning-ahead-coastal-change> (accessed 16/08/2021).

²⁰⁵ IPCC (2021) IPCC AR6 WGI Regional Fact Sheet Europe 2021 [Online] Available at: https://www.ipcc.ch/report/ar6/wg1/downloads/factsheets/IPCC_AR6_WGI_Regional_Fact_Sheet_Europe.pdf

²⁰⁶ UKCP18 (2021) UK Climate Projections: Headline Findings July 2021 [Online] Available at: https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/research/ukcp/ukcp18_headline_findings_v3.pdf

²⁰⁷ CCRA (2021) Third UK Climate Change Risk Assessment Technical Report: Summary for Scotland [Online] Available at: <https://www.ukclimaterisk.org/independent-assessment-ccra3/national-summaries/>

²⁰⁸ Adaptation Scotland (2021) Climate Projections for Scotland summary [Online] Available at: <https://www.adaptationscotland.org.uk/why-adapt/climate-trends-and-projections>

²⁰⁹ CCC (2021) The Adaptation Committee's Independent Assessment of UK Climate Risk [Online] Available at: <https://www.theccc.org.uk/publication/independent-assessment-of-uk-climate-risk/>

²¹⁰ UKCP18 (2018) UKCP18 Factsheet: Sea level rise and storm surge [Online] Available at: <https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/research/ukcp/ukcp18-fact-sheet-sea-level-rise-and-storm-surge.pdf>

²¹¹ Air Quality in Scotland (2021) Air Quality Management Areas [Online] Available at: <http://www.scottishairquality.scot/laqm/aqma?id=9999> (accessed 16/07/2021).



EDINBURGH AND SOUTH EAST SCOTLAND	
SEA TOPIC	ENVIRONMENTAL CONSIDERATIONS
Material Assets	<p>Key transport infrastructure within the study area includes:</p> <ul style="list-style-type: none"> • Three motorways (M8, M9 and M90) and seven A roads (A1, A7, A68, A701, A702, A985 and A720) on the trunk road network²¹² • 12 rail lines²¹³ • 53 railway stations²¹⁴ • Edinburgh Airport²¹⁵ • 10 ports²¹⁶
Water / Flooding	<ul style="list-style-type: none"> • 21 surface water features within the region. • SEPA identifies flood risk from surface water, river and coastal flooding at medium and high likelihood of flooding. • Settlements at greatest risk of coastal flooding are located along the Firth of Forth and include Cramond, Queensferry, Dunbar and Inverkeithing. • Areas at medium and high risk of river flooding are predominantly located in the catchments of River Ore, River Leven, River Almond, Water of Leith and River Esk. Settlements at risk include Cowdenbeath, Musselburgh, areas of Edinburgh and Edinburgh Airport. • Areas at high and medium risk of surface water flooding are scattered throughout. This is typically associated with surface water features, such as lochs, which are largely located within less populated areas. • SEPA identify areas along the banks of the water of Leith in Corstorphine, Roseburn at high risk of fluvial flooding. Areas around Ingliston, Musselburgh and Craigmillar are identified to be at high risk of surface water flooding.

²¹² Transport Scotland (2021) Scottish trunk road network map [Online] Available at: <https://www.transport.gov.scot/publication/scottish-trunk-road-network-map/> (accessed 16/07/2021).

²¹³ ScotRail (n.d.) Live Network Map [Online] Available at: https://www.scotrail.co.uk/sites/all/modules/interactive_map/assets/index.html (accessed 16/07/2021).

²¹⁴ ScotRail (n.d.) Stations and facilities [Online] Available at: <https://www.scotrail.co.uk/plan-your-journey/stations-and-facilities> (accessed 16/07/2021).

²¹⁵ Traffic Scotland (2021) Freight Information [Online] Available at: <https://trafficscotland.org/map/freight/index.aspx?type=204&latitude=57.1424253981371&longitude=-2.07668803884522&zoom=10> (accessed 30/06/2021).

²¹⁶ MarineScotland (n.d.) Maps NMPI: Part of Scotland's Environment [online] Available at: <https://marinescotland.atkinsgeospatial.com/nmpi/default.aspx?layers=23>

EDINBURGH AND SOUTH EAST SCOTLAND	
SEA TOPIC	ENVIRONMENTAL CONSIDERATIONS
Cultural Heritage	<p>The region contains a significant number of historic assets including:²¹⁷</p> <ul style="list-style-type: none"> • The Old and New Towns of Edinburgh World Heritage Site • The Forth Bridge World Heritage Site. • 20,682 Category A-C Listed buildings • 1,280 Scheduled Monuments • 11 designated Battlefield Sites²¹⁸ • 176 Conservation Areas^{219,220,221,222,223} • One Historic MPA
Population and Human Health	<ul style="list-style-type: none"> • Eight NCN Routes (NCN1, NCN10, NCN75, NCN76, NCN196, NCN754, NCN764 and NCN 766)²²⁴ • Three of Scotland's Great Trails (Forth Clyde Canal/Union Canal Towpath, John Muir Way and Cross Borders Drove Road)²²⁵ • 15 Heritage Paths²²⁶ • An extensive network of Core Paths consisting of 3,400km of routes

11.2. Edinburgh and South East Scotland Regional Assessment Summary

The package supports modal shift to more sustainable modes of transport. An enhanced rail network, improved access to airports and ports and the creation of mobility hubs/interchanges and ESES Mass Transit seeks to encourage modal shift, and, as a result, reduce levels of transport related air pollution and carbon emissions. The decarbonisation of the rail and bus network and freight deliveries will also support a reduction in greenhouse gas emissions and improvement in air quality.

The package provides an opportunity to adapt the transport network to the predicted effects of climate change, with one recommendation focused on this adaptation and promotes a more sustainable usage of the existing transport network.

²¹⁷ HES (2020) Historic Environment Portal [Online] Available at: <http://portal.historicenvironment.scot/> (accessed 21/07/21).

²¹⁸ Pastmap (n.d.) Exploring Scotland's Historic Scotland [Online] Available at: arcgisweb.uk/LocalViewEXT/Sites/BuiltHeritagePublic/

²¹⁹ Edinburgh City Council (n.d.) Conservation areas [Online] Available at: <https://www.edinburgh.gov.uk/conservation-2/conservation-areas> (accessed 22/07/2021).

²²⁰ East Lothian Council (n.d.) Conservation Areas [Online] Available at: https://www.eastlothian.gov.uk/info/210547/planning_and_building_standards/12248/historic_environment_and_planning (accessed 22/07/2021).

²²¹ Midlothian Council (n.d.) Conservation Areas in Midlothian [Online] Available at: https://www.midlothian.gov.uk/info/1220/conservation/289/conservation_areas_in_midlothian (accessed 22/07/2021).

²²² West Lothian Council (n.d.) Conservation areas [Online] Available at: <https://www.westlothian.gov.uk/conservation-areas> (accessed 22/07/2021).

²²³ Fife Council (n.d.) Conservation areas [Online] Available at: <https://www.fife.gov.uk/kb/docs/articles/planning-and-building2/built-and-natural-heritage/conservation-areas> (accessed 21/07/2021).

²²⁴ Ordnance Survey (2021) National Cycle Network map [Online] Available at: <https://osmaps.ordnancesurvey.co.uk/ncn> (accessed 16/07/2021).

²²⁵ Scotland's Great Trails (n.d.) Home [Online] Available at: <https://www.scotlandsgreattrails.com/> (accessed 16/07/2021).

²²⁶ ScotWays (n.d.) Heritage Paths [Online] Available at: <http://www.heritagepaths.co.uk/mapsearch.php#zoom=6&lat=56.7820&lon=-4.9000> (accessed 16/07/2021).



Positive effects are anticipated on Population and Human Health due to an expected increase in sustainable access to essential services, increased travel choice and improved connectivity and planning for the future capacity of public transport. Active travel interventions will have positive outcomes for the SEA Population and Human Health topic - for example through expected improvements in air quality and increased uptake of physical exercise through walking, wheeling and cycling.

Road interventions are anticipated to have positive effects on safety. Trunk road improvements which are focused on junction improvements, realignment / widening and overtaking opportunities are also not anticipated to have a notable impact on traffic volumes or mode share and subsequently transport-based emissions in the majority of locations. The construction and operation of these interventions may result in minor negative effects on population and human health with the potential for an increase in noise and vibration during construction and operation. This is dependent on the location and design of individual schemes. There is also potential for a negative effect on material assets due to the use of natural resources.

There is potential for negative environmental effects during construction and operation of the ESES Mass Transit, rail network enhancements and High Speed 2 interventions on the Population and Human Health (noise and vibration, public realm, safety), the Water Environment, Biodiversity, Soil, Historic Environment and Landscape and Visual Amenity. In addition, significant quantities of materials and construction related trips would be required. Depending on the source and type of materials/natural resources used, there is the potential for negative effects on Material Assets.

The Freight interventions are anticipated to result in minor negative effects on material assets as several interventions proposed involve enhancements to rail freight, terminals and facilities and therefore will require the use of natural resources.

Where any new infrastructure is required this could result in negative effects on biodiversity, soil, landscape, water, historic environment and material assets however the magnitude of effect is uncertain at this stage and will be determined by the design (and physical footprint) of the interventions.



12. South-West Scotland

12.1. South-West Scotland Baseline

The South-West Scotland region includes the local authorities of Dumfries and Galloway which has several small towns and villages located throughout its rural geography. Designated biodiversity sites are located throughout the region, particularly in the coastal areas. The Galloway Forest area within the region covers an area of 775 km², making it the largest forest in the UK and the only designated 'Dark Sky Park' as a result of its lack of light pollution. As with most regions in the country, peaty deposits can be found throughout the region. The region has three NSAs concentrated to the south of the Galloway Forest Park and Dumfries.

Due to the rural geography of the region, air quality is not identified as a prominent issue and there are no AQMAs. The SEPA flood map indicates a high risk of fluvial flooding to a significant part of the populous area around Dumfries from the River Nith as well as to the west of Lockerbie from the River Annan. Designated assets of cultural heritage interest are located throughout the region, with the highest densities around Dumfries, Lockerbie, Gretna and Thornhill.

SOUTH-WEST SCOTLAND	
SEA TOPIC	ENVIRONMENTAL CONSIDERATIONS
Biodiversity	<p>The region contains a significant number of biodiversity designations, including:²²⁷</p> <ul style="list-style-type: none"> • 18 SACs • Seven SPAs • 127 SSSIs • Five Ramsar Sites • One MPA • Two NNRs • Two LNRs • One Marine Consultation Area • Six RPSB Reserves
Soils/ Contaminated land	<ul style="list-style-type: none"> • The soils within the region are predominantly brown soils and mineral gleys, with peat deposits also prevalent throughout. • The region has 1223ha of derelict land across 111 sites, accounting for >1% of the regional land area. • There is also a significant number of GCR sites
Landscape / Visual	<ul style="list-style-type: none"> • There are three NSAs in the area: Nith Estuary, Fleet Valley and East Stewartry Coast.²²⁸ • 25 Gardens and Designed Landscapes²²⁹

²²⁷ NatureScot (2021) SiteLink [Online] Available at: <https://sitelink.nature.scot/home> (accessed 02/07/2021).

²²⁸ Scottish Government (2010) National Scenic Areas of Scotland [Online] Available at: <https://www.gov.scot/publications/national-scenic-areas-of-scotland-maps/> (accessed 15/07/2021).

²²⁹ HES (2020) Historic Environment Portal [Online] Available at: <http://portal.historicenvironment.scot/> (accessed 21/07/21).

SOUTH-WEST SCOTLAND	
SEA TOPIC	ENVIRONMENTAL CONSIDERATIONS
Climatic Factors	<ul style="list-style-type: none"> • Road transport accounts for 44% of all CO₂ emissions in the region. • Frequency and intensity of hot extremes projected to increase in all future climate scenarios.²³⁰ • Wetter and warmer winters projected, with increased likelihood of pluvial flooding and extreme rainfall.²³¹ • Increased soil moisture fluctuations will lead to increased risk of landslips.²³² • Under a high emission scenario, peak river flows for some areas could increase by more than 50% by the 2080's.²³³ • Projected increases to extreme coastal water levels increases the risk of coastal flooding and erosion.²³⁴ • Additional changes in storm surges are possible but difficult to predict.²³⁵
Air Quality	<ul style="list-style-type: none"> • There are no AQMAs in the study area.
Material Assets	<p>Key transport infrastructure within the study area includes:</p> <ul style="list-style-type: none"> • One motorway (A74(M)) and six A roads (A7, A75, A76, A77, A701 and A751) on the trunk road network²³⁶ • Two rail lines²³⁷ • 11 railway stations²³⁸ • Seven ports²³⁹
Water / Flooding	<ul style="list-style-type: none"> • 242 surface water features within the region. • SEPA identify areas to the west of Lockerbie, north and south of Dumfries and west of Castle Douglas as being at high risk of fluvial flooding.

²³⁰ IPCC (2021) IPCC AR6 WGI Regional Fact Sheet Europe 2021 [Online] Available at: https://www.ipcc.ch/report/ar6/wg1/downloads/factsheets/IPCC_AR6_WGI_Regional_Fact_Sheet_Europe.pdf

²³¹ UKCP18 (2021) UK Climate Projections: Headline Findings July 2021 [Online] Available at: https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/research/ukcp/ukcp18_headline_findings_v3.pdf

²³² CCRA (2021) Third UK Climate Change Risk Assessment Technical Report: Summary for Scotland [Online] Available at: <https://www.ukclimaterisk.org/independent-assessment-ccra3/national-summaries/>

²³³ Adaptation Scotland (2021) Climate Projections for Scotland summary [Online] Available at: <https://www.adaptationscotland.org.uk/why-adapt/climate-trends-and-projections>

²³⁴ CCC (2021) The Adaptation Committee's Independent Assessment of UK Climate Risk [Online] Available at: <https://www.theccc.org.uk/publication/independent-assessment-of-uk-climate-risk/>

²³⁵ UKCP18 (2018) UKCP18 Factsheet: Sea level rise and storm surge [Online] Available at: <https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/research/ukcp/ukcp18-fact-sheet-sea-level-rise-and-storm-surge.pdf>

²³⁶ Transport Scotland (2021) Scottish trunk road network map [Online] Available at: <https://www.transport.gov.scot/publication/scottish-trunk-road-network-map/> (accessed 16/07/2021).

²³⁷ ScotRail (n.d.) Live Network Map [Online] Available at: https://www.scotrail.co.uk/sites/all/modules/interactive_map/assets/index.html (accessed 16/07/2021).

²³⁸ ScotRail (n.d.) Stations and facilities [Online] Available at: <https://www.scotrail.co.uk/plan-your-journey/stations-and-facilities> (accessed 16/07/2021).

²³⁹ Traffic Scotland (2021) Freight Information [Online] Available at: <https://trafficscotland.org/map/freight/index.aspx?type=204&latitude=57.1424253981371&longitude=-2.07668803884522&zoom=10> (accessed 30/06/2021).

SOUTH-WEST SCOTLAND	
SEA TOPIC	ENVIRONMENTAL CONSIDERATIONS
Cultural Heritage	<p>The region contains a significant number of historic assets including:²⁴⁰</p> <ul style="list-style-type: none"> • 4,615 Category A-C Listed buildings • 998 Scheduled Monuments • One designated battlefield site (Battle of Sark) • 48 Conservation Areas²⁴¹
Population and Human Health	<ul style="list-style-type: none"> • Three NCN Routes (NCN7, NCN73 and NCN74)²⁴² • Four of Scotland's Great Trails (Mull of Galloway Trail, Southern Upland Way, Annadale Way and Romans and Reivers Route)²⁴³ • 23 Heritage Paths²⁴⁴ • An extensive network of Core Paths

12.2. South West Scotland Regional Assessment Summary

The package supports modal shift to more sustainable modes of transport. Enhanced rail network, and the creation of mobility hubs/interchanges and the improvements to passengers' services and facilities seeks to encourage modal shift, and, as a result, reduce levels of transport related air pollution and carbon emissions. The decarbonisation of the rail and bus network and freight deliveries will also support a reduction in greenhouse gas emissions and improvement in air quality.

The package provides an opportunity to adapt the transport network to the predicted effects of climate change, with one recommendation focused on this adaptation and promotes a more sustainable usage of the existing transport network

Positive effects are anticipated on Population and Human Health due to an expected increase in sustainable access to essential services, increased travel choice and improved connectivity and planning for the future capacity of public transport. Active travel interventions will have positive outcomes for the SEA Population and Human Health topic - for example through expected improvements in air quality and increased uptake of physical exercise through walking, wheeling and cycling.

Road interventions are anticipated to have positive effects on safety. Trunk road improvements which are focused on junction improvements, realignment / widening and overtaking opportunities are also not anticipated to have a notable impact on traffic volumes or mode share and subsequently transport-based emissions in the majority of locations. The construction and operation of these interventions may result in result in minor negative effects on population and human health with the potential for in an increase

²⁴⁰ HES (2020) Historic Environment Portal [Online] Available at: <http://portal.historicenvironment.scot/> (accessed 21/07/21).

²⁴¹ Dumfries and Galloway Council (n.d.) Conservation areas [Online] Available at: <https://www.dumgal.gov.uk/article/15335/Conservation-areas> (accessed 22/07/2021).

²⁴² Ordnance Survey (2021) National Cycle Network map [Online] Available at: <https://osmaps.ordnancesurvey.co.uk/ncn> (accessed 16/07/2021).

²⁴³ Scotland's Great Trails (n.d.) Home [Online] Available at: <https://www.scotlandsgreattrails.com/> (accessed 16/07/2021).

²⁴⁴ ScotWays (n.d.) Heritage Paths [Online] Available at: <http://www.heritagepaths.co.uk/mapsearch.php#zoom=6&lat=56.7820&lon=-4.9000> (accessed 16/07/2021).



in noise and vibration during construction and operation. This is dependent on the location and design of individual schemes. There is also potential for a negative effect on material assets due to the use of natural resources.

There is potential for negative environmental effects during construction and operation of the rail network enhancement and High Speed Rail 2 interventions on the Population and Human Health (noise and vibration, public realm, safety), the Water Environment, Biodiversity, Soil, Historic Environment and Landscape and Visual Amenity. In addition, significant quantities of materials and construction related trips would be required. Depending on the source and type of materials/natural resources used, there is the potential for negative effects on Material Assets.

The Freight interventions are anticipated to result in minor negative effects on material assets as several interventions proposed involve enhancements to rail freight, terminals and facilities and therefore will require the use of natural resources.

Where any new infrastructure is required this could result in negative effects on biodiversity, soil, landscape, water, historic environment and material assets however the magnitude of effect is uncertain at this stage and will be determined by the design (and physical footprint) of the interventions.

