

THE DRAFT INFRASTRUCTURE
INVESTMENT PLAN
2021-22 to 2025-26
Strategic Environmental Assessment
Environmental Report

Report prepared by:



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Non-Technical Summary

Introduction

The first Infrastructure Investment Plan was published in 2008, with updates published 2011 and 2015. The Scottish Government are now consulting on the latest “draft Infrastructure Investment Plan” which sets out a coherent and strategic approach to infrastructure planning.

What is Strategic Environmental Assessment?

Strategic Environmental Assessment (SEA) is the assessment of the likely significant environmental effects that a public plan, programme or strategy will have on the environment if implemented. Where possible, it proposes how negative effects can be avoided or reduced and identifies opportunities for positive effects to be maximised. SEA provides an opportunity for the public to express their views on the draft strategy and on an Environmental Report setting out the assessment findings. The Environmental Report has been prepared in accordance with the Environmental Assessment (Scotland) Act 2005.

What is the current state of the environment and what are the key environmental issues associated with infrastructure?

Table 1 summarises the current state of the environment, including key pressures associated with infrastructure, and current trends that could continue in the absence of the draft Plan.

Table 1

Climatic factors	<ul style="list-style-type: none">- Climate change is one of the most serious threats facing the world today, with impacts including changing weather patterns, rising air and sea temperatures, and impacts on Scotland’s unique biodiversity. Further changes, including more extreme weather events are expected; all of which have the potential to affect other aspects of the environment.- Heating and cooling homes and businesses accounts for approximately half of Scotland’s greenhouse gas emissions.- Infrastructure is a key source of greenhouse gas emissions.- In order to reduce the carbon footprint of infrastructure, it is important that account is taken of the energy that is embodied in the materials used (commonly referred to as embodied carbon).
Population and Human Health	<ul style="list-style-type: none">- Scotland’s population is growing.- Around 70% of people live in urban areas, covering just 2% of Scotland’s land area.- Human health is dependent on a high quality environment and access to services including health and education, and employment.- The impacts of climate change may be experienced disproportionately in areas of high deprivation.

Air	<ul style="list-style-type: none"> - Air quality in Scotland has improved considerably over the last few decades, however, air pollution is still generally considered to reduce life expectancy. - The quality of the air around us is affected by human activities, such as transport, industry and agriculture, as well as pollutants from natural sources.
Biodiversity	<ul style="list-style-type: none"> - Biodiversity loss has been well documented over the last 50 years. The greatest drivers of change in biodiversity in Scotland are: climate change, urbanisation, pollution, woodland management, fisheries, invasive non-native species, freshwater and agricultural management. Scotland's biodiversity receives protection through a range of existing designations and conservation objectives, however, many undesignated areas also contain a wide range of habitats and species that have important functions and roles. - Natural assets, such as greenspace and woodlands, can support biodiversity as well as help meet the climate change targets and adapt to its impacts.
Soil	<ul style="list-style-type: none"> - Soil is a non-renewable resource and loss of valued soil has potential for national impacts which will be difficult to reverse. Scotland's soils play a key role in climate change, acting as "carbon sinks". - There is a link between the health of Scotland's soils and other environmental topics such as biodiversity, water and air quality. - Climate change and loss of soil organic matter pose significant threats to Scottish soils. Changes in land use and land management practices are also a key pressure.
Water	<ul style="list-style-type: none"> - Water quality in many rivers, canals, and estuaries has improved significantly. Most of Scotland's seas, coasts, and estuaries are reported to be in good or excellent condition, however, some localised areas of concern remain. - Flood risk is expected to increase, posing risks to material assets, population and human health and loss of habitats from erosion. - The construction and use of infrastructure can negatively impact on water quality and new structures on land can affect flood defences.
Cultural heritage and the historic environment	<ul style="list-style-type: none"> - Scotland's many and varied historical sites are unique and irreplaceable. - Inappropriate development is a key pressure on the historic environment and cultural heritage, both directly in terms of damage to known and unknown features, and possible impacts on setting. - Other known pressures include changing land use and land management, tourism/ visitors, and climate change, for example as a result of rising sea levels and increased coastal erosion.
Landscape and geodiversity	<ul style="list-style-type: none"> - Scotland's diverse and distinctive landscapes are a significant part of the country's natural and cultural heritage. - Scotland's landscapes play a key role in attracting tourism, affording opportunities for business and providing the setting for outdoor recreation. - The distinctive landscape setting of many towns and cities is being lost as a result of settlement expansion and the need for associated infrastructure.

Material assets

- Built and natural assets are a key part of our environment. They include infrastructure for energy, heat, flood protection, water supply, and waste and water treatment.
- Increasing demand for goods and services puts pressure on natural resources
- Flooding and changing weather patterns are a key long-term risk to infrastructure performance.
- Digital infrastructure will become more vital as the population grows and there is greater reliance on data to meet a range of needs.
- Network services for energy, transport, water, and information & communications technology are vital, and failure in any one area can lead to wider disruption across these networks.

What is the draft Infrastructure Investment Plan?

The draft Infrastructure Investment Plan sets the strategic framework for the infrastructure investment the Scottish Government and its public bodies will make over the next 5 years, from 2021-22.

The draft Plan has built on and been directly informed by the work of the Infrastructure Commission Scotland, including the recommendations set out in the “Phase 1: Key findings report A blueprint for Scotland”. Recommendations include making the most of existing assets and an increased focus on decarbonising the heat and transport sector.

A new vision for infrastructure investment in Scotland is proposed and to deliver the vision, the draft Plan focuses on three key themes which are directly linked to Scotland’s National Performance Framework and the UN Sustainable Development Goals. A single vision for Scottish Government infrastructure investment choices has been adopted:

“Our infrastructure supports Scotland’s resilience and enables inclusive, net-zero, and sustainable growth”

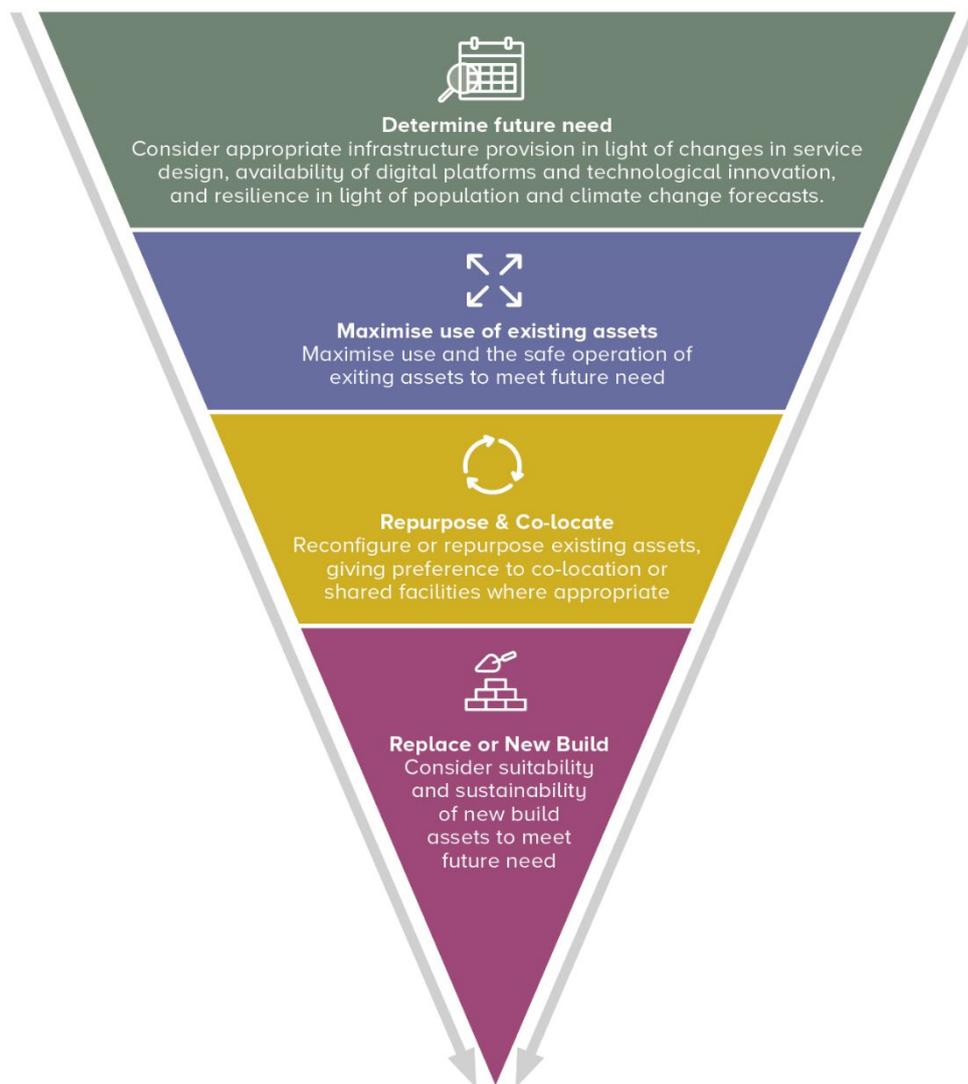
In supporting this vision, the draft Plan focuses on three key themes, recognising that these are not necessarily independent. For example, investing in a project which contributes towards Net Zero emissions could then also improve opportunities and outcomes in the place in which that project is based. The draft Plan outlines that investments which deliver positive outcomes across more than one theme will be prioritised.

- Enabling the transition to net-zero emissions and environmental sustainability
- Driving inclusive economic growth
- Building resilient and sustainable places and communities

An updated Scottish Government definition of infrastructure, expanded to include natural infrastructure, and a draft infrastructure investment hierarchy are also included.

The proposed draft hierarchy (see figure below) has been developed to provide an overarching and common approach to prioritise infrastructure investment decisions. The draft hierarchy requires that consideration is given to the suitability of existing assets ahead of new build. For example, through requiring that any new infrastructure investment consideration to future needs, such as the use of digital and technological innovation, the projected impacts of climate change and future demographic changes, including age and disability. Where new build assets are required, it also provides a new set of future priorities that promote sustainability.

Figure 1 Draft Common Investment Hierarchy



Investment decisions set out in the draft plan have been undertaken based on the most appropriate method available that prioritises, on a “no regrets” basis, their contribution to an inclusive net zero carbon economy, as recommended by the Infrastructure Commission. The Commission’s Phase 1 report recommended a number of improvements to the Scottish Government’s approach to infrastructure, intended to be

implemented over time, and support development of the next Infrastructure Investment Plan in 2025. The draft Plan also sets out a response to those recommendations. Proposed improvements include developing a new infrastructure investment assessment and prioritisation framework and an up to date “needs assessment” across all infrastructure sectors.

The draft Plan has been developed in alignment with the development of the Capital Spending Review. Once finalised, both documents will together provide a strong and coherent framework for directing, analysing, shaping, and prioritising future commitments. Further, the development of the draft Infrastructure Investment Plan has also run concurrent to work being taken forward to support economic and societal recovery post COVID-19 and the 2020-21 Programme for Government.

Once finalised, the Infrastructure Investment Plan will sit in the context of a wide range of other relevant Scottish Government policies and strategies, including Scotland’s National Performance Framework, Programme for Government and Economic Strategy. Other plans and strategies of relevance include the Climate Change Plan: the Third Report on Policies and Proposals, due to be updated later this year to incorporate green recovery proposals, and Climate Ready Scotland: Scotland’s Second Adaptation Plan. Work has also commenced on the development of National Planning Framework 4 which will look to 2050 and consider the infrastructure and development needed to support sustainable and inclusive growth, within the overarching context of climate change. It is a requirement that National Planning Framework 4 has regard to the Infrastructure Investment Plan and will itself be subject to Strategic Environmental Assessment.

How was the SEA undertaken and what are the assessment findings?

The SEA was undertaken in three stages:

- Stage one - considered the likely significant environmental impacts of the three draft key themes ‘Enabling the transition to net zero emissions and environmental sustainability; Driving inclusive economic growth; and, Building resilient and sustainable places and communities, and draft infrastructure investment hierarchy’.
- Stage two - expanded on the findings from Stage one to consider the potential impacts of the draft Plan as whole, including the interrelationship between the draft core strategic outcomes and draft hierarchy.
- Stage three – explored the potential for in-combination and cumulative impacts of the draft Plan in the context of the wide range of objectives, ambitions and requirements set out in wider policy. The SEA also set out recommendations, for mitigation and enhancement where appropriate.

Consideration of reasonable alternatives to the draft Plan

The Environmental Assessment (Scotland) Act 2005 requires that reasonable alternatives to the plan, programme or strategy are assessed.

The draft Plan sets out a strategic direction and a coherent approach to infrastructure delivery. It does this within three key themes which can be viewed as interlinked and of equal importance to delivering the draft Plan. These themes are not necessarily independent and investments which deliver positive outcomes across more than one theme will be prioritised. This approach supports the wider policy context including the Scottish Government's ambitions relating to climate change and in tackling inequalities. Given the wider policy context and legislative landscape and the supporting role infrastructure plays in the delivery of multiple outcomes, a "do nothing" scenario or a change in focus of the draft Plan are not considered "reasonable alternatives".

The draft Plan has also been directly informed by the Phase 1 findings of the Infrastructure Commission Scotland. For example, the draft Plan gives consideration to natural infrastructure and proposes a draft common investment hierarchy.

Assessment findings

Overall, significant benefits are considered likely to arise for climatic factors, air quality, water, population and human health, biodiversity, cultural heritage and material assets.

Significant benefits for climatic factors and material assets are expected to arise, in particular through the focus given to maximising the use of existing assets and ensuring these are effectively used. This will reduce the need for new build infrastructure over time and in turn reduce the associated energy requirements (embodied energy).

Support given to natural infrastructure, such as woodland creation and peatland restoration, and to the continued decarbonisation of the heat and transport networks, are also likely to give rise to significant positive impacts for climatic factors through climate change mitigation and adaptation. Making the best use of existing infrastructure assets can also help reduce pressure on natural resources, and the focus given to natural infrastructure can lead to multiple benefits including for biodiversity.

By supporting actions that increase resilience and adaptation to the impacts of climate change, e.g. flood management measures, the draft Plan can lead to positive effects for climatic factors, population and human health, cultural heritage and material assets.

Particular benefits are likely to arise where this leads to the increased use of natural infrastructure due to the multiple benefits that can arise, both environmental and social. For example, the "green" and "blue" features of the natural and built environment, and the range of services they provide are widely recognised as an essential part of successful places.

Where a focus is given to building resilient and sustainable places and communities based on local need, this can lead to positive impacts for population and human health, for example by improving access to goods and services such as employment and health care. Benefits will be fully realised where assets can be repurposed or reused in a way that best meets a broad range of user needs, and in particular where consideration is given to reducing current barriers to accessibility or in addressing current health inequalities. Benefits for climatic factors, air quality and population and human health should also arise from a reduced need to travel. For example, through the support given in the draft Plan to co-location of services, to active travel and to

digital infrastructure, which is itself likely to play a key role in how goods and services are accessed and delivered in the future.

There is the potential for both positive and negative impacts to arise where new or upgraded infrastructure development is required to deliver the draft Plan, including from construction and operation at a local level. Construction impacts may be short-term and temporary, however impacts from land use change, such as the loss of soil and habitats, can be long-term and permanent. Development can also lead to negative landscape and visual impacts and can adversely affect the setting of cultural heritage. This has the potential to lead to mixed effects for soil and landscape. The likely significance of these impacts will be influenced by a number of factors, for example infrastructure requirements may be greater for new technologies due to a lack of existing infrastructure. The siting and design of individual projects can also effect the significance of potential impacts at the local level. As previously discussed, positive impacts can arise from natural infrastructure. Finally, potential benefits, including at local level, should arise from the development and expansion of new and existing technologies. For example, increased digitisation and new low carbon technologies can lead to innovation in how goods and services are accessed and can support decarbonisation.

How can these environmental effects be effectively managed, mitigated or enhanced?

Infrastructure investment has the potential to lead to multiple benefits, for example, a focus on a place based approach to infrastructure investment can support inclusive growth, reduce GHG emissions and increase and adaptation to the impacts of climate change. Where consideration is given to repurposing, co-location and where natural infrastructure and nature-based solutions are adopted, as supported by the draft Plan, this can also lead to multiple benefits. As the risks from the impacts of climate change increase, support for improved resilience and adaptation across all networks is likely to be of particular benefit.

It is considered that the draft Plan should lead to significant benefits through reducing the need for new build assets over time. However, where upgrades to, or new infrastructure are required to meet the objectives of the draft Plan, these could lead to adverse localised impacts. Existing statutory and non-statutory measures are in place to assess the likely environmental impacts arising from development proposals at plan and project level and will be supplemented by statutory requirements such as Environmental Impact Assessment and Habitat Regulations Appraisal where relevant. Appropriate design and construction management measures at project level can also help avoid or reduce adverse local effects. Finally, by giving consideration to the suitability and sustainability of new infrastructure and supporting the use of natural infrastructure, positive impacts should also arise.

The findings in this Environmental Report can help to inform future infrastructure investment proposals and related assessment work which could include further Strategic Environmental Assessments and/or project related assessments. In this way,

there is opportunity to enhance the positive effects reported and address and manage negative effects.

What recommendations did the SEA make?

- The SEA supports the focus given in the draft plan to maximising the use of existing assets ahead of new build.
- The SEA supports the proposal to change the Scottish Government's definition of infrastructure to include natural infrastructure, and recommends that the use of nature based solutions is maximised wherever possible.
- It is recommended that a focus is given to maintaining assets at greatest risk or which deliver lifeline services, and to the re-use of infrastructure in areas of greatest need.
- The SEA welcomes proposals to develop a new, system wide infrastructure assessment and prioritisation framework; the commitment to developing an approach to enable the carbon assessment of future Infrastructure Investment Plans is also welcomed.
- The SEA supports the focus in the draft Plan towards a placed based approach to infrastructure investment.

What monitoring is proposed?

A number of monitoring and reporting arrangements currently exist to provide accountability and transparency on the status and delivery of projects set out in the Infrastructure Investment Plans.

In addition, there are a range of existing national and local programmes developed to monitor environmental status and assess performance against established environmental indicators which can also be used to help monitor the Infrastructure Investment Plan once finalised. These include monitoring that is undertaken to measure progress towards Scotland's National Performance Framework and requirements to monitor and report on greenhouse gas emissions, including within all sectors of the Scottish economy. A monitoring and evaluation framework is also being developed as part of work in taking forward Scotland's second climate change adaptation programme.

Monitoring is also likely to be supported by a number a sector specific plans, including on transport and energy, and annual progress reports on Scotland's Land Use Strategy. Requirements to produce Flood Risk Management Plans and report progress towards biodiversity targets give consideration to flood risk, including risk of surface water flooding and coastal erosion, and the status of habits and species, respectively.

Next Steps

Public views are now invited on the draft Infrastructure Investment Plan and on this Environmental Report. The consultation runs until **19 November 2020** and responses can be submitted:

- Online via the Scottish Government website
- In writing to:
Infrastructure Investment Plan Consultation
3-C North
Victoria Quay
Edinburgh
EH6 6QQ
- By email to: InfrastructureInvestmentStrategy@gov.scot

You may find the following questions helpful when commenting on the Environmental Report. Please note that responses do not need to be confined to these questions and more general comments on the Environmental Report and the draft Plan are also invited.

1. *What are your views on the accuracy and scope of the environmental baseline set out in the Environmental Report? (Please give details of additional relevant sources)*
2. *What are your views on the predicted environmental effects as set out in the Environmental Report?*
3. *What are your views on the proposals for mitigating, enhancing and monitoring the environmental effects set out in the Environmental Report?*

How will responses be considered?

Following the consultation, a SEA Post-Adoption Statement will be prepared. The Statement will reflect on the views provided on the findings of the assessment and the proposals in the draft Plan and will explain how the comments received have been taken into account in finalising the Plan.

1 Introduction

1.1 Background

- 1.1.1 The Scottish Government has published a draft Infrastructure Investment Plan for consultation. The draft Plan sets the strategic framework for the infrastructure investment the Scottish Government and its public bodies will make over the coming 5 years, from 2021/2022.

1.2 Strategic Environmental Assessment

- 1.2.1 Strategic Environmental Assessment (SEA) is the assessment of the likely significant environmental effects of a public plan, programme or strategy. The Scottish Government has undertaken a SEA of the draft Infrastructure Investment Plan and its findings are set out in this Environmental Report. The SEA was undertaken in accordance with the Environmental Assessment (Scotland) Act 2005 (the '2005 Act') and in parallel with the development of the draft Infrastructure Investment Plan. This iterative process enabled the SEA to inform and influence the draft Plan by embedding the consideration of likely significant environmental impacts into the decision making process.

1.3 Report Structure

- 1.3.1 This Environmental Report is set out as follows:

Section 1	An introduction to the draft Infrastructure Investment Plan and overview of the SEA process
Section 2	Information on the draft Infrastructure Investment Plan
Section 3	An overview of the wider policy context, including relationships with current plans, programmes, and strategies at the international, UK, and Scottish levels
Section 4	The proposed approach to undertaking the SEA
Section 5	An overview of relevant environmental objectives and the environmental information used to inform the assessment
Section 6	Sets out the assessment findings, conclusions and recommendations
Section 7	Proposals for monitoring
Section 8	Next steps
Appendix <u>A</u>	List of abbreviations
Appendix <u>B</u>	A review of relevant plans, programmes and strategies
Appendix <u>C</u>	Relevant Environmental Protection Objectives and Environmental Baseline Information
Appendix <u>D</u>	Detailed assessment tables

2 The draft Infrastructure Investment Plan

2.1 Background

- 2.1.1 The first Infrastructure Investment Plan was published in 2008¹ with updates published in 2011² and 2015. *Delivering for today, investing for tomorrow; the Scottish Government's Programme for Scotland 2018-2019*³ included a commitment to increase annual infrastructure investment to £6.7 billion by the end of the next parliament [2025-26], an increase of £1.5 billion per year⁴. This is referred to as the “National Infrastructure Mission”.
- 2.1.2 The Infrastructure Commission for Scotland, created in 2019 to provide independent and informed advice to Scottish Ministers, published its first report “Phase 1: Key findings report A blueprint for Scotland”⁵ in January 2020. The Report sets a 30 year infrastructure vision to support and enable an inclusive net-zero carbon economy and short and longer term actions to achieve this. The Report included a number of recommendations, including making the best use of assets and the continued decarbonisation of the heat and transport sectors. In July 2020, the commission published Phase 2: Delivery Findings Report A blueprint for Scotland¹.
- 2.1.3 The draft Infrastructure Investment Plan has been directly informed by the Phase 1 findings of the Infrastructure Commission. The Scottish Government will respond formally to Phase 2 recommendations at a later date.

2.2 The Infrastructure Investment Plan

- 2.2.1 The draft Infrastructure Investment Plan sets the strategic framework for the infrastructure investment the Scottish Government and its public bodies will make over the next 5 years, from 2021/22. It also provides details of major projects and programmes where investment will be focused.
- 2.2.2 The draft Infrastructure Investment Plan sets new vision for infrastructure investment in Scotland (set out below). To deliver the proposed vision, the draft

¹ Scottish Government (2008) Infrastructure Investment Plan 2008 [online] available at: <https://www.webarchive.org.uk/wayback/archive/20170107041525/http://www.gov.scot/Publications/2008/03/28122237/14> (accessed 15/01/2020)

² Scottish Government (2011) Infrastructure Investment Plan 2011 [online] available at: <https://www.webarchive.org.uk/wayback/archive/20170701185644/http://www.gov.scot/Publications/2011/12/05141922/0> (accessed 15/01/2020)

³ Scottish Government (2018) *Delivering for today, investing for tomorrow: the Government's programme for Scotland 2018-2019*. Available at: <https://www.gov.scot/publications/delivering-today-investing-tomorrow-governments-programme-scotland-2018-19/> (accessed 24/02/20)

⁴ The Scottish Parliament (undated) Scottish Government Infrastructure Investment [online] Available at: <https://digitalpublications.parliament.scot/ResearchBriefings/Report/2019/1/15/Scottish-Government-infrastructure-investment> (accessed 15/01/2020)

⁵ Infrastructure Commission for Scotland (2020) Key findings report [online] Available at: <https://infrastructurecommission.scot/page/key-findings-report> (accessed 20/01/2020)

Plan focuses on three key themes which are directly linked to Scotland's National Performance Framework and the UN Sustainable Development Goals.

2.2.3 The proposed vision and key themes are:

“Our infrastructure supports Scotland’s resilience and enables inclusive, net-zero, and sustainable growth”

- Enabling the transition to net-zero emissions and environmental sustainability
- Driving inclusive economic growth
- Building resilient and sustainable places and communities

2.2.4 The draft Plan also proposes an updated Scottish Government definition of infrastructure, expanded to incorporate natural infrastructure as recommended by the Infrastructure Commission for Scotland:

“The physical and technical facilities, natural and other fundamental systems necessary for the economy to function and to enable, sustain or enhance societal living conditions.

These include the networks, connections and storage relating to the enabling infrastructure of transport, energy, water, telecoms, digital and internet, to permit the ready movement of people, goods and services.

They include natural assets and networks; the built environment of housing; public infrastructure such as education, health, justice and cultural facilities; safety enhancement such as waste management or flood prevention; and public services such as emergency services and resilience.”

2.2.5 The draft Plan sets out a draft common investment hierarchy to guide infrastructure decisions and the Scottish Government’s overarching approach to planning and prioritising infrastructure interventions (Figure 2.1). The draft hierarchy will require that any new infrastructure investment has been considered in light of future needs, including; the use of digital platforms and technology, the likely impact of climate change risks, and future demographic trends including age and disability. The draft hierarchy will also require that consideration is given to the suitability of existing assets ahead of new build. However, where new build assets are required, it provides a new set of future priorities that promote sustainability.

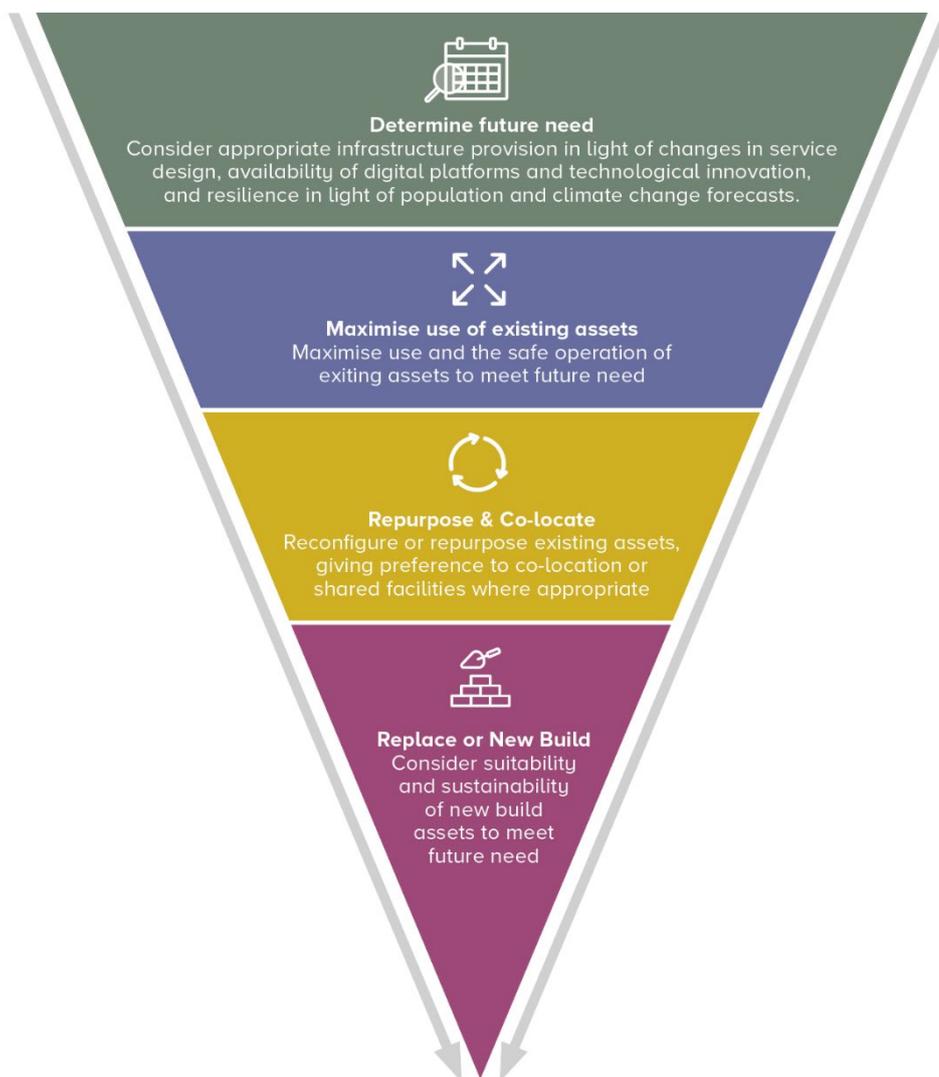
2.2.6 Investment decisions in this draft Plan have been undertaken based on the most appropriate method available that prioritises, on a “no regrets” basis, their contribution to an inclusive net zero carbon economy, as recommended by the Infrastructure Commission for Scotland. Potential impact on GHG emissions, delivery of renewable energy and access to green and blue spaces are some of the types of indicators that have been considered by the Scottish Government when assessing the potential benefits of infrastructure.

2.2.7 The Commission’s Phase 1 report recommended a number of improvements to the Scottish Government’s approach to infrastructure, intended to be implemented over time, and support development of the next Infrastructure Investment Plan in 2025. The draft Plan therefore sets out a response to those

recommendations. Proposed improvements include developing and adopting a new infrastructure investment assessment and prioritisation framework and an up to date “needs assessment” across all sectors. The draft Plan also sets out a number of proposed carbon assessment approaches and methodologies that could be developed and implemented to assess and report on the impact of infrastructure investment in meeting the climate change emissions reductions targets in future Infrastructure Investment Plans.

2.2.8 The draft Plan and Capital Spending Review have been undertaken in alignment. Once finalised, both documents will together provide a strong and coherent framework for directing, analysing, shaping, and prioritising future commitments. Further, the development of the draft Infrastructure Investment Plan has also run concurrent to work being taken forward to support economic and societal recovery post COVID-19 (see further details below) and the 2020-21 Programme for Government.

Figure 2.1 Draft Common Investment Hierarchy



3 Relationship with other Plans, Programmes, and Strategies and Environmental Objectives

3.1 Introduction

- 3.1.1 The 2005 Act requires the Environmental Report to outline the relationship between the draft Infrastructure Investment Plan and other relevant plans, programmes, and strategies. It is also a requirement of the 2005 Act that relevant environmental protection objectives at the international, European or national level be identified. The following sections of this report provide an overview of the policy context and the overarching objectives considered most relevant.
- 3.1.2 A wider overview of key plans, programmes and strategies and their objectives is set out in Appendix B to inform the assessment process.

3.2 The Policy Context

- 3.2.1 The development of the draft Infrastructure Investment Plan and its wider policy context, is illustrated in figure 3.1.
- 3.2.2 Scotland's National Performance Framework⁶ sets an overall purpose and vision for Scotland. It includes 11 broad national outcomes that support the purpose and provide measures on how well Scotland is progressing towards them. Aligned with the United Nations Sustainable Development Goals, it "...aims to reduce inequalities and gives equal importance to economic, environmental and social progress."
- 3.2.3 Scotland's Economic Strategy⁷ sets out an overarching framework for a more productive, cohesive and fairer Scotland. In addition to setting goals for sustainable economic growth, the Economic Strategy also sets out our ambitions for investment in Scotland's infrastructure, and seeks to prioritise investment to ensure that Scotland protects and nurtures its natural resources.
- 3.2.4 Capital Spending Review Framework, published alongside this draft Infrastructure Investment Plan, sets out at a high level the capital investment we intend, whether in infrastructure or other areas such as protecting and increasing jobs or through our capitalisation of the Scottish National Investment Bank. The Capital Spending Review Framework and the Infrastructure Investment Plan, once finalised, will provide a strong and coherent framework for directing, analysing, shaping, and prioritising future commitments.



⁶ Scottish Government (undated) National Performance Framework [online] Available at: <https://nationalperformance.gov.scot/> (accessed 07/05/2020)

⁷ Scottish Government (2015) Scotland's Economic Strategy [online] Available at: <https://beta.gov.scot/publications/scotlands-economic-strategy/> (accessed 13/01/2020)

- 3.2.5 Protecting Scotland, Renewing Scotland: the Government's Programme for Scotland 2020-2021⁸ sets out the Scottish Government's response to managing the impact of the economic, health and social crisis brought about by COVID 19 and working towards a sustainable recovery. This is set out over the three key themes of: creating new jobs, good jobs and green jobs, promoting lifelong health and wellbeing, and prioritising equality and helping young people achieve their full potential. The importance of ensuring green recovery is central to these themes is recognised.
- 3.2.6 The importance of infrastructure drove the 2018 decision to launch the National Infrastructure Mission which will increase annual investment by one per cent of then GDP between 2019-20 and the end of the next parliament in 2025-26. This will boost annual infrastructure investment by £1.56 billion by 2025-26 and will see around £7 billion of additional infrastructure investment delivered over the course of the Mission⁹. The draft Infrastructure Investment Plan together with the Capital Spending Review will set out the details around deployment of our funding, building on the work of the Infrastructure Commission for Scotland's Phase 1: Key Findings report and the Climate Change Plan.
- 3.2.7 The Climate Change (Emissions Reduction Targets) (Scotland) Act 2019 ("the 2019 Act") amends the Climate Change (Scotland) Act 2009 Act ("the 2009 Act"). The 2019 Act increases the ambition of Scotland's targets to reduce greenhouse gas emissions, including a target for net-zero emissions by 2045 and interim targets for reductions of 56%, 75% and 90% by 2020, 2030 and 2040 respectively.
- 3.2.8 The 2019 Act also includes a range of measures to improve transparency of the targets, for example basing progress on actual emissions from all sectors of the Scottish economy. The 2009 Act requirement for Scottish Ministers to lay regular "Climate Change Plans" in Parliament setting out their proposals and policies for meeting targets remains in place, but the details of this reporting duty are adjusted by the 2019 Act. For example, Plans will be required to include estimates of the costs and benefits of policies. Additionally, the 2019 Act updates arrangements for advice, planning and reporting on the emissions reductions targets. This includes advice from the UK Committee on Climate Change who have a statutory advisory and reporting role under Scotland's climate change legislation. A Just Transition Commission¹⁰ provides independent advice on a net-zero economy that is fair for all.



⁸ Scottish Government (2020) Protecting Scotland's Future: The Government's Programme for Scotland 2020-2021 [online] Available at: <https://www.gov.scot/publications/protecting-scotland-renewing-scotland-governments-programme-scotland-2020-2021/> (accessed 02/09/2020)

⁹ Scottish Government (2020) Scottish Budget 2020-2021 [online] Available at: <https://www.gov.scot/publications/scottish-budget-2020-21/> (accessed 17/03/2020)

¹⁰ Scottish Government (undated) Just Transition Commission [online] Available at: <https://www.gov.scot/groups/just-transition-commission/> (accessed 28/01/2020)

3.2.9 In recognition of the relationship between infrastructure (which is a long-term asset) and achieving the climate change targets, the 2019 Act also places a new duty on Scottish Ministers to assess and report on the impact of infrastructure investment in meeting the emissions reductions targets when producing an Infrastructure Investment Plan.

3.2.10 The Climate Change Plan: the Third Report on Policies and Proposals 2018-2032¹¹, published on 28 February 2018 is the third plan produced under the requirements of the 2009 Act. It sets out Scotland's ambitious approach to mitigating the effects of climate change across a range of sectors and proposed pathways to achieving a low carbon economy. In April 2019, the First Minister declared a global climate emergency and committed to updating the Climate Change Plan and an update is expected by the end of 2020.



3.2.11 Climate Ready Scotland: Second Scottish Climate Change Adaptation Programme 2019-2024¹², published in September 2019, provides an overarching framework for adaptation to climate change, setting out Scottish Ministers' objectives in relation to adaptation, as required by the 2009 Act. Building on the work of Climate Change Ready Scotland: Scottish Climate Change Adaptation Programme (2014) this second Programme sets out to address the impacts identified for Scotland by the 2017 UK Climate Change Risk Assessment¹³ as well as the Evidence Report Summary for Scotland. The Second Programme identifies 7 key outcomes, including infrastructure resilience.



3.2.12 National Planning Framework 3 (NPF3)¹⁴ and Scottish Planning Policy (SPP)¹⁵ set out Scotland's ambitions as: a successful, sustainable place; a low carbon place; a natural, resilient place; and a connected place and a long-term vision for development and investment across Scotland.

3.2.13 A review of the National Planning Framework is underway and NPF4 will incorporate SPP so that spatial and thematic policies will be addressed in one place. It will look to 2050 and set out where development and infrastructure is needed to support sustainable and inclusive growth and will respond to the global climate emergency. A draft NPF4 is expected to be laid in the Scottish Parliament in Autumn 2021 and will be subject to extensive consultation with a

¹¹ Scottish Government (2018) Climate Change Plan: the Third Report on Policies and Proposals 2018-2032 (RPP3) [online] Available at: <https://beta.gov.scot/publications/scottish-governments-climate-change-plan-third-report-proposals-policies-2018/> (accessed 16/12/2019)

¹² Scottish Government (2019) Climate Ready Scotland: Second Scottish Climate Change Adaptation Programme 2019-2024 [online] Available at: <https://www.gov.scot/publications/climate-ready-scotland-second-scottish-climate-change-adaptation-programme-2019-2024/> (accessed 13/01/2020)

¹³ Committee on Climate Change (2016) UK Climate Change Risk Assessment 2017 Evidence Report [online] Available at: <https://www.theccc.org.uk/uk-climate-change-risk-assessment-2017/> (accessed 13/01/2020)

¹⁴ Scottish Government (2014) Ambition, Opportunity, Place – Scotland's Third National Planning Framework [online] Available at: <https://beta.gov.scot/publications/national-planning-framework-3/> (accessed 13/01/2020)

¹⁵ Scottish Government (2014) Scottish Planning Policy [online] Available at: <https://beta.gov.scot/publications/scottish-planning-policy/> (accessed 13/01/2020)

view to publishing a final version of NPF4 spring 2022. NPF3 will remain in place until it is replaced by NPF4. The Planning (Scotland) Act 2019 requires NPF4 to have regard to the Infrastructure Investment Plan.

- 3.2.14 The Environment Strategy for Scotland: vision and outcomes¹⁶ sets out a vision of “One earth. One home. One shared future” and creates an overarching framework for Scotland’s existing environmental strategies and plans, including the Climate Change Plan. The vision and outcomes in the Strategy are intended to guide future development and delivery of these strategies and plans by establishing a long-term direction and shared goals. Further work on the development of pathways to deliver outcomes and the identification of strategy priorities and opportunities will continue to be progressed.
- 3.2.15 The National Transport Strategy (NTS2)¹⁷ sets out an ambitious and competing vision for Scotland’s transport system over the next 20 years. Four priorities of: *reduces inequalities, takes climate action, helps deliver inclusive economic growth and improves our health and wellbeing*, support the Strategy vision. The Strategy also sets out a Sustainable Investment Hierarchy to be applied at a national level to inform future transport investment decisions.
- 3.2.16 The Cabinet Secretary for Finance, Economy and Fair Work’s statement to the Scottish Parliament on 21 April 2020 recognised that the Covid-19 public health crisis has led to an economic crisis which is global in nature, but also very local, impacting on many people and businesses in Scotland. Public sector spending on infrastructure accounts for around 50% of all construction activity across Scotland, and it is recognised that infrastructure investment will play a vital role in how we reset, restart and recover the economy. An Advisory Group on Economy Recovery was established and their report “Towards a Robust and Resilient Wellbeing Economy for Scotland” published in June 2020¹⁸. The Scottish Government’s response to the Advisory Group is available online¹⁹ and makes clear the importance of decarbonisation and greening the economy and supporting wider aims to build a wellbeing economy.

¹⁶ Scottish Government (2020) The Environment Strategy for Scotland: vision and outcomes [online] Available at: <https://www.gov.scot/publications/environment-strategy-scotland-vision-outcomes/> (accessed 25/02/2020)

¹⁷ Transport Scotland (2020) National Transport Strategy [online] Available at: <https://www.transport.gov.scot/our-approach/national-transport-strategy/> (accessed 08/05/2020)

¹⁸ Scottish Government (2020) Coronavirus (COVID-19) update: Economy Secretary’s statement 21 April 2020 [online] Available at: <https://www.gov.scot/publications/coronavirus-covid-19-update-economy-secretarys-statement-economic-impact-covid-19-tuesday-21-april-2020/> (accessed 11/05/2020)

¹⁹ Scottish Government (2020) Economic Recovery Implementation Plan: Scottish Government repose the Advisory Group on Economic Recovery [online] Available at: <https://www.gov.scot/publications/economic-recovery-implementation-plan-scottish-government-response-to-the-advisory-group-on-economic-recovery/pages/2/> (accessed 17/08/2020)

NATIONAL PERFORMANCE FRAMEWORK

Economic Strategy
2020 - 2021

Programme for Government
2020-2021

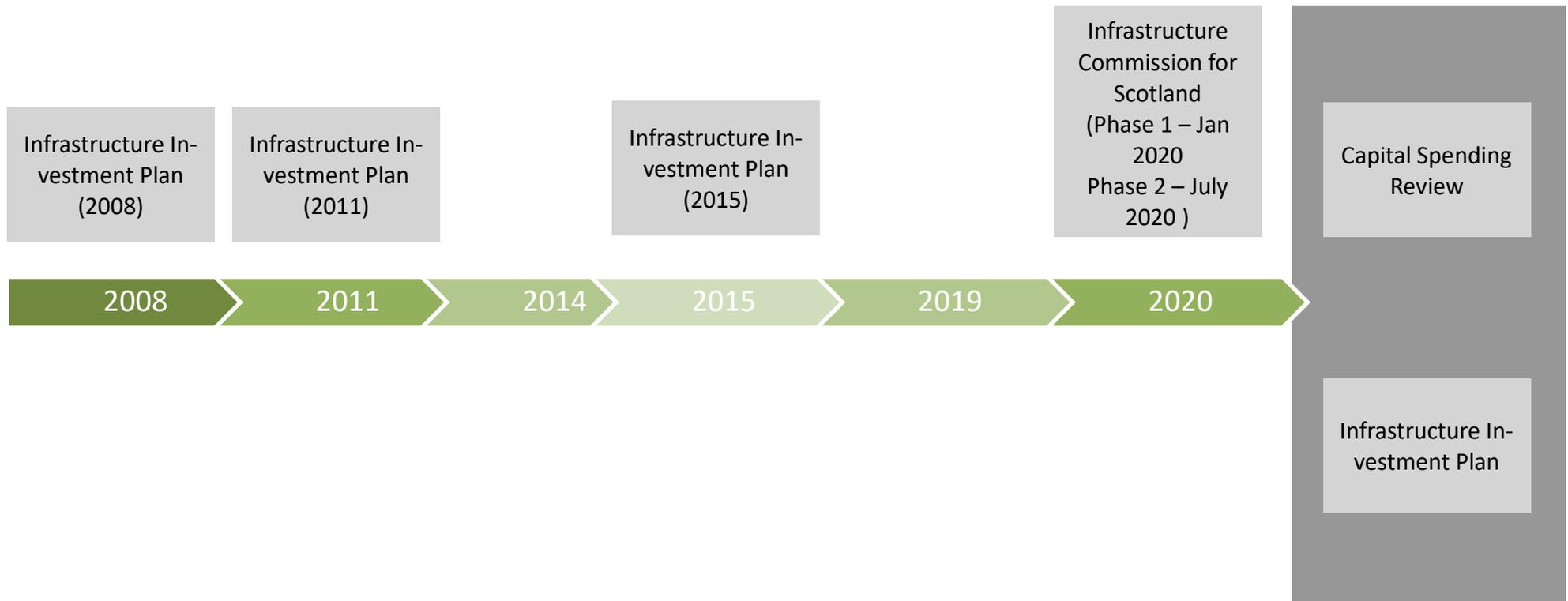


Figure 3.1. Development of the Infrastructure Investment Plan

4 The Approach to the Assessment

4.1 Scoping the SEA

- 4.1.1 The draft Infrastructure Investment Plan is considered to fall under Section 5(4) of the 2005 Act and the SEA process began with the submission of a joint Screening and Scoping Report to the SEA Gateway in June 2020. The joint Report set out initial information on the likelihood of significant environmental effects and the proposed evidence to inform the assessment process. The screening report determined that a SEA is required. Given the wide scope and high level nature of the draft Plan, it was proposed that all the SEA topics, required to be considered by the 2005 Act, should be scoped into the SEA. These are set out in Table 4.1.

Table 4.1 Proposed SEA topics

SEA topic	Scoped In
Biodiversity, flora and fauna	✓
Population and human health	✓
Soil	✓
Water	✓
Air	✓
Climatic factors	✓
Cultural heritage and the historic environment	✓
Landscape and Geodiversity	✓
Material assets	✓

4.2 Relationship between this SEA and previous assessments

- 4.2.1 This SEA has built upon and taken into account other relevant completed and ongoing SEAs, including NPF4; the Climate Change Plan: the draft Third Report on Policies and Proposals 2017-2032; Scotland's Climate Change Bill; the Planning Bill; the Second National Transport Strategy; and, the Scottish Climate Change Adaptation Programme.

4.3 Assessment Methodology

Staged approach to the assessment

- 4.3.1 The assessment was undertaken in three stages. The first stage considered the potential environmental impacts that could arise from the implementation of the draft common investment hierarchy and three key themes:
- Enabling the transition to net-zero emissions and environmental sustainability,

- ii. Driving inclusive economic growth, and
- iii. Building resilient and sustainable places and communities.

Recommendations for mitigation or enhancement were also developed, where relevant, based on the assessment findings. These assessment findings are in Appendix D and are summarised in Section 6 of this report.

- 4.3.2 The second stage of the assessment considered the potential impacts of the implementation of the draft Plan as a whole, including the interrelationship between the draft hierarchy and draft key themes. The assessment at this stage also sought to identify the environmental opportunities and challenges that could arise from the draft Plan and its constituent parts.
- 4.3.3 The third stage of assessment explored the potential for cumulative and in-combination effects of the draft Plan in the context of the wide range of objectives, ambitions and requirements set out in wider policy. The findings from the stages two and three of the assessment process are presented in narrative form in Section 6 of this report.
- 4.3.4 Questions were used to help focus the assessment on the environmental issues identified in the environmental baseline, and covered all the SEA topic areas. This also aided the consideration of potential cumulative and in-combination effects.

Limitations and uncertainties in undertaking this SEA

- 4.3.5 This is a strategic level assessment of a high level policy position and it is recognised that many of the potential environmental impacts that could arise from infrastructure investment will depend on the detailed siting, design and location of future infrastructure delivery, the details of which will be themselves be the subject of lower tier plans, and individual project proposals.
- 4.3.6 As such it has not been possible for the SEA to provide a detailed assessment of these potential impacts. This SEA has however sought to identify and highlight potential issues wherever possible, in order that these can be taken into account and can inform future decision making.

4.4 Consideration of Reasonable Alternatives

- 4.4.1 The 2005 Act requires that the likely significant environmental effects of any reasonable alternatives to a plan, programme, or strategy, taking into account its objectives and geographical scope, are assessed and reported on as part of the SEA process. The extent to which alternatives could be considered reasonable was influenced by the relevant legislative requirements and takes into account existing policy and strategic actions, the content of which has been set out elsewhere in higher level plans, programmes and strategies (see section 3.2).
- 4.4.2 As discussed in Section 2, the draft Plan sets out a strategic direction for infrastructure and will support the National Infrastructure Mission by seeking to deliver a coherent and strategic approach to infrastructure. It sets out to

balance social, economic and environmental considerations, with the three key themes viewed as interlinked and of equal importance in delivering the draft Plan. It is recognised in the draft Plan that these themes are not necessarily independent. For example, investing in a project which contributes towards Net Zero emissions could then also improve opportunities and outcomes in the place in which that project is based. The draft Plan outlines that investments which deliver positive outcomes across more than one theme will be prioritised. This approach aligns with the wider policy and legislative context in which the draft Plan was developed, including Scottish Government policy and ambitions on climate change adaptation and mitigation, sustainable economic development, improving physical and mental wellbeing, and tackling inequalities.

- 4.4.3 As such, it is considered that a **“Do nothing” scenario** or a **fundamental change in focus of the draft Plan**, could not be considered as “reasonable alternatives” to delivering the main objectives of the Plan.
- 4.4.4 Further, the draft plan has been directly informed by the Infrastructure Commission Scotland’s “Phase 1: Key findings report A blueprint for Scotland”²⁰ and the recommendations made, and sets out a number of changes to the approach to infrastructure investment inspired by this work. For example, the inclusion of natural infrastructure in the definition of infrastructure and the establishment of the common investment hierarchy. The work undertaken by the Commission was itself developed through a process of extensive stakeholder engagement with key stakeholders and delivery partners, including views sought from current and future users of infrastructure.

²⁰ Infrastructure Commission for Scotland (2020) Key findings report [online] Available at: <https://infrastructurecommission.scot/page/key-findings-report> (accessed 20/01/2020)

5 The Environmental Baseline

5.1 Purpose of this Section

5.1.1 The 2005 Act requires that the Environmental Report includes a description of the relevant aspects of the current state of the environment and its likely evolution without implementation of the draft Infrastructure Investment Plan. This is set out in Appendix C. Section 5 sets out a high level summary of the relevant environmental tensions and opportunities that can arise from infrastructure.

5.2 What are the key environmental issues associated with infrastructure?

5.2.1 Scotland's supporting systems, or infrastructure, comprise the facilities, systems, sites and networks necessary for the functioning of the country and to enable, sustain or enhance societal living conditions. Critical infrastructure is essential to the functioning of the society and economy in Scotland²¹.

5.2.2 Infrastructure includes economic and social aspects, and is currently defined as; the physical and technical facilities, and fundamental systems necessary for the economy to function and to enable, sustain or enhance societal living conditions. These include the networks, connections and storage relating to enabling infrastructure of transport, energy, water, telecoms, digital and internet, to permit the ready movement of people, goods and services. They include the built environment of housing; public infrastructure such as education, health, justice and cultural facilities; safety enhancement such as waste management or flood prevention; and public services such as emergency services and resilience²².

5.2.3 Human health is dependent on a number of environmental factors including access to services including health and education, employment, and good quality outdoor recreation facilities. A high quality environment with good air, soil and water quality is also an important contributor to health and well-being. For example, greenspace not only has substantial environmental and health impacts, but can lead to wider societal benefits such as creating a sense of place²³. Physical assets, such as transport, water, power,

Increased access to good and services and sense of place can lead to benefits for population and human health

²¹ Scottish Government (2019) Climate Ready Scotland: climate change plan adaptation programme 2019-2024 [online] Available at: <https://www.gov.scot/publications/climate-ready-scotland-second-scottish-climate-change-adaptation-programme-2019-2024/pages/11/>

²² Scottish Government (2018) Scotland's Fiscal Outlook: the Scottish Government's five year financial strategy [online] Available at: <https://www.gov.scot/publications/scotlands-fiscal-outlook-scottish-governments-five-year-financial-strategy/pages/3/> (accessed 17/03/2020)

²³ Scottish Government (2019) National Indicator: Greenspace [online] Available at: <https://www2.gov.scot/About/Performance/scotPerforms/indicator/greenspace#importance> (accessed 04/02/2020)

waste and digital communications, also play an essential part of building a sense of place²⁴, in addition to social, economic, cultural and historical characteristics²⁵.

- 5.2.4 Heating and cooling homes and businesses accounts for approximately half of Scotland's greenhouse gas emissions and as Scotland's energy mix changes the electricity transmission network (grid) that supports the balance between energy generation and demand will change significantly, for example, as a result of the increased electrification of the transport and heat network. Whilst increased electrification could have significant benefits in reducing greenhouse gas emissions and air pollution, it could also place pressure on the energy sector and grid infrastructure.
- 5.2.5 Data infrastructure will become more vital as the population grows and economies and societies become more reliant on getting more value from data to meet a range of needs²⁶. There are also key synergies between digital and data infrastructure and other forms of infrastructure such as energy and transport, including through alternative energy sources or the uptake of advancing and new technologies. While this can lead to a number of benefits for example, reduced greenhouse gas emissions through better monitoring of energy use and support for alternative modes of transport, digital technology is an increasing area of energy consumption.
- 5.2.6 In some areas the capacity of some assets to cope with demand for goods and services is being over-stretched, such as waste water management systems and energy generation, which can affect human health and wellbeing. Increased demand for goods and services can also place pressure on resources and waste management assets. Over 11.82 million tonnes of waste was generated in Scotland in 2017; an increase of 5.5% (0.62 million tonnes) from 2016. Construction accounts for around 50% of all waste in Scotland and has a major influence on the efficient use of resources²⁷.
- 5.2.7 Climate change is one of the most serious threats facing the world today. The Scottish Government recognises that there is a global climate emergency

What does net-zero mean?

Net-zero is when emissions of greenhouse gases to the atmosphere are balanced by removals of those gases (such as carbon being absorbed by forests). This is equivalent to a 100% reduction in net emissions from baseline levels.

Source: As defined in the Intergovernmental Panel on Climate Change Special Report

²⁴ ICE (2019) Getting good infrastructure to create a sense of place [online] Available at: <https://www.ice.org.uk/news-and-insight/the-infrastructure-blog/september-2019/good-infrastructure-sense-of-place> (accessed 13/02/2020)

²⁵ NHS Scotland (undated) Place and communities [online] Available at: <http://www.healthscotland.scot/media/1088/27414-place-and-communities-06-16.pdf>

²⁶ Open data for development (undated) State of open data - Data Infrastructure [online] Available at: <https://www.stateofopendata.od4d.net/chapters/issues/data-infrastructure.html> (accessed 16/01/2020)

²⁷ Zero Waste Scotland (undated) Reducing construction waste [online] Available at: <https://www.zerowastescotland.org.uk/content/reducing-construction-waste> (accessed 03/02/2020)

and is acting accordingly. This is demonstrated by the level of ambition for greenhouse gas emissions reductions which includes a target for net-zero emissions by 2045.

5.2.8 Infrastructure is estimated to account for just over half of total UK emissions in 2013 and is predicted to increase to 90% by 2050²⁸. To reduce the carbon footprint of infrastructure it is important that account is taken of energy embodied in the materials used²⁹. “Embodied energy” is “the sum of the energy requirements associated, directly or indirectly, with the delivery of a good or service”³⁰. Consideration of embodied carbon within the built environment at the initial design and construction stages, and the repair and maintenance of assets, can help support greenhouse gas emission reduction targets, as well as reduce waste and the use of natural resources for new infrastructure construction and operation.

Maintained and adaptable infrastructure can help reduce greenhouse gas emissions and pressure on finite resources

5.2.9 Climate projections indicate that climate trends observed over the last century will continue and intensify over coming decades³¹. Rising sea levels, changes in temperatures and extreme weather events as a result climate change can lead to a number of adverse effects and pose significant risks to infrastructure. Flood risk is expected to increase, impacting on properties and infrastructure with consequences for population, heritage, businesses and communities. In turn, this could lead to limited or reduced access to vital services and impact on people’s physical and mental wellbeing. The security and efficiency of the energy supply can also be affected through extreme weather events.

Climate change can impact negatively on infrastructure

5.2.10 Additionally, the network support services underlying energy, transport and information and communications technology, and the infrastructure that supports these, are closely interlinked. Failure in any area can lead to disruption across these networks. Whilst reducing GHG emissions (mitigation) will be fundamental to reduce the magnitude of further climate change, some degree of further change remains inevitable.

5.2.11 Steps are required to prepare and adapt to the likely effects of climate change (adaptation). As infrastructure continues to evolve and adapt, the increasing importance of digital technology, connectivity and of whole-system approaches will deepen interdependencies. While individual infrastructure networks and

²⁸ Infrastructure Commission for Scotland (2020) Key findings report [online] Available at: <https://infrastructurecommission.scot/page/key-findings-report> (accessed 20/01/2020)

²⁹ Institute of Civil Engineers (2015) Embodied Energy and Carbon [online] Available at: <https://www.ice.org.uk/knowledge-and-resources/briefing-sheet/embodied-energy-and-carbon> (accessed 03/02/2020)

³⁰ ibid

³¹ Adaptation Scotland (2018) Climate trends and projections [online] Available at: <https://www.adaptationscotland.org.uk/why-adapt/climate-trends-and-projections> (accessed 05/07/2019)

sectors will each have specific challenges, it will be increasingly important these are not viewed in isolation.

- 5.2.12 The construction and operation of infrastructure can lead to adverse impacts at local level such as increased noise, dust and vibration, loss of soil and soil erosion, loss of habitats and biodiversity and water pollution. Development can also lead to negative visual impacts and can adversely affect landscape and the setting of sites of cultural importance. New structures on land have the potential to affect the capacity of flood plains or flood defences, both positively and negatively. For example, green infrastructure can reduce flood risk whilst the creation of hard standing surfaces, such as car parks, can increase the risk of flooding due to their impermeable nature. Infrastructure works can also increase competition for land, in turn, placing increased pressure on land use.

The construction and operation of infrastructure can impact on the environment at local and national scale, both positively and negatively

6 Findings of the Assessment

6.1 Introduction

6.1.1 As discussed in Section 4, a staged approach was taken to the assessment. The first stage considered the likely significant environmental impacts that could arise from the draft common investment hierarchy and three key themes:

- i. Enabling the transition to net-zero emissions and environmental sustainability,
- ii. Driving inclusive economic growth, and
- iii. Building resilient and sustainable places and communities.

Detailed assessment findings from stage 1 can be located in Appendix D of this report and Stage 1 Summary tables are included in the following sections using the key below:

 Effects are significant positive overall for the environmental topic

 Effects are significant mixed overall for the environmental topic

 Effects are negative overall for the environmental topic

6.1.2 Section 6.2 contains the key findings, taking into account stages 2 and 3 of the assessment. This includes the consideration of in-combination and cumulative effects that could arise, both within the draft Plan, for example, between the three key themes and the draft hierarchy, and in the context of the wide range of objectives, ambitions and requirements set out in wider policy and legislation.

Stage one summary assessment tables

Draft Common Investment Hierarchy

Seeks to enhance and maintain existing assets ahead of new build. It does not preclude new assets, rather it sets out an approach to planning and decision making which will lead to consideration of future needs, including use of digital platforms and technology, and the suitability of existing assets. The hierarchy comprises 4 steps: determine future need, including in light of changes in service design and population and climate change forecasts, maximise use of existing assets, repurpose & co-locate existing assets and replace or build new with consideration given to suitability and sustainability to meet future needs



Opportunities:

Greater alignment with current Scottish Government waste policy and greater consideration of infrastructure assets
 Provide for greater flexibility across networks and increased consideration of future proofing
 Improve adaptability of assets to incorporate new and innovative technologies, including those that support climate change mitigation and adaptation.
 Potential for greater alignment of infrastructure requirements across sectors



Policy Context:

Making Things Last: A Circular Economy Strategy for Scotland sets out Scotland's ambitions for changing how waste is seen in our economy. It seeks to reduce waste lost from the economy, and retain the value of materials through repair, reuse, recycling and remanufacturing through a range of policies and proposals.
 The Strategy builds on the progress made on the zero waste and resource efficiency agenda set out in Scotland's Zero Waste Plan and Safeguarding Scotland's Resources.



Constraints:

Potential lack of understanding of current assets
 Uptake of circular economy principles in the construction industry may require promotion
 Uncertainty regarding level of infrastructure requirements for future and innovative technologies



Summary of Findings

Prioritising the use and maintenance of existing assets has the potential to lead to significant benefits for **climatic factors**, reducing the need for new build infrastructure and associated energy requirements (known as embodied energy). Additional secondary benefits for **climatic factors** and **material assets** are also considered likely through reduced pressure on waste streams and on the natural resources themselves (**soil** and **biodiversity**) which has the potential to be significant.

Full and proper maintenance not only ensures that assets perform more effectively over their lifespan, but well maintained infrastructure assets are potentially easier to repurpose and adapt when required, benefiting **climatic factors** and **material assets**. Embedding the consideration of climate change forecasts and increasing the resilience and adaptability of assets to the predicted impacts of climate change, including through improved maintenance, can help reduce disruption across networks with significant positive effects for **climatic factors**, **population** and **human health**, and **material assets**. Ensuring that infrastructure takes into account diverse user needs, and can accommodate future changes in use as well as changing user demands, including through repurposing or co-location, can help support actions to reduce GHG emissions and is likely to lead to positive effects for **climatic factors**, **population** and **human health**, and **material assets**. Wider societal benefits for **population** and **human health** could also arise from improved community cohesion, increased social interaction, and sense of place.

Where required, new infrastructure or upgrades to existing infrastructure may lead to associated adverse impacts from construction and operation. This could include negative impacts for **biodiversity** and lead to localised adverse impacts on **soil**, **water**, **landscape**, and **cultural heritage**. The nature of any impacts arising at individual project level are likely to range from temporary to long-term/ permanent and the significance of the impacts will depend on a number of factors, such as scale, siting and design. Local level consideration would need to be given to the potential implications that may arise through the siting, construction and development of any individual infrastructure proposals. Existing mechanisms, such as Environmental Impact Assessment (EIA) and relevant consenting regimes, can help avoid and reduce the potential for negative impacts.

Further, where new build assets are required, support provided for multifunctional and shared assets, alongside ensuring consideration is given to suitability and sustainability in meeting future needs, should lead to benefits from greater efficiency in the use of resources, increased access to services, and greater integration of infrastructure requirements and the services that underpin these, leading to significant positive effects for **climate factors**, **population** and **human health**, **material assets**. Additionally, the use of circular economy principles during design and construction has the potential to further support the ambitions of the investment hierarchy.



Key Findings:

- Significant benefits for climatic factors and material assets are considered likely where the use of existing assets is maximised and from the repurposing or co-location of existing assets ahead of replacing or new build. Benefits will also arise from increased resilience and adaptability.
- Wider benefits should also arise from reduced pressure on natural assets and waste streams, including positive impacts for biodiversity and soil.
- Positive impacts for climatic factors, population and human health and material assets should arise from ensuring consideration is given to changing user needs and improved resilience to the predicted impacts of climate change.
- There is potential for adverse effects to arise from the construction of new infrastructure or upgrades to existing infrastructure and these can be managed through relevant consenting and assessment regimes.

Overall Significant Impacts



Climatic factors, Population and human health, Soil, Biodiversity Material assets

Key theme: Enabling the transition to net-zero emissions and environmental sustainability

Notes the critical role of public infrastructure investment in tackling the twin crises of climate change and biodiversity loss. Seeks to increase spending on low carbon measures, climate resilience, and nature-based solutions.

Opportunities:

- Opportunity to reduce GHG emissions across sectors, including through improved efficiency
- Support for a diverse and decentralised energy mix and sustainable modes of transport
- Promotion of circular economy principles can lead to reduced pressures on natural resources and generation of waste and GHG emissions
- Improved infrastructure resilience to the impacts of climate change, including to the increased risk of extreme weather events.
- Use of natural assets and restoration and creation of habitats to support biodiversity and climate change adaptation, with potential for wider societal benefits.

Policy Context:

The Climate Change (Scotland) Act 2019 increases Scotland's ambition for reducing GHG emissions, including a target for net-zero emissions by 2045.

A range of policies and strategies are in place that seek to reduce GHG emissions across sectors, including the Third Climate Change Plan, the National Transport Strategy, Scotland's Energy Strategy and the Energy Efficient Scotland: route map. Energy efficiency is also set out as a National Infrastructure Priority.

The role of multipurpose land use and the many functions that nature provides is set out in the Scottish Forestry Strategy, the Land Use Strategy and 2020 Challenge for Scotland's Biodiversity.

Independent advice on a net-zero economy for Scotland that is fair for all is provided by the Just Transition Commission.

Constraints:

- Cost implications from the roll-out of new technologies
- Lack of infrastructure for large scale uptake of some technologies
- Infrastructure performance can be significantly impacted by climate change.
- Land availability and conflicting demands for land use
- Uptake of circular economy principles in manufacturing practises requires "buy in" which will influence the extent of benefits realised

Summary of Findings

There is the potential for significant positive effects to arise from reductions in GHG emissions, in particular, where a focus is given to supporting the decarbonisation of heat and transport, and to increasing energy efficiency (**climatic factors**). This is likely to be complemented by the focus given in the draft Plan towards decarbonising industry, including manufacturing. Linked to this, there is potential for positive impacts for improved **air quality** through reduced emissions, with associated benefits for **population and human health**. The focus given in the draft Plan to supporting a circular economy and reduced waste also has the potential to lead to positive effects for **climatic factors** and **material assets**, through improved waste management, reduced pressure on existing landfill infrastructure, and associated reductions in GHG emissions.

Where consideration is given to natural assets, e.g. woodland and forestry creation and peatland restoration, significant positive effects for **climatic factors** should arise, alongside multiple benefits, including for **biodiversity, water and soil**, e.g. through habitat creation, natural flood management and soil stabilisation. Additionally, natural assets can provide opportunities for recreation and some natural assets can have an important influence on **landscape** and be of cultural value (**population and human health and cultural heritage**). However, mixed effects on **landscape** can arise from poorly designed woodland and forestry creation.

Support for increased decarbonisation, energy efficiency, coastal resilience and flood management can also help to support climate change adaptation and help reduce disruption to key services with benefits for **climatic factors, water, population and human health, and material assets**. This is likely to be of particular importance where assets and /or the communities they support are more vulnerable to the impacts of climate change, for example life line services in remote areas. Many landscapes and sites of historic significance are located around the coast and there is potential for positive impacts for **cultural heritage** from the focus given to reducing the risk of coastal erosion and flooding.

The potential for localised adverse effects has been identified where new or upgraded infrastructure is required. For example, the development of low carbon technologies or novel fuels could lead to negative environmental effects from construction activities and siting of developments, with the potential for both temporary and long-term effects on **biodiversity, soil, water and air quality**. Other long term impacts could arise for **cultural heritage, landscape, and material assets**, for example, from changes in setting due to land use change, and increased pressure on land. The efficient use of resources and circular economy principles, is recommended where possible, reducing pressure on the use of natural resources.

The significance of any such impacts would likely depend on factors such as the type, scale, location and setting of individual projects. Local level consideration would need to be given to the potential implications that may arise through the siting, construction and development of any individual infrastructure proposals. Existing mechanisms, such as EIA and relevant consenting regimes, can reduce the potential for negative impacts. Additionally, it is considered that the identified potential negative impacts that might arise from woodland and forestry creation can be mitigated by adhering to relevant forestry standards and guidelines. Opportunities also exist for the re-use of infrastructure and to support circular economy principles, as supported by the draft hierarchy, with the potential for positive effects on **climatic factors** and **material assets**.

Overall Significant Impacts

-  Climatic factors, Air quality
-  Population and human health, Water, Biodiversity, Cultural Heritage, Material assets.
-  Soil, Landscape

Key Findings:

- Significant benefits for climatic factors should arise, particularly where a focus is given to continued support for decarbonisation of heat and transport networks, alongside increased energy efficiency, and circular economy principles.
- Where a focus is given to coastal resilience and flood management, significant benefits can arise for population and human health, cultural heritage and material assets.
- Natural assets can lead to multiple benefits, including through carbon sequestration and support for climate change adaptation and by providing a natural solution to flood management with potential benefits for biodiversity, water and soil,
- There is potential for adverse effects to arise from the construction of new infrastructure or upgrades to existing infrastructure and these can be managed through relevant consenting and assessment regimes.

Key theme: Driving inclusive economic growth

Seeks to boost productivity and competitiveness, and create good jobs and green jobs, by enhancing transport and digital connectivity and capacity in all areas of Scotland, and by stimulating innovation. The importance of supporting inclusion is also noted.



Opportunities:

Improved connectivity, including digital connectivity, could lead to greater efficiencies across a range of sectors, including the delivery of public services, energy and transport.

Potential to reduce barriers to accessibility and promote equality

Provide for new and innovative technologies and increase flexibility in how goods and services are provided and accessed



Policy Context:

Scotland's National Performance Framework "...aims to reduce inequalities and gives equal importance to economic, environmental and social progress."

Scotland's Economic Strategy sets overarching aims for increasing sustainable economic growth for Scottish industry, supported by a range of sector-specific policies and strategies.



Constraints:

Location, age and income can impact on individual's ability to access key goods and services

Viability of some new and innovative technologies and alternative fuels is uncertain and likely to require further consideration



Summary of Findings

Significant positive effects for **population and human health** are likely to arise where the draft Plan leads to increased access to goods and services, particularly to vital services such as employment. Wider societal benefits for **population and human health** should also arise, particularly where a focus is given to reducing barriers for individuals or communities with specific needs or where inequalities currently exist. Increased connectivity and the movement of people and goods has however the potential to lead to negative impacts for **climatic factors** and **air quality** where this leads to the increased uptake of less sustainable modes of transport. Where the Plan gives support to the decarbonisation of transport, including through a focus on sustainable and active travel, potential negative impacts should be reduced or avoided and benefit the transport system overall. Potential benefits are also likely to arise where support is given to innovation, research and development, particularly where this also supports climate change mitigation and adaptation. For example, digital connectivity and data infrastructure has the potential to play a central role in influencing how good and services are accessed and in the continued decarbonisation of energy and transport systems, with associated benefits for **climatic factors, air quality** and **population and human health**. Strong data infrastructure can also increase collaboration, efficiency and productivity in public and private sectors, nationally and internationally, however, digital technology is an increasing area of energy consumption, including through the energy requirements of data centres. The potential impacts of this should be reduced through support given in the draft Plan towards the continued decarbonisation of the energy sector. It is also recommended that opportunities are explored to power data centres from low carbon or renewable sources.

Positive impacts for **climatic factors, population and human health** and **material assets** should arise where consideration is given to future proofing digital assets, for example, by ensuring that new and emerging technologies can be accommodated, including those that support innovation and decarbonisation and enhance data accessibility. At the same time, the need to get greater value from data to meet a range of needs is expected to become increasingly vital. The focus provided by the draft Plan on increased resilience and adaptability of infrastructure assets to the predicted impacts of climate change, should benefit **climatic factors** and **materials assets**. Where new or updated infrastructure is required to support improved connectivity, for example, enhancements to the transport network, localised adverse impacts can arise. Direct impacts from development works can include temporary or long-term impacts from construction and operational activities (**soil, air, water, biodiversity, population and human health**). The siting and construction of developments could also have effects on the setting of cultural heritage and landscape assets (**cultural heritage** and **landscape**).



Key Findings:

- Significant benefits for population and human health should arise from increased access to goods and services, including key services such as employment.
- Wider benefits for climatic factors and air quality should also arise from innovation and technological developments, including through the role of digital infrastructure in supporting the decarbonisation of energy and transport systems.
- Support provided by the draft Plan to decarbonise the energy and transport, should also help reduce the potential for potential negative impacts that could arise from the uptake of less sustainable modes of transport and increased energy consumption from digitisation
- Measures taken to strengthen connectivity, such as enhancements to the transport network. has to potential to lead to adverse impacts on topics such as soil and landscape which will require local level consideration.

Overall Significant Impacts



Climatic factors, Population and human health, Material assets



Soil, Landscape

Key theme: Building resilient and sustainable places and communities

Recognises the importance of starting at the local community level to deliver the ambition for a fairer Scotland, including through investing in housing and better local delivery of services. Sets out to work with partners to meet the diverse economic, social and environmental needs of urban, rural and island areas.

Opportunities:

Improved access to key services, including vital healthcare services, and improved sense of place and community cohesion

Potential for greater community engagement to ensure diverse needs are met

Increased integration of infrastructure investment across systems, such as transport, energy and digital

Policy Context:

National Planning Framework 3 and Scottish Planning Policy set out ambitions for a successful, sustainable place, a low carbon place and a natural resilient place. Work on National Planning Framework 4 is currently underway.

Scottish Government policy on place-making is supported by tools such as the Place Principle and Place Standard

Policy relating to fuel poverty, such as the draft Fuel poverty Strategy for Scotland 2018 and Energy Efficient Scotland: route map, seek to improve human health by improving energy efficiency within housing stock.

Constraints:

Potential cost implications of the development and implementation of alternative fuels sources.

Upgrades and investment may be necessary to improve efficiency in older buildings.

Summary of Findings

Place has an important role to play in health and wellbeing and in tackling health inequalities. Significant positive effects for **population and human health** are likely to arise where a focus is given to place and to the provision of inclusive, healthy, resilient and safe places for people and communities, including through improved access to key public services, particularly where barriers currently exist. Designing places that are safe to move around can also help reduce dependency on private car use, encourage the uptake of active travel, and lead to wider societal benefits including increased community cohesion, leading to significant positive effects for **climatic factors, air quality, population and human health and material assets**. This should be supported by the focus provided by the draft Plan to co-location and sharing of resources, which can lead to additional benefits from reduced pressure on natural resources, including for **biodiversity**. Additional benefits for **climatic factors, population and human health, cultural heritage and material assets** have the potential to arise where opportunities are sought to ensure that current assets are maintained, repurposed and adapted. Further, benefits should arise through the focus given in the draft Plan to investment in natural infrastructure, as the “green” and “blue” features of the natural and built environment, and the range of services they provide, are widely recognised and valued as essential components of successful places.

Focus given in the draft Plan to greater public consultation, building on the “Place Principle,” should ensure the diverse needs of all population groups are recognised and will support a strategic approach to spatial planning, particularly where consideration is given to the challenges and opportunities for infrastructure integration, and can support for community led regeneration, benefiting **population and human health and material assets**. Successful places need to be connected and infrastructure can't be considered in isolation, for example houses need services such as energy and water. There are also key synergies between digital infrastructure and other forms of infrastructure, such as, transport and energy. Potential benefits can also arise where increased consideration is given to the integration of infrastructure requirements across all systems, including through the provision of warmer, more energy efficient building stock with associated benefits for **climatic factors, population and human health and material assets**. Resilient infrastructure helps protect the economy by reducing disruptions from shocks, such as severe storms and support the continuity of critical services such as power and water during a crisis, with associated benefits for **population and human health**.

Overall Significant Impacts



Climatic factors, Population and human health, Air quality, Biodiversity, Cultural heritage, Material assets

Key Findings:

- A focus on place based infrastructure investment has the potential to significantly benefit climatic factors, cultural heritage, population and human health and material assets, in particular, by ensuring that existing assets are maintained, repurposed and adapted to support sustainable place making.
- Particular benefits should arise for population and human health where consideration is given to differing geographical locations and to the differing needs of communities and populations including through increased public engagement.
- Improved integration and resilience across all networks should lead to benefits for climatic factors, population and human health and material assets though reduced risk of disruption from the impacts of climate change, with particular benefits for population and human health where this leads to the continuity of critical services.

6.2 Assessment findings

- 6.2.1 The following narrative draws together the findings from Stage one to consider the overall likely significant environmental effects of the draft Plan (Stage 2), including the potential for in-combination and cumulative effects (Stage 3).

Question 1: what are the overall likely significant environmental effects of the draft Infrastructure Investment Plan?

- 6.2.2 Through the draft common investment hierarchy, the draft Plan has the potential to lead to significant benefits for climatic factors and material assets by ensuring consideration is given to how current assets can be maintained, used and adapted to prolong their lifespan. This can reduce the need for new build over time and in turn can reduce associated energy requirements (embodied energy). Reducing the need for new build also has the potential to have significant positive impacts on climatic factors, soil, water, biodiversity and material assets by reducing pressure both on natural resources, and on the amount of waste going to landfill from construction activities.
- 6.2.3 Significant benefits for climatic factors are considered likely where the draft Plan supports continued decarbonisation across sectors, particularly where focus is given to heat and transport, due to their contribution to GHG emissions. Additional benefits should also arise for air quality and population and human health, for example, from the displacement or reduction of energy generated from traditional energy sources, and the provision of warmer, more energy efficient building stock and uptake of active travel. The benefits of this are likely to be experienced to a greater extent where measures are focused towards those who may need higher levels of support, for example, those living in fuel poverty.
- 6.2.4 With the adverse and unpredictable impacts of climate change expected to intensify, significant positive effects are expected to arise for population and human health, cultural heritage and material assets where the draft Plan seeks to ensure infrastructure investment supports resilience and adaptation to the impacts of climate change, including from flooding and coastal erosion. Positive impacts could be maximised where opportunities are sought to focus measures towards communities and assets considered to be at the greatest risk from the impacts of climate change. For example, communities less able to prepare and recover from the impacts of flooding or to vulnerable lifeline services. Where consideration is given in the draft Plan to natural infrastructure, such as woodland creation and peatland restoration, significant benefits should not only arise through natural flood management, but from the multiple benefits that can arise in supporting biodiversity and climate change mitigation and adaptation. Wider societal benefits can also arise from the use of natural infrastructure, further benefiting population and human health.
- 6.2.5 Significant benefits are considered likely to arise for population and human health, including where the draft Plan seeks to improve access to important public services, such as health services, education and employment

opportunities. Particularly where focus is given to improving facilities and access to services for members of society or areas where current barriers may exist, such as though location, age and income. Additional benefits should also arise for population and human health, climatic factors and air quality where this leads to reduced travel. Ensuring support for inclusive growth is considered alongside other relevant plans such as Scotland's National Transport Strategy, should reduce the potential for increased uptake of less sustainable modes of travel to arise. The approach set out in the draft Plan is also likely to support a move towards a net-zero economy that is fair for all, as set out in the Just Transition Principles³².

- 6.2.6 Digital infrastructure is likely to play an increasing role in how goods and services can be accessed and delivered, including key public services, and significant benefits for climatic factors and population and human health should arise where focus is given to supporting digital connectivity and data infrastructure. This is likely to become increasingly vital as reliance on getting more value from data to meet a range of needs is likely to increase in line with the predicted growth in population³³. However, digital technology is an increasing area of energy consumption. The potential impacts of this should be reduced through support given in the draft Plan towards the continued decarbonisation of the energy sector. There is also an opportunity to support the use of renewable or low carbon technologies to power data centres.
- 6.2.7 Where focus is given to building resilient and sustainable places and communities, and in providing the right investment in the right places based on local need, significant benefits for population and human health are expected. In addition, benefits for climatic factors and cultural heritage have the potential to arise, particularly where opportunities are sought to ensure that current assets are maintained, repurposed and adapted to ensure assets meet diverse user needs or are multifunctional to support sustainable placemaking. For example, the re-purposing of existing assets to support local housing and employment needs. Co-location, sharing of resources and designing places to be safe and easy to move around can also lead to a reduced need to travel and can in turn increase access to good and services, potentially benefiting climatic factors and population and human health.
- 6.2.8 The approach taken in the draft Plan to prioritising investment decisions on a “no regret” basis, for their contribution to an inclusive net zero carbon economy and prioritising investments which deliver positive outcomes across more than one theme, has the potential to lead to a number of positive impacts. Particularly through the consideration given in the draft Plan to indicators such as impact on GHG emissions, delivery of renewable infrastructure and access to green and blue spaces, when assessing the potential benefits of

³² Scottish Government (undated) Just Transition Commission [online] Available at: <https://www.gov.scot/groups/just-transition-commission/> (accessed 28/07/2020)

³³ Open data for development (undated) State of open data - Data Infrastructure [online] Available at: <https://www.stateofopendata.od4d.net/chapters/issues/data-infrastructure.html> (accessed 16/01/2020)

infrastructure investment. For example, measures to support climate change mitigation and adaptation, can also benefit a place based approach to infrastructure investment and support inclusive growth, with associated benefits for climatic factors, biodiversity, population and human health and material assets.

- 6.2.9 The positive impacts identified in this assessment, and where multiple benefits can be realised, have the potential to be supported in the future through proposals set out in the draft Plan on developing a new, system wide infrastructure investment assessment and prioritisation, including the development of an up to date “needs assessment”. This should be complemented by the proposal in the draft Plan to develop a new carbon assessment methodology, with potential for significant benefits for climatic factors once implemented.

Question 2: what are the likely environmental effects that could arise from infrastructure delivery on the ground?

- 6.2.10 The draft Plan has the potential to lead to a number of impacts, both positive and adverse, through upgrades to existing infrastructure, or new infrastructure development on the ground. The construction and operation of infrastructure can lead to adverse impacts at local level, including from increased noise, dust and vibration, loss of soil and soil erosion and water pollution. Development can also lead to negative landscape and visual impacts and can adversely affect the setting of cultural heritage. Where impacts arise from construction these should be short-term and temporary, however impacts from land use change, such as the loss of soil and habitats, can be long-term and permanent. Inappropriately sited development could lead to increased risk of flooding, whilst conversely, flooding poses the greatest long-term climate-related risk to infrastructure performance.
- 6.2.11 The likely significance of effects arising will be influenced by a number of factors. For example, infrastructure requirements may be greater for relatively new energy technologies as presently there may be little infrastructure in place to support these, with impacts likely to be dependent on the individual technology and the scale of implementation. The siting and design of individual projects can also effect the significance of potential impacts. Given the level of uncertainty regarding factors such as location or scale of infrastructure delivery required to meet the objectives of the draft Plan, it is not possible to provide detailed assessment findings. The impact of individual development proposals would however be considered at the local level including through relevant consenting regimes.
- 6.2.12 Positive impacts can arise where the use of natural infrastructure leads to multiple benefits within the same spatial area. For example, this could include support for biodiversity, climate change mitigation and adaptation and wider societal benefits, such as improved community cohesion.

6.2.13 The emergence and expansion of new and existing technologies has the potential to offer substantial benefits, including at local level. For example, though increased efficiencies across a range of systems, innovation in how goods and services can be accessed and support for decarbonisation. Examples include the increased digitisation of services and the increasing role of data, including “smart” buildings and energy networks, and new low carbon technologies and novel fuels.

Question 3: how can the likely effects of infrastructure delivery be managed, mitigated or enhanced?

6.2.14 The draft Plan sets out that current infrastructure assets should be maintained, and should be resilient and fit for purpose leading to significant benefits. Alongside support for reuse and adaptation, co-location, and shared use of resources, this can significantly prolong the lifespan of current assets, in turn, reducing the need for new build assets over time. Where the replacement of existing assets is required, the draft Plan includes a presumption against like for like replacement of existing assets and supports measures which improve sustainability, accessibility and the use of circular economy principles in new build assets.

6.2.15 Improved resilience and future proofing of infrastructure, including through the consideration of population and climate change projections, can help ensure that assets are more resilient, resource efficient and responsive to greater numbers of people, including through the consideration of diverse needs. This can in turn help to reduce new or upgraded infrastructure works to accommodate changes, including as new and innovative technologies emerge.

6.2.16 As the risks from the impacts of climate change increase, the focus given in the draft Plan to supporting resilience and adaptation across all networks is likely to be of particular benefit. Including where the draft Plan leads to greater consideration being given to how infrastructure assets can impact on the risk flooding, both positively and negatively and through the focus provided to natural infrastructure and nature-based solutions.

6.2.17 Infrastructure delivery will be informed and guided by the National Planning Framework 4 (NPF4) and the new system of development planning introduced through the Planning (Scotland) Act 2019. NPF4 is a long term plan for Scotland, setting out where development and infrastructure is needed to support sustainable and inclusive growth. The Scottish Government is currently reviewing the NPF4 and a key objective will be to promote the alignment of development and infrastructure at the local, regional, and national level, by identifying infrastructure capacity, need and what is required to support its delivery, with the opportunity for people to develop and shape proposals for the development and use of land in the place where they live.

6.2.18 Finally, individual proposals for new or upgraded infrastructure will be subject to all relevant statutory and other assessments and, where appropriate, adverse impacts mitigated through the relevant statutory consenting procedures. The

development of any further, more detailed plans, programmes or strategies for infrastructure delivery would themselves require consideration under the Environmental Assessment (Scotland) Act 2005. Candidate national developments for designation through NPF4 will be assessed as part of the SEA of NPF4. Transport specific projects are also likely to be subject to the Scottish Transport Appraisal Guidance (STAG) methodology.

Question 4: how can this assessment be taken into account at regional and local level?

- 6.2.19 There is an opportunity for the findings of this SEA to be taken into account as related plans, programmes and strategies are progressed, including NPF4, work on which is currently underway and which will itself be subject to SEA. There is opportunity for the findings set out in this Environmental Report to help inform the NPF4 assessment and other relevant assessment work. For example, Local Development Plans are also subject to the requirements of the 2005 Act, and individual projects may be subject to EIA and/or STAG.

6.3 Conclusions and recommendations for mitigation and enhancement

- 6.3.1 Whilst individually, the three key themes and draft common investment hierarchy have the potential to give rise to significant positive impacts, it is in considering these collectively and in combination that their effects will be optimised. Overall, significant benefits are considered likely to arise for climatic factors, air quality, water, population and human health, biodiversity, cultural heritage and material assets from the approach to infrastructure investment set out in the draft Plan. For example, measure to support climate change mitigation and adaptation can also benefit a place based approach to infrastructure investment and support inclusive growth. In particular, the SEA supports the focus given in the draft plan to maximising the use of existing assets ahead of new build.
- 6.3.2 The SEA further supports the proposal to amend the Scottish Government's definition of infrastructure to include natural infrastructure, as well as the focus given to nature based solutions in the draft Plan. It is recommended that the use of nature based solutions is maximised wherever possible to ensure the potential for multiple benefits, including for climatic factors and biodiversity, is fully realised.
- 6.3.3 The draft common investment hierarchy provides a critical "lens" to better understand how current assets can be utilised to achieve the objectives of the draft Plan and its key themes, with opportunities for greater consideration of resilience and future proofing. Further, when aligned with circular economy principles, this focus has the potential to lead to significant benefits and is supported by the SEA. To further maximise these benefits, it is recommended that a focus is given to maintaining assets at greatest risk, and to the re-use of infrastructure in areas of greatest need, whilst also giving consideration to wider network interdependencies.

- 6.3.4 The approach taken by the draft Plan to prioritising infrastructure investment decisions, including prioritising investments which deliver positive outcomes across more than one theme, has the potential to lead to a number of positive impacts. Proposals to develop a new, system wide infrastructure assessment and prioritisation framework, in addition to the development of an approach to enable the carbon assessment of future Infrastructure Investment Plans, are considered likely to maximise the positive impacts identified in this assessment and are welcomed.
- 6.3.5 The SEA supports the focus in the draft Plan towards a place based approach to infrastructure investment. It is recommended that opportunities for greater consideration of a place based approach to infrastructure planning continue to be explored within other relevant plans and programmes including those at lower tiers of plan-making, and in developing individual project proposals. Taking a place based approach will also be central to the development of NPF4, and its alignment with the draft Infrastructure Investment Plan help to ensure that the potential place based benefits of infrastructure investment are realised.
- 6.3.6 Finally, the draft Plan sets out a preference for the maintenance and use of existing assets, however, where upgrades to, or new infrastructure are required to meet the objectives of the draft Plan, these could lead both positive and negative impacts. For example, impacts from land use change, such as the loss of soil and habitats, can be long-term and permanent. Development can also lead to negative landscape and visual impacts. This has the potential to lead to mixed effects for soil and landscape, with the likely significance of these impacts influenced by a number of factors. For example, the siting and design of individual projects can affect the significance of potential impacts at the local level. The development of any further, more detailed plans, programmes or strategies for infrastructure delivery would themselves require consideration under the Environmental Assessment (Scotland) Act 2005. Individual development proposals continue to be subject to the usual consideration through the relevant consenting process, supplemented where appropriate by EIA, Habitats Regulations Appraisal (HRA), and via site controls and Environmental Management Plans.
- 6.3.7 The SEA supports that where new infrastructure is required, this follows the principles set out in the draft Plan and draft infrastructure investment hierarchy that seek to ensure that consideration is given to their suitability and sustainability in meeting future needs.

7 Monitoring

- 7.1.1 A number of existing monitoring and reporting arrangements are relevant currently exist to provide accountability and transparency on the status and delivery of projects set out in the Infrastructure Investment Plan.
- 7.1.2 There are also a wide range of existing programmes in place at the national and local level that monitor environmental status and assess performance against established environmental indicators. Many of these are of relevance to the draft Plan. These include monitoring that is undertaken to measure progress towards the 11 key outcomes set out in Scotland's National Performance Framework. This includes outcomes that relate to inclusive, empowered, resilient and safe communities, the protection and enhancement of the environment, a skilled and well-educated workforce and promotion of an inclusive and sustainable economy.
- 7.1.3 As noted in Section 2, the Climate Change (Emissions Reduction Targets) (Scotland) Act 2019 ("the 2019 Act") amends the Climate Change (Scotland) Act 2009 Act ("the 2009 Act"). Combined, these set out a number of reporting and monitoring requirements with regard GHG emissions, including the requirement to lay regular "Climate Change Plans" in Parliament setting out proposals and policies for meeting emissions reductions targets and a provision to base progress on actual emissions from all sectors of the Scottish economy. Annual monitoring and reporting of Scotland's overall GHG emission abatement is also undertaken by the Committee on Climate Change¹. This process involves reporting emissions trends and performance against these targets at both the sectoral and national levels.
- 7.1.4 In addition to Climate Change Plans, the collation of data on greenhouse gas emissions is also considered in a number of relevant plans and as part of the Scottish Government statistics series. A monitoring and evaluation framework is also being developed as part of work in taking forward Scotland's second climate change adaptation programme (published September 2019). This will provide an opportunity to ensure that annual reporting on progress and implementation is evidentially supported. Statutory annual reporting on progress to the Programme as a whole happens each May³⁴.
- 7.1.5 Monitoring is also likely to be supported by a number of sector specific programmes, for example, in relation to transport and energy. A number of publications set out data on Scotland's energy mix and provide information on how energy is both generated and consumed. This includes those that set out progress towards Scotland's Energy Strategy, such as the Annual compendium

³⁴ Scottish Government (2020) Scottish Climate Change Adaptation Programme: progress report 2020 [online] Available at: <https://www.gov.scot/publications/scottish-climate-change-adaptation-programme-progress-report-2020/>

of Scottish energy statistics³⁵ and annual energy statements³⁶. The Scottish Energy Statistics Hub³⁷ collates energy statistics and data, including those that relate to local energy and energy efficiency. The National Transport Strategy will be supported by the development of a Delivery Plan and accompanying monitoring and evaluation framework. This will also include assessment against the National Performance Framework Outcomes. Transport Scotland³⁸ also publish annual statistics on data such as road transport vehicles and participation in active travel.

- 7.1.6 Monitoring is also a key aspect of NPF3, with progress towards the delivery of the outcomes it sets out reported upon³⁹. Consideration will be given to updating this process, including how this can further align with National Performance Framework indicators, as the development of NPF4 progresses. Biodiversity reporting is undertaken both nationally and locally via a number of mechanisms, including via the State of Nature Scotland⁴⁰ reports and the requirement for public bodies to report every three years to demonstrate compliance with the biodiversity duty, including reporting on progress towards Scotland's Biodiversity Strategy.
- 7.1.7 Progress reports are also produced annually that relate to Scotland's Land Use Strategy. Requirements to produce Flood Risk Management Strategies set out the predicted risk of flooding in Scotland, which includes consideration of surface water flooding and increased coastal erosion. Additionally, projects such as Dynamic Coast have been developed to assess coastal change and identify assets at risk.
- 7.1.8 Monitoring and reporting of air quality currently takes place at monitoring sites throughout Scotland and in some instances, includes real time monitoring data⁴¹. Key performance indicators aligned to Cleaner Air for Scotland: The Road to a Healthier Future⁴² are also monitored.

³⁵ Scottish Government [2019] Annual compendium of Scottish energy statistics [online] Available at: the Annual Compendium of Scottish Energy Statistics [online] Available at: <https://www.gov.scot/publications/annual-compendium-of-scottish-energy-statistics/>

³⁶ Scottish Government (2019) Annual energy statement 2019 [online] Available at: <https://www.gov.scot/publications/annual-energy-statement-2019/pages/1/>

³⁷ Scottish Government (2020) Scottish energy statistics hub index [online] Available at: <https://www.gov.scot/publications/scottish-energy-statistics-hub-index/>

³⁸ Transport Scotland (2019) Scottish Transport Statistics [online] Available at: <https://www.transport.gov.scot/publication/scottish-transport-statistics-no-37-2018-edition/> (accessed 05/07/2019)

³⁹ Scottish Government (2019) National Planning Framework 3: monitoring report [online] Available at: <https://www.gov.scot/publications/national-planning-framework-3-monitoring-report/pages/1/>

⁴⁰ Walton P, Eaton M, Stanbury A, Hayhow D, Brand A, Brooks S, Collin S, Duncan C, Dundas C, Foster S, Hawley J, Kinninmonth A, Leatham S, Nagy-Vizitiu A, Whyte A, Williams S and Wormald K (2019). The State of Nature Scotland 2019. The State of Nature partnership [online] <https://www.nature.scot/state-nature-scotland-report-2019>

⁴¹ Air Quality in Scotland (2019) Air Quality in Scotland: Latest pollution map [online] Available at: <http://www.scottishairquality.scot/> (accessed 05/07/2019)

⁴² The Scottish Government (2015) Cleaner Air for Scotland: The Road to a Healthier Future [online] Available at: <http://www.gov.scot/Resource/0048/00488493.pdf> (accessed 05/07/2019)

8 Next Steps

8.1 Commenting on the Environmental Report and draft Infrastructure Investment Plan

8.1.1 Public views are now invited on the draft Infrastructure Investment Plan and on this Environmental Report. The consultation runs until **19 November 2020** and responses can be submitted.

- Online via the Scottish Government website
- In writing to: Infrastructure Investment Plan Consultation, 3-C North, Victoria Quay, Edinburgh, EH6 6QQ
- By email to: InfrastructureInvestmentStrategy@gov.scot

8.2 Suggested Questions

8.2.1 Respondents may find the following questions helpful when commenting on this Environmental Report. Please note that responses do not need to be confined to these questions, and more general comments on the Environmental Report and the draft Infrastructure Investment Plan are also invited.

Questions:

1. What are your views on the accuracy and scope of the environmental baseline set out in the Environmental Report? (Please give details of additional relevant sources)
2. What are your views on the predicted environmental effects as set out in the Environmental Report?
3. What are your views on the proposals for mitigation, enhancing and monitoring of the environmental effects set out in the Environmental Report?

8.3 Analysis and Use of Responses

8.3.1 Following the consultation, a SEA Post-Adoption Statement will be prepared. The Statement will reflect on the views provided on the findings of the assessment and will explain how the comments received have been taken into account in finalising the Infrastructure Investment Plan.

Appendix A Abbreviations

AQMA	Air Quality Management Area
CO ₂	Carbon dioxide
EC	European Commission
EIA	Environmental Impact Assessment
EU	European Union
GHG	Greenhouse Gas Emissions
GWh	Gigawatt hours
HEPS	Historic Environment Policy for Scotland
HES	Historic Environment Scotland
HRA	Habitats Regulations Appraisal
IPCC	Intergovernmental Panel on Climate Change
MPA	Marine Protected Area
Mt	Million tonnes
MtCO ₂ e	Million tonnes carbon dioxide equivalent
NH ₃	Ammonia
NMVOCs	non-methane volatile organic compounds
NTS2	National Transport Strategy 2
NO _x	Nitrogen oxides
NPF3	National Planning Framework 3
NPF4	National Planning Framework 4
NTS2	National Transport Strategy
O ₃	Ozone
PMF	Priority Marine Features
PM _x	Particulate matter
PPS	Plan, Programme and/or Strategy
SAC	Special Area(s) of Conservation
SEA	Strategic Environmental Assessment
SEPA	Scottish Environment Protection Agency
NatureScot	Scotland's Nature Agency (formerly Scottish Natural Heritage)
SMID	Scottish Index Multiple Deprivation
SO ₂	Sulphur dioxide
SPA	Special Protection Area
SPP	Scottish Planning Policy
SSSI	Site(s) of Special Scientific Interest
STAG	Scottish Transport Appraisal Guidance
SUDs	Sustainable Urban Drainage Systems
The 2005 Act	The Environmental Assessment (Scotland) Act 2005
The 2009 Act	Climate Change (Scotland) Act 2009
The 2019 Act	The Climate Change (Emissions Reductions Targets) (Scotland) Act 2019

UK	United Kingdom
UN	United Nations
UNFCCC	United Nations Framework Convention on Climate Change
VOC	Volatile Organic Compound

Appendix B Broader PPS review

Plan, Programme or Strategy	Summary of key environmental objectives
Climatic Factors	
The Climate Change (Emissions Reduction Targets) (Scotland) Act 2019 (“the 2019 Act”) & Climate Change (Scotland) Act 2009 (“the 2009 Act”)	Discussed in section 3.2 as part of the immediate policy context.
The Climate Change Plan: the draft Third Report on Policies and Proposals 2018-2032 (2018)	Discussed in section 3.2 as part of the immediate policy context
UK Climate Change Risk Assessment 2017	The 2017 Risk Assessment outlines the UK and Devolved Governments’ view on the key climate change risks and opportunities. It endorses six priority risk areas, from flooding to coastal change, pests, diseases and invasive non-native species. Scotland specific evidence has also been collated into a “Scotland Report”.
Climate Ready Scotland Second Scottish Climate Change Adaptation Programme: 2019-2024 (2019)	Discussed in section 3.2 as part of the immediate policy context
United Framework Convention on Climate Change (UNFCCC) Paris Agreement	The Paris Agreement is the first ever legally binding global climate change deal. Adopted by 195 countries, the agreement came into force in November 2016.
<i>Related SEA topics: Climate change impacts are likely to have a direct or indirect impact on the other SEA topics such as population and human health and air quality</i>	
Population and Human Health including noise and vibration	

Air Quality (Scotland) Regulations 2000, Air Quality (Scotland) Amendment Regulations 2002 and Air Quality (Scotland) Amendment Regulations 2016	Set objectives for a number of airborne pollutants with implications for human health under the Environment Act 1995.
The Pollution Prevention and Control (Scotland) Regulations 2012	These aim to prevent or reduce damage to air, water and land arising from industrial processes, potentially preventing or reducing adverse human health impacts caused by exposure to industrial-related discharges.
Environmental Noise Directive (2002/49/EC)	Noise is recognised as a statutory nuisance and the Directive sets out measures relating to noise pollution and disturbance from vibration. Protection is also afforded within the Environmental Protection Act 1990 and Environmental Noise (Scotland) Regulations 2006, at the UK and national level, respectively. The Directive introduced methods for mapping noise, plans to address it and requirements for making information available to the public.
Cleaner Air for Scotland – The Road to a Healthier Future (2015)	<p>Notes the importance of clean air for health and wellbeing, and sets out information on the sources of air pollution and the impacts on health that these can have, in addition to setting out a series of actions that seek to improve air quality. The close relationship between air pollution and environmental noise is also noted.</p> <p>Cleaner Air for Scotland was subject to an independent review, which concluded in August 2019, as part of a commitment in the 2018/2019 Programme Government. Work is currently being taken forward to consider the findings of the review with a view to publishing a draft revised Strategy for public consultation Autumn 2020.</p>
A More Active Scotland: Scotland’s Physical Activity Delivery Plan (2018)	The Plan sets out a commitment to increase physical activity in Scotland. Focus is given to the supporting an increased uptake in active travel, including a commitment to invest in active travel infrastructure.

Related SEA topics: Many of the issues that affect population and human health have direct or indirect impacts on other SEA topics such as air quality.

Air Quality

Air Quality Strategy for England, Scotland, Wales and Northern Ireland	Areas in which measured levels of airborne pollutants exceed the objectives set out in the Air Quality Strategy are designated as Air Quality Management Areas (AQMAs). Local authorities have a duty to develop and implement Air Quality Action Plans in these locations in order to raise air quality to an acceptable level.
Local Air Quality Management Policy Guidance 2016	Explains the objectives for improving air quality and provides a framework for activities in Local Air Quality Management Areas.
<i>Related SEA topics: Air quality can directly or indirectly impact on other SEA topics, such as biodiversity and population and human health.</i>	
Biodiversity, flora, and fauna	
United Nations Aichi Targets	Includes a number of strategic goals: address biodiversity loss through mainstreaming, reduce direct pressures on biodiversity and promote sustainable use, improve biodiversity by safeguarding ecosystems, species and genetic diversity, and enhance the benefit to all from biodiversity and ecosystem services. Also aims to enhance participatory planning, knowledge management and capacity building.
UK Biodiversity Action Plan	Emphasises the importance of biodiversity and notes the impact of human development and the use of land on the health of ecosystems. Includes the overall goal of conservation and enhancement of biodiversity within the UK, to contribute to the conservation of global biodiversity. Also aims to increase public awareness and involvement in conservation.
The 2020 Challenge for Scotland's Biodiversity (2013)	The 2020 Challenge is Scotland's response to the UN Aichi Targets for 2020 and the EU Biodiversity Strategy to 2020. The 2020 Challenge supplements the 2004 Scottish Biodiversity Strategy and key aims include preserving and restoring the health of Scotland's ecosystems at a catchment-scale and promoting climate change resilience.
The Environment Strategy for Scotland: vision and outcomes	The Strategy sets out a vision of "One earth. One home. One shared future" and creates an overarching framework for Scotland's existing environmental strategies and plans, including the Climate Change Plan.
<i>Related SEA topics: Biodiversity, flora, and fauna impacts have direct or indirect effects on other SEA topics such as air, water and soil quality</i>	
Soil	

Scottish Soil Framework 2009	<p>The Framework acknowledges the multiple functions of soils and includes a vision that soils be recognised as a vital part of our economy, environment, and heritage, and be safeguarded for existing and future generations. It notes that while Scotland's soils are generally in good health, they face two significant pressures: climate change and the loss of organic matter, and identifies 13 key soil outcomes, such as protecting soil biodiversity, reducing and remediating soil erosion, and tackling greenhouse gas emissions.</p> <p>It also considers that improving the availability of soil data and highlighting the knowledge gaps and research needs in Scotland are both important.</p>
Scotland's National Peatland Plan	The Plan sets out a number of targets regarding the protection and restoration of peatland.
Scottish Government's draft Peatland and Energy Policy Statement	Seeks to align peatland and energy policy in order to maximise greenhouse gas emissions abatement in a way that delivers multiple benefits.
<i>Related SEA topics: Loss of soil or poor quality soils can have direct or indirect impacts on other SEA topics such as biodiversity, climatic factors and water quality</i>	
Water including coastal and marine	
EU's Water Framework Directive (2000/60/EC)/ Water Environment and Water Services (Scotland) Act 2003 and River Basin Management Plans	Scotland fulfils its water protection obligations under the Water Framework Directive through Water Environment and Water Services Act which define the establishment of River Basin Management Plans. These plans provide an assessment of the condition of Scotland's water environment, and identify where efforts for protection and improvement must be targeted.
Flood Risk Management (Scotland) Act 2009	The Act implements the requirements of the EU Floods Directive (2007/60/EC). The Directive mandates the creation of flood risk management plans for all inland and coastal areas at risk of flooding, integrating their development and employment with existing River Basin management Plans. Flood risk management plans are designed to minimise negative impacts due to flooding on a range of receptors, including human health, the environment, and cultural heritage.
Scotland's National Marine Plan (2015)	Covers the management of both Scottish inshore waters (out to 12 nautical miles) and offshore waters (12 to 200 nautical miles). The plan provides direction to a wide range of marine decisions and consents made by public bodies and seeks to promote development that is compatible with the protection and enhancement of the marine environment.

Related SEA topics: Water quality and quantity can have a direct or indirect impact on other SEA topics such as biodiversity and population and human health

Cultural Heritage and the Historic Environment

Historic Environment Policy for Scotland (HEPS) (2019)	<p>The Historic Environment Policy for Scotland is a policy statement that should be taken into account where decision making affects the historic environment, both at national and local level.</p> <p>It sets out a series of principles and policies for the recognition, care and sustainable management of the historic environment, and promotes a greater understanding and enjoyment of the historic environment. The policy statement helps to deliver the vision and aims of Our Plan in Time and takes into account principles that the UK and Scottish Governments have agreed to in international and conventions on cultural heritage and landscape.</p>
Our Place in Time – The Historic Environment Strategy for Scotland (2014)	<p>Our Place in Time sets out a 10 year vision for Scotland’s historic environment. The vision is founded upon the fundamental aims of understanding, protecting, and valuing our historic environment, ensuring it continues to benefit Scotland’s wellbeing through its cultural, social, environmental, and economic contributions.</p>

Related SEA topics: The SEA Topics of cultural heritage and landscape are closely linked. Also climate change can have direct or indirect impacts on cultural heritage and the historic environment

Landscape and Visual Amenity

NatureScot (formally Scottish Natural Heritage) Natural Heritage Futures (2002, updated 2009)	<p>Natural Heritage Futures aim to guide the sustainable management and use of Scotland’s nature and landscape up to 2025.</p> <p>They note the importance of the diversity of Scotland’s landscapes and their role inspiring people, creating sense of place and areas for recreation and enjoyment. They emphasise the strong cultural links with the environment and recommend integrated solutions and spatial plans with sufficient flexibility and clear objectives for natural heritage. The prospectuses were reviewed and updated in 2009.</p>
NatureScot Landscape Policy Framework	<p>The Policy Framework sets out an overarching aim for landscapes “to safeguard and enhance the distinct identity, the diverse character and the special qualities of Scotland’s landscapes as a whole, so as to ensure tomorrow’s landscapes contribute positively to people’s environment and are at least as attractive and valued as they are today”.</p>

NatureScot landscape policy – Wild Land Wildness in Scotland’s Countryside: Policy Statement	The policy statement describes the main pressures leading to loss of wildness and considers how to identify and care for wild land in Scotland. NatureScot identified 42 wild land areas following a detailed analysis of where wildness can be found across all of Scotland’s landscapes. This is based on four attributes: perceived naturalness of land cover; ruggedness of the terrain; remoteness from public roads or ferries; and lack of buildings, roads, pylons and modern artefacts This informed the preparation of the 2014 map of wild land areas. Wild land is not a statutory designation, however wild land areas as identified on the 2014 map are recognised as nationally important in SPP.
People, Place and Landscape – A position statement from NatureScot (formally Scottish Natural Heritage) and Historic Environment Scotland	The position statement sets out the vision and approach of NatureScot and Historic Environment Scotland for managing change in Scotland’s landscapes. The Statement includes a shared Vision and Principles that will guide effort for landscape, and identifies key outcomes.
<i>Related SEA topics: Climate change can have direct or indirect impacts on landscape, cultural heritage, and the historic environment</i>	
Material Assets	
National Transport Strategy (NTS2) (2020)	Discussed in section 3.2 as part of the immediate policy context
NPF3/SPP	Discussed in section 3.2 as part of the immediate policy context
Getting The Best From Our Land: A Land Use Strategy for Scotland 2016–2021	Sets a framework for a more unified and strategic approach to land use within Scotland. Its fundamental principles of “long-term, well integrated, sustainable land use delivering multiple benefits for all society” are consolidated across the management strategies for a range of sectors including forestry and agriculture.
Energy Efficient Scotland: route map (2018)	The route map sets out a vision that: by 2040 out homes and buildings are warmer, greener and more efficient. The route map sets out a 20 year programme of action with two main objectives: removing poor energy efficiency as a driver for fuel poverty and reduce greenhouse gas emissions through more energy efficient buildings and decarbonising the heat supply.
The Scottish Energy Strategy: The future of energy in Scotland (2017)	The Scottish Energy Strategy sets out Scottish Government’s vision for energy generation and consumption to 2050. The Strategy centres around three themes: meeting our energy supply needs, transforming Scotland’s energy use and smart local energy systems. The Strategy builds on a well-established framework for energy policy in Scotland, including Scottish Government’s 2020 Routemap

	for Renewable Energy, the Electricity Generation Policy Statement, the Heat Policy Statement: Towards Decarbonising Heat – Maximising the Opportunities for Scotland, and the Community Energy Policy Statement.
Heat Decarbonisation Strategy	A commitment in the Programme for Government, the Heat Decarbonisation Policy Statement will build on the ambitious route map to transform energy efficiency through the Energy Efficiency Scotland. A key objective of the Policy Statement will be to support heat decarbonisation of homes and buildings in Scotland, including the scaling up and acceleration of existing work with the aim to reduce emissions from heating our homes and buildings to levels compatible with net zero by 2045, in line with advice from the Committee on Climate Change and the targets in the 2019 Act.
Housing to 2040: consultation on outline policy options	Sets out Scottish Government’s draft vision and principles for Scotland’s homes and communities in 2040.
Scotland’s Forestry Strategy 2019-2029	The Scottish Forestry Strategy 2019-2029 aims to achieve sustainable development of forests and woodlands, through good management and better integration with other land uses. Priorities include ensuring forests and woodlands are managed sustainably, increasing the adaptability and resilience of forests and woodlands and expanding the area of forests and woodlands, recognising wider land-use objectives. The Strategy sets out a vision of “In 2070, Scotland will have more forests and woodlands, sustainably managed and better integrated with other land uses. These will provide a more resilient, adaptable resource, with greater natural capital value, that supports a strong economy, a thriving environment, and healthy flourishing communities.
Making Things Last: A Circular Economy Strategy for Scotland (2016)	<p>Sets out Scotland’s ambitions for changing how waste is seen in our economy. It seeks to reduce waste lost from the economy, and retain the value of materials through repair, reuse, recycling, and remanufacturing via a range of policies and proposals. This is noted as fundamental to helping tackle climate change and to preserve natural capital. Four priorities areas for action are identified in Making Things Last: food and drink and the broader bio-economy, remanufacture, construction and the built environment, and energy infrastructure.</p> <p>Making Things Last builds the progress that has been made to date and integrates key elements of the Zero Waste Plan (2010) and Safeguarding Scotland’s Resources (2013), with a view that in due course, the Strategy will supersede both.</p>

Realising Scotland's full potential in a digital world: A Digital Strategy for Scotland (2017)	The Strategy is a refresh of the 2011 "Scotland's Digital Future" sets out in action of how the Scottish Government intend to achieve its digital ambition.
Data Hosting and Data Centre Strategy	Sets out Scottish Governments vision for Scotland's public sector data hosting to be cost effective, carbon-neutral and, where appropriate, cloud based.
<i>Related SEA topics: Changes made to material assets can directly or indirectly impact on other topic areas, such as air quality and population and human health</i>	

Appendix C Relevant Environmental Protection Objectives and Environmental Baseline Information

1 Overview

- 1.1 It is a requirement of the 2005 Act that Responsible Authorities provide details of the character of the environment which may be affected, including existing pressures and the likely evolution of the environment in the absence of the plan, programme or strategy. The draft Plan has been assessed against this baseline to establish the type and significance of any environmental effects that could arise.
- 1.2 There are many objectives for environmental protection and enhancement detailed within existing legislation, policies, strategies and plans at the international, UK and national level across all environmental topic areas. In addition to forming the context for the draft Infrastructure Investment Plan, they also form the context for this SEA. An initial summary of the existing environmental protection objectives has been set out in the following sections of this Report. These complement the review of environmental protection objectives relevant to the draft Infrastructure Investment Plan which are set out in Section 3 and Appendix B.
- 1.3 Information has been drawn from a range of sources including the Scottish Government, NatureScot, Historic Environment Scotland (HES), the Scottish Environmental Protection Agency (SEPA), and Scotland's Environment Web, amongst others.

2 Climatic Factors

Environmental Protection Objectives: The Scottish Government recognises that there is a global climate emergency. There are many plans and policies that seek to reduce the rate of climate change, and the Climate Change (Emissions Reduction Targets) (Scotland) Act 2019 strengthens the ambition of Scotland's targets to reduce greenhouse gas emissions and includes a target of net-zero emissions of all greenhouse gases by 2045. The importance of adaptation to climate change impacts is also set out in a number of policies, including Climate Ready Scotland: Second Scottish Climate Change Adaptation Programme 2019-2024, with many noting the importance of collaborative action in order to deliver the objectives.

Overview

- 2.1 A report by the Intergovernmental Panel on Climate Change (IPCC), published in October 2018, predicts that the impacts and costs of global warming of 1.5°C above pre-industrial levels will be far greater than expected, and consequently much worse at 2°C⁴³. Further, the IPCC also reported that 1.5°C could be reached in as little as 11 years, and almost certainly within 20 years without major reductions in CO₂ emissions. The Scottish Government recognises that there is a global climate emergency and is acting accordingly.
- 2.2 In 2017, Scotland's emissions of the seven greenhouse gasses (GHG) were estimated to be 40.5 million tonnes of carbon dioxide equivalent (MtCO₂e), a decrease in source emissions of 3.3% from 2016⁴⁴. The main contributors to this reduction between 2016 and 2017 are reported to be a fall in energy supply emissions, driven almost entirely by a decrease in the use of coal in the power generation sector, and a reduction in emissions from the combustion of fossil fuels in the chemical industry. A 46.8% reduction in estimated GHG emissions between 1990 and 2017 was also reported⁴⁵. Decreases in emissions from energy supply, waste management (i.e. landfill), business and industrial processes (such as manufacturing) and agriculture and related land use were reported as the four main contributors to this overall reduction.

Evolution of the Baseline – Pressures, Trends and Key Points

- 2.3 The main contributors to Scotland's GHG emissions in 2017 were the transport sector (including international aviation and shipping) (approximately 37%), agriculture and related land uses (24%), business and industrial process (22%),

⁴³ IPCC (2018) Global Warming of 1.5oC October 2018 [online] Available at: <https://www.ipcc.ch/> (accessed 14/01/2020)

⁴⁴ Scottish Government (2019) Scottish Greenhouse Gas Emissions 2017 [online] Available at: <https://www.gov.scot/publications/scottish-greenhouse-gas-emissions-2017/pages/3/> (accessed 14/01/2020)

⁴⁵ Scottish Government (2018) Scottish Greenhouse Gas Emissions 2016 [online] Available at: <https://www.gov.scot/publications/scottish-greenhouse-gas-emissions-2016/pages/3/> (accessed 14/01/2020)

the energy supply sector (15%), and the residential sector (15%)⁴⁶. Relatively minor totals were reported for public sector buildings, development, and waste management. Forestry was a net carbon sink and contributed to reducing emissions by approximately 24% in 2017⁴⁷.

- 2.4 Almost three-quarters (73%) of Scotland's GHG emissions in 2016 were in the form of carbon dioxide (CO₂)⁴⁸. During 2016, CO₂ was the main GHG emitted in most sectors, with the exception of agriculture and related land use sector and waste management. Methane (followed by CO₂ and nitrous oxide) was the main gas emitted by the agricultural and related land use sector and almost all emissions emitted by the waste management sector were in the form of methane.
- 2.5 The operation, maintenance and decommissioning of infrastructure assets, as well as from the construction of new assets can influence carbon emissions. It is estimated that just over half of annual GHG emissions are associated with infrastructure, either through the building and operation of the assets (16% of the UK's annual total), or through the use of infrastructure (37% of total)⁴⁹.
- 2.6 It is predicted that the greatest direct climate change-related threats for the UK are large increases in flood risk, exposure to high temperatures and heat waves, shortages in the public water supply and for agriculture, energy production and industry; substantial risks to UK wildlife and natural ecosystems risks to domestic and international food production and trade⁵⁰. New and emerging pests and diseases, and invasive non-native species affecting people, plants and animals have also been noted as a research priority⁵¹.
- 2.7 Scotland's soils are the biggest terrestrial store of carbon in Scotland, with peat soils (or soils under peatland habitat) alone holding around 1.6 billion tonnes of carbon⁵²; 60 times more than carbon stored by trees and other vegetation⁵³. Inshore and offshore waters also store a significant resource of blue carbon, with an estimated 18 million tonnes of organic carbon stored in the top 10 cm of sediments across Scotland's seas⁵⁴. Stocks of carbon within the habitats and

⁴⁶ Scottish Government (2019) Scottish Greenhouse Gas Emissions 2017 [online] Available at: <https://www.gov.scot/publications/scottish-greenhouse-gas-emissions-2017/pages/3/> (accessed 14/01/2020)

⁴⁷ ibid

⁴⁸ ibid

⁴⁹ Mott MacDonald (2013) Infrastructure Carbon Review: Technical Report [online] Available at: <https://www.gov.uk/government/publications/infrastructure-carbon-review>

⁵⁰ Committee on Climate Change (2017) UK Climate Change Risk Assessment 2017. Available at: <https://www.theccc.org.uk/uk-climate-change-risk-assessment-2017/> (accessed 14/01/2020)

⁵¹ ibid

⁵² NatureScot [2019] Managing nature for carbon capture [online] Available at: <https://www.nature.scot/professional-advice/land-and-sea-management/carbon-management/managing-nature-carbon-capture> (accessed 14/01/2020)

⁵³ NatureScot [2019] Managing nature for carbon capture [online]. Available at: <https://www.nature.scot/climate-change/taking-action/carbon-management/managing-nature-carbon-capture> (accessed 14/01/2020)

⁵⁴ NatureScot (2014) Commissioned Report 761 – Assessment of carbon budgets and potential blue carbon stores in Scotland's coastal and marine environment. Available at: <https://www.nature.scot/snh-commissioned-report-761-assessment-carbon-budgets-and-potential-blue-carbon-stores-scotland> (accessed 14/01/2020)

surface sediments of inshore Marine Protected Areas are estimated at 9.4 Mt organic carbon and 47.8 Mt inorganic carbon⁵⁵.

- 2.8 The extent of the effects of climate change will vary by location and projections indicate that climate change trends observed over the last century will continue and intensify over the coming decades. Key long-term climate change trends for Scotland are that weather may become more variable, typical summers will be hotter and drier, winter and autumn will be milder and wetter and sea levels will continue to rise⁵⁶. Increases in summer heat waves, extreme temperatures and drought, as well as an increase in the frequency and intensity of extreme precipitation events, are also expected⁵⁷.
- 2.9 Climate change has been identified as a primary pressure on many of the SEA topic areas (i.e. soil, water, biodiversity, cultural heritage and the historic environment). These pressures and predicted impacts have been discussed further under the individual SEA topics. The complex interaction between air quality and climate change has also been considered under the SEA topic of “Air Quality”.
- 2.10 Climate change can also give rise to indirect impacts arising from mitigation and adaptation measures. For example, renewable energy is crucial to meeting Scotland’s emissions reduction targets. However, individual technologies can have negative environmental impacts such as localised visual effects, changes in landscape and land use, and impacts on biodiversity, water and air quality, amongst others.

3 Population and Human Health

Environmental Protection Objectives: A range of environmental protection objectives are relevant to population and human health, including aspirations for greenspaces and sustainable transport in and around settlements. Access to the outdoors, green infrastructure and encouragement of physical activity are also key aims. Key environmental objectives relating to this topic also include on-going commitments to reducing pollution, in particular from air pollutants. Wider policy also addresses reducing inequalities and improving health.

⁵⁵ NatureScot (2017) Commissioned Report No. 957: Assessment of Blue Carbon Resources in Scotland’s Inshore Marine Protected Area Network. Available at: <https://www.nature.scot/snh-commissioned-report-957-assessment-blue-carbon-resources-scotlands-inshore-marine-protected-area> (accessed 14/01/2020)

⁵⁶ Adaptation Scotland (2018) Climate trends and projections [online] Available at: <https://www.adaptationscotland.org.uk/why-adapt/climate-trends-and-projections> (accessed 14/01/2020)

⁵⁷ ibid

Overview

- 3.1 The estimated population of Scotland in 2017 was 5.4 million, the highest to date, and has increased by 5% over the last decade⁵⁸. Projections forecast that the population will continue to rise to around 5.6 million in 2026, continuing to increase to around 5.7 million in 2041. Life expectancy has increased over the past three decades, however this has slowed in recent years⁵⁹.
- 3.2 Almost 70% of Scotland's people live in urban areas, which accounts for just 2% of Scotland's land surface⁶⁰. Most of the population and industry is concentrated in highly urbanised areas in the Central Belt and on the East Coast, and primarily in four key city regions (Aberdeen, Dundee, Edinburgh, and Glasgow) and a number of smaller cities and towns (e.g. Ayr, Inverness, Perth and Stirling). Around 12.4% of the population live in small towns of less than 10,000 people; of these, around 70% are located within a 30 minute drive of large urban settlements, with the other 30% located more remotely⁶¹.
- 3.3 The most deprived area is in Greenock town centre, while the areas with the largest local share of deprived areas were Inverclyde and Glasgow City⁶². Other local authorities with relatively high levels of deprivation include North Ayrshire, West Dunbartonshire and Dundee City. Levels of deprivation have fallen in Glasgow City, Renfrewshire and City of Edinburgh compared to SIMD 2016 with Glasgow City showing the biggest fall (from 48% of data zones in the 20% most deprived areas in Scotland, to 44%). Levels of deprivation have increased in Aberdeen City, North Lanarkshire, Moray, East Lothian, Highland and North Ayrshire, however these are no greater than 2%. The least deprived area is in Stockbridge, Edinburgh, while Na h-Eileanan an Iar, Shetland and Orkney have no areas among the 20% most deprived in Scotland. However, this does not mean there are no people experiencing deprivation living there. Finally, the SIMD also shows that over half of people on low income do not live in the 20% most deprived areas in Scotland.
- 3.4 Human health is dependent on a number of environmental factors including access to services including health and education, employment, good quality outdoor recreation facilities and a high quality environment with good air, soil and water quality an important contributor to good health and well-being. Climate change poses a wide range of potential effects on human health, some harmful (e.g. increase in future flood events and effects on dwellings and

⁵⁸ National Records for Scotland (2018) Scotland's population 2017 [online] Available at: <https://www.nrscotland.gov.uk/news/2018/scotlands-population-2017> (accessed 14/01/2020)

⁵⁹ *ibid*

⁶⁰ Scotland's Environment (2014) Scotland's State of the Environment Report 2014 – 7 People and the environment [online] Available at: <https://www.environment.gov.scot/media/1170/state-of-environment-report-2014.pdf> (accessed 14/01/2020)

⁶¹ *ibid*

⁶² Scottish Government (2020) Scottish Index of Multiple Deprivation 2020. Available at: <https://www.gov.scot/news/scottish-index-of-multiple-deprivation-2020/> (accessed 24/02/20)

human health) and some beneficial (e.g. milder winters positively affecting health and cold related service disruptions)⁶³.

Evolution of the Baseline – Pressures, Trends and Key Points

- 3.5 Air quality is important for both short and long-term human health. In general, healthy people may not suffer from any serious health effects from exposure to the levels of pollution commonly experienced in urban environments. However, continual exposure can cause harm over the long term, and those with pre-existing health conditions such as heart disease, lung conditions, and asthma can be adversely impacted by daily exposure to air pollutants⁶⁴. Research has shown that air pollution reduces average life expectancy and can contribute to premature deaths⁶⁵.
- 3.6 Due to several common sources, most notably road traffic in urban areas, there is also a close relationship between air quality and environmental noise. Air pollution also disproportionately affects the most vulnerable members of society, including the very young, the elderly, people with existing medical conditions and those living in deprived urban areas and deprived circumstances. Activities that generate air pollutants have been considered under the topic of Air Quality.
- 3.7 Scotland's population is ageing, with around 19% of the population aged 65 or over, compared with 16% ten years ago⁶⁶. It is projected that those aged 75 and over will be the fastest growing age group in Scotland, with estimated increases of 27% by 2026 and 29% by 2041 expected⁶⁷.
- 3.8 Significant inequalities in levels of obesity persist between those living in the least and most deprived groups in Scotland. Overall, around 32% of adults living in the most deprived areas are classed as obese, compared with 20% of those living in the least deprived areas. Additionally, it is reported that this gap is widening for children. Similarly, the proportion of adults who regularly meet the guidelines for moderate or vigorous physical activity has not changed significantly over the last decade. Adults in the most deprived areas were at 32% more likely to have very low activity levels than those in the least deprived areas (12%)⁶⁸.

⁶³ The Research and Innovation for our Dynamic Environment (RIDE) Forum Health Climate Change Impacts Report Card 2015 (2015) [online]: <https://nerc.ukri.org/research/partnerships/ride/lwec/report-cards/health/> (accessed 04/02/2020)

⁶⁴ Scotland's Environment (2016) Air quality and health [online] Available at: <https://www.environment.gov.scot/our-environment/air/air-quality-and-health/> (accessed 14/01/2020)

⁶⁵ House of Commons Environmental Audit Committee (2010) Air Quality - Fifth Report of Session 2009-10 – Volume 1 [online] Available at: <http://www.publications.parliament.uk/pa/cm200910/cmselect/cmenvaud/229/229i.pdf> (accessed on 14/01/2020)

⁶⁶ Infrastructure Commission for Scotland (2020) Key findings report [online] Available at: <https://infrastructurecommission.scot/page/key-findings-report> (accessed 20/01/2020)

⁶⁷ *ibid*

⁶⁸ Scottish Government (2018) Scottish health survey 2018: Key findings <https://www.gov.scot/publications/scottish-health-survey-2018-summary-key-findings/pages/8/> (accessed 04/02/2020)

- 3.9 Greenspace not only has substantial environmental and health impacts, but can lead to wider societal benefits. For example, access to high quality greenspace can improve the health, wellbeing and confidence of people and communities as well as creating a sense of place⁶⁹. Green infrastructure and green spaces can also provide opportunities for active travel and regular exercise and to help deliver benefits for physical and mental health and well-being.
- 3.10 Heating and cooling homes and businesses accounts for approximately half of Scotland's GHG emissions. Challenging weather, poor energy efficiency and reduced heating options (especially in rural areas) can make fuel bills unaffordable, resulting in fuel poverty⁷⁰. In 2017, the level of fuel poverty remained similar to 2016; 24.9% or 613,000 households were fuel poor, and 7% or 174,000 households were living in extreme fuel poverty⁷¹. This compares to the 26.5% or 649,000 fuel poor households in 2016, with 7.5% or 183,000 households living in extreme fuel poverty⁷².
- 3.11 Flooding can have significant environmental impacts and can also affect people, communities and businesses⁷³. When floods occur, they disrupt day-to-day lives and their impacts can be long lasting. Climate change is expected to increase the risk of flooding in coming years, and it also brings additional risks to human health through changes to air quality and rising temperatures⁷⁴.
- 3.12 The potential risks and benefits of climate change on population and health will not be evenly spread. For example, pockets of dense urban development will be more at risk of surface water flooding and summer heat stress. In addition, the effects to human health from climate change may have the greatest impact on vulnerable people. Negative health effects are likely to be disproportionately severe in areas of high deprivation because of the reduced ability of individuals and communities in these areas to prepare, respond and recover⁷⁵. The elderly population are also less resilient to climate change and associated weather events.

⁶⁹ Scottish Government (2019) National Indicator: Greenspace [online] Available at: <https://www2.gov.scot/About/Performance/scotPerforms/indicator/greenspace#importance> (accessed 04/02/2020)

⁷⁰ Scottish Government (undated) Home energy and fuel poverty [online] Available at: <https://www.gov.scot/policies/home-energy-and-fuel-poverty/> (accessed 14/01/2020)

⁷¹ Scottish Government (2018) A national statistic publication for Scotland [online] Available at: <https://www.gov.scot/news/no-real-change-in-fuel-poverty-in-2017/> (accessed 14/01/2020)

⁷² *ibid*

⁷³ Committee on Climate Change (2017) UK Climate Change Risk Assessment 2017 Evidence Report [online] Available at: <https://www.theccc.org.uk/uk-climate-change-risk-assessment-2017/> (accessed 14/01/2020)

⁷⁴ *ibid*

⁷⁵ The Scottish Parliament (2012) SPICe Briefing: Climate Change and Health in Scotland [online] Available at: http://www.parliament.scot/ResearchBriefingsAndFactsheets/S4/SB_12-26rev.pdf (accessed 14/01/2020)

4 Air Quality

Environmental Protection Objectives: Air quality objectives aim to reduce emissions which are potentially harmful to health and the environment. There are also requirements for monitoring, with a particular focus on areas where air pollution is concentrated (Air Quality Management Areas).

Overview

- 4.1 As discussed in 'Population and Human Health', air pollution can result in adverse impacts on human health and can significantly affect many aspects of quality of life. Air pollution can also cause adverse effects in the wider environment. For example, it can increase nutrient levels in water bodies and soil and contribute to acidification, both of which can impact on plant and animal life, as well as damage the fabric of buildings and monuments.
- 4.2 The quality of the air around us is affected by the pollutants released into the atmosphere through human activities, such as transport, industry and agriculture as well as pollutants arising from natural sources. The main air pollutants are nitrogen oxides (NO_x), particulate matter (PM_x), sulphur dioxide (SO₂), ammonia (NH₃), volatile organic compounds (VOCs), and ozone (O₃). Sulphur dioxide, oxides of nitrogen, particulates, and low level ozone are generally considered to be of most importance in relation to human health and the environment⁷⁶.

Evolution of the Baseline – Pressures, Trends and Key Points

- 4.3 Air quality in Scotland has generally significantly improved since the 1950s, particularly in relation to CO and SO₂ with a significant fall in both NO₂ and PM₁₀ emissions since 2008. However, air pollution is still estimated to reduce the life expectancy of every person in the UK by an average of 7–8 months⁷⁷ and there are some towns and cities where air quality has been identified as a concern.
- 4.4 In Scotland there are, 38 Air Quality Management Areas (AQMA), with 15 of Scotland's 32 Local Authorities having declared at least one. The majority of these are in urban areas as a result of NO_x alone or in combination with PM₁₀ levels, and primarily as a result of traffic emissions⁷⁸.

⁷⁶ Scotland's Environment (2014) Scotland's State of the Environment Report 2014 [online] Available at: <https://www.environment.gov.scot/media/1170/state-of-environment-report-2014.pdf> (accessed 14/01/2020)

⁷⁷ Scottish Government (2015) Air Quality - Air Pollutant Emissions - High Level Summary of Statistics Trend [online] Available at: <http://www.scotland.gov.uk/Topics/Statistics/Browse/Environment/trendairpollutants> (accessed 14/01/2020)

⁷⁸ Air Quality in Scotland (2018) Air Quality Management Areas [online] Available at: <http://www.scottishairquality.co.uk/laqm/aqma> (accessed 14/01/2020)

- 4.5 Cleaner air provides multiple benefits and actions taken, such as a shift towards low or zero emissions transport and energy sources, should provide mutual benefits for both air quality and climate change⁷⁹. Further, action taken to improve air quality can also support improved human health and reduced health inequalities and improve the natural environment⁸⁰.

5 Soil

Environmental Protection Objectives: Soil objectives include European level recognition of the importance of soil resources and national commitments to sustainable soil management that protect valued soils, including prime quality agricultural land (the land most suitable for farming), and those with a high carbon content, such as peat. At national level, guidance on the development of wind farms on peat, and commitments to remediation of contaminated land and prevention of soil pollution are relevant.

Overview

- 5.1 Soil is a non-renewable resource and is fundamentally one of Scotland's most important assets⁸¹. It supports a wide range of natural processes and underpins much of our natural environment, helping to provide a wide range of environmental, economic and societal benefits. For example, soil provides the basis for food, controls and regulates environmental interactions such as regulating the flow and quality of water and providing a platform for buildings and roads⁸². There is an intrinsic relationship between soil health and other environmental topics; biodiversity, water and air quality in particular. For example, soil erosion is one of the main contributors to diffuse water pollution⁸³.
- 5.2 Scotland's soils play a key role as the main store of terrestrial carbon, most of it being held in peatland soils. It is estimated that Scotland's soils contain 3,000 million tonnes of carbon, making up over 50% of the UK's soil carbon⁸⁴. It is estimated that the loss of just 1% of soil carbon as carbon dioxide would triple Scotland's annual GHG emissions⁸⁵.

⁷⁹ Scottish Government (2015) Cleaner air for Scotland: the road to a healthier future [online] Available at: <http://www.gov.scot/Publications/2015/11/5671> (accessed 14/01/2020)

⁸⁰ *ibid*

⁸¹ Scottish Government (2006) Scotland's Soil Resource - Current State and Threats [online] Available at: <https://www2.gov.scot/publications/2006/09/21115639/7> (accessed 14/01/2020)

⁸² Scottish Government (2009) The Scottish Soil Framework [online] Available at: <http://www.scotland.gov.uk/Publications/2009/05/20145602/0> (accessed 14/01/2020)

⁸³ SEPA (undated) Soil [online] Available at: <http://www.sepa.org.uk/environment/land/soil/#effect> (accessed 14/01/2020)

⁸⁴ Scotland's Soils – part of Scotland's Environment (2017) State of Scotland's soils – State of Scotland's Soil Report 2011 [online] Available at: <http://soils.environment.gov.scot/soils-in-scotland/state-of-scotlands-soils/> (accessed 10/08/2020)

⁸⁵ *ibid*

- 5.3 Scotland has a diverse range of soils, which are generally more organic, more acidic, more leached and wetter than those of most other European countries. Only 25% of Scotland is used for arable crops (mostly in the eastern half of the country) and improved grassland, mostly on the more mineral soils of the central belt and in lowland areas and predominantly found in the south west. The remainder of the country is occupied by semi natural habitats over more organic soils with over 20% of Scotland being cover in peatland habitat on peat soils⁸⁶.

Evolution of the Baseline – Pressures, Trends and Key Points

- 5.4 While Scotland's soils are considered to generally be in good health, there are a range of pressures on them. Climate change and loss of organic matter pose significant threats to Scottish soils, with both likely to affect soil function, including loss of soil carbon. The loss of valued soils in particular has the potential for national impacts which will be difficult to reverse. In the case of climate change, these impacts have the potential to be felt on a global scale⁸⁷.
- 5.5 As with all soils, those under peatland habitat are at risk from land use change and the effects of climate change, and their loss or degradation (and the associated loss of carbon) has the potential to be a significant contributor to Scotland's GHG emissions⁸⁸.
- 5.6 Changes in land use and land management practices are also a key pressure on soil. These include activities such as transport and development, including road building and the expansion of agriculture and forestry⁸⁹. At present, there is uncertainty and a lack of quantitative information regarding threats to soil functions and ecosystem services, particularly in relation to the extent of soil sealing, changes in soil biodiversity, and compaction of soils⁹⁰. Estimates of soil sealing suggest figures of approximately 1000 hectares a year⁹¹.
- 5.7 Soil contamination can also arise from many causes, including atmospheric deposition, agriculture and forestry operations, mining and historic land contamination, and can impact on soil function and biodiversity⁹².

⁸⁶ Scottish Government (2009) The Scottish Soil Framework. Available at: <https://www.gov.scot/publications/scottish-soil-framework/> (accessed 11/05/20)

⁸⁷ *ibid*

⁸⁸ Scotland's Soils – part of Scotland's Environment (undated) Welcome to Scotland's soils [online] Available at: <http://soils.environment.gov.scot/> (accessed 14/01/2020)

⁸⁹ Scotland's Environment (2011) Soils [online] Available at: <https://www.environment.gov.scot/media/1213/land-soils.pdf> (accessed 14/01/2020)

⁹⁰ European Commission (2016) JRC Technical Reports - Soil threats in Europe - Status, methods, drivers and effects on ecosystem services [online] Available at: http://esdac.jrc.ec.europa.eu/public_path/shared_folder/doc_pub/EUR27607.pdf (accessed 14/01/2020)

⁹¹ SEPA (2011) The State of Scotland's Soil [online] Available at: <https://www.sepa.org.uk/media/138741/state-of-soil-report-final.pdf> (accessed 14/01/2020)

⁹² SEPA (2019) Guidance on consideration of soil in Strategy Environmental Assessment [online] Available at: <https://www.sepa.org.uk/media/162986/lups-sea-gu2-consideration-of-soil-in-sea.pdf> (accessed 14/01/2020)

6 Water

Environmental Protection Objectives: Coastal and marine water policies include Scotland's two River Basin Management Plans, which aim to improve the overall condition of water bodies inland and on the coast, and marine policies, such as Scotland's National Marine Plan. The protection of coastal areas and the management of both coastal and inland flood risk are also key objectives. The importance of the interaction between the marine and terrestrial environments is also noted.

Overview

- 6.1 Scotland's water provides a wide range of benefits that support our health and prosperity, such as the provision of drinking water and as a resource for use in agriculture and industry. These water resources also support a rich diversity of habitats and species, attract tourism, promote recreation and provide for the sustainable growth of the economy⁹³.
- 6.2 In recent decades, significant improvements to water quality in many rivers, canals, and estuaries have been observed alongside significant reductions in pollution. Most of Scotland's seas, coasts, and estuaries are in good or excellent condition; however, some localised areas of concern remain. Nearly half of rivers are now in good condition or better and almost two thirds of lochs surveyed were found to be in good or high condition⁹⁴. Scotland's groundwater is a valuable asset and nearly 80% of ground water bodies are considered to be in good condition⁹⁵.
- 6.3 Flooding can have significant and long-lasting impacts on people, communities, and businesses. Flood Risk Management Strategies⁹⁶ co-ordinate action to tackle flooding in Scotland, setting out the national direction for flood risk management and helping target investment and coordinate action across public bodies. Flood maps have also been produced which help to show where areas are likely to be at risk of flooding from rivers, seas and surface water⁹⁷.

Evolution of the Baseline – Pressures, Trends and Key Points

- 6.4 Key pressures on the surface water environment include urbanisation, an increase in invasive non-native species, intensive agriculture/aquaculture and climate change. Rural and urban diffuse pollution remains a concern for water

⁹³ Scotland's Environment (2014) Scotland's State of the Environment Report 2014 [online] Available at: <https://www.environment.gov.scot/media/1170/state-of-environment-report-2014.pdf> (accessed 14/01/2020)

⁹⁴ *ibid*

⁹⁵ Scotland's Environment (2016) Scotland's freshwater [online] Available at: <https://www.environment.gov.scot/our-environment/water/scotland-s-freshwater/> (accessed 14/01/2020)

⁹⁶ SEPA (undated) Flood Risk Management Strategies [online] Available at: <http://apps.sepa.org.uk/FRMStrategies/> (accessed 14/01/2020)

⁹⁷ SEPA (undated) Flood maps [online] Available at: <http://www.sepa.org.uk/environment/water/flooding/flood-maps/> (accessed 14/01/2020)

quality, particularly in relation to agriculture, forestry, and urban development⁹⁸. Ground water quality and flow can be affected by diffuse pollution from rural sources, discharges from industries such as mining and quarrying, and agriculture irrigation⁹⁹.

- 6.5 Airborne pollution can impact upon water bodies. Heightened nitrogen concentrations can cause the acidification and eutrophication of water bodies. Eutrophication occurs when the concentrations of otherwise limiting nutrients increase, allowing aquatic plants and algae to grow unchecked and depleting oxygen levels.
- 6.6 The predicted effects of climate change such as increased temperatures and changes to rainfall patterns could affect flows in rivers and impact on water resource availability¹⁰⁰. For example, water scarcity is expected to increase due to climate change¹⁰¹ with Scotland predicted to experience more frequent and more severe droughts with associated implications on water availability for drinking, agriculture and ecosystems¹⁰². A changing climate is also expected to lead to warmer sea and river temperatures and an increasing risk of non-native species spreading and becoming established in water environments¹⁰³, further impacting on aquatic ecosystems.
- 6.7 The risk of flooding from rivers, surface waters and sea is predicted to increase. It is estimated that there are currently 284,000 homes businesses and services at risk of flooding in Scotland, more than double that identified to be at risk in 2015¹⁰⁴. It is predicted that the number of properties at risk will increase by a further 110,000 by 2080¹⁰⁵. Flooding can damage material assets, pose risks to population and human health through the spread of infectious diseases and also lead to a loss of habitats, resulting from erosion.
- 6.8 The development and operation of new infrastructure has the potential to negatively impact on water quality, either during construction or via pollution

⁹⁸ SEPA (2015) The river basin management plan for the Scotland river basin district: 2015–2027 [online] Available at: <https://www.sepa.org.uk/media/163445/the-river-basin-management-plan-for-the-scotland-river-basin-district-2015-2027.pdf> (accessed 14/01/2020)

⁹⁹ Scotland's Environment (undated) Scotland's freshwater [online] Available at: <https://www.environment.gov.scot/our-environment/water/scotland-s-freshwater/> (accessed 11/02/2020)

¹⁰⁰ Scotland's Environment (2014) Scotland's State of the Environment Report 2014 [online] Available at: <https://www.environment.gov.scot/media/1170/state-of-environment-report-2014.pdf> (accessed 14/01/2020)

¹⁰¹ SEPA (undated) Water scarcity [online] Available at: <https://www.sepa.org.uk/environment/water/water-scarcity/> (accessed 27/07/2020)

¹⁰² ClimateXchange (2019) The increased risk of water scarcity in Scotland due to climate change and the influence of land use on water scarcity [online] Available at: <https://www.climatechange.org.uk/media/3680/cxc-water-scarcity-climate-change-and-land-use-options.pdf> (accessed 27/07/2020)

¹⁰³ SEPA (2015) The river basin management plan for the Scotland river basin district: 2015–2027 [online] Available at: <https://www.sepa.org.uk/media/163445/the-river-basin-management-plan-for-the-scotland-river-basin-district-2015-2027.pdf> (accessed 14/01/2020)

¹⁰⁴ Infrastructure Commission for Scotland (2020) Key findings report [online] Available at: <https://infrastructurecommission.scot/page/key-findings-report> (accessed 20/01/2020)

¹⁰⁵ *ibid*

run-off. New structures on land can also affect the capacity of flood plains or flood defences.

7 Biodiversity, Flora and Fauna

Environmental Protection Objectives: The importance of halting the loss to biodiversity, in addition to reducing pressure and promoting sustainable use is set out in a wide range of policy, including those that seek to meet International Aichi Targets. These include the 2020 Challenge for Scotland's Biodiversity which sets out objectives for the conservation and enhancement of biodiversity in Scotland. Habitats and species identified as of particular value are also considered within legislation and policies relating to the protection of biodiversity, flora and fauna from damage and disturbance. These policies define a hierarchy of protection, from the international to local level, including European sites and the suite of European Protected Species. Beyond designated sites and species, there are longer term aspirations for enhancing biodiversity, improving landscape-scale ecological networks and addressing the impacts of climate change on the natural environment.

Overview

- 7.1 Biodiversity is commonly used as a measure of the health of an ecosystem, and helps to provide the ecosystems services that are the basis of life including the regulation of air and water, soil formation, nutrient cycling, flood regulation and pollination, amongst many others¹⁰⁶. Biodiversity, flora, and fauna is also closely linked with other environmental topics, particularly soil and water, which help to support an incredible diversity of life across Scotland and in its surrounding waters.
- 7.2 The abundance and distribution of Scotland's species has on average declined over recent decades, with most measures indicating that this decline had continued in the most recent decade¹⁰⁷. The State of Nature Scotland Report 2019 shows that from 1994 to 2016, 49% of Scottish species have decreased and 28% have increased in abundance¹⁰⁸. Further, 11% of species have been classified as threatened with extinction from Great Britain and 133 (of those assessed) have already become extinct¹⁰⁹. Since 1970, changes in species

¹⁰⁶ NatureScot (undated) Ecosystem approach [online] Available at: <https://www.nature.scot/scotlands-biodiversity/value-ecosystem-approach/ecosystem-approach> (accessed 14/01/2020)

¹⁰⁷ Walton P, Eaton M, Stanbury A, Hayhow D, Brand A, Brooks S, Collin S, Duncan C, Dundas C, Foster S, Hawley J, Kinninmonth A, Leatham S, Nagy-Vizitiu A, Whyte A, Williams S and Wormald K (2019). The State of Nature Scotland 2019. The State of Nature partnership [online] <https://www.nature.scot/state-nature-scotland-report-2019>

¹⁰⁸ Ibid

¹⁰⁹ Ibid

distribution have also been recorded, with 33% of Scotland's wildlife found in fewer places and 20% found in more places¹¹⁰.

- 7.3 Scotland's protected areas include 251 Special Areas of Conservation (SACs), 153 Special Protection Areas (SPAs), 51 Ramsar sites and 2 Biosphere Reserves, amongst other internationally designated sites. There are further national level designations such as 1,423 Sites of Special Scientific Interest (SSSIs), 30 Marine Protected Areas (MPAs) and 2 National Parks¹¹¹. In addition to these, a recent consultation on proposed SPAs for Scottish Marine birds and site classifications set out additional sites to be designated¹¹². In June 2019, a further consultation on proposals to designate four new MPAs in Scottish waters was launched¹¹³. There are also a wide range of Priority Marine Features (PMFs) which help to conserve and enhance the marine environment¹¹⁴.
- 7.4 Areas of biodiversity value are not only found within the network of designated sites and many undesignated areas of Scotland also contain habitats and species that have important functions and roles. Greenspace such as public and private gardens, parks, woodlands, recreational grounds, green corridors, allotments and community growing spaces can provide habitats and ecosystems which are not only important to wildlife, but for human health and wellbeing¹¹⁵.

Evolution of the Baseline – Pressures, Trends and Key Points

- 7.5 Biodiversity loss has been well documented over the last 50 years, and today there is a range of pressures with the potential to impact on Scotland's wildlife and biodiversity.
- 7.6 The greatest drivers of change in biodiversity in Scotland are: climate change, urbanisation, pollution, woodland management, fisheries, invasive non-native

¹¹⁰ Walton P, Eaton M, Stanbury A, Hayhow D, Brand A, Brooks S, Collin S, Duncan C, Dundas C, Foster S, Hawley J, Kinninmonth A, Leatham S, Nagy-Vizitiu A, Whyte A, Williams S and Wormald K (2019). The State of Nature Scotland 2019. The State of Nature partnership [online] <https://www.nature.scot/state-nature-scotland-report-2019>

¹¹¹ NatureScot (undated) International designations [online] Available at: <https://www.nature.scot/professional-advice/safeguarding-protected-areas-and-species/protected-areas/international-designations> (accessed 14/01/2020)

¹¹² Scottish Government (2019) Proposed Special Protected Areas for Scottish marine birds: Strategic Environmental Assessment. Available at: <https://www.gov.scot/publications/proposed-special-protection-areas-scottish-marine-birds-supplementary-consultation-sea-site-classification/> (accessed 14/01/2020)

¹¹³ Scottish Government (2019) A consultation on proposals to designate four Marine Protected Areas in Scottish waters. Available at: <https://www.gov.scot/publications/marine-protected-areas-mobile-marine-species-consultation-proposals-designate-four-new-marine-protected-areas-scottish-waters/> (accessed 14/01/2020)

¹¹⁴ NatureScot (undated) Priority Marine Features in Scotland's seas [online] Available at: <https://www.nature.scot/professional-advice/safeguarding-protected-areas-and-species/priority-marine-features-scotlands-seas> (accessed 04/02/2020)

¹¹⁵ NatureScot (undated) Urban habitats [online] Available at: <https://www.nature.scot/habitats-and-ecosystems/habitat-types/urban-habitats> (accessed 14/01/2020)

species, freshwater management and agricultural management¹¹⁶. Over exploitation of natural resources is also a known pressure.

- 7.7 Climate change in particular has the potential to greatly impact on biodiversity on a global scale¹¹⁷. The predicted effects of climate change and the potential for associated impacts on biodiversity, flora and fauna are well documented, with evidence already showing the wide ranging effects that a changing climate can have on flora and fauna species and their habitats¹¹⁸. Indirect impacts may also arise through climate change adaptation and action taken in sectors such as agriculture, forestry, planning, water and coastal management in the face of a changing climate¹¹⁹.

8 Cultural Heritage and the Historic Environment

Environmental Protection Objectives: Cultural heritage objectives focus on protecting sites, townscapes (places, buildings and open spaces), buildings, archaeological sites, battlefields, wrecks and landscapes at international, national and local level. Policy also emphasises the importance of recognising and avoiding negative impacts on the wider setting of sites, and enhancement where appropriate. Key objectives also extend to preventing the loss of currently unknown archaeology. Policies on architecture and place aim to improve the quality of our settlements and built environment and emphasise the importance of recognising and avoiding negative impacts on the wider setting of recognised sites and enhancement where appropriate.

Overview

- 8.1 Scotland's many and varied historical sites are unique and irreplaceable. These sites and features are regarded as making a valuable contribution to our quality of life, cultural identity, education and economy. While these assets are distributed widely throughout Scotland, there are clusters of sites in and around our settlements and also around our coastlines.
- 8.2 Some parts of Scotland's historic environment are protected through a process of designation. The process aims to identify parts of the historic environment for their significance and enhance their protection. As of 2016, it is estimated that

¹¹⁶ Walton P, Eaton M, Stanbury A, Hayhow D, Brand A, Brooks S, Collin S, Duncan C, Dundas C, Foster S, Hawley J, Kinninmonth A, Leatham S, Nagy-Vizitiu A, Whyte A, Williams S and Wormald K (2019). The State of Nature Scotland 2019. The State of Nature partnership [online] <https://www.nature.scot/state-nature-scotland-report-2019>

¹¹⁷ Convention on Biological Diversity (undated) Climate Change and Biodiversity – Introduction [online] Available at: <http://www.cbd.int/climate/intro.shtml> (accessed 14/01/2020)

¹¹⁸ NatureScot (undated) Climate change impacts in Scotland [online] Available at: <https://www.nature.scot/climate-change/climate-change-impacts-scotland> (accessed 14/01/2020)

¹¹⁹ JNCC (2010) Biodiversity and Climate Change – a summary of impacts in the UK [online] Available at: <http://archive.jncc.gov.uk/page-5145> (accessed 14/01/2020)

around 5-10% of the historic environment is designated¹²⁰. Designated assets currently include World Heritage Sites, listed buildings, scheduled monuments, conservation areas and Historic Marine Protected Areas. However, whilst most of the historic environment is undesignated (90-95%), these known but undesignated assets provide important contextual information which helps us better understand designated sites¹²¹. Further, despite not being designated, Scotland's historic environment resonates internationally and nationally, as well as being culturally important to local communities.

Evolution of the Baseline – Pressures, Trends and Key Points

- 8.3 Development is a key pressure on the historic environment and cultural heritage, both directly in terms of damage to known and unknown features, and the potential for impacts on setting. Other known pressures include changing land use and land management and tourism/visitors and climate change¹²².
- 8.4 Climate change related impacts include damage to masonry, risk of dampness, condensation and fungal growth, vegetation growth, and accelerated decay. Historic landscapes and sites within the coastal zone are particularly vulnerable. Some of Scotland's unique and special sites, such as Skara Brae in Orkney, are at most risk¹²³. This threat will grow in the future, given the future predictions of the likely effects of global warming and climate change for the remainder of this century. Action to mitigate and adapt to the effects of climate change are also likely to have a significant effect.
- 8.5 The historic environment enhances quality of life and is a key social, cultural, economic and environmental resource. Management decisions affecting places of cultural significance should focus on avoiding or minimising adverse impacts¹²⁴. Decisions affecting the historic environment should ensure that its understanding and enjoyment as well as its benefits are secured for present and future generations¹²⁵. Development is a key pressure on the historic environment and cultural heritage, both directly in terms of damage to known and unknown features, and the potential for impacts on setting. Other known

¹²⁰ Historic Environment Scotland (2016) Scotland's Historic Environment Audit: Summary Report 2016 [online] Available at: <https://www.historicenvironment.scot/archives-and-research/publications/publication/?publicationId=315b3f0d-631b-4a24-b12b-a6db00ba1696> (accessed 14/01/2020)

¹²¹ Historic Environment Scotland (2016) Scotland's Historic Environment Audit: Summary Report 2016 [online] Available at: <https://www.historicenvironment.scot/archives-and-research/publications/publication/?publicationId=315b3f0d-631b-4a24-b12b-a6db00ba1696> (accessed 14/01/2020)

¹²² Historic Environment Scotland (2019) Historic Environment Policy for Scotland [online] Available at: <https://www.historicenvironment.scot/archives-and-research/publications/publication/?publicationId=1bcfa7b1-28fb-4d4b-b1e6-aa2500f942e7>

¹²³ Scotland's Environment (2014) Scotland's State of the Environment Report 2014 [online] Available at: <https://www.environment.gov.scot/media/1170/state-of-environment-report-2014.pdf> (accessed 14/01/2020)

¹²⁴ Historic Environment Scotland (2019) Historic Environment Policy for Scotland [online] Available at: <https://www.historicenvironment.scot/archives-and-research/publications/publication/?publicationId=1bcfa7b1-28fb-4d4b-b1e6-aa2500f942e7>

¹²⁵ Ibid

pressures include changing land use and land management and tourism/visitors and climate change¹²⁶.

9 Landscape and Geodiversity

Existing Environmental Protection Objectives: Landscape objectives, including the European Landscape Convention, recognise and protect special landscapes but also aim to improve degraded landscapes and highlight the importance of all landscapes. Key national objectives include the National Scenic Areas Programme which demonstrates a continuing commitment to protect the special qualities of nationally important landscapes and seascapes. Policies include a continuing commitment to protecting the special qualities of nationally important landscapes, with planning seeking to maintain and enhance distinctive landscape character.

The environmental protection objectives set out in legislation and policy for geodiversity are broadly aimed at protecting geological and geomorphological features from damage and disturbance, principally by identification and conservation of areas of particular value. Geological sites are also protected, including through the geological Sites of Special Scientific Interest designation.

Overview

- 9.1 Rich in diversity, Scotland's landscapes are internationally renowned. Scotland's distinctive landscapes are a significant part of the country's natural and cultural heritage, and make a significant contribution to both the country's economic performance and the well-being of its people. Scotland's landscapes play a key role in attracting tourism, affording opportunities for business and providing the setting for outdoor recreation.
- 9.2 Landscape and geodiversity are closely linked. Geodiversity is the physical basis for Scotland's varied landscapes (both rural and urban) and scenery, and has a profound influence on terrestrial and marine habitats, wildlife and use of land and water. Many places in Scotland are of great importance to geoscience for their rocks, fossils and landforms, demonstrating important geological processes or events that have significant value for education and research and as part of Scotland's geoheritage.
- 9.3 There are currently two National Parks (Loch Lomond and The Trossachs, and the Cairngorms) and 40 National Scenic Areas in Scotland. Over 13% of Scotland's land area has been classified as a National Scenic Area¹²⁷.

¹²⁶ Historic Environment Scotland (2019) Historic Environment Policy for Scotland [online] Available at: <https://www.historicenvironment.scot/archives-and-research/publications/publication/?publicationId=1bcfa7b1-28fb-4d4b-b1e6-aa2500f942e7>

¹²⁷ NatureScot (undated) National Scenic Areas [online] Available at: <https://www.nature.scot/professional-advice/safeguarding-protected-areas-and-species/protected-areas/national-designations/national-scenic-areas> (accessed 14/01/2020)

Designations such as Local Landscape Areas, Special Landscape Areas, Regional Scenic Areas and Areas of Great Landscape Value have also been established at a regional and local level by many local authorities. These areas of important nature or landscape value have been designated locally for conservation purposes.

Evolution of the Baseline – Pressures, Trends and Key Points

- 9.4 Scotland's landscapes are constantly changing and evolving in response to both natural processes and the changing demands of society. Regional and local landscapes are becoming less distinct as a result of more similarity in building form, settlement patterns, and agricultural practices with pressures also arising from renewable energy technology. Similarly, in agriculture there has been a focus on maximising yields which has resulted in a move towards a monoculture, at the expense of a more diverse landscape of field types and hedgerows¹²⁸. Changes in landscape tend to occur over long periods of time, and gradual change, as a result of development such as housing, and changes in farming and forestry practice, can be difficult to determine¹²⁹.
- 9.5 Wild land areas as shown on NatureScot's Wild Land Areas Map (2014) are not a designation, however Scottish Planning Policy (SPP) recognises these areas as 'nationally important'. SPP set out that plans should identify and safeguard the character of these areas, and includes considerations for development, which may be appropriate in some circumstances.
- 9.6 Climate change is expected to lead to extensive landscape change across Scotland with the greatest changes likely to occur in lowland and coastal areas where human population is highest. Geodiversity assets are also expected to be affected by climate change. Direct impacts are likely as a result of changing temperatures and patterns of precipitation, weather events, and sea level change. However, mitigation and adaptation measures are expected to have a greater influence on both Scotland's landscapes, geodiversity and quality of life than the direct effects of climate change¹³⁰.
- 9.7 Development and changes in land use associated with urban expansion and associated infrastructure, is also a key pressure and the distinctive landscape settings of many towns and cities is under pressure. The coast and foreshore are also subject to a number of pressures, particularly climate change, rising sea level and coastal erosion.

¹²⁸ Scotland's Environment (2014) Landscape [online] Available at: <https://www.environment.gov.scot/media/1196/land-landscape.pdf> (accessed 14/01/2020)

¹²⁹ *ibid*

¹³⁰ NatureScot (2019) Landscape: Climate change [online] Available at: <https://www.nature.scot/professional-advice/landscape/landscape-policy-and-guidance/landscape-climate-change> (accessed 08/01/2020)

10 Material Assets

Environmental Protection Objectives: ‘Material assets’ is a broad topic area, and objectives and policies related to this are wide ranging. These include policies relating to improvements to infrastructure, sustainable development of assets, land use principles and commitments for mitigation and adaptation action relating to climate change. Policy also sets out Scotland’s ambitions for changing how waste is considered in the economy, including through the promotion of circular economy principles.

Overview

- 10.1 Consideration of material assets in SEA covers a wide variety of assets and resources including built assets such as infrastructure relating to energy/heat generation and distribution, heat and energy efficiency and management, flood protection, water and waste water management, transport, telecommunications, waste management and pipelines; land in relation to developed land/settlements, vacant, derelict and contaminated land; buildings and facilities such as housing, healthcare facilities, schools, greenspace, core paths, cycle paths; manufactured goods.
- 10.2 Natural assets can include minerals, aggregates, watercourses, natural flood management processes, forestry and woodlands, agricultural land and associated elements such as field boundaries¹³¹.
- 10.3 Infrastructure includes economic and social aspects, and is currently defined as: the physical and technical facilities, and fundamental systems necessary for the economy to function and to enable, sustain or enhance societal living conditions. These include the networks, connections and storage relating to enabling infrastructure of transport, energy, water, telecoms, digital and internet, to permit the ready movement of people, goods and services. These include the built environment of housing; public infrastructure such as education, health, justice and cultural facilities; safety enhancement such as waste management or flood prevention; and public services such as emergency services and resilience¹³².
- 10.4 The following paragraphs summarise key issues for the SEA topic of material assets relevant to the draft Plan.

¹³¹ SEPA (2019) Guidance on consideration of material assets in Strategic Environmental Assessment [online]: <https://www.sepa.org.uk/media/219432/lups-sea-gu4-consideration-of-material-assets-in-sea.pdf> (accessed 05/02/2020)

¹³² Infrastructure Commission for Scotland (2020) Key findings report [online] Available at: <https://infrastructurecommission.scot/page/key-findings-report> (accessed 20/01/2020)

Energy

- 10.5 Heating makes up approximately half of Scotland's energy consumption (52%) with transport (24.4%) and electricity (23.5%) making up approximately a quarter each¹³³. A breakdown by sector of non-transport energy consumption shows that 58.1% is accounted for by industrial and commercial sectors, with 41.9% consumed domestically¹³⁴. There have been significant changes to the electricity generation mix in recent years with the vast majority of the electricity that Scotland generated from low carbon sources, 88.3% in 2017, compared to 50.1% in 2010¹³⁵. At a domestic level, Scotland is reliant on gas as the primary heating fuel for homes, with 80% of Scotland's 2.5 million dwellings using gas¹³⁶. However, almost 20% of Scottish domestic consumers live in an off-gas grid area, with the highest proportion of off-grid properties found in the Highlands and Argyll and Bute¹³⁷.

Transport

- 10.6 Over the last five years there has been an increase in car, air, rail, and ferry passenger numbers, as well as in distance cycled. At the same time, there has been a fall in bus passengers¹³⁸. In 2017, 48 billion vehicle kilometres were travelled on Scotland's roads, the highest recorded level with cars accounting for over three quarters (75%) of the total volume of traffic on the roads¹³⁹.
- 10.7 More than 99% of road vehicles in Scotland ran on petrol (51%) or diesel (48%) in 2017, with electric and hybrid cars making up the remaining share (>1%)¹⁴⁰. Improving cycling and walking networks can promote active travel. Approximately 34% of all car journeys in Scotland are less than two miles in length and could be covered by bicycle or on foot¹⁴¹.

Housing

- 10.8 The number of households in Scotland has increased by 15% in 2018-2019 but it is still 19% below the level seen in 2007-2008. New housing supply remains below pre-recession levels and is 19% below the 2007-08 figure, however annual supply has increased by 49% since 2012-13. Housing completions in 2018-2019 show the highest rates were observed in Midlothian, East Lothian, Perth and Kinross, Highland and Orkney Islands. The lowest rates were

¹³³ Scottish Government (2019) Annual Compendium of Scottish Energy Statistics May 2019) Update [online] Available online: <https://www2.gov.scot/Resource/0054/00547632.pdf> (accessed 14/01/2020)

¹³⁴ *ibid*

¹³⁵ *ibid*

¹³⁶ Infrastructure Commission for Scotland (2020) Key findings report [online] Available at: <https://infrastructurecommission.scot/page/key-findings-report> (accessed 20/01/2020)

¹³⁷ *ibid*

¹³⁸ Transport Scotland (2019) Scottish Transport Statistics No 37: 2018 Edition [online] Available at: <https://www.transport.gov.scot/publication/scottish-transport-statistics-no-37-2018-edition/> (accessed 14/01/2020)

¹³⁹ *ibid*

¹⁴⁰ *ibid*

¹⁴¹ Transport Scotland (undated) Walking and cycling [online] Available at: <https://www.transport.gov.scot/our-approach/active-travel/walking-and-cycling/#42959> (accessed 05/07/2019)

observed in Dumfries and Galloway, Dundee City, Stirling, Na h-Eilean Siar and Argyll and Bute¹⁴².

Vacant and derelict land

- 10.9 The amount of derelict and urban vacant land in Scotland has decreased by 716 hectares (6%) from 11,753 hectares in 2017 to 11,037 hectares in 2018¹⁴³. Overall in Scotland, 29.1% of the population were estimated to live within 500 metres of a derelict site, though there are differences across the country. Shetland and Orkney had the lowest percentage, both less than 1%. 58% of people living in the most deprived decile in Scotland are estimated to live within 500 metres of derelict land, compared to 11% of people in the least deprived decile.

Blue-green infrastructure

- 10.10 Blue-green infrastructure is an interconnected network of natural and semi-natural areas, ranging in size from rain gardens to green streets, which can perform several functions and provide several benefits within the same spatial area. Benefits of blue-green infrastructure include reduced potential for flooding, improved water quality, reduced infrastructure costs, and increased space for communities and wildlife¹⁴⁴. For example sustainable urban drainage systems (SuDS) mimic natural drainage process, reducing the quality and quantity of runoff from development¹⁴⁵. In addition to reducing the risk of flooding and diffuse pollution, other benefits include improved social cohesion through the creation of attractive open spaces and diverse habitats for wildlife¹⁴⁶. Green infrastructure can also encourage active travel, improve accessibility and connectivity, and can lead to wider benefits for health through increased physical activity and improved air quality.

Digital

- 10.11 Data such as statistics, maps and real-time sensor readings help us make decisions, build services and gain insight¹⁴⁷. Data infrastructure consists of data assets supported by people, processes and technology and considered as important physical infrastructure, such as road, railway and energy networks. Strong data infrastructure can increase collaboration, efficiency and productivity

¹⁴² Scottish Government (2019) Housing Statistics Scotland 2019 Key Trends Summary [online]: <https://www.gov.scot/publications/housing-statistics-scotland-2019-key-trends-summary/pages/2/> (accessed 06/02/2020)

¹⁴³ Scottish Government (2019) Scottish Vacant and Derelict Land Survey 2018 [online] Available at: <https://www.gov.scot/publications/scottish-vacant-derelict-land-survey-2018/> (accessed 04/02/2020)

¹⁴⁴ Green Growth Knowledge Platform (undated) Blue and Green Cities [online] Available at: <https://www.greengrowthknowledge.org/blog/blue-and-green-cities-role-blue-green-infrastructure-managing-urban-water-resources> (accessed 20/01/2020)

¹⁴⁵ GovUK (2019) Valuing the benefits of blue-green infrastructure [online] Available at: <https://www.gov.uk/government/publications/valuing-the-benefits-of-blue-green-infrastructure> (accessed 20/01/2020)

¹⁴⁶ Green4Grey (2020) Integrated planning for multifunctional land use [online] Available at: <https://green4grey.be/en/project-objective#integrale> planning voor een veelzijdig landgebruik (accessed 20/01/2020)

¹⁴⁷ Open data institute (undated) What is data infrastructure [online] Available at: <https://theodi.org/topic/data-infrastructure/> (accessed 16/01/2020)

in public and private sectors, nationally and internationally¹⁴⁸. Benefits of enabling new technologies through better data infrastructure include reduced travel delays and increased co-ordination in responding to extreme weather events¹⁴⁹. Data centres use power in two ways: they need power to run the IT equipment that they house (i.e. servers) and power to keep servers cool enough to function reliably¹⁵⁰. A very large data centre may consume 30 Gigawatt hours of power in a year and energy is usually the largest single element of operating costs for data centres, varying from 25-60%¹⁵¹.

Waste

- 10.12 Over 11.82 million tonnes of waste was generated in Scotland in 2017; an increase of 5.5% (0.62 million tonnes) from 2016. Most of this increase is due to waste from construction and demolition which increased by 10.8% (0.6 million tonnes) from 2016¹⁵². However, the generation of waste from construction and demolition is sensitive to large regional projects which can account for large year on year variations. The largest proportions of waste produced in 2017 consisted of soils (37.6%), household and similar wastes (17.4%) and mineral waste from construction and demolition (12.3%)¹⁵³.
- 10.13 In order to reduce the carbon footprint of infrastructure it is important that account is taken of the energy that is embodied in the materials used¹⁵⁴. The dictionary of energy defines “embodied energy” as “the sum of the energy requirements associated, directly or indirectly, with the delivery of a good or service”¹⁵⁵. This includes the emissions caused by extraction, manufacturing/processing, transportation and assembly of every product and element in an asset¹⁵⁶. In some cases, (depending on the boundary of an assessment), it may also include the maintenance, replacement, deconstruction, disposal and end-of-life aspects of the material and systems that make up the asset¹⁵⁷. It excludes operational emissions of the asset.
- 10.14 Taking a circular economy approach to construction, such as through designing to enable adaptability and use of discrete elements that can facilitate low cost

¹⁴⁸ Open data institute (undated) What is data infrastructure [online] Available at: <https://theodi.org/topic/data-infrastructure/> (accessed 16/01/2020)

¹⁴⁹ National Infrastructure Commission (2020) Data for the Public Good [online] Available at: <https://www.nic.org.uk/publications/data-public-good/> (accessed 16/01/2020)

¹⁵⁰ Intellect (undated) Data Centres and Power [online] Available at: https://www.techuk.org/images/programmes/DataCentres/Data_Centres_and_Power.pdf (accessed 17/01/2020)

¹⁵¹ Intellect (undated) Data Centres and Power [online] Available at: https://www.techuk.org/images/programmes/DataCentres/Data_Centres_and_Power.pdf (accessed 17/01/2020)

¹⁵² SEPA (2019) Waste from all sources – summary data 2017 [online] Available at: https://www.sepa.org.uk/media/413267/wfas_2017_commentary_final.pdf (accessed 14/01/2020)

¹⁵³ *ibid*

¹⁵⁴ Institute of Civil Engineers (2015) Embodied Energy and Carbon [online] Available at: <https://www.ice.org.uk/knowledge-and-resources/briefing-sheet/embodied-energy-and-carbon> (accessed 03/02/2020)

¹⁵⁵ *ibid*

¹⁵⁶ UK Green Building Council (2017) Embodied Carbon: developing a client brief [online] Available at: <https://www.ukgbc.org/wp-content/uploads/2017/09/UK-GBC-EC-Developing-Client-Brief.pdf> (accessed 03/02/2020)

¹⁵⁷ *ibid*

repair and maintenance, can increase life-span, reducing the need for new construction materials and associated embodied carbon. Designing out waste from the outset is estimated to have the potential to divert 11 million tonnes from landfill¹⁵⁸.

Material assets evolution of the Baseline – Pressures, Trends and Key Points

- 10.15 Built and natural assets are a key part of our environment, they include infrastructure for energy, heat, flood protection, water supply, and waste and waste water management.
- 10.16 Derelict and vacant land can affect a community's health, environment, economy and social cohesion¹⁵⁹. Transforming vacant and derelict land, for example, through new homes or the creation of urban greenspaces, has the potential to deliver both environmental and broader social benefits, including addressing health inequalities¹⁶⁰.
- 10.17 Currently, 2.5 million homes in Scotland (80%) will still be in use in 2050¹⁶¹. Further, 75% of the current housing stock was built before 1982, with 20% built before 1920, making these properties at least 100 years old¹⁶². The level of disrepair in housing quality remained unchanged between 2017 and 2016 with a 50% of all Scotland's homes reported to have disrepair to critical elements in 2017. Of traditionally built homes (pre-1919) 68% were in any critical disrepair, while 5% were in critical, urgent and extensive disrepair. The prevalence of disrepair in critical elements is found to be associated with the age of construction with dwellings built post – 1964 having lower rates of disrepair¹⁶³.
- 10.18 In the coming years, the digitisation of transport, and Intelligent Transport Systems in particular, are likely to take a leap forwards. Including new technologies to support the move to a more connected, cooperative and potentially more autonomous vehicles and the concept of Mobility as a Service¹⁶⁴.

¹⁵⁸ Zero Waste Scotland (undated) Reducing construction waste [online] Available at: <https://www.zerowastescotland.org.uk/content/reducing-construction-waste> (accessed 03/02/2020)

¹⁵⁹ Greenspace Scotland (2020) negative impact of vacant land on communities [online] Available at: <https://www.greenspacescotland.org.uk/news/derelict-sites-contribute-to-perceptions-of-urban-decline> (accessed 06/02/2020)

¹⁶⁰ Scottish Land Commission (2019) the Impact of vacant and derelict land [online] Available at: <https://landcommission.gov.scot/news-events/news-blog/the-impact-of-vacant-and-derelict-land> (accessed 06/02/2020)

¹⁶¹ Infrastructure Commission for Scotland (2020) Key findings report [online] Available at: <https://infrastructurecommission.scot/page/key-findings-report> (accessed 20/01/2020)

¹⁶² ibid

¹⁶³ Scottish Government (2018) Scottish house condition survey: 2017 key findings [online] Available at: <https://www.gov.scot/publications/scottish-house-condition-survey-2017-key-findings/pages/2/> (accessed 04/02/2020)

¹⁶⁴ Transport Scotland (2017) Scotland's Trunk Road and Motorway Network - Future Intelligent Transport Systems Strategy 2017 [online] Available at: <https://www.transport.gov.scot/media/40406/its-strategy-2017-final.pdf> (accessed 13/02/2020)

- 10.19 The benefits of blue-green infrastructure include reduced potential for flooding, improved water quality, reduced infrastructure costs, and increased space for communities and wildlife¹⁶⁵. A key aspect of blue-green infrastructure is its ability to perform several functions and provide multiple benefits in the same spatial area. Blue-Green infrastructure can also contribute to climate change mitigation and adaptation.
- 10.20 In some areas the capacity of some material assets to deal with demand is being over-stretched such as waste water management systems and energy generation, which can affect human health and wellbeing. Increasing demand for goods and services puts pressure on existing material assets and causes an increasing demand for resources together with the need for waste management and disposal mechanisms.
- 10.21 The UK construction industry is the largest consumer of natural resources in the country with over 400 million tonnes of material consumed each year which accounts for approximately 10% of total UK carbon emissions¹⁶⁶. Infrastructure is estimated to account for 53% of total UK emissions in 2013 and is predicted to increase to 90% by 2050¹⁶⁷. Construction accounts for around 50% of all waste in Scotland and has a major influence on the efficient use of resources¹⁶⁸.
- 10.22 Consideration of embodied carbon within the built environment at the initial design and construction stages can not only contribute to meeting GHG emissions reductions, but reduce pressure on resources. This could include the use of alternative materials with lower embedded energy content.
- 10.23 As Scotland's energy mix changes over the next few years, the electricity transmission network (grid) that supports the balance between energy generation and demand will change significantly. For example, as a result of the increased electrification of the transport and heat network. Infrastructure will play a key role in ensuring security of supply and decarbonising our energy systems in the most cost effective, affordable way¹⁶⁹. Energy storage is likely to be an increasingly important part of the transition to delivering clean, affordable and secure supplies of energy¹⁷⁰. For example, the continued development of

¹⁶⁵ Green Growth Knowledge Platform (undated) Blue and Green Cities [online] Available at: <https://www.greengrowthknowledge.org/blog/blue-and-green-cities-role-blue-green-infrastructure-managing-urban-water-resources> (accessed 20/01/2020)

¹⁶⁶ Institute of Civil Engineers (2015) Embodied Energy and Carbon [online] Available at: <https://www.ice.org.uk/knowledge-and-resources/briefing-sheet/embodied-energy-and-carbon> (accessed 03/02/2020)

¹⁶⁷ Infrastructure Commission for Scotland (2020) Key findings report [online] Available at: <https://infrastructurecommission.scot/page/key-findings-report> (accessed 20/01/2020)

¹⁶⁸ Zero Waste Scotland (undated) Reducing construction waste [online] Available at: <https://www.zerowastescotland.org.uk/content/reducing-construction-waste> (accessed 03/02/2020)

¹⁶⁹ DECC (2015) Towards a Smart Energy System [online] Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/486362/Towards_a_smart_energy_system.pdf (accessed 14/01/2020)

¹⁷⁰ ClimateXChange (2016) Energy Storage in Scotland - Summary of reports on thermal and electrical energy storage [online] Available at: https://www.climateexchange.org.uk/media/1391/summary_energy_storage.pdf (accessed 14/01/2020)

battery storage technologies and hydrogen fuel cells for vehicle use in the transport sector.

- 10.24 Data infrastructure will become more vital as the population grows and economies and societies become more reliant on getting more value from data to meet a range of needs¹⁷¹. There are also key synergies between digital and data infrastructure and other forms of infrastructure such as energy and transport. Digital technology is an increasing area of energy consumption, primarily with regard the charging of battery supported devices, but also due to data centres that have large energy requirements¹⁷². Powering data centres from renewables or low carbon generation on site are beginning to be explored¹⁷³. Future proofing for technological and data changes will be essential¹⁷⁴.
- 10.25 Data infrastructure will become more vital as the population grows and economies and societies become more reliant on getting more value from data to meet a range of needs¹⁷⁵. There are also key synergies between digital and data infrastructure and other forms of infrastructure such as energy and transport. Digital technology is an increasing area of energy consumption, primarily with regard the charging of battery supported devices, but also due to data centres that have large energy requirements¹⁷⁶. Powering data centres from renewables or low carbon generation on site are beginning to be explored¹⁷⁷. Future proofing for technological and data changes will be essential¹⁷⁸.
- 10.26 Flooding poses the greatest long-term climate related risk to infrastructure performance, however, growing risks posed from heat, water scarcity and slope instability caused by severe weather could also prove significant¹⁷⁹. Road and rail are generally more vulnerable to a changing climate than air and water transport and flooding is anticipated to be the most significant impact on these

¹⁷¹ Open data for development (undated) State of open data - Data Infrastructure [online] Available at: <https://www.stateofopendata.od4d.net/chapters/issues/data-infrastructure.html> (accessed 16/01/2020)

¹⁷² Infrastructure Commission for Scotland (2020) Key findings report [online] Available at: <https://infrastructurecommission.scot/page/key-findings-report> (accessed 20/01/2020)

¹⁷³ Data economy (2019) Scotland to welcome the world's largest ocean powered data centre facility [online] Available at: <https://data-economy.com/scotland-to-welcome-the-worlds-largest-ocean-powered-data-centre-facility/> (accessed 06/02/2020)

¹⁷⁴ Infrastructure Commission for Scotland (2020) Key findings report [online] Available at: <https://infrastructurecommission.scot/page/key-findings-report> (accessed 20/01/2020)

¹⁷⁵ Open data for development (undated) State of open data - Data Infrastructure [online] Available at: <https://www.stateofopendata.od4d.net/chapters/issues/data-infrastructure.html> (accessed 16/01/2020)

¹⁷⁶ Infrastructure Commission for Scotland (2020) Key findings report [online] Available at: <https://infrastructurecommission.scot/page/key-findings-report> (accessed 20/01/2020)

¹⁷⁷ Data economy (2019) Scotland to welcome the world's largest ocean powered data centre facility [online] Available at: <https://data-economy.com/scotland-to-welcome-the-worlds-largest-ocean-powered-data-centre-facility/> (accessed 06/02/2020)

¹⁷⁸ Infrastructure Commission for Scotland (2020) Key findings report [online] Available at: <https://infrastructurecommission.scot/page/key-findings-report> (accessed 20/01/2020)

¹⁷⁹ Committee on Climate Change (2017) UK Climate Change Risk Assessment 2017 Evidence Report – Summary for Scotland [online]: <https://www.theccc.org.uk/wp-content/uploads/2016/07/UK-CCRA-2017-Scotland-National-Summary.pdf> (accessed 04/02/2020)

networks, as well as those arising from extreme weather conditions and landslides¹⁸⁰.

- 10.27 The network support services underlying energy, transport, water, and information and communications technology are vital to health and wellbeing and economic prosperity. The effect of climate change on these infrastructure systems will be varied but is likely to include an increase in disruptive events such as flooding, landslides, drought, and heatwaves. Further, this infrastructure is closely inter-linked and failure in any area can lead to wider disruption across these networks¹⁸¹.

¹⁸⁰ Committee on Climate Change (2017) UK Climate Change Risk Assessment 2017 Evidence Report – Summary for Scotland [online]: <https://www.theccc.org.uk/wp-content/uploads/2016/07/UK-CCRA-2017-Scotland-National-Summary.pdf> (accessed 04/02/2020)

¹⁸¹ Adaptation Scotland (undated) 15 Key Consequences of Climate Change for Scotland [online] Available at: <http://adaptationscotland.org.uk/climatereadyplaces/impacts/> (accessed 14/01/2020)

Appendix D Assessment tables for the draft Infrastructure Investment Plan

This Appendix contains the assessment tables for the draft common investment hierarchy and the three key themes of: *Enable the transition to net-zero emissions and environmental sustainability, Driving inclusive economic growth, and Build resilient and sustainable places*. The tables set out the potential for positive and negative impacts across the SEA topics and has sought to capture the strategic direction of the draft Plan, drawing on areas and types of infrastructure where investment is known or may be focused.

The environmental effects are presented in two formats:

- i. **A narrative describing the potential for environmental environment effects** – this narrative discusses the likely primary environmental impacts that could arise, whilst also identifying the potential for secondary or indirect impacts.
- ii. **Colour-coded scores** – the scores seek to reflect the likely impacts that could arise against each environmental topic and where these are considered to be significant.

In many instances, existing mitigation measures have been identified which can help to address the potential for adverse impacts, many of which are likely arise indirectly. For example, negative effects associated with construction activities and the development of infrastructure can be mitigated through a combination of appropriate design, on-site environmental management measures, and existing statutory mechanisms (e.g. the planning system, Environmental Impact Assessment (EIA) and Habitats Regulations Appraisal (HRA)). Where applicable, this “assumed mitigation” is factored into the assessment of the significance of effects.

While the narrative discusses the potential for secondary or indirect impacts, the scores reflect the overall assessment findings. This approach has been taken to enable the reader to readily identify the significant impacts associated with each policy.

Where positive impacts have been identified, the assessment narrative identifies opportunities to enhance these where possible.

The tables also outline any assumptions made in undertaking the assessment and where relevant, refer to previous SEA work used to inform the assessment.

The scores used are:

+	Potential for significant positive environmental effects
-	Potential for significant negative environmental effects
+/-	Potential for significant mixed environmental effects
0	Potential for environmental effects has not been identified

	Climatic Factors / Emissions Reduction	Population and Human Health	Air	Soil	Water	Biodiversity, Flora and Fauna	Cultural heritage	Landscape	Material Assets (Waste, Energy, Transport and Land Use)	Likely Environmental Effects
<p>Draft Common Investment Hierarchy - Seeks to enhance and maintain existing assets ahead of new build. It does not preclude new assets, rather it sets out an approach to planning and decision making which will lead to consideration of future needs, including use of digital platforms and technology, and the suitability of existing assets. The hierarchy comprises 4 steps</p>	+	+	0	+	+	+	0	0	+	<p>1: Determine future need - consider appropriate infrastructure provision in light of changes in service design, availability of digital platforms and technical innovation, and resilience in light of population and climate change forecasts.</p> <p>Positive impacts for climatic factors, population and human health and material assets is expected where consideration is given to the use and suitability of current assets to meet user needs. Seeking to provide services in different ways, e.g. the increased use of digital infrastructure, also has the potential to lead to benefits for climatic factors, air quality and population and human health through improved accessibility to goods and services and potential reductions in travel. Benefits are likely to be realised to a greater extent where a focus is given to particular geographical areas where barriers currently exist, or to populations or communities where specific needs are currently unmet. Positive impacts should also arise where consideration is given to future projected trends which could lead to new or increased pressures. For example, the predicted increase in Scotland's aging population¹⁸² is likely to lead to changing physical and social needs, whilst an increasing population will lead to increasing pressure on housing, waste and water services.</p> <p>Positive impacts for climatic factors, population and human health and material assets are also likely to arise where consideration is given to the importance of increased resilience to the impacts of climate change. The effects of climate change on infrastructure systems will be varied and failure in one area can lead to wider disruption across networks due to their interlinked nature. This includes the network support services that underlie energy, transport, water, and information and communications technology¹⁸³. This will be of key importance as the risks of climate change impacts, including flooding, storms and heat waves, are predicted to increase. Benefits should arise where consideration is given to how infrastructure, including new structures, can influence the risk of flooding, both positively and negatively. For example, the use of hard standing material can give rise to the increased risk of surface water flooding in urban environments which can have significant negative impacts on people and communities, in addition to environmental impacts.</p> <p>There is also an opportunity for the draft hierarchy to highlight the benefits of measures which seek to reduce over-use or dependence on resources such as water, energy and transport¹⁸⁴ as reducing pressure on services can help support resilience, including to the impacts of climate change.</p>

¹⁸² National Records of Scotland (2017) Projected Population of Scotland (2016-based) [online] Available at: <https://www.nrscotland.gov.uk/statistics-and-data/statistics/statistics-by-theme/population/population-projections/population-projections-scotland/2016-based> (accessed 05/07/2019)

¹⁸³ Adaptation Scotland (undated) 15 Key consequences of climate change for Scotland [online] Available at: <http://adaptationscotland.org.uk/climatereadypages/impacts/> (accessed 05/07/2019)

¹⁸⁴ ClimateXchange (undated) Resilience and resource use [online] Available at: <https://www.climatechange.org.uk/research/indicators-and-trends/buildings-and-infrastructure-networks/resilience-and-resource-use/> (accessed 02/03/2020)

		Climatic Factors / Emissions Reduction	Population and Human Health	Air	Soil	Water	Biodiversity, Flora and Fauna	Cultural heritage	Landscape	Material Assets (Waste, Energy, Transport and Land Use)	Likely Environmental Effects
		+	+	0	+	+	+	0	0	+	<p><u>2: Maximise use of existing assets - Maximise the use and safe operation of existing assets to meet future need</u></p> <p>Most of the underlying infrastructure that will be required in the next 30 years' already exists today and it is essential that these assets are maintained, effectively and efficiently utilised, and enhanced to net zero readiness¹⁸⁵. For example, it is estimated that 80% of the 2.5 million homes in Scotland will still be in use in 2050¹⁸⁶. Significant benefits are likely to arise for material assets through ensuring current infrastructure is fit for purpose and that its lifespan is prolonged. Where the use of existing assets reduces the need for new infrastructure, this can lead to wider positive effects for climatic factors, soil, water and biodiversity, by reducing the use of natural resources. Additional benefits can also arise for climatic factors through reduced energy embodied in construction materials (embodied energy¹⁸⁷) as well as a reduction in energy use associated with construction activity. Further benefits should also arise from reducing the amount of waste going to landfill from construction activities, as the disposal of waste can itself be energy intensive and lead to negative impacts on water and soil quality and increased exposure to noise and dust. This has the potential to be significant as the construction sector is the largest consumer of natural resources and the largest contributor to waste in Scotland, accounting for at least 50% of overall waste¹⁸⁸.</p> <p>Full and proper maintenance not only ensures that assets perform more effectively over their lifespan, but well maintained infrastructure assets are potentially easier to repurpose, adapt and refurbish when needs require¹⁸⁹. This likely to become increasingly important as systems and networks change and evolve. For example, as Scotland's energy mix changes, the electricity transmission network (grid) that supports the balance between energy generation and demand will change significantly. At the same time, how we travel and communicate will change and the sustainability of water and wastewater systems will be increasingly important¹⁹⁰. Where consideration is given to changing user needs and opportunities to accommodate new emerging technologies, including those that support climate change mitigation and adaptation, benefits should arise for climatic factors, population and human health and material assets. Positive impacts on water and air may also arise where measures support sustainable water management and clean energy.</p> <p>As climate change increases the likelihood of extreme weather events (including flooding, storms and heat waves) it will be increasingly important that infrastructure systems are resilient. Maintenance is critical for reliability and can help to ensure that climate impacts are not magnified unnecessarily¹⁹¹, with associated positive impacts for material assets and population and human health. Increased resilience and safety could also benefit population and human health through reduced risks of accidents and fatalities and where there is the potential to encourage a more integrated response to reducing disruption, for example, to adverse weather effects. This will be particularly significant where a focus is given to systems more vulnerable to the impacts of climate change and to</p>

¹⁸⁵ Infrastructure Commission for Scotland (2020) Key findings report [online] Available at: <https://infrastructurecommission.scot/page/key-findings-report> (accessed 20/01/2020)

¹⁸⁶ *ibid*

¹⁸⁷ The dictionary of energy defines "embodied energy" as the "the sum of energy requirements associated with, directly or indirectly, with the delivery of a good or service. This includes the emissions caused by extraction, manufacturing/processing, transportation and assembly of every product and element in an asset (<https://www.ice.org.uk/knowledge-and-resources/briefing-sheet/embodied-energy-and-carbon>)

¹⁸⁸ Zero Waste Scotland (undated) Reducing construction waste [online] Available at: <https://www.zerowastescotland.org.uk/content/reducing-construction-waste> (accessed 03/02/2020)

¹⁸⁹ Infrastructure Commission for Scotland (2020) Key findings report [online] Available at: <https://infrastructurecommission.scot/page/key-findings-report> (accessed 20/01/2020)

¹⁹⁰ ICE (2019) Getting good infrastructure to create a sense of place [online] Available at: <https://www.ice.org.uk/news-and-insight/the-infrastructure-blog/september-2019/good-infrastructure-sense-of-place> (accessed 13/02/2020)

¹⁹¹ ClimateXchange (undated) Resilience and resource use [online] Available at: <https://www.climatechange.org.uk/research/indicators-and-trends/buildings-and-infrastructure-networks/resilience-and-resource-use/> (accessed 02/03/2020)

		Climatic Factors / Emissions Reduction	Population and Human Health	Air	Soil	Water	Biodiversity, Flora and Fauna	Cultural heritage	Landscape	Material Assets (Waste, Energy, Transport and Land Use)	Likely Environmental Effects
											<p>populations and communities less able to respond to and recover from adverse events. For example, critical lifeline services and services in areas of severe deprivation. Wider benefits could also arise where increased resilience leads to reduced disruption and efficiencies across infrastructure, including more energy efficient and energy secure housing stock and reduced congestion in the transport sector, with associated benefits for climatic factors, air quality and population and human health.</p> <p>There is an opportunity for the draft hierarchy to give consideration to increased vulnerability from data storage and collection, for example, security risks from data breaches, which can have negative impacts on population and human health and material assets.</p>
		+	+	+	0	0	0	0	0	+	<p><u>3: Repurpose & Co-locate - Reconfigure or repurpose existing assets, giving preference to co-location or shared facilities where appropriate</u></p> <p>Repurposing and co-location is an effective way of using existing materials and keeping products in circulation for longer. This has the potential to lead to benefits for material assets and climatic factors through optimising or extending the lifespan of existing infrastructure, in turn, reducing pressure on natural resources and waste management systems. Repurposing and adaptation to meet changing needs will become increasingly important if anticipated changes - including increased digitisation and use of emerging technologies to support climate change mitigation – are realised. Opportunities include the decommissioning and repurposing of large oil and gas assets to support Carbon Capture and Storage. At the same time, reuse opportunities for Scotland’s grid and transmission infrastructure, construction industry and built environment are key priorities in “Making Things Last: A Circular Economy Strategy for Scotland”¹⁹²; and, the efficient use of existing infrastructure and natural assets is set out in National Planning Framework 3.</p> <p>Benefits for population and material assets should also arise where opportunities are sought to ensure that current infrastructure is repurposed and reused in a way that meets wider or changing user needs or is multifunctional. For example, the re-purposing of a former industrial building or site to provide homes and offices for local residents¹⁹³. Further, positive impacts should also arise where co-location and sharing of resources leads to reduced travel and increased access to good and services, including education and employment opportunities and public services, e.g. health services, with associated benefits for climatic factors, air quality, population and human health and material assets. Benefits can be maximised where action is focused toward those who currently experience barriers to accessibility, for example, due to financial and locational constraints. There is also an opportunity for wider societal benefits to arise from re-purposing. For example, derelict and vacant land can affect a community’s health, environment, economy and social cohesion¹⁹⁴ and where opportunities are sought to transform vacant and derelict land e.g. through new homes or the creation of urban greenspaces, there is the potential to deliver both environmental and broader social benefits, including addressing health inequalities¹⁹⁵.</p>

¹⁹² Scottish Government (2016) Making Things Last A Circular Economy Strategy for Scotland [online] Available at: <http://www.gov.scot/Resource/0049/00494471.pdf> (accessed 28/10/2016)

¹⁹³ Stop waste and Arup (2018) Circular Economy in the Built Environment, Opportunities for Local Government Leadership [online] Available at: <http://www.stopwaste.org/sites/default/files/Circularity%20in%20the%20Built%20Environment-20180614.pdf> (accessed 04/03/2020)

¹⁹⁴ Greenspace Scotland (2020) negative impact of vacant land on communities [online] Available at: <https://www.greenspacescotland.org.uk/news/derelict-sites-contribute-to-perceptions-of-urban-decline> (accessed 06/02/2020)

¹⁹⁵ Scottish Land Commission (2019) the Impact of vacant and derelict land [online] Available at: <https://landcommission.gov.scot/news-events/news-blog/the-impact-of-vacant-and-derelict-land> (accessed 06/02/2020)

		Climatic Factors / Emissions Reduction	Population and Human Health	Air	Soil	Water	Biodiversity, Flora and Fauna	Cultural heritage	Landscape	Material Assets (Waste, Energy, Transport and Land Use)	Likely Environmental Effects
											<p>Where upgrades to existing infrastructure are required this can lead to associated localised adverse impacts from construction and operation. These could include secondary negative impacts such as disturbance and displacement of biodiversity and adverse impacts on soil, water, landscape, and cultural heritage. Local level consideration would need to be given to the siting, construction and development of any development. Existing consenting mechanisms and where relevant Environmental Impact Assessment (EIA) at the project level prior to work being undertaken can reduce the potential for negative impacts.</p> <p>Where work is undertaken to re-purpose or facilitate the co-location of infrastructure, support for future proofing as set out in the draft hierarchy, should help reduce the need for future changes, including as innovation and technologies develop.</p>
		+	+	+/-	+/-	+/-	+/-	+/-	+/-	+	<p>4: Replace or new build - consider suitability and sustainability of new build assets to meet future need.</p> <p>Infrastructure is critical to a functioning economy and society and in some areas the capacity of some assets to cope with demand is being over stretched, which can affect human health and wellbeing. Further, the emergence of new technologies and expansion of existing ones will come with some level of infrastructure requirement, whether large scale or local, and these requirements will differ depending on technology.</p> <p>There is the potential for new infrastructure to lead to mixed/uncertain impacts on a number of SEA topics. For example, infrastructure can adversely impact on biodiversity, soil, air and water from construction and operation. Further, development is a key pressure on cultural heritage and landscape and can increase pressure on other land uses. The nature of potential impacts will range from temporary to long-term/permanent, with the significance of these dependent on a number of factors including scale, siting and design. For example, large-scale deployment of individual technologies has the potential to lead to cumulative impacts. New structures, can also influence the risk of flooding, both positively and negatively, which can lead to significant impacts on people and communities, in addition to environmental impacts.</p> <p>Moving away from single purpose infrastructure can lead to benefits for material assets, climatic factors, biodiversity, soil and population and human health through greater efficiencies, both in the use of the infrastructure, and in the natural resources used during construction. Additionally, infrastructure does not sit in isolation, for example, homes and schools need roads and utilities and it is anticipated that this interdependency is expected to increase with a transition to low and zero carbon solutions¹⁹⁶. There is opportunity to give increased consideration to integrating infrastructure investment across systems, such as transport, energy and digital due to their interdependencies. Benefits should arise through ensuring the development of infrastructure that supports accessibility and increased energy efficiency, for example, the development of “smart buildings”. Further, this should provide for a system wide approach to supporting resilience and adaptation, with associated benefits for climatic factors, material assets, air quality and population and human health.</p> <p>Once implemented, the draft hierarchy should also lead to the development of infrastructure that serves a number of functions and better suits user needs, which has the potential to increase access to key services such as employment and health, benefiting population and human health and material assets. Positive impacts should also arise where consideration is given to the increased sustainability of assets and consideration of natural infrastructure and nature based solutions, as supported by the draft Plan. For example, blue-green infrastructure</p>

¹⁹⁶ Infrastructure Commission for Scotland (2020) Key findings report [online] Available at: <https://infrastructurecommission.scot/page/key-findings-report> (accessed 20/01/2020)

		Climatic Factors / Emissions Reduction	Population and Human Health	Air	Soil	Water	Biodiversity, Flora and Fauna	Cultural heritage	Landscape	Material Assets (Waste, Energy, Transport and Land Use)	Likely Environmental Effects
											<p>can provide multiple benefits in the same spatial area, e.g. enhanced drainage and reduced risk of flooding and benefits for air quality, biodiversity, in addition to health and wellbeing through access to greenspace. Blue-green infrastructure can also contribute to climate change mitigation and adaptation.</p> <p>Infrastructure development can place pressure on natural resources and the construction sector is the largest contributor to waste in Scotland. There is an opportunity to highlight the significant benefits could arise where a circular economy approach to construction. In addition to designing for deconstruction, this can facilitate reuse and recovery via repair and maintenance and retrofit activities¹⁹⁷. Associated benefits should arise through increasing life-spans, reducing the need for new construction materials and associated embodied carbon. This could also help support futureproofing. Further, designing out waste from the outset has the potential to divert 11 million tonnes from landfill¹⁹⁸, reducing pressure on existing waste management streams.</p>
	<p>Summary of opportunities for enhancement and mitigation: Benefits should be maximised where focus is given to populations or assets considered to be at greatest risk to the impacts of climate change such as populations and communities less able to prepare and recover from extreme weather events and to infrastructure assets around the coast. Where focus is given to the repurposing of assets, positive impacts should be felt to a greater extent where opportunities are sought to target measures towards areas of greatest need and where barriers to accessibility currently exist. There is an opportunity to give consideration to increased vulnerability from data storage and collection, for example, security risks from data breaches, which can have negative impacts on population and human health and material assets. There is also an opportunity for the draft hierarchy to highlight the benefits of reducing over-use or dependence on resources which can help support resilience, including to the impacts of climate change, the significant benefits that could arise from taking a circular approach to construction, and the multiple benefits that natural infrastructure can provide, including both environmental and societal.</p>										
Assumption and links with other SEA work	<p><u>Assumptions:</u></p> <ul style="list-style-type: none"> The draft common investment hierarchy is not location specific <p><u>Previous SEA work:</u></p> <ul style="list-style-type: none"> Scotland's Second National Transport Strategy Climate Change Plan 2017 – 2032 and Energy Strategy National Planning Framework 3 / Scottish Planning Policy Proposals for a new Climate Change Bill Climate Ready Scotland: Draft Second Climate Change Adaptation Programme Making Things Last: A Circular Economy Strategy for Scotland 										

¹⁹⁷ Zero Waste Scotland (2017) Circular economy opportunities in the construction sector [online] Available at: <https://www.zerowastescotland.org.uk/content/circular-economy-opportunities-construction-sector-2017> (accessed 04/03/2020)

¹⁹⁸ Zero Waste Scotland (undated) Reducing construction waste [online] Available at: <https://www.zerowastescotland.org.uk/content/reducing-construction-waste> (accessed 03/02/2020)

		Climatic Factors / Emissions Reduction	Population and Human Health	Air	Soil	Water	Biodiversity, Flora and Fauna	Cultural heritage	Landscape	Material Assets (Waste, Energy, Transport and Land Use)	Likely Environmental Effects
	<p>KEY THEME – Enable the transition to net-zero emissions and environmental sustainability</p> <p><i>Notes the critical role of public infrastructure investment in tackling the twin crises of climate change and biodiversity loss. Seeks to increase spending on low carbon measures, climate resilience, and nature-based solutions.</i></p>	+	+	+	+/-	+	+	+	+/-	+	<p>In order to reach a net zero target, alternatives to carbon based fuels will be required across the energy system, not just in electricity generation, but for buildings, industry and transport¹⁹⁹. The Scottish Energy Strategy: The future of energy in Scotland also sets out a 2030 “all-energy” target for the equivalent of 50% of Scotland’s heat, transport and electricity consumption to be supplied from renewable sources²⁰⁰. Further, it is recognised that a well-balanced energy supply portfolio or “energy mix” will remain essential to decarbonise heat, transport and electricity systems, providing the basis for secure and affordable heat, mobility and power in future decades²⁰¹.</p> <p>Significant benefits are likely to arise for climatic factors where support is given in the draft Plan to climate change mitigation, particularly through the focus given to the continued decarbonisation of heat and transport. When combined, these sectors contribute to the majority of CO2 emissions in Scotland²⁰². This is likely to be complemented by the focus given in the draft Plan to decarbonising industry, including manufacturing. There is an opportunity to align actions taken to decarbonise heat and industry, for example, heat is integral to many industrial processes and there is potential for significant carbon savings from employing technologies and systems that recover excess heat from industrial processes²⁰³. Additionally, recovered heat could be used within the same or nearby buildings for water and space heating, further reducing energy demand and with associated benefits from reductions in GHG emissions.</p> <p>Significant positive secondary effects should also arise for air quality and population and human health as many air pollutants arise from the same activities, such as transport and energy generation. The benefits of this will be experienced to a greater extent where current air quality issues exist, such as in Air Quality Management Areas (AQMAs) and by those most at risk from air pollution, for example, children and the elderly. Support provided by the draft Plan to sustainable and active travel can also lead to reduced GHG emissions, improve air quality and have a positive impact on physical and mental wellbeing, further benefiting population and human health. There is an opportunity for the draft Plan to maximise positive impacts through recommending the use of green infrastructure to support active travel, which can lead to additional benefits, including positive impacts for biodiversity and increasing the capacity of the environment to adapt to climate change.</p> <p>The focus given in the draft Plan to energy efficiency measures to reduce emissions should lead to positive impacts. The importance of energy efficiency is set out in the Scottish Energy Strategy and improving the energy efficiency of Scotland’s homes and buildings in the commercial, public and industrial sectors is recognised as a National Infrastructure Priority²⁰⁴. Reducing overall energy demand, improving the efficiency of energy generation, and increasing low carbon generation, could make a significant contribution to meeting climate change targets²⁰⁵. Greater energy efficiency also has the potential to reduce pressure on existing supply and distribution networks and help to optimise the use of existing energy resources, potentially enhancing security of supply and resilience and benefiting material assets as a whole. Population and human health could also be positively impacted through increased security of energy supply. Where possible,</p>

¹⁹⁹ Committee on Climate Change (2018) Hydrogen in a low-carbon economy [online] Available at: <https://www.theccc.org.uk/wp-content/uploads/2018/11/Hydrogen-in-a-low-carbon-economy.pdf> (accessed 15/06/2020)

²⁰⁰ Scottish Government (2017) The future of energy in Scotland: Scottish Energy Strategy [online] Available at: <https://www.gov.scot/publications/scottish-energy-strategy-future-energy-scotland-9781788515276/> (accessed 15/06/2020)

²⁰¹ ibid

²⁰² Infrastructure Commission for Scotland (2020) Key findings report [online] Available at: <https://infrastructurecommission.scot/page/key-findings-report> (accessed 20/01/2020)

²⁰³ Scottish Government (2017) Strategic Environmental Assessment Environmental Report on the Draft Climate Change Plan and Draft Scottish Energy Strategy [online] Available at: <http://www.gov.scot/Publications/2017/01/9030> (accessed 04/09/2020)

²⁰⁴ The Scottish Government (2015) Infrastructure Investment Plan 2015 [online] Available at: <http://www.gov.scot/Resource/0049/00491180.pdf> (accessed 07/12/2016)

²⁰⁵ Scottish Government (2017) Strategic Environmental Assessment Environmental Report on the Draft Climate Change Plan and Draft Scottish Energy Strategy [online] Available at: <http://www.gov.scot/Publications/2017/01/9030> (accessed 04/09/2020)

											<p>opportunities to maximise benefits should be sought through ensuring that these measures are targeted towards areas of greatest need.</p> <p>The focus given in the draft Plan to supporting a circular economy and reducing waste has the potential to lead to positive effects for climatic factors and material assets, through improving waste management, reducing pressure on existing landfill infrastructure and contributing to a reduction in GHG emissions. Particularly where there this leads to the acceleration of landfill gas capture due the impact that the release of landfill gasses, such as methane, can have in the atmosphere.</p> <p>Where upgrades to, or new infrastructure, is required this could lead to negative impacts, including the potential for land take, soil compaction, increased exposure to noise and dust and impacts on water quality. Development is also a key pressure on cultural heritage and landscape. Potential impacts can range from long term and permanent, to short term and temporary, for example, those arising during construction activities. The significance of potential impacts will be dependent on a number of factors, including scale, siting and design and some impacts may be localised in nature. Where possible, new infrastructure or upgrades to the existing assets should be designed to accommodate future changes, potentially reducing the need of further work to be undertaken as innovation and technologies develop. Additionally, the efficient use of resources and circular economy principles during design and construction should be supported where possible, reducing pressure on the use of natural resources.</p> <p>Alongside emissions reductions, the draft Plan also gives consideration to the importance of improving resilience and adaptation to climate change. This includes the importance of adapting to key pressures such as flooding and coastal erosion which can negatively impact on a number of SEA Topics, including material assets, population and human health, water quality and cultural heritage, posing significant risks. It is estimated that 33-50% of coastal buildings, roads, rail and water networks lie in erodible areas²⁰⁶ and that some stretches of the Scottish coastline are reported as actively eroding, exposing these networks²⁰⁷. If the current rate of coastal erosion continues, around £400 million of assets could be threatened by 2050, including residential and non-residential buildings, railway, roads and the freshwater aquatic environment²⁰⁸. Significant benefits for material assets are considered likely to arise through actions which seek to protect and support resilience to the predicted impacts. Positive effects should also arise for cultural heritage where focus is given to reducing the risks of flooding and coastal erosion as many historic landscapes and sites located in the coastal zone are particularly vulnerable to the impacts of climate change. Benefits for population and human health are also likely to arise from focus given in the draft Plan to flood risk management and coastal erosion due to the significant environmental impacts these issues can have on people, communities and businesses²⁰⁹. There is the potential to maximise positive effects as the potential impacts of climate change on population and human health will not be evenly spread. For example, some remote rural, coastal communities and deprived areas are recognised as being more vulnerable to the negative impacts of climate change due to pre-existing inequities. Many island and remote communities are also reliant on life-line services which can be disrupted by the impacts of climate change.</p> <p>Man-made flood defences, such as engineered embankments, flood walls and temporary structures, are a key part of flood management, however, a number of natural assets can provide flood management solutions with multiple benefits, both environmental and societal. The role of natural assets is recognised in the draft Plan, including through the proposal to amend the definition of infrastructure to include natural infrastructure and recognition given to the role they can play in flood management and tackling climate change, amongst other benefits. The restoration of peatlands and forestry and woodland creation is also considered within the draft Plan and these have the potential to lead to significant positive effects on climatic factors from increased carbon sequestration, in addition to increasing the ability of a catchment area to store and hold water, in turn, reducing flood risk. Peatlands also support many important species, habitats and ecosystems which may have been lost through previous degradation and upland peatlands are considered some of our most iconic landscapes and are of cultural significance. In addition to benefits for biodiversity, sustainably managed</p>
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²⁰⁶ Infrastructure Commission for Scotland (2020) Key findings report [online] Available at: <https://infrastructurecommission.scot/page/key-findings-report> (accessed 20/01/2020)

²⁰⁷ Committee on Climate Change (2017) UK Climate Change Risk Assessment 2017 Evidence Report - Summary for Scotland [online] Available at: <https://www.theccc.org.uk/wp-content/uploads/2016/07/UK-CCRA-2017-Scotland-National-Summary.pdf> (accessed 05/07/2019)

²⁰⁸ Infrastructure Commission for Scotland (2020) Key findings report [online] Available at: <https://infrastructurecommission.scot/page/key-findings-report> (accessed 20/01/2020)

²⁰⁹ Committee on Climate Change (2017) UK Climate Change Risk Assessment 2017 Evidence Report [online] Available at: <https://www.theccc.org.uk/uk-climate-change-risk-assessment-2017/> (accessed 14/01/2020)

		<p>forests and woodlands can also lead to positive impacts for soil and water through reduced soil erosion and regulation of water run-off. The effects of land use change on the wider environment could be mixed, depending on the scale and nature of changes. For example woodland creation can have significant positive or negative impacts on the landscape, Land use conflicts may also arise. However, it is anticipated that planting activities will support the objectives and priorities of the Scotland's Forestry Strategy 2019-2029²¹⁰. Positive impacts should also arise for population and human health through the recreation opportunities that natural assets, such as forests, woodland and peatlands, also provide.</p>
	<p>Summary of opportunities for enhancement and mitigation: <i>Where focus is given to energy efficiency and support for increased diversity in the energy mix, benefits are likely to be felt to a greater extent where opportunities are sought to target measures towards areas of greatest need, for example, those who are currently considered to be fuel poor. There is an opportunity to align action taken towards the decarbonisation of heat and industry, for example, through heat recovery and district heating networks. Where possible, opportunities should be sought to reuse and repurpose exiting infrastructure when consideration is given to infrastructure requirements that may be needed to meet this outcome with the promotion of circular economy principles during design and construction supported where possible. The focus in the draft Plan towards natural infrastructure is supported and where possible, opportunities should be explored to support these due to the multiple benefits they can provide, including both environmental and societal. Further positive impacts could arise where the beneficial role of blue-green infrastructure is highlighted. For example, this could include the use of green infrastructure to support active travel or in managing flood risk in urban environments. Benefits could also be maximised where opportunities are sought to focus efforts on populations or assets considered to be at greatest risk to the impacts of climate change, for example, extreme weather events and flooding, such as those less able to prepare and recover.</i></p>	
<p>Assumption and links with other SEA work</p>	<p><u>Assumptions:</u></p> <ul style="list-style-type: none"> • Work in district heading is also being taken forward via the Heat Policy Statement and Energy Efficient Scotland Routemap update. • Woodland/forestry planting will meet the requirements of the UK Forestry Standard which defines the requirements for the sustainable management of forests in the UK. • The majority of measures to implement the key themes of the draft Infrastructure Investment Plan are not location specific. <p><u>Previous SEA work:</u></p> <ul style="list-style-type: none"> • Scotland's Second National Transport Strategy • Climate Change Plan 2017 – 2032 and Energy Strategy • Getting the Best From Our Land: A Land Use Strategy for Scotland 2016-2021. • National Planning Framework 3 / Scottish Planning Policy • Proposals for a new Climate Change Bill • Climate Ready Scotland: Draft Second Climate Change Adaptation Programme 	

²¹⁰ Scottish Government (2019) Scotland's Forestry Strategy 2019-2029 [online] Available at: <https://www.gov.scot/publications/scotlands-forestry-strategy-20192029/> (accessed 17/06/2020)

		Climatic Factors / Emissions Reduction	Population and Human Health	Air	Soil	Water	Biodiversity, Flora and Fauna	Cultural heritage	Landscape	Material Assets (Waste, Energy, Transport and Land Use)	Likely Environmental Effects
	<p>KEY THEME – Driving inclusive economic growth</p> <p><i>Seeks to boost productivity and competitiveness, and create good jobs and green jobs, by enhancing transport and digital connectivity and capacity in all areas of Scotland, and by stimulating innovation. The importance of supporting inclusion is also noted.</i></p>	+	+	0	+/-	0	0	0	+/-	+	<p>Improved connections facilitate accessibility within and between places, within Scotland and beyond, and support economic growth and an inclusive society²¹¹. Where focus is given in the draft Plan to improving connectivity, benefits for population and human health are considered likely to arise primarily through increased accessibility to key services, such as employment, education, healthcare and training opportunities. Particular benefits are likely to arise where focus is given to those currently experiencing barriers to accessibility. For example, access to services such as employment and education can be hindered by financial and locational constraints, and public transport availability serving to perpetuate existing disadvantage and exclusion²¹². Providing support to low income groups in accessing public transport and active travel can work towards removing some of these barriers, in turn, increasing the likelihood of access to key opportunities that may improve health and socioeconomic outcomes, benefiting population and human health²¹³.</p> <p>Benefits should also arise for population and human health where consideration is given in the draft Plan to stimulate business and innovation, including in manufacturing, through the potential to drive investment, innovation, productivity and internationalism and support inclusive growth by providing well paid and highly skilled employment opportunities. Manufacturing is also a key sector where new opportunities exist though adopting a circular economy approach to reduce waste through increased efficiency and improved design and manufacturing processes to extend product life-cycle²¹⁴. In turn, this can lead to significant benefits for climate factors and material assets though keeping products and materials in use for longer and reducing waste. Further benefits also arise through reduced pressure on natural resources, including positive effects for biodiversity, soil and water.</p> <p>There is the however potential for negative impacts for climatic factors and air quality to arise where measures within this theme have the potential to lead to the uptake of less sustainable modes of transport. For example, whilst vital to the movement of people and goods, key infrastructure hubs and international gateways such as airports and ports can often support modes of transport that can significantly contribute to GHG emissions and air pollution²¹⁵. The potential impacts of this should be reduced where support is given in the draft Plan to more sustainable modes of travel, including improving rail services, and alignment with Scotland's Second National Transport Strategy, which sets out four priorities of: reduces inequalities, takes climate action, helps deliver inclusive economic growth and improves our health and wellbeing, in addition to noting the importance of the sustainable travel hierarchy.</p> <p>This importance of digital connectivity, as well as data sharing, is set out on the draft Plan. It is recognised that where, when and how travel is undertaken will evolve, and technological developments will impact on logistics, potentially enhancing journey times and connections for both people and goods. Changes in working patterns, including greater working from home or "smart working", and the role of "smart" energy systems, will</p>

²¹¹ Scottish Government (2014) Scottish Planning Policy [online] Available at: <https://beta.gov.scot/publications/scottish-planning-policy/> (accessed 05/07/2019)

²¹² University College London (2014) Transport and Poverty: A review of the evidence [online] Available at: <http://discovery.ucl.ac.uk/1470392/> (accessed 05/07/2019)

²¹³ ibid

²¹⁴ Scottish Government (2016) A manufacturing future for Scotland Action Plan [available at: <https://www.gov.scot/publications/a-manufacturing-future-for-scotland-action-plan/> (accessed 17/06/2020)

²¹⁵ The Scottish Parliament (2016) SPICe Briefing, Air Quality in Scotland [online] Available at: http://www.parliament.scot/ResearchBriefingsAndFactsheets/S5/SB_16-35_Air_Quality_in_Scotland.pdf (accessed 05/07/2019)

		Climatic Factors / Emissions Reduction	Population and Human Health	Air	Soil	Water	Biodiversity, Flora and Fauna	Cultural heritage	Landscape	Material Assets (Waste, Energy, Transport and Land Use)	Likely Environmental Effects
											<p>be influenced by digital connectivity. Strong data infrastructure can also increase collaboration, efficiency and productivity in public and private sectors, nationally and internationally²¹⁶. This has the potential to improve connectivity and accessibility, and to increased efficiencies across the energy and transport sectors and can reduce travel being undertaken, with associated benefits for climatic factors, air quality and population and human health. Material assets should also benefit from greater efficiencies and resilience across the network as a whole, including within building stock. This has the potential to be significant as sectorally, housing, energy and transport infrastructure have a strong role to play in addressing inequalities and supporting inclusive economic growth²¹⁷. Benefits for population and human health should also arise from focus within the draft Plan to changing demographics and the diverse needs of users. For example, some groups may be excluded from affording or operating certain technologies, for example, due to low income or disability.</p> <p>As the population grows and economies and societies become more reliant on getting more value from data to meet a range of needs, data infrastructure will become increasingly vital²¹⁸. Additionally, given the key synergies between digital and data infrastructure and other forms of infrastructure, such as energy and transport, there is likely to be increased pressure on digital networks and benefits for material assets should arise where focus is given in the draft Plan to support increased digitisation across sectors. However digital technology is an increasing area of energy consumption, primarily with regards the charging of battery supported devices, but also due to data centres that have large energy requirements²¹⁹ which could lead to negative impacts on climatic factors. The impact of this should be reduced where opportunities are sought by the draft Plan to power data centres from renewables or low carbon generation on site. As more devices and control systems are connected online, increased data storage and collection will be required which has the potential to lead to increased vulnerability for cyber security and can increase the potential for disruption to physical assets, potentially leading to increased vulnerability to data breaches and to the interruption of infrastructure with negative impacts on population and human health. Future proofing will also be essential to keep pace with new and emerging technology developments and data changes²²⁰.</p> <p>While individual infrastructure networks and sectors will each have specific challenges, it will be increasingly important that they are not viewed in isolation and there is an opportunity to support the alignment of infrastructure across sectors. Further, failure in any area can lead to wider disruption across these networks²²¹ and giving greater consideration to the infrastructure interdependencies should also be beneficial for climatic factors and material assets, for example, through increasing resilience. This is likely to be of particular relevance as infrastructure continues to evolve and adapt, the increasing importance of digital technology, connectivity and of whole-system approaches will serve to deepen the interdependencies²²².</p>

²¹⁶ Open data for development (undated) State of open data - Data Infrastructure [online] Available at: <https://www.stateofopendata.od4d.net/chapters/issues/data-infrastructure.html> (accessed 16/01/2020)

²¹⁷ Infrastructure Commission for Scotland (2020) Key findings report [online] Available at: <https://infrastructurecommission.scot/page/key-findings-report> (accessed 20/01/2020)

²¹⁸ Open data for development (undated) State of open data - Data Infrastructure [online] Available at: <https://www.stateofopendata.od4d.net/chapters/issues/data-infrastructure.html> (accessed 16/01/2020)

²¹⁹ Infrastructure Commission for Scotland (2020) Key findings report [online] Available at: <https://infrastructurecommission.scot/page/key-findings-report> (accessed 20/01/2020)

²²⁰ ibid

²²¹ Adaptation Scotland (undated) 15 Key consequences of climate change for Scotland [online] Available at: <http://adaptationscotland.org.uk/climatereadypplaces/impacts/> (accessed 05/07/2019)

²²² Institution of Civil Engineers (2018) State of the Nation 2018: Infrastructure Investment [online] Available at: <https://www.ice.org.uk/news-and-insight/latest-ice-news/ice-launches-2018-state-of-the-nation-investment> (accessed 05/07/2019)

		Climatic Factors / Emissions Reduction	Population and Human Health	Air	Soil	Water	Biodiversity, Flora and Fauna	Cultural heritage	Landscape	Material Assets (Waste, Energy, Transport and Land Use)	Likely Environmental Effects
											Requirements for upgrades to, or new infrastructure, may be required to support this key outcome, with the potential to give rise to associated adverse impacts from construction and operation. This could include secondary negative impacts such as disturbance and displacement to biodiversity and lead to diverse impacts on soil, water, landscape, and cultural heritage . Potential impacts could range from permanent to temporary, and may be localised in nature. Local level consideration would need to be given to the potential implications that may arise through the siting, construction and development of any required infrastructure. Existing mechanisms such as, EIA and consenting conditions at the project level prior to work being undertaken should also reduce the potential for negative impacts.
	<p>Summary of opportunities for enhancement and mitigation: Consideration should be given to opportunities to implement this outcome in a way that supports the continued decarbonisation of the energy and transport systems, whilst maximising benefits for those likely to be benefit the greatest. Opportunities to better align and give consideration to improving resilience across networks, such as transport, energy and digital, should be sought due to their interdependencies. Where possible, focus should be given to use of renewable energy or low carbon solutions for data centres due to their high energy requirements and consideration given to future proofing these assets. There is also an opportunity to give consideration to consideration to increased vulnerability from data storage and collection, for example, security risks from data breaches, which can have negative impacts and the future proofing of assets.</p>										
Assumption and links with other SEA work	<p><u>Assumptions:</u></p> <ul style="list-style-type: none"> The majority of measures to implement the three key themes of the draft Infrastructure Investment Plan are not location specific Support for the manufacturing sector will include consideration of circular economy principles <p><u>Previous SEA work:</u></p> <ul style="list-style-type: none"> Scotland's Second National Transport Strategy Climate Change Plan 2017 – 2032 and Energy Strategy National Planning Framework 3 / Scottish Planning Policy Proposals for a new Climate Change Bill Climate Ready Scotland: Draft Second Climate Change Adaptation Programme Making Things Last: A Circular Economy Strategy for Scotland 										

		Climatic Factors / Emissions Reduction	Population and Human Health	Air	Soil	Water	Biodiversity, Flora and Fauna	Cultural heritage	Landscape	Material Assets (Waste, Energy, Transport and Land Use)	Likely Environmental Effects
	<p>KEY THEME – Building resilient and sustainable places and communities</p> <p><i>Recognises the importance of starting at the local community level to deliver the ambition for a fairer Scotland, including through investing in housing and better local delivery of services. Sets out to work with partners to meet the diverse economic, social and environmental needs of urban, rural and island areas.</i></p>	+	+	+	0	0	+	+	0	+	<p>Place is the combined social, economic, physical, cultural and historical characteristics of a place²²³. It encompasses both the physical environment (the buildings, streets, public areas and natural spaces that make up neighbourhoods) and the social environment (the relationships, social contacts and support networks that exist in a community)²²⁴. Place has an important role to play in health and wellbeing and tackling health inequalities²²⁵ and physical assets, such as transport, water, power, waste and digital communications all play an essential part of building a sense of place²²⁶.</p> <p>Inclusive, healthy, empowered, resilient and safe places for people and communities are central to delivering Scotland's National Outcomes and are a National Public Health Priority²²⁷. Place-based investing creates healthy and thriving communities by increasing available capital for positive social, economic or environmental impacts, for example, affordable and supportive housing, community and childcare facilities, healthcare centres, employment opportunities and renewable energy and energy efficiency²²⁸. Place based investing can also support a more joined up, collaborative approach to services, land and buildings, across all sectors within place, to enable better outcomes and increase opportunities for people and communities to shape their own lives²²⁹.</p> <p>Through seeking to improve access to education, employment, and to important public services, such as health services, the draft Plan should lead to positive impacts for population and human health. Particularly, where the draft Plan focuses on increased co-location and the sharing of resources and buildings as currently the public sector estate is estimated to extend to nearly 3,700 physical assets, the majority serving one purpose²³⁰. The benefits of this are likely to be experienced to a greater extent where action is focused toward those who currently experience barriers to accessibility, for example, due to financial and locational constraints.</p> <p>People are also more likely to be physically active if they live in neighbourhoods with many places to go, such as shops and other facilities, and designing neighbourhoods well can better enable people to walk and cycle to destinations²³¹. Wider societal benefits and improved community cohesion could arise as environments designed to be walkable (safe and easy to get around in on foot) and provide well-maintained public and green spaces potentially increasing social interaction and togetherness²³². Living in supportive and inclusive communities can also benefit those in lower income groups more than others and could be an important factor</p>

²²³ NHS Scotland (undated) Place and communities [online] Available at: <http://www.healthscotland.scot/media/1088/27414-place-and-communities-06-16.pdf>

²²⁴ ibid

²²⁵ ibid

²²⁶ ICE (2019) Getting good infrastructure to create a sense of place [online] Available at: <https://www.ice.org.uk/news-and-insight/the-infrastructure-blog/september-2019/good-infrastructure-sense-of-place> (accessed 13/02/2020)

²²⁷ Nature Scotland (2019) the Place Principle – our contribution to place-based working [online] Available at: <https://www.nature.scot/place-principle-our-contribution-place-based-working> (accessed 19/06/2020)

²²⁸ <https://hospitaltoolkits.org/investment/place-based-investing/>

²²⁹ Nature Scotland (2019) the Place Principle – our contribution to place-based working [online] Available at: <https://www.nature.scot/place-principle-our-contribution-place-based-working> (accessed 19/06/2020)

²³⁰ Infrastructure Commission for Scotland (2020) Key findings report [online] Available at: <https://infrastructurecommission.scot/page/key-findings-report> (accessed 20/01/2020)

²³¹ National Children's Bureau (2012) Environmental inequalities and their impact on the health outcomes of children and young people: Policy and evidence briefing [online] Available at: <https://www.ncb.org.uk/sites/default/files/field/attachment/Environmental%20Inequalities.pdf> (accessed 21/05/2019)

²³² NHS Scotland (undated) Place and communities [online] Available at: <http://www.healthscotland.scot/media/1088/27414-place-and-communities-06-16.pdf>

		Climatic Factors / Emissions Reduction	Population and Human Health	Air	Soil	Water	Biodiversity, Flora and Fauna	Cultural heritage	Landscape	Material Assets (Waste, Energy, Transport and Land Use)	Likely Environmental Effects
											<p>in reducing health inequalities²³³, further benefiting population and human health. Positive impacts should be maximised where opportunities are sought to ensure that current infrastructure is repurposed and reused in a way that meets wider user needs or is multifunctional, as supported by the draft hierarchy. For example, derelict and vacant land can affect a community's health, environment, economy and social cohesion²³⁴ and transforming vacant and derelict land, such as through new homes or the creation of urban greenspaces, has the potential to deliver both environmental and broader social benefits, including addressing health inequalities²³⁵. Additionally, the “green” and “blue” features of the natural and built environment, and the range of services they provide, are widely recognised and valued as essential components of successful places²³⁶. The cultural and historical characteristics of an area, including the physical built environment, play a key role in providing a sense of a place, benefiting cultural heritage, population and human health and material assets. The potential benefits of this could be maximised where opportunities are taken to maintain, restore and repurpose these assets to support sustainable placemaking,</p> <p>These benefits are likely to be supported by focus given in the draft Plan to greater public consultation, building on the “Place Principle”²³⁷, from ensuring the diverse needs of all population groups are recognised and supporting community led generation. For example community empowerment and engagement, and co-production (working with communities to achieve positive outcomes) are considered essential to improve health and social outcomes and reduce inequalities²³⁸. Positive impacts should also arise where consideration is given in the draft Plan to how access to services and infrastructure requirements differs across the country, including between urban and rural locations. For example, a lack of integrated transport infrastructure in remote and rural areas can be a barrier to accessing goods and services, including important healthcare services²³⁹. The interconnected nature of infrastructure also means that it doesn't sit in isolation and successful places need to be connected, for example, houses need services such as energy and water. The close alignment with between the draft Infrastructure Investment Plan and development of NPF4 has the potential to lead to number of benefits. NPF4 can provide a spatial overview of where development and infrastructure will be needed to support sustainable and inclusive growth in the longer term. This could help to improve infrastructure integration, such as, cross boundary implications and interdependencies, and put “place” at the heart of coherent infrastructure prioritisation and planning.</p> <p>Positive impacts should also arise from the focus given in the draft Plan to improved access to safe and suitable homes which are warm and affordable, as good quality housing, which is affordable and energy efficient, is seen as an important component in the delivery of Scotland's ambitions for eradicating child poverty and homelessness, ending fuel poverty, tackling the effects of climate change and promoting inclusive economic growth²⁴⁰. Further benefits should also arise from increased energy efficiency across the network</p>

²³³ ibid

²³⁴ Greenspace Scotland (2020) negative impact of vacant land on communities [online] Available at: <https://www.greenspacescotland.org.uk/news/derelict-sites-contribute-to-perceptions-of-urban-decline> (accessed 06/02/2020)

²³⁵ Scottish Land Commission (2019) the Impact of vacant and derelict land [online] Available at: <https://landcommission.gov.scot/news-events/news-blog/the-impact-of-vacant-and-derelict-land> (accessed 06/02/2020)

²³⁶ Nature Scotland (2019) the Place Principle – our contribution to place-based working [online] Available at: <https://www.nature.scot/place-principle-our-contribution-place-based-working> (accessed 19/06/2020)

²³⁷ Scottish Government (2019) Place Principle – introduction [online] Available at: <https://www.gov.scot/publications/place-principle-introduction/> (accessed 19/06/2020)

²³⁸ NHS Scotland (undated) Place and communities [online] Available at: <http://www.healthscotland.scot/media/1088/27414-place-and-communities-06-16.pdf>

²³⁹ NHS Scotland (undated) Improve access to care for remote and rural areas [online] Available at: <http://www.shiftingthebalance.scot.nhs.uk/improvement-framework/improve-access-to-care-for-remote-and-rural-areas/> (accessed 05/07/2019)

²⁴⁰ Infrastructure Commission for Scotland (2020) Key findings report [online] Available at: <https://infrastructurecommission.scot/page/key-findings-report> (accessed 20/01/2020)

		Climatic Factors / Emissions Reduction	Population and Human Health	Air	Soil	Water	Biodiversity, Flora and Fauna	Cultural heritage	Landscape	Material Assets (Waste, Energy, Transport and Land Use)	Likely Environmental Effects
											and in building stock, in turn, supporting resilience and reduced risk of disruption to the impacts of climate change, with associated benefits for climatic factors, population and human health and material assets . In addition to reducing pressure on natural resources , co-location as supported by the draft Plan, should also provide for increased consideration to integrating infrastructure investment across systems, such as transport, energy and digital, and to their interdependencies. For example, the greater use of data and technology to support the development of “smart” buildings, not only supports increased energy efficiency, with associated benefits for climatic factors, air quality and population and human health , but a system wide approach to climate change resilience and adaptation , also benefiting material assets . Resilient infrastructure also protects the economy by reducing disruptions to industry from shocks, such as severe storms and support the continuity of critical services such as power and water during a crisis, with associated benefits for population and human health .
	<p>Summary of opportunities for enhancement and mitigation: Where possible, positive impacts could be maximised through the use of measures that not only benefit climatic factors but support health and well-being objectives, for example, through increased accessibility or multifunctional infrastructure. The reuse or co-location of assets and resources is supported with the benefits of this are likely to be felt the greatest by those who currently experience barriers to accessibility or experience health inequalities. This is has the potential to be supported by greater public engagement to ensure the diverse needs of all population groups are taken into account.</p>										
Assumption and links with other SEA work	<p><u>Assumptions:</u></p> <ul style="list-style-type: none"> • Support for Increased public engagement in the planning process will build on the Place Principle and Place Standard. • The majority of measures to implement the three key themes of the draft Infrastructure Investment Plan are not location specific. <p><u>Previous SEA work:</u></p> <ul style="list-style-type: none"> • Scotland’s Second National Transport Strategy • Climate Change Plan 2017 – 2032 and Energy Strategy • National Planning Framework 3 / Scottish Planning Policy • Proposals for a new Climate Change Bill • Climate Ready Scotland: Draft Second Climate Change Adaptation Programme • Making Things Last: A Circular Economy Strategy for Scotland 										