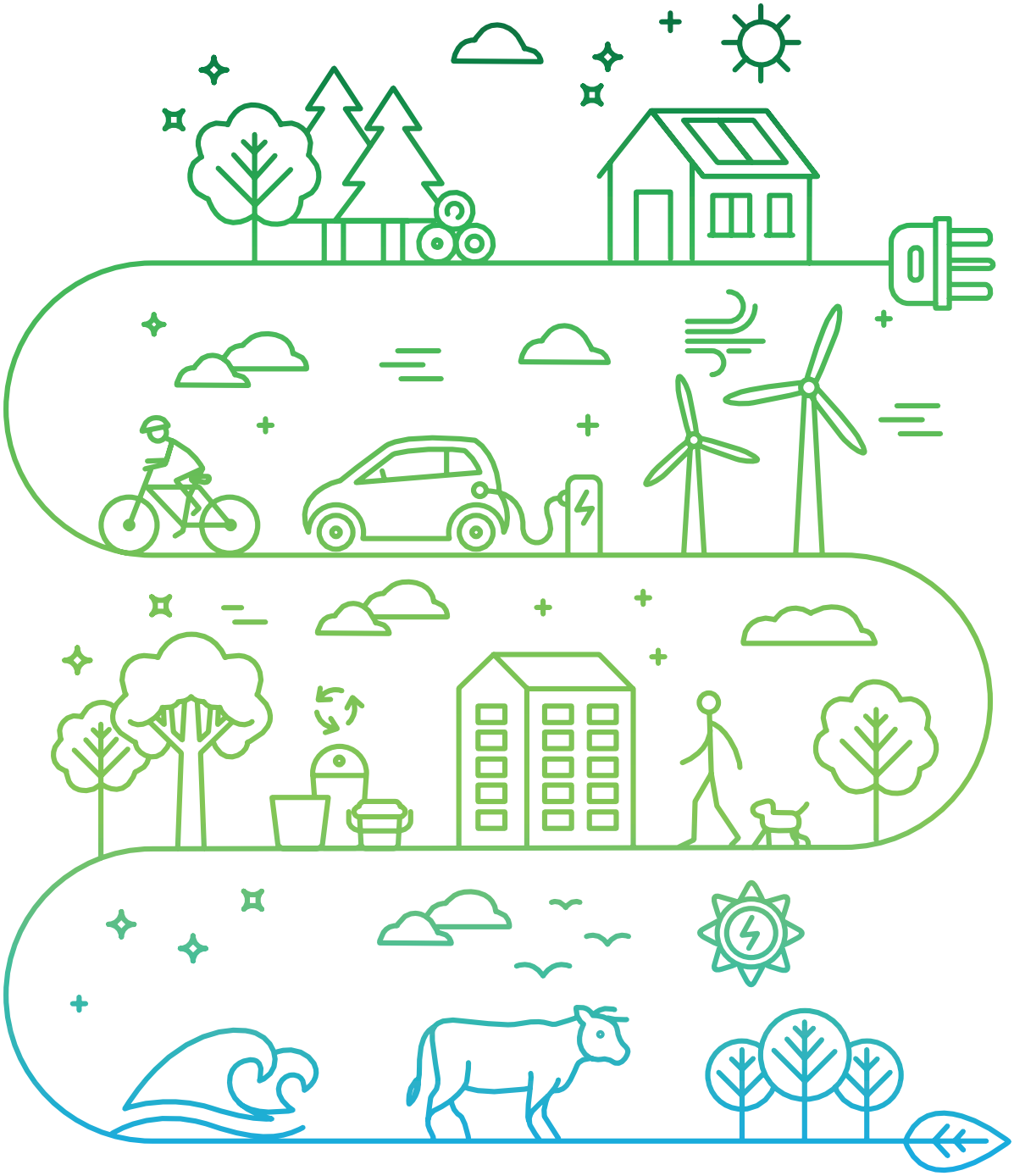
PROPOSALS FOR A NEW CLIMATE CHANGE BILL

Strategic Environmental Assessment
Environmental Report

July 2017



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Introduction

Scotland has made sustained progress towards the emissions reduction targets set by the Climate Change (Scotland) Act 2009. Emissions reduction targets for 2014 and 2015 have been met, and Scotland is also on track to meet the 2020 interim target. The Scottish Government is committed to keeping Scotland at the forefront of global climate action by introducing a new Climate Change Bill.

What are the proposals for a new Climate Change Bill and how have these been developed?

Following the receipt of advice from the Committee on Climate Change in March 2017, the proposed Climate Change Bill will raise the ambition of Scotland's targets to reduce greenhouse gas emissions. The Scottish Government's 'Consultation on proposals for a new Climate Change Bill' sets out proposals to increase the level of ambition of the 2050 target to a reduction in greenhouse gas emissions of at least 90% from the baseline. This matches the more ambitious of two options presented by the Committee on Climate Change.

The Consultation Paper also includes other, more technical proposals, including a new mechanism that will allow for the future setting of a net-zero greenhouse gas emissions target when the evidence for this becomes available, as well as proposed changes to the way emissions reduction targets are currently set.

How will the draft proposals for a new Climate Change Bill sit within wider Policy?

The Climate Change (Scotland) Act 2009 requires a Land Use Strategy to be produced every five years. In addition, a Report on Proposals and Policies on how annual targets will be met is delivered as soon as reasonably practicable following the setting of annual targets.

The development of the proposed Climate Change Bill will not remove these requirements. However, there is the potential for future iterations of the related plans and strategies set out in the following figure to be affected by changes in the greenhouse gas emissions targets proposed:


Legislation
Commitments
Climate Change (Scotland) Act 2009
The Climate Change Bill
Paris Agreement 2016
Kyoto Protocol 1997
Related Policy Programmes and Strategies
Draft Climate Change Plan and Previous Reports on Policies and Proposals
Climate Change Adaptation Programme
Scottish Planning Policy
Draft Energy Strategy
National Marine Plan
National Planning Framework
Land Use Strategy
2020 Challenge for Scotland's Biodiversity
National Transport Strategy
Scottish Soil Framework
Scottish Forestry Strategy
Making Thing's Last – A Circular Economy Strategy for Scotland
Scottish Rural Development Programme 2014-2020
Cleaner Air Scotland
Legislation
Commitments
Related policy

What is Strategic Environmental Assessment?

In Scotland, public bodies are required to assess, consult on, and monitor the likely environmental impacts of their plans, programmes, and strategies. This process is known as Strategic Environmental Assessment. Further guidance on Strategic Environmental Assessment, including its requirements and key stages, is available on the Scottish Government website.

The Strategic Environmental Assessment has been undertaken in parallel with the development of the Consultation on proposals for a new Climate Change Bill.

How was the assessment undertaken?

Scoping

A Scoping Report was prepared and issued to the statutory Consultation Authorities (Historic Environment Scotland, Scottish Natural Heritage, and the Scottish Environment Protection Agency) in April 2017. The Scoping Report set out initial information on the likelihood of significant environmental effects arising from the Bill proposals, and noted that a more ambitious emissions target was likely to have significant positive effects, particularly for climatic factors.

The Scoping Report recognised that a considerable amount of work had already been undertaken in exploring the predicted impacts of climate change, and of the likely environmental effects of the related policies, programmes, and strategies. The assessment of the 2008 Scottish Climate Change Bill, and the joint assessment undertaken for the draft Climate Change Plan: the draft Third Report on Policies and Proposals 2017 – 2032 and the draft Scottish Energy Strategy: The Future of Energy in Scotland, were identified as being of particular relevance. The Scoping Report also identified the potential for indirect or secondary effects relating to a range of other environmental topic areas, and indicated that this would be explored further in the assessment.

A staged approach to the assessment

As proposed in the Scoping Report, the assessment of the proposals for a new Climate Change Bill was undertaken in two stages. The first stage involved a review of previous assessments relevant to the proposals set out in the Consultation Paper, drawing together the key findings to provide an overview of known environmental effects. This process provided a robust evidence base from which to consider the potential environmental issues likely to arise from current and future action to reduce greenhouse gas emissions. Undertaking this review process also helped to ensure consistency in how the findings are reported.

The second stage of the assessment process drew heavily on the findings of the first stage to provide a broad, overarching view of the potential for environmental effects that could be associated with the proposals for a new Climate Change Bill.

Collection of relevant environmental information

An overview of the relevant environmental information collected to inform the assessment, including the identification of relevant climatic pressures for each environmental topic area, is set out below.

Biodiversity, Flora and Fauna	
Summary of Key Issues	Our natural environment is varied and productive, supporting an abundance of species that are in some cases globally rare or endemic. Upland and blanket bog ecosystems comprise much of our land cover, alongside areas of woodland, peatland, farmland, and urban greenspace. Scotland's aquatic ecosystems include an extensive coastal zone and both freshwater and sea lochs, all of which are home to a number of nationally and internationally recognised species. Biodiversity is a good indicator of the health of the surrounding environment and is particularly reflective of prevailing soil and water quality.
Climatic Pressures	Habitat loss, declining populations, reduced food availability, and changes to organism life cycle events such as migration and breeding have all been identified as potential impacts. Biodiversity could also suffer from the spread of diseases, pests, and invasive species in response to more favourable climatic conditions. Additional adverse impacts could arise indirectly from mitigation measures, such as large-scale biomass planting and harvesting operations.

Population and Human Health	
Summary of Key Issues	The outdoors play a vital role in maintaining and enhancing both physical and mental health. Human health is closely tied to ambient air quality; however, areas of poor air quality persist in several urban locations throughout Scotland, often as a result of traffic-related emissions.
Climatic Pressures	Vulnerability to climate change differs across different segments of the population due to factors such as location, age, and level of deprivation. For example, areas of dense urban development have a limited ability to absorb the effects of climate change and are at a higher risk of surface flooding and summer heat stress. Similarly, coastal communities face rising sea levels, changes in wave heights, and an increase in the frequency and magnitude of storm surges.

Soils	
Summary of Key Issues	Soils are an invaluable natural asset on which much of life depends. Their key functions include supporting food production, providing habitats, acting as a base for the built environment, regulating hydrology, and carbon storage. In Scotland, there is a lack of trend data to inform assessments of change and projections of future soil health. Scotland's soils contain massive carbon stocks (over 50% of the UK's total soil carbon).
Climatic Pressures	Soil carbon loss spurred by climate change is a significant concern - a loss of just 0.5% of total soil carbon could double Scotland's greenhouse gas emissions in a year. Further, changes in soil water content and temperature could make episodes of drought or flooding more common, threaten soil viability, and increase greenhouse gas emissions, particularly among carbon-rich upland peat soils. Existing problems such as soil erosion and changes in soil biodiversity could also be exacerbated by climate change.

Water	
Summary of Key Issues	Scotland possesses considerable quantities of both fresh and saltwater, including 8% of Europe's coastline and 70% of the UK's total surface waters. A clean, reliable water supply is essential for drinking, agriculture, and a variety of industries such as whisky production and tourism. Scotland's waters are home to a number of nationally and internationally recognised species. Monitoring suggests that Scottish water quality has improved in recent decades, particularly in terms of pollution levels.
Climatic Pressures	Marine environments face rising sea temperatures, changes in acidity and salinity, and invasive non-native species. Changes in annual rainfall patterns could affect river flows and the breakdown of pollutants. Sea levels are projected to rise, putting coastal land at risk of flooding and salinisation. More indirect impacts could stem from changes to the growing season, which could increase the amount of agriculturally-derived contaminants entering Scotland's rivers, lochs, and seas.

Air	
Summary of Key Issues	Scotland's air quality is reported as being in moderate condition. However, 38 Air Quality Management Areas have been designated in urban locations throughout Scotland due to elevated levels of certain pollutants. The link between human health and air quality is well established, and chronic exposure to air pollution is implicated in reduced life expectancy, early death, and the development of respiratory illnesses and other health problems, particularly among the young, elderly, and those with pre-existing conditions.
Climatic Pressures	Mitigation against climate change, rather than climate change itself, is likely to have a greater impact on future air quality. For example, emissions from well-operated and well-maintained biomass boilers are generally lower than the coal equivalent, but the burning of biomass feedstock still emits air pollutants such as particulates. Seasonal variations in air quality could change in response to climate change; for example, weather conditions that give rise to summertime smog are predicted to become more common.

Climatic Factors	
Summary of Key Issues	The UK Climate Change Projections describe the climatic conditions that are likely to be experienced by Scotland in the future. Under a medium emissions scenario, higher temperatures in both summer and winter, drier summers, wetter winters, more summer heat-waves, extreme temperatures and drought, sea level rise, increased frequency and intensity of extreme precipitation events, and reduced occurrence of frost and snowfall are considered likely. Overall, Scotland's greenhouse gas emissions have been in decline since 1994. Most of these emissions are in the form of carbon dioxide and the majority are released by the energy supply, transport, agriculture and related land uses, business and industrial processes, and residential sectors.
Climatic Pressures	Climate change stands to affect every facet of the environment, including impacts on the productivity of our forests and the quality and availability of water. Impacts can also arise from mitigation and adaptation measures; for example, certain types of renewable energy installations can result in localised visual effects and changes in landscape and land use.

Cultural Heritage	
Summary of Key Issues	Our cultural heritage forms a fundamental aspect of our cultural identity and sense of place. Scotland is renowned for its cultural heritage and it remains a primary driver of tourism. The true extent of Scotland's uncovered archaeological material is not known.
Climatic Pressures	Threats to structural integrity and the health of buildings may stem from increased rainfall, more frequent or severe storms, or flooding. Some impacts may arise from mitigation measures such as the disturbance of archaeology due to the planting and harvesting of energy crops and retrofitting historic buildings with energy efficiency technologies that alter their character and appearance. However, the appropriate adaptive reuse of buildings can assist with climate change mitigation and adaptation.

Landscape, Seascape, and Visual Amenity	
Summary of Key Issues	Scotland is internationally recognised for its diverse array of iconic landscapes and seascapes. These landscapes encourage tourism, support recreation, and possess a number of intangible qualities such as beauty, tranquillity, and wildness.
Climatic Pressures	Climate change could alter landscapes through a loss of land to the sea, an increased risk of coastal and river flooding, erosion, and changing patterns of natural and semi-natural habitats, such as the northward movement of species as the climate changes. Indirect impacts stemming from mitigation measures may potentially be more significant than direct impacts arising from climate change itself, such as the construction of engineered flood defences. Such changes are likely to be most apparent and immediate in lowland areas, where population is more concentrated.

Material Assets	
Summary of Key Issues	Scotland's material assets are substantial and include vast reserves of renewable energy, productive forests, and fertile agricultural land. Several policies seek to ensure we utilise and manage our material assets more sustainably, such as Scotland's Zero Waste Plan.
Climatic Pressures	The threats to material assets posed by climate change are potentially extensive, including damage to transport infrastructure due to flooding and landslides, and changes in forest ecology. However, in some instances, climate change could potentially benefit material assets, such as through the increased productivity of forestry operations. Mitigation and adaptation measures can result in secondary impacts that relate primarily to competing and changing land uses, such as the spread of biomass energy.

What conclusions and recommendations were drawn from the Strategic Environmental Assessment?

- The assessment found that the introduction of a new Climate Change Bill to raise the ambition of Scotland's targets for reducing greenhouse gas emissions will enhance Scotland's efforts at tackling climate change, with likely benefits to climatic factors. In addition, positive secondary effects are expected for air quality, population and human health, and material assets, due in large part to the further decarbonisation of energy generation and transport. These benefits could be increased by making sure climate change action is brought in line with overarching Scottish Government objectives.
- The assessment also identified the likelihood of indirect or secondary impacts, both positive and negative, as a consequence of actions undertaken to meet the new emissions reduction targets, rather than a result of the setting of any new targets.
- In view of Climate Change Committee advice that evidence is not yet available to set a target for net-zero emissions, the Strategic Environmental Assessment supports the proposal to allow for such a target to be set at a later date, once the evidence becomes available.
- The assessment concluded that achieving further reductions in greenhouse gas emissions will increase Scotland's resilience to future climatic change, as well as facilitate adaptation, particularly through changes in the area of land use management and in the storage of carbon within the terrestrial and marine environments.
- The necessary infrastructure must be in place if Scotland is to meet more ambitious targets. Such infrastructure will also be the primary source of any negative secondary effects that may arise and it is recommended that existing infrastructure is reused wherever possible and that existing, project-level mitigation measures are implemented and enforced.
- It was identified that, at present, there is some uncertainty surrounding the extent of action and environmental impacts that may arise as a result of more ambitious targets. As new plans and policies emerge, the potential for cumulative impacts must be kept in mind.
- As additional proposals in support of the revised targets emerge, the need for additional assessment work, including additional Strategic Environmental Assessments, will likely arise. This will help ensure that any future environmental impacts are adequately addressed and mitigated against where appropriate.

How have alternatives been considered?

It is a requirement when undertaking a Strategic Environmental Assessment that consideration is given to the potential for significant environmental effects arising from reasonable alternatives to the plan, programme, or strategy being assessed. Based on the advice of the Climate Change Committee, 'maintain[ing] the 2050 target at [an] 80% reduction in greenhouse gas emissions from baseline levels for now, creating review points at which the target ambition could be increased' was included in the assessment as a reasonable alternative.

If the existing 2050 target is retained and pursued, current and long-term actions to reduce emissions and contribute to climate change mitigation and adaptation efforts are likely to continue as at present. This assessment identified the potential for significant environmental benefits to arise for climatic factors in particular. Further, previous assessments such as that undertaken for the recently published draft Climate Change Plan noted the potential for indirect or secondary environmental effects to arise from activities to reduce greenhouse gas emissions and meet the existing 2050 target. As a consequence, the likelihood of environmental impacts resulting from this activity would not be expected to change.

However, continuing the present approach set out in this alternative may represent a missed opportunity to strengthen Scotland's climate change commitments. The proposal to set a more ambitious 2050 target would build upon Scotland's already significant efforts at addressing the causes of climate change, and could help to deliver wider, long-term environmental benefits.

What mitigation was proposed?

The proposals contained within the Consultation Paper concern new, more ambitious targets for reducing greenhouse gas emissions in Scotland. The specific actions that will need to be undertaken to meet any new targets, and the potential for related environmental effects, will fall under the domain of other programmes, policies, and strategies such as the draft Climate Change Plan and further sectoral-level programmes. As such, it is difficult for this Strategic Environmental Assessment to predict how any subsequent actions undertaken in support of the new targets, such as actions undertaken to further decarbonise the energy sector, will be translated into specific projects on the ground. By extension, any environmental impacts arising as a result of these projects are unclear. As a result, it is difficult to propose specific mitigation measures given the uncertainty surrounding the specific nature and magnitude of any environmental impacts that may arise.

There are, however, a range of existing project-level mitigation measures available which will likely become the most appropriate and practical way of ensuring any environmental impacts are properly addressed. These include relevant consenting procedures, associated Environmental Impact Assessments and Habitats Regulations Appraisals, regulations relating to the management of protected species, and

appropriate design and construction management measures (e.g. Environmental Management Plans).

What monitoring was proposed?

A number of local, national, and international environmental monitoring arrangements are already in place across Scotland. Some of these, such as the Key Scottish Environment Statistics Report, assess environmental health as a whole using a range of indicators relating to air quality, land use, biodiversity, and other topics. Other monitoring programmes are more specific and report on the state of particular environmental topic areas, such as the monitoring of Scotland's waters by the Scottish Environment Protection Agency as required by the EU's Water Framework Directive.

In terms of greenhouse gas emissions, Scotland is already obligated to monitor and report on its progress towards reducing emissions at both the national and sectoral levels. This takes the form of statutory reports issued by the Scottish Government to Parliament, as well as independent reports prepared by the Committee for Climate Change. Additionally, both the draft Climate Change Plan and the draft Scottish Energy Statement include accompanying monitoring frameworks.

These and other monitoring programmes would continue to be undertaken. As further policies and proposals aimed at reducing emissions are introduced, such as future iterations of the Climate Change Plan, it is possible that new, corresponding monitoring schemes will also come into effect.

How can I provide comments on this Environmental Report?

When can I respond?

Respondents are asked to submit responses to this Environmental Report directly to the Scottish Government by **22 September 2017.**

How can I respond?

- **Online:** You can respond online using the Scottish Government's consultation platform, Citizen Space, at: **https://consult.scotland.gov.uk/energy-and-climate-change-directorate/climate-change-bill**

  Citizen Space allows you to save and return to your responses while the consultation is still open. A copy of your final response will be emailed to you.

- **By Email or Post:** Responses can be submitted by email, with the Respondent Information Form, to **CCBill@gov.scot** or by mail to The Scottish Government, Climate Change Bill, Area 3-J (South) Victoria Quay, Edinburgh EH6 6QQ.

How will responses be considered?

Following the consultation, a Post-Adoption Statement will be prepared. The Statement will reflect on the views provided on the findings of the assessment and the proposals in the Consultation Paper and will explain how the issues raised have been taken into account in the proposals for a new Climate Change Bill.

This Post-Adoption Statement will be prepared and published alongside, or as soon as practicable, the enactment of the Climate Change Act.

Suggested questions for responses to this Environmental Report

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 confined to these questions, and more general comments on this Environmental Report and the proposals set out in the Consultation Paper are also invited.

1. What are your views on the evidence set out in the Environmental Report that has been used to inform the assessment process? (Please give details of any additional relevant sources.)
2. What are your views on the predicted environmental effects as set out in the Environmental Report?
3. Are there any other environmental effects that have not been considered?
4. Do you agree with the conclusions and recommendations set out in the Environmental Report?
5. Please provide any other comments you have on the Environmental Report.

1 Introduction

1.1 Background

1.1.1 Scotland has made sustained progress towards the emissions reduction targets set by the Climate Change (Scotland) Act 2009[1]. Official statistics published in June 2017 show that Scottish emissions, for the purposes of reporting against targets, were 41.0% below the baseline level in 2015[2]. The last two annual targets, for 2014 and 2015, have been met and progress is well on track to meet the interim 2020 target of a 42% reduction in greenhouse gas emissions. However, there is still work to be done to reduce these emissions further, and in the 2016-17 Programme for Government, the Scottish Government confirmed its intention to bring forward a new Climate Change Bill to establish a 'new and more testing 2020 target'[3].

1.1.2 In March 2017, the Committee on Climate Change provided advice to the Scottish Government on a new Scottish Climate Change Bill[4]. Advice was provided on a range of issues, including the potential level of ambition for new Scottish emissions reduction targets. This advice has informed the development of the 'Consultation on proposals for a new Climate Change Bill' ('the Consultation Paper'). Further information on the development of the Consultation Paper can be found in Section 3.

1.2 Strategic Environmental Assessment

1.2.1 The development of proposals for a new Climate Change Bill is considered to fall under Section 5(3) of the Environmental Assessment (Scotland) Act 2005 ('the 2005 Act'). As such, a Strategic Environmental Assessment (SEA) is required.

Strategic Environmental Assessment (SEA)

SEA is the assessment of the likely significant environmental effects that a public plan, programme, or strategy will have on the environment if implemented.

1.2.2 The SEA has been undertaken in accordance with the 2005 Act and in parallel with the development of the Consultation Paper. Further guidance on SEA, including its requirements and key stages, is available on the Scottish Government website[5].

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[1] Reduce greenhouse gas emissions by at least 80% by 2050 with an interim target of a 42% reduction by 2020

[2] Scottish Government (2017) Scottish Greenhouse Gas Emissions 2015 - An Official Statistics Publication for Scotland [online] Available at: http://www.gov.scot/Publications/2017/06/9986 (accessed 22/06/2017)

[3] Scottish Government (2016) A Plan for Scotland: The Scottish Government's Programme for Scotland 2016-17 [online] Available at: http://www.gov.scot/Publications/2016/09/2860 (accessed 22/06/2017)

[4] Committee on Climate Change (2017) Advice on the new Scottish Climate Change Bill [online] Available at: https://www.theccc.org.uk/publication/advice-on-the-new-scottish-climate-change-bill/ (accessed 22/06/2017)

[5] Scottish Government (2017) Strategic Environmental Assessment - Tools for Practitioners - Guidance [online] Available at: http://www.gov.scot/Topics/Environment/environmental-assessment/sea/guidance/SEAGuidance (accessed 22/06/2017)

1.3 Report structure

1.3.1 This Environmental Report sets out the findings of the SEA and is set out as follows:

- Section 1 – Provides an introduction to the proposals for a new Climate Change Bill, and an overview of the SEA process.
- Section 2 – Provides an overview of climate change in Scotland.
- Section 3 – Sets out information on the development of the proposals for a new Climate Change Bill. Also included is information on Scotland's current climate change ambitions and actions.
- Section 4 – Provides an overview of the wider policy context for the proposals for a new Climate Change Bill and explores the relationships with current plans, programmes, and strategies at the EU, UK, and Scottish levels.
- Section 5 – Sets out the proposed approach to undertaking the SEA.
- Section 6 – Presents an overview of Stage One of the assessment process
- Section 7 – Presents the findings of Stage Two of the assessment process, consideration of the reasonable alternative, and additional technical proposals on target mechanisms.
- Section 8 – Sets out information relating to the identification of mitigation measures and opportunities for enhancement.
- Section 9 – Sets out proposals for monitoring.
- Section 10 – Sets out the assessment conclusions and recommendations.
- Section 11 - Sets out the proposed programme of works and the next steps in the development of a new Climate Change Bill and the SEA process.
- Appendix A – Contains the environmental baseline information.
- Appendix B - Contains an abbreviations list for this Report.
- Appendix C – Contains a Respondent Information Form.

2 Scotland and climate change

2.1 Climate change in Scotland

2.1.1 Climate change is widely regarded as one of the most serious threats facing the world today. Over the last 50 years, it has become increasingly apparent that the world's climate is changing at an unprecedented rate. Evidence of an increase in average global temperatures, coinciding with an increase in greenhouse gas (GHG) emissions, has led to the conclusion that human activities are the main reason for this increase[6]. Everyday activities such as travel, energy generation, food production and waste disposal all have the potential to generate GHG emissions.

2.1.2 In 2015, actual Scottish emissions of the basket of Kyoto Protocol GHGs were estimated to be 48.1 million tonnes of carbon dioxide equivalent ($MtCO_2e$)[7]. The majority of these emissions were generated by the transport, energy supply, agriculture, and business and industry sectors. These sectors are therefore a key focus in addressing climate change.

2.1.3 The greatest direct climate change-related threats for the UK are predicted to be large increases in flood risk; exposure to high temperatures and heat waves; shortages in public water supply and availability of water for agriculture, energy production, and industry; and, substantial risks to UK wildlife and natural ecosystems, amongst others[8]. Climate change is also considered to be one of the most serious environmental threats to sustainable development, with adverse impacts expected on human health, food security, economic activity, natural resources, and physical infrastructure[9,10]. These effects, and impacts on other environmental topic areas, are discussed further below.

2.1.4 Records indicate a recent and rapid warming trend in temperature coupled with changes in rainfall patterns since the 1960s[11]. Whilst the effects of climate change will vary by location, it is predicted that temperature increases in Scotland may exceed 4°C by the end of this this century[12], resulting in milder

[6] Scotland's Environment (undated) Get Informed – Climate - Climate [online] Available at: http://www.environment.scotland.gov.uk/our_environment/air_and_climate/climate_change.aspx (accessed 22/06/2017)

[7] Scottish Government (2017) Scottish Greenhouse Gas Emissions 2015 - An Official Statistics Publication for Scotland [online] Available at: http://www.gov.scot/Publications/2017/06/9986 (accessed 22/06/2017)

[8] Committee on Climate Change (2016) UK Climate Change Risk Assessment 2017 [online] Available at: https://www.theccc.org.uk/uk-climate-change-risk-assessment-2017/ (accessed 22/06/2017)

[9] ibid

[10] ICAO (undated) Climate Change: Adaptation [online] Available at: http://www.icao.int/environmental-protection/Pages/adaptation.aspx (accessed 22/06/2017)

[11] Scotland's Environment (2014) Scotland's Climate Trends Handbook [online] Available at: http://www.environment.scotland.gov.uk/climate_trends_handbook/index.html (accessed 22/06/2017)

[12] UKCP09 (2014) Maps & key findings [online] Available at: http://ukclimateprojections.metoffice.gov.uk/21708 (accessed 22/06/2017)

and wetter winters, hotter and drier summers, more extreme weather events, and rising sea levels[13]. These effects are expected to lead to uneven and potentially significant pressures on Scotland's environment. Pockets of dense urban development, for example, will be more at risk of surface water flooding. Similarly, the predicted effects on human health from climate change may have the greatest impact on vulnerable people and in areas where levels of deprivation are higher[14].

2.1.5 Increased temperatures, changes in rainfall patterns, and an increase in the frequency of extreme weather events could affect flows in rivers and have an impact on water availability and quality[15]. This could ultimately result in changes in habitat composition and distribution[16] that may present substantial risks to wildlife and natural ecosystems on a national and global scale[17]. A changing climate is also expected to have other ecological impacts, such as an increasing risk of non-native species spreading and becoming established in both terrestrial and aquatic environments[18].

2.1.6 There is evidence to suggest that climate change is already having an effect on Scotland's natural environment. Impacts on biodiversity and ecosystems in Scottish coastal and marine areas have been observed, including warmer sea temperatures and increased salinity in Scotland's marine areas[19][20]. As land use sectors like agriculture, forestry, town and country planning, and water and coastal management respond and adapt to climate change, additional indirect impacts on biodiversity could arise[21].

2.1.7 Soils provide a wide range of environmental, economic, and societal functions and play an important role in carbon storage, acting as a carbon 'sink' and

[13] IPCC (2014) Climate Change 2014: Synthesis Report - Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [online] Available at: http://ipcc.ch/report/ar5/syr/ (accessed 22/06/2017)

[14] 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 22/06/2017)

[15] Scotland's Environment (2016) Get Informed – Climate - Climate [online] Available at: http://www.environment.scotland.gov.uk/get-informed/climate/climate/ (accessed 22/06/2017)

[16] JNCC (2010) Biodiversity and Climate Change – a summary of impacts in the UK [online] Available at: http://jncc.defra.gov.uk/PDF/Pub10_Bio_&_CC_IACCF_2010_Web.pdf (accessed 22/06/2017)

[17] Convention on Biological Diversity (undated) Climate Change and Biodiversity – Introduction [online] Available at: http://www.cbd.int/climate/intro.shtml (accessed 22/06/2017)

[18] SEPA (2015) The river basin management plan for the Scotland river basin district: 2015–2027 [online] Available at: https://www.sepa.org.uk/media/20163445/the-river-basin-management-plan-for-the-scotland-river-basin-district-2015-2027.pdf (accessed 22/06/2017)

[19] Scotland's Environment (2017) Get Informed - Water – Offshore Waters [online] Available at: http://www.environment.scotland.gov.uk/get-informed/water/offshore-waters/ (accessed 22/06/2017)

[20] Biodiversity Scotland (2017) Climate change [online] Available at: http://www.biodiversityscotland.gov.uk/biodiversity/pressures/climate-change/ (accessed 22/06/2017)

[21] MONARCH (undated) Modelling Natural Resource Reponses to Climate Change: a synthesis for biodiversity conservation [online] Available at: http://www.academia.edu/27987626/MONARCH_Modelling_Natural_Resource_Responses_to_Climate_Change_a_synthesis_for_biodiversity_conservation (accessed 22/06/2017)

helping to regulate GHG emissions[22]. Changes in climate can have a direct influence on soil formation and function, posing a threat to Scotland's soils with the potential for impacts to be experienced globally. In particular, the loss of valued soils such as peatlands and highly productive agricultural soils could have significant impacts which would be difficult to reverse[23]. Any negative impact on soil is also likely to influence the wider environment, including biodiversity and water resources.

2.1.8 Changes in soil properties, as well as differing land uses and land use practices as a result of climate change adaptation, could have impacts on the character of Scotland's landscapes. This could include direct impacts such as the loss of land and soils through coastal erosion and flooding, as well as secondary effects such as gradual landscape change associated with changing habitats and land use. The greatest changes are likely to be seen in areas of highest population, such as lowland and coastal areas, rather than upland areas where landscape change may be less sudden or obvious[24,25].

2.1.9 Air pollution often originates from the same activities that contribute to climate change, notably transport and energy generation, and has associated effects on population and human health[26]. Whilst air quality in Scotland has improved considerably over the last few decades[27], air pollution is still estimated to reduce the life expectancy of every person in the UK by several months[28]. There are still many urban areas in Scotland where air quality has been identified as a serious concern. These Air Quality Management Areas[29] have been designated primarily as a result of emissions from transport[30].

2.1.10 Pressures on cultural heritage assets and sites may occur as Scotland becomes warmer and wetter, potentially leading to increased weathering of

[22] SNH (2016) Managing nature for carbon [online] Available at: http://www.snh.gov.uk/climate-change/taking-action/carbon-management/managing-nature-for-carbon/ (accessed 22/06/2017)

[23] 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 22/06/2017)

[24] SNH (2017) How will Scotland's landscapes be affected by climate change? [online] Available at: http://www.snh.gov.uk/protecting-scotlands-nature/looking-after-landscapes/landscape-policy-and-guidance/climate-change-landscape/ (accessed 22/06/2017)

[25] Scotland's Environment(2016) Get Informed – Land – Landscape [online] Available at: http://www.environment.scotland.gov.uk/get-informed/land/landscape/ (accessed 22/06/2017)

[26] Air Quality in Scotland (undated) Local Air Quality Management – Air Quality Management Areas [online] Available at: http://www.scottishairquality.co.uk/laqm.php?a=l&la_id=i (accessed 22/06/2017)

[27] Scottish Government (2016) Air Quality - Air Pollutant Emissions - High Level Summary of Statistics Trend – Last update: Wednesday, October 26, 2016 – Index of Scottish air pollutant emissions [online] Available at: http://www.gov.scot/Topics/Statistics/Browse/Environment/trendairpollutants (accessed 22/06/2017)

[28] ibid

[29] Air Quality in Scotland (2017) Air Quality Management Areas [online] Available at: http://www.scottishairquality.co.uk/laqm/aqma (accessed 22/06/2017)

[30] Scotland's Environment (undated) Get Informed - Air [online] Available at: http://www.environment.scotland.gov.uk/get-informed/air/ (accessed 22/06/2017)

stone work, rotting of timbers, and corrosion of metals[31]. Some climate change adaptation and energy efficiency measures can also have adverse effects on the fabric of historic buildings[32].

2.1.11 Adaptation to the effects of climate change is now acknowledged as being necessary to respond effectively and equitably to its impacts[33]. Although reducing GHG emissions is important for reducing the magnitude of further climatic change, some degree of further change remains inevitable. It is therefore important that steps are still taken to prepare for and adapt to the likely effects of climate change[34].

2.1.12 Further relevant environmental baseline information collated during the SEA and used to inform this assessment process is set out in Appendix A.

The UK Climate Change Risk Assessment 2017 Evidence Report

This report on the effects of climate change and the progress of climate change adaptation in the UK identified six key areas of climate risk.

It noted that climate change is likely to present risks to domestic and international food production and trade, threaten the health of our natural environment, pose a risk to human health and productivity as a result of high temperatures, increase the risk of flooding and coastal change, and lead to impacts on water availability. New and emerging pests and diseases, as well as invasive non-native species affecting people, plants, and animals, have also been identified as a research priority.

Source: UK Climate Change Risk Assessment 2017 Evidence Report: Synthesis report: priorities for the next five years [online] Available at: https://www.theccc.org.uk/wp-content/uploads/2016/07/UK-CCRA-2017-Synthesis-Report-Committee-on-Climate-Change.pdf (accessed 22/06/2017)

[31] Scotland's Environment (2015) Get Informed – People and the environment - Historic Environment [online] Available at: http://www.environment.scotland.gov.uk/get-informed/people-and-the-environment/historic-environment/ (accessed 22/06/2017)

[32] ibid

[33] ICAO (undated) Climate Change: Adaptation [online] Available at: http://www.icao.int/environmental-protection/Pages/adaptation.aspx (accessed 22/06/2017)

[34] Committee on Climate Change (2015) Progress in preparing for climate change - 2015 Report to Parliament [online] Available at: https://www.theccc.org.uk/wp-content/uploads/2015/06/6.736_CCC_ASC_Adaptation-Progress-Report_2015_FINAL_WEB_250615_RFS.pdf (accessed 22/06/2017)

3 Proposals for a new Climate Change Bill

3.1 Scotland's current climate change ambitions and actions

3.1.1 The Climate Change (Scotland) Act 2009 ('the 2009 Act')[35] creates the statutory framework for GHG emissions reductions in Scotland. It sets a target for a reduction in emissions of the basket of Kyoto Protocol greenhouse gases (GHGs)[36] of 80% by 2050 as compared to the 1990/1995 baseline level, alongside an interim target of a 42% reduction by 2020. The 2009 Act sets out Scotland's ambition on tackling climate change and through this legislation, Scotland contributes to international (EU and UN) efforts towards climate change mitigation and adaptation.

3.1.2 Scotland has made sustained progress towards the emissions reduction targets set out in the 2009 Act. Official Statistics published in June 2017 show that Scottish GHG emissions, for the purpose of reporting against statutory targets, were 41.0% below the baseline level in 2015[37]. The last two annual targets, for 2014 and 2015, have been met and progress is well on track to meet the 2020 target of a 42% reduction.

3.1.3 The 2009 Act also requires that annual GHG emissions targets are set, by Order, for each year in the period 2010-2050. When setting each batch of targets, Scottish Ministers are required to have regard to advice received from the Committee on Climate Change (CCC). Following the initial phase of target-setting, the annual targets are set in five year batches, at least twelve years in advance. The third and most recent batch of annual targets, covering the years 2028-2032, was agreed by the Scottish Parliament in October 2016.

3.1.4 Section 35 of the Act requires that Scottish Ministers lay a report in Parliament setting out proposals and policies for meeting emissions reduction targets, as soon as reasonably practicable after each batch of annual targets has been set. These have become the series of Reports of Policies and Proposals. In January 2017, the draft Climate Change Plan: the draft Third Report on Policies and Proposals 2017-2032[38] was published for parliamentary scrutiny.

[35] Scottish Government (2012) Climate Change (Scotland) Act 2009 [online] Available at: http://www.gov.scot/Topics/Environment/climatechange/scotlands-action/climatechangeact (accessed 22/06/2017)

[36] The basket of Kyoto Protocol greenhouse gases comprises carbon dioxide (CO_2), methane, and nitrous oxide, for which the baseline is 1990; and hydrofluorocarbons, perfluorocarbons, and sulphur hexafluoride, for which the baseline is 1995. Nitrogen triflouride has subsequently been added and applies to the second commitment period of 2013-20.

[37] Scottish Government (2017) Scottish Greenhouse Gas Emissions 2015 - An Official Statistics Publication for Scotland [online] Available at: http://www.gov.scot/Publications/2017/06/9986 (accessed 22/06/2017)

[38] Scottish Government (2017) Draft Climate Change Plan: the draft Third Report on Policies and Proposals 2017-2032 [online] Available at: http://www.gov.scot/Publications/2017/01/2768/downloads (accessed 22/06/2017)

3.1.5 The Scottish Climate Change Adaptation Programme ('the Programme')[39] was developed in 2014 to address the impacts identified for Scotland in the 2012 UK Climate Change Risk Assessment[40]. The Programme set out Scottish Ministers' objectives in relation to climate change adaptation, their proposals and policies for meeting these objectives, the period within which these proposals and policies would be introduced, and arrangements for wider engagement in meeting these objectives. The second iteration of the Programme is due in 2019[41].

3.1.6 In November 2016, the United Nations Framework Convention on Climate Change (UNFCCC) Paris Agreement came into force[42]. The Paris Agreement is the first ever legally binding global climate deal and sets out aims to limit global warming to well below 2°C, and to pursue further efforts to limit it to 1.5°C [43]. A further long-term goal is to achieve net-zero levels of global GHG emissions by the second half of this century. The Agreement also covers a range of other issues such as mitigation through reducing emissions, adaptation, and loss and damage[44].

3.1.7 A more comprehensive overview of the policy context in relation to Scotland's climate change commitments and relevant environmental protection and improvement objectives contained within existing legislation, policies, plans, programmes, and strategies at the EU, UK, and Scottish levels, is set out in Appendix A of this report.

3.2 Background to a new Climate Change Bill

3.2.1 Having made sustained progress towards the targets set out in the 2009 Act, the Scottish Government has committed to keeping Scotland at the forefront of global climate action by responding to the UNFCCC Paris Agreement with a Climate Change Bill setting new, evidence-based, statutory GHG emissions reduction targets[45].

3.2.2 In March 2017, the CCC, which has a statutory advisory role under the 2009 Act, provided advice to the Scottish Government on the levels, forms, and

[39] Scottish Government (2014) Climate Ready Scotland Scottish Climate Change Adaptation Programme [online] Available at: http://www.gov.scot/Publications/2014/05/4669 (accessed 22/06/2017)

[40] UK Government (2012) UK climate change risk assessment: Government report 2012 [online] Available at: https://www.gov.uk/government/publications/uk-climate-change-risk-assessment-government-report (accessed 22/06/2017)

[41] Committee on Climate Change (2016) Scottish Climate Change Adaption Programme: An independent assessment [online] Available at: https://www.theccc.org.uk/publication/scottish-climate-change-adaptation-programme-an-independent-assessment-for-the-scottish-parliament/ (accessed 22/06/2017)

[42] UNFCC (2016) The Paris Agreement [online] Available at: http://unfccc.int/paris_agreement/items/9485.php (accessed 22/06/2017)

[43] European Commission (2016) Paris Agreement [online] Available at: http://ec.europa.eu/clima/policies/international/negotiations/paris/index_en.htm (accessed 22/06/2017)

[44] ibid

[45] Inspired PQ S5W-05402

mechanisms for emissions reduction targets in a Climate Change Bill[46]. The CCC's advice covered four areas:

- the appropriate level of future emissions;
- the form of future emissions targets;
- the future of the accounting framework; and,
- flexibility to update emissions targets.

3.2.3 On the issue of the appropriate level of future emissions over the period to 2050, the CCC set out two recommended options:

- Option 1: Keep the current 2050 target of an 80% reduction for now, but create statutory powers to review and increase this in future as the international evidence base becomes clearer.
- Option 2: Increase the level of the 2050 target to a 90% reduction.

3.2.4 The CCC advised that the setting of a further target for net-zero levels of Scottish GHG emissions should be kept under review, on the basis that the evidence to set such a target does not exist at the present time.

3.2.5 On the other areas where the CCC provided advice, recommendations included; setting new interim targets for 2030 and 2040, increasing the transparency of emissions accounting, and setting all emissions reduction targets in the form of percentage reductions from baseline levels.

3.3 The development of the Consultation Paper

3.3.1 Scottish Government is now consulting on a range of proposals for a new Climate Change Bill. These proposals closely reflect the advice from the CCC.

3.3.2 The intention set out in the Consultation Paper is that the new Climate Change Bill will strengthen the ambition and strategic framework for action to reduce GHG emissions in Scotland. The proposals for the new Climate Change Bill will amend only those parts of the 2009 Act that relate to emissions reduction targets and associated reporting duties. It will remain the case that the proposals and policies for delivering against the statutory targets will be set out in strategic climate change plans, which are themselves subject to SEA. This Environmental Report is therefore focused on the present proposals regarding the strategic ambition and not on the potential delivery mechanisms.

3.3.3 The proposals for the new Bill will not amend any parts of the 2009 Act relating to climate change adaptation.

[46] Committee on Climate Change (2017) Advice on the new Scottish Climate Change Bill [online] Available at: https://www.theccc.org.uk/publication/advice-on-the-new-scottish-climate-change-bill/ (accessed 22/06/2017)

The proposals set out in the Consultation Paper

3.3.4 The proposals on the levels of emissions reduction targets within the Consultation Paper include:

- Increasing the level of ambition of the 2050 target to a reduction in GHG emissions of at least 90% from the baseline. This matches the more ambitious of the two options recommended by the CCC, based on its advice that a 90% reduction in GHG emissions by 2050 would be more consistent with the Paris Agreement aim for global efforts to limit temperature rise to 1.5^{o}C;
- Creating a statutory mechanism to allow for the future setting of a net-zero GHG emissions target, when the evidence for this becomes available; and,
- Establishing new and updated interim targets for reductions in GHG emissions, specifically:
  - A 2020 target for a reduction of at least 56% from baseline levels;
  - A 2030 target for a reduction of at least 66% from baseline levels; and,
  - A 2040 target for a reduction of at least 78% from baseline levels.

3.3.5 Other, more technical, proposals set out in the Consultation Paper include:

- A shift from setting targets on the basis of 'adjusted emissions' (the adjustment accounts for the operation of the EU Emissions Trading System in Scotland) to setting all targets on the basis of 'actual Scottish emissions';
- All targets being set as percentage reductions from baseline levels;
- To allow for annual target levels to be set as a direct consequence of interim and 2050 target levels, instead of through secondary legislation; and,
- To allow the levels of interim and 2050 targets to be updated, subject to due regard to CCC advice, through secondary legislation.

3.4 Consideration of reasonable alternatives

3.4.1 The 2005 Act requires that the potential for significant environmental effects of reasonable alternatives to a plan, programme, or strategy are assessed as part of the SEA process. SEA Guidance explains that alternatives must be realistic and that when considering whether or not an alternative is reasonable, potential restrictions to its implementation, such as parameters set by relevant legalisation and any relevant policy commitments for example, are fully considered. It is important to note that when considering the scope of alternatives, the 2005 Act does not specify whether this means considering an

alternative plan, programme, or strategy, or different alternatives within the plan, programme, or strategy itself.

3.4.2 As noted above, the intention set out in the Consultation Paper is that the new Climate Change Bill will strengthen the ambition and strategic framework for action to reduce GHG emissions in Scotland. As such, the main realistic alternatives that could be assessed within the present SEA process are considered to be those that relate to the proposals on the levels of emissions reduction targets. It is considered that the principal alternative in relation to target levels would be the alternative option recommended by the CCC, which is to:

- Maintain the 2050 target at 80% for now, creating review points at which the target ambition could be increased.

3.4.3 Based on the expert advice of the CCC, this option is regarded as an equal means of taking forward the climate change ambitions of the Scottish Government. As such, this is viewed as the main realistic alternative that could be considered within the SEA process.

4 Relationship with other plans, programmes, and strategies and environmental objectives

4.1 Introduction

1.1.1 The following sections of this report provide an overview of the overarching objectives considered most relevant in the context of the preparation of the proposals for a new Climate Change Bill. It is important to note that many of the plans, programmes, and strategies set out below are reporting requirements of the 2009 Act. For example, it is a requirement of the 2009 Act to produce a Land Use Strategy every five years as well as to prepare the series of Reports of Policies and Proposals, such as the recently published draft Climate Change Plan[47]. These, in addition to a broad range of other relevant plans, programmes and strategies, set out action on how climate change targets are to be met across a range of sectors.

Policy Context in the 2005 Act

The 2005 Act requires that the Environmental Report include an outline of the relationships between the proposed policy 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.

4.1.1 As noted previously, the proposed Climate Change Bill will not substantively affect the approach to the strategic monitoring requirements under the 2009 Act. However, the plans, programmes, and strategies set out below have the potential to be affected by any updates, made through the new Climate Change Bill, to the framework of statutory emissions reduction targets. In particular, the proposals for long-term target ambition could lead to differing sets of implications for delivery programmes.

4.1.2 A further overview of key plans, programmes, and strategies and their objectives is set out in the environmental baseline section of this report (Appendix A). This has been developed to ensure that these objectives and ambitions are taken into account at an early stage in the development of the new Climate Change Bill and to ensure they are appropriately reflected in the SEA process.

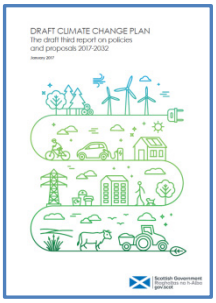
[47] Scottish Government (2017) Draft Climate Change Plan - the draft Third Report on Policies and Proposals 2017-2032 [online] Available at: http://www.gov.scot/Publications/2017/01/2768/downloads (accessed 22/06/2017)

4.2 The policy context

4.2.1 Presently the 2009 Act[48] sets the statutory framework for GHG emissions reductions in Scotland, with a reduction target of at least 80% by 2050, with an interim 2020 target of 42%. These targets are more ambitious than those for the UK as a whole, and the EU.

4.2.2 Developed in 2009, the Climate Change Delivery Plan[49] set out the high-level measures required in each sector to meet Scotland's statutory climate change targets, looking up to 2020 and beyond. Following the introduction of the 2009 Act, this has been taken forward through the development of a series of Reports on Policies and Proposals (RPPs). RPP[50] and RPP2[51] contain policies and proposals for sectors across the economy for the period 2010 to 2027 to reduce GHG emissions per the statutory targets.

4.2.3 The recently published draft Climate Change Plan[52] is formally the third report in the RPP series. It builds on the work of the previous RPP reports, taking forward these ambitions and exploring opportunities to further reduce Scotland's GHG emissions by 66% in 2032 (against the 1990 baseline). The draft Climate Change Plan sets out Scotland's ambitious approach to mitigating the effects of climate change across a range of sectors, specifically agriculture, electricity generation, forestry, industry, peat, residential, services, transport, and waste. It provides a system-wide view of how the emissions reduction targets can be most effectively delivered.



4.2.4 The draft Climate Change Plan will be the last produced under the 2009 Act. Future climate change plans will be developed following the passage through Parliament of the proposed Climate Change Bill.

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[48] Scottish Government (2012) Climate Change (Scotland) Act 2009 [online] Available at: http://www.gov.scot/Topics/Environment/climatechange/scotlands-action/climatechangeact (accessed 22/06/2017)

[49] Scottish Government (2009) Climate Change Delivery Plan: Meeting Scotland's Statutory Climate Change Targets [online] Available at: http://www.gov.scot/Resource/Doc/276273/0082934.pdf (accessed 22/06/2017)

[50] Scottish Government (2013) Low Carbon Scotland - Meeting the Emissions Reduction Targets 2010-2022 [online] Available at: http://www.gov.scot/Topics/Environment/climatechange/scotlands-action/lowcarbon/rpp (22/06/2017)

[51] Scottish Government (2013) Low Carbon Scotland – Meeting our Emissions Reduction Targets 2013-2027 [online] Available at: http://www.gov.scot/Topics/Environment/climatechange/scotlands-action/lowcarbon/meetingthetargets (accessed 22/06/2017)

[52] Scottish Government (2017) Draft Climate Change Plan - the draft Third Report on Policies and Proposals 2017-2032 [online] Available at: http://www.gov.scot/Publications/2017/01/2768 (accessed 22/06/2017)

4.2.5 Section 53 of the 2009 Act placed a duty on Ministers to produce an adaptation programme to address the risks identified for Scotland in the 2012 UK Climate Change Risk Assessment[53]. The Scottish Climate Change Adaptation Programme was published in 2014[54], outlining Scottish Ministers' objectives for adaptation. The Programme includes a series of policies and proposals aimed at mainstreaming climate change adaptation across sectors to help reduce climate change risks. It was structured around three themes: adaptation in the natural environment, buildings and infrastructure networks, and a climate ready society. The impacts identified for Scotland by the 2017 UK Climate Change Risk Assessment[55] are expected to be addressed by the second iteration of the Programme which is due in 2019[56].

4.2.6 National Planning Framework (NPF3)[57] was published alongside Scottish Planning Policy (SPP)[58] in June 2014. They focus on Scotland's ambitions as: a successful, sustainable place; a low carbon place; a natural, resilient place; and a connected place. NPF3 brought together plans and strategies in economic development, regeneration, energy, environment, climate change, transport, and digital infrastructure to provide a coherent vision of how Scotland should evolve over the next 20 to 30 years. NPF3 is clear that planning will play a key role in delivering on the commitments set out in the Scottish Government's low carbon ambitions and action set out in the Reports on Policies and Proposals. It provides a clear direction of travel consistent with Scottish climate change legislation.

4.2.7 SPP sets out the national planning policies for Scotland which reflect Scottish Ministers' priorities for the operation of the planning system, as well as the development and use of land. It sets out policy principles for supporting a low carbon transition that are consistent with national objectives and targets; for

[53] Defra (2012) UK climate change risk assessment: Government report 2012 [online] Available at: https://www.gov.uk/government/publications/uk-climate-change-risk-assessment-government-report (accessed 22/06/2017)

[54] Scottish Government (2014) Climate Ready Scotland Scottish Climate Change Adaptation Programme [online] Available at: http://www.gov.scot/Publications/2014/05/4669 (accessed 22/06/2017)

[55] Committee on Climate Change (2016) UK Climate Change Risk Assessment 2017 [online] Available at: https://www.theccc.org.uk/uk-climate-change-risk-assessment-2017/ (accessed 22/06/2017)

[56] Committee on Climate Change (2016) Scottish Climate Change Adaption Programme: An independent assessment for the Scottish Parliament [online] Available at: https://www.theccc.org.uk/publication/scottish-climate-change-adaptation-programme-an-independent-assessment-for-the-scottish-parliament/ (accessed 22/06/2017)

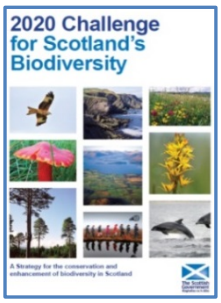
[57] Scottish Government (2014) National Planning Framework 3: A Plan for Scotland: Ambition, Opportunity, Place [online] Available at: http://www.gov.scot/Topics/Built-Environment/planning/NPF3-SPP-Review/NPF3 (accessed 22/06/2017)

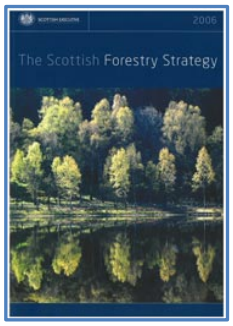
[58] Scottish Government (2014) Scottish Planning Policy [online] Available at: http://www.gov.scot/Publications/2014/06/5823 (accessed 22/06/2017)

example, those pertaining to the reduction of GHG emissions. SPP further notes the role of planning in protecting and making efficient use of Scotland's existing resources and environmental assets.

4.2.8 The 2009 Act places a duty on Scottish Ministers to produce a Land Use Strategy that is revised every five years or less. It is a requirement that this should set out how the Strategy will contribute to the achievement of Ministers' duties and objectives for climate change mitigation and adaptation and sustainable development. Getting the best from our land: A Land Use Strategy for Scotland 2016-2021[59] was published in 2016. This continued the policy direction set out in the first Strategy, taking forward the same Vision to 2050 and Objectives and Principles for Sustainable Land Use. The Principles include that 'land use decisions should be informed by an understanding of the opportunities and threats brought about by a changing climate' as well as that 'greenhouse gas emissions associated with land use should be reduced and land should continue to contribute to delivering climate change adaptation and mitigation objectives'.

4.2.9 The Scottish Government's 2020 Challenge for Scotland's Biodiversity[60] is Scotland's response to the 20 Aichi Targets set by the United Nations Convention on Biological Diversity[61], as well as the European Union's Biodiversity Strategy for 2020. The 2020 Challenge supplements the 2004 Scottish Biodiversity Strategy[62] 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'. The Strategy also notes the increased adverse pressure that climate change will have on ecosystems and includes a key outcome that a healthy natural environment is much more resilient to climate change.





4.2.10 The Scottish Forestry Strategy[63] was developed around a core principle based on sustainable development and social inclusion, achieved through a culture of 'forestry for and with people' and delivered by well-managed forests and

[59] Scottish Government (2016) Getting the best from our land: A Land Use Strategy for Scotland 2016 – 2021 [online] Available at: http://www.gov.scot/Topics/Environment/Countryside/Landusestrategy (accessed 22/06/2017)

[60] Scottish Government (2013) 2020 Challenge for Scotland's Biodiversity – A Strategy for the conservation and enhancement of biodiversity in Scotland [online] Available at: http://www.gov.scot/Publications/2013/06/5538 (accessed 22/06/2017)

[61] Convention on Biological Diversity (undated) Aichi Biodiversity Targets [online] Available at: https://www.cbd.int/sp/targets/ (accessed 28/06/2017)

[62] Scottish Government (2004) Scottish Biodiversity Strategy: It's in Your Hands – A strategy for the conservation and enhancement of biodiversity in Scotland [online] Available at: http://www.gov.scot/Publications/2004/05/19366/37239 (accessed 22/06/2017)

[63] Forestry Commission Scotland (2006) The Scottish Forestry Strategy [online] Available at: http://scotland.forestry.gov.uk/supporting/strategy-policy-guidance/forestry-strategy (accessed 22/06//2017)

woodlands that integrate effectively with other land uses, businesses, and sectors such as energy, transport, health, water, education, and tourism. The key themes of the Strategy include climate change mitigation and adaptation, increasing sustainable timber resources, the protection of the environmental quality of natural resources (water, soil, and air), and helping to restore, maintain, and enhance Scotland's biodiversity, amongst others.

4.2.11 The Scottish Soil Framework[64] was developed to promote the sustainable management and protection of Scotland's soils. It acknowledges the multiple functions of soils and includes a vision that soils be recognised as a vital part of our economy, environment, and heritage, and be safeguarded for existing and future generations. The framework notes that while Scotland's soils are generally in good health, they face two significant pressures: climate change and the loss of organic matter. The Framework does not set out new policy but rather seeks to integrate soil protection into existing and emerging policies such as those relating to land use and management, water quality and flooding, and planning, amongst others. It also acknowledges the importance of improving the availability of soil data and highlighting soil knowledge gaps and research needs in Scotland.

4.2.12 The Scottish Government's Cleaner Air for Scotland – The Road to a Healthier Future (2015) proposes a national strategy for improving Scotland's air quality with a vision of making it 'the best in Europe'[65]. Among its specific goals are full compliance with EU air quality legislation and significant progress towards rescinding all existing Air Quality Management Areas in Scotland by 2020.

4.2.13 The Scottish Rural Development Programme 2014-2020 carries out Pillar 2 of the EU Common Agricultural Policy on the local scale, which promotes the efficient use of resources and facilitates the transition by the agriculture, food, and forestry sectors towards a low carbon and climate ready economy[66].

4.2.14 The National Marine Plan[67] considers climate change in terms of how actions undertaken within the Plan can help to mitigate GHG emissions, in addition to how these actions also need to be adapted to take into account the effects of climate change. The National Marine Plan and the draft Sectoral Plans for

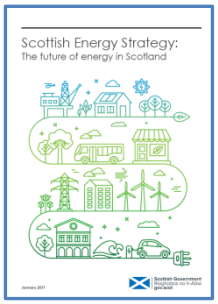
[64] Scottish Government (2009) The Scottish Soil Framework [online] Available at: http://www.gov.scot/Publications/2009/05/20145602/0 (accessed 22/06/2017)

[65] 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 22/06//2017)

[66] Scottish Government (2016) SRDP 2014 – 2020 [online] Available at: http://www.gov.scot/Topics/farmingrural/SRDP/SRDPprogramme (accessed 22/06/2017)

[67] Scottish Government (2015) Scotland's National Marine Plan [online] Available at: http://www.gov.scot/Publications/2015/03/6517 (accessed 22/06/2017)

Offshore Renewable Energy in Scottish Waters[68] also include provisions relating to energy development in Scottish territorial waters (out to 12 nautical miles). The Sectoral Plans in particular set out opportunities for offshore renewables development, identifying the role that this could play in contributing to Scotland's energy mix and in facilitating the transition to a low carbon economy and reducing GHG emissions across a range of sectors. The National Marine Plan also stipulates that the development and use of the marine environment should not have a significant impact on the national status of Priority Features. Many of these are known for their role in carbon sequestration, including within Marine Protected Areas.



4.2.15 The draft Scottish Energy Strategy: The Future of Energy in Scotland was also launched for consultation in January 2017[69]. Informed by the development of the draft Climate Change Plan, the priorities it lays out are underpinned by Scotland's climate change ambitions. The draft Scottish Energy Strategy draws together existing Scottish energy policies and new ambitions within a single overarching Strategy, and sets a long-term vision for the energy system in Scotland. The 2050 energy vision is aligned to three themes: A Whole System View, A Stable and Managed Energy Transition, and A Smarter Model of Local Energy Efficiency.

4.2.16 The draft Scottish Energy Strategy draws together common policy ambitions set out in existing Scottish energy policy, including the 2013 revision of the Electricity Generation Policy Statement[70], the 2020 Routemap for Renewable Energy in Scotland (as updated in 2015), and the Heat Policy Statement: Towards Decarbonising Heat: Maximising the Opportunities for Scotland[71]. Many of the policies and proposals set out in the draft Scottish Energy Strategy are reflected in the draft Climate Change Plan, particularly in relation to the electricity supply sector and others which focus on sector decarbonisation and improving energy efficiency at point of use.

4.2.17 Scotland's National Transport Strategy sets out a long-term vision for transport policies, stating they should meet the needs of everyone in Scotland whilst providing them with integrated, modern, reliable, and environmentally efficient

[68] Scottish Government (2013) Planning Scotland's Seas: Draft Sectoral Marine Plans for Offshore Renewable Energy in Scottish Waters: Consultation Paper [online] Available at: http://www.gov.scot/Publications/2013/07/8702 (accessed 22/06/2017)

[69] Scottish Government (2017) Draft Scottish Energy Strategy: The Future of Energy in Scotland [online] Available at: http://www.gov.scot/Publications/2017/01/3414 (accessed 22/06/2017)

[70] Scottish Government (2013) Electricity Generation Policy Statement - 2013 [online] Available at: http://www.gov.scot/Topics/Business-Industry/Energy/EGPS2012/EGPS2013 (accessed 22/06/2017)

[71] Scottish Government (2015) The Heat Policy Statement: Towards Decarbonising Heat: Maximising the Opportunities for Scotland [online] Available at: http://www.gov.scot/Publications/2015/06/6679 (accessed 22/06/2017)

transport choices[72]. One of the three strategic key outcomes underlying the vision is '[a reduction] in emissions to tackle the issues of climate change, air quality and health improvement which impact on our high-level objective for protecting the environment and improving health'. The role that transport plays in producing GHG emissions is recognised in the 2006 publication and it was announced in 2016 that the National Transport Strategy will be subject to a full review. That review will include setting out an updated vision and exploring ways to address the strategic challenges facing the transport network.

4.2.18 Making Things Last - A Circular Economy Strategy for Scotland[73] sets out Scotland's ambitions for changing how waste is seen in our economy. It seeks to reduce waste lost from the economy and retain the value of materials through repair, reuse, recycling, and remanufacturing via a range of policies and proposals. This is noted as being fundamental to helping tackle climate change and preserve natural capital. Four priority areas for action are identified in Making Things Last: food and drink and the broader bio-economy, remanufacture, construction and the built environment, and energy infrastructure.

4.2.19 At the UK level, the Climate Change Act 2008 sets the statutory framework for GHG emissions reductions in the UK. The UK also contributes to a range of climate change initiatives in place at the international level. These focus primarily on reducing GHG emissions, improving energy efficiency, increasing the generation of renewable energy, and a series of associated commitments. Examples of such initiatives include the EU Emissions Trading System[74], the Renewable Energy Directive[75], the Energy Efficiency Directive[76], and binding targets decreasing emissions from road transport and the level of emissions allowed from new cars and vans[77]. In 2013, the EU adopted a climate change adaptation strategy which encouraged both Member States and cities to produce comprehensive adaptation strategies[78]. In 2014, a climate and energy framework for 2030 was agreed upon[79].

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[72] Scottish Government (2006) Scotland's National Transport Strategy [online] available at: http://www.gov.scot/Resource/Doc/157751/0042649.pdf (accessed 22/06/2017)

[73] Scottish Government (2016) Making Things Last – A Circular Economy Strategy for Scotland [online] Available at: http://www.gov.scot/Publications/2016/02/1761 (accessed 22/06/2017)

[74] European Commission (2017) The EU Emissions Trading System (EU ETS) [online] Available at: http://ec.europa.eu/clima/policies/ets_en (accessed 22/06/2017)

[75] European Commission (2009) Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC [online] Available at: http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32009L0028&from=EN (accessed 22/06/2017)

[76] European Commission (2012) Directive 2012/27/EU of the European Parliament and of the Council of 25 October 2012 on energy efficiency, amending Directives 2009/125/EC and 2010/30/EU and repealing Directives 2004/8/EC and 2006/32/EC [online] Available at: http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32012L0027&from=EN (accessed 22/06/2017)

[77] European Commission (2017) Road transport: Reducing CO_2 emissions from vehicles[online] Available at: http://ec.europa.eu/clima/policies/transport/vehicles_en (accessed 22/06/2017)

[78] European Commission (2017) EU Adaptation Strategy [online] Available at: https://ec.europa.eu/clima/policies/adaptation/what_en (accessed 03/07/2017)

[79] European Commission (2014) 2030 climate & energy framework [online] Available at: http://ec.europa.eu/clima/policies/strategies/2030/index_en.htm (accessed 22/06/2017)

4.2.20 The policy context for the preparation of the draft Scottish Climate Change Bill is illustrated in Figure 4.1.

Figure 4.1 Relevant policy context for the Consultation Paper

5 The approach to the assessment

5.1 The SEA process to date

5.1.1 SEA has a number of distinct stages: screening, scoping, the environmental assessment and the production of an Environmental Report, and the publication of a Post-Adoption Statement. At each stage, there is a requirement to consult with three statutory Consultation Authorities. These are Historic Environment Scotland (HES), Scottish Natural Heritage (SNH) and the Scottish Environment Protection Agency (SEPA). The present SEA process began with the production of a Scoping Report published for consultation in April 2017. This set out initial information on the likelihood of significant effects arising from proposals to be included in the Consultation Paper. It also provided an initial view on the proposed evidence base that would be used to inform the assessment.

5.1.2 At scoping stage, it was considered likely that the proposals to change the levels of emissions targets would yield significant beneficial environmental impacts, particularly in the context of climatic factors. It also identified that through the implementation of the wide range of proposals, lower level policies, programmes, and strategies that seek to mitigate or adapt to climate change, there could be potential for indirect or secondary effects for a range of other environmental topic areas. As a consequence, all environmental topic areas were scoped into the assessment[80].

5.2 Proposed approach to the assessment

A staged approach to the assessment

5.2.1 The assessment of the proposals for a new Climate Change Bill has been undertaken in two stages, as set out at the scoping stage.

Stage One:

5.2.2 As previously stated (Section 3), the proposals for a new Climate Change Bill will not substantively affect the approach to the strategic reporting requirements under the 2009 Act. However, there are a number plans, programmes, and strategies set out that have the potential to be affected by any updates, made through the proposed Climate Change Bill, to the framework of statutory emissions reduction targets.

[80] The environmental topic areas covered by SEA are: Biodiversity, Flora and Fauna; Population and Human Health; Soil; Air; Water; Climatic Factors; Cultural Heritage; Landscape, Seascape, and Visual Impacts; and Material Assets (Waste, Energy, Transport and Land Use).

5.2.3 At scoping stage, it was recognised that a considerable amount of work has already been undertaken to explore the environmental effects of the policies, programmes, and strategies of relevance when considering the proposals set out in the Consultation Paper. Of particular relevance are the SEA of the 2008 Scottish Climate Change Bill[81], and the joint SEA of the draft Climate Change Plan and the draft Scottish Energy Strategy[82].

5.2.4 Stage One of the assessment involved reviewing and collating the findings of previous SEA Environmental Reports relevant to the proposals for a new Climate Change Bill. This stage has drawn together the key findings of these assessments and provides an overview of known environmental effects. This process has provided a robust evidence base from which to consider the potential environmental issues likely to arise from current and future action to reduce GHG emissions. Undertaking this review process has also helped to ensure consistency in how findings are reported.

5.2.5 The Stage One review process includes a review the SEA work undertaken on:

- The 2008 Scottish Climate Change Bill[83] (for the 2009 Act).
- The draft Climate Change Plan and draft Scottish Energy Strategy[84].
- Getting the best from our land: Scotland's Land Use Strategy 2016 – 2021[85].
- Making Things Last – A Circular Economy Strategy for Scotland[86].
- The 2020 Challenge for Scotland's Biodiversity[87].
- Climate Ready Scotland: Scottish Climate Change Adaptation Programme[88].

[81] Scottish Government (2008) Strategic Environmental Assessment (SEA) of the Scottish Climate Change Bill: Consultation Proposals: Final Environmental Report (Post-Consultation Issue) [online] Available at: http://www.gov.scot/Publications/2008/12/03145652/0 (accessed 03/07/2017)

[82] Scottish Government (2017) Strategic Environmental Assessment Environmental Report on the Draft Climate Change Plan and Draft Scottish Energy Strategy [online] Available at: http://www.gov.scot/Publications/2017/01/9030 (accessed 03/07/2017)

[83] Scottish Government (2008) Strategic Environmental Assessment (SEA) of the Scottish Climate Change Bill: Consultation Proposals: Final Environmental Report (Post-Consultation Issue) [online] Available at: http://www.gov.scot/Publications/2008/12/03145652/0 (accessed 03/07/2017)

[84] Scottish Government (2017) Strategic Environmental Assessment Environmental Report on the Draft Climate Change Plan and Draft Scottish Energy Strategy [online] Available at: http://www.gov.scot/Publications/2017/01/9030 (accessed 03/07/2017)

[85] The Scottish Government (2016) Land Use Strategy 2016 – 2021 [online] Available at: http://www.gov.scot/Topics/Environment/Countryside/Landusestrategy/LUS2consultation (accessed 03/07/2017)

[86] Scottish Government (2015) Making Things Last - Consultation on the Circular Economy in Scotland [online] Available at: http://www.gov.scot/Publications/2015/08/2820/0 (accessed 03/07/2017)

[87] Scottish Government (2012) A Consultation on the 2020 Challenge for Scotland's Biodiversity [online] Available at: http://www.gov.scot/Resource/0039/00396675.pdf (accessed 03/07/2017)

[88] Scottish Government (2014) Climate Ready Scotland Scottish Climate Change Adaptation Programme [online] Available at: http://www.scotland.gov.uk/Publications/2014/05/4669 (accessed 03/07/2017)

5.2.6 Stage Two of the assessment draws heavily on the findings of the first stage and seeks to provide a broad, overarching view of potential environmental effects that could be associated with the proposals for a new Climate Change Bill. This is reflective of the high level and strategic nature of the Consultation Paper and the proposals it sets out. The assessment is set out in narrative form and focuses on exploring the potential for environmental effects that may arise from action taken across a range of sectors in order to meet new, more ambitious emissions reduction targets.

5.2.7 Together with the findings from Stage One of the assessment, this process has enabled the consideration of the potential for cumulative and in-combination effects that may arise from action to strengthen Scotland's approach to mitigating and adapting to the predicted effects of climate change.

5.3 Consideration of reasonable alternatives

5.3.1 The 2005 Act requires those preparing a public plan, programme, or strategy to consider and outline the likely environmental effects of any reasonable alternatives.

5.3.2 The SEA has considered the following as a reasonable alternative to the proposal to increase the ambition of the 2050 target to at least a 90% reduction in GHG emissions from baseline levels:

- Maintain the 2050 target at 80% for now, creating review points at which the target ambition could be increased.

5.3.3 The consideration of environmental effects associated with the reasonable alternatives is discussed further in Section 7.

5.4 Scope of the assessment

5.4.1 The intention set out in the Consultation Paper is that the new Climate Change Bill will strengthen the ambition and strategic framework for action to reduce GHG emissions in Scotland, under which specific delivery policies are, and will, continue to be required. The proposals for the new Climate Change Bill will amend only those parts of the 2009 Act that relate to emissions reduction targets and associated reporting duties. It will remain the case that detailed proposals and policies for delivering against the statutory targets will be set out in strategic climate change plans, which will themselves be subject to SEA requirements. This Environmental Report is therefore focused on the consultation proposals to raise the ambition of Scotland's targets to reduce GHG emissions and not on any potential delivery mechanisms. In addition, the proposals for the new Bill will not amend any parts of the 2009 Act relating to climate change adaptation.

6 Assessment findings: Stage One

6.1 Overview of previous assessment findings

6.1.1 The review of previous assessment work identified the potential for a number of key effects. In particular, impacts relating to climatic factors, air quality, and population and human health emerged as common themes. Several previous assessments also identified the potential for implications for material assets. Secondary impacts across a range of SEA topics were also identified as likely to arise through the implementation of action to reduce GHG emissions and in adapting to the effects of climate change.

6.2 Summary of previous assessment findings

Previous assessment findings in relation to Climatic Factors

6.2.1 Overall, the suite of actions and ambitions set out in current Scottish policy are likely to have positive effects for climatic factors. Importantly, Scotland's cross-sectoral ambitions seek to build upon progress already made in both reducing GHG emissions as well as improving resilience to the predicted effects of climate change. The role of Scotland's energy sector is one such example. Climate ambitions underpin the priorities laid out in the draft Scottish Energy Strategy, and the development of the 'whole systems' approach it sets out for how energy is to be produced, distributed, and used in the coming decades. The SEA undertaken for the draft Scottish Energy Strategy and draft Climate Change Plan found that the long-term, sustained decarbonisation of the energy sector in the period to 2050 presents an opportunity to achieve substantial emissions reductions. For example, policies aimed at encouraging further renewables development and facilitating the emergence of new technologies such as electricity storage and Carbon Capture and Storage (CCS) as part of Scotland's varied energy mix were identified in the SEA as being likely to contribute to further GHG emissions reductions.

6.2.2 The SEA of the draft Scottish Energy Strategy also identified the potential for many of the policies and proposals to reduce energy consumption. For example, ambitions for decentralising energy supply and facilitating greater uptake of low carbon and renewable energy technologies at the local level were considered likely to contribute to GHG emissions reductions. Expanding energy storage and employing Active Network Management were also considered likely to provide greater flexibility in matching demand and supply and in improving energy security, both of which have the potential for positive

effects. Complementary measures, such as the Scottish Energy Efficiency Programme (SEEP), were identified in the SEA as being important in reducing electricity and heat demand at point of use, with the likelihood of further reductions in GHG emissions.

6.2.3 The draft Climate Change Plan sets out a series of policies and proposals aimed at reducing emissions within the transport sector. For example, these include policies encouraging active travel, public transport options, and greater market penetration for ultra-low and low emission vehicles, amongst others. The assessment of the draft Climate Change Plan identified the potential for significant reductions in GHG emissions through the implementation of these proposals, as well as through achieving a reduction in reliance on fossil fuels. Policies set out in National Planning Framework 3 (NPF3) and Scottish Planning Policy (SPP) seek to minimise travel time or reduce the need for travel altogether by encouraging the development of compact settlements and the improvement of digital connectivity. Further, promoting active travel options over vehicular travel and providing quality greenspace and cycling/walking networks, as set out in NPF3 and SPP, were also considered likely to be beneficial.

6.2.4 The importance of land and resource management in a changing climate is set out through the integrated management approach of the draft Climate Change Plan and the Second Land Use Strategy. The SEA for the draft Climate Change Plan identified less intensive farming, the introduction of more efficient farming practices, and promoting a shift in focus to sustainability and protecting ecosystem services as likely to be beneficial for climatic factors. The draft Climate Change Plan and its SEA also reflected on the potential to contribute to carbon sequestration through restoring degraded land, protecting carbon-rich soils, restoring peatlands, and expanding woodland. The assessment also noted that many of these, such as increased woodland creation, climate friendly farming, and the restoration of peatlands provide further opportunities for adaptation. For example, it noted that the use of trees in riparian areas can also assist as natural flood management measures, yielding potential benefits in mitigating the predicted effects of climate change. Other proposals or policies, such as those targeting improvements in the energy efficiency of infrastructure and housing stock (e.g. via SEEP) as well as reducing energy demand and consumption, are also likely to improve climate change resilience.

6.2.5 Achieving a more efficient use of resources is a fundamental aspect of Making Things Last – A Circular Economy Strategy for Scotland, and one that is likely to become increasingly important in the future. In setting out circular economy ambitions for Scotland, the Strategy contained a range of proposals aimed at reducing the landfilling of waste materials and retaining their value in the economy (e.g. by reuse of products or use of waste materials as a resource in manufacturing processes). Its SEA found the potential for largely positive effects in terms of climatic factors, with improved resource use and waste being

seen as key contributors to reducing GHG emissions. The SEA also considered that the package of measures proposed would likely help industries to adapt their waste management approaches to account for uncertainties driven by a changing climate.

Previous assessment findings in relation to Air Quality and Population and Human Health

6.2.6 There was general acknowledgement in previous assessments that air pollution often originates from the same activities that contribute to climate change, and that poor air quality can have human health implications. The previous assessment findings reported that actions and ambitions set out in current Scottish policy are likely to have positive effects for both air quality and human health. For example, the package of policies and proposals set out in the recent draft Climate Change Plan and draft Scottish Energy Strategy were identified as likely to make a significant contribution to improving Scottish air quality and delivering associated benefits for human health. This included those policies and proposals focused on increasing the uptake of low and ultra-low carbon vehicles on roads, the use of public transport, and the greater uptake of active travel options, amongst others.

6.2.7 NPF3 and SPP highlight Scotland's move towards a low carbon future, and together they set out the role of connectivity and green infrastructure such as the Central Scotland Green Network in contributing to these ambitions. The joint SEA undertaken for NPF3 and SPP identified that proposals for enhancing tourism and recreation, including completion of a national cycle and walking network, should provide benefits for people and health and create opportunities for enjoying the environment. Additionally, the SEA reported that policies aimed at linking development with public transport networks, walking, and cycling routes could also help to reduce climate change emissions from transport and as such, deliver associated benefits for air quality and population and human health.

6.2.8 The assessment of the draft Scottish Energy Strategy identified the 'whole systems' approach to managing energy production, distribution, and use as an integral part of meeting Scotland's climate change commitments. It considered the decarbonisation of the sector, alongside greater efficiency in consumption, as both contributing to a reduction in GHG emissions and delivering benefits in terms of air quality and human health. Promoting further growth in low carbon and renewable energy development, as well as facilitating the continued expansion of local and community-owned renewable energy projects, should improve overall air quality and offer greater energy security, particularly among more remote communities or other vulnerable demographics. The SEA considered the inclusion of policies such as SEEP in targeting more efficient

energy use in buildings as likely to lead to further benefits. For example, it found that improving heat efficiency in the residential sector has the potential to improve air quality for occupants and reduce exposure to cold, dampness, and mould in residential properties.

6.2.9 A number of previous assessments identified the potential for mixed or adverse secondary impacts that may arise from the implementation of policies to reduce GHG emissions. For example, the potential for air quality impacts associated with the use of technologies such as bioenergy and combustion processes were noted in the SEA for the draft Climate Change Plan. Construction activities arising from infrastructure works, including those associated with the emergence of new energy technologies and ensuring appropriate infrastructure, could result in largely localised, short-term negative effects such as disturbance (e.g. dust, noise, vibration, visual impact). However, the SEA for the draft Climate Change Plan also noted the potential for adverse impacts to be mitigated in many instances through a combination of strategic- and project-level controls (e.g. the development planning process, appropriate siting and design, local consultation and engagement, environmental assessment, and on-site management measures).

Previous assessment findings in relation to Material Assets (Infrastructure)

6.2.10 Maximising the efficiency and performance of existing resources and infrastructure were identified as key in the development of NPF3 and SPP, and constitute a central theme in the recently published draft Climate Change Plan, draft Scottish Energy Strategy, and Making Things Last. The previous assessments undertaken on these policies identified the likelihood of improved efficiencies across many sectors. For example, greater efficiency in the generation, distribution, and use of energy was considered likely to reduce Scotland's overall energy demand. The SEA of the draft Scottish Energy Strategy noted that this should reduce pressure on existing energy infrastructure and resources, and help to optimise their sustainable use. The SEA also considered that decentralisation of energy production could have similar benefits, potentially helping to enhance resilience to the challenges the sector faces as a result of the impacts of climate change.

6.2.11 The assessment undertaken for the draft Climate Change Plan considered that ambitions to decarbonise the transport sector could significantly reduce pressure on Scotland's road infrastructure, in particular proposals aimed at reducing traffic congestion and travel journeys, shifting road freight to rail, and improving traffic management. The inclusion of guidance on coastal development in the SPP, including providing infrastructure to facilitate greater use of low carbon fuel options, was identified as being of particular importance

in Scotland's more car dependent coastal areas. Likewise, Making Things Last and its SEA found that the implementation of circular economy principles should help to reduce landfill waste, promote the use of waste as a resource, and reduce the need for additional landfill infrastructure.

6.2.12 The SEA of the draft Climate Change Plan and draft Scottish Energy Strategy considered that having the appropriate infrastructure in place would be crucial to implementing the policies and proposals they set out. The SEA also found that utilising existing infrastructure efficiently, such as through the use of systems such as Active Network Management and energy storage, could also be beneficial in terms of material assets.

6.2.13 The SEA for the draft Climate Change Plan and draft Scottish Energy Strategy identified that additional infrastructure would likely be required to fully realise Scotland's climate change ambitions and commitments. Both the draft Scottish Energy Strategy and its SEA identified that moves to decentralise energy generation could present new challenges for distribution networks[89]. In particular, it noted that this could introduce a requirement for new or upgraded infrastructure (e.g. to manage distribution and accommodate a growth in demand for heat and electricity). The assessment considered that a requirement for new, more flexible infrastructure would be needed to realise ambitions for further decarbonisation in energy and transport, and could help to meet an associated increase in demand for energy.

6.2.14 The SEA for the draft Climate Change Plan and draft Scottish Energy Strategy considered that a progressive shift towards low carbon and renewable energy technologies as part of Scotland's varied energy mix could have positive impacts on a range of topic areas. For example, the assessment identified the potential for a reduction in pollution as likely to be beneficial for water, air, soil, biodiversity, and population and human health. A reduced need for the development of new raw material sources could reduce pressure on waste streams, with the potential for positive effects in terms of material assets. The SEA noted that the emergence of new energy technologies and opportunities to expand existing technologies is also expected to come with some level of infrastructure requirements. For example, it found that greater uptake of local/community generation such as the development of district heating networks and further growth in onshore and offshore wind development would necessitate that appropriate grid, road, and marine infrastructure is in place. Similarly, greater prominence of electricity as an energy source for transport and heating will likely place additional burdens on the grid and could necessitate additional infrastructure development to cater for this increased demand. However, the SEA also felt that pursuing established technologies

[89] DECC (2012) Electricity System: assessment of future challenges – summary [online] Available at: https://www.gov.uk/government/publications/electricity-system-assessment-of-future-challenges (accessed 03/07/2017)

and opportunities, such as the repowering of existing wind farms, could make use of existing infrastructure such as roads and grid connections.

6.2.15 NPF3 and SPP highlighted the importance of climate change resilience as a key consideration in any future infrastructure works. The SEA for the draft Climate Change Plan and draft Scottish Energy Strategy found that there are likely to be opportunities to coordinate upgrades and maintenance works in order to reduce the potential for impacts on environmental receptors (e.g. disturbance). However, it was also considered that many opportunities may also have mixed effects. For example, while the decommissioning of offshore oil and gas could present opportunities to reuse infrastructure for growth in other technologies (e.g. reuse of platforms and wells for CCS), not all equipment is likely to be suitable for reuse. The assessment identified that this could create additional waste management pressures. It also noted that consideration would need to be given to the potential for environmental effects arising from any future infrastructure requirements in meeting Scotland's climate change commitments. This is discussed further in the following question.

The potential for secondary environmental effects (all SEA topic areas) identified in previous assessments

6.2.16 The previous assessments considered in this SEA identified the potential for mixed or negative indirect/secondary effects associated with the implementation of climate change action set out in current Scottish policy. The SEA for the draft Climate Change Plan in particular identified the potential for adverse effects from construction and development work; for example, in implementing proposals for improving the energy efficiency of Scotland's building stock, upgrading infrastructure, and proposals seeking to increase climate change resilience. That assessment, and that of NPF3 and SPP, considered that many of the potential environmental effects will be at local scale where development, without careful planning, could negatively impact on soil, water, landscape, and cultural heritage. Impacts from construction works were likely to be largely temporary, and could include increased noise and vibration disturbance of nearby receptors (e.g. people and biodiversity features), visual impacts, and air quality effects.

6.2.17 The SEA undertaken for the draft Climate Change Plan and draft Scottish Energy Strategy found that negative impacts can also arise, in some instances, from the presence and operation of infrastructure and energy technologies. For example, the draft Energy Strategy included an approach to repowering windfarms reaching the end of their 25 year planning permission period. The SEA considered that while having fewer larger wind turbines could reduce bird collision risk, the repowering of wind turbines with larger, more efficient turbines

could increase collision risk for some bird species. The potential for marine fauna and seabird impacts from the operation and maintenance of offshore renewables has also been identified in numerous assessments such as the SEA for the Scottish Government's Draft Sectoral Marine Plans for Offshore Renewable Energy in Scottish Waters[90].

6.2.18 The findings of the SEA undertaken for the draft Climate Change Plan and draft Scottish Energy Strategy also identified the potential for the installation of energy efficiency measures on existing domestic and non-domestic building stock to have adverse environmental effects. For example, the potential for adverse effects associated with energy efficiency works involving changes to the fabric of buildings of historic and cultural significance, and/or to their settings, was noted. It was also noted that specific works, such as those on roofs or in roof cavities, could have the potential for negative effects on biodiversity.

6.2.19 The potential for visual effects arising from the uptake of many technologies at the national and local scale, and through associated changes in land use, have been considerations in several previous assessments. For example, the SEA for the draft Climate Change Plan identified the potential of larger, more efficient wind turbines, the implementation of technologies such as CCS, further growth in the offshore wind and marine renewables sector, and a shift to hydrogen gas heat source to have negative impacts on landscapes and seascapes, amongst other topic areas. However, the SEA also noted that the significance of impacts would be influenced by factors such as the scale of change. For example, onshore and offshore wind or marine renewables can have large visual envelopes, and thus the potential to impact on landscape and seascape. If inappropriately sited and designed, the presence and operation of this infrastructure could also affect the setting of historic buildings and other features, as well as presenting risks to other environmental features (e.g. biodiversity, flora, and fauna).

6.2.20 Several of the policies and proposals set out in the draft Climate Change Plan, and also in the Second Land Use Strategy, pertain to smarter land management. These share common objectives for rehabilitating degraded land, sustainable land use, maximising the efficient use of existing infrastructure and resources, and protecting and supporting the provision of ecosystem services. This has been identified in a number of previous assessments, most notably in the SEA for the Second Land Use Strategy. That assessment identified the potential for largely positive and far-reaching environmental effects through pursuing these objectives, particularly as the health and productivity of Scottish lands and resources is inherently dependent on the condition of its waters and soils.

[90] Scottish Government (2013) Planning Scotland's Seas - SEA of Plans for Wind, Wave and Tidal Power in Scottish Marine Waters - Environmental Report [online] Available at: http://www.gov.scot/Resource/0042/00428212.pdf (accessed 29/06/2017)

6.2.21 The assessment of the draft Climate Change Plan and draft Scottish Energy Strategy identified the potential for an increased role for bioenergy and associated demand for feedstocks. For example, the SEA identified the potential for visual effects as well as negative impacts on other land uses, exacerbation of soil erosion issues, and removing microhabitats such as field margins that sustain biodiversity, amongst others. It also noted that increased demand for feedstocks could lead to significant land use changes, and identified the importance of sustainable land use and management in mitigating any potential adverse environmental effects.

Key findings from Stage One of the assessment

- It is widely regarded that climate change is one of the most serious threats facing the world today. Climate change has the potential for adverse environmental effects across each of the SEA topic areas.
- The challenge of meeting Scotland's ambitious emissions reduction targets cannot be met by one sector alone, but rather, effort is required across all sectors.
- Previous assessment work identified the likelihood of largely positive environmental effects from Scottish action to reduce GHG emissions, particularly if part of a wider global effort. Benefits in relation to climatic factors, air quality, and population and human health were noted in particular.
- There is also the potential for largely positive environmental effects for material assets through the implementation of Scotland's climate change ambitions. In particular, opportunities to maximise efficiencies in the use of natural resources and infrastructure, improving resilience, and having appropriate infrastructure in place should underpin wider climate change action and lead to benefits for a wide range of industries and sectors.
- The potential for significant indirect and secondary effects was noted both as a consequence of climate change itself, and from the implementation of policies and actions to mitigate and adapt to its predicted effects. In particular:
  - There is the potential for negative effects due to disturbance from construction works, from the presence and operation of new infrastructure, and from action such as energy efficiency works on historic buildings, amongst others.
  - Current policies aimed at enhancing Scotland's carbon sequestration potential such as increasing peatland restoration and woodland growth, and improving farm and land use management practices, are likely to yield positive environmental effects.
  - It was considered that existing mechanisms such as the Scottish planning and marine licensing systems as well as project-level controls (e.g. design and environmental management) should continue to play an important role in helping to manage and mitigate the potential for any indirect/secondary adverse effects.

7 Assessment findings: Stage Two

7.1.1 The following paragraphs set out the findings of the second stage of the assessment process which focused on the proposals in the Consultation Paper to raise the ambition of targets to reduce GHG emissions.

7.2 A more ambitious 2050 target

Proposal:

Increase the ambition of the 2050 target to at least a 90% reduction in GHG emissions from baseline levels.

7.2.1 This proposal seeks to strengthen Scotland's long-term commitments to reduce GHG emissions.

7.2.2 The establishment of more ambitious targets does not in itself lead to direct environmental effects. Rather, as identified in previous SEA work, environmental effects are likely to arise as a result of current and future actions and measures that will be implemented to meet the targets. However, the setting of a new, even more challenging 2050 target (alongside new interim targets for 2030 and 2040) is likely to build upon current commitments and drive the implementation of more ambitious actions to deliver greater reductions in GHG emissions over the long term. This is likely to lead to positive environmental effects, particularly for climatic factors. It has also become increasingly evident through the findings of previous SEA work that since the introduction of the 2009 Act, action to reduce GHG emissions can also lead to wider benefits that align with broader Scottish Government policy objectives, such as those that seek to promote health or improve housing stock.

7.2.3 In order to reach a more ambitious long-term target to reduce emissions, there may be a need to accelerate effort associated with decarbonisation delivery measures over the longer term. In many instances, such actions could lead to positive effects: for example, additional effort in decarbonising transport and increasing alternative travel options could lead to more rapid reductions in air pollution and the faster realisation of benefits in terms of improved local air quality. Increased participation in sustainable forms of travel, such as walking and cycling, could have physical and mental health benefits for individuals over a shorter timeframe than is currently in place. Similarly, an accelerated programme of delivering warmer, more energy efficient and energy secure housing stock could provide more immediate benefits to human health, particularly if funding and efficiency efforts are concentrated towards areas where benefits would be realised to greatest effect.

7.2.4 The potential for mixed or adverse environmental effects associated with accelerated progress towards decarbonisation over the longer term is also considered likely. For example, greater adoption of low carbon and renewables technologies ranging from small scale measures such as heat pumps to large scale installations such as wind turbine arrays could lead to faster reductions in GHG emissions within the energy sector. However, negative impacts may also arise from the increased uptake of these technologies, such as those that can arise on biodiversity, landscape, and cultural heritage from infrastructure requirements. Additionally, the operation of some technologies can have negative impacts. For example, the increased use of biomass has led to concerns regarding the potential for air quality impacts, alongside those that may arise from any associated increase in the production of feedstocks if not managed sustainably[91].

7.2.5 Scotland's ambitious targets for tackling climate change cannot be met by one sector alone; rather, a collaborative effort will be required across all sectors[92]. This is best demonstrated through the policies and proposals set out in the draft Climate Change Plan, which span across all sectors of the Scottish economy: energy, transport, industry, and the built environment. It is also demonstrated by the 'whole systems' approach to energy generation set out in the draft Energy Strategy. Wider benefits of taking such an integrated approach include improved air quality from action to decarbonise transport and warmer, more energy efficient homes[93].

7.2.6 Land use management can have a significant effect on overall GHG emissions as well as on Scotland's capacity to adapt to the predicted impacts of climate change[94]. For example, moving towards a more climate friendly agriculture sector can help curb emissions arising from crop and livestock production, while the forestry sector plays a vital role in both carbon storage and flood management. The effective management of urban land, in particular greenspaces, can yield additional benefits that extend beyond climatic factors, such as the creation of habitats and improved air quality and access to outdoor space[95].

7.2.7 Opportunities to further enhance climate change action and resilience across a range of sectors could involve greater exploration of the marine environment. However, whilst the marine environment plays a crucial role in supporting mitigation measures such as through the provision of wave and tidal energy, its

[91] Scottish Government (2017) Strategic Environmental Assessment Environmental Report on the Draft Climate Change Plan and Draft Scottish Energy Strategy [online] Available at: http://www.gov.scot/Publications/2017/01/9030 (accessed 26/06/2017)

[92] ibid

[93] ibid

[94] Scottish Government (2016) Land Use Strategy 2016 – 2021 [online] Available at: http://www.gov.scot/Topics/Environment/Countryside/Landusestrategy/LUS2consultation (accessed 03/07/2017)

[95] ibid

potential role in the sequestration of carbon is not as well understood as land-based sequestration methods. Action to manage the network of Marine Protected Areas and the future review of Priority Marine Features will provide one opportunity to consider the key role the marine environment plays as a carbon sink.

7.2.8 Additionally, the interface between coast and land can be challenging to address and greater alignment of the principles of the Land Use Strategy with those found in marine planning, such as the National Marine Plan, could help facilitate greater consideration of the interaction between the terrestrial and marine environments[96,97]. This is likely to become increasingly important as the impacts of climate change have the potential to be realised along much of Scotland's extensive coast.

7.2.9 Infrastructure is likely to play a key role in delivering much of the action required to reduce emissions and appropriate infrastructure will need to be in place to facilitate a transition to a decarbonised energy sector. However, there are some challenges that lie ahead with respect to ensuring that the necessary infrastructure is made available. For example, the demand for energy is expected to rise significantly as a result of the electrification of transport and heat[98], placing additional pressure on electricity generation and distribution infrastructure. The emergence of new technologies and the expansion of existing ones will also come with some level of infrastructure requirements, whether for large scale or local generation[99]. This will be of particular relevance when considering the greater use of renewable and low carbon technologies such as CCS, offshore and onshore renewables, and low carbon heat and storage. Technologies such as these are likely to play a greater role as part of a diverse and balanced energy mix that will be needed to support the transition towards the decarbonisation of energy generation and use[100].

7.2.10 If not appropriately sited and designed, there is likely to be the potential for the intensification of some environmental effects arising from the installation of technologies and infrastructure. Examples include additional competition for land, the potential intensification of construction activity, and visual impacts. However, existing mechanisms such as the planning system, energy consenting procedures, project-level controls, and associated environmental

[96] Scottish Government (2016) Land Use Strategy 2016 – 2021 [online] Available at: http://www.gov.scot/Topics/Environment/Countryside/Landusestrategy/LUS2consultation (accessed 03/07/2017)

[97] Scottish Government (2012) A Consultation on the 2020 Challenge for Scotland's Biodiversity [online] Available at: http://www.gov.scot/Publications/2012/07/5241/downloads (accessed 26/06/2017)

[98] Scottish Government (2017) Strategic Environmental Assessment Environmental Report on the Draft Climate Change Plan and Draft Scottish Energy Strategy [online] Available at: http://www.gov.scot/Publications/2017/01/9030 (accessed 26/06/2017)

[99] ibid

[100] Scottish Government (2017) Strategic Environmental Assessment Environmental Report on the Draft Climate Change Plan and Draft Scottish Energy Strategy [online] Available at: http://www.gov.scot/Publications/2017/01/9030 (accessed 26/06/2017)

assessment processes should continue to play important roles in identifying, avoiding, and mitigating the potential for adverse effects associated with local-level development. Further, opportunities to co-locate infrastructure and coordinate development work could help to mitigate the potential for adverse effects and in some instances, existing infrastructure may be used.

7.2.11 At this stage there is, inherently, a degree of uncertainty regarding the extent of action and environmental impacts that may arise as a result of increased effort to meet more ambitious targets. As new plans and policies emerge, the potential for cumulative impacts will need to be considered, such as visual impacts from infrastructure or impacts on air quality through climate change action. The latter is of particular relevance as it is likely that 'negative emission' technologies (those that absorb CO_2 from the atmosphere, such as the use of bioenergy with CCS) will become more important as Scotland contemplates a net-zero level of emissions later in the century[101]. As noted in the Consultation Paper, the CCC have advised that adequate evidence is not available at this time to inform the setting of a target for net-zero levels of Scottish GHG emissions, further noting that a 90% target for 2050 is at 'the very limit of feasibility'.

7.2.12 With the proposal to keep the setting of a net-zero emissions target under review, the role of land management and the marine environment in storing carbon is likely to become increasingly important. As discussed earlier, the way in which land is managed and used can also make a fundamental contribution towards adapting to the anticipated impacts of climate change[102]. Additionally, action to improve efficiencies in sectors such as the built environment and energy sector through improvements in the energy efficiency of housing stock and reducing energy demand are also likely to become of greater importance by optimising the use of existing infrastructure and resources. As such, it is possible that the increased effort that is likely to be required to meet more ambitious targets to reduce GHG emissions could benefit adaption efforts and improve Scotland's resilience to the predicted impacts of climate change.

7.2.13 Proposals such as the setting of interim targets, and on the role of future climate change plans if there is a cumulative under-performance against targets, have been considered as steps that will complement the overall strategic ambition of a more ambitious target for 2050.

[101] University of Cambridge & World Energy Council (2014) Climate Change: Implications for the Energy Sector - Key Findings from the Intergovernmental Panel on Climate Change Fifth Assessment Report [online] Available at: http://www.cisl.cam.ac.uk/business-action/low-carbon-transformation/ipcc-climate-science-business-briefings/pdfs/briefings/IPCC_AR5_Implications_for_Energy_Briefing_WEB_EN.pdf (accessed 26/06/2017)

[102] Scottish Government (2016) Land Use Strategy 2016 – 2021 [online] Available at: http://www.gov.scot/Topics/Environment/Countryside/Landusestrategy/LUS2consultation (accessed 26/06/2017)

7.3 Consideration of the reasonable alternative

Reasonable alternative proposal:

Maintain the 2050 target of at least an 80% reduction in GHG emissions from baseline levels for now, creating review points at which the target ambition could be increased.

7.3.1 The policies and proposals set out in the draft Climate Change Plan are the primary vehicle for reducing Scotland's GHG emissions and meeting the targets (currently set out to 2032) under the 2009 Act. Other strategic plans, programmes, and strategies such as Scotland's draft Energy Strategy[103], the second Land Use Strategy[104], Scotland's Energy Efficiency Programme (SEEP)[105], the draft Peatland and Energy Policy Statement[106], and the Scottish Forestry Strategy[107] also contribute to meeting Scotland's current climate change objectives.

7.3.1 Under the alternative proposal of maintaining the existing 2050 target, current and long-term actions to reduce emissions and contribute to climate change mitigation and adaptation efforts are likely to continue as at present.

7.3.2 Similarly, many of the trends identified in the environmental baseline are considered likely to continue along their current trajectories, both positive and negative, under the alternative proposal. For example, a number of secondary effects that arise from activity to reduce GHG emissions have been identified throughout this assessment such as impacts on air quality, population and human health, and material assets. It is considered that, under the reasonable alternative approach, these pressures would likely remain consistent with current levels of climate change action.

7.3.3 It is considered likely that under the reasonable alternative approach, significant benefits would still arise for climatic factors in particular. This view has been based on the findings of previous SEA assessments that considered the impacts of climate change action across a range of sectors. However, this alternative approach may represent a missed opportunity to strengthen Scotland's climate change commitments, and build upon current progress

[103] Scottish Government (2017) Scottish Energy Strategy: The future of energy in Scotland [online] Available at: http://www.gov.scot/Resource/0051/00513466.pdf (accessed 27/06/2017)

[104] Scottish Government (2016) Land Use Strategy 2016 – 2021 [online] Available at: http://www.gov.scot/Topics/Environment/Countryside/Landusestrategy (accessed 27/06/2017)

[105] Scottish Government (2017) Scotland's Energy Efficiency Programme (SEEP) – Phase 2 [online] Available at: http://www.gov.scot/Topics/Business-Industry/Energy/Action/lowcarbon/LCITP/SEEP (accessed 27/06/2017)

[106] Scottish Government (2016) Draft Peatland and Energy Policy Statement [online] Available at: http://www.gov.scot/Resource/0050/00502389.pdf (accessed 03/07/2017)

[107] Scottish Government (2014) The Scottish Forestry Strategy: Progress Report (2014-15) and Future Implementation (2015 – 18) [online] Available at: http://scotland.forestry.gov.uk/images/corporate/pdf/sfs-implementation-plan-2015-2016.pdf (accessed 27/06/2017)

towards reducing GHG emissions. The proposal to set a more ambitious 2050 target would build upon Scotland's already significant efforts at addressing the causes of climate change and could help to deliver wider long-term benefits across other environmental topic areas. It would further reinforce Scotland's established reputation as a leader in climate change action, and enhance efforts at tackling global climate change in combination with international commitments such as the Paris Agreement.

7.3.4 It is a requirement of the 2005 Act that consideration is also given to the evolution of the baseline in the absence of the plan, programme, or strategy. As stated, many of the trends identified in the environmental baseline are considered likely to continue on their current trajectory in the absence of the proposal of a more ambitious 2050 target. As such, and for the purposes of this assessment, it is viewed that the assessment findings regarding the impacts likely to arise from the reasonable alternative can also be considered to apply to the evolution of the baseline in the absence of the proposal to establish a new 2050 target to reduce GHG emissions by at least 90% from baseline levels.

7.4 Additional technical proposals on target mechanisms

7.4.1 As set out above, it is considered that the principal environmental impacts from the proposals set out in the Consultation Paper will be in relation to the proposed changes to the levels of long-term emissions reduction targets. The additional, more technical proposals have not been explored in detail in this SEA. However, a brief summary of the assessment findings for the main technical proposals contained in the Consultation Paper are set out below.

Actual emissions accounting

7.4.2 The EU Emissions Trading System ('EU ETS') is a key component of the EU's policy to combat climate change, with a 20% emissions reduction target for 2020 and 30% by 2030 below 2005 levels. The EU ETS, in operation since 2005, aims to mitigate climate change by limiting EU-wide GHG emissions from large point source emitters (primarily electricity generation and energy-intensive industries) through a cap and trade-based approach.

7.4.3 Under the carbon accounting rules set out in the 2009 Act, the contribution of the 'traded sectors' in measuring progress towards targets is determined by the Scottish share of emissions allowances covered by the EU ETS, rather by than the actual level of emissions.

7.4.4 A component of the advice provided by the CCC on the Climate Change Bill was that Scotland's emissions accounting framework should shift to one based on actual Scottish emissions, rather than on the current 'adjusted basis'. This proposal has been taken forward in the Consultation Paper. It is noted that the proposal to change the emissions accounting basis for future targets would not change how the EU ETS operates in practise. This is of particular importance

when considering future emissions reductions from energy-intensive industry and the power sector.

Consistent annual targets

7.4.5 The 2009 Act makes provisions for annual emissions to be set every year up to 2050. These are currently specified as fixed amounts of GHG emissions, measured in tonnes of carbon dioxide equivalent, and are set in five year batches through secondary legislation.

7.4.6 A component of the advice provided by the CCC on the Climate Change Bill stated that all emissions reduction targets, including annual targets, should be set in the form of percentage reductions from baseline levels. This proposal has been taken forward in the Consultation Paper.

7.4.7 The Consultation Paper also includes a proposal to set annual target levels directly from those of interim and 2050 targets, rather than through secondary legislation.

A flexible and responsive target framework

7.4.8 The Consultation Paper includes a proposal that the levels of the interim and 2050 targets should be allowed to be updated, subject to due regard to advice from the CCC, through secondary legislation.

Proposals:

Further technical proposals in the Consultation Paper relating to the technical mechanisms associated with the target framework.

7.4.9 These further proposals, such as the use of interim targets, and on the role of future climate change plans if there is a cumulative under-performance against targets, are largely administrative and are unlikely to have any direct environmental effects. However, they should help to improve openness and transparency in terms of how GHG emissions are accounted for and reported. In particular, it is anticipated that setting all targets on the basis of 'actual Scottish emissions' and in the same form (as percentage reductions from baseline levels) should substantially improve transparency around the measurement of progress.

7.4.10 Setting annual targets as a direct consequence of long-term targets should ensure that the two sets of targets remain fully consistent with one another. Allowing for the updating of long-term target levels in the case of changing circumstances and evolving evidence should allow for a more flexible and responsive target framework.

8 Identifying mitigation measures and opportunities for enhancement

8.1.1 A key part of the SEA process is to identify possible mitigation measures for any adverse effects, as well as opportunities to enhance benefits. As noted throughout this assessment, it is considered that the likely environmental effects will arise through current and future action to meet strengthened emissions targets and not through the setting of the targets themselves. As such, there are limitations to the mitigation that can be proposed as this will fall within the scope of influence of future Reports on Policies and Proposals, such as the current draft Climate Change Plan, rather than the proposed new Climate Change Bill.

8.1.2 The proposals set out in the Consultation Paper would make Scotland's long-term GHG emissions reductions targets more ambitious, strengthening Scotland's climate change commitment. It is likely that there may be a need to accelerate effort to reach more ambitious long-term targets, which also has the potential to maximise opportunities for Scotland to adapt to the predicted effects of climate change.

8.1.3 While there will be clear benefits from further reductions in GHG emissions and greater climate change resilience, the potential for indirect and secondary adverse environmental effects is noted. For example, the development or upgrading of infrastructure is likely to be required through the increased uptake of low carbon and renewable technologies and the decarbonisation of the heat and transport sector. This has the potential to lead to negative effects on a range of topics, such as landscape and cultural heritage, biodiversity, and soil. Additionally, the installation and operation of some low carbon and renewable technologies has the potential to lead to negative impacts, such as increased noise exposure and implications for air quality. The development or updating of plans, programmes, and strategies to facilitate further GHG emissions reductions will themselves require consideration under the Environmental Assessment (Scotland) Act 2005.

8.1.4 It is expected that mitigation of environmental effects associated with development will continue to be addressed primarily at a project level. For example, considering infrastructure for offshore renewables and repowering of onshore and offshore wind development under existing regulatory regimes such as energy consents and planning, marine licensing, EIA and HRA, and regulations relating to the management of protected species will help to manage the potential for environmental effects prior to works commencing. Ensuring appropriate design and construction management measures (e.g. Environmental Management Plans) are implemented at the project level should also help minimise the potential for adverse impacts to the environment and to nearby receptors (e.g. those arising from noise, dust, and vibration).

9 Proposals for monitoring

9.1.1 Annual monitoring and reporting of Scotland's overall GHG emissions abatement, at national and sectoral levels, is already undertaken through both statutory reports from the Scottish Government to Parliament and through independent reports from the CCC. The proposed Bill would retain these requirements[108].

9.1.2 The draft Climate Change Plan proposed the development of an associated monitoring framework. The planned publication of an Annual Energy Statement outlined in the draft Scottish Energy Strategy should also provide opportunities to monitor progress in reducing emissions in the energy sector. Together, these could also help to identify further opportunities to adapt Scottish policy and actions in relation to climate change, and in meeting changing needs and circumstances.

9.1.3 A wide range of existing programmes are in place at the national and local level to report on environmental status and assess performance against established environmental indicators. In many instances, this includes monitoring progress in reducing GHG emissions. For example, the Key Scottish Environment Statistics Report provides information on a wide range of environmental topics and indicators, including performance against indicators for GHG emissions and climate, air quality, land use, water, waste, and biodiversity. It also includes key datasets on the state of the environment in Scotland, with an emphasis on the trends over time where possible[109].

9.1.4 A number of existing programmes are in place targeting specific environmental topic areas. For example, the Water Framework Directive[110] sets the statutory obligation for monitoring of water quality by member states, and monitoring of Scotland's rivers, canals, freshwater lochs, estuaries, and coastal and offshore waters is undertaken by SEPA and reported annually[111]. Monitoring as part of the Water Framework Directive includes a biodiversity element, through the requirement to consider the ecological quality of water in this monitoring programme. Changes to national levels of biodiversity are also monitored, with a focus on the status of valued and designated biodiversity features, such as Special Areas of Conservation and Special Protected Areas[112]. Additionally,

[108] Committee on Climate Change (2016) Carbon budgets: how we monitor emissions targets [online] Available at: https://www.theccc.org.uk/tackling-climate-change/reducing-carbon-emissions/carbon-budgets-and-targets/ (accessed 27/06/2017)

[109] Scottish Government (2016) Key Scottish Environment Statistics 2016 [online] Available at: http://www.gov.scot/Publications/2016/10/7565 (accessed 27/06/2017)

[110] European Commission (2016) EU Water Framework Directive – integrated river basin management for Europe [online] Available at: http://ec.europa.eu/environment/water/water-framework/index_en.html (accessed 27/06/2017)

[111] Scotland's Environment (undated) Get Informed - Water [online] Available at: http://www.environment.scotland.gov.uk/get-informed/water/ (accessed 27/06/2017)

[112] SNH (2015) Site Condition Monitoring [online] Available at: http://www.snh.gov.uk/protecting-scotlands-nature/protected-areas/site-condition-monitoring/ (accessed 27/06/2017)

the monitoring and reporting of air quality currently takes place at 95 sites located in urban areas throughout Scotland[113], and key performance indicators from the development of the Cleaner Air for Scotland - The Road to a Healthier Future[114] are also monitored.

9.1.5 Together, these monitoring programmes are expected to be important considerations in the development of future plans, programmes, and strategies, and particularly in continuing to inform future SEA processes. It is also likely that as new policies and proposals are brought forward, including as part of future iterations of the Climate Change Plan for example, further monitoring proposals may be developed to review progress of their implementation.

[113] Air Quality in Scotland (2017) Air pollution levels across Scotland updated hourly [online] Available at: http://www.scottishairquality.co.uk/ (accessed 03/07/2017)

[114] Scottish Government (2015) Cleaner Air for Scotland: The Road to a Healthier Future [online] Available at: http://www.gov.scot/Resource/0048/00488493.pdf (accessed 03/07/2017)

10 Assessment conclusions and recommendations

10.1.1 The following paragraphs set out the conclusions and recommendations identified in the SEA of the proposals for a new Climate Change Bill.

10.1.2 Proposals in the Consultation Paper for a new, more ambitious 2050 target will build upon current action to mitigate climate change, with benefits likely to be experienced for climatic factors in particular. However, wider benefits are also likely to be realised for air quality, population and human health, and material assets. These benefits will be achieved through the actions to meet the new target and not through the setting of the target itself.

10.1.3 The SEA supports greater policy alignment of action to reduce GHG emissions with wider Scottish Government policy objectives in order to maximise potential benefits from climate change action. Additionally, improved policy integration may provide an opportunity at a strategic level to better understand more complex interactions: for example, the link between climate change and air quality, and interaction between the terrestrial and marine environments.

10.1.4 Increased effort to reduce GHG emissions can also support adaptation to climate change, and this SEA advocates that opportunities should be sought to increase adaption and build resilience to the impacts of climate change where possible. The role of land use management has been identified as one area where such benefits for adaptation can be attained. Additionally, the terrestrial and marine environment and the role these can play in storing carbon are likely to play an increasingly important role in the future setting of a target for carbon-neutral growth.

10.1.5 Consideration will need to be given to ensure that appropriate infrastructure is in place to facilitate many of the current and future actions to mitigate climate change. This will be of particular relevance where new technologies and energy sources are developed, and as these begin to play an increasingly important role as part of Scotland's energy mix. This SEA supports the reuse and co-location of infrastructure and the use of existing mitigation, where practicable, to reduce the impacts as identified in previous assessments.

10.1.6 At this stage, there is a degree of uncertainty with regard to the extent of action and environmental impacts that may arise as a result of increased effort to meet a new, more ambitious target. As new plans and policies emerge, consideration will need to be given to the potential for cumulative impacts, such as visual impacts from infrastructure requirements or impacts on air quality from climate change action.

10.1.7 Given that the CCC has advised that evidence is not yet available to set a target for net-zero emissions, the SEA supports the additional proposal to allow for such a target to be set at a later date, once the evidence becomes available.

10.1.8 The technical proposals in the Consultation Paper in relation to the mechanisms for the target framework are not considered likely to have direct environmental impacts.

11 Next steps

When can I respond?

Respondents are asked to submit responses to this Environmental Report directly to the Scottish Government by **22 September 2017.**

How can I respond?

- **Online:** You can respond online using the Scottish Government's consultation platform, Citizen Space, at: **https://consult.scotland.gov.uk/energy-and-climate-change-directorate/climate-change-bill**

  Citizen Space allows you to save and return to your responses while the consultation is still open. A copy of your final response will be emailed to you.

- **By Email or Post:** Responses can be submitted by email, with the Respondent Information Form, to **CCBill@gov.scot** or by mail to The Scottish Government, Climate Change Bill, Area 3-J (South) Victoria Quay, Edinburgh EH6 6QQ.

How will responses be considered?

Following the consultation, a Post-Adoption Statement will be prepared. The Statement will reflect on the views provided on the findings of the assessment and the proposals in the Consultation Paper and will explain how the issues raised have been taken into account in the proposals for a new Climate Change Bill.

A Post-Adoption Statement will be prepared and published alongside, or as soon as practicable, the enactment of the Climate Change Act.

Suggested questions for responses to this Environmental Report

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 confined to these questions, and more general comments on this Environmental Report and the proposals set out in the Consultation Paper are also invited.

1. What are your views on the evidence set out in the Environmental Report that has been used to inform the assessment process? (Please give details of any additional relevant sources.)
2. What are your views on the predicted environmental effects as set out in the Environmental Report?
3. Are there any other environmental effects that have not been considered?
4. Do you agree with the conclusions and recommendations set out in the Environmental Report?
5. Please provide any other comments you have on the Environmental Report.

Appendix A

Relevant environmental protection objectives and environmental baseline information

1 Purpose of this section

1.1.1 Schedule 3 of the 2005 Act requires that the following be identified when undertaking an 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.

1.1.2 There are many objectives for environmental protection and enhancement detailed within existing legislation, policies, strategies, and plans at the international, UK, and national levels across all environmental topic areas. These objectives form the context for this SEA. For each environmental topic area scoped into the assessment, an initial summary of the existing environmental protection objectives has been set out in the following sections of this Scoping Report.

1.1.3 It is expected that sufficient information will also be provided in the environmental baseline to explore the implications of the draft Climate Change Bill with regard to action that is undertaken and likely to continue to be undertaken in order to meet climate change targets. This should also help to facilitate discussion around the potential for indirect and secondary effects on other environmental topic areas as a consequence of the proposals set out in the Consultation Paper.

1.1.4 The following text sets out an example of the environmental baseline that is likely to be included in the Environmental Report and used to inform the assessment process. This includes a description of the current state of the environment in Scotland as well as an overview of key existing pressures, including those relating specifically to climatic factors.

1.1.5 Information will be drawn from a range of sources including the Scottish Government, Scottish Natural Heritage (SNH), Historic Environment Scotland (HES), the Scottish Environment Protection Agency (SEPA), and Scotland's Environment Web, amongst others.

2 Biodiversity, flora and fauna

2.1 Environmental protection objectives

2.1.1 To date, significant work has been undertaken at the international, European, and national level to address the challenges faced by biodiversity, flora, and fauna. Most notable are the Aichi Targets for 2020[115], a product of the United Nations Convention on Biological Diversity[116] and developed in support of the Strategic Plan for Biodiversity 2011-2020[117]. The Targets underpin five strategic goals relating to various aspects of biodiversity including raising awareness of the causes of biodiversity loss and reducing direct pressures.

2.1.2 At the European level are the EC Habitats (92/43/EEC)[118] and Birds (2009/147/EC)[119] Directives. The maintenance and enhancement of biodiversity, with an emphasis on protecting rare and endangered wild species and natural habitats of European significance, are key aims. The Natura 2000 network is the primary vehicle for meeting these collective aims and comprises terrestrial and marine Special Protection Areas (SPAs) and Special Areas of Conservation (SACs) [120]. Many of these sites are also underpinned by Sites of Special Scientific Interest (SSSI)[121].

2.1.3 The UK Biodiversity Action Plan[122] and its successor, the UK Post-2010 Biodiversity Framework[123], unites and coordinates conservation strategies across all four UK countries in an effort to identify and capitalise upon common

[115] Convention on Biological Diversity (2010) Aichi Biodiversity Targets [online] Available at: https://www.cbd.int/sp/targets/default.shtml (accessed 21/06//2017)

[116] Convention on Biological Diversity (1993) Text of the CBD [online] Available at: https://www.cbd.int/convention/text/ (accessed 21/06/2017)

[117] Convention on Biological Diversity (2010) Strategic Plan for Biodiversity 2011-2020 [online] Available at: https://www.cbd.int/decision/cop/?id=12268 (accessed 21/06/2017)

[118] European Commission (1992) The Habitats Directive [online] Available at: http://ec.europa.eu/environment/nature/legislation/habitatsdirective/index_en.htm (accessed 21/06/2017)

[119] European Commission (2009) The Birds Directive [online] Available at: http://ec.europa.eu/environment/nature/legislation/birdsdirective/index_en.htm (accessed 21/06/2017)

[120] Scottish Government (2016) Natura 2000 [online] Available at: http://www.gov.scot/Topics/Environment/Wildlife-Habitats/protectedareas/NATURA (accessed 21/06/2017)

[121] Scottish Natural Heritage (2016) Sites of Special Scientific Interest [online] Available at: http://www.snh.gov.uk/protecting-scotlands-nature/protected-areas/national-designations/sssis/ (accessed 21/06/2017)

[122] JNCC (2012) The UK Biodiversity Action Plan [online] Available at: http://jncc.defra.gov.uk/page-6189 (accessed 21/06/2017)

[123] JNCC (2012) The UK Post-Biodiversity Framework [online] Available at: http://jncc.defra.gov.uk/page-6189 (accessed 21/06/2017)

conservation priorities. The 2020 Challenge for Scotland's Biodiversity[124] is Scotland's response to the UN Aichi Targets for 2020 and the EU Biodiversity Strategy to 2020[125]. The 2020 Challenge supplements the 2004 Scottish Biodiversity Strategy[126]. Key aims include preserving and restoring the health of Scotland's ecosystems at a catchment scale and promoting climate change resilience.

2.1.4 Other conservation measures include Biosphere reserves[127], Ramsar sites[128], National Parks[129], Regional Parks[130], National Nature Reserves[131], and Local Nature Reserves[132]. 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.

2.2 Baseline information

Current state

2.2.1 Scotland's natural environment is diverse and supports a rich array of flora and fauna species.

- Upland areas comprise 50% of our total land area with blanket bog covering another 23%[133]. Additional ecosystems include an extensive coastline, numerous freshwater and sea lochs, large areas of forest, moorland, and peatland.

[124] Scottish Government (2013) 2020 Challenge for Scotland's Biodiversity: A Strategy for the conservation and enhancement of biodiversity in Scotland [online] Available at: http://www.gov.scot/Resource/0042/00425276.pdf (accessed 21/06/2017)

[125] European Commission (2011) European Biodiversity Strategy to 2020 [online] Available at: http://ec.europa.eu/environment/nature/info/pubs/docs/brochures/2020%20Biod%20brochure%20final%20lowres.pdf (accessed 21/06/2017)

[126] Scottish Government (2004) Scotland's Biodiversity Strategy: It's in Your Hands – A strategy for the conservation and enhancement of biodiversity in Scotland [online] Available at: http://www.gov.scot/Publications/2004/05/19366/37239 (accessed 21/06/2017)

[127] UNESCO (undated) Biosphere Reserves – Learning Sites for Sustainable Development [online] Available at: http://www.unesco.org/new/en/natural-sciences/environment/ecological-sciences/biosphere-reserves (accessed 21/06/2017)

[128] Ramsar Convention on Wetlands (1975) Text of the RCW [online] Available at: http://www.ramsar.org/document/the-convention-on-wetlands-text-as-amended-in-1982-and-1987 (accessed 21/06/2017)

[129] Scottish Government (2013) National Parks in Scotland [online] Available at: http://www.gov.scot/Topics/Environment/Countryside/16131 (accessed 21/06/2017)

[130] SNH (2014) Regional Parks [online] Available at: http://www.snh.gov.uk/protecting-scotlands-nature/protected-areas/local-designations/regional-parks/ (accessed 03/07/2017)

[131] Scotland's National Nature Reserves (2015) Introducing National Nature Reserves (NNRs) [online] Available at: http://www.nnr-scotland.org.uk/about-reserves/introducing-nnrs/ (accessed 21/06/2017)

[132] SNH (2017) Scotland's Local Nature Reserves [online] Available at: http://www.snh.gov.uk/enjoying-the-outdoors/where-to-go/nature-reserves-and-parks/lnrs/ (accessed 21/06/2017)

[133] SNH (2015) Peat bogs [online] Available at: http://www.snh.gov.uk/about-scotlands-nature/habitats-and-ecosystems/mountains-heaths-and-bogs/peat-bogs/ (accessed 21/06/2017)

- The Scottish coast and marine environment include sites of international importance for bird species including seabirds[134].
- Forests and woodlands are home to a disproportionately high percentage of Scotland's total biodiversity[135], particularly native and especially ancient, semi-natural woodlands[136].
- The farmland and lowland ecosystem benefit biodiversity by improving habitat connectivity[137]. In particular, field margins provide habitats for a range of animals including invertebrates that may serve as crop pollinators[138].
- Some of the species and habitats found within Scotland have been classified as globally rare or endemic, such as the Scottish crossbill[139] and blanket bog[140] and lowland heath[141].
- Greenspaces within urban areas can help alleviate habitat fragmentation and enhance biodiversity by helping form 'green networks'[142].
- Biodiversity is a good indicator of the health status of other aspects of the environment, such as soil and water.

Existing pressures

2.2.2 Land use change and poor land management are major drivers of biodiversity loss and ecosystem degradation.

- Pressures stem from agriculture, forestry, and the need for land for development and urban expansion.
- These activities result in habitat fragmentation, damage, and loss[143]; the overexploitation of natural resources that sustain biodiversity; and

[134] SNH (2015) Seabirds and shorebirds [online] Available at: http://www.snh.gov.uk/about-scotlands-nature/species/birds/seabirds-and-shorebirds/ (accessed 21/06/2017)

[135] Forestry Commission Scotland (2012) Biodiversity [online] Available at: http://scotland.forestry.gov.uk/supporting/strategy-policy-guidance/biodiversity (accessed 21/06/2017)

[136] Forestry Commission Scotland (2014) Native Woodland Survey of Scotland (NWSS) – Ancient woodland information [online] Available at: http://scotland.forestry.gov.uk/supporting/strategy-policy-guidance/native-woodland-survey-of-scotland-nwss/guidance/ancient-woodland (accessed 21/06/2017)

[137] SNH (2009) Natural Heritage Futures: Farmland [online] Available at: http://www.snh.gov.uk/about-snh/what-we-do/nhf/nhf-downloads/ (accessed 21/06/2017)

[138] SNH (2015) Field margins and hedgerows [online] Available at: http://www.snh.gov.uk/about-scotlands-nature/habitats-and-ecosystems/farmland-and-croftland/hedgerows-and-field-margins/ (accessed 21/06/2017)

[139] Forestry Commission Scotland (undated) Scottish Crossbill (Loxia scotica) [online] Available at: http://scotland.forestry.gov.uk/activities/wildlife/scottish-crossbill (accessed 03/07/2017)

[140] SNH (2015) Peat bogs [online] Available at: http://www.snh.gov.uk/about-scotlands-nature/habitats-and-ecosystems/mountains-heaths-and-bogs/peat-bogs/ (accessed 21/06/2017)

[141] SNH (2015) Lowland heathland [online] Available at: http://www.snh.gov.uk/about-scotlands-nature/habitats-and-ecosystems/farmland-and-croftland/lowland-heaths/ (accessed 21/06/2017)

[142] SNH (2011) Habitat networks and spatial ecology [online] Available at: http://www.snh.gov.uk/docs/B924102.pdf (accessed 21/06/2017)

[143] Biodiversity Scotland (2017) Habitat change [online] Available at: http://www.biodiversityscotland.gov.uk/biodiversity/pressures/habitat-change/ (accessed 21/06/2017)

changes to local hydrological regimes that are of particular relevance to wetlands[144], among other negative impacts.

- Agricultural change and intensification have all been linked to decreased farmland biodiversity[145]. In particular, the use of agricultural chemicals and changes in field characteristics have resulted in severe reductions in pollinators such as bees, with potentially serious implications for crop production[146].

2.2.3 Marine environments face specific threats. These primarily relate to pollution and changes in water chemistry due to nutrient deposition and other factors, and dwindling fish and shellfish stocks due to certain fishing practices.

- Elevated nutrient levels, acidification, increased turbidity, and marine non-native species can impact on marine habitats and species[147].
- The main sources of diffuse pollution are agriculture, forestry, marine development, and marine transport.
- In aquatic environments, persistently elevated concentrations of nutrients such as phosphorus and nitrogen can lead to algal blooms and eutrophication[148].

Climatic pressures

2.2.4 Climate change can impact on biodiversity, flora, and fauna in a number of ways, both directly and indirectly.

- Loss of habitats and species, altered migration patterns and breeding cycles, and changes in food availability could all negatively affect biodiversity[149].
- The potential propagation of pests, invasive species, and diseases is another key concern[150].
- Climate change may result in environmental conditions that are favourable to certain species, potentially benefiting biodiversity in some instances[151].

[144] Scotland's Environment (2014) Get Informed – Land – Wetlands [online] Available at: http://www.environment.scotland.gov.uk/get-informed/land/wetlands/ (accessed 21/06/2017)

[145] SNH (2002) Natural Heritage Futures: Farmland [online] Available at: http://www.snh.gov.uk/about-snh/what-we-do/nhf/nhf-downloads/ (accessed 21/06/2017)

[146] SNH (2015) A Pollinator Strategy for Scotland 2016 – 2026: Consultation document [online] Available at: http://www.snh.gov.uk/docs/A1835258.pdf (accessed 21/06/2017)

[147] Scotland's Environment (2011) Estuaries and seas [online] Available at: http://www.environment.scotland.gov.uk/media/54845/Wildlife-Estuaries-and-Seas.pdf (accessed 21/06/2017)

[148] Scottish Government (2011) Scotland's Marine Atlas: Information for The National Marine Plan – Eutrophication [online] Available at: http://www.gov.scot/Publications/2011/03/16182005/38 (accessed 21/06/2017)

[149] SNH (2016) Impacts on nature – species [online] Available at: http://www.snh.gov.uk/climate-change/impacts-in-scotland/species/ (accessed 21/06/2017)

[150] ibid

[151] SNH and The Marine Biological Association (undated) Impacts of climate change on seabed wildlife in Scotland [online] Available at: http://www.marlin.ac.uk/PDF/Climate_change_brochure.pdf (accessed 21/06/2017)

- In terms of indirect impacts, changes in land use in support of mitigation measures such as biomass feedstock production[152] could place additional stress on ecosystems.

3 Population and human health

3.1 Environmental protection objectives

3.1.1 Population and human health are protected by a range of policies and statutes either directly or indirectly. Many of these focus on preventing or limiting exposure to environmental pollutants: for example, the Air Quality Standards (Scotland) Regulations 2010[153], the national equivalent of the EU Ambient Air Quality Directive (2008/50/EC)[154]. These set limits and targets for a number of airborne pollutants with implications for human health, including carbon monoxide, oxides of nitrogen, sulphur dioxide, and particulates.

3.1.2 The Pollution Prevention and Control (Scotland) Regulations 2012 aim to prevent or reduce damage to air, water, and land arising from industrial processes, potentially preventing or reducing adverse human health impacts arising from exposure to industrial-related discharges[155].

3.1.3 There are also measures in place relating to noise pollution and disturbance from vibration. These are entrenched in both the Environmental Noise Directive (2002/49/EC)[156] at the European level and the Environmental Protection Act 1990[157] and the Environmental Noise (Scotland) Regulations 2006[158] at the UK and national levels, respectively.

3.1.4 Provisions for access to the outdoors for recreation are included in the Land Reform (Scotland) Act 2003[159]. In line with this, Scottish Planning Policy states that open space and green networks should be protected, enhanced, and

[152] SNH (2014) Bioenergy [online] Available at: http://www.snh.gov.uk/planning-and-development/renewable-energy/bioenergy/ (accessed 21/06/2017)

[153] The Air Quality Standards (Scotland) Regulations 2010, SSI No. 204 [online] Available at: http://www.legislation.gov.uk/ssi/2010/204/contents/made (accessed 21/06/2017)

[154] European Commission (2008) Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe [online] Available at: http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32008L0050 (accessed 21/06/2017)

[155] The Pollution Prevention and Control (Scotland) Regulations 2012, SSI No. 360 [online] Available at: http://www.legislation.gov.uk/ssi/2012/360/introduction/made (accessed 21/06/2017)

[156] European Commission (2002) Noise - Environmental Noise Directive [online] Available at: http://ec.europa.eu/environment/noise/directive_en.htm (accessed 21/06/2017)

[157] Environmental Protection Act 1990, Chapter 43 [online] Available at: http://www.legislation.gov.uk/ukpga/1990/43/introduction (accessed 21/06/2017)

[158] The Environmental Noise (Scotland) Regulations 2006, SSI No. 465 [online] Available at: http://www.legislation.gov.uk/ssi/2006/465/made (accessed 21/06/2017)

[159] The Land Reform (Scotland) Act 2003, asp 2 [online] Available at: http://www.legislation.gov.uk/asp/2003/2/introduction (accessed 21/06/2017)

promoted as a key aspect of effective placemaking[160]. Green infrastructure is also given consideration in National Planning Framework 3, primarily through the designation of the Central Scotland Green Network as a national development[161]. In addition to performing functions such as supporting active travel networks and habitat creation, green infrastructure can contribute to climate change mitigation by absorbing CO_2 from the atmosphere[162].

3.2 Baseline information

Current state

3.2.1 The importance of the natural environment in promoting human health and well-being is well-documented.

- Regular access to the outdoors provides opportunities for exercise, socialising, and connecting with nature, with associated benefits for both physical and mental health[163]. Approximately half of urban residents reported visiting their local greenspace on a weekly basis[164].
- Air quality is important for both short-term and long-term human health, and poor air quality can have impacts on people with existing health issues.
- Research has shown that air pollution reduces average life expectancy and can lead to premature deaths[165]. Activities that generate air pollutants will be considered under the topic of Air Quality.

Existing pressures

3.2.2 Existing environmental stressors include poor air quality and increasing demand for natural resources.

- Air pollution remains a chronic issue in many areas, particularly urban locations that experience high volumes of traffic. Sulphur dioxide, oxides

[160] Scottish Government (2014) Scottish Planning Policy [online] Available at: http://www.gov.scot/Publications/2014/06/5823 (accessed 21/06/2017)

[161] Scottish Government (2014) National Planning Framework 3: A Plan for Scotland: Ambition, Opportunity, Place and Scottish Planning Policy [online] Available at: http://www.gov.scot/Topics/Built-Environment/planning/NPF3-SPP-Review/NPF3 (accessed 21/06/2017)

[162] Central Scotland Green Network (undated) About Us [online] Available at: http://www.centralscotlandgreennetwork.org/about (accessed 21/06/2017)

[163] Greenspace Scotland (2008) Greenspace and quality of life: a critical literature review [online] Available at: http://www.greenspacescotland.org.uk/SharedFiles/Download.aspx?pageid=133&mid=129&fileid=95 (accessed 21/06/2017)

[164] Scottish Natural Heritage (2014) Scotland's People and Nature Survey 2013/14 [online] Available at: http://www.snh.org.uk/pdfs/publications/commissioned_reports/679.pdf (accessed 21/06/2017)

[165] House of Commons Environmental Audit Committee (2010) Air Quality - Fifth Report of Session 2009 – 10 - Volume 1 [online] Available at: http://www.publications.parliament.uk/pa/cm200910/cmselect/cmenvaud/229/229i.pdf (accessed on 21/06/2016)

of nitrogen, particulates, and low level ozone are generally considered to be of most importance in relation to human health and the environment[166].

- Scotland's population is projected to increase in the coming years, leading to a corresponding increase in demand for natural resources and ecosystem services that is likely to place pressure on the natural environment.

Climatic pressures

3.2.3 Population and human health face particular pressures arising from climate change. Vulnerability to climate change differs across different segments of the population due to factors such as location, socioeconomic status, and age.

- Areas of dense urban development possess limited capacity to absorb the effects of climate change and their inhabitants face higher risks of surface water flooding[167] and summer heat stress[168].
- Remote coastal communities are at risk of inundation from sea level rise as well as changes in wave heights and an increase in the incidence and magnitude of storm surges[169].
- In general, more deprived communities have fewer resources to devote to climate change preparedness, response, and recovery, and so any associated negative health impacts will be disproportionately felt in these areas[170].
- The elderly are less able to cope with changes in climate and associated weather events, and their numbers as a percentage of the total population will increase during the 21st century[171].

[166] Scotland's Environment (2014) Get Informed – Air – Air quality [online] Available at: http://www.environment.scotland.gov.uk/get-informed/air/air-quality/ (accessed 21/06/2017)

[167] SNH(2011) An assessment of the impacts of climate change on Scottish landscapes and their contribution to quality of life: Phase 1 - Final Report [online] Available at: http://www.snh.gov.uk/docs/B980599.pdf (accessed 21/06/2017)

[168] Forestry Commission Scotland (2013) Air temperature regulation by urban trees and green infrastructure [online] Available at: https://www.forestry.gov.uk/pdf/FCRN012.pdf/$FILE/FCRN012.pdf (accessed 21/06/2017)

[169] SNIFFER (2012) Coastal Flooding in Scotland: A guidance document for coastal practitioners [online] Available at: http://www.crew.ac.uk/sites/default/files/sites/default/files/publication/Coastal%20Flooding_300812_Final.pdf (accessed 21/06/2017)

[170] SPICe (2012) SPICe Briefing: Climate Change and Health in Scotland [online] Available at: http://www.parliament.scot/ResearchBriefingsAndFactsheets/S4/SB_12-26rev.pdf (accessed 21/06/2017)

[171] ibid

4 Soil

4.1 Environmental protection objectives

4.1.1 The importance of soil protection has been recognised at the European level in the form of the European Commission's Thematic Strategy for Soil Protection[172]. The Strategy is founded on the principles of preventing further soil degradation and safeguarding its functions, ensuring responsible soil use and management patterns, mitigating the effects of human activities and environmental phenomena on soil condition, as well as restoring degraded soils to an acceptable level.

4.1.2 Many of these aims are shared by the Scottish Soil Framework, which places the sustainable management of soils within the context of the economic, social, and environmental needs of Scotland[173]. The Framework identifies 13 key soil outcomes such as protecting soil biodiversity, reducing and remediating soil erosion, and tackling greenhouse gas emissions.

4.1.3 Peatland soils have been given particular consideration in Scotland's National Peatland Plan which sets out a number of targets regarding the protection and restoration of peatland[174]. The Scottish Government's Draft Peatland and Energy Policy Statement seek to align peatland and energy policy in order to maximise greenhouse gas emissions abatement in a way that delivers multiple benefits[175]. The draft Climate Change Plan also includes peatland restoration among its suite of policy outcomes aimed at reducing Scotland's greenhouse gas emissions[176].

4.2 Baseline information

Current status

4.2.1 Soils perform a number of vital functions.

- More specifically, soils provide the basis for food and timber, control and regulate environmental interactions such as regulating water flow and quality, and provide a platform for buildings and roads.

[172] European Commission (2006) Thematic Strategy for Soil Protection [online] Available at: http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52006DC0231 (accessed 21/06/2017)

[173] Scottish Government (2009) The Scottish Soil Framework [online] Available at: http://www.gov.scot/Publications/2009/05/20145602/0 (accessed 21/06/2017)

[174] SNH (2015) Scotland's National Peatland Plan: Working for our future [online] Available at: http://www.snh.gov.uk/docs/A1697542.pdf (accessed 21/06/2017)

[175] Scottish Government (2016) Draft Peatland and Energy Policy Statement [online] Available at: http://www.gov.scot/Topics/Business-Industry/Energy/Energy-sources/19185/Draft-Peatland-Policy (accessed 21/06/2017)

[176] Scottish Government (2017) Draft Climate Change Plan – the draft Third Report on Policies and Proposals 2017-2032 [online] Available at: http://www.gov.scot/Publications/2017/01/2768 (accessed 21/06/2017)

- Soils act as an important and complex habitat for many different organisms[177].
- Soil is a non-renewable resource and is fundamentally one of Scotland's most important assets[178].

4.2.2 In particular, Scotland's soils play a significant role in removing and storing carbon from our atmosphere.

- It is estimated that our soils may currently hold up to 3,000 million tonnes of carbon[179], representing over 50% of the UK's total soil carbon[180].
- Of this amount, over 70% is contained within Scotland's peat soils which comprise just 11% of its land area[181], most of which is found in the north of Scotland.
- There is so much carbon sequestered within Scottish soil that a loss of just 1% of this volume as carbon dioxide could triple Scotland's annual greenhouse gas emissions[182].

4.2.3 The overall state of Scotland's soils is presumed to be good, but uncertainties exist.

- There is a lack of national trend data to provide evidence of change or damage to soils[183]. For this reason, projections of soil health are difficult to make.

Existing pressures

4.2.4 Soils face extensive threats to their ability to function.

- Soil can be irretrievably lost due to erosion[184] and soil sealing[185] (covering soil with impervious material) or as a result of compaction[186].

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[177] SNH (2016) Soil function: habitat and biodiversity support [online] Available at: http://www.snh.gov.uk/protecting-scotlands-nature/safeguarding-geodiversity/pressures/living-landscape/habitats-and-biodiversity/ (accessed 03/07/2017)

[178] Scottish Government (2006) Scotland's Soil Resource - Current State and Threats – Chapter 4: Loss of Soil Biodiversity [online] Available at: http://www.gov.scot/publications/2006/09/21115639/7 (accessed 21/06/2017)

[179] Scottish Government (2009) Scottish Soil Framework [online] Available at: http://www.gov.scot/Publications/2009/05/20145602/4 (accessed 21/06/2017)

[180] Scotland's Soils (part of Scotland's Environment) (undated) State of Scotland's soils [online] Available at: http://soils.environment.gov.scot/soils-in-scotland/state-of-scotlands-soils/ (accessed 21/06/2017)

[181] SNH (2012) The main soil types in Scotland [online] Available at: http://www.snh.gov.uk/about-scotlands-nature/rocks-soils-and-landforms/scotlands-soils/soil-types/ (accessed 21/06/2017)

[182] Scotland's Soils (part of Scotland's Environment) (undated) State of Scotland's soils [online] Available at: http://www.soils-scotland.gov.uk/soils-in-scotland/state-of-scotlands-soils/ (accessed 21/06/2017)

[183] Scotland's Environment (2016) Get Informed – Land - Soils [online] Available at: http://www.environment.scotland.gov.uk/get-informed/land/soils/ (accessed 21/06/2017)

[184] Scottish Government (2006) Scotland's Soil Resource – Current State and Threats – Chapter 6: Soil Erosion [online] Available at: http://www.gov.scot/Publications/2006/09/21115639/9 (accessed 21/06/2017)

[185] Scottish Government (2006) Scotland's Soil Resource – Current State and Threats – Chapter 8: Loss of soil to development and mineral extraction [online] Available at: http://www.gov.scot/Publications/2006/09/21115639/11 (accessed 21/06/2017)

- Loss of organic matter is a major threat to soil health and can be difficult to reverse[187].
- Contaminants including nitrogen, sulphur, pathogens, pesticides, and heavy metals can enter the soil ecosystem via atmospheric deposition or as a result of land-based human activities, potentially causing acidification, eutrophication, and other issues[188].
- Changes in land use and land management practices represent another key pressure on soil, and include activities such as development, cultivation of soils for agriculture and forestry, and expansion of agriculture and forestry, amongst others[189].

Climatic pressures

4.2.5 Climate change may exacerbate many of the existing problems our soils currently face, as well as introducing new challenges.

- Existing problems include loss of organic matter[190], erosion[191], and changes in soil biodiversity[192].
- Changes in soil water content and temperature could increase the likelihood of drought or flooding, compromise soil fertility, and increase GHG emissions, particularly in the context of upland peat soils[193].

[186] Scottish Government (2006) Scotland's Soil Resource – Current State and Threats – Chapter 5: Structural degradation and compaction [online] Available at: http://www.gov.scot/Publications/2006/09/21115639/8 (accessed 21/06/2017)

[187] SEPA (2011) The State of Scotland's Soil [online] Available at: http://www.sepa.org.uk/media/138741/state-of-soil-report-final.pdf (accessed 21/06/2017)

[188] Scottish Government (2006) Scotland's Soil Resource – Current State and Threats – Chapter 7: Soil contamination [online] Available at: http://www.gov.scot/Publications/2006/09/21115639/10 (accessed 21/06/2017)

[189] Scotland's Soils (part of Scotland's Environment) (undated) Home – Soils in Scotland – Our soils [online] Available at: http://soils.environment.gov.scot/soils-in-scotland/our-soils/ (accessed 21/06/2017)

[190] SEPA (2011) The State of Scotland's Soil [online] Available at: http://www.sepa.org.uk/media/138741/state-of-soil-report-final.pdf (accessed 21/06/2017)

[191] SEPA (2006) State of Scotland's Environment 2006 [online] Available at: https://www.sepa.org.uk/media/36400/state-of-scotlands-environment-2006.pdf (accessed 21/06/2017)

[192] SEPA (2011) The State of Scotland's Soil [online] Available at: http://www.sepa.org.uk/media/138741/state-of-soil-report-final.pdf (accessed 21/06/2017)

[193] Scottish Government (2006) Scotland's Soil Resource – Current State and Threats – Chapter 11: Discussion and Conclusions [online] Available at: http://www.gov.scot/Publications/2006/09/21115639/14 (accessed 21/06/2017)

5 Water

5.1 Environmental protection objectives

5.1.1 The EU's Water Framework Directive (2000/60/EC) was introduced as a more comprehensive approach to managing and protecting Europe's water bodies including rivers, lochs, transitional waters, coastal waters, and groundwater resources[194]. The Water Framework Directive sets out a requirement for the assessment of chemical parameters alongside biodiversity when determining water quality, and has a goal of bringing all European waters to 'good ecological and chemical status.'

5.1.2 Scotland fulfils its water protection obligations under the Water Framework Directive primarily through the Water Environment and Water Services (Scotland) Act 2003[195] which defines the establishment of River Basin Management Plans (RBMPs)[196], and the Water Environment (Controlled Activities) (Scotland) Regulations 2011[197]. Other relevant legislation includes the Pollution Prevention and Control (Scotland) Regulations 2012, developed specifically to control pollution relating to industry discharges[198].

5.1.3 The EU Floods Directive (2007/60/EC)[199] is implemented at the national level through the Flood Risk Management (Scotland) Act 2009[200]. The Directive mandates the creation of flood risk management plans for all inland and coastal areas at risk of flooding, integrating their development and employment with existing RBMPs. Flood risk management plans are designed to minimise negative impacts due to flooding on a range of receptors, including human health, the environment, and cultural heritage.

[194] European Commission (2000) Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy [online] Available at: http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32000L0060 (accessed 21/06/2017)

[195] Water Environment and Water Services (Scotland) Act 2003, asp 3 [online] Available at: http://www.legislation.gov.uk/asp/2003/3/pdfs/asp_20030003_en.pdf (accessed 21/06/2017)

[196] SEPA (2016) River Basin Management Planning [online] Available at: https://www.sepa.org.uk/environment/water/river-basin-management-planning/ (accessed 21/06/2016)

[197] The Water Environment (Controlled Activities) (Scotland) Regulations 2011, SSI No. 206 [online] Available at: http://www.legislation.gov.uk/ssi/2011/209/pdfs/ssi_20110209_en.pdf (accessed 21/06/2017)

[198] The Pollution Prevention and Control (Scotland) Regulations 2012, SSI No. 360 [online] Available at: http://www.legislation.gov.uk/ssi/2012/360/introduction/made (accessed 21/06/2017)

[199] European Commission (2007) The EU Floods Directive [online] Available at: http://ec.europa.eu/environment/water/flood_risk/ (accessed 21/06/2017)

[200] Flood Risk Management (Scotland) Act 2009, asp 6 [online] Available at: http://www.legislation.gov.uk/asp/2009/6/pdfs/asp_20090006_en.pdf (accessed 21/06/2017)

5.2 Baseline information

Current status

5.2.1 We require a clean, reliable supply of water to support our health and prosperity.

- Scotland's waters are a valuable source of drinking water as well as water for use in industry and agriculture. They also sustain a variety of habitats for nationally and internationally important species.
- Scottish industries such as whisky production and fishing are largely dependent upon the availability of high quality water. Clean water is also vital to many tourism activities, including bird watching and kayaking.
- Scotland's water is in generally good condition, with notable reductions in pollution over the last 25 years[201].

5.2.2 Scotland is fortunate to have an abundance of both marine and freshwater resources.

- Scotland has around 19,000 km of coastline which makes up 8% of Europe's coastline[202]. Collectively, our rivers, lochs, canals, and ponds cover around 2% of Scotland's land area whilst equating to 70% of the UK's surface waters. These water resources provide a range of habitats for wildlife such as otters and freshwater pearl mussels[203].
- Groundwater is another important resource. Aquifers and other groundwater bodies provide 75% of private drinking water supplies in rural communities and 70% of the water bottled by the distilling industry[204].

Existing pressures

5.2.3 Our water resources are vulnerable to a variety of threats of both human and natural origin.

- Pollution stemming from agriculture, mining, waste, and legacy industrial activities places a strain on our aquatic environments. In particular, the use of synthetic fertilizers to increase agricultural output has raised the concentration of nitrogen and phosphorus in some local water bodies, making them vulnerable to elevated nutrient levels, algal blooms, and eutrophication.

[201] Scotland's Environment (2014) Get informed – State of the environment summary – Downloads – June 2014 State of Environment Report – Water [online] Available at: http://www.environment.scotland.gov.uk/media/54405/Water.pdf (accessed 21/06/2017)

[202] ibid

[203] Scotland's Environment (undated) Rivers and lochs [online] Available at: http://www.environment.scotland.gov.uk/get-informed/water/rivers-and-lochs/ (accessed 21/06/2017)

[204] Scotland's Environment (2011) Groundwater [online] Available at: http://www.environment.scotland.gov.uk/media/54815/Water-Groundwater.pdf (accessed 21/06/2017)

- Flooding is a major concern for many localities in Scotland. Approximately 1 in 22 of all residential properties and 1 in 13 of all non-residential or business properties are classified as being at risk from flooding[205].
- Invasive non-native species can crowd out native species, disrupting the ecological balance of water environments.

Climatic pressures

5.2.4 The impacts of climate change on Scotland's waters could be considerable and extensive.

- The capacity of aquatic environments to safely absorb and decompose contaminants may be reduced. In addition, changes to rainfall patterns could lead to the increased pollution of seas[206].
- The growing season could be extended[207], placing additional pressure on water quality as agriculture is a key source of diffuse pollutants[208].
- Sea level rise may put coastal communities and habitats at risk of flooding, salinisation, and other negative impacts due to saltwater inundation[209].
- With respect to the marine environment, key impacts of climate change include rising sea temperatures[210], changes in salinity[211] and acidity[212], and changes in species composition and range, including the introduction and proliferation of invasive non-native species[213].

[205] SEPA (2011) National Flood Risk Assessment [online] Available at: http://map.sepa.org.uk/nfra/map.htm (accessed 21/06/2017)

[206] Scotland's Environment (2014) Get Informed – Water – Rivers and canals [online] Available at: http://www.environment.scotland.gov.uk/get-informed/water/rivers-and-canals/ (accessed 21/06/2017)

[207] SEPA (undated) The effects of climate change [online] Available at: http://www.sepa.org.uk/environment/climate-change/the-effects-of-climate-change/ (accessed 21/06/2017)

[208] DPMAG (undated) Rural diffuse pollution plan for Scotland [online] Available at: http://www.sepa.org.uk/media/37557/rural-diffuse-pollution-plan-scotland.pdf (accessed 21/06/2017)

[209] CREW (2012) Coastal Flooding in Scotland: A guidance document for coastal practitioners [online] Available at: http://www.crew.ac.uk/publication/coastal-flooding-scotland-guidance-document-coastal-practitioners (accessed 21/06/2017)

[210] SNH (2015) Marine impacts [online] Available at: http://www.snh.gov.uk/climate-change/impacts-in-scotland/marine-impacts/ (accessed 21/06/2017)

[211] MCCIP (2013) Marine climate change impacts [online] Available at: http://www.mccip.org.uk/media/1301/mccip-arc2013.pdf (accessed 21/06/2017)

[212] SNH (2015) Marine impacts [online] Available at: http://www.snh.gov.uk/climate-change/impacts-in-scotland/marine-impacts/ (accessed 21/06/2017)

[213] Scottish Government (2011) Scotland's Marine Atlas: Information for the National Marine Plan – Non-Native Species in Scottish Waters [online] Available at: http://www.gov.scot/Publications/2011/03/16182005/59 (accessed 21/06/2017)

6 Air

6.1 Environmental protection objectives

6.1.1 The EC Ambient Air Quality Directive (2008/50/EC)[214] is transposed via the Air Quality Standards (Scotland) Regulations 2010[215]. These set limits and targets for a number of airborne pollutants including carbon monoxide, oxides of nitrogen, sulphur dioxide, and particulates. The Regulations also satisfy the mandate of the EC's 4th Air Quality Daughter Directive (2004/107/EC), which applies limits to ambient concentrations of certain heavy metals and polycyclic aromatic hydrocarbons[216]. Additionally, Scotland's Pollution Prevention and Control Regulations (2012) apply to the regulation and monitoring of certain industrial activities that can generate airborne pollution[217].

6.1.2 Areas in which measured levels of airborne pollutants exceed the limits established by the Air Quality Strategy are designated as Air Quality Management Areas[218]. Local authorities have a duty to develop and implement Air Quality Action Plans (AQMAs) in these locations in order to raise air quality to an acceptable level.

6.1.3 The Scottish Government's Cleaner Air for Scotland – The Road to a Healthier Future proposes a national strategy for improving Scotland's air quality with a vision of making it the 'best in Europe'[219]. Among its specific goals are full compliance with EU air quality legislation and significant progress towards rescinding all existing Air Quality Management Areas in Scotland by 2020.

6.2 Baseline information

Current state

6.2.1 Overall, Scotland's air is considered to be in moderate condition, although persistently elevated concentrations of some pollutants remains a problem in

[214] European Commission (2008) Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe [online] Available at: http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32008L0050 (accessed 21/06/2017)

[215] The Air Quality Standards (Scotland) Regulations 2010, SSI No. 204 [online] Available at: http://www.legislation.gov.uk/ssi/2010/204/contents/made (accessed 21/06/2017)

[216] European Commission (2004) Directive (2004/107/EC) of the European Parliament and of the Council of 15 December 2004 relating to arsenic, cadmium, mercury, nickel and polycyclic aromatic hydrocarbons in ambient air [online] Available at: http://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX:32004L0107 (accessed 21/06/2017)

[217] The Pollution Prevention and Control (Scotland) Regulations 2012, SSI No. 360 [online] Available at: http://www.legislation.gov.uk/ssi/2012/360/introduction/made (accessed 21/06/2017)

[218] Air Quality in Scotland (undated) Local Air Quality Management – Air Quality Management Areas [online] Available at: http://www.scottishairquality.co.uk/laqm/ (accessed 21/06/2017)

[219] 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 03/07/2017)

certain urban areas[220]. Further projections estimate that air quality will remain stable or continue to improve[221].

- In Scotland, 38 AQMAs have currently been declared, with 14 of Scotland's 32 Local Authorities having declared at least one. The majority of these are declared in urban areas as a result of oxides of nitrogen alone or in combination with particulate matter (PM_{10}) levels, and primarily as a result of traffic emissions[222].
- 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 environment[223].

6.2.2 Poor air quality can have significant detrimental impacts on human health.

- Within the UK, air pollution is implicated in approximately 40,000 early deaths per year[224]. Further, air pollution in the UK is believed to reduce life expectancy by 7-8 months[225].
- The very young[226], elderly[227], and those with existing heart and lung conditions[228] are at an increased risk of developing health problems related to air pollution.

Existing pressures

6.2.3 Air pollutants can originate from industry, transport, energy, agriculture, and some household activities such as heating[229].

- Economic activity, inward investment, population change and demographic change can all influence the development of our towns and cities. This in turn can have effects such as increased traffic volumes, which can have a range of associated effects on air quality and human health.

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[220] Scotland's Environment (2014) June 2014 State of Environment Report – Air quality [online] Available at: http://www.environment.scotland.gov.uk/media/54339/Air-Air-quality.pdf (accessed 03/07/2017)

[221] ibid

[222] Air Quality in Scotland (undated) Air Quality Management Areas [online] Available at: http://www.scottishairquality.co.uk/laqm/aqma (accessed 03/07/2017)

[223] Scotland's Environment (2014) Get Informed – Air – Air quality [online] Available at: http://www.environment.scotland.gov.uk/get-informed/air/air-quality/ (accessed 03/07/2017)

[224] Royal College of Physicians (2016) Every breath we take: the lifelong impact of air pollution [online] Available at: https://www.rcplondon.ac.uk/projects/outputs/every-breath-we-take-lifelong-impact-air-pollution (accessed 03/07/2017)

[225] Air Quality in Scotland (Scottish Government) (undated) About air quality [online] Available at: http://www.scottishairquality.co.uk/air-quality/ (accessed 03/07/2017)

[226] Scotland's Environment (undated) Air quality & health – air pollution and health impacts project [online] Available at: http://www.environment.scotland.gov.uk/air-quality/air-quality-and-health/ (accessed 03/07/2017)

[227] ibid

[228] Defra (2013) Effects of air pollution [online] Available at: https://uk-air.defra.gov.uk/air-pollution/effects (accessed 03/07/2017)

[229] Scotland's Environment (2014) June 2014 State of Environment Report – Air quality [online] Available at: http://www.environment.scotland.gov.uk/media/54339/Air-Air-quality.pdf (accessed 03/07/2017)

- In addition to negatively impacting population and human health, the effects of air pollution extend to soil, water, biodiversity, cultural heritage, climate, and other areas. For example, ground-level ozone can harm crops and other plants by damaging leaves and reducing yields[230], while black soot and sulphur dioxide threaten the exteriors of historic buildings[231]. These impacts may be felt on a local, regional, or global scale[232].

Climatic pressures

6.2.4 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 particulates[233].
- However, the implementation of mitigation and adaptation measures intended to tackle emissions from activities that produce GHG emissions, such as reducing energy and transport emissions, could promote improved air quality.
- Seasonally-induced variations in air quality could change in response to climate change. For example, periods of poor dispersion in winter due to stagnation and temperature inversions could become less common[234]. Conversely, weather conditions that give rise to summertime photochemical smog are predicted to become more common[235].

[230] Scottish Government (2016) High Level Summary of Statistics Trend – Last update: October 26, 2016 – Ground Level Ozone Concentration [online] Available at: http://www.gov.scot/Topics/Statistics/Browse/Environment/TrendOzone (accessed 03/07/2017)

[231] Scotland's Environment (2015) Get informed – People and the environment – Historic Environment [online] Available at: http://www.environment.scotland.gov.uk/get-informed/people-and-the-environment/historic-environment/ (accessed 03/07/2017)

[232] JNCC (2015) Air Pollution [online] Available at: http://jncc.defra.gov.uk/page-1426 (accessed 03/07/2017)

[233] ibid

[234] Air Quality Expert Group (2007) Air Quality and Climate Change: A UK Perspective (report prepared for Defra) [online] Available at: https://uk-air.defra.gov.uk/assets/documents/reports/aqeg/fullreport.pdf (accessed 03/07/2017)

[235] ibid

7 Climatic factors

7.1 Environmental protection objectives

7.1.1 Scotland's current ambition on tackling climate change is set out in the Climate Change (Scotland) Act 2009 ('the 2009 Act')[236]. 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 GHG emissions reductions in Scotland, and set targets for reductions in emissions of the basket of Kyoto Protocol greenhouse gases[237] of 80% by 2050, with an interim 2020 target of 42% as compared to the 1990/1995 baseline level.

7.1.2 The Act also requires that annual GHG emissions targets are set, by Order, for each year in the period 2010-2050. Following the initial phase of target-setting, the annual targets are set in five year batches, at least twelve years in advance. The third and most recent batch of annual targets, covering the years 2028-2032, was set in October 2016.

7.1.3 The Scottish Climate Change Adaptation Programme addresses the impacts identified for Scotland in the UK Climate Change Risk Assessment. 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. The impacts identified for Scotland in the recently published UK Climate Change Risk Assessment[238] are expected to be addressed by the second iteration of the Adaptation Programme which is due in 2019[239].

7.1.4 In November 2016, the UNFCCC Paris Agreement came into force[240] after being adopted by 195 countries. The Agreement is the first ever universal, legally binding global climate deal and sets out a goal to limit global warming to

[236] Climate Change (Scotland) Act 2009, asp 12 [online] Available at: http://www.legislation.gov.uk/asp/2009/12/pdfs/asp_20090012_en.pdf (accessed 03/07/2017)

[237] The basket of Kyoto Protocol greenhouse gases comprises Carbon dioxide (CO_2), methane (CH_4) and Nitrous oxide (N_2O), for which the baseline is 1990; and hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and Sulphur hexafluoride (SF_6), for which the baseline is 1995. Nitrogen triflouride (NF_3) has subsequently been added.

[238] Committee on Climate Change (2016) UK Climate Change Risk Assessment 2017 [online] Available at: https://www.theccc.org.uk/uk-climate-change-risk-assessment-2017/ (accessed 03/07/2017)

[239] Committee on Climate Change (2016) Scottish Climate Change Adaption Programme: An independent assessment for the Scottish Parliament [online] Available at: https://www.theccc.org.uk/wp-content/uploads/2016/09/Scottish-Climate-Change-Adaptation-Programme-An-independent-assessment-CCC-September-2016.pdf (accessed 03/07/2017)

[240] UNFCCC (2016) The Paris Agreement [online] Available at: http://unfccc.int/paris_agreement/items/9485.php (accessed 03/07/2017)

well below 2°C, and to pursue further efforts to limit it to 1.5°C[241]. The Agreement also covers a range of other issues such as mitigation through reducing emissions, adaptation, and loss and damage[242].

7.1.5 The EU Emissions Trading System (EU ETS) is a key component of the EU's policy to combat climate change. In operation since 2005, it aims to reduce GHG emissions from energy intensive industries, with emissions from within Europe aviation added in 2012. The EU ETS operates in 31 countries (all 28 EU countries plus Iceland, Liechtenstein, and Norway) and covers 45% of the EU's emissions.[243] The EU ETS has emission reduction targets for 2020 of 20% below 2005 levels for industrial emissions. To achieve this, the system works on a 'cap and trade' principle, requiring participants to obtain allowances to cover their annual emissions, the availability of which reduces annually. The allowances are issued through a combination of auction and free allocation, and participants can trade them on a secondary market, creating a market price for carbon.

7.2 Baseline information

Current state

7.2.1 There is evidence to suggest Scotland's climate has already undergone changes since the middle of the last century, while the UK Climate Change Projections (UKP09) predicts how our climate may continue to evolve in the coming decades.

- Some measured changes in Scotland's climate between 1961 and 2004 include higher temperatures, increased precipitation including as much as a 70% increase in winter precipitation for northern Scotland, and increased heavy winter rainfall events particularly in northern and western regions. A longer growing season, fewer days with snow cover, and sea level rise were also observed[244].
- Under a medium emissions scenario, the central estimate for increases in summer temperatures by the 2080s may be 3.5°C in eastern Scotland and west Scotland, and 3°C in northern Scotland. In addition, winter temperatures may be 2.2°C higher in eastern Scotland and northern Scotland, and 2.6°C higher in western Scotland[245]. Precipitation may become greater in winter months whilst summers will be drier. Climate

[241] European Commission (2016) Climate Action – Paris Agreement [online] Available at: https://ec.europa.eu/clima/policies/international/negotiations/paris_en (accessed 03/07/2017)

[242] ibid

[243] European Commission (2016) Climate Action, The EU Emissions Trading System [online] Available at: http://ec.europa.eu/clima/policies/ets/index_en.htm (accessed 03/07/2017

[244] Scotland's Environment (2014) Get Informed – Climate – Climate [online] Available at: http://www.environment.scotland.gov.uk/get-informed/climate/climate/ (accessed 03/07/2017)

[245] Defra et al. (2009) UK Climate Projections [online] Available at: http://ukclimateprojections.metoffice.gov.uk/ (accessed 03/07/2017)

change is predicted to result in more summer heat waves, extreme temperatures and drought, sea level rise, increased frequency and intensity of extreme precipitation events, and reduced occurrence of frost and snowfall[246].

- While the extent of the effects of a changing climate is expected to vary by location, there is significant evidence to support the belief that significant changes in precipitation, snowfall, seasonality, cloud cover, humidity, wind speeds, soil moisture, rising sea levels, and extreme weather may occur[247].

7.2.2 Between 1994 and 2015, Scotland exhibited a general decline in greenhouse gas emissions.

- In 2015, actual Scottish emissions of the basket of Kyoto GHGs were estimated to be 48.1 million tonnes carbon dioxide equivalent ($MtCO_2eq$), equating to a 37.6% reduction from baseline levels. Carbon dioxide (CO_2) accounted for 75.4% of Scotland's GHG emissions in 2015.
- The main contributors to these emissions were the transport (27.4%) energy supply (25.4%), agriculture and related land uses (22.5%), business and industrial processes (17.9%), and the residential (12.7%) sectors, with relatively minor totals reported for the waste management (2.9%) and other sectors[248].

Existing pressures

7.2.3 Climate change is inextricably linked to the condition of other SEA topic areas such as water, air quality, biodiversity, and landscape.

- Some of the key consequences for Scotland that may occur as a result of climate change are impacts on the productivity of our agricultural and forestry sectors, food security, the health of our natural environment, flood risk, and the availability and quality of water[249].
- 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.

[246] Scotland's Environment (2014) Get Informed – Climate - Climate [online] Available at: http://www.environment.scotland.gov.uk/get-informed/climate/climate/ (accessed 03/07/2017)

[247] IPCC (2007) Climate Change 2007: Synthesis Report [online] Available at: http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr_full_report.pdf (accessed 03/07/2017)

[248] Scottish Government (2017) Scottish Greenhouse Gas Emissions 2015 [online] Available at: http://www.gov.scot/Publications/2017/06/9986 (accessed 03/07/2017)

[249] Scottish Government (2014) Climate Ready Scotland: Scottish Climate Change Adaptation Programme [online] Available at: http://www.gov.scot/Resource/0045/00451392.pdf (accessed 03/07/2017)

8 Cultural heritage and the historic environment

8.1 Environmental protection objectives

8.1.1 Existing cultural heritage objectives are set out in legislation including the Historic Environment (Amendment) (Scotland) Act (2011).[250] This builds upon existing legislation pertaining to ancient monuments and listed buildings as well as providing for the creation of inventories of gardens and designed landscapes, as well as of battlefields. Specifically, the 2011 Act amends the Historic Buildings and Ancient Monuments Act 1953[251] and modifies the Ancient Monuments and Archaeological Areas Act 1979[252] as well as the Planning (Listed Buildings and Conservation) (Scotland) Act 1997[253].

8.1.2 Our Place in Time – The Historic Environment Strategy for Scotland, published in 2014, lays out a 10 year vision for Scotland's historic environment.[254] The vision is founded upon the fundamental aims of understanding, protecting, and valuing our historic environment, ensuring it continues to benefit Scotland's wellbeing through its cultural, social, environmental, and economic contributions.

8.1.3 The 2014 Strategy and the Historic Environment Scotland Policy Statement[255] set out an overarching framework for historic environment policy in Scotland. Other relevant policies include the National Planning Framework[256] and Scottish Planning Policy[257], Historic Environment Circular 1[258], and Historic Environment Scotland's Managing Change in the Historic Environment guidance note series[259]. These set out to advise planning authorities making

[250] Historic Environment (Amendment) (Scotland) Act (2011), asp 3 [online] Available at: http://www.legislation.gov.uk/asp/2011/3 (accessed 03/07/2017)

[251] Historic Buildings and Ancient Monuments Act 1953, Chapter 49 [online] Available at: http://www.legislation.gov.uk/ukpga/1953/49/pdfs/ukpga_19530049_en.pdf (accessed 03/07/2017)

[252] Ancient Monuments and Archaeological Areas Act 1979, Chapter 46 [online] Available at: http://www.legislation.gov.uk/ukpga/1979/46 (accessed 03/07/2017)

[253] Planning (Listed Buildings and Conservation) (Scotland) Act 1997, Chapter 9 [online] Available at: http://www.legislation.gov.uk/ukpga/1997/9/introduction (accessed 03/07/2017)

[254] Scottish Government (2014) Our Place in Time – The Historic Environment Strategy for Scotland [online] Available at: http://www.gov.scot/Publications/2014/03/8522/0 (accessed 03/07/2017)

[255] Historic Environment Scotland (2016) Historic Environment Scotland Policy Statement June 2016 [online] Available at: https://www.historicenvironment.scot/archives-and-research/publications/publication/?publicationId=f413711b-bb7b-4a8d-a3e8-a619008ca8b5 (accessed 03/07/2017)

[256] Scottish Government (2014) National Planning Framework 3: A Plan for Scotland: Ambition, Opportunity, Place and Scottish Planning Policy [online] Available at: http://www.gov.scot/Publications/2014/06/3539 (accessed 03/07/2017)

[257] Scottish Government (2014) Scottish Planning Policy [online] Available at: http://www.gov.scot/Publications/2014/06/5823 (accessed 03/07/2017)

[258] Historic Environment Scotland (2016) Historic Environment Circular 1 [online] Available at: https://www.historicenvironment.scot/archives-and-research/publications/publication/?publicationId=ec209755-9bf8-4840-a1d8-a61800a9230d (accessed 03/07/2017)

[259] Historic Environment Scotland (undated) Managing Change in the Historic Environment: Guidance notes [online] Available at: https://www.historicenvironment.scot/advice-and-support/planning-and-guidance/legislation-and-guidance/managing-change-in-the-historic-environment-guidance-notes/ (accessed 03/07/2017)

decisions pertaining to applications for conservation area and listed building consents, including any potential impacts on the historic environment and the greater context in which it is found.

8.2 Baseline information

Current state

8.2.1 Our cultural heritage and historic environment are part of what make Scotland a unique, thriving, and resilient country in which to live.

- Scotland's national identity and sense of place are closely intertwined with its historic environment. It is also a key driver of tourism to Scotland[260]
- There remains a significant amount of as yet undiscovered archaeological material, the true extent of which is not known.
- The adaptive reuse of historic properties contributes to climate change mitigation by reducing the need for new buildings.

Existing pressures

8.2.2 Competing land uses, such as that stemming from energy-related development, is one of the primary threats faced by our cultural heritage and historic environment.

- For example, the planting of energy crops can disturb archaeological remains due to planting, root growth, and localised changes in water and drainage.

Climatic pressures

8.2.3 Climate change can compromise the health and structural integrity of the historic environment.

- Within the coastal zone, rising sea levels and increased storm events can accelerate coastal erosion, threatening historic landscapes, structures, buildings, and archaeology.
- Increased volumes of rainfall can cause water infiltration into masonry and other structural elements, putting historic buildings at increased risk of dampness; condensation; algal, fungal, and mould growth[261]; weathering of stone; corrosion of metals[262]; and even collapse[263].

[260] Historic Environment Scotland (2014) Scotland's Historic Environment Audit [online] Available at: https://www.historicenvironment.scot/archives-and-research/publications/publication/?publicationId=e3d0a6d8-4410-49b8-96e8-a6db00bc21b0 (accessed 03/07/2017)

[261] Scotland's Environment (2015) Get Informed – People and the environment – Historic Environment [online] Available at: http://www.environment.scotland.gov.uk/get-informed/people-and-the-environment/historic-environment/ (accessed 03/07/2017)

[262] ibid

- The effects of climate change can also be indirect, arising as a result of mitigation and adaptation measures. For example, the installation of low carbon technologies can have a negative impact on the historic appearance of certain buildings and structures.

9 Landscape, seascape and visual amenity

9.1 Environmental protection objectives

9.1.1 Landscape protection is the subject of a variety of policies and legislation. The European Landscape Convention strives to promote landscape protection, management, and planning as well as to achieve a more concerted approach to addressing landscape issues at the European scale[264]. The Convention presents a highly inclusive definition of landscape, specifying that protection and enhancement activities should apply equally to both 'outstanding' as well as less remarkable or degraded landscapes. This definition encompasses natural, rural, urban, and peri-urban landscapes across land, marine, and inland water environments.

9.1.2 The National Scenic Areas Programme (NSAs) identifies Scottish landscapes of "outstanding scenic value in a national context" for the purpose of ensuring such areas are afforded due consideration and protection within the local authority planning system[265]. At a national level, the role of Scotland's natural heritage and landscapes in informing land use planning is set out in Scottish Planning Policy[266]. Additionally, the National Planning Framework 3 acknowledges the multiple benefits we derive from landscapes, such as improving human health and wellbeing as well as contributing to our quality of life[267]. The vulnerability of landscapes to climate change is also noted.

9.1.3 SNH's Landscape Policy Framework strives to "safeguard and enhance the distinct identity, the diverse character, and the special qualities of Scotland's landscapes as a whole"[268]. Additionally, SNH has undertaken research on

[263] Historic Scotland (2012) A Climate Change Action Plan for Historic Scotland 2012-2017 [online] Available at: https://www.historicenvironment.scot/media/2611/climate-change-plan-2012.pdf (accessed 03/07/2017)

[264] European Landscape Convention (2000) European Treaty Series No. 176 [online] Available at: https://rm.coe.int/CoERMPublicCommonSearchServices/DisplayDCTMContent?documentId=0900001680080621 (accessed 03/07/2017)

[265] SNH (undated) National Scenic Areas [online] Available at: http://www.snh.gov.uk/protecting-scotlands-nature/protected-areas/national-designations/nsa/ (accessed 03/07/2017)

[266] Scottish Government (2014) Scottish Planning Policy [online] Available at: http://www.gov.scot/Publications/2014/06/5823 (accessed 03/07/2017)

[267] Scottish Government (2014) National Planning Framework 3: A Plan for Scotland: Ambition, Opportunity, Place and Scottish Planning Policy [online] Available at: http://www.gov.scot/Publications/2014/06/3539 (accessed 03/07/2017)

[268] SNH (2005) Statement: SNH's Landscape Policy Framework [online[Available at: http://www.snh.gov.uk/docs/A147583.pdf (accessed 03/07/2017)

areas which are viewed as wild land[269]. This definition 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 Scotland[270].

9.2 Baseline information

Current state

9.2.1 Scotland's landscape is distinctive, varied, dynamic, and internationally renowned, providing us with both tangible and intangible assets.

- Scotland's landscape changes markedly according to location, with noticeable differences in appearance and character between the northern, southern, eastern, and western regions of the country.
- Some of the intangible benefits that we derive from landscapes include beauty, tranquillity, enjoyment, and wildness.
- Tangible benefits include supporting the tourism industry as well as providing opportunities for recreation.

Existing pressures

9.2.2 Reconciling competing land uses with landscape preservation remains a key challenge.

- Drivers of land use and development include climate change, land use policy, a changing economic base, and pursuing economic efficiency.

Climatic pressures

9.2.3 Climate change may irreparably alter the appearance, form, and functionality of a landscape.

- The potential direct effects of climate change on landscapes are likely to include the loss of land to the sea, increased risk of coastal and river flooding, erosion, and changing patterns of natural and semi-natural habitats, such as the northward movement of species in line with the northward spread of favoured climatic conditions[271].

[269] SNH (2012) Wild Land [online] Available at: http://www.snh.gov.uk/protecting-scotlands-nature/looking-after-landscapes/landscape-policy-and-guidance/wild-land/ (accessed 03/07/2017)

[270] SNH (2016) Mapping Wild Land Areas [online] Available at: http://www.snh.gov.uk/protecting-scotlands-nature/looking-after-landscapes/landscape-policy-and-guidance/wild-land/mapping/ (accessed 03/07/2017)

[271] SNH (2011) Summary of the effects of climate change on landscape and quality of life in Scotland [online] Available at: http://www.snh.gov.uk/docs/B988942.pdf (accessed 03/07/2017)

- The indirect impacts of climate change on landscape in the form of adaptation and mitigation measures may potentially be more substantial than any direct impacts.
- Examples of adaptation measures include a demand for engineered flood defences, changes in agricultural practices and activity, and some forms of renewable energy developments[272].
- The cumulative impact of direct and indirect or secondary effects is likely to be most obvious in lowland and coastal areas, where human population is most concentrated[273].

10 Material assets

10.1 Environmental protection objectives

10.1.1 Many of the policies pertaining to material assets are aligned with Scottish climate change legislation and policy. Collectively, these policies largely aim to contribute to core planning objectives and support sustainable development, reduce GHG emissions, and make the best use of Scotland's resources and existing infrastructure.

10.1.2 There are 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. Examples of such policies include National Planning Framework 3[274] and Scottish Planning Policy[275], the draft Energy Strategy[276], Getting The Best From Our Land: A Land Use Strategy for Scotland 2016–2021[277], Scotland's National Transport Strategy[278], the Scottish Forestry Strategy, and Making Things Last - A Circular Economy Strategy for Scotland[279].

[272] Scotland's Environment (2015) Get Informed – Land – Landscape [online] Available at: http://www.environment.scotland.gov.uk/get-informed/land/landscape/ (accessed 03/07/2017)

[273] SNH (2011) Summary of the effects of climate change on landscape and quality of life in Scotland [online] Available at: http://www.snh.gov.uk/docs/B988942.pdf (accessed 03/07/2017)

[274] Scottish Government (2014) National Planning Framework 3: A Plan for Scotland: Ambition, Opportunity, Place and Scottish Planning Policy [online] Available at: http://www.gov.scot/Publications/2014/06/3539 (accessed 03/07/2017)

[275] Scottish Government (2014) Scottish Planning Policy [online] Available at: http://www.gov.scot/Publications/2014/06/5823 (accessed 03/07/2017)

[276] Scottish Government (2017) Draft Energy Strategy: The future of energy in Scotland [online] Available at: http://www.gov.scot/Resource/0051/00513466.pdf (accessed 03/07/2017)

[277] Scottish Government (2011) Getting The Best From Our Land: A Land Use Strategy for Scotland 2016 - 2021 [online] Available at: http://www.gov.scot/Topics/Environment/Countryside/Landusestrategy (accessed 03/07/2017)

[278] Scottish Government (2006) Scotland's National Transport Strategy [online] Available at: http://www.gov.scot/Resource/Doc/157751/0042649.pdf (accessed 03/07/2017)

[279] Scottish Government (2016) Making Things Last - A Circular Economy Strategy for Scotland [online] Available at: http://www.gov.scot/Resource/0049/00494471.pdf (accessed 03/07/2017)

10.1.3 National Planning Framework 3 has a vision of a successful, sustainable place; a low carbon place; a natural, resilient place; and a connected place. Scottish Planning Policy sets out how the visions presented in the National Planning Framework 3 should be delivered on the ground.

10.1.4 The draft Scottish Energy Strategy builds on a well-established framework for energy policy in Scotland, including Scottish Government's 2020 Routemap for Renewable Energy[280], the Electricity Generation Policy Statement[281], the Heat Policy Statement: Towards Decarbonising Heat – Maximising the Opportunities for Scotland[282], and the Community Energy Policy Statement[283]. Specifically, it sets out Scottish Government's vision for energy generation and consumption to 2050. The Strategy centres around three themes: meeting our energy supply needs, transforming Scotland's energy use, and smart local energy systems.

10.1.5 Getting The Best From Our Land: A Land Use Strategy for Scotland 2016 - 2021 sets forth a framework for a more unified and strategic approach to land use within Scotland[284]. Its fundamental principles of "long-term, well integrated, sustainable land use delivering multiple benefits for all society" are consolidated across the management strategies for a range of sectors including forestry and agriculture. For example, publications such as those produced by Farming for a Better Climate[285] and The Future of Scottish Agriculture: a Discussion Document[286] set out actions to help farmers tackle climate change and promote good practise.

10.1.6 Scotland's National Transport Strategy lists one of its five High Level Objectives up to circa 2026 as "protect[ing] our environment and improv[ing] health by building and investing in public transport and other types of efficient and sustainable transport which minimise emissions and consumption of energy and resources"[287]. The Strategic Transport Projects Review gives preference,

[280] Scottish Government (2011) 2020 Routemap for Renewable Energy in Scotland [online] Available at: http://www.gov.scot/Publications/2011/08/04110353/0 (accessed 03/07/2017)

[281] Scottish Government (2013) Electricity Generation Policy Statement - 2013 [online] Available at: http://www.gov.scot/Topics/Business-Industry/Energy/EGPS2012/EGPS2013 (accessed 03/07/2017)

[282] Scottish Government (2015) The Heat Policy Statement: Towards Decarbonising Heat: Maximising the Opportunities for Scotland [online] Available at: http://www.gov.scot/Publications/2015/06/6679 (accessed 03/07/2017)

[283] Scottish Government (2015) Scottish Government: Community Energy Policy Statement - September 2015 [online] Available at: http://www.gov.scot/Resource/0048/00485122.pdf (accessed 03/07/2017)

[284] Scottish Government (2011) Getting The Best From Our Land: A Land Use Strategy for Scotland 2016 - 2021 [online] Available at: http://www.gov.scot/Topics/Environment/Countryside/Landusestrategy (accessed 03/07/2017)

[285] SRUC (2017) Farming For A Better Climate [online] Available at: https://www.sruc.ac.uk/info/120175/farming_for_a_better_climate (accessed 03/07/2017)

[286] Scottish Government (2015) The Future of Scottish Agriculture: a Discussion Document [online] Available at: http://www.gov.scot/Publications/2015/06/6695 (accessed 03/07/2017)

[287] Scottish Government (2006) Scotland's National Transport Strategy [online] Available at: http://www.gov.scot/Resource/Doc/157751/0042649.pdf (accessed 03/07/2017)

wherever possible, to more efficient use of existing resources over the construction of new transport infrastructure[288].

10.1.7 The Scottish Forestry Strategy sets out a vision of a forestry sector that is diverse and robust, environmentally sensitive, and enhances human wellbeing in a number of ways[289]. The Strategy sets out seven key themes that have informed this vision, including climate change and environmental quality

10.1.8 In terms of waste management, the Waste (Scotland) Regulations 2012 made waste producers more accountable by requiring the sorting of recyclable materials prior to collection with additional requirements for food waste[290]. Making Things Last – A Circular Economy Strategy for Scotland seeks to promote national acceptance of the concept of circular economy as a way of benefiting the environment, tackling waste and carbon emissions, and reducing our reliance on scarce resources[291].

10.2 Baseline information

Current state

10.2.1 Scotland possesses a wealth of material assets, including a robust renewable energy sector, productive forests, and vast expanses of agricultural land.

- Existing and planned electricity transmission and distribution grid are essential material assets. Scotland's wind and seas hold some of the most concentrated potential not only across the UK and Europe but in the world, representing an estimated 25% of Europe's offshore wind and wave potential[292] and 10% of its tidal[293].
- Around 60% of the UK's forestry resource is found in Scotland and timber production is projected to double in the next 15 years as mature forests are harvested[294].
- Agriculture is the dominant land use in Scotland, covering 6.2 million hectares, 80% of the land area[295].

[288] Transport Scotland (2009) Strategic Transport Projects Review Final Report [online] Available at: https://www.transport.gov.scot/publication/strategic-transport-projects-review-final-report/ (accessed 03/07/2017)

[289] Forestry Commission (2006) The Scottish Forestry Strategy [online] Available at: http://scotland.forestry.gov.uk/images/corporate/pdf/scottish-forestry-strategy-2006.pdf (accessed 03/07/2017)

[290] The Waste (Scotland) Regulations 2012, SSI No. 148 [online] Available at: http://www.legislation.gov.uk/ssi/2012/148/introduction/made (accessed 03/07/2017)

[291] Scottish Government (2016) Making Things Last – A Circular Economy Strategy for Scotland [online] Available at: http://www.gov.scot/Publications/2016/02/1761 (accessed 03/07/2017)

[292] Scottish Government (2016) Energy in Scotland: Get the facts [online] Available at: http://www.gov.scot/Topics/Business-Industry/Energy/Facts (accessed 03/07/2017)

[293] Highlands and Islands Enterprise (2016) Wave Energy [online] Available at: http://www.hi-energy.org.uk/Renewables/Wave-Energy.htm (accessed 03/07/2017)

[294] Scotland's Environment (2016) Get Informed – Land - Timber and forestry products [online] Available at: http://www.environment.scotland.gov.uk/get-informed/land/timber-and-forestry-products/ (accessed 03/07/2017)

[295] Scotland's Environment (2014) Get Informed – Land - Crops and livestock [online] Available at: http://www.environment.scotland.gov.uk/get-informed/land/crops-and-livestock/ (accessed 03/07/2017)

10.2.2 There have been several measures implemented in order to achieve more sustainable use of our material assets.

- For example, Scotland's Zero Waste Plan outlines our target of 70% waste recycling and a maximum of 5% to landfill by 2025 for all Scotland's waste[296].

Existing pressures

10.2.3 The demand for the services that the natural environment provides is likely to grow in line with population growth, placing a further burden on natural and built resources and infrastructure.

- For example, there will likely be an increased need for materials for further development, food, water, fuel, and infrastructure such as houses and roads.

Climatic pressures

10.2.4 Climate change can threaten material assets in a number of ways.

- An increase in flooding, extreme weather conditions, and landslides are likely to have a negative effect on transport[297].
- Climate change presents both opportunities and threats to forestry with changes in productivity of different species, disease and pest risk, windthrow, and wildfire[298].

10.2.5 Climate change can also have an indirect impact on material assets as a result of mitigation and adaptation measures.

- Current land uses have the potential to be affected by changes to policy on renewable energy. Key interactions could arise from biomass growth[299] and opportunities such as anaerobic digestion[300].

[296] Scottish Government (2010) Scotland's Zero Waste Plan [online] Available at: http://www.gov.scot/Resource/Doc/314168/0099749.pdf (accessed 03/07/2017)

[297] Scottish Government (2009) Scotland's Climate Change Adaptation Framework – Transport [online] Available at: http://www.gov.scot/Publications/2009/12/08131211/1 (accessed 03/07/2017)

[298] Scottish Government (2009) Scotland's Climate Change Adaptation Framework – Forestry [online] Available at: http://www.gov.scot/Publications/2009/12/08131009/1 (accessed 03/07/2017)

[299] Scottish Government (2007) Biomass Action Plan for Scotland – 8. Biomass Supply [online] Available at: http://www.gov.scot/Publications/2007/03/12095912/9 (accessed 03/07/2017)

[300] Defra (2011) Anaerobic Digestion Strategy and Action Plan: A commitment to increasing energy from waste through Anaerobic Digestion [online] Available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/69400/anaerobic-digestion-strat-action-plan.pdf (accessed 03/07/2017)

Appendix B Abbreviations

AQMA	Air Quality Management Area
CCC	Committee on Climate Change
CCS	Carbon Capture and Storage
CHP	Combined Heat and Power
CO	Carbon Monoxide
CO2	Carbon Dioxide
COP 21	Paris Climate Conference
EC	European Commission
EIA	Environmental Impact Assessment
EU	European Union
EU ETS	European Union Emissions Trading Scheme
GHG	Greenhouse Gas
HES	Historic Environment Scotland
HRA	Habitats Regulations Appraisal
$MtCO_2e$	metric tons carbon dioxide equivalent
NPF3	National Planning Framework 3
NSA	National Scenic Area(s)
PM_{10}	particulate matter of diameter less than or equal to 10 micrometres
RBMP	River Basin Management Plan
RPP	Low Carbon Scotland: Meeting our Emissions Reduction Targets 2010 – 2022: Report on Proposals and Policies
RPP2	Low Carbon Scotland: Meeting our Emissions Reduction Targets 2013 – 2027: The Second Report on Proposals and Policies
SAC	Special Area(s) of Conservation
SEA	Strategic Environmental Assessment
SEPA	Scottish Environment Protection Agency
SEEP	Scotland's Energy Efficiency Programme
SNH	Scottish Natural Heritage
SPA	Special Protection Area
SPP	Scottish Planning Policy
SSSI	Site(s) of Special Scientific Interest
The 2005 Act	The Environmental Assessment (Scotland) Act 2005
The 2009 Act	Climate Change (Scotland) Act 2009
UNFCCC	United Nations Framework Convention on Climate Change
UK	United Kingdom
UKP09	UK Climate Projections

Appendix C Respondent information form

Climate Change Bill - Consultation

RESPONDENT INFORMATION FORM

Please Note this form **must** be completed and returned with your response.

Are you responding as an individual or an organisation?

☐ Individual

☐ Organisation

Full name or organisation's name

Please specify organisation type (if applicable):

☐ Community group or organisation

☐ Third sector organisation

☐ Private sector organisation

☐ Academic or research organisation

☐ Public Body, including Local Government, Executive Agencies etc.

Other – please state…

Phone number

Address

Postcode

Email

The Scottish Government would like your permission to publish your consultation response. Please indicate your publishing preference:

☐ Publish response with name

☐ Publish response only (without name)

☐ Do not publish response

Information for organisations:

The option 'Publish response only (without name)' is available for individual respondents only. If this option is selected, the organisation name will still be published.

If you choose the option 'Do not publish response', your organisation name may still be listed as having responded to the consultation in, for example, the analysis report.

We will share your response internally with other Scottish Government policy teams who may be addressing the issues you discuss. They may wish to contact you again in the future, but we require your permission to do so. Are you content for Scottish Government to contact you again in relation to this consultation exercise?

☐ Yes

☐ No

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