

Scottish Government

**Strategic Environmental
Assessment of the Update
to the Climate Change Plan
2018-2032
Environmental Report**

December 2020



Scottish Government

Strategic Environmental Assessment of the Update to the Climate Change Plan Environmental Report

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Non-Technical Summary

Introduction to the Update of the Climate Change Plan

The update to the Climate Change Plan (CCPu) “boosts” existing carbon reduction policies and proposals and/or identifies additional new policies and proposals to those currently set out in the Plan. The update builds on and complements the existing Plan.

Initially, the CCPu was drafted pre COVID-19 and included summaries of contributions from each of the key policy sectors. The draft plan and sector summaries were due to be laid before Parliament in April 2020, however due to the COVID-19 outbreak this work was postponed.

This update recognises the potential role the CCPu can play in ensuring a green and resilient recovery to COVID-19. Policies and proposals must consider both how they support the green recovery from the pandemic and greenhouse gas emissions reductions. The Committee on Climate Change (CCC) has highlighted the opportunity to turn the COVID-19 crisis into a defining moment in tackling climate change and has provided advice on delivering economic recovery that accelerates the transition to a cleaner, net-zero emissions economy, whilst strengthening the resilience to the impacts of climate change. From an economic perspective, this could include investing in climate-resilient low-carbon infrastructure, job creation in low-carbon and climate-resilient industries, training and reskilling of the workforce.

The update to the CCP continues to focus on the required seven key sectors: electricity, industry, buildings, transport, agriculture, waste, and land use, land use change and forestry (LULUCF), and includes the additional sector of Negative Emissions Technologies which include ways of removing carbon dioxide from the air.

What is Strategic Environmental Assessment?

Strategic Environmental Assessment (SEA) is a way of considering the environment when preparing public plans, programmes and strategies. It identifies potential significant environmental effects and, where necessary, describes how these effects can be avoided or reduced. Through consultation, SEA also provides an opportunity for the public to express their views on proposed policies and their potential environmental impacts.

SEA should begin at an early stage in a plan’s preparation, as it is important that the future consultation on the plan and the Environmental Report takes place when ideas are forming, and policy options are still being actively considered. In this case, SEA was undertaken on the emerging updates with the first iteration prepared in spring 2020 and followed by the assessment of the Green Recovery CCPu in autumn 2020.

How was the Strategic Environmental Assessment undertaken?

SEA is an assessment of the likely environmental effects of the Update of Climate Change Plan and the alternatives to it. The Environmental Report considers the environmental effects of the Update to the Climate Change Plan. The assessment has considered policies which are new, boosted or maintained.

The SEA process began in early 2020 with the production of a Screening/Scoping Report for the update to the CCP. The Screening/Scoping Report outlines the environmental baseline for the plan areas as well as the policy context and key sustainability issues. The assessment identifies positive and negative environmental effects and the significance of these; considers whether they would be temporary or permanent; and notes where they would arise

in the short, medium or long term. It also distinguishes between effects arising directly and indirectly from the update to the Climate Change Plan.

The draft update will seek to build on and complement the existing CCP published in February 2018. Reflecting the ambitious nature of the plan, it was anticipated that achieving the GHG emissions targets would require maximum possible emissions savings (whilst ensuring nobody is left behind, reflecting the principle of a Just Transition) across the sectors.

Which reasonable alternatives have been considered?

The 2005 Act requires that the likely significant environmental effects of reasonable alternatives of a plan, programme or strategy are assessed as part of the SEA process.

Due to the requirement of meeting ambitious climate change targets, the scope for alternatives is limited.

In considering what a “reasonable” alternative is, the Scottish Government’s commitment to decarbonise the whole energy system and tackle climate change has been taken into account. The CCP is being updated to reflect the increased ambition of the new targets set in the Climate Change (Emissions Reduction Targets) (Scotland) Act 2019.

Based on the current legislative context, and the declared climate emergency, it was identified that the current ambition can only be to achieve the maximum emissions reductions possible, reflected across all sectors based on current technical and practical limitations, and no reasonable alternatives were identified as a consequence.

What are the key environmental challenges relevant to the Update of the Climate Change Plan?

In terms of climatic factors, it is predicted that the greatest climate change related threats for the UK are large increases in flood risk, exposure to high temperatures and heat waves and sea level rise. Issues such as shortages in the public water supply and for agriculture, energy production, and industry will also become more frequent. There will also be a substantial risk to UK wildlife and natural ecosystems, risks to domestic and international food production and trade. New and emerging pests and diseases, and invasive non-native species are also influenced by a changing climate. Key land use actions to address climate change include development of renewable energy and protection of carbon stocks on land and in the marine environment.

For population and human health, key environmental challenges include population growth. Impacts on population include air pollution that may pose both short- and long-term health issues. Transport is a significant contributor to poor air quality, especially in urban areas. Heating and cooling of homes accounts for a significant part of the GHG emissions, and fuel poverty remains an issue. Flooding can also pose significant environmental impacts and can also affect people, communities and businesses.

Air pollution, despite recent reductions, is still identified as a concern especially in towns and cities. Some of the key contributors to air pollution are transport, energy generation and agriculture, which are also key contributors to climate change.

Scotland’s soils are considered to generally be in good health, however, there are a range of pressures on them. Issues such as 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. Changes in land use and land management are also some of the key pressures on soil. These include activities such as transport and development through road building, the expansion of urban areas, and agriculture and forestry practices.

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 quality, particularly in relation to agriculture, forestry and urban development. The risk of flooding from rivers, surface waters and sea are also predicted to increase as a result of climate change.

Key pressures for biodiversity include land use intensification and modification, pollution, urban development, nutrient enrichment and over exploitation of natural resources. Climate change also poses a significant risk to biodiversity.

In terms of cultural heritage and historic environment, development poses a key pressure on these both directly in terms of damage to known and unknown features, and the potential impacts on setting. Other pressures include changing land use and land management, tourism/visitors, pollution and climate change.

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 practices can be difficult to determine. Climate change poses one of the key environmental challenges for Scottish landscapes due to changing temperatures and patterns of precipitation, weather events and sea level change.

Energy storage is likely to be an increasingly important part of the transition to delivering clean, affordable and secure supply of energy. Increasing the use of biological wastes in processes such as anaerobic digestion can

increase the production of biogas, which is a source of renewable fuel and heat. Forestry and farming will need to adapt to cope with the impacts of climate change, such as flooding, drought, unseasonable weather and increased risk of pests and diseases. The demands for the services that the natural environment produces, such as food, water, fuel and materials for development, is likely to grow in line with population growth. Some material assets, such as roads and rail transport, and generally more vulnerable to a changing climate than air and water transport. Flooding is identified to have the most significant impact on these networks, extreme weather conditions and landslides will also have significant impacts.

Which existing environmental protection objectives are relevant?

There are many established environmental protection objectives which form the context for the assessment. International and national level policies and strategies that aim to protect and enhance the environment. Climatic objectives focus on achieving Scotland's GHG emissions to net zero by 2045. Objectives for population and human health aim to prevent or limit exposure to environmental harm and nuisance such as air pollution, especially in urban areas. Objectives for water and air aim to reduce pollution, and to reverse the effects of past emissions. Soil and geology objectives seek to protect prime quality agricultural land and valuable soil resources including the protection of peatlands and remediation of contaminated land. Biodiversity objectives focus on protecting habitats and species from damage and disturbance and improve natural heritage networks. Cultural heritage objectives range from protection of World Heritage Sites and Marine Protected Areas, to recognition and management of more locally important buildings and archeology, and their wider setting. Landscape objectives reflect the importance of all landscapes and the need to help to improve those that have become

degraded. The assessment of seascape as an element of landscape value is also recognised. The role of the marine environment in renewable energy generation is clearly recognised, alongside the role of land based assets such as forestry and agriculture. Objectives for material assets seeks to contribute to the core planning objective and supporting sustainable development, reducing greenhouse gas emissions, and making the best use of Scotland's resources and existing infrastructure. Cutting across all these objectives, international and national climate change objectives are expressed in targets for reducing greenhouse gas emissions and supporting adaptation to changing weather patterns.

Strategic Environmental Assessment Findings

The environmental effects from the policies related to each sector are followed by cumulative, secondary and synergistic effects across the SEA topic areas.

Electricity

Policies and proposals within the electricity sector are expected to have significant positive effects in relation to climatic factors as they generally seek to aid the decarbonisation of electricity generation through new technologies such as renewable energy, carbon capture, utilisation and storage, hydrogen and electricity storage. The greater implementation of these green technologies will contribute towards reducing GHG emissions, by reducing reliance on fossil-fueled electricity. The greater implementation of such technologies is likely to result in significant positive effects on material assets due to improved flexibility and security of energy supply.

Transport

Policies and proposals within the transport sector are expected to have significant positive

effects in relation to climatic factors as they support decarbonisation of transport through promoting the uptake of electric or low emission vehicles, encouraging behavioural change to travel, such as shorter or fewer journeys, and encouraging travel by active and public transport. These measures will contribute towards reducing GHG emissions, thereby having positive effects on climate change. With a shift from fossil fuelled vehicles to low emissions vehicles, and greater uptake of active travel, there is likely to be improvements in air quality due to less pollution, particularly in urban areas within poor air quality, and benefitting human health.

Industry

Policies and proposals within the industry sector promote a wide range of measures such as the introduction of discount and emissions trading schemes, and funds to promote the uptake of low-carbon technologies for example low-carbon heat, carbon capture, utilisation and storage, hydrogen, renewable energy and energy efficiency measures. The greater uptake and use of these technologies and schemes set out within the industry sector is likely to result in significant positive effects in relation to climate change, as a result of reductions in GHG emissions across the sector. This will lead to increased energy efficiency and a reduction in the demand for energy, reducing pressure on supply and distribution networks with positive effects on these networks.

Negative Emissions Technologies (NETs)

Policies and proposals within the negative emission technologies sector promote a wide range of measures which support the uptake of negative emission technologies, such as carbon capture, utilisation and storage, and hydrogen technologies. Policies and proposals provide mechanisms for the identification of potential sites, funding, demonstration and the expansion of evidence relating to such technologies. Additionally, policies and

proposals supporting the uptake of bioenergy and biomass may encourage low-carbon alternatives to provide energy, heat and transport fuel. The greater uptake and use of these technologies and schemes set out within the negative emission technologies sector is likely to result in significant positive effects in relation to climate change, as a result of reductions in GHG emissions across the sector. Similar to industry, reduced pressure on energy supply and distribution networks and will provide greater security of supply.

Buildings

Policies and proposals within the buildings sector are expected to have significant positive effects in relation to climatic factors as they generally seek to improve the energy efficiency of buildings, promote renewable energy and low carbon heat. This will result in reductions in GHG emissions due to less reliance on traditional fuels. Furthermore, improving efficiency and promoting uptake of low-carbon energy and heat will have positive effects on population and human health as a result of improved flexibility and security of supply.

Agriculture

All policies and proposals set out within the agriculture sector are expected to have significant positive effects relating to climate change due to the promotion of more efficient and sustainable farming practices which will reduce GHG emissions, such as reduced use of nitrogen fertilisers and improved emissions intensity of livestock. Furthermore, proposals supporting knowledge exchange, onsite renewable energy generation, and land use management to provide increased carbon sequestration will also facilitate reductions in GHG emissions.

General improvements in land management practices are also expected to have positive effects in relation to material assets, and proposals supporting the development of other

habitats such as woodland within agricultural holdings provide benefits for biodiversity by providing new habitats and greater connectivity.

Waste

Policies and proposals within the waste sector are expected to have significant positive effects in relation to climatic factors as they generally seek to reduce pressure on landfill infrastructure and increase recycling of waste. Proposals supporting recycling and the circular economy, reductions in food waste and the banning of single use items such as bottles and carrier bags could lead to reductions in GHG emissions as a result of less processing of waste and reduced need to manufacture goods from new. Positive effects on GHG emissions are also predicted from policies and proposals seeking to capture landfill gas which would otherwise be released into the atmosphere. Additionally, policies and proposals which will aid in reducing pressure on landfill infrastructure are expected to have positive effects on material assets.

Land Use, Land Use Change and Forestry

The policies and proposals set out within the LULUCF sector are likely to result in significant positive effects in relation to climate change. Policies and proposals generally promote the expansion and creation of woodland and forestry and/or support peatland restoration. The expansion of woodland and forestry is expected to increase rates of carbon sequestration, and the restoration of peatland will improve the quality of high carbon soils, reducing GHG emissions and maximising the potential for carbon to be stored and absorbed.

The policies and proposals relating to LULUCF are expected to have mixed effects on material assets as although they may promote and encourage better land management and may improve degraded land through planting of woodland or forestry or peatland, there may be

direct conflicts of land use. For example, loss of agricultural land for woodland, forestry or peatland restoration.

Cumulative, secondary and synergistic effects

Secondary environmental effects

Electricity

Several secondary effects are identified as likely to arise from policies and proposals within the electricity sector. Policies and proposals which seek to reduce reliance on fossil-fueled electricity by promoting the uptake of new low-carbon technologies are likely to have associated benefits for air quality due to lower levels of pollution. This is identified as resulting in subsequent benefits for population and human health.

Proposals which encourage the uptake of low-carbon technologies such as renewable energy, CCS and hydrogen may result in development which could have adverse effects on topics such as landscape and cultural heritage. Furthermore, some development may have adverse effects in relation to soils, depending on the scale, nature and location of development.

Additionally, policies and proposals within the electricity sector may have adverse secondary effects on a number of SEA topics such as population and human health, soil, water, air and biodiversity, as a consequence of construction and infrastructure improvement works. However, it is recognised that these effects are likely to be temporary in nature.

Transport

Whilst policies and proposals within the transport sector are expected to have primary positive effects in relation to climatic factors, air and population and human health, a number of secondary effects have been identified in relation to other SEA topics. Policies promoting alternatively fueled vehicles, public transport and active travel may

result in additional infrastructure requirements. If existing infrastructure is not adequate to meet the needs of development set out in policies and proposals, there may be increased pressure on infrastructure, having adverse effects for material assets.

Transport related development as outlined in policies and proposals may have mixed effects on biodiversity due to potential loss of habitat for infrastructure. However, promotion of active travel such as footpaths and cycle paths may provide biodiversity benefits by creating linear corridors of habitat.

Likewise, development of transport infrastructure such as new roads, distribution centres, charging facilities and processing plants for alternative fuels such as hydrogen could have potential adverse effects on soil, population and human health air and water quality. However, it is recognised that some of these effects are likely to arise during construction periods and are temporary in nature.

Industry

A number of secondary effects could arise from policies and proposals within the industry sector. Policies and proposals which support and promote the uptake of measures which will result in reductions in GHG emissions are likely to have associated benefits for air quality, and subsequent benefits for population and human health.

Policies and proposals may result in the greater uptake of technologies and measures which could affect the fabric of a building, heritage asset or landscape character. However, it is recognised that these policies and proposals will primarily relate to improvements or application of technologies in existing industrial areas.

Additionally, policies and proposals within the industry sector may have adverse secondary effects on a number of SEA topics such as population and human health, soil, water, air and biodiversity, as a consequence of

construction and infrastructure improvement works. However, it is recognised that these effects are likely to be temporary in nature.

Negative Emissions Technologies

A number of secondary effects are identified as likely to arise from policies and proposals within the negative emission technologies sector. Policies and proposals which support and promote the uptake of measures which will result in reductions in GHG emissions are likely to have associated benefits for air quality, and subsequent benefits for population and human health. However, policies and proposals supporting bioenergy such as biomass may have mixed effects in relation to air quality as the biomass combustion process can result in the emission of air pollutants which could have subsequent adverse effects on human health.

Additionally, policies and proposals within the negative emission technologies sector may have adverse secondary effects on a number of SEA topics such as population and human health, soil, water, air and biodiversity, as a consequence of construction and infrastructure improvement works. However, it is recognised that these effects are likely to be temporary in nature.

Buildings

Several secondary effects are identified as likely to arise from policies and proposals within the building sector. Firstly, policies and proposals which seek to reduce reliance on fossil-fueled energy and heat could result in air quality improvements. However, the implementation of such technologies may have adverse effects on a number of SEA topics. Changes to the fabric of buildings to incorporate energy efficiency measures or low-carbon technologies might have adverse effects on biodiversity, for example bats, or cultural heritage or landscape as a result of changes to the appearance of buildings.

As a consequence of construction and building improvement works, there may be adverse

effects on topics such as soil, biodiversity, water and air quality. However, it is recognised that these effects are likely to be temporary in nature.

Agriculture

Improvements in land management techniques, as set out in policies and proposals within the agriculture sector may have secondary effects on several SEA topics. Promoting better land management and the more efficient use of fertilisers may reduce nutrient leaching and pollution of nearby watercourses, having positive effects on water quality. This may have subsequent benefits for biodiversity, including aquatic species.

Furthermore, limiting fertiliser use and promoting a diverse range of habitats may improve soil quality. Improved soil quality may have subsequent benefits on material assets as a result of improved fertility and crop production. In addition, better land management practices and the planting of habitats such as woodland and hedgerows may improve landscape character and have positive effects on the setting of cultural heritage assets.

Waste

Policies and proposals within the waste sector are expected to have adverse secondary effects in relation to several SEA topics such as population and human health, biodiversity, soil, water, landscape, cultural heritage and air quality, as a consequence of construction, operation and siting of waste infrastructure. However, it is recognised that these effects will be dependent on the scale, nature and location of developments, and in the case of effects arising from the construction phase, may be temporary in nature.

Land Use, Land Use Change and Forestry

Policies supporting woodland expansion or creation, and peatland restoration may subsequently result in improvements to population and human health as a result of

improved opportunities to access woodland, forestry and peatland for recreational purposes.

Additionally, secondary benefits arising from woodland and forestry creation and peatland restoration may result in positive effects on water due to intercepting and filtering pollutants and providing natural flood management measures. Likewise, benefits to soils may arise due to increased soil stability resulting from the planting of woodland and forestry and improved quality of high carbon soils from peatland restoration.

Further benefits may arise for biodiversity, as a result of the creation of new and improved habitats and greater connectivity. However, in some cases, policies and proposals may result in adverse effects on biodiversity as the creation of woodland or peatland restoration may impact non-woodland and non-peatland biodiversity, respectively.

Cumulative and in-combination effects

The following paragraphs summarise the potential cumulative and in-combination effects likely to arise from the Climate Change Plan.

Climatic Factors and Emissions Reduction

The policies and proposals set out in each of the sectors within the update to the Climate Change Plan are expected to make a significant contribution to Scotland's commitment to GHG reduction targets.

All of the policies and proposals set out in the update to the Climate Change Plan will contribute towards reducing GHG emissions and meeting Scotland's target for net zero, thereby having positive effects on climatic factors. The extent to which these policies and proposals will contribute towards emission reductions varies, with complementary roles of the policies and proposals resulting in overall positive cumulative effects. For example, measures aimed at promoting energy efficiency within the building and industry

sectors will be complemented by those that provide financial mechanisms to facilitate their uptake.

All of the policies and proposals within the electricity sector focus on aiding the decarbonisation of electricity generation and promote the increased uptake of renewable and low carbon technologies. These policies and proposals will be complemented by policies and proposals supporting technologies such as electric vehicles, electricity storage, CCUS, and hydrogen power. This sector therefore could make a significant contribution towards meeting net zero targets and ensuring a broad mix of technologies will help improve the security and flexibility of supply. This will be important in order to meet the future challenges to electricity supply and transmission.

Furthermore, reducing the overall demand for electricity and energy within the buildings and industry sector by improving the energy efficiency of both domestic and non-domestic buildings, and industry will further contribute towards reducing GHG emissions. The policies and proposals set out within these sectors may also encourage reductions in GHG emissions by promoting and supporting the uptake of renewable and low-carbon energy and heat technologies. In addition, the promotion and support of negative emission technologies including CCUS, hydrogen and bioenergy may further contribute towards GHG emission reductions.

Land management will also play a fundamental role in reducing GHG emissions. Policies and proposals, such as those that relate to the creation of woodland and forestry and restoration of peatland, will help to reduce emissions and support adaptation.

Reductions and more targeted use of fertilisers and improved efficiency of resources may also contribute towards general reductions in GHG emissions. Other measures promoted within the agricultural sector policies and proposals

include reducing the emission intensity of livestock, which will have direct effects on GHG emission reductions across the sector.

The policies and proposals relating to transport are also expected to play a fundamental role in reducing GHG emissions. Policies generally support the decarbonisation of the sector, seeking greater uptake of ultra-low emission vehicles (ULEVs) and behavioural change towards travel. Policies and proposals promote the use of public and active transport modes for journeys and encourage a reduction in the number and length of journeys made by private vehicle. This would have direct effects on reducing GHG emissions, and subsequent benefits for other SEA topics which are discussed below.

Likewise, policies and proposals within the waste sector are expected to have significant positive effects in relation to climate change as they generally seek to reduce pressure on landfill infrastructure and increase recycling of waste. Proposals supporting recycling and the circular economy, landfill gas capture reductions in food waste and the banning of single use items could lead to reductions in GHG emissions as a result of less processing of waste and reduced need to manufacture goods from new.

Having appropriate infrastructure in place to enable the transition and uptake of technologies such as ULEVs, low-carbon and renewable energy and heat will be vital in achieving these benefits for climate change, and could provide additional benefits in terms of material assets.

Population and Human Health

Many of the policies and proposals set out within the update to the climate change plan are likely to have significant benefits for air quality in Scotland, and subsequently will have significant positive effect on population and human health. Air quality issues are often associated with the release of GHG emissions, which are frequently derived from the transport

and energy sectors. Therefore, policies and proposals which seek to reduce emissions from these sources, including those related to CCUS, are therefore likely to provide benefits to air quality, and subsequently, population and human health.

In addition to policies and proposals relating to decarbonisation of transport, those which promote uptake of active travel such as walking and cycling, may have additional benefits by increasing physical activity and helping to improve mental wellbeing. This may be complemented by policies and proposals within the LULUCF sector which may provide improved recreational opportunities by increasing accessibility for people to woodland and forestry, and areas of peatland.

Policies and proposals supporting improved energy efficiency in buildings and industry, and uptake of low carbon and renewable energy and heat may have additional benefits for population and human health by reducing fuel poverty and ensuring access to warm homes and workplaces.

However, some negative effects could arise as a result of construction activities relating to the development and improvement of infrastructure and buildings. These are likely to be short-term in nature. These are most likely to be related to nuisance such as dust, noise, vibration or visual impact, and are likely to be localised and temporary. In many instances, adverse impacts may be mitigated through a combination of planning mechanisms and on-site management measures.

Air

Many of the policies and proposals set out within the update to the Climate Change Plan are likely to have significant benefits for air quality in Scotland. As air pollution often originates from the same sources and activities that contribute to the release of GHG emissions, notably transport and electricity/energy generation, proposals which support the move towards low-carbon and

renewable energy, and seek to decarbonise the transport sector are expected to have associated benefits to air quality. Therefore, reducing emissions from these sources is therefore likely to improve air quality at both local and national levels.

One of the primary causes of poor air quality is due to pollution derived from transport.

Policies and proposals which aim to aid the decarbonisation of the transport sector are therefore likely to have significant positive effects on improving air quality. Measures to improve air quality are further complemented by policies and proposals which encourage the use of active and public modes of transport.

Additionally, the decarbonisation of the energy and electricity sector through promotion of low-carbon and renewable energy and heat, is likely to have further positive effects on air quality. This will be complemented by policies within the buildings and industry sector which also promote energy efficiency measures, thereby requiring less energy production, and the uptake of low-carbon and renewable technologies.

Technologies such as CCUS, as promoted within the negative emission technologies, could help to contribute to significant reductions in air pollution; particularly if utilised on a commercial scale. While this could have positive effects for air quality, any benefits will be influenced by the specific CCUS utilised and the industries for which this technology is used.

Soil

Several sectors within the update to the Climate Change Plan are likely to have significant benefits for soil quality in Scotland. Both the LULUCF and agricultural sectors are identified as having policies and proposals which could have potential significant effects on soil quality. Policies and proposals relating to the creation of woodland and forestry may improve soil stability and drainage, and those promoting peatland restoration are likely to

improve the quality of high carbon soils. These positive effects on soil are likely to be complemented by policies and proposals promoting better land use management across the agricultural sector.

Additionally, both positive and negative effects on soil are anticipated as a result of policies and proposals set out in the waste sector. Policies and proposals which support the reduced need for landfilling of waste may have positive effects on soil due to less land take for landfilling.

However, the widespread uptake of low-carbon and renewable energy and heat technologies, as promoted across the electricity, buildings, negative emission technologies and industry sectors, may have adverse effects on soil quality due to the siting of developments, resulting in soil sealing and soil compaction. This may be particularly relevant when considered cumulatively, especially due to the development of large-scale commercial scale renewable energy schemes such as wind farms, which are often sited in landscapes with important soil resources.

Water

Both the LULUCF and agricultural sectors are identified as having policies and proposals which are likely to result in significant benefits for water quality. Policies and proposals relating to the creation of woodland and forestry may improve the quality of nearby watercourses and groundwater as it could intercept run-off and filter pollutants.

Additionally, policies relating to peatland restoration are also expected to improve water quality by storing and cleaning water, as well as acting as important natural flood plains, soaking up excess water and regulating run-off. Woodland and forestry may also provide natural flood management measures.

These positive effects are likely to be complemented by policies and proposals within the agricultural sector which relate to

better land management practices. However, some negative effects may arise as a result of construction activities relating to the development and improvement of infrastructure. This is likely to be localised and short-term in nature. In many instances, adverse impacts may be mitigated through a combination of planning mechanisms and on-site management measures.

Biodiversity, Flora and Fauna

Both the LULUCF and agricultural sectors are identified as having policies and proposals which are likely to result in significant benefits for biodiversity, flora and fauna. Policies and proposals relating to the creation of woodland and forestry may provide benefits for biodiversity by creating new habitats and improving connectivity of the ecological network. Policies relating to peatland restoration will also be expected to improve peatland biodiversity. However, it is noted that the creation of woodland and peatland may result in adverse effects on non-woodland and non-peatland biodiversity.

These positive effects arising from woodland/forestry creation and peatland restoration are likely to be complemented by policies and proposals within the agricultural sector which relate to better land management practices.

Policies and proposals relating to the decarbonisation of the electricity sector, including those promoting large-scale renewable energy development may disturb both terrestrial and marine biodiversity, with bird strike a notable issue for onshore wind turbines. Likewise, policies and proposals supporting energy efficiency in homes may adversely affect biodiversity such as roosting bats, if roof cavities are disturbed for the installation of insulation.

Additionally, some negative effects could arise because of construction activities relating to the development and improvement of infrastructure. This is likely to be localised and

short-term in nature. In many instances, adverse impacts during both construction and operation may be mitigated through a combination of planning mechanisms such as Environmental Impact Assessment (EIA), appropriate siting and design, local consultation and engagement and on-site management measures.

Cultural Heritage & Historic Environment

Both the LULUCF and agricultural sectors are identified as having policies and proposals which are likely to result in significant benefits for cultural heritage and the historic environment. Policies and proposals relating to the creation of woodland and forestry may improve the setting of heritage assets, depending on the species grown and the design of planting. Furthermore, policies promoting peatland restoration have the potential to have benefits on cultural heritage, particularly as peatlands are considered some of Scotland's most iconic landscapes and are culturally significant.

Policies and proposals seeking to improve the energy efficiency of buildings and encouraging the uptake of low carbon and renewable energy technologies may have adverse effects on cultural heritage and the historic environment. In particular, the retrofitting of buildings to include new technologies, for example solar panels or heat pumps, and siting of new development may alter the setting of heritage assets or change the appearance or fabric of a historic asset. Negative effects are likely as a result of cumulative developments.

Negative effects on the historic environment may be further heightened by large scale developments resulting from transport policies and proposals. For example, the development of large-scale consolidation centres may result in visual impacts which could affect landscape and cultural heritage, depending on site and setting.

Additionally, some negative effects could arise because of construction activities relating to the development and improvement of infrastructure. This is likely to be localised and short-term in nature. In many instances, adverse impacts identified through the implementation and construction of infrastructure may be mitigated through a combination of planning mechanisms, including Environmental Impact Assessment (EIA) where applicable, appropriate siting and design, local consultation and engagement and on-site management measures.

Landscape and geodiversity

Both the LULUCF and agricultural sectors have policies and proposals which are likely to result in significant benefits for landscape. Policies and proposals relating to the creation of woodland and forestry could improve the landscape character, depending on the scale and nature of change. However, if inappropriately designed woodland or forestry may have adverse effects on landscape character. Potential negative impacts on the landscape can be mitigated if woodland creation schemes are appropriately designed and delivered. Furthermore, policies promoting peatland restoration have the potential to have benefits on landscape character, particularly as peatlands are considered some of Scotland's most iconic landscapes.

Policies and proposals seeking to improve the energy efficiency of buildings and encouraging the uptake of low carbon and renewable energy technologies may have adverse effects on landscape character. In particular, the retrofitting of buildings to include new technologies such as solar panels and siting of new development may alter the character of the landscape.

As noted for cultural heritage, negative effects on the landscape may be further heightened by large scale developments resulting from transport policies and proposals, such as consolidation centres.

Additionally, some negative effects could arise because of construction activities relating to the development and improvement of infrastructure. This is likely to be localised and short-term in nature. In many instances, adverse impacts identified through the implementation and construction of infrastructure are likely to be mitigated through a combination of planning mechanisms, including Environmental Impact Assessment (EIA) as applicable, appropriate siting and design, local consultation and engagement and on-site management measures.

Material Assets (Waste, Energy, Transport and Land Use)

Promoting and encouraging the uptake of low-carbon and renewable energy technologies is a theme that is present within numerous sectors of the Climate Change Plan, notably those relating to electricity, buildings, negative emission technologies and industry. Policies and proposals in these sectors complement each other, supporting the decarbonisation of electricity generation. They promote new technologies ranging from small scale, such as solar PV on buildings, to large scale such as commercial-scale renewable energy, CCUS, hydrogen and electricity storage. The implementation of these technologies, and reduced reliance on fossil-fuel derived energy will help reduce pressure on the existing distribution network, and improve the reliability, flexibility and security of electricity supply, having significant positive effects on material assets.

However, if infrastructure is not adequate to accommodate a larger number of and greater variety of renewable and low carbon technologies, there may be added pressure on the existing network until infrastructure improvements are made. Similarly, transport policies promoting public transport and alternatively fueled vehicles may require additional infrastructure. If existing infrastructure is not adequate to meet the needs of development set out in policies and

proposals, there may be increased pressure on infrastructure, having adverse effects for material assets.

Positive effects on material assets are expected to arise from policies and proposals within the waste sector, as they seek to reduce the amount of waste going to landfill. However, policies and proposals relating to LULUCF are expected to have mixed effects on material assets as although they may promote and encourage better land management and may improve degraded land through planting of woodland or forestry or peatland, there may be direct conflicts of land use. For example, loss of agricultural land for woodland, forestry or peatland restoration. The policies relating to agriculture may complement those of LULUCF as they generally seek to improve soil quality and fertility which subsequently may result in increased crop production, again having positive effects on material assets. However, as with LULUCF, agricultural policies and proposals may have cumulative adverse effects on material assets arising from conflicts of land use.

What measures could be put in place to avoid, reduce or manage the environmental effects of the Update of the Climate change Plan?

The CCPu sets out a series of climate change mitigation measures and the ambitions, policies and proposals aim to meet Scotland's climate change commitments. They are also likely to have beneficial impacts for adapting to and improving resilience to the predicted effects of climate change. Opportunities for mitigation of adverse environmental effects and enhancement of positive environmental effects are set out for each sector.

For Agriculture there are opportunities to further enhance benefits, particularly in relation to biodiversity, flora and fauna, water and landscape through supporting landscape scale co-ordination of these actions.

For Electricity further understanding is needed of potential adverse effects from the development of new, or the upgrading of existing, infrastructure particularly identified in relation to cultural heritage and landscape and potential mixed effects on biodiversity, flora and fauna, soil and air through monitoring, and where additional mitigation may be required through strengthening advice in existing guidance.

For LULUCF priorities for woodland planting need to be balanced against the biodiversity value of other habitat types to reflect the biodiversity emergency. There may be a role for enhanced guidance on decision making for woodland creation to help mitigate both long- and short-term environmental effects in relation to this, and on guiding species type in relation to maximising carbon sequestration, and climate change risk from pests and disease.

Potential environmental effects from the decarbonisation of Scottish industry could include localised adverse impacts on some topic areas from project level construction and infrastructure improvement works. Potential impacts can be mitigated by ensuring the development of appropriate guidance in relation to environmental effects from the development of new technologies in relation to existing mechanisms such as the planning system, SEPA regulation, EIA, HRA, guidance and on-site management measures.

Negative Emissions Technologies bring benefits primarily in relation to climatic factors and material assets, but also for population and human health as a result of associated benefits for air quality. However, policies and proposals supporting bioenergy such as biomass may have mixed effects in relation to air quality. Ensuring appropriate levels of regulation of biomass installations will mitigate potential environmental effects.

There are a wide range of benefits across the built environment, with synergy between

positive effects for climatic factors and population and human health for domestic buildings through increased energy efficiency and lower fuel costs. An area based co-ordinated approach such as that promoted by Scotland's Energy Efficiency Programme, will also help to mitigate this potential impact on cultural heritage from retrofitting buildings through the consideration of cumulative impacts.

Decarbonising transport has largely positive effects in relation to climatic factors, population and human health, and air, with key synergies between reductions in emissions, improved air quality and increased active travel. Opportunities to enhance the positive effects are associated with co-ordination of local actions to achieve a strongly integrated transport network.

Waste has largely positive effects in relation to climatic factors and material assets as a result of overall reductions in waste generated. Mitigation of environmental effects from developing new recycling and waste management facilities may be achieved through focusing development on existing sites or brownfield land.

Next Steps

Consultation responses to the Environmental report can be submitted via the Scottish Government Citizen Space website address <https://consult.gov.scot/>. Responses can be also be submitted by email, with the Respondent Information Form (Appendix E) to: climate_change@gov.scot or by post to:

Climate Change Plan update SEA
Consultation

Climate Change Plan Team, 3F South

Scottish Government

Victoria Quay

Edinburgh

EH6 6QQ

Chapter 1

Introduction

Strategic Environmental Assessment of the Update to the Climate Change Plan December

Introduction

1.1 This Strategic Environmental Assessment (SEA) Environmental Report (ER) has been prepared by LUC, on behalf of the Scottish Government, for the emerging update to the Climate Change Plan (CCP).

1.2 The update to the CCP (CCPu) “boosts” existing emissions reduction policies and proposals and/or identifies additional new policies and proposals to those currently set out in the Plan. The update builds on and complements the existing Plan, rather than replicating or superseding it in its entirety.

1.3 The initial update to the CCP was due to be laid in Parliament in April 2020, with a finalised version subject to SEA, however, due to the COVID-19 outbreak this work was necessarily postponed.

1.4 As the pandemic and associated lockdown unfolded, the Scottish Government anticipated the vital importance of economic and social recovery and the potential role that the CCPu could play in ensuring a green and resilient recovery from COVID-19. The CCPu therefore has two purposes; as a strategic document on green recovery, and providing a routemap for the Scottish Government to meet its climate change targets.

1.5 The Committee on Climate Change (CCC) has highlighted the opportunity to turn the COVID-19 crisis into a defining moment in the fight against climate change, and has provided advice on delivering economic recovery that accelerates the transition to a cleaner, net-zero emissions economy, whilst strengthening resilience to the impacts of climate change. From an economic perspective, this could

include investing in climate-resilient low-carbon infrastructure, job creation in low-carbon and climate-resilient industries, training and reskilling of the workforce.

Background

1.6 The current *Climate Change Plan: The Third Report on Policies and Proposals 2018-2032*¹, published by the Scottish Government, outlines policies and proposals to meet the emission targets as outlined in the Climate Change (Scotland) Act 2009² (“the 2009 Act”) to reduce carbon emissions by 42% by 2020 and by 80% by 2050 (1990 baseline), over the plan period of 2018 - 2032.

1.7 The Climate Change (Emissions Reduction Targets) (Scotland) Act 2019³ (“the 2019 Act”) amends the 2009 Act, setting targets to reduce Scotland's emissions of all greenhouse gases to net-zero by 2045 at the latest. It includes interim targets for reductions of at least 56% by 2020, 75% by 2030, 90% by 2040.

1.8 The 2019 Act includes a range of measures to improve transparency of the targets, for example basing progress to meeting targets on actual emissions from all sectors of the Scottish economy. Duties in the 2009 Act requiring Scottish Ministers to lay regular “Climate Change Plans” (CCPs) in Parliament setting out their proposals and policies for meeting targets remain in place, but the details of this reporting duty are adjusted by the 2019 Act. For example, future CCPs will be required to include estimates of the costs and benefits of policies.

1.9 During the passage of the Climate Change (Emissions Reduction Targets) (Scotland) Bill through Parliament, recommendations from the Environment, Climate Change and Land Reform Committee

(ECCLR)⁴ included that the CCP should be updated within six months of the Bill receiving Royal Assent. In April 2019, the First Minister declared a global climate emergency and committed to updating the CCP within six months of the 2019 Act receiving Royal Assent. The non-statutory update to the CCP was postponed in March 2020 in light of the coronavirus (COVID-19) outbreak.

Climate Change in Scotland

1.10 The UK Met Office’s most recent climate projections ([UKCP18](#)) suggest that under a high emissions scenario, by the 2070s, average temperatures in Central Scotland could be up to 4.8°C warmer in summer and 4.5°C warmer in winter. The expected increase in temperature is greatest in the south and east. There is greater uncertainty about precipitation, with projections suggesting that by 2070, summers could range from 40% drier to 8% wetter, whilst winters could range from 3% drier to 12% wetter. Scotland was 4% wetter in the most recent decade (2008-2017) compared to the 1981-2010 average. These trends vary across Scotland but increases in rainfall are likely to be most pronounced in the north and west.

1.11 The overall pattern of warming is expected to continue and is likely to be accompanied by changes in rainfall patterns and more frequent episodes of extreme weather including storms, flooding, drought and unseasonably hot or cold weather. Warmer temperatures will result in rising sea levels, coastal flooding and loss of land to the sea. The UKCP18 predicts that by the end of the century, sea levels at Edinburgh could be between 0.3m and 0.9m higher than the average for 1981-2000.

¹ Scottish Government (2018) Climate Change Plan: the Third Report on Proposals and Policies 2018-2032 (RPP3) [online] Available at: <https://beta.gov.scot/publications/scottish-governments-climate-change-plan-third-report-proposals-policies-2018/> (accessed 16/03/2020)

² Climate Change (Scotland) Act 2009

³ Climate Change (Emissions Reduction Targets) (Scotland) Act 2019

⁴ The Scottish Parliament (2019) Environment, Climate Change and Land Reform Committee Stage 2 Report on the Climate Change (Emissions Reductions Targets) (Scotland) Bill [online] Available at: <https://sp-bpr-en-prod-cdnep.azureedge.net/published/ECCLR/2019/6/5/Stage-2-Report-on-the-Climate-Change--Emissions-Reduction-Targets---Scotland--Bill/ECCLRS052019R6.pdf> (accessed 06/03/2020)

1.12 With increasing awareness of climate change, and the impact that it will have on society and the environment, Scotland has taken steps to reduce its overall contribution of greenhouse gases (GHG)s. Overall, between 1990 and 2016 there was a 49% reduction in GHG emissions in Scotland⁵, with the main contributors to this reduction being the energy, waste and industrial sectors. Scotland's overall carbon footprint decreased by 6.9% between 2015 and 2016, to a record low of 73.8 million tonnes of CO₂ equivalent (MtCO_{2e})⁶.

1.13 Over the period 1990-2017, GHG emissions from the electricity sector have reduced by 92%, due to renewable energy generation capacity increasing threefold. As of June 2019, there was 11.6GW of installed capacity across the country, and in 2017 51.7% of electricity generated was from renewable resources⁷. Over the same period, GHG emissions from the buildings and industrial sectors have fallen by 16% and 46%, respectively. Likewise, the waste sector saw a reduction of 72% in GHG emissions and the agricultural sector a 15% reduction.

1.14 Land use and forestry is a key sector with great potential to slow climate change, due to the potential for carbon sequestration. Reports suggest carbon sequestration totalled approximately 5.4MtCO_{2e} in 2017, compared to 0.3 in 1990. This is primarily a result of increased woodland and forestry cover, and restoration of peatland. In 2018-2019, 58% more woodland was planted compared to the previous year, totalling 11,200ha. This equates to 84% of total woodland creation in the UK over this period. Likewise, between 2018-2019, 5,800ha of peatland were restored over the same period.

1.15 Despite the transport sector making improvements to reduce carbon emissions,

including introducing low emission busses, further electrification of rail networks, promoting electric vehicles, and reducing the average emissions of new vehicles, the total emissions from the transport sector in 2017 (including aviation and shipping) had increased by 0.4% compared to 1990.

Current Climate Change Plan

1.16 The current *Climate Change Plan: The Third Report on Policies and Proposals 2018-2032*⁸, identifies seven key sectors which contribute towards emissions and outlines the policies and proposals for each sector to meet the overall emission targets. The key sectors and a brief summary of the targets and policies are listed below:

- **Electricity:** Policies seek the further decarbonisation of energy generation by supporting the development of a wide range of renewable energy technologies, seeking improvements to electricity generation and network asset management, encouraging the development of a range of technologies that aid system security, flexibility and resilience, and encouraging innovative energy systems which improve efficiencies and deliver secure, clean and affordable electricity. The overall target is to reduce emissions by 28% over the plan period.
- **Transport:** Policies seek to the continued decarbonisation of transport by increasing the uptake of ultra-low carbon vehicles, reducing vehicle emissions including from heavier vehicles such as busses, HGVs and ferries, introducing low emission zones in larger cities, and investing more money in improving and promoting active

⁵ <https://www.gov.scot/publications/scottish-greenhouse-gas-emissions-annual-target-report-2016/pages/1/>

⁶ Scottish Government (2019) Scotland's Carbon Footprint [online] Available at: <https://www.gov.scot/publications/scotlands-carbon-footprint-1998-2016/>

⁷ Scottish Government (2019) Climate Change Plan: Monitoring Report [online] Available at: <https://www.gov.scot/publications/climate-change-plan-monitoring-report-2019/>

⁸ Scottish Government (2018) Climate Change Plan: the Third Report on Proposals and Policies 2018-2032 (RPP3) [online] Available at: <https://beta.gov.scot/publications/scottish-governments-climate-change-plan-third-report-proposals-policies-2018/> (accessed 16/03/2020)

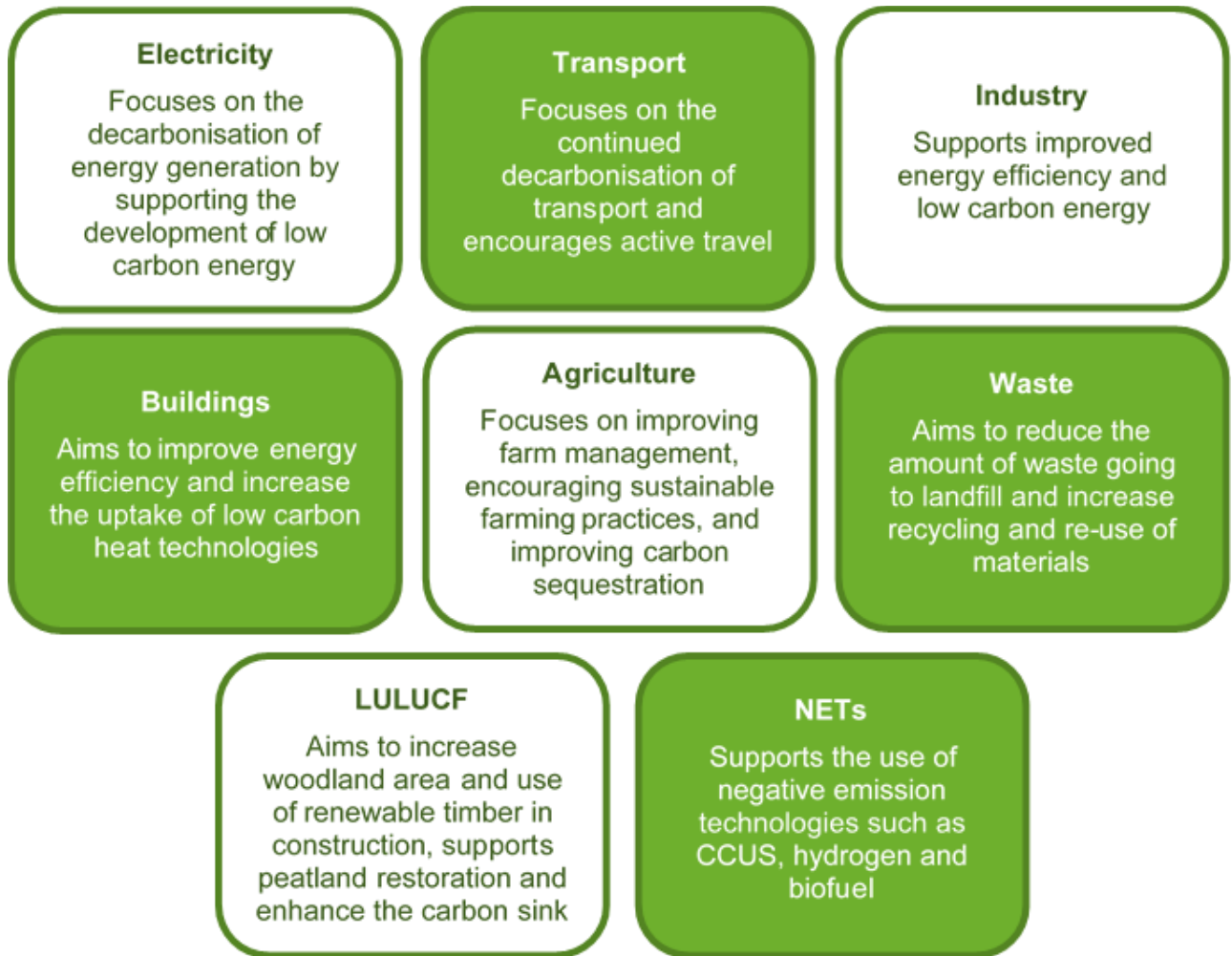
travel. The overall target is to reduce transport related emissions by 37% over the plan period.

- **Industry:** Policies seek to reduce industry emissions through a combination of fuel diversification, cost saving energy efficiency, heat recovery and participation in the EU Emissions Trading System. Additionally, policies seek to consider emerging Carbon Capture and Storage (CCS), Carbon Capture and Utilisation (CCU) and hydrogen opportunities. The overall target is to reduce industry emissions by 21% over the plan period.
- **Buildings:** Policies seek to improve the energy efficiency of homes through use of insulation, secondary glazing and smart readers, and increase the use of low carbon fuels and heat technologies. The overall target is to reduce emissions by 33% over the period of the plan.
- **Agriculture:** Policies seek to reduce agricultural emissions by promoting low carbon farming practices (including

nutrient, fertiliser and manure and slurry management), efficient use of fertilisers, increasing carbon sequestration of farmland, and increasing education and awareness. The policies seek to reduce agricultural emissions by 9% over the plan period.

- **Waste:** Policies seek to reduce, re-use and recycle more waste and capture gasses from landfill sites. This focus also aligns with Scotland's circular economy ambitions. The overall target is to reduce emissions by 52% over the plan period.
- **Land Use, Land Use Change and Forestry:** Policies seek to increase forestry and woodland from 18% of Scotland's land area to 21%, resulting in an additional 18,000 ha of forestry and woodland plantation per year. In addition, policies seek the restoration of 20,000ha of peatland per annum, resulting in a carbon sink of -6.7MTCO_{2e} by 2032.

Figure 1.1: Key sectors



Update to the Climate Change Plan

1.17 The CCPu includes amendments to the scale and/or timescale of delivery for existing policies/proposals and additional new policies/proposals to those set out in the CCP to help achieve the overall emission reduction targets.

1.18 The CCPu continues to focus on the required seven key sectors: electricity, industry, buildings, transport, agriculture, waste, and land use, land use change and forestry (LULUCF), and has included an eighth sector, Negative Emissions Technologies, for this update only.

1.19 **Table 1.1** sets out the key facts about the update to the CCP.

Table 1.1: Key Facts

Responsible Authority	Scottish Government
Title	Update to the Climate Change Plan 2018-2032: Securing a Green Recovery on a Path to Net Zero
Subject	Climate Change
Period Covered	2020-2032
Area covered by the policy	Scotland
What prompted the preparation of the policy?	The Climate Change (Emissions Reduction Targets) Act 2019 increased the level of ambition of greenhouse gas emissions reductions targets from that set out in the Climate Change (Scotland) Act 2009. In April 2019, the First Minister declared a global climate emergency and committed to updating the Climate Change Plan.
Purpose and/or objectives of the policy	The update to the Climate Change Plan sets out Scottish Government Proposals and Policies across a range of sectors for meeting greenhouse gas emissions reduction targets for 2020-2032. These sectors comprise: electricity, buildings, transport, industry, waste, land use change and forestry, agricultural and Negative Emissions Technologies. The update is an amendment to the existing Climate Change Plan and “boosts” existing carbon reduction policies and proposals and/or additional new policies and proposals to those currently set out in the Plan. The update builds on and complements the existing Plan, rather than replicating or superseding it in its entirety.

Strategic Environmental Assessment (SEA)

1.20 SEA is the process by which environmental considerations are required to be fully integrated into the preparation of plans, programmes or strategies prior to their final adoption. The SEA process identifies the likely significant environmental effects that the plan, programme or strategy will have on the environment if implemented.

1.21 SEA should begin at an early stage in a plan's preparation, as it is important that the future consultation on the plan and the Environmental Report takes place when ideas are forming, and policy options are still being actively considered. SEA was undertaken on the emerging updates with the first iteration being prepared in spring 2020 and followed by the assessment of the CCPu in autumn 2020, recast around a green recovery.

Requirement for SEA

1.22 The requirement for SEA is outlined by the EU SEA Directive 2001/42/EC or 'SEA Directive'. The SEA Directive is implemented in Scotland by the Environmental Assessment (Scotland) Act 2005⁹. The 2005 Act requires Scottish public bodies or those exercising functions of a public character (Responsible Authorities) to undertake a SEA when preparing plans, if it is likely to have significant environmental effects.

Stages in SEA

1.23 The SEA process comprises a number of stages as identified below.

Screening – determining whether a plan requires a SEA.

Scoping – establishing significant environmental topics and setting the environmental baseline. Requires a formal consultation with the Consultation

Authorities “to identify the scope and level of detail to be reflected in an Environmental Report”.

Environmental Assessment – assessing the potential environmental impact of the plan; developing alternatives where necessary; and, consulting on both the draft plan and ER.

Post-Adoption Statement – setting out how the assessment and the consultation results have been considered within the finalised plan. Developing the monitoring strategy to assess progress once adopted.

Monitoring – monitoring the significant environmental effects of the implementation of the plan and identifying any unforeseen adverse effects at an early stage in order to undertake appropriate remedial action.

Purpose of the Environmental Report

1.24 The ER outlines the findings from the assessment of the CCPu and identifies any likely significant effects (positive or negative) of implementing the update to the CCP. The ER:

- assesses the impact of new outcomes/policies/ proposals to meet the GHG emissions reduction targets covered by the update to the CCP; and
- identifies the likely impacts of “boosts” to current outcomes/policies/proposals in the form of increased scale or shortened timescales for delivery.

1.25 This ER presents an update to the baseline information and a review of relevant plans, programmes and strategies (PPSs)¹⁰ from the original ER.

⁹ Environmental Assessment (Scotland) Act 2005

¹⁰ Updated in spring 2020

Structure of the Environmental Report

1.26 This ER is structured to be compliant with the reporting requirements of the SEA Act:

- **Non-Technical Summary** – provides a non-technical summary of the information contained in the Environmental Report.
- **Chapter 1 Introduction** – describes the background to the update to the Climate Change Plan and outlines its content; the purpose of SEA and the Environmental Report; key dates and milestones; and, the structure of the Environmental Report.
- **Chapter 2 Approach to the Assessment** – describes the method used in carrying out the SEA. The next iteration of the ER will outline the approach to reasonable alternatives and will describe any difficulties encountered and data limitations.
- **Chapter 3 Context of the update to the Climate Change Plan** - describes links to other plans, programmes, strategies and environmental protection objectives and the environmental baseline.
- **Chapters 4 - SEA Findings** - the next iteration of the ER will identify environmental problems and presents the finding from the assessment of the update to the CCP and reasonable alternatives.

- **Chapter 5 Mitigation and Enhancement** – the next iteration of the ER will describe the mitigation measures that have been considered and incorporated to avoid or mitigate any potential (significant) adverse impacts.
- **Chapter 6 Monitoring** – presents a proposed framework for monitoring the significant effects identified in the Environmental Report.
- **Chapter 7 Next Steps** – sets out information on the consultation including how to provide views on the Environmental Report and how these responses will be taken into account in the finalisation of the draft update to the Climate Change Plan.

1.27 The main body of the report is supported by the following appendices:

- **Appendix A** – Consultation Authority responses.
- **Appendix B** – SEA Assessment matrices.
- **Appendix C** – Compliance checklist setting out the sections of the Environmental Report that address the requirements of the 2005 Act.
- **Appendix D** – Baseline mapping
- **Appendix E** – Respondent Information Form

Chapter 2

Approach to the Assessment

Introduction

2.1 The methodology set out in this chapter describes the approach that has been taken to the SEA of the CCPu to date.

Screening/Scoping

2.2 The SEA process began in early 2020 with the production of a Screening/Scoping Report for the update to the CCP. The Screening/Scoping Report outlined the environmental baseline for the plan area as well as the policy context and key sustainability issues. It was considered that all environmental topics should be scoped into the SEA due to the potential for likely significant effects to occur across all topics:

- Climatic Factors / Emissions Reduction
- Population and Human Health
- Air
- Soil
- Water
- Biodiversity, Flora and Fauna
- Cultural Heritage and the Historic Environment
- Landscape
- Material Assets (Waste, Energy, Transport and Land Use).

Environmental Assessment

2.3 Due to the nature of the update and the hierarchy in which it sits, the assessment has been undertaken at the strategic, national level. The approach to the assessment reflects the national status of the update and the

consequently high-level nature of the assessment it requires.

2.4 As noted previously, the draft update will seek to build on and complement the existing CCP published in February 2018. Reflecting the ambitious nature of the plan, it was anticipated that achieving the GHG emissions targets would require maximum possible emissions savings (whilst ensuring that nobody is left behind, reflecting a just transition) across the sectors. The assessment has considered policies which are new, boosted or maintained.

SEA of Reasonable Alternatives

2.5 Part 14(2) of the 2005 Act requires that:

“The report shall identify, describe and evaluate the likely significant effects on the environment of implementing (a) the plan or programme; and (b) reasonable alternatives to the plan or programme, taking into account the objectives and the geographical scope of the Plan or Programme”.

2.6 The context for the alternatives is limited by the requirement to meet the ambitious climate change targets. The 2005 Act requires that the Scottish Government also identify, describe and evaluate the likely significant effects on the environment of any reasonable alternatives to the CCPu. This section outlines what has been assessed, including the reasonable alternatives that have been considered.

2.7 In considering what a “reasonable” alternative is, the Scottish Government’s commitment to decarbonise the whole energy system and tackle climate change has been taken into account. The CCP is being updated to reflect the increased ambition of the new targets set in the Climate Change (Emissions Reduction Targets) (Scotland) Act 2019.

2.8 The Climate Change (Emissions Reduction Targets) (Scotland) Act 2019, which amends the Climate Change (Scotland) Act 2009, sets targets to reduce Scotland’s

emissions of all greenhouse gases to net-zero by 2045 at the latest, with interim targets for reductions of at least 56% by 2020, 75% by 2030, 90% by 2040. To help ensure delivery of the long-term targets, Scotland’s climate change legislation also includes annual targets for every year to net-zero. Scotland’s target of net-zero emissions by 2045, five years ahead of the UK, is firmly based on what the independent Committee on Climate Change (CCC) advise is the limit of what can currently be achieved. The 2019 Act also embeds the principles of a Just Transition, which means reducing emissions in a way which tackles inequality and promotes fair work, at the heart of Scotland’s approach to reaching net-zero.

2.9 In considering potential reasonable alternatives to be included in the assessment the approach to alternatives for the 2017 Environmental Report for the Scottish Government Climate Change Plan was considered. The previous assessment was based on two broad scenarios for emissions reduction in Scotland: a Central Scenario and High Ambition Scenario. These scenarios illustrated broad indicative packages of measures that could be used to meet varying overall levels of emission reduction. However, based on the current legislative context, and the declared climate emergency, it was identified that the current ambition can only be to achieve the maximum emissions reductions possible, reflected across all sectors. The previous approach to alternatives is therefore no longer reasonable in the current legislative context.

2.10 A further option of assessing those policies and proposals in the CCPu which were identified as ‘maintained’ and assessing these as ‘boosted’ was considered. Review of the ‘maintained’ policies and proposals identified that these were policies for which it is not reasonable to ‘boost’ due to the nature of the text. For example, continuing a partnership approach, or undertaking research to improve the evidence base for a sector are actions for which undertaking more action or

action on an accelerated timescale is not realistic. This further reflects the legislative context for the CCPu (noting that the CCPu document itself is non-statutory), and the need for the update to achieve maximum emissions reduction based on current technical and practical limitations.

Appraisal Methodology

2.11 The outcomes, policies and proposals have been appraised against the SEA topics outlined above, with scores being attributed to indicate likely sustainability effects on each objective. In line with the SEA of the current CCP, effects are identified as either positive, negative, mixed or neutral.

Table 2.1: Key to symbols and colour coding

+	Effects are positive overall for that environmental topic
0	Effects are neutral overall for that environmental topic
-	Effects are negative overall for that environmental topic
+/-	Effects are mixed (positive/negative) overall for that environmental topic

2.12 The assessment framework is structured around each SEA topic and includes combined justification text for the scores.

2.13 The approach to the assessment was as follows:

- Assessment matrices were developed for each sector considered in the draft Plan. These tables set out the potential for impacts across a range of environmental receptors for each boosted or new policy and proposal included within that sector (see Appendix B). These matrices reflect the draft SEA objectives for NPF4.
- Drawing on the findings from the first stage of assessment, summary tables

show the combined effect of the individual policies and proposals. Findings are displayed for each sector included in the draft Plan (Chapter 4).

- This is followed by narrative text (Chapter 4) which sets out the consideration of potential cumulative, synergistic and in-combination effects likely to arise from boosted and new policies and proposals, the maintained policies, and the wider policy context across all of the sectors.

2.14 Schedule 2 of the 2005 Act identifies criteria for determining the likely significance of effects on the environment (see Table 2.2) which will be reflected in the approach to scoring set out in the assessment.

Table 2.2: Approach to scoring

SEA Assessment Criteria	Breakdown and Description
(a) the probability, duration, frequency and reversibility of the effects	<p><u>Probability</u> Low – Not likely to have an effect Medium High – Highly likely to have an effect</p> <p><u>Duration</u> Short-term – 0-1 years Medium-term – 1-2 years (up to the end of strategy period) Long-term – 2+ years (beyond the end of the strategy period)</p> <p><u>Frequency</u> Continual; defined by number of occurrences; or intermittent</p> <p><u>Reversibility</u> Whether the effect can be reversed (i.e. can the receptor return to baseline condition) without significant intervention</p>
(b) the cumulative nature of the effects	Where several options each have insignificant effects but together have a significant or combined effect. This includes synergistic effects, which is when effects interact to produce a total effect greater than the sum of the individual effects.
(c) the transboundary nature of the effects	Effects beyond Scotland's boundary.
(d) the risks to human health or the environment	Whether the impact of the effect would present a risk for people and the environment.
(e) the magnitude and spatial extent of the effects (geographical area and size of the population likely to be affected)	<p><u>Magnitude</u> High – High proportion of the receptor affected Medium Low – Low proportion of the receptor affected</p> <p><u>Spatial extent</u> National/Transboundary – Effects on Scotland or England International – Effects extending to the UK or beyond</p>
(f) the value and vulnerability of the area likely to be affected due to: (i) special natural characteristics or cultural heritage (ii) exceeded environmental quality standards or limit values (iii) intensive land-use	Impact of the effect on the value or condition of the existing area.
(g) the effects on areas or landscapes which have a recognised national, Community or international protection status	Impacts on areas with national, community or international protection.

Difficulties Encountered and Data Limitations

2.15 Schedule 3 of the 2005 Act states that Responsible Authorities should identify any difficulties encountered during the assessment process.

2.16 The development of the policies and proposals has been an ongoing process alongside the assessment and this evolution has required the assessment to focus on high level environmental impacts to reflect the level of detail available on the policies and proposals.

2.17 Key limitations of the assessment process relate to information on the likely scale and extent of development brought about by some of the policies and proposals. Other limitations include the balance in the assessment of the role of other regulatory processes in mitigating environmental effects. This is particularly an issue where there is uncertainty on the scale of development, particularly between different sectors.

Chapter 3

Context of the Update to the Climate Change Plan

Relationship with other Plans, Programmes and Strategies and Environmental Objectives

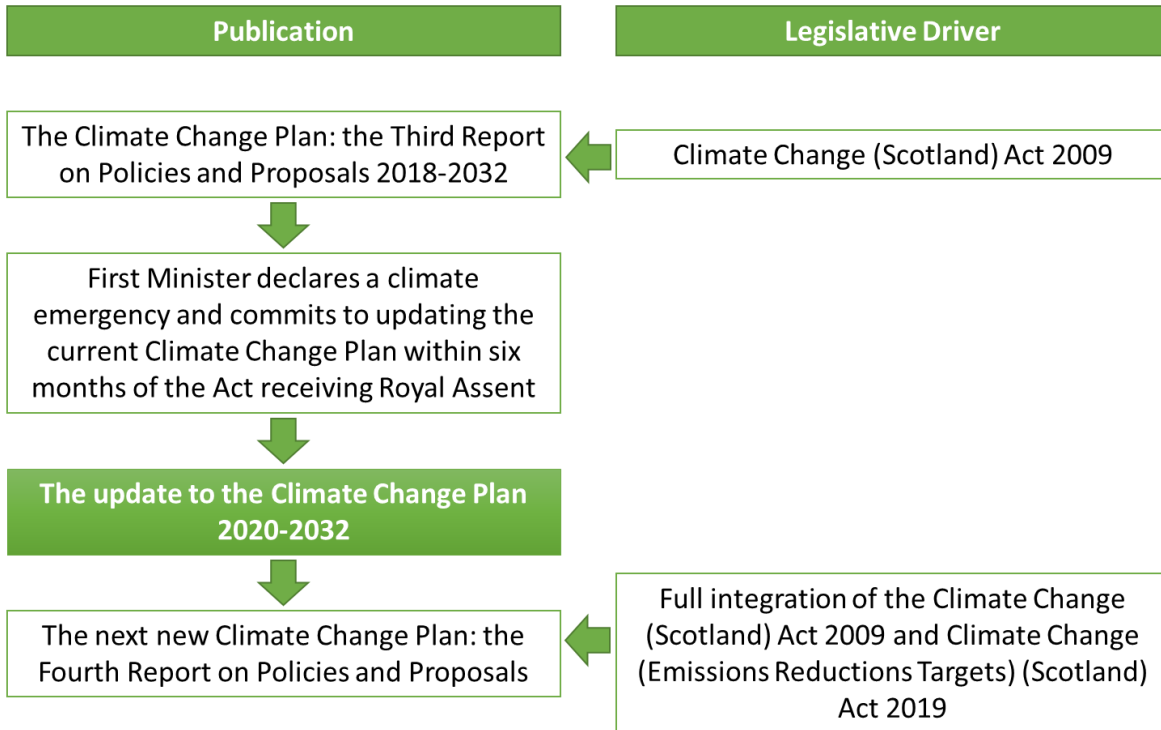
Introduction

3.1 The 2005 Act requires the ER to outline the relationships between the update to the Climate Change 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.

The policy context

3.2 The immediate policy context for the update to the Climate Change Plan is illustrated in **Figure 3.1**.

Figure 3.1: Immediate policy context for the update to the Climate Change Plan



3.3 As discussed previously, the 2019 Act increases the ambition of targets for reducing greenhouse gas emissions, in response to the UN Paris Agreement and global climate emergency. It also updates arrangements for advice, planning and reporting in relation to those 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. The Just Transition Commission¹¹ also provides independent advice on a net-zero economy for Scotland that is fair for all.

3.4 Big Climate Conversation¹² engaged over 2,500 people in Scotland, over a six-month period up to November 2019, in a discussion about Scotland's response to tackling the global climate emergency. Cross cutting issues which emerged included:

- A holistic and system-wide approach requiring an integrated plan.
- Government leadership ensuring that low carbon behaviours become the most convenient or only option.
- A just transition to ensure that action to address climate change should not exacerbate inequalities and, where possible, should reduce them.

3.5 Climate Ready Scotland: Second Scottish Climate Change Adaptation Programme 2019-2024¹³, published in September 2019, provides an overarching framework for adaptation to climate change, setting out Scottish Ministers' objectives 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 Assessment¹⁴ as well as the Evidence Report Summary for Scotland.

3.6 Scotland's Economic Strategy¹⁵ sets out an overarching framework for a more productive, cohesive and fairer Scotland. The Economic Strategy forms the strategic plan for existing and all future Scottish Government policy. In addition to setting goals for sustainable economic growth, the Economic Strategy also sets out our ambitions for investing in Scotland's infrastructure, and prioritises investment to ensure that Scotland protects and nurtures its natural resources and captures the opportunities offered by the transition to a more resource efficient, lower carbon economy.

3.7 Protecting Scotland, Renewing Scotland: The Government's Programme for Scotland 2020-2021¹⁶ sets out Scottish Government's plans to make Scotland a more successful country, with opportunities and increased well-being for all. Within the context of the global climate emergency it sets out that the Scottish Government is committed to achieving net zero by 2045. The importance of adaptation to prepare and manage the impacts of climate change is also set out. The programme sets out the next Infrastructure Investment Plan which will reflect Scotland's commitment to achieving net zero.

3.8 National Planning Framework 3 (NPF3)¹⁷ and **Scottish Planning Policy**

¹¹ Scottish Government (undated) Just Transition Commission [online] Available at: <https://www.gov.scot/groups/just-transition-commission/> (accessed 28/01/2020)

¹² <https://www.gov.scot/publications/report-findings-big-climate-conversation/>

¹³ 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)

¹⁴ 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)

¹⁵ Scottish Government (2015) Scotland's Economic Strategy [online] Available at: <https://beta.gov.scot/publications/scotlands-economic-strategy/> (accessed 13/01/2020)

¹⁶ Scottish Government (2020) Protecting Scotland, Renewing Scotland: The Government's Programme for Government for Scotland 2020-2021 [online] Available at: <https://www.gov.scot/publications/protecting-scotland-renewing-scotland-governments-programme-scotland-2020-2021/> (accessed 09/12/2020)

¹⁷ Scottish Government (2014) Ambition, Opportunity, Place – Scotland's Third National Planning Framework [online] Available at:

(SPP)¹⁸ 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. NPF3 and SPP also set out the key role that planning plays in delivering Scottish Government's commitments of transitioning to a low carbon economy and highlights the role of planning in protecting and making efficient use of Scotland's existing resources and environmental assets.

3.9 A review of NPF3 has commenced and the Programme for Government highlights NPF4 as a major commitment in response to the global climate emergency. 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. A final version of NPF4 is expected in 2021 and will be approved by Parliament, before it is adopted by Scottish Ministers. NPF3 will remain in place until it is replaced by NPF4.

3.10 Scotland's National Marine Plan fulfils requirements under the Marine (Scotland) Act 2010 and the Marine and Coastal Access Act 2009 to prepare marine plans, providing a cohesive approach to the management of both inshore and offshore waters in accordance with EU Directive 2014/89/EU on maritime spatial planning. It seeks to promote development in a way that is compatible with the protection and enhancement of the marine environment. The Plan covers the management of both Scottish inshore waters (out to 12 nautical miles) and offshore waters (12 to 200 nautical miles). The role of the marine environment in supporting decarbonisation, including through reducing

pressure and safeguarding natural carbon sinks is noted. The Plan also notes the interaction between marine and terrestrial planning and highlights the importance of alignment between both.

Environmental Baseline

Introduction

3.11 Schedule 3 of the Environmental Assessment (Scotland) Act 2005 (the 2005 Act) requires that the following be identified when undertaking a SEA:

- Relevant aspects of the current state of the environment and its likely evolution without implementation of the plan or programme.
- Environmental characteristics of areas likely to be affected.
- Relevant existing environmental problems.
- Relevant environmental protection objectives at the international, European or national level.

3.12 The update to the CCP will be assessed against this baseline to provide an indication of the type and significance of any environmental effects that could arise.

Climatic Factors

Environmental Protection Objectives

3.13 Scotland's ambition on tackling climate change is set out in the *Climate Change (Scotland) Act 2009* ("the 2009 Act")¹⁹. Through this legislation, Scotland contributes to international (EU and UN) efforts on climate change mitigation and adaptation. The 2009 Act creates the statutory framework for

<https://beta.gov.scot/publications/national-planning-framework-3/> (accessed 13/01/2020)

¹⁸ Scottish Government (2014) Scottish Planning Policy [online] Available at: <https://beta.gov.scot/publications/scottish-planning-policy/> (accessed 13/01/2020)

¹⁹ The Scottish Government (2009) Climate Change (Scotland) Act 2009 [online] Available at:

<http://www.legislation.gov.uk/asp/2009/12/contents> (accessed 14/02/2020)

greenhouse gas (GHG) emissions reduction in Scotland and set targets for reduction in emissions of the seven Kyoto Protocol GHG by 80% by 2050, with an interim 2020 target of 42%, compared to the 1990/1995 baseline level.

3.14 *The Climate Change (Emissions Reduction Targets) (Scotland) Act 2019*²⁰, amends the *Climate Change (Scotland) Act 2009*, sets targets to reduce Scotland's emissions of all greenhouse gases to net-zero by 2045 at the latest, with interim targets for reductions of at least 56% by 2020, 75% by 2030, 90% by 2040.

3.15 The 2019 Act also requires that annual GHG emissions targets are set, by Order, for each year in the period 2021-2045. Following the initial phase of target-setting, the annual targets are set in nine-year batches.

3.16 The *Scottish Climate Change Adaptation Programme* (the Adaptation Programme)²¹ addresses the impacts identified for Scotland in the *UK Climate Change Risk Assessment (CCRA)*²². The Adaptation Programme sets out Scottish Ministers' objectives in relation to adaptation to climate change, their proposals and policies for meeting these objectives, and the period within which these proposals and policies will be introduced. The Programme also sets out the arrangements for wider engagement in meeting these objectives.

3.17 At the Paris Climate Conference (COP 21) in December 2015, 195 countries adopted the first ever universal, legally binding global climate deal. The *Paris Agreement* is a bridge between today's policies and climate-neutrality before the end of the century. The agreement

sets out a global action plan to put the world on track to avoid dangerous climate change by limiting global warming to well below 2°C²³. The deal also states that countries should aim for the even more ambitious target of 1.5°C²⁴. A number of other agreements were reached on key issues such as mitigation through reducing emissions, adaptation and loss and damage²⁵. The Agreement entered into force on 4th November 2016²⁶.

Overview of Baseline

3.18 In October 2018, the Intergovernmental Panel on Climate Change published a report which predicts that the impacts and costs of global warming 1.5°C above pre-industrial levels will be far greater than expected. It also highlights that the impacts will be much worse if global warming reaches 2°C or more. Urgency for action is required as the report predicts such level of global warming can be reached within the next 11 years, and most certainly within 20 years without major reductions in CO₂ emissions. The Scottish government has recognised a climate emergency and is acting accordingly.

3.19 In 2018, Scotland's total emissions of the seven GHG were estimated to be 41.6 MtCO₂e, an increase in source emissions of 1.5% from 2017²⁷. The main contributors to this increase between 2017 and 2018 was a rise in Energy Supply emissions (0.8MtCO₂e, 13.4%) and it was driven almost entirely by increased emissions from power stations. A 45.4% reduction in estimated GHG emissions between 1990 and 2018 was also reported²⁸. Decreases in emissions were from energy supply, land use, land use change and forestry, waste management (i.e. landfill), and

²⁰ Scottish Government (2019) *The Climate Change (Emissions Reduction Targets) (Scotland) Act 2019* [online] Available at: <http://www.legislation.gov.uk/asp/2019/15/enacted> (accessed 27/03/2020)

²¹ Scottish Government (2019) *Climate Ready Scotland 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 14/02/2020)

²² UK Government (2017) *UK Climate Change Risk Assessment* [online] Available at: <https://www.gov.uk/government/publications/uk-climate-change-risk-assessment-2017> (accessed 10/02/2020)

²³ UNFCCC (2016) *The Paris Agreement* [online] Available at: http://unfccc.int/paris_agreement/items/9485.php (accessed 14/02/2020)

²⁴ Ibid.

²⁵ Ibid.

²⁶ Ibid.

²⁷ Scottish Government (2020) *Scottish Greenhouse Gas Emissions 2018*. [pdf] Available at: <https://www.gov.scot/publications/scottish-greenhouse-gas-emissions-2018/> [Accessed on 08/09/2020]

²⁸ Ibid.

business emissions (such as manufacturing). The largest factor slowing the overall reduction is transport (excluding international), as this sector was the largest contributor in 2018 with 12.9MtCO₂e, and it has only reduced emissions by 4.9% since 1990²⁹.

3.20 Land use, land use change and forestry play a crucial role in removing CO₂ from the atmosphere by serving as a carbon stock in a form of forestland, cropland, grassland, wetlands, settlements and harvested wood products and rewetting soils and gaining soils organic matter.

3.21 In towns and cities, urban woodlands, forests and trees not only improve the general public realm but also deliver cooling, shade, better air quality and absorb CO₂ emissions.

Evolution of the Baseline – Pressure, Trends and Key Points

3.22 In Scotland, greenhouse gas (GHG) emissions are the key driver for climate change. Major contributors to the GHG emissions include transport sector (excluding international aviation and shipping) (12.9 million tonnes of carbon dioxide equivalent (MtCO₂e)), business (8.4MtCO₂e), agriculture (7.5MtCO₂e), energy supply (6.8MtCO₂e) and the residential sector (6.2MtCO₂e). Minor contributions were recorded for international aviation and shipping, public sector buildings, waste management and industrial processes. Land use, land use change and forestry were the only aggregate sector which contributed to reducing emissions by approximately 5.4MtCO₂e in 2018³⁰.

3.23 Almost three-quarters (74.2%) of Scotland's GHG emissions in 2018 were in the form of carbon dioxide (CO₂)³¹. During 2018, CO₂ was the main GHG emitted in most sectors, with the exception of agriculture sector. Methane (followed by CO₂ and nitrous oxide) was the main gas emitted by the agriculture sector and almost all emissions emitted by the waste management sector were in the form of methane.

3.24 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 trade³². New and emerging pests and diseases, and invasive non-native species affecting people, plants and animals has also been noted as a research priority³³.

3.25 Scotland's soils and peatlands are the biggest terrestrial store of carbon with peatlands alone holding around 3,000 megatonnes tonnes of carbon³⁴; 60 times more than carbon stored by trees and other vegetation³⁵. 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 seas³⁶. Stocks of carbon within the habitats and surface sediments of offshore Marine Protected Areas are estimated at 9.4 Mt organic carbon and 47.8 Mt inorganic carbon³⁷.

²⁹ Ibid.

³⁰ Scottish Government (2020) Scottish Greenhouse Gas Emissions 2018. [pdf] Available at: <https://www.gov.scot/publications/scottish-greenhouse-gas-emissions-2018/> [Accessed on 08/09/2020]

³¹ Scottish Government (2020) Scottish Greenhouse Gas Emissions 2018. [pdf] Available at: <https://www.gov.scot/publications/scottish-greenhouse-gas-emissions-2018/> [Accessed on 08/09/2020]

³² 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 14/02/2020)

³³ Ibid

³⁴ SNH [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 14/02/2020)

³⁵ Ibid

³⁶ SNH (2014) SNH 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 14/02/2020)

³⁷ SNH (2017) SNH 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->

3.26 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 rise³⁸ and this will have an impact on coastal landscapes. 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 expected³⁹. Urban areas in particular will be exposed to extreme heat conditions.

3.27 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”.

3.28 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.

3.29 The Covid pandemic has posed new challenges and highlighted the scale of changes required for achieving Scotland’s emissions reduction targets. Despite strict lockdown regulations imposed across the world and resulting temporary local improvements in air quality, evidence suggests that the direct effect of the pandemic-driven response will be negligible in the longer term. However, the same research highlights a window of opportunity to reduce emissions if the economic recovery is tilted towards green stimulus and reductions in fossil fuels investments⁴⁰. Importantly, the pandemic has demonstrated that radical change can be achieved if necessary.

Related SEA topics: Climate change has been identified as primary pressure on many of the SEA topic areas (i.e. soil, water, biodiversity, cultural heritage and the historic environment).

Population and Human Health

Environmental Protection Objectives

3.30 Many existing environmental protection objectives are relevant to population and human health, either directly or indirectly. For example, the *Air Quality Standards (Scotland) Regulations 2010*⁴¹, the *Air Quality (Scotland) Regulations 2000*⁴², the *Air Quality (Scotland) Amendment Regulations 2002*⁴³ and the *Air Quality (Scotland) Amendment Regulations 2016*⁴⁴ help set out current objectives and requirements for air quality with clear relevance for human health. Protection is also afforded through existing legislation against

[assessment-blue-carbon-resources-scotlands-inshore-marine-protected-area](#) (accessed 14/02/2020)

³⁸ Adaptation Scotland (2018) Climate trends and projections [online] Available at: <https://www.adaptationscotland.org.uk/why-adapt/climate-trends-and-projections> (accessed 14/02/2020)

³⁹ *ibid*

⁴⁰ Forster, P. et al. (7 August 2020) Current and future global climate impacts resulting from COVID-19. Nature Climate change. [online] Available at: <https://www.nature.com/articles/s41558-020-0883-0> [accessed on 28/08/2020]

⁴¹ The Air Quality Standards (Scotland) Regulations 2010 [online] Available at: <http://www.legislation.gov.uk/ssi/2010/204/contents/made> (accessed 14/02/2020)

⁴² Scottish Government (2000) The Air Quality (Scotland) Regulations 2000 [online] Available at: <http://www.legislation.gov.uk/ssi/2000/97/made> (accessed 27/03/2020)

⁴³ Scottish Government (2002) The Air Quality (Scotland) Amendment Regulations 2002 [online] Available at: <http://www.legislation.gov.uk/ssi/2002/297/introduction/made> (accessed 27/03/2020)

⁴⁴ The Air Quality (Scotland) Amendment Regulations 2016 [online] Available at: <http://www.legislation.gov.uk/sdsi/2016/9780111030837/contents> (accessed 14/02/2020)

noise and vibration nuisance at the both the European level through the *Environmental Noise Directive (2002/49/EC)*⁴⁵ and the national level through regulations such as the *Environmental Noise (Scotland) Regulations 2006*⁴⁶.

3.31 The *Pollution Prevention and Control (Scotland) Regulations 2012*⁴⁷ (PPC Regulations) also seek to provide protection for human health. The PPC Regulations introduce a consistent and integrated approach to environmental protection to ensure that industrial activities that may have a significant impact on the environment are strictly regulated. The regulations were designed to eliminate or minimise emissions to air, water and land and extended pollution controls to previously unregulated sectors.

3.32 *Cleaner Air for Scotland – The Road to a Healthier Future*⁴⁸ sets out a long-term vision for air quality in Scotland by detailing how Scottish Government and its partner organisations aim to reduce air pollution. As a result, this strategy will lead to improved human health, wellbeing, environment, placemaking and sustainable economic growth. Lastly, it will fulfil Scotland's legal responsibilities to reduce emissions. Currently, the strategy is under review and a new strategy is due to be published early 2021.

Overview of Baseline

3.33 The estimated population of Scotland in 2018 was 5.4 million, the highest to date, and has increased by 0.5% from 2017 and by 5% over the last decade⁴⁹. Projections forecast that the population will continue to rise to

around 5.6 million in 2026 to around, continuing to increase to around 5.7 million in 2041⁵⁰. Life expectancy has increased over the past three decades; however, this has slowed in recent years⁵¹.

3.34 Approximately 71% of Scotland's people live in urban areas, which accounts for just 2% of Scotland's land surface⁵². 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 several 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 remotely⁵³.

3.35 The Scottish Index of Multiple Deprivation ranks small areas (data zones) in Scotland from the most deprived to the least deprived. It analyses data from several indicators across the domains of income, employment, health, education, skills and training, housing, geographic access and crime. Key findings from the 2020 Index show that 14 areas have been consistently among the 5% most deprived in Scotland since the 2004 Index. Of these, 9 were in Glasgow City with the remainder located in Inverclyde, Renfrewshire, Highland, North Lanarkshire and North Ayrshire. Six council areas now have a larger share of the 20% most deprived data zones in Scotland compared to 2016, with the largest increases observed in

⁴⁵ Environmental Noise Directive 2002/49/EC [online] Available at: http://ec.europa.eu/environment/noise/directive_en.htm (accessed 14/02/2020)

⁴⁶ Environmental Noise (Scotland) Regulations 2006 [online] Available at: <http://www.legislation.gov.uk/ssi/2006/465/made> (accessed 14/02/2020)

⁴⁷ The Pollution and Prevention Control (Scotland) Regulations 2012 [online] Available at: <http://www.legislation.gov.uk/ssi/2012/360/contents/made> (accessed 14/02/2020)

⁴⁸ Scottish Government (2015) *Cleaner air for Scotland: the road to a healthier future* [online] Available at: <https://www.gov.scot/publications/cleaner-air-scotland-road-healthier-future/> (accessed 27/03/2020)

⁴⁹ National Records for Scotland (2019) *Scotland's population 2018* [online] Available at: <https://www.nrscotland.gov.uk/files/statistics/rqar/2018/rqar18.pdf> (Accessed on 08/09/2020)

⁵⁰ 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 08/09/2020)

⁵¹ National Records for Scotland (2019) *Scotland's population 2018* [online] Available at: <https://www.nrscotland.gov.uk/files/statistics/rqar/2018/rqar18.pdf> (Accessed on 08/09/2020)

⁵² *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 08/09/2020)

⁵³ *ibid*

Aberdeen City, North Lanarkshire, Moray, East Lothian, Highland and North Ayrshire⁵⁴.

Evolution of the Baseline

3.36 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 exposure to air pollutants⁵⁵. Research has shown that air pollution is one of the largest environmental risks to public health in the UK, reducing average life expectancy and often contributing to premature deaths⁵⁶. Activities that generate air pollutants have been considered under the topic of Air Quality.

3.37 Transport is a significant contributor to poor air quality in urban areas⁵⁷ and emissions from transport have only declined by 4.9% since 1990⁵⁸. Approximately 66% of all journeys in Scotland are reported to be made by car, which is an increase of 7.7% over 5 years⁵⁹. 40% of these journeys are less than two miles in length and could be potentially covered by bicycle or on foot⁶⁰. In addition to helping to reduce GHG emissions, active travel such as cycling or walking, can provide

access to the outdoors with additional benefits for physical and mental health and well-being, including reducing obesity and stress. Due to several common sources, most notably road traffic in urban areas, there is also a close relationship between air quality and environmental noise⁶¹. The agriculture sector has dominated the ammonia emissions inventory, producing around 90% of Scotland's ammonia emissions in 2016⁶².

3.38 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 poverty⁶³. In 2018, the estimated rate of fuel poverty remained similar to the previous year at approximately 25.0% or around 619,000 fuel poor households, and 7.0% or 174,000 households were living in extreme fuel poverty⁶⁴. 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 poverty⁶⁵.

3.39 Flooding can have significant environmental impacts and can also affect people, communities and businesses⁶⁶. 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

⁵⁴ Scottish Government (2020) Introducing - The Scottish Index of Multiple Deprivation 2020 [online] Available at: <https://www.gov.scot/publications/scottish-index-multiple-deprivation-2020/> (accessed 08/09/2020)

⁵⁵ Scotland's Environment (2016) Air quality and health [online] Available at: <https://www.environment.gov.scot/our-environment/air/air-quality-and-health/> (accessed 09/09/2020)

⁵⁶ Scottish Government (2019) Cleaner Air for Scotland strategy: independent review [pdf] Available at: <https://www.gov.scot/publications/cleaner-air-scotland-strategy-independent-review/pages/6/> (accessed 09/09/2020)

⁵⁷ Scotland's Environment (2016) Air quality [online] Available at: <https://www.environment.gov.scot/our-environment/air/air-quality/> (accessed 09/09/2020)

⁵⁸ Scottish Government (2020) Scottish Greenhouse Gas Emissions 2018. [pdf] Available at: <https://www.gov.scot/publications/scottish-greenhouse-gas-emissions-2018/> [Accessed on 08/09/2020]

⁵⁹ Transport Scotland (2019) Scottish Transport Statistics [pdf] Available at: <https://www.transport.gov.scot/media/47196/scottish-transport-statistics-2019.pdf> (accessed 09/09/2020)

⁶⁰ Transport Scotland (undated) Walking and cycling [online] Available at: <https://www.transport.gov.scot/our-approach/active-travel/walking-and-cycling/#42959> (accessed 09/09/2020)

⁶¹ Scottish Government (2019) Cleaner Air for Scotland strategy: independent review [pdf] Available at: <https://www.gov.scot/publications/cleaner-air-scotland-strategy-independent-review/pages/6/> (accessed 09/09/2020)

⁶² National Atmospheric Emissions inventory (2018) Air Pollutant Inventories for England, Scotland, Wales and Northern Ireland: 1990 – 2016 [online] Available at: https://uk-air.defra.gov.uk/assets/documents/reports/cat09/1810160958_DA_Air_Pollutant_Inventories_1990-2016_Issue1.pdf (accessed 27/10/2020)

⁶³ Scottish Government (undated) Home energy and fuel poverty [online] Available at: <https://www.gov.scot/policies/home-energy-and-fuel-poverty/> (accessed 09/09/2020)

⁶⁴ 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 09/09/2020)

⁶⁵ *ibid*

⁶⁶ 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 09/09/2020)

additional risks to human health posed by changes to air quality and rising temperatures⁶⁷.

3.40 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 recover⁶⁸.

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

Environmental Protection Objectives

3.41 Scotland's air quality environmental protection objectives are largely derived from the *EC Air Quality Directive (2008/50/EC)*⁶⁹ and the *4th Air Quality Daughter Directive (2004/107/EC)*⁷⁰, via the *Air Quality Standards (Scotland) Regulations 2010*⁷¹ which transpose these Directives into the Scottish

context. There are also domestic objectives as part of the Local Air Quality Management system set under the *Environment Act 1995*⁷² and associated regulations⁷³. These objectives are largely aimed at reducing air emissions that are potentially harmful to human health and the environment, and together they set out the requirement for monitoring with a particular focus on areas where air pollution is concentrated.

3.42 Scotland's *PPC Regulations (2012)*⁷⁴ allow for the regulation and monitoring of certain industrial activities in Scotland that can generate airborne pollution. Together with the *Air Quality Standards (Scotland) Regulations 2010*⁷⁵, the PPC Regulations enable regulators to monitor, manage and, ultimately, improve Scottish air quality. It also sets a requirement for monitoring of air quality with a particular focus on areas where air pollution is concentrated and seeks to identify the sources.

3.43 Air Quality Strategy for England, Scotland, Wales and Northern Ireland⁷⁶ sets out long term air quality objectives and policy options to further improve air quality in the UK. The strategy focuses on tackling the key air pollutants to air in the UK which include Particulate Matter (PM-PM10 and PM2.5), oxides of nitrogen (NOx), Ozone, sulphur dioxide, polycyclic aromatic hydrocarbons (PAHs), benzene, 1,3 – butadiene, carbon monoxide, lead and ammonia. It sets out

⁶⁷ 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 09/09/2020)

⁶⁸ 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 09/09/2020)

⁶⁹ The European Parliament and the Council of the European Union (2008) Directive 2008/50/EC of the European Parliament and of the Council on ambient air quality and cleaner air for Europe [online] Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32008L0050&from=en> (accessed 09/09/2020)

⁷⁰ The European Parliament and the Council of European Union (2004) Directive 2004/107/EC of the European Parliament and of the Council relating to arsenic, cadmium, mercury, nickel and polycyclic aromatic hydrocarbons in ambient air [online] Available at: <https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2005:023:0003:0016:EN:PDF> (accessed 09/09/2020)

⁷¹ The Air Quality Standards (Scotland) Regulations 2010 [online] Available at: http://www.legislation.gov.uk/ssi/2010/204/pdfs/ssi_20100204_en.pdf (accessed 09/09/2020)

⁷² Environment Act 1995, c.25 [online] Available at: <http://www.legislation.gov.uk/ukpga/1995/25/introduction> (accessed 09/09/2020)

⁷³ Scottish Government (2016) Local Air Quality Management policy guidance [online] Available at: <https://www.gov.scot/binaries/content/documents/govscot/publications/advice-and-guidance/2018/03/local-air-quality-management-policy-guidance-scotland/documents/00507617-pdf/00507617-pdf/govscot%3Adocument/00507617.pdf> (accessed 09/09/2020)

⁷⁴ Scottish Parliament, The Pollution Prevention and Control (Scotland) Regulations 2012 [online] Available at: http://www.legislation.gov.uk/ssi/2012/9780111018408/pdfs/sdsi_9780111018408_en.pdf (accessed 09/09/2020)

⁷⁵ The Air Quality Standards (Scotland) Regulations 2010 [online] Available at: <http://www.legislation.gov.uk/ssi/2010/204/made/data.pdf> (accessed 09/09/2020)

⁷⁶ DEFRA, Scottish Executive, Welsh Assembly Government and DENI (2007) The Air Quality Strategy for England, Scotland, Wales and Northern Ireland [online] Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/69336/pb12654-air-quality-strategy-vol1-070712.pdf (accessed 09/09/2020)

specific national objectives that consider European Directive limits and target values for protecting human health.

Overview of Baseline

3.44 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.

3.45 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 environment⁷⁷.

Evolution of the Baseline – Pressure, Trends and Key Points

3.46 Air quality in Scotland has improved considerably over the last few decades. Between 1990 and 2016 there were decreases of 84% for carbon monoxide (CO), 72% for nitrogen oxides (NO_x), 65% for non-methane volatile organic compounds, 64% for fine particulate matter (PM₁₀) and 94% for SO₂⁷⁸.

However, air pollution is still estimated to reduce the life expectancy of every person in the UK by an average of 7–8 months⁷⁹ and there are some areas of towns and cities where air quality has been identified as a concern.

3.47 Section 83(1) of the *Environmental Act 1995*⁸⁰ sets out a requirement that where air quality objectives are not being met or are unlikely to be met within the relevant period, Local Authorities must designate an Air Quality Management Area (AQMA). In Scotland, 38 AQMAs have currently been declared, 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 emissions⁸¹.

3.48 Air pollution often originates from the same activities that contribute to climate change; notably transport, agriculture and energy generation. Transport is the most significant source contributing to poor air quality in urban areas⁸². While measures such as using alternative fuels sources and encouraging active travel can help improve air quality in addition to reducing GHG emissions, some measures aimed at reducing the impacts of climate change can also have a negative impact on air quality. For example, while emissions from well operated and well-maintained modern biomass boilers are generally lower than the coal equivalent, the burning of biomass feedstock does emit air pollutants such as particulates⁸³.

3.49 Cleaner air provides multiple benefits and actions taken, such as a shift towards low or zero emissions transport and energy

⁷⁷ 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 09/09/2020)

⁷⁸ Ibid

⁷⁹ Scottish Government (2018) 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 09/09/2020)

⁸⁰ Environment Act 1995, c.25 [online] Available at: <http://www.legislation.gov.uk/ukpga/1995/25/introduction> (accessed 09/09/2020)

⁸¹ Air Quality in Scotland (2018) Air Quality Management Areas [online] Available at: <http://www.scottishairquality.co.uk/laqm/aqma> (accessed 09/09/2020)

⁸² Scotland’s Environment (2016) Air quality [online] Available at: <https://www.environment.gov.scot/our-environment/air/air-quality/> (accessed 09/09/2020)

⁸³ ibid

sources, should provide mutual benefits for both air quality and climate change⁸⁴.

3.50 Evidence suggests that due to the pandemic, air pollution of NO₂ and NO_x across 7 sites in Scotland has on average decreased by -55% and -61% respectively⁸⁵. However, such results have been gained by implementing very strict measures.

3.51 Covid-19 pandemic has led to air quality improvements especially in urban areas mainly due to the reduction in private and public transport use. Private and public transport declined by approximately 90% between 14th to 19th of April 2020 in comparison to the same period last year. In the same time active travel such as cycling has increased by 50%⁸⁶. With the easing of lockdown restrictions, private vehicles have returned on the roads, however bus and rail services still experience significant drops in demand (rail: -70%, bus: - 55% for the week of 17 – 23 of August). Interestingly, cycling rates have remained stable and are 30% higher than last year⁸⁷.

Related SEA topics: Air quality can directly or indirectly impact on other SEA topics, such as biodiversity and population and human health.

Soil and Geology

Environmental Protection Objectives

3.52 The importance of soil as a resource is recognised internationally through the *European Commission's Thematic Strategy for Soil Protection*⁸⁸. Nationally, the protection of prime quality agricultural land and peatlands is set out in the *Scottish Soil Framework*⁸⁹, *Scotland's National Peatland Plan*⁹⁰ and the *Scottish Government's Draft Peatland and Energy Policy Statement*⁹¹.

3.53 Geological sites receive protection through the designation of geological Sites of Special Scientific Interest (SSSIs) at the national level and at the international recognition through establishment of a network of Geoparks⁹².

Overview of Baseline

3.54 Soil is a non-renewable resource and is fundamentally one of Scotland's most important assets⁹³. 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 roads⁹⁴. There is an intrinsic relationship between soil health and other environmental topics; biodiversity, water and

⁸⁴ 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 09/09/2020)

⁸⁵ Ricardo Energy and Environment (2020) COVID-19 lockdown effects on air quality. [online] Available at: http://www.scottishairquality.scot/assets/documents/COVID19_lockdown_effect_s_on_air_quality.html

⁸⁶ Transport Scotland (2020) COVID-19 Transport Trend Data 14 – 19 April 2020 [online] Available at: <https://www.transport.gov.scot/publication/covid-19-transport-trend-data-14-19-april-2020/>

⁸⁷ Transport Scotland (2020) COVID-19 Transport Trend Data 17 – 23 August 2020 [online] Available at: <https://www.transport.gov.scot/publication/covid-19-transport-trend-data-17-23-august-2020/> [accessed on 28/08/2020]

⁸⁸ European Commission (2015) Soil, The Soil Thematic Strategy [online] Available at: http://ec.europa.eu/environment/soil/three_en.htm (accessed 09/09/2020)

⁸⁹ The Scottish Government (2009) The Scottish Soil Framework [online] Available at: <https://www.gov.scot/publications/scottish-soil-framework/> (accessed 09/09/2020)

⁹⁰ SNH (2015) Scotland's National Peatland Plan, Working for our Future [online] Available at: <https://www.nature.scot/scotlands-national-peatland-plan-working-our-future> (accessed 09/09/2020)

⁹¹ The Scottish Government (2017) Draft Peatland and Energy Policy Statement [online] Available at: <http://www.gov.scot/Resource/0050/00502389.pdf> (accessed 09/09/2020)

⁹² SNH (undated) Geoparks [online] Available at: <https://www.nature.scot/professional-advice/safeguarding-protected-areas-and-species/protected-areas/international-designations/geopark> (accessed 09/09/2020)

⁹³ Scottish Government (2006) Scotland's Soil Resource - Current State and Threats [online] Available at: <https://www2.gov.scot/publications/2006/09/21115639/7> (accessed 09/09/2020)

⁹⁴ Scottish Government (2009) The Scottish Soil Framework [online] Available at: <http://www.scotland.gov.uk/Publications/2009/05/20145602/0> (accessed 09/09/2020)

air quality in particular. For example, soil erosion is one of the main contributors to diffuse water pollution⁹⁵.

3.55 Soils can play two significant roles with regards to carbon. It is estimated that Scotland's soils contain over 3 billion tonnes of historic carbon, 60 times the amount of carbon held in trees and plants, making up over 53% of the UK's soil carbon⁹⁶. It is estimated that the loss of just 1% of soil carbon as carbon dioxide would triple Scotland's annual GHG emissions⁹⁷. However, soil has also capacity to continue removing atmospheric carbon dioxide through additional sequestration.

3.56 Degraded soil can act as a net carbon emitter, soils in good condition protect the carbon store and depending on the vegetation cover can continue to sequester carbon. Land use change and management practices can impact significantly on soil carbon stores and sequestration.

3.57 Peatlands are of particular importance for mitigating climate change by acting as carbon 'sinks'. If peatlands are in good condition they have the ability to deposit and continually sequester new carbon in peat-forming vegetation. Peatlands in Scotland extend over large areas of Scottish uplands but are most extensive in the north and west in areas with gentle slopes and poor drainage⁹⁸. Blanket bog is the most extensive semi-natural habitat in Scotland, covering around 23% of the land area⁹⁹. Approximately 1.6 billion tonnes of the carbon stored in Scottish soils is within peat¹⁰⁰. As with all soils, peats 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 emissions¹⁰¹. If Scotland lost all of the carbon stored in its peat soils as CO₂, it would be the equivalent of more than 120 times Scotland's annual GHG emissions. It is estimated that over 80% of Scotland's peatlands are degraded¹⁰².

Evolution of the Baseline – Pressures, Trends and Key Points

3.58 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 scale¹⁰³. As such, the management and use of these resources can affect the amount of CO₂ that is held or released. Peatlands in good condition remove CO₂ from the atmosphere and store carbon in the soil. Conversely, degraded peatlands may emit more CO₂ than they remove and become a net source of greenhouse gases¹⁰⁴.

3.59 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 forestry¹⁰⁵. At present, there is uncertainty and

⁹⁵ SEPA (undated) Soil [online] Available at:

<http://www.sepa.org.uk/environment/land/soil/#effect> (accessed 14/01/2020)

⁹⁶ 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-scotland-soils/> (accessed 09/09/2020)

⁹⁷ *ibid*

⁹⁸ SNH (2014) Commissioned Report No. 701 - Scotland's peatland – definitions & information resources [online] Available at: <https://www.nls.uk/e-monographs/2014/701.pdf> (accessed 09/09/2020)

⁹⁹ *ibid*

¹⁰⁰ Climate X Change (2018) Soil Carbon and Land Use in Scotland Final Report [online] Available at: climalexchange.org.uk/media/3046/soil-carbon-and-land-use-in-scotland.pdf (accessed 09/09/2020)

¹⁰¹ Scotland's Soils – part of Scotland's Environment (undated) Welcome to Scotland's soils [online] Available at: <http://soils.environment.gov.scot/> (accessed 09/09/2020)

¹⁰² Scotland's Environment (2019) Peatland Restoration [online] Available at: <https://soils.environment.gov.scot/resources/peatland-restoration/> (accessed 09/09/2020)

¹⁰³ *ibid*

¹⁰⁴ Scotland's Environment (2019) Peatland Restoration [online] Available at: <https://soils.environment.gov.scot/resources/peatland-restoration/> (accessed 09/09/2020)

¹⁰⁵ Scotland's Environment (2011) Soils [online] Available at: <https://www.environment.gov.scot/media/1213/land-soils.pdf> (accessed 09/09/2020)

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 soils¹⁰⁶. Estimates of soil sealing suggest figures of approximately 1000 hectares a year¹⁰⁷. 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 biodiversity¹⁰⁸.

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.

Water

Environmental Protection Objectives

3.60 Objectives relating to the condition of all water bodies are set through the *Water Framework Directive*¹⁰⁹, which governs objectives for rivers, lochs, transitional waters, coastal waters and groundwater resources. The Water Framework Directive sets out the requirement for an assessment of both chemical and ecological status, alongside the requirement to consider the status of biodiversity as an indicator in determining water quality.

3.61 These objectives are set in the Scottish context in a range of water, coastal and marine policies. Scotland's two River Basin Management Plans (RBMPs)¹¹⁰ aim to improve the overall condition of water bodies. The protection of Scotland's water resources has also been translated through the establishment of legislation and regulations such as the *Water Environment and Water Services (Scotland) Act 2003*¹¹¹ and the *Water Environment (Controlled Activities) (Scotland) Regulations 2011*¹¹². These complement the role of others such as the *Pollution Prevention and Control (Scotland) Regulations 2012*¹¹³, developed to specifically control pollution relating to industry discharges.

3.62 The *Flood Risk Management (Scotland) Act 2009*¹¹⁴ provides for the management of flood risk and translates the *EU Floods Directive*¹¹⁵ into the national context. The Directive mandates the creation of Flood Risk Management Plans (FRMPs) for all inland and coastal areas at risk of flooding, integrating their development and employment with existing RBMPs.

3.63 *Scotland's National Marine Plan*¹¹⁶ 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

¹⁰⁶ 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 09/09/2020)

¹⁰⁷ 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 09/09/2020)

¹⁰⁸ SEPA (2019) Guidance on consideration of soil in Strategy Environmental Assessment [online] Available at: <https://www.sepa.org.uk/media/162986/lups-sea-qu2-consideration-of-soil-in-sea.pdf> (accessed 09/09/2020)

¹⁰⁹ European Commission (2000) The Water Framework Directive [online] Available at: http://eur-lex.europa.eu/resource.html?uri=cellar:5c835afb-2ec6-4577-bdf8-756d3d694eeb.0004.02/DOC_1&format=PDF (accessed 09/09/2020)

¹¹⁰ SEPA (2016) River Basin Management Planning, The Current Plans [online] Available at: <https://www.sepa.org.uk/environment/water/river-basin-management-planning/> (accessed 09/09/2020)

¹¹¹ Water Environment and Water Services (Scotland) Act (2003) [online] Available at: <http://www.legislation.gov.uk/asp/2003/3/contents> (accessed 09/09/2020)

¹¹² Water Environment (Controlled Activities) (Scotland) Regulations (2011) [online] Available at: <http://www.legislation.gov.uk/ssi/2011/209/contents/made> (accessed 09/09/2020)

¹¹³ The Pollution Prevention and Control (Scotland) Regulations (2012) [online] Available at: <http://www.legislation.gov.uk/ssi/2012/360/contents/made> (accessed 09/09/2020)

¹¹⁴ The Flood Risk Management (Scotland) Act 2009 [online] Available at: <http://www.legislation.gov.uk/asp/2009/6/contents> (accessed 09/09/2020)

¹¹⁵ European Commission, Directive 2007/60/EC of 23 October 2007 on the Assessment and Management of Flood Risks [online] Available at: <http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32007L0060&from=EN> (accessed 09/09/2020)

¹¹⁶ Scottish Government (2015) Scotland's National Marine Plan [online] Available at: <https://www.gov.scot/publications/scotlands-national-marine-plan/> (accessed 09/09/2020)

that is compatible with the protection and enhancement of the marine environment.

Overview of Baseline

3.64 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 industry¹¹⁷. These water resources also support a rich diversity of habitats and species, attract tourism, promote recreation and provide for the sustainable growth of the economy¹¹⁸.

3.65 In recent decades, significant improvements to water quality in many rivers, canals, and estuaries have been observed alongside significant reductions in pollution¹¹⁹. 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 in Scotland are now in good condition or better and almost two thirds of lochs surveyed were found to be in good or high condition¹²⁰.

3.66 Scotland's groundwater is a valuable asset for many, particularly rural communities where it provides most of the private drinking water (75%)¹²¹. Around 80% of Scotland's groundwater is in good condition, although there are particular regions with widespread problems; for example, in the Central Belt¹²². Agriculture and the legacy of industrial activity are the main causes of regional-scale groundwater problems, whereas inadequate construction of private water supplies and

inappropriate management of wastes can create localised problems¹²³.

3.67 Flooding can have significant and long-lasting impacts on people, communities, and businesses. Flood Risk Management Strategies¹²⁴ 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 water¹²⁵.

3.68 Scotland's peatlands play an important role in natural flood management. Peatland has the ability to soak up and store vast quantities of water, particularly in pools, hollows and depressions, thereby slowing flow of water through a catchment. This can prevent flooding downstream within catchments, particularly if large areas of peatland are present upstream¹²⁶. Likewise, other habitats such as woodland may also contribute towards natural flood management. Woodland and forestry can help prevent flooding by intercepting precipitation, reducing surface water runoff through increased infiltration, increased use of water through evapotranspiration¹²⁷. Fallen branches and trees may also create natural dams along watercourses, helping to slow the flow of the water.

¹¹⁷ Scotland's Environment (undated) Scotland's Freshwater [online] Available at: <https://www.environment.gov.scot/our-environment/water/scotland-s-freshwater/> (accessed 09/09/2020)

¹¹⁸ 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 09/09/2020)

¹¹⁹ Scotland's Environment (2014) Rivers and Canals [online] Available at: <https://www.environment.gov.scot/media/1179/water-rivers-and-canals.pdf> (accessed 09/09/2020)

¹²⁰ *ibid*

¹²¹ Scotland's Environment (2011) Groundwater [online] Available at: <https://www.environment.gov.scot/media/1230/water-groundwater.pdf> (accessed 09/09/2020)

¹²² *ibid*

¹²³ *ibid*

¹²⁴ SEPA (undated) Flood Risk Management Strategies [online] Available at: <http://apps.sepa.org.uk/FRMStrategies/> (accessed 09/09/2020)

¹²⁵ SEPA (undated) Flood maps [online] Available at: <http://www.sepa.org.uk/environment/water/flooding/flood-maps/> (accessed 09/09/2020)

¹²⁶ Allot et al. (2019) Peatland Catchments and Natural Flood Management [online] Available at: <https://www.iucn-uk-peatlandprogramme.org/sites/default/files/2019-11/COI%20Peatlands%20and%20NFM.pdf>

¹²⁷ Natural Flood Management Network Scotland (2020). Woodland [online] Available at: <https://www.nfm.scot/topics/woodland> (accessed 09/12/2020)

Evolution of the Baseline – Pressures, Trends and Key Points

3.69 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 quality, particularly in relation to agriculture, forestry, and urban development¹²⁸.

3.70 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.

3.71 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 availability¹²⁹. A changing climate is also expected to have ecological impacts, such as warmer sea temperatures and an increasing risk of non-native species spreading and becoming established in water environments¹³⁰.

3.72 The risk of flooding from rivers, surface waters and sea is predicted to increase. This 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.

3.73 The development and operation of new infrastructure has the potential to negatively impact on water quality, either during

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

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.

Biodiversity, Flora and Fauna

Environmental Protection Objectives

3.74 Environmental protection objectives for biodiversity, flora and fauna are largely aimed at protecting habitats and species from damage and disturbance; principally through the identification and conservation of areas of particular value. The policies define a hierarchy of protection and include a range of international conventions, including the development of the *Aichi Targets for 2020*¹³¹ and the *Convention on Biological Diversity*¹³².

3.75 At European level, the Natura 2000 network of sites affords protection to key natural assets under the European Commission (EC) *Habitats Directive*¹³³ and *Birds Directive*¹³⁴; both of which have been transposed into UK and Scottish regulations. The Natura 2000 network is made up of Special Areas of Conservation (SAC) and Special Protection Areas (SPA). The majority of SPAs and SACs are also underpinned by SSSI legislation¹³⁵.

3.76 The designation of European protected species and identification of species and habitats as being the most threatened and

¹²⁸ 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 09/09/2020)

¹²⁹ 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 09/09/2020)

¹³⁰ 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 09/09/2020)

¹³¹ Convention on Biological Diversity (2011) Aichi Biodiversity Targets [online] Available at: <https://www.cbd.int/sp/targets/default.shtml> (accessed 09/09/2020)

¹³² Convention on Biological Diversity (1993) Text of the CBD [online] Available at: <https://www.cbd.int/convention/text/> (accessed 09/09/2020)

¹³³ European Commission, The Habitats Directive [online] Available at: http://ec.europa.eu/environment/nature/legislation/habitatsdirective/index_en.htm (accessed 09/09/2020)

¹³⁴ European Commission, The Birds Directive [online] Available at: http://ec.europa.eu/environment/nature/legislation/birdsdirective/index_en.htm (accessed 09/09/2020)

¹³⁵ Scottish Government (undated) Natura 2000 [online] Available at: <https://www.gov.scot/policies/biodiversity/natura-2000/> (accessed 09/09/2020)

requiring conservation action in the UK also demonstrates the prioritisation of conservation ambitions at European and national levels. *UK Biodiversity Action Plan*,¹³⁶ succeeded by the *UK Post 2010 Biodiversity Framework*¹³⁷ is a response to Article 6 of the Biodiversity Convention. It is a national strategy for the conservation of biological diversity, the sustainable use of biological resources and to contribute to the conservation of global biodiversity through all appropriate mechanisms.

3.77 The *2020 Challenge for Scotland's Biodiversity*¹³⁸ is Scotland's response to the 20 Aichi Targets set by the United Nations Convention on Biological Diversity, and the *European Union's Biodiversity Strategy for 2020*¹³⁹. The 2020 Challenge supplements the 2004 *Scottish Biodiversity Strategy*¹⁴⁰ and focuses on the importance of healthy ecosystems and an outcome that "*Scotland's ecosystems are restored to good ecological health so that they provide robust ecosystem services and build on our natural capital*".

3.78 Beyond site and species designations there are also longer-term aspirations for enhancing biodiversity, improving landscape-scale ecological networks and addressing the

impacts of climate change on the natural environment.

Overview of Baseline

1.1 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 others¹⁴¹. 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.

1.2 As of 2020, Scotland's protected areas included 251 SACs¹⁴², 153 SPAs¹⁴³, 51 Ramsar sites¹⁴⁴ and 2 Biosphere reserves¹⁴⁵, amongst other internationally designated sites. There are further national level designations such as 1,423 SSSIs¹⁴⁶, 231 Marine Protected Areas¹⁴⁷ and 2 National Parks¹⁴⁸. In addition to these, a recent consultation on proposed SPAs for Scottish Marine birds and site classifications set out additional sites to be designated¹⁴⁹. In June 2019, a further

¹³⁶ UK Government (1994) Biodiversity: The UK Action Plan [online] Available at: <http://data.jncc.gov.uk/data/cb0ef1c9-2325-4d17-9f87-a5c84fe400bd/UKBAP-BiodiversityActionPlan-1994.pdf> (accessed 09/09/2020)

¹³⁷ JNCC and Defra on behalf of the Four Countries' Biodiversity Group (2012) UK Post-2010 Biodiversity Framework [online] Available at: <https://hub.jncc.gov.uk/assets/587024ff-864f-4d1d-a669-f38cb448abdc#UK-Post2010-Biodiversity-Framework-2012.pdf> (accessed 09/09/2020)

¹³⁸ Scottish Government (2013) 2020 Challenge for Scotland's Biodiversity – A Strategy for the conservation and enhancement of biodiversity in Scotland [online] Available at: <https://www.gov.scot/publications/2020-challenge-scotlands-biodiversity-strategy-conservation-enhancement-biodiversity-scotland/> (accessed 09/09/2020)

¹³⁹ European Commission (2011) Our life insurance, our natural capital: an EU biodiversity strategy to 2020 [online] Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52011DC0244&from=EN>

¹⁴⁰ Scottish Government (2004) Scottish Biodiversity Strategy – It's in your hands [online] Available at: <https://www.gov.scot/publications/scotlands-biodiversity---its-in-your-hands/> (accessed 09/09/2020)

¹⁴¹ SNH (undated) Ecosystem approach [online] Available at: <https://www.nature.scot/scotlands-biodiversity/value-ecosystem-approach/ecosystem-approach> (accessed 09/09/2020)

¹⁴² SNH (undated) Special Areas of Conservation [online] Available at: <https://www.nature.scot/professional-adv-ice/safeguarding-protected-areas-and-species/protected-areas/international-designations/natura-sites/special-areas-conservation-sacs> (accessed 09/09/2020)

¹⁴³ SNH (undated) Special Protection Areas [online] Available at: <https://www.nature.scot/professional-adv-ice/safeguarding-protected-areas-and-species/protected-areas/international-designations/natura-sites/special-areas-conservation-sacs> (accessed 09/09/2020)

[species/protected-areas/international-designations/natura-sites/special-areas-conservation-sacs](https://www.nature.scot/professional-adv-ice/safeguarding-protected-areas-and-species/protected-areas/international-designations/natura-sites/special-areas-conservation-sacs) (accessed 09/09/2020)

¹⁴⁴ SNH (undated) Ramsar Sites [online] Available at: <https://www.nature.scot/professional-adv-ice/safeguarding-protected-areas-and-species/protected-areas/international-designations/ramsar-sites> (accessed 09/09/2020)

¹⁴⁵ SNH (undated) Biosphere Reserves [online] Available at: <https://www.nature.scot/professional-adv-ice/safeguarding-protected-areas-and-species/protected-areas/international-designations/biosphere-reserve> (accessed 09/09/2020)

¹⁴⁶ SNH (undated) Sites of Special Scientific Interest [online] Available at: <https://www.nature.scot/professional-adv-ice/safeguarding-protected-areas-and-species/protected-areas/national-designations/sites-special-scientific-interest> (accessed 09/09/2020)

¹⁴⁷ Scottish Government (2018) Scottish MPA network – Parliamentary Report [online] Available at: <https://www.gov.scot/binaries/content/documents/govscot/publications/progress-report/2018/12/marine-protected-area-network-2018-report-scottish-parliament/documents/00544750-pdf/00544750-pdf/govscot%3Adocument/00544750.pdf> (accessed 09/09/2020)

¹⁴⁸ Scottish Government (undated) Landscapes and outdoor access [online] Available at: <https://www.gov.scot/policies/landscape-and-outdoor-access/national-parks/> (accessed 09/09/2020)

¹⁴⁹ 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 09/09/2020)

consultation on proposals to designate four new MPAs in Scottish waters was launched¹⁵⁰.

1.3 The UK Biodiversity Action Plan¹⁵¹ identified 39 priority habitats and 197 priority species either occurring, or known to have occurred until recently, in Scotland. By May 2019, the proportion of nationally protected nature sites reported as being in a “favourable” condition decreased by 0.8% from 79.7% in 2018 to 78.9%¹⁵². Despite this decrease, this represents a 2.9% percentage point increase since the current protocols were established in 2007¹⁵³.

1.4 Areas of biodiversity value are not only found within this network of designated sites and many undesignated areas of Scotland also contain habitats and species that have important functions and roles. For example, urban 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 valuable to wildlife¹⁵⁴.

Evolution of the Baseline – Pressures, Trends and Key Points

3.79 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. Key issues such as land use intensification and modification, and pollution have been noted¹⁵⁵.

3.80 Climate change in particular has the potential to greatly impact on biodiversity on a global scale¹⁵⁶. 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 habitats¹⁵⁷. Indirect impacts may also arise through climate change adaptation and the action taken in sectors such as agriculture, forestry, planning, water and coastal management in the face of a changing climate¹⁵⁸.

3.81 Habitat change, due mainly to increased and more intensive land management, urban development, pollution, nutrient enrichment, and over exploitation of natural resources are other known pressures.

Related SEA topics: Biodiversity, flora, and fauna impacts have direct or indirect effects on other SEA topics such as air, water and soil quality.

Cultural Heritage and Historic Environment

Environmental Protection Objectives

3.82 Existing cultural heritage objectives are set out in legislation including the *Historic Environment (Amendment) Scotland Act*

¹⁵⁰ 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 09/09/2020)

¹⁵¹ UK Government (1994) Biodiversity: The UK Action Plan [online] Available at: <http://data.incc.gov.uk/data/cb0ef1c9-2325-4d17-9f87-a5c84fe400bd/UKBAP-BiodiversityActionPlan-1994.pdf> (accessed 09/09/2020)

¹⁵² SNH (2019) The Proportion of Scotland’s Protected Sites in Favourable Condition 2019: An Official Statistics Publication for Scotland [online] Available at: <https://www.nature.scot/information-hub/official-statistics/official-statistics-protected-sites> (accessed 09/09/2020)

¹⁵³ SNH (2019) Statistical News Release: the proportion of Scotland’s Protected Sites in Favourable Condition 2019 [online] Available at: <https://www.snhpresscentre.com/news/statistical-news-release-the-proportion-of-scotland-protected-sites-in-favourable-condition-2019> (accessed 09/09/2020)

¹⁵⁴ SNH (undated) Urban habitats [online] Available at: <https://www.nature.scot/habitats-and-ecosystems/habitat-types/urban-habitats> (accessed 09/09/2020)

¹⁵⁵ SNH (undated) Key pressures on biodiversity [online] Available at: <https://www.nature.scot/scotland-biodiversity/key-pressures-biodiversity> (accessed 14/02/2020)

¹⁵⁶ Convention on Biological Diversity (undated) Climate Change and Biodiversity – Introduction [online] Available at: <http://www.cbd.int/climate/intro.shtml> (accessed 14/02/2020)

¹⁵⁷ SNH (undated) Climate change impacts in Scotland [online] Available at: <https://www.nature.scot/climate-change/climate-change-impacts-scotland> (accessed 14/02/2020)

¹⁵⁸ JNCC (2010) Biodiversity and Climate Change – a summary of impacts in the UK [online] Available at: <http://archive.incc.gov.uk/page-5145> (accessed 14/02/2020)

2011¹⁵⁹, *Ancient Monuments and Archaeological Areas Act 1979 (as amended)*¹⁶⁰ and *Planning (Listed Buildings and Conservation Areas) (Scotland) Act 1997*¹⁶¹. These objectives are focused primarily on the protection of valued sites and features, including townscapes (i.e. places, buildings and open spaces), buildings, archaeological sites, battlefields, wrecks and landscapes that have been recognised at the international, national and local levels through a hierarchy of designations.

3.83 Policies such as *National Planning Framework (NPF3)*¹⁶² and *Scottish Planning Policy (SPP)*¹⁶³ aim to improve the quality of our settlements and built environment with a national level focus. These are complemented by the *Historic Environment Strategy for Scotland (2014)*¹⁶⁴ and the *Historic Environment Scotland Policy Statement*¹⁶⁵ which provide an overarching framework for historic environment policy in Scotland. Together, they emphasise the importance of preserving recognised sites, avoiding negative impacts on them and their wider setting, and contributing to their enhancement where appropriate. These key objectives also extend to taking into account of, and avoiding damage to or loss of, currently unknown archaeology.

Overview of Baseline

3.84 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.

3.85 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 around 5-10% of the historic environment is designated¹⁶⁶. Designated assets currently include World Heritage Sites, Listed Buildings, Scheduled Monuments, Conservation Areas, Designed Gardens and Landscapes, Historic Marine Protected Areas, Scheduled Wrecks and Nationally Important Battlefields¹⁶⁷. 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 sites¹⁶⁸.

Evolution of the Baseline – Pressures, Trends and Key Points

3.86 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

¹⁵⁹ The Historic Environment (Amendment) Scotland Act 2011 [online] Available at: <http://www.legislation.gov.uk/asp/2011/3/contents/enacted> (accessed 17/02/2020)

¹⁶⁰ Ancient Monuments and Archaeological Areas Act 1979 (as amended) [online] Available at: http://www.legislation.gov.uk/ukpga/1979/46/pdf/s/ukpga_19790046_en.pdf (accessed 17/02/2020)

¹⁶¹ Planning (Listed Buildings and Conservation Areas) (Scotland) Act 1997 [online] Available at: <http://www.legislation.gov.uk/ukpga/1997/9/contents> (accessed 17/02/2020)

¹⁶² The Scottish Government (2014) National Planning Framework 3 [online] Available at: <http://www.gov.scot/Publications/2014/06/3539/0> (accessed 17/02/2020)

¹⁶³ The Scottish Government (2014) Scottish Planning Policy [online] Available at: <http://www.gov.scot/Publications/2014/06/5823> (accessed 17/02/2020)

¹⁶⁴ Historic Environment Scotland (2014) Our Place in Time: The Historic Environment Strategy for Scotland [online] Available at: <http://www.gov.scot/Resource/0044/00445046.pdf> (accessed 17/02/2020)

¹⁶⁵ Historic Environment Scotland (2019) Historic Environment Scotland Policy Statement [online] Available at: <https://www.historicenvironment.scot/advise-and-support/planning-and-guidance/legislation-and-guidance/historic-environment-scotland-policy-statement/> (accessed 17/02/2020)

¹⁶⁶ 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 14/02/2020)

¹⁶⁷ Scotland's Environment (undated) Historic Environment [online] Available at: <https://www.environment.gov.scot/our-environment/people-and-the-environment/historic-environment/> (accessed 17/02/2020)

¹⁶⁸ *ibid*

management, tourism/visitors, pollution and climate change.

3.87 It is projected that Scotland will become warmer and wetter as a result of climate change, resulting in the increased weathering of stone, rotting timbers and corrosion of metals. Rising sea levels and increased storm events may increase coastal erosion, endangering our historic landscapes, structures, buildings and archaeology in the coastal zone. Some of Scotland's unique and special sites, such as Skara Brae in Orkney, are at most risk¹⁶⁹.

3.88 Increased rainfall will mean that historic buildings and assets will be wetter for longer periods of time, and as such may result in the penetration of water, dampness, condensation and fungus growth, ground instability and structural collapse¹⁷⁰. This can potentially have damaging effects on the fabric of buildings and the health of those using it. 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.

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

Landscape

Environmental Protection Objectives

3.89 Environmental protection objectives reflect the importance of all landscapes and also the need to help to improve those that

have become degraded. The *European Landscape Convention*¹⁷¹ lays the foundation for these objectives.

3.90 The establishment of key national programmes including the National Scenic Areas Programme¹⁷² demonstrate a continuing commitment to protect the special qualities of nationally important landscapes and seascapes. The protection and enhancement of Scotland's landscapes are set out at the national level in SPP and are also referenced in relation to several national developments and under a natural, resilient place in NPF3.

3.91 SNH Natural Heritage Futures¹⁷³ sets out guidelines for sustainable management and use of Scotland's nature and landscaped until 2025. It aims to ensure utilisation of an integrated approach to work with Scotland's nature and land. It also provides basis for stakeholders' engagement. It consists of 21 documents that cover the whole of Scotland, as each of the areas has its own identity and distinct issues.

3.92 SNH Landscape Policy Framework¹⁷⁴ sets out to safeguard and enhance the distinct identity, the diverse character and the special qualities of Scotland's landscapes to ensure that in the future they will contribute to the quality of life. Its main priorities include promotion of the debate on Scotland's future landscapes, description of Scotland's landscape resources, monitoring of change in Scotland's landscape, landscape planning and management and action for Scotland's special landscapes.

¹⁶⁹ 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 14/02/2020)

¹⁷⁰ Historic Environment Scotland (undated) Effect on the historic environment [online] Available at: <https://www.historicenvironment.scot/about-us/what-we-do/climate-change/effect-on-the-historic-environment/> (accessed on 17/02/2020)

¹⁷¹ Council of Europe (2015) European Landscape Convention, ETS No. 176 [online] Available at: <http://www.coe.int/en/web/conventions/full-list/-/conventions/treaty/176> (accessed 17/02/2020)

¹⁷² SNH (undated) National Scenic Areas [online] Available at: [https://www.nature.scot/professional-advise/safeguarding-protected-areas-and-](https://www.nature.scot/professional-advise/safeguarding-protected-areas-and-species/protected-areas/national-designations/national-scenic-areas)

[species/protected-areas/national-designations/national-scenic-areas](https://www.nature.scot/professional-advise/safeguarding-protected-areas-and-species/protected-areas/national-designations/national-scenic-areas) (accessed 17/02/2020)

¹⁷³ Scottish Natural Heritage (2002) Natural Heritage Futures: An Overview [online] Available at: <https://www.nature.scot/sites/default/files/2017-05/A337645%20-%20Natural%20Heritage%20Futures%20-%20An%20Overview.pdf> (accessed 27/03/2020)

¹⁷⁴ Scottish Natural Heritage (2010) SNH's Landscape Policy Framework [online] Available at: <https://www.nature.scot/sites/default/files/2019-10/Landscape%20Policy%20Framework%20-%20Policy%20Statement%20No.05-01.pdf> (accessed 27/03/2020)

3.93 SNH has undertaken research on areas which are viewed as wild land¹⁷⁵. 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. Areas with stronger wild land characteristics are more commonly found in the north and west, particularly areas of higher ground, although additional areas of wild land are present in other areas of Scotland¹⁷⁶.

Overview of Baseline

3.94 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.

3.95 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 Area¹⁷⁷. 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 authorities¹⁷⁸. These areas of important nature or landscape value have been designated locally for conservation purposes and are afforded protection from inappropriate development¹⁷⁹.

Evolution of the Baseline – Pressures, Trends and Key Points

3.96 Scotland's landscapes are constantly changing and evolving in response to both natural processes and the changing demands of society. 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 determine¹⁸⁰.

3.97 Climate change is expected to lead to extensive landscape change across Scotland and is viewed as an increasing pressure on landscape, not only as a result of direct effects but also as a result of indirect impacts¹⁸¹. Direct impacts are likely as a result of changing temperatures and patterns of precipitation, weather events and sea level change¹⁸². Other commitments to adapting to the predicted effects of climate change, for example, the development of renewable energy (such as wind farms and hydro schemes) is seen by many as a pressure on both visual amenity and the character of many rural landscapes. The construction of new transport infrastructure and working towards a national target for increasing forest cover in Scotland also has the potential to affect our landscapes and seascapes.

3.98 The greatest changes are likely to be seen in areas of highest population, such as lowland and coastal areas. Mitigation and adaptation measures are expected to have a greater influence on both Scotland's landscapes and the quality of life than that of

¹⁷⁵ SNH (undated) Landscape Policy: Wild Land [online] Available at: <https://www.nature.scot/professional-advice/landscape/landscape-policy-and-guidance/landscape-policy-wild-land> (accessed 17/02/2020)

¹⁷⁶ Ibid

¹⁷⁷ Scottish Natural Heritage (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 14/02/2020)

¹⁷⁸ SNH (undated) Local Designations [online] Available at: <https://www.nature.scot/professional-advice/safeguarding-protected-areas-and-species/protected-areas/local-designations> (accessed 17/02/2020)

¹⁷⁹ Ibid

¹⁸⁰ Scotland's Environment (2014) Landscape [online] Available at: <https://www.environment.gov.scot/media/1196/land-landscape.pdf> (accessed 14/02/2020)

¹⁸¹ Scottish Natural Heritage (2019) Landscape: Climate change [online] Available at: <https://www.nature.scot/professional-advice/landscape/landscape-policy-and-guidance/landscape-climate-change> (accessed 08/02/2020)

¹⁸² Scotland's Environment (2014) Landscape [online] Available at: <https://www.environment.gov.scot/media/1196/land-landscape.pdf> (accessed 14/02/2020)

the direct effects of climate change¹⁸³. The coast and foreshore are under many pressures particularly from climate change, rising sea level and coastal erosion.

Related SEA topics: Climate change can have direct or indirect impacts on landscape, cultural heritage, and the historic environment.

Material Assets

Environmental Protection Objectives

3.99 While existing policies relating to energy, waste, transportation and land use are wide-ranging, they largely share the aims of contributing to core planning objectives and supporting sustainable development, reducing GHG emissions, and making the best use of Scotland's resources and existing infrastructure.

3.100 There is a wealth of existing protection objectives and policy at the national and international levels relating to these broad topic areas. These include existing and forthcoming energy policy and climate change commitments in addition to current objectives and commitments set out in relevant policies.

3.101 *National Planning Framework 4 (NPF4) Position Statement*¹⁸⁴ sets out the Scottish Government's position on issues that will need to be addressed in the draft NPF4. The position statement outlines that the NPF4 is expected to focus on achieving four key outcomes: net-zero emissions, a wellbeing economy, resilient communities, and better,

greener places. *Scottish Planning Policy (SPP)*¹⁸⁵ sets out national planning policies. It promotes the consistency in application of policies across Scotland and it relates to the preparation of development plans, the design of development, and the determination of planning applications and appeals.

3.102 *Scotland's National Transport Strategy 2*¹⁸⁶ considers the whole transport system including walking, wheeling, cycling, travelling by bus, train, ferry, car, lorry and aeroplanes/ It sets out the strategic framework within which future decisions on investment will be made.

3.103 *Infrastructure Investment Plan 2015*¹⁸⁷ sets out priorities for investment and a long-term strategy for the development of public infrastructure in Scotland. It sets out why the Scottish Government invests, how it invests and what it plans to invest in. A new Infrastructure Investment Plan is currently being prepared which will cover the period 2021-2026. A draft version¹⁸⁸ of this plan is currently out for consultation.

3.104 *Getting the Best from Our Land: A Land Use Strategy for Scotland 2016-2021*¹⁸⁹ builds on the framework set out in 2011 in Scotland's first Land Use Strategy from 2011. The overall aim of this strategy is to continue use Scotland's land with long term objectives in mind and in a well-integrated and sustainable manner. In addition, this strategy focuses on the five-year period (2016 – 2021) and represents a programme of action supported by a suite of policies and proposals.

3.105 *Energy Efficient Scotland: Route Map*¹⁹⁰ focuses on improving the energy efficiency of

¹⁸³ SNH (undated) Landscape: climate change. Available at: <https://www.nature.scot/professional-advice/landscape/landscape-policy-and-guidance/landscape-climate-change> (accessed 14/02/2020)

¹⁸⁴ Scottish Government (2020) Position Statement [online] Available at: <https://www.transformingplanning.scot/national-planning-framework/position-statement/> (accessed 09/12/2020)

¹⁸⁵ Scottish Government (2016) Scottish Planning Policy [online] Available at: <http://www.gov.scot/Publications/2014/06/5823> (accessed 17/02/2020)

¹⁸⁶ Scottish Government (2020) National Transport Strategy 2, Protecting our Climate and Improving Lives [online] Available at: <https://www.transport.gov.scot/media/47052/national-transport-strategy.pdf> (accessed 17/02/2020)

¹⁸⁷ Scottish Government (2015) Infrastructure Investment Plan [online] Available at: <https://www.gov.scot/publications/infrastructure-investment-plan-2015/> (accessed 27/03/2020)

¹⁸⁸ Scottish Government (2020) A National Mission with Local Impact - draft infrastructure investment plan 2021-2022 to 2025-2026: consultation [online] Available at: <https://www.gov.scot/publications/national-mission-local-impact-draft-infrastructure-investment-plan-scotland-202122-202526/> (accessed 09/12/2020)

¹⁸⁹ Scottish Government (2016) Getting The Best From Our Land: A Land Use Strategy For Scotland 2016 – 2021 [online] Available at: <https://www.gov.scot/publications/getting-best-land-land-use-strategy-scotland-2016-2021/> (accessed 27/03/2020)

¹⁹⁰ Scottish Government (2018) Energy Efficient Scotland: route map [online] Available at: <https://www.gov.scot/publications/energy-efficient-scotland-route-map/> (accessed 27/03/2020)

Scotland's existing buildings and supporting the deployment of low carbon heat options to achieve the targets of the Climate Change Plan 2018.

3.106 *The Scottish Energy Strategy: The future of energy in Scotland*¹⁹¹ guides energy related decisions of the Scottish Government. It directly builds on the Heat Policy Statement of 2015, and it continues to focus on energy and electricity. However, this strategy takes a whole-system view and also includes heat and transport sectors.

3.107 *Heat Decarbonisations Strategy*¹⁹² - 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.

3.108 *Scotland's Forestry Strategy 2019-2029*¹⁹³ - 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".

3.109 *Making Things Last: A Circular Economy Strategy for Scotland*¹⁹⁴ sets out priorities for moving towards a more circular economy with a long-term ambition. It articulates Scotland's aspirations and proposes a number of actions to take over the short to medium term and creates conditions for long term change. This strategy builds on the Zero Waste Plan (2010)¹⁹⁵ and the Safeguarding Scotland's Resources (2013)¹⁹⁶.

3.110 *Realising Scotland's full potential in a digital world: A Digital Strategy for Scotland*¹⁹⁷ sets out a vision for Scotland as a vibrant, inclusive, open and outward looking digital nation. It sets out plans to ensure that all aspects of life in Scotland will also have its digitalised form, as well as recognition of challenges which such transition brings.

Overview of Baseline

3.111 While existing policies relating to energy, waste, transportation and land use are wide-ranging, they largely share the aims of contributing to core planning objectives, supporting sustainable development, reducing GHG emissions, and making the best use of Scotland's resources and existing infrastructure.

3.112 Scotland's natural resources are also material assets. Mineral resources and aggregates are used for purposes such as fuel (e.g. coal), and construction (e.g. sand, gravel

¹⁹¹ Scottish Government (2017) Scottish Energy Strategy: The future of energy in Scotland [online] Available at: <https://www.gov.scot/publications/scottish-energy-strategy-future-energy-scotland-9781788515276/> (accessed 27/03/2020)

¹⁹² Scottish Government (2015) Heat Policy Statement [online] Available at: <https://www.gov.scot/binaries/content/documents/qovscot/publications/speech-statement/2015/06/heat-policy-statement-towards-decarbonising-heat-maximising-opportunities-scotland/documents/00478997-pdf/00478997-pdf/qovscot%3Adocument/00478997.pdf> (accessed 27/03/2020)

¹⁹³ Scottish Government (2019) Scotland's Forestry Strategy 2019 – 2029 [online] Available at: <https://www.gov.scot/publications/scotlands-forestry-strategy-20192029/> (accessed 27/03/2020)

¹⁹⁴ Scottish Government (2016) Making Things Last: A Circular Economy Strategy for Scotland [online] Available at: <http://www.gov.scot/Resource/0049/00494471.pdf> (accessed 17/02/2020)

¹⁹⁵ Scottish Government (2010) Zero Waste Plan [online] Available at: <https://www2.gov.scot/Publications/2010/06/08092645/11> (accessed 27/03/2020)

¹⁹⁶ Scottish Government (2013) Safeguarding Scotland's Resources: blueprint for a more resource efficient and circular economy [online] Available at: <https://www.gov.scot/publications/safeguarding-scotlands-resources-blueprint-more-resource-efficient-circular-economy/> (accessed 27/03/2020)

¹⁹⁷ Scottish Government (2017) Realising Scotland's full potential in a digital world: a digital strategy for Scotland [online] Available at: <https://www.gov.scot/publications/realising-scotlands-full-potential-digital-world-digital-strategy-scotland/> (accessed 27/03/2020)

and rock). However, the quantity of these resources is finite and once they are used up, they cannot be replaced.

3.113 Waste management, transportation and efficiency in energy generation and land use form key aspects of the draft update and have the potential for environmental impacts. Environmental baseline information relevant to each of these sectors is presented in the following sections.

Energy

3.114 Heating makes up approximately half of Scotland's energy consumption (52%) with transport (24.4%) and electricity (23.5%) making up approximately a quarter each¹⁹⁸. 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 domestically¹⁹⁹. Domestic consumption of electricity and heat dropped by 20.1% in 2016, with energy consumption in transport decreasing by 2.7%. It is estimated that industrial energy consumption has dropped by 31.8% but commercial consumption rose by 17.7% compared to the 2005-2007 baseline²⁰⁰.

3.115 It is estimated that 20% of Scotland's total energy consumption in 2017 came from renewable sources; the highest level to date and an increase from 16% in 2016. This is attributed to an increase in installed capacity for renewable electricity and heat in 2016. In 2018, provisional figures indicate that the equivalent of 74.6% of gross electricity consumption was from renewable sources, rising from 70.3% in 2017. Much of this increase is due to increase in wind capacity²⁰¹.

3.116 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 2010²⁰². In turn, fossil fuel generation is at its lowest level, with just 10.5% of all electricity generated from oil and gas, compared to 48.4% in 2010²⁰³.

3.117 In 2018, 71.8% of all renewable electricity generated in Scotland was from wind. Hydro is Scotland's second highest source of renewable generation, while solar capacity has increased rapidly in the first half of this decade. Bioenergy and energy from waste accounts for 8.3% and whilst the current capacity of wave and tidal is considered to be relatively small, technology is developing²⁰⁴.

3.118 In 2017, the equivalent of 5.9% of non-renewable heat demand was met by renewable sources, an increase from 4.7% in 2016. A rise in the generation of renewable heat by biomass is attributed to this increase. Thermal energy from waste and heat pumps each make up less than 10% of renewable heat output²⁰⁵.

3.119 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 way²⁰⁶.

3.120 Since 2000, Scottish renewables have displaced an estimated 124 million tonnes of

¹⁹⁸ Scottish Government (2019) Annual Compendium of Scottish Energy Statistics May 2019) Update [online] Available online: <https://www2.gov.scot/Resource/0054/00547632.pdf> (accessed 14/02/2020)

¹⁹⁹ Scottish Government (2019) Annual Compendium of Scottish Energy Statistics May 2019) Update [online] Available online: <https://www2.gov.scot/Resource/0054/00547632.pdf> (accessed 14/02/2020)

²⁰⁰ *ibid*

²⁰¹ *ibid*

²⁰² *ibid*

²⁰³ *ibid*

²⁰⁴ *ibid*

²⁰⁵ *ibid*

²⁰⁶ 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 14/02/2020)

CO₂²⁰⁷, assuming that the same amount of electricity generation would be generated by fossil fuels²⁰⁸. In 2007 alone, Scottish renewable electricity has displaced an estimated 11.6 million tonnes of CO₂²⁰⁹.

Waste

3.121 Nearly 12 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 wastes from construction and demolition which increased by 10.8% (0.6 million tonnes) from 2016²¹⁰. However, the generation of waste from construction and demolition is sensitive to large regional projects which can account for large year on year variations.

3.122 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%)²¹¹. Of this, around 6.93 million tonnes was recycled, reused or composted, an increase of 2.1% than in 2016²¹². The remaining waste comprised 4.0 million tonnes disposed via incineration or landfill, and 0.76 million tonnes recovered through incineration/co-incineration processes²¹³.

3.123 There has been a progressive reduction in landfilled waste volumes since 2005 (around 50%)²¹⁴. However, following significant reductions seen between 2005 and 2010, coinciding with the publication and implementation of Scotland's Zero Waste Plan, there has been increased variation in

recycled volumes in recent years. In 2017, around two thirds of recycled wastes were classed as soils and mineral wastes from construction and demolition, with the remainder consisting of vegetal, paper and cardboard, wood, metallic, sludge and other wastes²¹⁵. There has been a steady increase in waste recovered through energy generation at co-incineration or incineration facilities.

3.124 A key driver to waste management has been achieving the aim of 'moving up' the waste hierarchy, and promoting the long-term benefits of waste prevention, use minimisation and reuse in preference to disposal options. Much of Scotland's policy approach to waste management was set out in Scotland's Zero Waste Plan²¹⁶, Safeguarding Scotland's Resources: Blueprint for a More Resource Efficient and Circular Economy²¹⁷ and Making Things Last: A Circular Economy Strategy for Scotland²¹⁸.

Transport²¹⁹

3.125 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 passengers. In 2017, 48.0 billion vehicle kilometres were travelled on Scotland's roads, the highest recorded level. Cars account for over three quarters (75%) of the total volume of traffic on the roads while the remaining traffic is shared between light goods vehicles (17%) and heavy goods vehicles (5%). More than 99% of road vehicles in Scotland ran on petrol (51%) or diesel (48%) in 2017. As of

²⁰⁷ Across the GB system

²⁰⁸ Scottish Government (2019) Annual Compendium of Scottish Energy Statistics May 2019 Update [online] Available online: <https://www2.gov.scot/Resource/0054/00547632.pdf> (accessed 14/02/2020)

²⁰⁹ *ibid*

²¹⁰ SEPA (2017) Waste from all sources – summary data 2017 [online] Available at: https://www.sepa.org.uk/media/413267/wfas_2017_commentary_final.pdf (accessed 14/02/2020)

²¹¹ *ibid*

²¹² *ibid*

²¹³ *ibid*

²¹⁴ *ibid*

²¹⁵ *ibid*

²¹⁶ Scottish Government (2010) Scotland's Zero Waste Plan. Available at: <http://www.gov.scot/Publications/2010/06/08092645/0> (accessed 18/02/2020)

²¹⁷ Scottish Government (2013) Zero Waste - Safeguarding Scotland's Resources: Blueprint for a More Resource Efficient and Circular Economy [online] Available at: <https://www2.gov.scot/Resource/0043/00435308.pdf> (accessed 14/02/2020)

²¹⁸ Scottish Government (2016) Making Things Last: A Circular Economy Strategy for Scotland [online] Available at: <http://www.gov.scot/Resource/0049/00494471.pdf> (accessed 14/02/2020)

²¹⁹ All statistics in this section of text have been drawn from the following reference document, unless individually referenced: 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 14/02/2020)

2018, there were 56,364 kilometres of public road in Scotland. Overall, there was an increase of 24% in the amount of trunk road that was newly constructed, reconstructed, strengthened, or surface dressed in 2017-18 compared to the previous year. Newly registered cars are becoming more efficient, with average CO₂ emissions for new car registrations falling by 26% over the last 10 years, despite a slight 0.1% increase compared to 2016²²⁰. While there has been a nine-fold increase in the uptake of ultra-low carbon vehicles between 2014 and 2018, and a 31% increase in new registrations in 2018 compared to 2017, this currently represents a very small proportion of new car registrations²²¹.

3.126 Passenger journeys on Scotrail services increased by 4% in 2017-18, with 97.8 million passenger journeys undertaken and in general, rail patronage has been steadily rising since 1994-95. The total route length of the railway network in Scotland is 2,819km in Scotland which is serviced by 359 stations. Of this total, 709km are electrified. Bus use is generally higher in urban areas compared to rural, however, bus passenger journeys have generally been falling in the long-term.

3.127 A reported 28.8 million air terminal passengers travelled through Scottish airports in 2017, an increase of 7.3% or 2 million people from 2016. Edinburgh had the highest number of terminal passengers, though Glasgow's share has increased in the last year. A number of smaller airports are also run by Local Authorities in Scotland, such as Oban Airport, and some of these provide connections to more remote areas

3.128 Scotland's marine areas and coastal

waters are utilised by a wide range of vessels and service a variety of industries. Ports and harbours are located all around the Scottish coastline. In addition to being an important means of distributing goods, the shipping sector also helps deliver lifeline ferry services which are vital to island communities. In 2017, 67 million tonnes of freight was handled by ports, accounting for one quarter of Scotland's total freight tonnage²²². A total of 8.5 million passengers travelled on ferry routes within Scotland in 2017. Larger ports such as Cairnryan support ferry services between Scotland and Northern Ireland, with a further 1.8 million passengers travelling to Northern Ireland in 2017. The Forth (28 million tonnes), Clyde (9 million tonnes) and Glensanda (6 million tonnes) ports accounted for the highest freight traffic in 2017²²³.

3.129 Transport emissions, including Scotland's share of international aviation and shipping, accounted for 37% (14.9 MtCO₂e) of Scotland's total emissions in 2017, an increase of 3% on the previous year²²⁴. Road transport is by far the largest source of these emissions, accounting for 65% of all transport emissions. In 2017, cars alone accounted for nearly half of Scotland's transport sector emissions (40%) alongside HGVs (13%) and vans (13%). International aviation and shipping emissions contributed around 30% of total transport emissions²²⁵.

Forestry

3.130 In 2019, Scotland's woodland and forest cover was estimated at 1.46 million hectares (19% of the land area), with just one quarter of this being native woodland; the remainder is dominated by introduced species²²⁶. Of this, around one third of which is owned by Scottish Ministers, on behalf of the

²²⁰ Transport Scotland (2018) Scottish Transport Statistics No. 37 2018 Edition [online] Available at: <https://www.transport.gov.scot/media/44025/scottish-transport-statistics-no-37-2018-edition.pdf> (accessed 18/02/2020)

²²¹ *ibid*

²²² *ibid*

²²³ *ibid*

²²⁴ Committee on Climate Change (2019) Reducing Emissions in Scotland 2019 Progress Report [online] Available at: <https://www.theccc.org.uk/wp-content/uploads/2019/12/Reducing-emissions-in-Scotland-2019-Progress-Report-to-Parliament-CCC.pdf> (accessed 18/02/2020)

²²⁵ *ibid*

²²⁶ Forest Research (2019) Forestry Statistics 2019 [online] Available at: <https://www.forestryresearch.gov.uk/tools-and-resources/statistics/forestry-statistics/forestry-statistics-2019/> (accessed 18/02/2020)

nation, as part of Scotland's National Forests and Land²²⁷. The remainder of Scotland's woodland area is privately or community²²⁸.

3.131 Around 13,000 hectares of new woodland were created in the UK in 2018-2019, mostly with conifer species which accounted for 60% of the new planting area²²⁹. Scotland's Forestry Strategy sets out plans to increase woodland cover to 21% by 2032²³⁰. While Scotland's forests and woodlands occupy just 19% of our land surface, they support a disproportionately high share of our biodiversity²³¹. Scotland's mature native woodlands support a rich variety of species, and some native woodlands and the plants and animals that live there are unique to Scotland and are at the limits of their worldwide distribution. Some areas of native woodland are legally protected as SSSIs or SACs, and as of February 2020, around 79% of designated woodland features were in favourable or recovering condition²³². This represented an increase from 68% in 2015.

3.132 Most Scottish woodlands are dominated by non-native species, with native woodland covering just 4% of the total land area²³³. Some 8.4 million cubic metres of overbark standing timber was harvested from Scottish forests in 2016, representing a 1% decrease from the previous year²³⁴. Wood fuel for biomass heating is a growing use of forestry resources²³⁵. With the exception of a drop in

harvesting in 2008/2009 and since 2014, the quantity of timber harvested has increased relatively steadily over the past 35 years and is around seven times the level of the late 1970s²³⁶.

3.133 Woodlands and forests contain substantial carbon in the soil and vegetation, and are hugely important for carbon, water and energy cycles. In the UK, the amount of carbon held in woodlands and forests is estimated at around 880 million tonnes of carbon²³⁷. In addition, harvesting trees for wood fuel or power generation instead of fossil fuels can result in a net emissions reduction, provided the rate of growth of replacement trees is sufficient to absorb the CO₂ released during fuel production and consumption²³⁸.

3.134 Scotland is a net sink of GHG from land use, land use change and forestry activities. The size of this sink increased fifteen-fold between 1990 and 2017, from -347 kt CO₂eq to -5,438 kt CO₂eq attributed largely to an increase in forest carbon stocks and a reduction in the conversion of grassland and forests to cropland and settlements²³⁹.

Agriculture

3.135 Agriculture is the dominant land use in Scotland, with 75% of Scotland's land mass under agricultural production²⁴⁰. A diverse range of farming takes place across the country including arable farming, crofting, hill

²²⁷ Scottish Government (2019) Scotland's Forestry Strategy [online] Available at: <https://www.gov.scot/publications/scotlands-forestry-strategy-20192029/> (accessed 18/02/2020)

²²⁸ *ibid*

²²⁹ Forest Research (2019) Forestry Statistics 2019 [online] Available at: <https://www.forestresearch.gov.uk/tools-and-resources/statistics/forestry-statistics/forestry-statistics-2019/> (accessed 18/02/2020)

²³⁰ Scottish Government (2019) Scotland's Forestry Strategy [online] Available at: <https://www.gov.scot/binaries/content/documents/govscot/publications/strategy-plan/2019/02/scotlands-forestry-strategy-20192029/documents/scotlands-forestry-strategy-2019-2029/scotlands-forestry-strategy-2019-2029/govscot%3Adocument/scotlands-forestry-strategy-2019-2029.pdf> (accessed 18/02/2020)

²³¹ Scottish Forestry (undated) Biodiversity [online] Available at: <https://forestry.gov.scot/forests-environment/biodiversity> (accessed 18/02/2020)

²³² Scotland's Environment (2020) Protected Nature Sites [online] Available at: <https://www.environment.gov.scot/data/data-analysis/protected-nature-sites/> (accessed 18/02/2020)

²³³ SNH (undated) History of Scotland's Woodlands [online] Available at: [https://www.nature.scot/professional-advice/land-and-sea-](https://www.nature.scot/professional-advice/land-and-sea-management/managing-land/forests-and-woodlands/history-scotlands-woodlands)

[management/managing-land/forests-and-woodlands/history-scotlands-woodlands](https://www.nature.scot/professional-advice/land-and-sea-management/managing-land/forests-and-woodlands/history-scotlands-woodlands) (accessed 18/02/2020)

²³⁴ Scottish Government (2017) Forestry – Timber Harvested [online] Available at: <https://www2.gov.scot/Topics/Statistics/Browse/Agriculture-Fisheries/TrendTimberHarvested> (accessed 18/02/2020)

²³⁵ Energy Saving Trust (2017) Woodfuel Demand & Usage. Available at: <https://forestry.gov.scot/publications/91-woodfuel-demand-and-usage-in-scotland> (accessed 18/02/2020)

²³⁶ Scottish Government (2017) Forestry – Timber Harvested [online] Available at: <https://www2.gov.scot/Topics/Statistics/Browse/Agriculture-Fisheries/TrendTimberHarvested> (accessed 18/02/2020)

²³⁷ Forest Research (undated) Forestry and climate change mitigation [online] Available at: <https://www.forestresearch.gov.uk/research/forestry-and-climate-change-mitigation/> (accessed 18/02/2020)

²³⁸ *ibid*

²³⁹ Jones et al. (2019) Greenhouse Gas Inventories for England, Scotland, Wales and Northern Ireland: 1990 – 2017 [online] Available at: https://naei.beis.gov.uk/reports/reports?report_id=991 (accessed 18/02/2020)

²⁴⁰ Scottish Natural Heritage, (2018). Farming and crofting. Available at: <https://www.nature.scot/professional-advice/land-and-sea-management/managing-land/farming-and-crofting> (accessed 14/02/2020)

farming and lowland livestock and dairy farming²⁴¹. Over half of Scotland's agricultural land is used for upland sheep farming and mixed sheep and beef cattle farming²⁴².

3.136 Agricultural land use has a strong influence on the landscape and environment, sustaining important habitats for biodiversity including unimproved grassland, cultivated fields, walls and hedges, watercourses, wetlands, moorland and upland grassland. Changes in land use can have an impact on wildlife habitats and water pollution (e.g. via diffuse pollution). Agriculture also accounts for around 10% of the total GHG emissions in the UK, contributing predominantly Nitrous oxide (N₂O) and methane gases, with smaller amounts of CO₂²⁴³.

3.137 Intensive land management is one of the main challenges to farmland wildlife and shift toward intensification has resulted in a change in biodiversity which could have major implications for food production²⁴⁴. Increased field sizes and use of agricultural chemicals has led to a potentially serious decline in pollinators such as bees, which in turn, can negatively affect crop volumes²⁴⁵. Poor land management can also lead to increased soil erosion, which can lead to loss of top soil and reduce soil function²⁴⁶.

3.138 Climate change is expected to raise further challenges for the agriculture sector. Further changes in temperature and rainfall are expected to change the patterns of Scotland's agricultural land-uses and could lead to increased pressure on the land²⁴⁷.

Farming has an important role to play in increasing the resilience of biodiversity and assisting adaptation through the management of existing habitats and enhancing connectivity between areas through habitat networks²⁴⁸. Conversely, increased connectivity may also result in quicker spread of diseases and pests, including invasive non-native species.

Evolution of the Baseline – Pressures, Trends and Key Points

3.139 Energy storage is likely to be an increasingly important part of the transition to delivering clean, affordable and secure supplies of energy²⁴⁹. For example, the continued development of battery storage technologies and hydrogen fuel cells for vehicle use in the transport sector.

3.140 Increasing the use of biological wastes in processes such as anaerobic digestion can increase the production of biogas, a source of renewable fuel and heat²⁵⁰. This can help divert waste materials away from landfill, reducing the amount of waste going to landfill and in turn, lead to a reduction of sequestered gases that would otherwise be released into the atmosphere.

3.141 Forestry and farming will need to adapt to cope with the impacts of climate change, such as flooding, drought, unseasonable weather and increased risk of pests and diseases. Further, changes in temperature and rainfall are expected to change the patterns of Scotland's agricultural land-use placing increased pressure on the land²⁵¹.

²⁴¹ *ibid*

²⁴² Scottish Natural Heritage, (2018). Hill farming. Available at: <https://www.nature.scot/professional-advice/land-and-sea-management/managing-land/farming-and-crofting/types-farming/hill-farming> (accessed 14/02/2020)

²⁴³ Jones et al. (2019) Greenhouse Gas Inventories for England, Scotland, Wales and Northern Ireland: 1990 – 2017 [online] Available at: https://naei.beis.gov.uk/reports/reports?report_id=991 (accessed 18/02/2020)

²⁴⁴ Scotland's Environment (2014) State of the Environment Report [online] Available at: <https://www.environment.gov.scot/media/1170/state-of-environment-report-2014.pdf> (accessed 14/02/2020)

²⁴⁵ *ibid*

²⁴⁶ Scotland's Soils (undated) Extent of soil erosion and landslides [online] Available at: <http://www.soils-scotland.gov.uk/context/erosion> (accessed 14/02/2020)

²⁴⁷ SNH (undated) Farming and Climate Change [online] Available at: <https://www.nature.scot/professional-advice/land-and-sea-management/managing-land/farming-and-crofting/farming-and-climate-change> (accessed 18/02/2020)

²⁴⁸ SNH (2009) Natural Heritage Futures Update, Farming [online] Available at: <http://www.snh.gov.uk/docs/A306272.pdf> (accessed 14/02/2020)

²⁴⁹ ClimateXChange (2016) Energy Storage in Scotland - Summary of reports on thermal and electrical energy storage [online] Available at: https://www.climatechange.org.uk/media/1391/summary_energy_storage.pdf (accessed 14/02/2020)

²⁵⁰ Scottish Government (2016) Making Things Last: A Circular Economy Strategy for Scotland [online] Available at: <http://www.gov.scot/Resource/0049/00494471.pdf> (accessed 14/02/2020)

²⁵¹ SNH (2019) Farming and Climate Change [online] Available at: <https://www.nature.scot/professional-advice/land-and-sea->

3.142 The demand for the services provided by the natural environment, such as food, water, fuel and materials for development, is likely to grow in line with population growth.

3.143 Some material assets including road and rail transport 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 networks, as well as those arising from extreme weather conditions and landslides²⁵².

3.144 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 networks²⁵³.

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.

[management/managing-land/farming-and-crofting/farming-and-climate-change](#) (accessed 14/02/2020)

²⁵² 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 14/02/2020/)

²⁵³ Adaptation Scotland (undated) 15 Key Consequences of Climate Change for Scotland [online] Available at: <http://adaptationscotland.org.uk/climate-ready-places/impacts/> (accessed 14/02/2020)

Chapter 4

SEA Findings




4.1 This section of the Environmental Report sets out a summary of the environmental effects by sector, including the proposed mitigation and enhancement measures that should be taken into account to reduce likely significant effects. Where likely significant effects are identified, monitoring indicators will be outlined in the ER.

4.2 As discussed in Section 2, the assessment of the draft CCPu involved three-stages. A detailed assessment of the individual policies and proposals set out in the draft Plan (Appendix B) was initially undertaken.

4.3 The combined environmental effects were then considered for the eight sectors included in the draft CCPu. The findings of this assessment stage are set out in the Summary Tables presented in the following section of this Report (Stage 2). These tables also include a brief outline of the relevant policy context and key potential opportunities and constraints that have been identified.

4.4 To illustrate the key findings in the Summary Tables, a summary box and arrows have been used to show the significant impacts associated with each sector/policy grouping.

4.5 The following key has been used:

Symbol	Description of effects
	Effects are positive overall for that environmental topic
	Effects are mixed overall for that environmental topic
	Effects are negative overall for that environmental topic

4.6 The accompanying narrative provides an over-arching and strategic analysis of the likely significant environmental impacts of the draft Plan and includes the potential for cumulative and in-combination effects.

Agriculture

Objectives of the Policies and Proposals

Promoting sustainable agriculture that contributes a range of environmental benefits

Encouraging farm management measures including soil testing, nitrogen use efficiency, manure management and animal health practices. This will be supported by information and advice for farmers, carbon auditing and the development of tailored support schemes.

Promoting the reduction and efficient use of nitrogen fertiliser.

Supporting reduced emissions intensity from livestock, slurry and manure

Promoting agroforestry, woodland creation, and soil regeneration practices.



Opportunities:

Opportunity to reduce GHG emissions from the agricultural sector through changing and improving farming practices and land use management.

Improved farm management, greater sustainability of the sector and opportunity to future-proof the industry.

Improved storage and application of slurries and manure.

Improved livestock genetics, including fertility and mortality, to reduce emissions intensity.

Further implementation of woodland creation and agroforestry practices.



Environmental Context:

The Scottish Rural Development Programme 2014 - 2020 delivers Pillar 2 of the EU Common Agricultural Policy. It is aimed at protecting and improving the environment and addressing the impact of climate change on the sector.

Getting the Best from Our Land: A Land Use Strategy for Scotland 2016-2021 sets out activities up to 2021. Scotland's third Land Use Strategy is currently out for consultation and is based around a series of conceptual landscapes and how policies relate to these.

Farming For A Better Climate set out five key action areas to help farmers tackle climate change and improve their business.



Constraints:

Potential short-term cost implications for farmers in implementing changes, although longer term savings could also be expected as costs should be recuperated over time.

Effective communication will be required to demonstrate benefits in the sector.

Uncertainty in delivery of specific environmental benefits as a consequence of these policies and proposals.



Summary of Findings

Overall Significant Impacts: Climatic Factors, Soil, Water, Landscape, Biodiversity, Flora and Fauna, and Material Assets



There is potential for positive environmental effects from the policies and policy proposals in the update to the Climate Change Plan relating to the agricultural sector. In particular, there are extensive opportunities to contribute to GHG emission reductions through changing farming practices as a result of increased knowledge exchange, more efficient use of resources, notably a reduction in the use of nitrogen fertilisers, and encouraging a change in the way land is used and managed to provide greater carbon reduction/sequestration benefits (**climatic factors and material assets**). Changes in land use and management, such as maximising woodland creation and agroforestry, soil restoration and regeneration, and improving the storage and application of slurries and manures will also have positive effects on climatic factors and material assets.

There is also likely to be additional benefits through greater use of farm waste as sources of renewable energy through anaerobic digestion. The creation or enhancement of woodland could help alleviate flood risk and other potential implications of a changing climate. Furthermore, policies and proposals seeking to improve the emissions intensity of livestock through means such as genotyping will also contribute to reducing GHG emissions (**climatic factors**).

The majority of the policies and proposals present an opportunity to improve the conditions of the natural environment and promote less intensive farming practices, for example, by reducing the use of chemical fertilisers, increasing natural and organic fertilisers, and generally improving the quality of the soil through soil restoration and grazing management. If land is managed properly, and there is less need to use nitrogen fertilisers, there could be a reduction in diffuse pollution and nutrient leaching from agricultural lands, with subsequent benefits for groundwater and surface water quality, soil structure, fertility and crop production (**water, soil and material assets**). Additionally, there is likely to be benefits for local habitats and species, particularly bird, aquatic and pollinating species (**biodiversity**). The creation or enhancement of new habitats through woodland creation could have positive effects on water quality by intercepting run-off (**water**).

There are also potential benefits for rural landscapes by improving the health and appearance of farmland through better management practices and increasing woodland cover on agricultural land (**landscape**), although the scale and nature of any such benefit would likely be site and region specific.

The significance of the effects will depend on the uptake of management practices on the ground. The facilitation of peer-to-peer knowledge exchange, and provision of governmental advice, guidance and subsidies will play a key role in this process.



Key Findings:

- The policies and policy proposals are likely to have overall positive effects in contributing to meeting GHG emissions reduction targets. The extent of these benefits will depend on the level of take up of the measures.
- The take up of certain measures and practices will depend on peer-to-peer knowledge exchange and success of implementation elsewhere.
- Additional positive effects are also likely for the natural environment including soil, water and biodiversity.

Electricity Supply

Objectives of the Policies and Proposals

- Supporting renewables and the development of new technologies through funding and incentives, including for community schemes.
- Encourage investment in CCS and hydrogen technologies.
- Promote the development of energy storage (including pumped hydro-storage) schemes and flexible systems.
- Encourage development of technologies which facilitate improved security of supply.



Opportunities:

- A decarbonised and decentralised electricity sector.
- Increased take-up of renewable technologies.
- Increased opportunity for the take up of CCS and hydrogen technologies.
- Increased flexibility and security of supply from enhanced energy storage, and the development of community schemes.



Environmental Context:

A range of policies are in place which promote a reduction in emissions derived from electricity generation. The 2013 revision of the Electricity Generation Policy Statement and the 2020 Routemap for Renewable Energy set the pathway for the delivery of at least 100% of gross electricity consumption from renewables by 2020. It also promotes community-owned renewable schemes.

The NPF3 states that planning must facilitate the transition to a low carbon economy, and should deliver the aims of Scotland's low carbon ambitions and the Climate Change Plan. A review of NPF3 has commenced and the Programme for Government highlights NPF4 as a major commitment in response to the global climate emergency. A final version of NPF4 is expected in 2021.




Constraints:


- Cost implications in the development of new technologies and roll-out of CCS.
- The primary influence on the implementation of new technologies will likely lie with the Government and market forces.
- Uncertainty on the future of subsidies and funding schemes.



Summary of Findings

Overall Significant Impacts:

Climatic Factors, Population and Human Health, Air, and Material Assets 

Biodiversity, Soil, Cultural Heritage and Landscape 

Policies and proposals are likely to result in predominantly positive effects with relation to **climatic factors**. Policies and proposals which seek to encourage and aid the decarbonisation of electricity generation will contribute to reduced GHG emissions. Furthermore, greater reductions in GHG emissions are also likely as a result of policies and proposals which promote innovation and encourage investment into new technologies such as electricity storage, CCS, and other low-carbon technologies such as hydrogen power. The development of technologies that enable electricity storage, will improve security of supply, along with promoting community-owned renewable schemes. Furthermore, improvements in **air quality** and subsequently **population and human health** are also likely from aiding a larger shift from traditional non-renewable supplies. The boosting of existing policies and the introduction to new policies included within the Update to the Climate Change Plan will help heighten these positive effects by further facilitating the shift to low-carbon and renewable electricity generation. This will subsequently enable greater reductions in GHG emissions, bringing further benefits in relation to **climatic factors**. Additionally, the boosting of these policies and new policies introduced will help achieve GHG emissions, renewables and low-carbon electricity targets in a shorter timeframe.

There is the potential for negative effects arising from some policies and proposals, particularly in relation to **cultural heritage** and **landscape**, as a result of development changing the setting of heritage assets and landscape character. Other negative effects could arise during the construction phase of development. Construction activity may have adverse effects on biodiversity, **soil, water, air quality, and population and human health**, due to pollution and noise. However, it is recognised that most effects associated with construction activity are short term in nature. The significance of the identified impacts will be dependent on factors such as the scale, nature and location of developments, and are likely to be experienced at a local level. Potential impacts are likely to be mitigated by existing mechanisms such as the planning system, SEPA regulation, marine licencing, EIA, HRA and on-site management measures.



Key Findings:

- The policies and proposals are likely to contribute to meeting GHG emissions reduction targets, through promoting renewable and low-carbon energy.
- Benefits include improved energy security, and greater flexibility in managing demand and supply.
- There is potential for adverse effects relate to infrastructure development and construction. However, potential impacts are likely to be mitigated by existing mechanisms such as the planning system, SEPA regulation and on-site management measures.

LULUCF

Objectives of the Policies and Proposals

- Carbon sequestration, by increasing the amount of forested area in Scotland
- Promoting peatlands restoration
- Promoting a shift from high-energy building materials to renewable timber products, with associated benefits for the construction industry and rural populations.
- Establishment of Regional Land Use Partnership pilots



Opportunities:

- Creation of new peatland and forestry/woodland habitats, and biodiversity net gain.
- Improving degraded landscapes.
- Increasing the size of Scotland's carbon sink, both in high-carbon soils and in woodland/forestry.
- The development of local knowledge and skills to support restoration projects.
- Opportunity to grow Scottish timber market, particularly for the construction industry.



Environmental Context:

Getting the Best from Our Land: A Land Use Strategy for Scotland 2016-2021 builds on the framework set out in 2011 in Scotland's first Land Use Strategy. Scotland's third Land Use Strategy is currently out for consultation and brings together for the first time key strands of Scottish Government policy that affect land use, and sets out how these various policy areas fit together on the ground. The strategy is structured around a number of conceptual landscapes and recognises the role of peatland restoration and woodland creation and the wider benefits from these actions.

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.

Scotland's National Peatland Plan seeks to quantify and promote the benefits of peatland restoration, protection and management.

The 2020 Challenge for Scotland's Biodiversity seeks to protect biodiversity whilst utilising nature and its many processes and functions to improve prosperity and welfare.



Constraints:

- Cost implications in restoration of peatland areas.
- Cost of woodland creation.
- Land availability and potential trade off with other land uses.
- Timescale for approval of forestry projects.



Summary of Findings

Overall Significant Impacts:
 Climatic Factors, Cultural Heritage, Biodiversity, Flora and Fauna, Soil, Water, Landscape and Population and Human Health
 Material Assets

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Largely positive environmental effects are expected from the land use, land use change and forestry sector; most notably in relation to a reduction in GHG emissions associated with the restoration of peatlands and creation of woodland and forestry. This will have positive effects on **climatic factors**. This may have additional positive effects in relation to **population and human health**, due to improved air quality. Furthermore, restoring peatland, and creating new woodland and forestry may increase access to the outdoors and provide recreational uses for people, such as walking and cycling opportunities.

Both peatland restoration and woodland creation is likely to result in positive effects in relation to habitat creation, soil function and stability, water quality, and natural flood management, depending on the scale and nature of changes. Therefore, these policies could potentially have positive effects in relation to **soil, water, and biodiversity**. However, whilst peatland, forestry and woodland will likely have positive effect, poorly designed forestry/woodland could have negative effects on local biodiversity, soil and water. Managing forests according to the UK Forestry Standard could help to mitigate the potential negative effects on biodiversity, soil and water quality, especially during the operations associated with timber harvesting.

There is potential for positive effects associated with land use change as a result of improving land management and restoring degraded land. However, demand for land from other land uses could also generate some pressure. As such, there may be mixed effects on **material assets**. Additionally, woodland, forestry and peatland restoration is likely to contribute to enhancing the **landscape** character and value, having mainly positive effects. However, effects on the landscape could potentially be mixed, as poorly designed and established woodlands or forests, and peatlands could affect the scenic value of the area which could lead to negative visual impacts. Furthermore, peatlands are of cultural value and their restoration will likely have positive impacts on **cultural heritage**.

The boosting of existing policies and the introduction to new policies included within the Update to the Climate Change Plan will help heighten these positive effects by further enhancing the rate of peatland restoration and forestry and woodland creation. This will subsequently enable greater reductions in GHG emissions, through an increased natural carbon sink, bringing greater benefits in relation to **climatic factors**. Furthermore, the boosting of these policies and new policies introduced will help achieve planting and restoration targets and GHG emission reduction targets in a shorter timeframe. These policies may also further enhance associated benefits to population and human health, landscape, soil, water, cultural heritage and biodiversity. However, as noted above, could also increase the potential negative effects for these topics.

It is considered that the potential negative impacts resulting from forestry could be mitigated by adhering to relevant UK forestry standards and guidelines, by adopting good practice and the development and revision of Local Authority Forest and Woodland Strategies. Further consideration of potential environmental effects is likely to be undertaken at a project level, where woodland creation proposals must meet the requirements of statutory processes for assessing impact on designated habitats or the wider environment; for example, Environmental Impact Assessment (EIA).



Key Findings:

- Forestry planting and peatland restoration will likely increase Scotland's carbon sink and contribute towards reduced GHG emission targets.
- Peatland restoration could have associated benefits for soil, water and biodiversity, particularly over the long-term.
- Woodland creation could have associated benefits for biodiversity, soil, water (flood management) and population and human health.
- Potential negative impacts could be mitigated at the project level by adhering to relevant UK forestry standards and guidelines, adopting good practice and through via existing mechanisms such as the planning process, EIA and HRA.

Industry

Objectives of the Policies and Proposals

Decarbonisation of the industrial sector and identifying opportunities for savings, and provision of support and access to finance.

Supporting investment in new technology to support emissions reductions.

Opportunities:

Investment in new and future-proofed industry, including low-carbon technologies such as renewable energy schemes and heat networks.

A change in thinking amongst industry and the identification of opportunities to increase productivity, save money and employ greater control over resource security.

Investment in energy efficiency measures across industry.

Environmental Context:

Scotland's Economic Strategy sets out an overarching framework for a more productive, cohesive and fairer Scotland. The Economic Strategy forms the strategic plan for existing and all future Scottish Government policy. In addition to setting goals for sustainable economic growth, the Economic Strategy also sets out ambitions for investing in Scotland's infrastructure, and prioritises investment to ensure that Scotland protects and nurtures its natural resources and captures the opportunities offered by the transition to a more resource efficient, lower carbon economy.

National policies such as NPF3 set out principles for increasing the sustainable use of Scotland's natural resources. A review of NPF3 has commenced and the Programme for Government highlights NPF4 as a major commitment in response to the global climate emergency. A final version of NPF4 is expected in 2021.

Others, such as the consultation draft Infrastructure Investment Plan and Energy Efficient Scotland sets out wide ranging programmes targeting activity on energy efficiency.

Constraints:



Cost implications for businesses in the short-term.

'Buy-in' from businesses is voluntary

Current economic uncertainty, particularly as a result of COVID-19.

Uncertainty in delivery of specific environmental benefits as a consequence of these policies and the proposal.

Summary of Findings

Overall Significant Impacts:
 Climatic Factors, Material Assets, Population and human health, and Air 
 Population and Human Health, Landscape, Cultural Heritage Soil, Water, and Biodiversity, Flora and Fauna 

A range of measures are expected to have positive effects on climatic factors as a result of reductions in GHG emissions. Such measures include the delivery of funding mechanisms including an Energy Transition Fund, Industrial Energy Transformation Fund, and Low Carbon Manufacturing Challenge Fund. In addition policies and proposals support the continuation of the Non-domestic Renewable Heat Incentive and funds to promote the uptake of low-carbon technologies and encourage the creation of green jobs. Schemes aimed at encouraging the uptake of low carbon heat technologies, district heating networks, and the installation of energy efficiency measures may reduce the demand for electricity and heat from fossil fuel sources. This will have positive effects on **climatic factors**. The boosted and new policies included within the Update to the Climate Change Plan will help heighten these positive effects by enabling greater reductions in GHG emissions. Furthermore, the boosting and new policies will help achieve targets faster.

The greater uptake of energy efficiency measures within industry will likely result in a reduction in the demand for energy, thereby reducing pressure on supply and distribution networks, having positive effects on **material assets**. Further benefits may arise from the use of low-carbon heat technologies which may help improve security of supply, and reduced pressure on waste management facilities through the promotion and uptake of the circular economy. This could reduce reliance on finite resources and limit carbon generation from the processing of such materials, having benefits for both **material assets** and **climatic factors**. The boosted and new policies included within the update to the Climate Change Plan will help heighten these positive effects by enabling greater reductions in GHG emissions and further reducing pressure on existing energy infrastructure and waste management facilities. Furthermore, the boosting of existing policies and new policies will help achieve targets faster.

There is potential for localised adverse impacts on some topic areas, including **population and human health, soil, water, air and biodiversity**, as a consequence of construction and infrastructure improvement works from the installation of new heating networks, low-carbon technologies and energy efficiency measures. However, these effects resulting from construction activity are likely to be temporary in nature. Longer term negative impacts can arise from certain technologies which may impact on the fabric of a building or landscape character, having adverse effects on landscape and cultural heritage. However, it is recognised that policies and proposals will largely relate to existing industrial areas and as such are unlikely to result in further effects on cultural heritage or landscape.

The significance of the identified impacts will be dependent on factors such as the scale, nature and location of developments, and are likely to be experienced at a local level. Potential impacts are likely to be mitigated by existing mechanisms such as the planning system, SEPA regulation, EIA, HRA and on-site management measures.

Key Findings:

- The policies and proposals are likely to contribute to meeting GHG emissions reduction targets and increase resource security.
- The realisation of any benefits is likely to be influenced by communicating potential benefits and opportunities to the sector, and achieving the buy-in of industry is an opportunity to introduce long-term thinking into infrastructure development.
- In most cases, potential adverse effects relate to infrastructure development and construction. However, potential impacts are likely to be mitigated by existing mechanisms such as the planning system, SEPA regulation and on-site management measures.

Negative Emission Technologies

Objectives of the Policies and Proposals

Undertake feasibility work to identify specific sites and applications of NETs

Transitioned decarbonisation of Scotland with a focus on the use of negative emission technologies.

Promoting the development of a Bioenergy Action Plan, and the use of bioenergy technologies such as biomass.

Support and promote negative emission technologies including bioenergy, CCUS and hydrogen technologies.



Opportunities:

Investment in new and future-proofed industry, including low-carbon technologies such as CCUS and hydrogen.

Identification of opportunities to reduce GHG emissions through investment in negative emission technologies.



Environmental Context:

Scotland's Economic Strategy sets out an overarching framework for a more productive, cohesive and fairer Scotland. The Economic Strategy forms the strategic plan for existing and all future Scottish Government policy. In addition to setting goals for sustainable economic growth, the Economic Strategy also sets out ambitions for investing in Scotland's infrastructure, and prioritises investment to ensure that Scotland protects and nurtures its natural resources and captures the opportunities offered by the transition to a more resource efficient, lower carbon economy.

National policies such as NPF3 set out principles for increasing the sustainable use of Scotland's natural resources. A review of NPF3 has commenced and the Programme for Government highlights NPF4 as a major commitment in response to the global climate emergency. A final version of NPF4 is expected in 2021.

Constraints:

Cost implications for businesses in the short-term.

'Buy-in' from businesses is voluntary

Current economic uncertainty, particularly as a result of COVID-19.

Uncertainty in delivery of specific environmental benefits as a consequence of these policies and the proposal.



Summary of Findings

Overall Significant Impacts:

Climatic Factors, Material Assets, and Population and human health
 Landscape
 Population and Human Health, Air



A wide range of measures are expected to have positive effects on climatic factors as a result of reductions in GHG emissions. Such measures include the support and promotion of schemes which will result in negative emissions, such as CCUS, hydrogen and bioenergy. Furthermore, this may reduce the demand for electricity and heat from fossil fuel sources. This will have positive effects on **climatic factors**. In addition to utilising carbon obtained through CCUS, sequestering carbon emissions via CCUS is also likely to have significant positive effects by reducing GHG emissions, and may also lead to improvements in **air quality**. This may have subsequent benefits for **population and human health**. The boosted and new policies included within the Update to the Climate Change Plan will help heighten these positive effects by enabling greater reductions in GHG emissions. Furthermore, the boosting and new policies will help achieve targets faster.

Additionally, policies and proposals supporting the uptake and development of bioenergy, including biomass, may contribute to reductions in GHG emissions. However, whilst reducing GHG emissions may have positive effects on air quality, the combustion process associated with biomass may release pollutants into the air. Therefore, policies supporting these technologies may have mixed effects on **air quality**.

The greater uptake of alternative, negative emission technologies will likely reduce pressure on supply and distribution networks, having positive effects on **material assets**. Further benefits may arise from the use of negative emission technologies as they may help improve security and flexibility of supply. The boosted and new policies included within the Update to the Climate Change Plan will help heighten these positive effects by enabling greater reductions in GHG emissions and further reducing pressure on existing energy infrastructure. Furthermore, the boosting of existing policies and new policies will help achieve targets faster.

There is potential for localised adverse impacts on some topic areas, including **population and human health, soil, water, air and biodiversity**, as a consequence of construction and infrastructure improvement works from the installation of CCUS, hydrogen and bioenergy infrastructure. However, these effects resulting from construction activity are likely to be temporary in nature. Longer term negative impacts can arise from certain technologies which may impact on the fabric of a building or landscape character, having adverse effects on landscape and cultural heritage. The significance of the identified impacts will be dependent on factors such as the scale, nature and location of developments, and are likely to be experienced at a local level. Potential impacts are likely to be mitigated by existing mechanisms such as the planning system, SEPA regulation, EIA, HRA and on-site management measures.



Key Findings:

- The policies and proposals are likely to contribute to meeting GHG emissions reduction targets and increase resource security.
- The potential for technologies such as CCUS to help industry reduce climate change impacts, and aid the continued use of oil and gas as an energy source as industry transitions to low carbon energy sources.
- Bioenergy, notably biomass may result in mixed effects on air quality due to particles released during the combustion process.
- In most cases, potential adverse effects relate to infrastructure development and construction. However, potential impacts are likely to be mitigated by existing mechanisms such as the planning system, SEPA regulation and on-site management measures.

Buildings

Objectives of the Policies and Proposals

Decarbonising the heat supply to residential and non-domestic buildings, through a suite of existing and proposed funding, loans and investment measures

Regulating energy efficiency measures in residential and non-domestic buildings.

Introducing zero emissions heat standard for new buildings.

Co-ordinating and integrating delivery of a national scheme to replace Warmer Homes Scotland.

Widespread smart meter installation for all homes and businesses.

Opportunities:

Increased energy efficiency of the domestic and non-domestic building stock.

Decarbonisation of heat generation in the sector.

Increased use of heat through district heat networks.

Increased retrofitting of energy efficiency measures.

Environmental Context:

National policies such as the NPF3 set out ambitions to reduce energy demand and increase renewable electricity and heat generation across Scotland. A review of NPF3 has commenced and the Programme for Government highlights NPF4 as a major commitment in response to the global climate emergency.

The Energy Efficient Scotland: Route Map focuses on improving the energy efficiency of Scotland's existing buildings and supporting the deployment of low carbon heat options to achieve the targets of the Climate Change Plan. The Scottish Energy Strategy: The future of energy in Scotland directly builds on the Heat Policy Statement of 2015, and it continues to focus on energy and electricity. However, this strategy takes a whole-system view and also includes heat and transport sectors.

The Heat Decarbonisation Strategy - 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.

Constraints:

Potential short-term cost implications for homeowners, although longer term savings could also be expected.

Upfront cost implications for development of heat networks.

'Buy in' will be required.

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

Summary of Findings

Overall Significant Impacts:

Climatic Factors, Population and Human Health, Material Assets, and Air
 Soil, Cultural Heritage, Landscape, Water, Biodiversity



Largely positive effects are identified for policies and proposals in this sector in relation to **climatic factors, population and human health, material assets, and air**.

Improving energy efficiency and encouraging low carbon heat across Scotland's domestic and non-domestic building stock, will help to reduce GHG emissions, having positive effects on **climatic factors**. Encouraging energy efficiency, and low-carbon heat and energy will likely have subsequent benefits for **air quality** by minimising the demand for energy produced by more traditional, finite resources like oil and gas. Improvements in air quality will therefore have associated benefits for **population and human health**. Additionally, further benefits for population and human health are likely to arise from improved security of supply and reduced fuel poverty, which may also have benefits for general health and wellbeing.

Additionally, the greater uptake of new low carbon technologies could help reduce pressure on existing energy networks. Furthermore, the greater diversity in technologies and how they feed into the energy system will help to future-proof supply, and make it more resilient to the effects of climate change. Therefore, positive effects are expected in relation to **material assets**. The boosted and new policies included within the Update to the Climate Change Plan will help heighten these positive effects by enabling greater reductions in GHG emissions and further reducing pressure on existing energy networks. Furthermore, the boosting of policies and new policies introduced will help achieve GHG emission targets in a shorter timescale.

However, some potential negative effects were identified through the assessment of policies and proposals. Certain technologies, such as biomass, can have negative effects on **air quality** due to the release of air pollutants during the biomass combustion process. These pollutants may be harmful to **human health**. Additionally, energy efficiency measures can have some adverse effects, most notably, on **biodiversity** as a result of works undertaken to roof cavities (i.e. insulation) which may hold bat roosts. Furthermore, some efficiency measures could affect **cultural heritage** features directly or through visual impacts on their setting and **landscape**. In many instances, the impacts on cultural heritage and landscape may be managed through appropriate design. Additionally, the policy supporting the application and use of sensitively designed low carbon heat with heritage assets may avoid adverse effects.

In addition, some negative effects arising during the construction phase of development, such as for district heating systems, may occur. Many of these effects were temporary in nature, and may impact on **soil, water, air and biodiversity and population and human health**. The significance of the identified impacts will be dependent on the scale, nature and location of developments and likely to be experienced at a local level. Potential impacts are likely to be mitigated by existing mechanisms such as the planning system, SEPA regulation, EIA, HRA and on-site management measures.

Key Findings:

- Policies and proposals will likely improve energy efficiency of Scotland's building stock, and subsequently reduce GHG emissions. However, significance of effects will depend on level of buy-in from homeowners and businesses.
- There will likely be increased uptake of low-carbon heat, such as district/local heat networks.
- Many of the potential adverse effects are related to the need for infrastructure development, and are likely to be considerations under existing mechanisms such as the planning or consenting process, EIA and HRA, amongst others.

Transport

Objectives of the Policies and Proposals

Decarbonising the transport sector, including road, rail, ferries, shipping and aviation.

Reducing reliance on private cars

Encouraging take-up of low carbon technologies, particularly in relation to ULEVs.

Promoting and actively facilitating a modal shift towards low carbon travel (from road to rail, from motorised to active travel).

Changing how freight is delivered, whilst seeking to maximise secondary benefits such as improving air quality in urban areas and associated benefits to health and wellbeing.

Opportunities:

Investment in future-proofed infrastructure and low-carbon transport technologies, including electricity, hydrogen and biofuels.

Potential to drive change in how freight is delivered and transported.

Encourage behavioural change to travel, including up-take of public transport and active travel.

Increased up-take of electric vehicles amongst bus operators and taxi firms.

Environmental Context:

Scotland's National Transport Strategy 2 considers the whole transport system including walking, wheeling, cycling, travelling by bus, train, ferry, car, lorry and aeroplanes. It sets out the strategic framework within which future decisions on investment will be made, including strategic objectives on improving journey times and connections, tackling congestion and improving integration: and reducing emissions to tackle climate change, air quality, and health improvement.

The NPF3 explored Scotland's overarching ambitions for connectivity and accessibility, ambitions to change how we travel and ensuring infrastructure is in place to facilitate decarbonisation of the sector.

Infrastructure Investment Plan 2015 sets out priorities for investment and a long-term strategy for the development of public infrastructure in Scotland, including public transport. It sets out why the Scottish Government invests, how it invests and what it plans to invest in.

Constraints:

Legislation will be needed to progress several proposals (e.g. Low Emissions Zones).

Take-up of electric vehicles (EVs) and ultra-low emission vehicles (ULEVs) is dependent on consumer buy-in.

Financial incentives may be required.

Achieving stakeholder buy-in

Summary of Findings

Overall Significant Impacts:

Climatic Factors, Population and Human Health, and Air

Cultural Heritage, Landscape, Water, and Soil

Material Assets, Biodiversity



Largely positive effects are identified for policies and proposals in this sector in relation to **climatic factors, population and human health, and air**.

Policies and proposals which encourage the take-up of electric and ultra-low emission vehicles (ULEVs) will help to further reduce the release of GHG emissions. Furthermore, policies supporting reduced travel journeys and active travel, as well as the decarbonisation of freight transport through electrification, and incentivising low emission aircrafts and sustainable aviation fuel may also contribute towards reductions in GHG emissions, having positive effects on **climatic factors**.

In addition, many of the policies and proposals encouraging a modal shift to low-carbon transport, may result in subsequent improvements in **air quality**, particularly in urban areas with Air Quality Management Areas (AQMAs). The reduction in air pollution, as a result of replacing cars, HGVs, buses and trains with low-carbon alternatives may therefore provide benefits for **population and human health**. However, having appropriate infrastructure in place to enable this transition will be vital in achieving these benefits, and will provide benefits in terms of **material assets**. However, until appropriate infrastructure is in place, an increase in the up-take of low carbon vehicles may put increased pressure and demand on existing infrastructure networks.

The boosting of existing policies and the introduction to new policies included within the Update to the Climate Change Plan will help heighten these positive effects by further facilitating the shift to low-carbon and sustainable modes of transport. This will subsequently enable a greater reductions in GHG emissions, bringing greater benefits in relation to **climatic factors**. Furthermore, the boosting of these policies and new policies introduced will help achieve GHG emissions, emissions reduction target for the transport sector, and will provide additional benefits to air quality and human health in a shorter timeframe.

However, upgrades to or the creation of new infrastructure to facilitate this modal shift to low-carbon technologies may have localised negative environmental effects. For example, the development of freight distribution centres, charging facilities and hydrogen processing plants could lead to effects on **biodiversity** and **soil** (from land take), **population and human health** (from noise and air pollution), **water** and **air quality**. These effects would most likely occur during the construction phase and would be largely temporary in nature.

Furthermore, the siting of developments, particularly those of larger scales, could also have effects on the setting of **cultural heritage** and **landscape** character. However, the significance of the identified impacts will be dependent on the scale, nature and location of developments and likely to be experienced at a local level. Potential impacts are likely to be mitigated by existing mechanisms such as the planning system, SEPA regulation, EIA, HRA and on-site management measures.

Key Findings:

- Policies and proposals will likely result in increased up-take of electric and ultra-low emission vehicles, both by individuals and public transport operators.
- Policies and proposals will likely contribute to meeting GHG emissions reduction targets.
- The significance of effects will depend on the level of buy-in from stakeholders and the wider transport sector.
- Infrastructure development could result in largely localised and temporary adverse effects. Potential impacts are likely to be mitigated by existing mechanisms such as the planning system, EIA, HRA and on-site management measures.

Waste

Objectives of the Policies and Proposals

Reducing waste (including food waste), and delivering on recycling and landfill diversion targets for 2025.

Capturing landfill gas on closed sites.

Promoting a circular economy through policy and legislation..



Opportunities:

Reducing the amount of waste sent to landfill.

Promoting recycling and the re-use of waste materials, infusion of this into the design and manufacturing process, and industry seeing waste as a resource.

Reduction in consumption of natural resources from improved utilisation of waste, and potential for reduction in GHG emissions, particularly in the industrial sector due to reduced manufacturing and processing.

Opportunity for businesses to better manage resource inputs and waste outputs.

Reducing the use of single-use items such as beverage cups and carrier bags.



Environmental Context:

Making Things Last: A Circular Economy Strategy for Scotland sets out priorities for moving towards a more circular economy with a long-term ambition. It articulates Scotland's aspirations and proposes a number of actions to take over the short to medium term and creates conditions for long term change. It seeks to reduce waste lost from the economy, and retain the value of materials through repair, reuse, recycling and remanufacturing.

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:


Likely to be short-term cost implications for business and the industry.


There is some uncertainty in the delivery of specific environmental benefits as a consequence of these policies and the proposal.



Summary of Findings

Overall Significant Impacts:

Climatic Factors and Material Assets 

Population and Human Health, Landscape, Cultural Heritage, Air, Water, and Biodiversity, Flora and Fauna 

Soil 

This sector could have largely positive environmental effects in relation to climatic factors and material assets, but some negative effects are identified in relation to some SEA topics. However, these negative effects are likely to arise from infrastructure development and construction and will likely be short term in nature.

As a result of improved waste management, positive effects are likely in relation to **climatic factors** and **material assets**, by reducing pressure on existing landfill infrastructure and contributing to reductions in GHG emissions. The policies and proposals promoting the circular economy and seeking to achieve waste and recycling targets, will result in the more efficient use of resources and will encourage the reuse, recycling and remanufacturing of goods (**material assets**). This may have further benefits on GHG emission reduction and **climatic factors**, as the remanufacturing of goods is less resource-intensive than manufacturing from new. Additionally, proposals supporting the futureproofing of waste facilities for CCS technologies may have further benefits in relation to GHG emissions. The boosted and new policies included within the Update to the Climate Change Plan will help heighten these positive effects by enabling greater reductions in GHG emissions and further reducing pressure on landfill infrastructure and new resources. Furthermore, the boosting and new policies will help achieve targets faster.

Additionally, the promotion of landfill gas capture will reduce GHG emissions released to the atmosphere by capturing methane produced at landfill sites before it can be released. This will have further positive effects on **climatic factors**. However, new and boosted policies that increase the number of landfill gas capture sites will help achieve greater reductions in GHG emissions over a shorter timescale.

Localised negative effects could arise from changes in how waste is managed, including policies that may require the development of new recycling and waste management facilities. Such policies may have potential negative effects on **biodiversity, soil, water, air quality, population and human health, landscape and cultural heritage**. These effects can occur from the construction, operation and siting of waste infrastructure developments. It is noted that any effects resulting from construction activity is largely temporary in nature. Whilst there may be a reduced need for landfill operations, leading to benefits for soil, there could be requirements for a greater number of additional recycling and waste management facilities which could have negative impacts on soil from land take. The significance of the identified impacts will be dependent on the scale, nature and location of developments and likely to be experienced at a local level. Potential impacts are likely to be mitigated by existing mechanisms such as the planning system, SEPA regulation, EIA, HRA and on-site management measures.



Key Findings:

- Improving how waste is utilised in our economy, through recycling and reuse, is likely to reduce pressure on waste infrastructure.
- Improving recycling and reuse of materials is likely to reduce consumption of resources, and by reducing the manufacturing of goods is likely to contribute to a reduction in GHG emissions.
- The significance of any benefits will depend on the level of stakeholder commitment and buy-in.
- In most cases, potential adverse effects relate to infrastructure development and construction. However, potential impacts are likely to be mitigated by existing mechanisms such as the planning system, SEPA regulation and on-site management measures.
- There is an opportunity to further increase long-term thinking in how waste materials are used in the manufacturing sector.

Summary of Likely Environmental Effects

Primary Environmental Effects

Electricity

4.7 Policies and proposals within the electricity sector are expected to have significant positive effects in relation to climatic factors as they generally seek to aid the decarbonisation of electricity generation through new technologies such as renewable energy, carbon capture and storage (CCS), hydrogen and electricity storage. The greater implementation of these green technologies will contribute towards reducing GHG emissions, as a result of reducing reliance on fossil-fuelled electricity. Additionally, the greater implementation of such technologies is likely to result in significant positive effects on material assets due to improved flexibility and security of supply.

Transport

4.8 Policies and proposals within the transport sector are expected to have significant positive effects in relation to climatic factors as they generally seek to aid the decarbonisation of transport through promoting the uptake of ULEVs and zero or low emission aeroplanes, encouraging behavioural change to journeys (e.g. shorter/less journeys) and encouraging travel by active and public transport. The implementation of these measures will contribute towards reducing GHG emissions, thereby having positive effects on climate change. With a shift from traditionally fuelled vehicles to ULEV, and greater uptake of active travel, there is likely to be improvements in air quality due to less pollution, particularly in urban areas within Air Quality Management Areas (AQMAs), and subsequent benefits to population and human health.

Industry

4.9 Policies and proposals within the industry sector promote a wide range of measures

such as the introduction of the funding for green jobs and the decarbonisation of the industry sector, and funds to promote the uptake of low-carbon technologies (e.g. low-carbon heat, renewable energy and energy efficiency measures). The greater uptake and use of these technologies and schemes set out within the industry sector is likely to result in significant positive effects in relation to climate change, as a result of reductions in GHG emissions across the sector.

4.10 Furthermore, the greater use of low-carbon technologies and energy efficiency measures across the industry sector will likely result in a reduction in the demand for energy, thereby reducing pressure on supply and distribution networks. The uptake of such technologies may also provide greater security of supply. Therefore, policies and proposals across the industry sector are generally expected to have positive effects in relation to material assets.

Negative Emissions Technologies

4.11 Policies and proposals within the negative emission technologies sector promote a wide range of measures which support the uptake of negative emission technologies, such as carbon capture, utilisation and storage, and hydrogen technologies. Policies and proposals provide mechanisms for the identification of potential sites, funding, demonstration and the expansion of evidence relating to such technologies. Additionally, policies and proposals supporting the uptake of bioenergy and biomass may encourage low-carbon alternative to provide energy, heat and transport fuel. The greater uptake and use of these technologies and schemes set out within the negative emission technologies sector is likely to result in significant positive effects in relation to climate change, as a result of reductions in GHG emissions across the sector.

4.12 Furthermore, the greater use of negative emission technologies across the

sector will reduce pressure on energy supply and distribution networks. The uptake of such technologies may also provide greater security of supply. Therefore, policies and proposals across this sector are generally expected to have positive effects in relation to material assets.

Buildings

4.13 Policies and proposals within the buildings sector are expected to have significant positive effects in relation to climatic factors as they generally seek to improve the energy efficiency of buildings, promote low carbon and renewable energy, and low carbon heat such as heat networks. This will result in reductions in GHG emissions due to less reliance on traditional fuels. Furthermore, improving efficiency and promoting uptake of low-carbon energy and heat will have positive effects on population and human health as a result of improved flexibility and security of supply.

Agriculture

4.14 All policies and proposals set out within the agriculture sector are expected to have significant positive effects relating to climate change due to the promotion of more efficient and sustainable farming practices which will reduce GHG emissions, such as reduced use of nitrogen fertilisers and improved emissions intensity of livestock. Furthermore, proposals supporting advice, support and knowledge exchange, onsite renewable energy generation, and land use management to provide increased carbon sequestration will also facilitate reductions in GHG emissions.

4.15 General improvements in land management practices will also have positive effects in relation to material assets, and proposals supporting the development of other habitats such as woodland within agricultural holdings will provide benefits for biodiversity by providing new habitats and greater connectivity.

Waste

A reduction in waste going to landfill is likely to have positive effects on each of the environmental topics, however, policies and proposals within the waste sector are expected to have significant positive effects in relation to climatic factors as they generally seek to reduce pressure on landfill infrastructure and increase recycling of waste. Proposals supporting recycling and the circular economy, reductions in food waste, improved resource efficiency, the banning of single use items such as bottles and carrier bags, and behavioural change could lead to reductions in GHG emissions as a result of less processing of waste and reduced need to manufacture goods from new. Positive effects on GHG emissions are also predicted from policies and proposals seeking to capture landfill gas which would otherwise be released into the atmosphere, and for proposals requiring waste facilities are 'future-proofed' for CCS technology. Additionally, policies and proposals which will aid in reducing pressure on landfill infrastructure are expected to have positive effects on material assets.

Land Use, Land Use Change and Forestry

4.16 The policies and proposals set out within the LULUCF sector are likely to result in significant positive effects in relation to climate change. Policies and proposals generally promote the expansion and creation of woodland and forestry and/or support peatland restoration. The expansion of woodland and forestry is expected to contribute towards mitigating GHG emissions by increasing rates of carbon sequestration, and the restoration of peatland will improve the quality of high carbon soils, reducing GHG emissions and maximising the potential for carbon to be stored. Therefore, the enhancement of the carbon sink will likely contribute towards reduced emissions.

4.17 Additionally, the policies and proposals relating to LULUCF are expected to have mixed effects on material assets as although

they may promote and encourage better land management and may improve degraded land through planting of woodland or forestry or peatland, there may be direct conflicts of land use. For example, loss of agricultural land for woodland, forestry or peatland restoration.

Secondary Environmental Effects

Electricity

4.18 Several secondary effects are identified as likely to arise from policies and proposals within the electricity sector. Firstly, policies and proposals which seek to reduce reliance on fossil-fuelled electricity by promoting the uptake of new low-carbon technologies are likely to have associated benefits on air quality due to the release of less GHG emissions. This is identified as resulting in subsequent benefits for population and human health.

4.19 Proposals which encourage the uptake of low-carbon technologies such as renewable energy, CCS and hydrogen etc. may result in development which could have adverse effects on topics such as landscape and cultural heritage. Furthermore, some development may have adverse effects in relation to soils, depending on the scale, nature and location of development.

4.20 Additionally, policies and proposals within the electricity sector may have adverse secondary effects on a number of SEA topics such as population and human health, soil, water, air and biodiversity, as a consequence of construction and infrastructure improvement works. However, it is recognised that these effects are likely to be temporary in nature.

Transport

4.21 Whilst policies and proposals within the transport sector are expected to have primary positive effects in relation to climatic factors, air and population and human health, a number of secondary effects have been identified in relation to other SEA topics. Policies promoting alternatively fuelled

vehicles, public transport and active travel may result in additional infrastructure requirements. If sufficient infrastructure is in place, there may be positive effects on material assets. However, if existing infrastructure is not adequate to meet the needs of development set out in policies and proposals, there may be increased pressure on infrastructure, having adverse effects for material assets.

4.22 Transport related development as outlined in policies and proposals may have mixed effects on biodiversity due to potential loss of habitat for infrastructure. However, promotion of active travel such as footpaths and cycle paths may provide biodiversity benefits by creating linear corridors of habitat.

4.23 Likewise, development of transport infrastructure such as new roads, distribution centres, charging facilities and processing plants for alternative fuels such as hydrogen could have potential adverse effects on soil, population and human health air and water quality. However, it is recognised that some of these effects are likely to arise during construction periods and are temporary in nature.

Industry

4.24 A number of secondary effects are identified as likely to arise from policies and proposals within the industry sector. Policies and proposals which support and promote the uptake of measures which will result in reductions in GHG emissions are likely to have associated benefits for air quality, and subsequent benefits for population and human health.

4.25 Policies and proposals may result in the greater uptake of technologies and measures which could affect the fabric of a building, heritage asset or landscape character. However, it is recognised that these policies and proposals will primarily relate to improvements or application of technologies in existing industrial areas which may have already affected landscape or cultural

heritage. Additional development resulting from these policies and proposals are unlikely to have significant secondary effects in relation to cultural heritage and landscape.

4.26 Additionally, policies and proposals within the industry sector may have adverse secondary effects on a number of SEA topics such as population and human health, soil, water, air and biodiversity, as a consequence of construction and infrastructure improvement works. However, it is recognised that these effects are likely to be temporary in nature.

Negative Emissions Technologies

4.27 A number of secondary effects are identified as likely to arise from policies and proposals within the negative emission technologies sector. Policies and proposals which support and promote the uptake of measures which will result in reductions in GHG emissions are likely to have associated benefits for air quality, and subsequent benefits for population and human health. However, policies and proposals supporting bioenergy such as biomass may have mixed effects in relation to air quality as the biomass combustion process can result in the emission of air pollutants which could have subsequent adverse effects on human health.

4.28 Additionally, policies and proposals within the negative emission technologies sector may have adverse secondary effects on a number of SEA topics such as population and human health, soil, water, air and biodiversity, as a consequence of construction and infrastructure improvement works. However, it is recognised that these effects are likely to be temporary in nature.

Buildings

4.29 Several secondary effects are identified as likely to arise from policies and proposals within the building sector. Firstly, policies and proposals which seek to reduce reliance on fossil-fuelled energy and heat could result in air quality improvements. However, the

implementation of such technologies may have adverse effects on a number of SEA topics. Changes to the fabric of buildings to incorporate energy efficiency measures or low-carbon technologies might have adverse effects on biodiversity (e.g. roosting bats) or cultural heritage or landscape as a result of changes to the appearance of buildings.

4.30 As a consequence of construction and building improvement works, there may be adverse effects on topics such as soil, biodiversity, water and air quality. However, it is recognised that these effects are likely to be temporary in nature.

Agriculture

4.31 Improvements in land management techniques, as set out in policies and proposals within the agriculture sector may have secondary effects on several SEA topics. Promoting better land management and the more efficient use of fertilisers may reduce nutrient leaching and pollution of nearby watercourses, having positive effects on water quality. This may have subsequent benefits for biodiversity, including aquatic species.

4.32 Furthermore, limiting fertiliser use and promoting a diverse range of habitats may improve soil quality. Improved soil quality may have subsequent benefits on material assets as a result of improved fertility and crop production. In addition, better land management practices and the planting of habitats such as woodland and hedgerows may improve landscape character, and have positive effects on the setting of cultural heritage assets.

Waste

4.33 Policies and proposals within the waste sector are expected to have adverse secondary effects in relation to several SEA topics such as population and human health, biodiversity, soil, water, landscape, cultural heritage and air quality, as a consequence of construction, operation and siting of waste

infrastructure. However, it is recognised that these effects will be dependent on the scale, nature and location of developments, and in the case of effects arising from the construction phase, may be temporary in nature.

Land Use, Land Use Change and Forestry

4.34 Alongside significant positive effects on climate change, the policies and proposals set out within the LULUCF sector are likely to result in positive secondary effects in relation to several other SEA topics. Policies supporting woodland expansion or creation, and peatland restoration may subsequently result in improvements to population and human health as a result of improved opportunities to access woodland, forestry and peatland for recreational purposes.

4.35 Additionally, secondary benefits arising from woodland and forestry creation and peatland restoration may result in positive effects on water due to intercepting and filtering pollutants and providing natural flood management measures. Likewise, benefits to soils may arise due to increased soil stability resulting from the planting of woodland and forestry and improved quality of high carbon soils from peatland restoration.

4.36 Further benefits may arise for biodiversity, as a result of the creation of new and improved habitats and greater connectivity. However, in some cases, policies and proposals may result in adverse effects on biodiversity as the creation of woodland or peatland restoration may impact non-woodland and non-peatland biodiversity, respectively.

Summary of Cumulative and In-combination Effects

4.37 The following paragraphs set out the potential cumulative and in-combination effects likely to arise from the Climate Change Plan.

Climatic Factors and Emissions Reduction

4.38 The policies and proposals set out in each of the eight sectors within the update to the Climate Change Plan are expected to make a significant contribution to Scotland's commitment to GHG reduction targets.

4.39 All of the policies and proposals set out in the update to the Climate Change Plan will contribute towards reducing GHG emissions and meeting Scotland's target for net zero, thereby having positive effects on climatic factors. The extent to which these policies and proposals will contribute towards emission reductions varies, with complementary roles of the policies and proposals resulting in overall positive cumulative effects. For example, measures aimed at promoting energy efficiency within the building and industry sectors will be complemented by those that provide financial mechanisms to facilitate their uptake.

4.40 All of the policies and proposals within the electricity sector focus on aiding the decarbonisation of electricity generation, and promote the increased uptake of renewable and low carbon technologies. These policies and proposals will be complemented by policies and proposals supporting technologies such as electric vehicles, electricity storage, CCUS, hydrogen power. This sector therefore could make a significant contribution towards meeting net zero targets, and ensuring a broad mix of technologies will help improve the security and flexibility of supply. This will be important in order to meet the future challenges to electricity supply and transmission.

4.41 Furthermore, reducing the overall demand for electricity and energy within the buildings and industry sector by improving the energy efficiency of both domestic and non-domestic buildings, and industry will further contribute towards reducing GHG emissions. The policies and proposals set out within these sectors may also encourage reductions in GHG emissions by promoting and supporting

the uptake of renewable and low-carbon energy and heat technologies. In addition, the promotion and support of negative emission technologies including CCUS, hydrogen and bioenergy may further contribute towards GHG emission reductions.

4.42 Land management will also play a fundamental role in reducing GHG emissions. Policies and proposals, such as those that relate to the creation of woodland and forestry and restoration of peatland, will help to reduce emissions and support adaptation. Expanding the area of woodland and forestry across Scotland will increase the rate of carbon sequestration, whilst peatland restoration will improve the quality of high carbon soils, providing greater potential for increasing the carbon sink. These measures will be complemented by policies and proposals relating to land management practices within the agricultural sector which aim to promote a greater diversity of habitats (e.g. providing woodland or wetland areas). Additionally, the policies and proposals supporting the creation of forestry and woodland, and peatland restoration may provide supplementary benefits in relation to climatic factors due to potential opportunities for climate change adaptation. This includes for example, natural flood management, and providing shading and cooling.

4.43 Furthermore, reductions and more targeted use of fertilisers and improved efficiency of resources may also contribute towards general reductions in GHG emissions. Other measures promoted within the agricultural sector policies and proposals include reducing the emission intensity of livestock, which will have direct effects on GHG emission reductions across the sector.

4.44 The policies and proposals relating to transport will also play a fundamental role in reducing GHG emissions. Policies generally support the decarbonisation of the sector, seeking greater uptake of ultra-low emission vehicles (ULEVs) and behavioural change towards travel. Policies and proposals promote

the use of public and active transport modes for journeys and encourage a reduction in the number and length of journeys made by private vehicle. This will have direct effects on reducing GHG emissions, and subsequent benefits for other SEA topics which are discussed below.

4.45 Likewise, policies and proposals within the waste sector are expected to have significant positive effects in relation to climate change as they generally seek to reduce pressure on landfill infrastructure and increase recycling of waste. Proposals supporting recycling and the circular economy, landfill gas capture reductions in food waste and the banning of single use items could lead to reductions in GHG emissions as a result of less processing of waste and reduced need to manufacture goods from new.

4.46 However, having appropriate infrastructure in place to enable the transition and uptake of technologies such as ULEVs, low-carbon and renewable energy and heat will be vital in achieving these benefits for climate change, and will provide benefits additional benefits in terms of material assets (discussed below).

Population and Human Health

4.47 Many of the policies and proposals set out within the update to the climate change plan are likely to have significant benefits for air quality in Scotland, and subsequently will have significant positive effect on population and human health. Air quality issues are often associated with the release of GHG emissions, which are frequently derived from the transport and energy sectors. Therefore, policies and proposals which seek to reduce emissions from these sources, including those related to CCUS, are therefore likely to provide benefits to air quality, and subsequently, population and human health.

4.48 In addition to policies and proposals relating to decarbonisation of transport, those which promote uptake of active travel such as

walking and cycling, may have additional benefits by increasing physical activity and helping to improve mental wellbeing. This may be complemented by policies and proposals within the LULUCF sector which may provide improved recreational opportunities by increasing accessibility for people to woodland and forestry, and areas of peatland.

4.49 Policies and proposals supporting improved energy efficiency in buildings and industry, and uptake of low carbon and renewable energy and heat may have additional benefits for population and human health by reducing fuel poverty, and ensuring access to warm homes and workplaces. This will reduce exposure to cold, damp, and mouldy properties. They will also increase the resilience of buildings to the future effects of climate change, and ensuring a reliable, secure and flexible supply of energy.

4.50 However, some negative effects arise as a result of construction activities relating to the development and improvement of infrastructure and buildings. These are likely to be short-term in nature. These are most likely to be related to nuisance such as dust, noise, vibration or visual impact, and are likely to be localised and temporary. In many instances, adverse impacts may be mitigated through a combination of planning mechanisms and on-site management measures.

Air

4.51 Many of the policies and proposals set out within the update to the Climate Change Plan are likely to have significant benefits for air quality in Scotland. As air pollution often originates from the same sources and activities that contribute to the release of GHG emissions, notably transport and electricity/energy generation, proposals which support the move towards low-carbon and renewable energy, and seek to decarbonise the transport sector are expected to have associated benefits to air quality. Therefore, reducing emissions from these sources is

therefore likely to improve air quality at both local and national levels.

4.52 One of the primary causes of poor air quality is due to pollution derived from transport. Policies and proposals which aim to aid the decarbonisation of the transport sector are therefore likely to have significant positive effects on improving air quality. Measures to improve air quality are further complemented by policies and proposals which encourage the use of active and public modes of transport.

4.53 Additionally, the decarbonisation of the energy and electricity sector through promotion of low-carbon and renewable energy and heat, is likely to have further positive effects on air quality. This will be complemented by policies within the buildings and industry sector which also promote energy efficiency measures, thereby requiring less energy production, and the uptake of low-carbon and renewable technologies.

4.54 Technologies such as CCUS, as promoted within the negative emission technologies sector, could help to contribute to significant reductions in air pollution; particularly if utilised on a commercial scale. While this could have positive effects for air quality, any benefits will be influenced by the specific CCUS utilised and the industries for which this technology is used. For example, increased uptake of biomass may result in combustion related air pollution.

4.55 Policies and proposals relating to the agricultural and LULUCF sectors are unlikely to contribute significantly towards improvements in air quality, although actions in relation to agriculture may reduce pollutants such as ammonia.

Soil

4.56 Several sectors within the update to the Climate Change Plan are likely to have significant benefits for soil quality in Scotland. Both the LULUCF and agricultural sectors are identified as having policies and proposals which could have potential significant effects

on soil quality. Policies and proposals relating to the creation of woodland and forestry may improve soil stability and drainage, and those promoting peatland restoration are likely to improve the quality of high carbon soils. These positive effects on soil are likely to be complemented by policies and proposals promoting better land use management across the agricultural sector. For example, reducing the use of nitrogen and chemical fertilisers may also improve soil quality, increasing the general fertility of the soil, increasing crop production, and minimising the leaching of minerals.

4.57 Additionally, both positive and negative effects on soil are anticipated as a result of policies and proposals set out in the waste sector. Policies and proposals which support the reduced need for landfilling of waste may have positive effects on soil due to less land take for landfilling. However, policies and proposals which promote and encourage recycling may result in increased land take to accommodate recycling and waste management facilities, having adverse effects on soil.

4.58 However, the widespread uptake of low-carbon and renewable energy and heat technologies, as promoted across the electricity, buildings negative emission technologies, and industry sectors, may have adverse effects on soil quality due to the siting of developments, resulting in soil sealing and soil compaction. This may be particularly relevant when considered cumulatively, especially due to the development of large-scale commercial scale renewable energy schemes such as wind farms, which are often sited in landscapes with important soil resources.

Water

4.59 Both the LULUCF and agricultural sectors are identified as having policies and proposals which are likely to result in significant benefits for water quality. Policies and proposals relating to the creation of

woodland and forestry may improve the quality of nearby watercourses and groundwater as it could intercept run-off and filter pollutants. Additionally, policies relating to peatland restoration are also expected to improve water quality by storing and cleaning water, as well as acting as important natural flood plains, soaking up excess water and regulating run-off. Woodland and forestry may also provide natural flood management measures.

4.60 These positive effects are likely to be complemented by policies and proposals within the agricultural sector which relate to better land management practices. For example, reducing the use of nitrogen and chemical fertilisers may reduce nutrient leaching, run-off and contamination of nearby watercourses. This may have subsequent benefits for biodiversity, including aquatic species.

4.61 However, some negative arise as a result of construction activities relating to the development and improvement of infrastructure. This is likely to be localised and short-term in nature. In many instances, adverse impacts may be mitigated through a combination of planning mechanisms and on-site management measures.

Biodiversity, Flora and Fauna

4.62 Both the LULUCF and agricultural sectors are identified as having policies and proposals which are likely to result in significant benefits for biodiversity, flora and fauna. Policies and proposals relating to the creation of woodland and forestry may provide benefits for biodiversity by creating new habitats and improving connectivity of the ecological network. This may enable species movement and provide greater resilience to the future effects of climate change. Policies relating to peatland restoration will be also expected to improve peatland biodiversity. However, it is noted that the creation of woodland and peatland may result in adverse effects on non-woodland and non-peatland biodiversity.

4.63 These positive effects arising from woodland/forestry creation and peatland restoration are likely to be complemented by policies and proposals within the agricultural sector which relate to better land management practices. For example, encouraging the planting of woodlands and hedgerows will provide benefits for biodiversity, and reducing the use of nitrogen and chemical fertilisers may improve the quality of nearby watercourses, having subsequent benefits for aquatic biodiversity.

4.64 Policies and proposals relating to the decarbonisation of the electricity sector, including those promoting large-scale renewable energy development may disturb both terrestrial and marine biodiversity, with bird strike a notable issue for onshore wind turbines. Likewise, policies and proposals supporting energy efficiency in homes may adversely affect biodiversity such as roosting bats, if roof cavities are disturbed for the installation of insulation.

4.65 Additionally, some negative effects arise because of construction activities relating to the development and improvement of infrastructure. This is likely to be localised and short-term in nature. In many instances, adverse impacts during both construction and operation may be mitigated through a combination of planning mechanisms such as Environmental Impact Assessment (EIA), appropriate siting and design, local consultation and engagement and on-site management measures.

Cultural Heritage & Historic Environment

4.66 Both the LULUCF and agricultural sectors are identified as having policies and proposals which are likely to result in significant benefits for cultural heritage and the historic environment. Policies and proposals relating to the creation of woodland and forestry may improve the setting of heritage assets, depending on the species grown and the design of planting. Furthermore, policies promoting peatland restoration have the

potential to have benefits on cultural heritage, particularly as peatlands are considered some of Scotland's most iconic landscapes and are culturally significant.

4.67 Policies and proposals seeking to improve the energy efficiency of buildings and encouraging the uptake of low carbon and renewable energy technologies may have adverse effects on cultural heritage and the historic environment. In particular, the retrofitting of buildings to include new technologies (e.g. solar panels or heat pumps) and siting of new development may alter the setting of heritage assets, or change the appearance or fabric of a historic asset. Negative effects are likely as a result of cumulative developments. However, due to the nature of industrial areas, policies and proposals relating to the retrofitting of industrial buildings to incorporate energy efficiency measures and low carbon or renewable technologies are unlikely to significantly affect the setting of heritage assets.

4.68 Negative effects on the historic environment may be further heightened by large scale developments resulting from transport policies and proposals. For example, the development of large scale consolidation centres may result in visual impacts which could affect landscape and cultural heritage, depending on site and setting.

4.69 Additionally, some negative effects could arise because of construction activities relating to the development and improvement of infrastructure. This is likely to be localised and short-term in nature. In many instances, adverse impacts identified through the implementation and construction of infrastructure may be mitigated through a combination of planning mechanisms, including Environmental Impact Assessment (EIA) where applicable, appropriate siting and design, local consultation and engagement and on-site management measures.

Landscape and geodiversity

4.70 Both the LULUCF and agricultural sectors are identified as having policies and proposals which are likely to result in significant benefits for landscape. Policies and proposals relating to the creation of woodland and forestry could improve the landscape character, depending on the scale and nature of change. However, if inappropriately designed woodland or forestry may have adverse effects on landscape character. Potential negative impacts on the landscape can be mitigated if woodland creation schemes are appropriately designed and delivered to meet the requirements of the UK Forestry Standard, and locational requirements set out in local forestry and woodland strategies. Furthermore, policies promoting peatland restoration have the potential to have benefits on landscape character, particularly as peatlands are considered some of Scotland's most iconic landscapes, and their restoration will restore a sense of 'wildness'.

4.71 Policies and proposals seeking to improve the energy efficiency of buildings and encouraging the uptake of low carbon and renewable energy technologies may have adverse effects on landscape character. In particular, the retrofitting of buildings to include new technologies (e.g. solar panels) and siting of new development may alter the character of the landscape. However, due to the nature of industrial areas, policies and proposals relating to the retrofitting of industrial buildings to incorporate energy efficiency measures and low carbon or renewable technologies are unlikely to significantly affect landscape character in these locations.

4.72 Negative effects on the landscape may be further heightened by large scale developments resulting from transport policies and proposals. For example, the development of large-scale consolidation centres may result in visual impacts which could affect landscape character, depending on site and setting.

4.73 Additionally, some negative effects arise because of construction activities relating to the development and improvement of infrastructure. This is likely to be localised and short-term in nature. In many instances, adverse impacts identified through the implementation and construction of infrastructure may be mitigated through a combination of planning mechanisms, including Environmental Impact Assessment (EIA) as applicable, appropriate siting and design, local consultation and engagement and on-site management measures.

Material Assets (Waste, Energy, Transport and Land Use)

4.74 Promoting and encouraging the uptake of low-carbon and renewable energy technologies is a theme that is present within numerous sectors of the Climate Change Plan, notably those relating to electricity, buildings, negative emission technologies and industry. Policies and proposals in these sectors complement each other, supporting the decarbonisation of electricity generation. They promote new technologies ranging from small scale (e.g. solar PV on buildings) to large scale such as commercial-scale renewable energy, CCUS, hydrogen and electricity storage. The implementation of these technologies, and reduced reliance on fossil-fuel derived energy will help reduce pressure on the existing distribution network, and improve the reliability, flexibility and security of electricity supply, having significant positive effects on material assets.

4.75 However, if infrastructure is not adequate to accommodate a larger number of and greater variety of renewable and low carbon technologies, there may be added pressure on the existing network until infrastructure improvements are made. Similarly, transport policies promoting public transport and alternatively fuelled vehicles may require additional infrastructure. If sufficient infrastructure is in place, such as charging point, there may be positive effects

on material assets. However, if existing infrastructure is not adequate to meet the needs of development set out in policies and proposals, there may be increased pressure on infrastructure, having adverse effects for material assets.

4.76 Positive effects on material assets are expected to arise from policies and proposals within the waste sector, as they seek to reduce pressure on landfill infrastructure by promoting the circular economy, recycling and behavioural change. However, policies and proposals relating to LULUCF are expected to have mixed effects on material assets as although they may promote and encourage better land management and may improve degraded land through planting of woodland or forestry or peatland, there may be direct conflicts of land use. For example, loss of agricultural land for woodland, forestry or peatland restoration. The policies relating to agriculture may complement those of LULUCF as they generally seek to improve soil quality and fertility which subsequently may result in increased crop production, again having positive effects on material assets. However, as with LULUCF, agricultural policies and proposals may have cumulative adverse effects on material assets arising from conflicts of land use.

Chapter 5

Mitigation and Enhancement

5.1 The CCPu sets out a series of climate change mitigation measures and the ambitions, policies and proposals aim to meet Scotland's climate change statutory targets. They are also likely to have beneficial impacts for adapting to and improving resilience to the predicted effects of climate change. The following paragraphs set out key opportunities for mitigation of adverse environmental effects and enhancement of positive environmental effects for each sector.

5.2 For Agriculture there are a range of benefits across the SEA topics, including air, water, soil and biodiversity, flora and fauna. Opportunities to further enhance these benefits, could be achieved through supporting landscape scale co-ordination of these actions.

5.3 For Electricity key benefits relate to climatic factors, population and human health and material assets. Adverse effects could arise from the development of new, or the upgrading of existing, infrastructure particularly identified in relation to cultural heritage and landscape and potential mixed effects on biodiversity, flora and fauna, soil and air. Further understanding is needed of potential adverse effects through monitoring, and where additional mitigation may be required through strengthening advice in existing guidance. The potential for adverse impacts from the construction and operation of new energy developments will be further managed through the use of appropriate design and construction management measures at the project level. Existing regulatory regimes should ensure that any development projects will be subject to appropriate controls, minimising the potential impacts of activities and infrastructure.

5.4 The policies and proposals for LULUCF bring about key benefits in terms of climatic factors, however, mixed effects for landscape, biodiversity, flora and fauna may arise as a result of large-scale landscape change with potential longer-term effects. There is also potential for short term impacts from woodland planting for soil and water. Priorities for woodland planting need to be balanced against the biodiversity value of other habitat types to reflect the biodiversity emergency. There may be a role for enhanced guidance on decision making for woodland creation to help mitigate both long- and short-term environmental effects in relation to this, and on guiding species type in relation to maximising carbon sequestration, and climate change risk from pests and disease.

5.5 The decarbonisation of Scottish industry has positive effects on climatic factors, air quality and material assets. There is potential for localised adverse impacts on some topic areas from project level construction and infrastructure improvement works, including population and human health, soil, water, air, biodiversity, flora and fauna, cultural heritage and landscape and geodiversity. Potential impacts are likely to be mitigated by existing mechanisms such as the planning system, SEPA regulation, EIA, HRA, guidance and on-site management measures.

5.6 Negative Emissions Technologies bring benefits primarily in relation to climatic factors and material assets, but also for population and human health as a result of associated benefits for air quality. However, policies and proposals supporting bioenergy such as biomass may have mixed effects in relation to air quality. Ensuring appropriate levels of regulation of biomass installations will mitigate potential environmental effects.

5.7 There are a wide range of benefits across the built environment, with synergy between positive effects for climatic factors and population and human health for domestic buildings through increased energy efficiency and lower fuel costs. Negative impacts will

arise from retrofitting older buildings to improve energy efficiency, including undertaking works in roof spaces and attics, particularly impacting and biodiversity, flora and fauna. External works will have impacts on cultural heritage and the historic environment, with potential wider landscape impacts. An area based co-ordinated approach such as that promoted by Scotland's Energy Efficiency Programme, will also help to mitigate this potential impact through the consideration of cumulative impacts. This will be particularly relevant in areas that are designated for their cultural heritage.

5.8 Decarbonising transport has largely positive effects in relation to climatic factors, population and human health, and air, with key synergies between reductions in emissions, improved air quality and increased active travel. Opportunities to enhance the positive effects are associated with co-ordination of local actions to achieve a strongly integrated transport network.

5.9 Reducing waste, and changing how we consume and use materials, has largely positive effects in relation to climatic factors and material assets as a result of overall reductions in waste generated. Potentially localised negative effects may arise from the development of new recycling and waste management facilities. Mitigation of these environmental effects maybe achieved through focusing development on existing sites or brownfield land, and the role of existing mechanisms such as the planning system, SEPA regulation, EIA, HRA, and on-site management measures.

Chapter 6

Monitoring

6.1 Monitoring for any unforeseen adverse environmental effects is a statutory requirement within the 2005 Act. Monitoring seeks to ensure that plans avoid generating unforeseen adverse environmental effects. Due to the wide-ranging nature of the sectors, and the potential for indirect environmental effects it is necessary for the monitoring framework for the SEA to reflect all environmental topics.

6.2 A monitoring framework has been developed for the Climate Change Plan update which sets out indicators for each policy outcome and progress towards key milestones and targets. It is suggested that the monitoring for the Environmental Report combines the monitoring framework for the Climate Change Plan with other key environmental indicators in order to identify potential correlation between progress towards outcomes and other environmental change, and to trigger further investigation of potential causation.

6.3 The following existing monitoring programmes will be relevant to monitoring potential adverse environmental effects of the Climate Change Plan Update:

- Scotland's GHG emissions- data collected by the Committee on Climate Change²⁵⁴.
- Travel and transport – data collected for the National Transport Strategy and key statistics collected by Transport Scotland²⁵⁵.

²⁵⁴ The Committee on Climate Change carbon budgets and targets. Available at: <https://www.theccc.org.uk/topic/carbon-budgets/>

²⁵⁵ <https://www.transport.gov.scot/our-approach/statistics/>

- Biodiversity, flora and fauna – condition monitoring of designated biodiversity sites²⁵⁶.
- Air quality²⁵⁷ - national monitoring of air quality.
- Water quality²⁵⁸ - SEPA undertake water quality condition monitoring.
- Soil – a soil monitoring action plan is underway²⁵⁹ and land use change can also provide indications of soil quality.
- Cultural heritage²⁶⁰ - Historic Environment Scotland monitors changes to designated sites but impacts on setting and cumulative change requires an alternative monitoring mechanism to be established.
- Landscape and geodiversity – NatureScot run the national Scotland’s Landscape Monitoring Programme²⁶¹. Additionally, data on woodland and forestry, changes in agricultural land management practices and renewable energy all provide data on landscape change.
- Total waste production – SEPA collect key waste statistics²⁶². Data on the proportion of energy from waste (combustion and biogas) would also be relevant.
- Area of woodland and forestry/new woodland and forestry²⁶³ - Scottish Forestry collect woodland and forestry data.
- Scotland’s installed renewable GW capacity – collected through proposed CCPu monitoring framework.

²⁵⁶ NatureScot Site condition monitoring. Available at: <https://www.nature.scot/professional-advice/protected-areas-and-species/protected-areas/site-condition-monitoring/view-monitoring-results>

²⁵⁷ Air quality in Scotland monitoring data. Available at: <http://www.scottishairquality.scot/data/>

²⁵⁸ SEPA water quality condition monitoring: Available at: <https://www.sepa.org.uk/data-visualisation/water-environment-hub/>

²⁵⁹ Scotland’s environment Soil Monitoring Action Plan. Available at: <https://soils.environment.gov.scot/soils-in-scotland/soil-monitoring/>

²⁶⁰ Historic Environment Scotland monitors the condition of Scheduled Monuments. The Buildings at Risk register provides information on buildings at risk.

²⁶¹ NatureScot Scotland’s Landscape Monitoring Programme <https://www.nature.scot/professional-advice/landscape/scotlands-landscape-monitoring-programme>

²⁶² SEPA waste data for Scotland. Available at: <https://www.sepa.org.uk/environment/waste/waste-data/waste-data-reporting/waste-data-for-scotland/>

²⁶³ Scottish Forestry Open Data hub. Available at: <https://open-data-scottishforestry.hub.arcgis.com/>

Chapter 7

Next Steps

Consultation on the Draft Environmental Report and the update to the CCP

7.1 Comments on this Environmental Report can be submitted via the Scottish Government Citizen Space website address (<https://consult.gov.scot/>). The consultation on the Climate Change Plan Update, to which this Environmental Report relates, will be carried out by the Scottish Parliament and information on how to submit comments on the Plan can therefore be found on the Scottish Parliament's consultation website ([Scottish Parliament - Citizen Space](#)).

7.2 Regrettably, due to the ongoing COVID-19 it is not possible to make hard copies available.

7.3 Responses to this SEA consultation can also be submitted by email, with the Respondent Information Form (Appendix E) to: climate_change@gov.scot or by post to:

*Climate Change Plan update SEA
Consultation
Climate Change Plan Team, 3F South
Scottish Government
Victoria Quay
Edinburgh
EH6 6QQ*

7.4 Respondents may find the following questions helpful to provide a focus for their responses to this Environmental Report. Please note that responses do not need to be limited to these questions, and more general comments on this Environmental Report and the proposals set out in the Consultation Paper are also invited:

1. (a) Do you have any comments on the environmental baseline information referred to in the Environmental Report?

(b) Are you aware of further information that could be used to inform the assessment findings?
2. (a) Do you agree with the assessment findings?

(b) Are there other environmental effects arising from the Draft Climate Change Plan Update?
3. Do you agree with the justification for the approach to alternatives?
4. What in your view are the most significant environmental effects which should be taken into account as the Draft Climate Change Plan Update is finalised?
5. How can the Draft Climate Change Plan Update be enhanced to maximise positive environmental effects?
6. What are your views on the proposed approach to mitigation and monitoring proposed in chapters 5 and 6?

Post-Adoption Statement

7.5 Following the consultation period, the consultation responses will be analysed and the Scottish Government will finalise and publish the Climate Change Plan Update. After the Climate Change Plan Update is adopted a Post Adoption Statement will be produced. This Statement will set out how the SEA and the views received in the consultation processes have been taken into account.



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