Edinburgh Adapts

Climate Change Adaptation Action Plan

2016→2020


Adaptation
Scotland
supporting climate change resilience


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Foreword

Councillor Lesley Hinds
Chair of the Edinburgh Sustainable Development Partnership

Climate change is already happening. While working to reduce the causes, one of the key priorities for the city is to prepare for the unavoidable impacts of climate change over the coming decades.

This Action Plan will help us develop a better and more informed understanding of these impacts, and what we need to do to alleviate them. Not only will this help us achieve our vision of a climate ready Edinburgh, but by adapting we can also help the city to become a greener, healthier, safer and better place to live.

The Edinburgh Sustainable Development Partnership, Adaptation Scotland and over fifty organisations across the city have contributed to the development of this Action Plan. Dealing with the consequences of climate change is a citywide issue. We can only hope to tackle this by working together, in partnership, with our communities, businesses and public agencies.

This is only the beginning of a long-term process. Much still needs to be done but by producing this Action Plan we have started out on the journey of ensuring Edinburgh remains a resilient city.

Councillor Lesley Hinds, City of Edinburgh Council

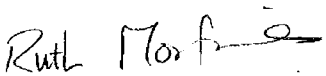
Ruth Monfries
Chair of the Edinburgh Adapts Steering Group

All of us have seen the evidence of Scotland's climate changing. Over the last century our climate has warmed, rainfall patterns have changed, sea levels have risen and extreme weather events are on the increase.

For example, at the Royal Botanic Garden Edinburgh staff are already adapting to climate uncertainty – dealing with floods, unseasonable temperatures and high winds.

Edinburgh Adapts brings together a diverse group of organisations from across the city, a cross-section of which are represented on the Steering Group. This Action Plan sets out how we are working collaboratively to help Edinburgh meet the challenges of a changing climate now and in the future.

Raising awareness of the impacts of climate change and sharing knowledge between organisations and sectors can help us better manage the risks while realising the opportunities in being well prepared, helping us ensure that a climate ready Edinburgh remains a great place to live, work and visit.



Ruth Monfries, Royal Botanic Garden Edinburgh

Introduction

The Climate Change (Scotland) Act 2009 created a framework for both mitigating and adapting to climate change. The Act put in place requirements to prepare Scotland for climate change and to adapt to its impacts. The first statutory Scottish Climate Change Adaptation Programme was published in May 2014.

While working to reduce the causes of climate change, Edinburgh also needs to prepare for the unavoidable impacts of a changing climate over the coming decades.

The climate in Edinburgh is set to get warmer and drier in summer, and milder and wetter in winter. As global average temperatures increase, we will also experience rises in sea level around the coast.

The following changes to local conditions can be expected:[1]

- Average temperatures will increase in all seasons (**H**), with the greatest increase in summer (**M**).
- What is considered a heatwave or extremely hot summer today will occur more frequently in future (**M**).
- Rainfall is projected to become more seasonal, with an increase in average winter and autumn rainfall (**M**). Average summer rainfall may decrease (**L**). Heavy rainfall events may occur more frequently in winter, spring, and autumn (**M**). An increase in summer heavy rainfall events is uncertain (**L**).
- Snow is projected to be less frequent in coastal locations like Edinburgh with rising temperatures (**H**), although by how much is complicated by increased winter precipitation (**L**).
- The growing season will continue to lengthen due to increasing temperatures in spring and autumn (**H**).
- Winter storms with extreme rainfall may become more frequent (**L**), although there is large uncertainty in models.
- Sea level will rise (**H**).

The final impacts of climate change on Edinburgh will vary depending on the success of global mitigation efforts, but even a relatively modest increase in temperature is likely to bring significant changes.

1 Assessment of 'Overall Confidence' in scientific evidence for individual statements: High (H), Medium (M) and Low (L). Note: in preparation by CXC and Adaptation Scotland.

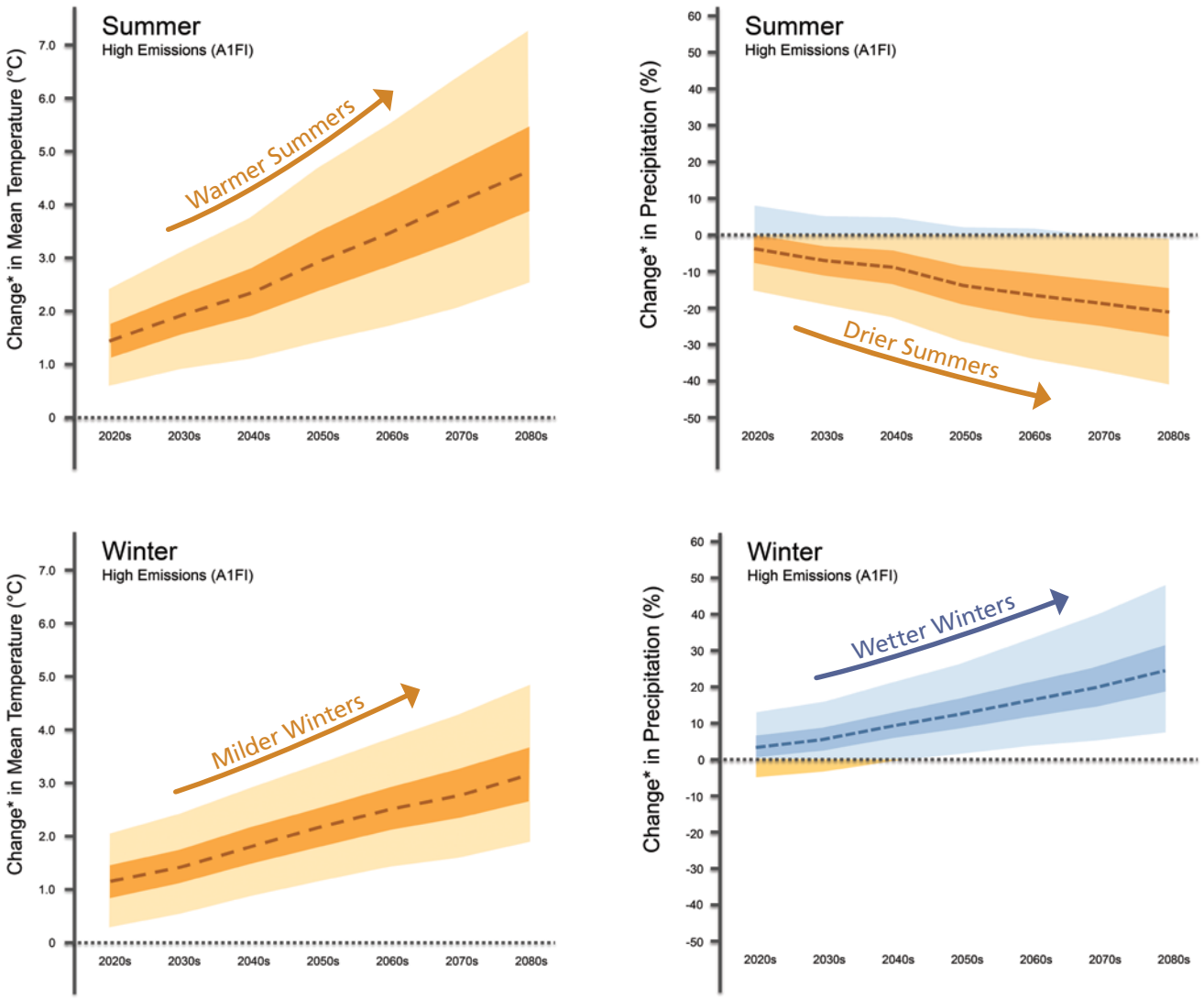
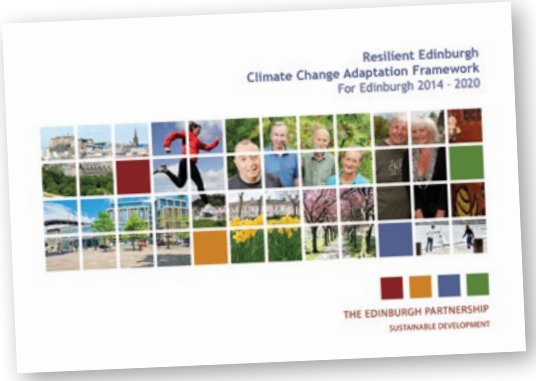


Figure 1: UKCP09 climate projections for Edinburgh (cell 806) showing expected change in mean temperature and mean precipitation for the 21st century. The dashed line is 50% central estimate, the inner band is the likely probability range and the outer band is the very likely probability range (i.e. it is very likely that temperature or rainfall will be within this range). Note all values compared to 1961-1990 baseline average.

*compare to 1961-1990 baseline location = Edinburgh (cell 806)



The remit of the Edinburgh Sustainable Development Partnership, comprising key public and private stakeholders across the city, third sector and community groups, is aligned with Sustainable Edinburgh 2020 (SE2020). The City of Edinburgh Council, through SE2020 is committed to ensuring that by 2020 Edinburgh will have "adapted to the unavoidable impacts of climate change in partnership with key stakeholders and local communities".

The Resilient Edinburgh Climate Change Adaptation Framework 2014-2020 set out Edinburgh's strategic approach to increasing resilience to the impacts of climate change, identified priority actions, and committed partners to ongoing monitoring and reporting, including the development of a detailed action plan.

Edinburgh Adapts, the city's first climate change adaptation action plan, has been developed to help the city prepare for and adapt to the impacts of climate change.

A partnership approach has been taken, with the Edinburgh Sustainable Development Partnership, Adaptation Scotland and other key stakeholders across the city working together to produce the Plan. Over fifty stakeholders were involved in developing the Plan, from a wide range of organisations across the city. This included working with the Edinburgh Biodiversity Partnership to develop adaptation actions for both the Edinburgh Biodiversity Action Plan 2016-18 and this Action Plan.

The Edinburgh Adapts Action Plan provides a platform for bringing together adaptation activity across the city, helping to maintain momentum and delivering on the commitments made in the Resilient Edinburgh Framework.

The Action Plan is themed into five sections on Governance, Natural Environment and Greenspace, the Built Environment and Infrastructure, Flood Prevention, and Society and Economy. All these themes are inter-linked and try to capture a whole city approach to adaptation. However there will be gaps, which will be addressed as the Action Plan progresses.

A vision for a Climate Ready Edinburgh has been developed in conjunction with the Action Plan. The vision aims to tell the story of Edinburgh's adaptation journey, first in 2025 and then in 2050.

"The Royal Botanic Garden Edinburgh is delighted to endorse this Action Plan, having engaged with partner organisations and contributed throughout its development. We are working with our partners to gain a deeper understanding of the implications of climate change for Edinburgh and to share knowledge and expertise in helping the city adapt to a changing climate."

Governance

Edinburgh Adapts is the city's first adaptation action plan. It provides a blueprint for dealing with the impacts of climate change in Edinburgh and making the city more resilient.

The Plan is just the start of an in-depth, long term process to ensure Edinburgh remains a climate resilient city. To ensure that the actions in the Plan are achievable, a dedicated adaptation steering group has been established to take forward governance of adaptation in the city.

The Steering Group's role is to oversee the development and implementation of the Action Plan. In particular, to encourage and facilitate partnership working to ensure Edinburgh continues to be a climate-resilient city. The Steering Group will report back regularly to the Edinburgh Sustainable Development Partnership.

As well as providing a governance structure for adaptation in the city, we also need to ensure evidence is built up and kept updated on how the climate in Edinburgh is changing, and what the potential impacts of this will be, to aid mapping and identification of areas at risk and to inform risk assessments, contingency planning and decision-making.

It is also crucial that we communicate and raise awareness of climate change and the effects this will have on the city and its communities, including the impacts already affecting the city and the actions already being taken or needing to be taken to help the city become more resilient. This will enable the sharing of best practice, help build partnerships and inform and engage all sectors of the city.

Edinburgh has an established Community Planning Partnership structure under the Edinburgh Partnership. Integrating climate change priorities will support the local implementation of climate change policy during the development of the Local Outcome Improvement Plan by identifying how local priorities can be pursued in line with climate change objectives to ensure that all forms of climate inequality are reduced.

We can also learn from other similar cities as to how they are tackling the same issues. This is why we are working with European partners to raise awareness, promote best practice and build up evidence of climate impacts and adaptation through the EU Mayors Adapt programme and through building partnerships and developing projects with other European and international partners.

Edinburgh Adapts received support from the Adaptation Scotland programme to help develop the Edinburgh Adapts Vision and Action Plan, and establish long term governance arrangements to oversee the implementation of actions.

Adaptation Scotland
supporting climate change resilience

A wide range of organisations and community representatives have been closely involved in developing the vision and action plan. A project Task Group including Historic Environment Scotland, Edinburgh World Heritage, City of Edinburgh Council, University of Edinburgh, Transition Edinburgh South and Edible Edinburgh played a key role in helping to plan and run a series of very popular engagement workshops that saw over fifty organisations participate and over 100 actions proposed for inclusion in the plan.

The workshops also provided an opportunity for organisations and community representatives to help develop long term governance arrangements to oversee the implementation of the action plan. Discussion groups and an anonymous survey were used to help identify the preferred governance options and following this the Edinburgh Sustainable Development Partnership approved the establishment of a dedicated Edinburgh Adapts Steering Group.

Membership of the Steering Group is open to all those who have contributed actions to the action plan and has a strong and active membership including the Royal Botanical Garden Edinburgh, Historic Environment Scotland, Edinburgh World Heritage, University of Edinburgh, City of Edinburgh Council, the Adaptation Scotland programme, Scottish Wildlife Trust, Edinburgh College and Heriot Watt University.

The Adaptation Scotland Programme is funded by the Scottish Government and delivered by sustainability charity Sniffer

“Safeguarding Edinburgh’s unique urban environment against the impacts of climate change calls for cross-sectoral collaboration and knowledge exchange based on sound science and engineering. Heriot-Watt University has worked closely with its partners in the development of this important Action Plan, guiding the direction for successful city-wide adaptation.”

Governance Actions

Action Ref	Action Title	Action	Partners	Timescale
G1	Edinburgh Adapts Steering Group	Establish a Steering Group to ensure the successful implementation of the Edinburgh Adapts Action Plan	Edinburgh Adapts Steering Group	2016-2020
G2	Edinburgh adaptation evidence base	Establish and develop an adaptation evidence base on projected changes in climate in Edinburgh and the East of Scotland, and the impacts to the city, from all possible sources, to aid mapping and identification of areas at risk and inform risk assessments, contingency planning and decision-making	City of Edinburgh Council, SEPA, Royal Botanic Garden Edinburgh, Scottish Wildlife Trust, SNH, Met Office, other relevant sources	2016-2020
G3	EU Horizon 2020 Momentum -Climate Services	As part of this EU Climate Services project, the Edinburgh demonstrator would: a) review how climate information has been used to develop and inform individual actions in the Action Plan; b) produce an online compendium of climate information available for Edinburgh and provide examples of how it is being used to inform decision making; c) support the further use of climate information for a small selection of actions identified in the Action Plan. The aim would be to help build the case for implementing the actions and ensure that they are informed by climate information. This part of the project would produce case studies showing how climate information has been used as part of implementing the actions.	University of Edinburgh, Adaptation Scotland, City of Edinburgh Council, Forest Research, UK and EU partners	Stage 2. If successful the project will run from 2017-2020

Governance Actions

Action Ref	Action Title	Action	Partners	Timescale
G4	Adaptation Communications Strategy	Develop a communications strategy to raise awareness, communicate and showcase adaptation in the city and help people to engage.	Edinburgh Adapts Steering Group, Edinburgh Sustainable Development Partnership, other city stakeholders	2016-2020
G5	Partnership building	Through the Steering Group and/or its sub groups facilitate potential partnerships and/or funding sources to take forward projects across the city	Edinburgh Adapts Steering Group and/or funding sub-group	2016-2020
G6	Resilience Planning	As part of the risk assessment process, incorporate current and emerging climate change related risks and impacts into resilience planning, including severe weather planning and associated other relevant contingency planning.	Council Resilience Group, Edinburgh Community Resilience Group, CAT1 Responder Partners	2016-2020
G7	Council risk register	Review the Council's Risk Register and embed climate-related risks where appropriate.	City of Edinburgh Council Internal Audit	2016-2020
G8	EU Mayors Adapt	Work with EU partners to raise awareness, promote best practice and build up evidence on climate change impacts and adaptation through the EU Mayors Adapt programme.	City of Edinburgh Council Strategy & Insight Division	2016-2020
G9	Community Planning preparation of LOIP 2016-2020	Support the local implementation of climate change policy in the new Local Outcome Improvement Plan by identifying how local priorities can be pursued in line with climate change objectives to ensure that all forms of climate inequality are reduced.	Edinburgh Partnership, City of Edinburgh Council Strategy & Insight Division	2017-2020

Natural Environment and Greenspace

Climate change will affect the natural environment as weather patterns change, temperatures rise and species relocate. However, the natural environment, greenspaces and green infrastructure also have an essential role in offsetting some of the predicted impacts of climate change.

Investing in the natural environment helps to manage and reduce risks from extreme weather. Green infrastructure provides a wide range of adaptive benefits, including providing shade and cooling for urban centres, reducing the impact of heavy rain by absorbing water and slowing run-off, improving air and water quality by absorbing pollutants, increasing wildlife and biodiversity, and improving general well-being. Planting 'smart' in line with national guidance will help create a resilient natural environment which can better cope with new pests, diseases and weather patterns.

Well connected green networks aid species movement and dispersal, therefore integrated habitat networks form a key component of this Action Plan. Through the promotion of green infrastructure we will strengthen habitat networks, reduce habitat fragmentation and provide opportunities for species migration.

Change is already happening, in the timing of seasonal events and in species distribution. As this continues, we will see further changes to our urban landscapes, parks and woodlands, and the plants and animals that inhabit them. This will create future challenges for our land management and conservation priorities.

There are many risks to the natural environment from climate change, including biodiversity change and loss, environmental degradation, longer growing seasons, increased incidence of pests and disease, and flooding. We must not underestimate the risks we face. But, it is also important to recognise that within this changing context our environment will retain many valued species and habitats and the city may also develop new features and habitats that we wish to protect and enhance.

The city's greenspace and green networks play an important role in ensuring Edinburgh's climate resilience. Assessing the impacts of climate change on the natural environment will help to inform policy, management and decision making. The current Edinburgh Biodiversity Action Plan (2016-18) seeks to carry out such an assessment. The Edinburgh Biodiversity Partnership has worked since 2000 to deliver Biodiversity Action Plans which improve the quality, extent and connectivity of the natural environment. Many of the actions relating to climate change adaptation and the natural environment are being delivered jointly with the EBAP 2016-18. By working in partnership, we will continue to conserve and manage protected species and sites, as well as developing a city-scale approach to natural heritage management, building in habitat enhancements to reduce other pressures on biodiversity and developing habitat networks to aid species dispersal. The challenge is to take the right action at the right time to minimise loss, facilitate change and take advantage of new opportunities.

This Action Plan includes measures to preserve and increase quality greenspace on city land and provide nature-based solutions to climate related problems. As well as the overarching Edinburgh Biodiversity Action Plan, initiatives such as Edinburgh Living Landscapes aim to encourage more natural management of the city's green spaces through naturalisation of city parks and greenspaces, and planting to create habitats such as nectar borders and berry hedges to benefit bees and other species.

Organisations in the city are already taking action. For example, the Royal Botanic Garden in Edinburgh is already adapting to climate uncertainty – dealing with floods, prolonged periods of low rainfall, high winds and unseasonable temperatures in their gardens.

> "Scottish Wildlife Trust is really pleased to see the Edinburgh Adapts Action Plan and it is clear to see that it firmly embodies the aspirations of the Edinburgh Living Landscape. A healthy, green and biodiverse city will be vital in meeting our adaptation challenges."

Case Study: Royal Botanic Garden Edinburgh

The Royal Botanic Garden Edinburgh (RBGE) carried out a study into the impact of weather events on their gardens and how this can be used to best deal with projected climate change.

Information was gathered on:

- observed impacts of current weather conditions and extreme weather experienced, and any adaptive actions taken as a result;
- risks related to weather or climate change that have been identified;
- potential opportunities arising from a changing climate;
- records of garden closures to visitors and staff; and
- historic weather data.

Storm damage has resulted in multiple broken panes of glass in the glasshouses at Inverleith in Edinburgh, leaving tender plants exposed to the elements.

All the gardens had lost or damaged trees during storms. This provides both challenges, when specimens are of particular conservation importance, and opportunities for planting new species. Mild winters increase the risk of pests and diseases, including an increase in aphids such as green spruce aphid on *Picea* (spruce), and soft scale, previously considered a glasshouse pest, on rhododendron.

As the climate changes, the gardens have to close more frequently due to severe weather. This leads to a loss of man hours as staff are also excluded from the garden for safety reasons, income is lost, visitors are disappointed and staff time is needed to clear up after a storm.

The increase in heavy rainfall has made the use of bark and grass paths impractical. All the gardens are now replacing these paths with gravel, or other porous paths together with improved drainage measures.

Adaptation is site specific. The four different sites allow RBGE to draw on a wide range of experience in dealing with different weather events and site impacts.

Adaptation measures include:

- Planting a mix of species. This increases resilience to pests and diseases, and provides a more effective windbreak and structure to shelter belts.
- When re-designing garden infrastructure, locating facilities such as visitor centres and cafes outside the pay zone to provide access even if the garden is closed.
- When planning staff resource and time, include allowance for clear-up and remedial work following extreme weather events.
- Replacing paths with gravel or other porous materials.
- Providing additional drainage and factoring in staff time for keeping drains clear.
- Researching glasshouse structures and glazing systems that are less susceptible to wind damage.
- Adopting a zero tolerance maintenance procedure to glass damage such as cracks, and keep more glass on site to reduce repair time.

RBGE will now compare anecdotal evidence about changing weather with actual weather records from weather stations at each garden. Opportunities, such as being able to grow new species in a milder future climate, will be highlighted. Maps of the gardens will be produced with a 'trail' showing adaptation features, and interpretative signage will be developed to explain climate impacts and adaptation measures to visitors.

Find out more about this project on the RBGE website: www.rbge.org.uk

Natural Environment and Greenspace Actions

Action Ref	Action Title	Action	Partners	Timescale
GS1	Green and Blue networks – Adaptation Policy and Management	Assess the effects of climate change and their impact on the natural environment and green and blue space, and produce guidance to inform adaptation policy and management.	City of Edinburgh Council Planning and Transport, Edinburgh Biodiversity Partnership, Scottish Wildlife Trust	2017-2020
GS2	Green and Blue networks – review plans, conservation management strategies and projects	Review Habitat Action Plans, Species Action Plans, site management plans and other conservation strategies, plans and projects to ensure that: 1) all risks from adverse climate change have been identified; 2) future changes in these pressures are assessed; 3) that these are being explicitly addressed wherever possible incorporating adaptation measure; 4) carbon capture within habitats is considered.	City of Edinburgh Council Planning and Transport, and Environment, Site Managers, Edinburgh Biodiversity Partnership,	Annual from 2016 onwards
GS3	Green infrastructure adaptation	Promote green infrastructure to help nature to adapt to climate change by strengthening habitat networks, reducing habitat fragmentation and providing opportunities for species to migrate.	City of Edinburgh Council Planning and Transport, and Environment, Edinburgh Living Landscapes	Annual from 2016 onwards

Natural Environment and Greenspace Actions

Action Ref	Action Title	Action	Partners	Timescale
GS4	Edinburgh Living Landscapes (Phases 1 and 2)	Improve climate change resilience through: 1) mapping of the Council's green and blue estate, its connectivity and greenspace typology, including ecosystem services; 2) managing and maintaining up to 70 urban meadow sites across the city incorporating mixed floral, native wildflower and grass meadow sites 3) reducing grass cutting frequency allowing natural grassland to thrive, tree planting, increasing use of herbaceous perennial planting etc.	Edinburgh Living Landscapes (The City of Edinburgh Council, Scottish Wildlife Trust, ELGT, RBGE, Green Surge, the University of Edinburgh, SEPA, Scottish Natural Heritage, the Cockburn Association, OPENspace Research Centre)	2015 onwards
GS5	Forest Research	Share lessons with stakeholders on innovative methods in urban greenspace planning and engagement of non-governmental stakeholders in this, based on GREEN SURGE findings. Further analyse the connectivity of urban green spaces through mapping and analysis of vegetation in domestic gardens as part of the GREEN SURGE project. This will help to identify gaps in suitable habitat for insect pollinators and therefore prioritise habitat improvement areas.	Edinburgh Living Landscapes, Forest Research	Study 1 ongoing Study 2 2017 onwards
GS6	i-Tree Edinburgh	Calculation of the ecosystem services value of Edinburgh's trees, including improving air quality, offsetting carbon emissions, promoting biodiversity, limiting flood risk, reducing the urban heat island effect, promoting inward investment and job creation.	City of Edinburgh Council Environment, Forest Research	Ongoing

Natural Environment and Greenspace Actions

Action Ref	Action Title	Action	Partners	Timescale
GS7	Trees in the City – Trees and Woodland Action Plan	Through the Plan, promote tree planting to mitigate the effects of severe weather, reduce the impact of heavy rain and floods, improve the effectiveness of SUDs, improve air quality, and help reduce the urban heat effect.	City of Edinburgh Council Environment	2014 onwards
GS8	Habitat connectivity and integrated habitat networks	Promote habitat resilience and greenspaces through tree planting, biodiversity improvements, strategic projects (linking green networks), active travel projects, creating new greenspaces, and preventing fragmentation of habitat networks. Promote SRDP grant funding opportunities to land managers to build capacity.	Lothians & Fife Green Network Partnership, Edinburgh & Lothians Greenspace Trust, Scottish Natural Heritage	Ongoing
GS9	Water of Leith Habitat Creation	Investigate opportunities for habitat creation in the upper catchment of the Water of Leith, including woodland creation.	City of Edinburgh Council Planning and Transport, Lothians & Fife Green Network Partnership, Water of Leith Conservation Trust, Scottish National Heritage Edinburgh & Lothians Greenspace Trust, Forestry Commission Scotland, RSPB, RAFTS	Early stages

Natural Environment and Greenspace Actions

Action Ref	Action Title	Action	Partners	Timescale
GS10	Provide an integrated approach to adapting Edinburgh's Open Spaces to the impacts of climate change through the Open Spaces Strategy	Review approaches to climate change adaptation through green infrastructure and sustainable design during the preparation of the new Open Spaces Strategy and ensure proposed actions support Edinburgh's climate change resilience for the benefit of communities	City of Edinburgh Council Planning, Flood Prevention, Parks & Greenspace Service, Housing	Ongoing to Q4 2016
GS11	Urban ecosystem services mapping	Develop and apply methods for modelling and mapping 'urban ecosystem services'. Edinburgh is one of the case study cities.	Innovate-UK project (Spades), Forest Research, City of Edinburgh Council	Early stages
GS12	Greenspace site connectivity	Undertake research into site connectivity for key plant species within the city to understand the ecological dynamics of greenspace.	Royal Botanic Garden Edinburgh, Edinburgh Living Landscapes	2016 onwards
GS13	Monitor ecosystem health	Develop a suite of ecosystem health measures and indicators such as: 1) Indices of habitat connectivity 2) Percentage cover by trees/ Native Woodland Survey of Scotland 3) Ecological status of water bodies 4) Species indicators 5) Phenology study (online herbarium species indexing project) 6) Measures of community engagement	Scottish Wildlife Trust, City of Edinburgh Council Planning and Transport, Scottish Natural Heritage, Forestry Commission Scotland, SEPA, RSPB, University of Edinburgh, TWIC, ELL, RBGE	2018 onwards

Natural Environment and Greenspace Actions

Action Ref	Action Title	Action	Partners	Timescale
GS14	Monitor changes in climate change indicator species' distribution and populations and take action	1) RSPB Species Study – Develop a model of predicted changes in distribution and population size of bird species due to climate change. Climate proof landscapes and corridors to aid species movement. Raise public awareness of climate change impacts and adaptation.	RSPB	2018 onwards
		2) Monitor changes in butterfly population size and distribution – Continue to carry out generic butterfly surveys to build an understanding of changing populations in Edinburgh's managed sites and urban green spaces.	City of Edinburgh Council Environment, Historic Environment Scotland	Ongoing
		3) Continue to utilise volunteers in the surveying of butterfly species on NH Service and Historic Environment Scotland sites.	City of Edinburgh Council Environment, Historic Environment Scotland, Butterfly Conservation Scotland	Ongoing
GS15	Raise awareness of biodiversity implications of climate change	Support the use of long-term datasets and publication and promotion of information describing the implications of climate change on Edinburgh's biodiversity through websites, public information etc	Edinburgh Biodiversity Partnership	Annual from 2016 onwards
GS16	Scottish Plant Health Strategy	Use Edinburgh Adapts and its partnership network as a platform to raise awareness among stakeholders of emerging plant health issues and increase preparedness for pest outbreaks, to help contribute to achieving the aims of the Scottish Plant Health Strategy in Edinburgh.	Agriculture and Rural Development Division – Scottish Government	2016-2020

Natural Environment and Greenspace Actions

Action Ref	Action Title	Action	Partners	Timescale
GS17	Citywide INNS project	Identify third party organisations and suitable funding for a city-wide invasive non native species (INNS) project. Develop a partnership project to control priority INNS.	City of Edinburgh Planning and Transport, Scottish Natural Heritage, RFFTS, SEPA, Edinburgh Living Landscapes	Funding dependent 2017
GS18	Green Infrastructure Schools Project	Edinburgh Living Landscape school participation: Up to 10 schools with access to high quality 'naturalised' school grounds, green infrastructure and local greenspace for outdoor learning, linked to ELL initiative and supported by learning resources.	City of Edinburgh Council Environment, Edinburgh Living Landscapes (ELL)	December 2016 onwards
GS19	Greening of Edinburgh's cycle network	Cyclepath management: Carry out biodiversity enhancement and conservation enhancement projects along Edinburgh's Cyclepath Network.	Edinburgh & Lothians Greenspace Trust, City of Edinburgh Council Planning and Transport, and Neighbourhoods, Edinburgh Living Landscapes	Ongoing as funding opportunities arise
GS20	Holyrood Park Management	Aid adaptation of Holyrood Park through: conservation of grasslands/ wildlife and adding of wild flower area; education programmes delivered by the Ranger Service to local schools and communities; and, woodland and wetland management.	Historic Environment Scotland in partnership with schools (education), community outreach, RBGE (conservation)	Ongoing
GS21	Edinburgh College Outdoors action plan	Edinburgh College are developing a holistic action plan aimed at bringing together various elements of outdoor space including community growing; biodiversity; tree cover; outdoor learning; interpretation; low carbon management and more.	Edinburgh College in partnership with RSPB and others	Draft – late 2016

The Built Environment and Infrastructure

Land use planning plays a central role in preparing Edinburgh for a changing climate. Effective local planning is essential to minimise future vulnerability and improve resilience to the impacts of climate change.

Edinburgh's new Local Development Plan (ELDP) sets out policies and proposals to guide development in the city. The ELDP aims to promote development in sustainable locations and enhance the city's green network by encouraging land management practices which capture, store and retain carbon, and prevent and manage flood risk.

Edinburgh Design Guidance promotes quality and sustainable design and construction, encouraging the protection and integration of green infrastructure and networks in development. Edinburgh Street Guidance aims to co-ordinate street design and promote collaborative working to improve the quality and sustainability of our streets.

Edinburgh's current stock of buildings and infrastructure will need to be adapted. These are susceptible to extreme weather events, over-heating, flooding and disruption to power and water supplies. For existing and new build, smart appropriate design needs to be encouraged, so that buildings and infrastructure can be prepared for projected changes in temperature, weather and rainfall.

Edinburgh is a historic city and World Heritage Site. This presents particular challenges when tackling climate change. Many of our historic buildings, sites and designed urban landscapes have already experienced and survived significant climatic change in the past. Ensuring they continue to do so is the challenge we face. We need to develop a clear understanding of how our climate may impact on this historic heritage and what can be done to reduce or alleviate this.

The development of a new Edinburgh World Heritage Management Plan offers the opportunity to embed adaptation into the strategic priorities of the city's historic environment. The Edinburgh World Heritage Trust and Historic Environment Scotland are already adapting their buildings to a changing climate, and through training, maintenance and repair, are ensuring they continue to be prepared for future climatic change.

There is a strong relationship between the built and natural environment in relation to water, where surface water run-off can cause flooding and pollution. As climate change is expected to increase the frequency and volume of rainfall, these impacts are expected to get worse.

Adapting the built environment through the use of green infrastructure such as sustainable urban drainage systems, living roofs, raingardens and other innovations helps to alleviate these effects. Greening of buildings can also help with insulation against heat and cold, as well as offering new habitats to wildlife. Street trees and other vegetation also absorb air pollution and help with shading and cooling.

As sea levels rise, the risk of erosion, flooding and storm surges along Edinburgh's coast will increase. By strengthening scientific evidence, engaging stakeholders and building awareness of current and future coastal change, we can identify ways to adapt our changing coast and live with increased coastal flood and erosion risk.

"Historic Environment Scotland is delighted to endorse this Climate Change Action Plan. We have been involved in its development at every stage, working with our partners to lead the way in the adaptation of Edinburgh's historic environment to the changing climate."

Case Study: Heriot Watt University

Domestic gardens form a major part of Edinburgh's urban area, providing multiple benefits by helping to improve air quality, support biodiversity, improve health and wellbeing, and enhance the city's streetscapes. Importantly, they also provide a valuable asset in terms of surface water management as garden vegetation acts as a "sponge" by soaking up rainfall and filtering pollution.

However, many gardens across Edinburgh have been covered by hard paving by residents to create low-maintenance gardens or off-street parking. Replacing natural vegetation with impermeable surfaces reduces the amount of rainfall that can infiltrate naturally into the ground and increases the rate and volume of runoff flowing to the city's drainage systems.

Across Edinburgh, increased urbanisation and land impermeability mean that the city's surface water drainage system is increasingly having to handle volumes of runoff far in excess of what it was designed to cope with. During storm events, this can cause the system to become overwhelmed and lead to localised flooding.

This case study quantifies rainwater runoff generation from a typical front garden in Edinburgh in order to assess the impact of garden paving on flood risk and provide a benchmark for garden adaptation planning (see box).

The protection, reinstatement, and adaptation of Edinburgh's gardens could provide a valuable asset for surface water management strategies, providing enhanced future flood resilience across the city.

Variation in runoff due to garden paving for a 1 in 50 year storm in Edinburgh

A typical front garden was assumed to have an area of 50 m^2 based on average UK city garden sizes.

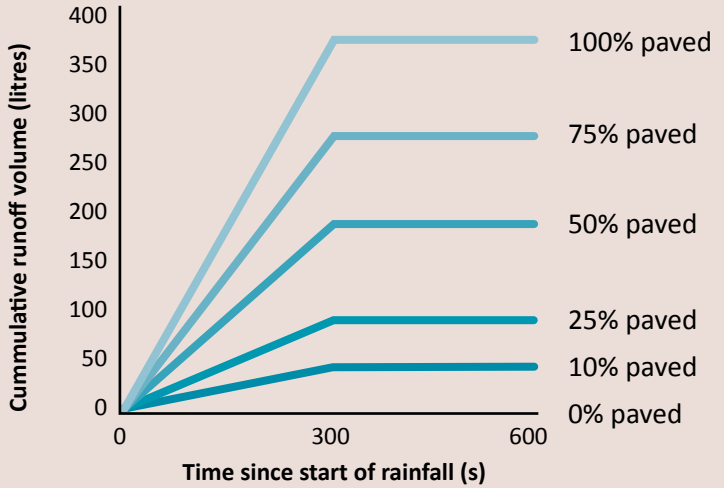
A rainfall-runoff model (developed at Heriot-Watt University) was used to assess runoff sensitivity to paved area under both current and future rainfall intensities.

A rainfall intensity of 86 mm/h over 5 minutes was used to represent current rainfall in Edinburgh based on the 1 in 50 year design storm.

Future rainfall was represented by applying change factors (cf) derived from the UK Climate Projections 2009 (UKCP09) for both the 2050s (cf = +20%) and 2080s (cf = +36) under the HIGH greenhouse gas emissions scenario and for probability levels of 90% (unlikely to be exceeded).

A coarse, well-drained soil with a high infiltration rate was assumed for the vegetated garden areas, and also that all rainfall landing on impermeable surfaces contributed to garden runoff.

Results show that a front garden which is completely paved over could generate 357 litres of rainwater runoff, whilst a garden with no paving is able to naturally infiltrate all of the rainwater. By the 2050s and 2080s, gardens with no paving were still able to infiltrate all rainfall despite the increased intensity, whilst runoff from the completely paved garden increased to 428 litres and 485 litres, respectively.



The Built Environment and Infrastructure Actions

Action Ref	Action Title	Action	Partners	Timescale
BE1	Built Environment – climate change impacts	Assess the likely impacts of climate change and their effect on the built environment and use it to inform adaptation policy. Increase the climate resilience of the built environment through natural greening measures in new developments, such as the use of natural features (e.g. street trees, green roofs, rain gardens etc) and other materials such as permeable paving.	The City of Edinburgh Council Planning & Transport, Edinburgh World Heritage Trust, Scottish Natural Heritage	Annual Ongoing
BE2	Embed climate resilience within Edinburgh planning guidance	Through the Edinburgh Local Development Plan (ELDP) and Design Guidance: 1) promote quality and sustainable design and construction 2) Ensure developments are not at risk from flooding from watercourses (above and below ground), surface water flooding or from the sea 3) Update SUDs design requirements within Edinburgh Design Guidance 4) protect open spaces, promote multifunctional green and blue infrastructure in developments and connect this to the wider network of open spaces and habitats 5) encourage the incorporation of living roofs and walls and other green infrastructure in appropriate locations	The City of Edinburgh Council Planning & Transport, developers, other stakeholders, Lothian & Fife Green Networks Partnership, Edinburgh & Lothians Greenspace Trust, Scottish Wildlife Trust, Scottish Natural Heritage	Ongoing
BE3	Catchment scale approach to sustainable flood risk management	Ensure new developments in areas with medium to high likelihood of flooding are avoided as per Scottish Planning Policy and accompanying Planning notes.	The City of Edinburgh Council Planning & Transport	Ongoing

The Built Environment and Infrastructure Actions

Action Ref	Action Title	Action	Partners	Timescale
BE4	Embed climate resilience within the Edinburgh & South East Scotland Strategic Development Plan 2 (SESPlan)	Through promotion of strategic green networks and strategic flood risk policy guidance. Transition to proposed plan creates opportunities for collaboration between authorities. SDP2 will set the framework for the six councils' second wave of Local Development Plans.	SESPlan, The City of Edinburgh Council, Historic Environment Scotland, SEPA, Scottish Natural Heritage	Ongoing
BE5	Strategic Infrastructure Fund and City Deal	Strategic Infrastructure Fund, if developed, could create new funding mechanism available for strategic scale adaptation infrastructure projects set out in SDP2 Action Programme. Approved City Deal should create new funding for infrastructure projects that could include greening and adaptation elements.	The City of Edinburgh Council, SESPlan and member councils, Scottish Natural Heritage	2017 onwards
BE6	Edinburgh Urban Design Panel (EUDP) sustainability awareness raising	Contribute to raising awareness of sustainability solutions at an early stage in the design process for new development through: For the EUDP's process 1) Revisit how the Panel can raise the importance of sustainably being embedded in the early stages of the development design process and presented to the Panel as part of the presentation. Ensure that sustainability forms part of the Panel's discussion. 2) Further consider whether a sustainability specialist should form part of the core members of the Panel. 3) Ensure that sustainably forms part of the Panel's report and advice by having this as a standard item for discussion even if not detailed in the presenters' pro forma information. For the Planning process – As part of a Planning Application an assessment method for sustainability could be considered, for example BREEAM.	Edinburgh Urban Design Panel	2016 onwards

The Built Environment and Infrastructure Actions

Action Ref	Action Title	Action	Partners	Timescale
BE7	Built Environment – Green Infrastructure	Promote green infrastructure in the built environment to help nature to adapt to climate change by strengthening habitat networks, reducing habitat fragmentation and providing opportunities for species to migrate.	The City of Edinburgh Council Planning & Transport, Edinburgh Sustainable Development Partnership, Edinburgh Living Landscapes, SNH	2018 onwards
BE8	Ecosystem Approach to planning	1) Produce a policy statement on the ecosystem approach and planning in Edinburgh. 2) New developments planned and delivered to create low carbon, walkable neighbourhoods and work places containing high quality green and blue infrastructure, increasing the number of green exteriors of buildings where appropriate.	The City of Edinburgh Council Planning & Transport, Edinburgh Sustainable Development Partnership, Edinburgh Living Landscape	2017
BE9	Showcase high quality developments	1) Work with developers to showcase high quality, wildlife rich developments including meadows, ponds, native trees etc. 2) Introduce a Natural Capital Standard for Green Infrastructure	Scottish Wildlife Trust, Edinburgh Living Landscapes, CEC Planning and Transport	2018 (funding dependent)
BE10	Street trees	In line with Street Design Guidance incorporate guidance on street trees and greening in the updated Edinburgh Design Guidance. Undertake monitoring.	The City of Edinburgh Council Planning and Transport, CEC Forestry Service	Ongoing
BE11	Brownfield site habitats	To compensate for the loss of brownfield habitats, include living roofs which replicate brownfield habitats in the promotion of green infrastructure, including in the Edinburgh Design Guidance. Recommend all developments over a minimum size to include Living Roofs.	The City of Edinburgh Council Planning and Transport, Buglife	2017 onwards
BE12	Temporary greening of vacant sites	Identify sites or projects for temporary greening on vacant and derelict land. Look at opportunities to promote adaptation through temporary siting of raingardens, ponds etc at these sites.	Edinburgh and Lothians Greenspace Trust, City of Edinburgh Council Planning and Transport, Edinburgh Living Landscapes, RBGE, Scottish Natural Heritage	Ongoing dependent on funding

The Built Environment and Infrastructure Actions

Action Ref	Action Title	Action	Partners	Timescale
BE13	Depaving/ permeable surfaces promotion	Joint working to develop mechanisms to promote de-paving of front gardens, school grounds, etc and introduce permeable surfaces. Encourage householders to green and enhance their gardens e.g. encourage development of rain gardens in domestic properties to reduce flood risk. Demonstrate depaving/porous paths/rain gardens/ low maintenance gardens to encourage re-greening.	Heriot Watt University, RBGE, Edinburgh Living Landscapes	Early stages
BE14	Edinburgh raingarden audit	Map number and sites of existing raingardens in Edinburgh and those in development	Scottish Green Infrastructure Forum, City of Edinburgh Council	2016-2020
BE15	10,000 raingardens Edinburgh	1) Identify potential sites and through this develop list of candidate raingarden sites in Edinburgh 2) Install high profile raingardens in Edinburgh at organisation level and through current or new partnerships	Scottish Green Infrastructure Forum	2016-2020
BE16	Raingarden Officer	Seek funding to appoint a full-time joint Glasgow/Edinburgh raingarden officer to take forward 10,000 raingarden project.	Scottish Green Infrastructure Forum	2016-2020
BE17	Green Infrastructure – Edinburgh case study	EU funding bid on green infrastructure. Consortium would use Edinburgh as a case study and hope to: 1) Conduct a baseline assessment of green infrastructure (ideally rain gardens) in Edinburgh 2) Conduct co-design/develop technical specifications 3) Identify the potential for demonstration sites 4) Co-develop plans for a systematic implementation of rain gardens	Heriot Watt University, EU Consortium partners	2nd stage. 5-year project potentially starting in 2017
BE18	Coastal change and risks along Edinburgh's coast	Strengthen scientific evidence and awareness building (practitioner and public) of current and future coastal change along Edinburgh's coast and in the wider context of the Firth of Forth.	University of Glasgow (Dr. Jim Hansom – Lead, Dr James Fitton and Dr Larissa Naylor)	2016-2020

The Built Environment and Infrastructure Actions

Action Ref	Action Title	Action	Partners	Timescale
BE19	Coastal adaptation and stakeholder engagement	Engage stakeholders to identify how we can adapt our urban footprint to accommodate a dynamic and changing coast and live with increased coastal flood and erosion risk.	University of Glasgow (Dr. Jim Hansom – Lead, Dr James Fitton and Dr Larissa Naylor), Scottish Natural Heritage	2016-2020
BE20	Edinburgh's Local Transport Strategy (LTS) 2014 -2019	The next review of the Local Transport Strategy is anticipated to take place during 2017 to 2018. It is anticipated that the Issues for Review stage will consider Scotland's Climate Change Adaptation Framework and inform the development of policies to strengthen the resilience of Edinburgh's transport network to the impacts of climate change.	The City of Edinburgh Council Planning and Transport	2016-2019
BE21	Embed adaptation into the Road Asset Management Plan	New investment strategy focusing on a preventative approach for all transport assets. The condition of Edinburgh's road network and the effectiveness of the preventative materials will be monitored annually.	The City of Edinburgh Council	2016 onwards
BE22	Weather Resilience and Climate Change Adaptation (WRCCA) Plan for Network Rail Scotland Route	Plan incorporates a number of programmes and initiatives designed to ensure the climate resilience of the rail network in Scotland, including an assessment of key vulnerabilities in Edinburgh and the Lothians	Network Rail	Ongoing

The Built Environment and Infrastructure Actions

Action Ref	Action Title	Action	Partners	Timescale
BE23	SESTran Regional Transport Strategy	Support the Scottish Government's Climate Change Strategy, low emission vehicle development, infrastructure and use through improving the resilience of Edinburgh's transport network to the impacts of climate change, in the areas of: 1) Connectivity in Edinburgh e.g. airport gateway & surface access to/from the airport; 2) Edinburgh's sections of the regional movement corridors; 3) Region-wide measures concentrating on land use planning and a reduction in single occupancy vehicles, ensuring sustainability is a key consideration of future development; co-ordinating with local authorities and Health Boards to develop travel plans.	South East Scotland Transport Partnership (SEStran)	2015-2020
BE24	University of Edinburgh Climate Change Strategy	Through developing a new Strategy adapt the University to the impacts of climate change, including measures to: 1) Deliver globally by supporting/encouraging research, learning and teaching in adaptation, in keeping with the Strategy's whole institution approach; 2) Act in partnership locally, with continued representation on the Edinburgh Adapts Steering Group and participation in the Edinburgh Living Landscapes (ELL) Partnership, which addresses issues of adaptation for the city and will feed into estates design; 3) Identify, evaluate and monitor adaptation actions, following Adaptation Scotland guidance: assess climate threats and opportunities, assess climate risks and identify actions, report and implement, monitor and review 4) Conduct assessments of risk to operations and impact on stakeholders and future business every three years, collating data and information for the new Scottish Government mandatory climate change reporting requirements for adaptation.	University of Edinburgh, Edinburgh Living Landscapes, Edinburgh Adapts Steering Group	2016-19

Action Ref	Action Title	Action	Partners	Timescale
BE25	Edinburgh College Climate Change and Sustainability Action Plan	Edinburgh College has developed a Climate Change and Sustainability Policy of which one theme is climate change adaptation. An action plan will follow in 2016.	Edinburgh College	Draft – late 2016
HS1	Edinburgh World Heritage Management Plan 2017-2021	Develop a new Edinburgh World Heritage management plan with a section on adaptation. Opportunity to embed adaptation in strategic priorities for the city's historic environment.	The City of Edinburgh Council, Edinburgh World Heritage, Historic Environment Scotland, Scottish Natural Heritage	2016-2017
HS2	Historic Buildings – Awareness raising	Through training in traditional repair and maintenance skills for owners and occupiers of historic buildings, and trades people e.g. roofers, joiners and professionals such as surveyors	Edinburgh World Heritage, Historic Environment Scotland	Ongoing
HS3	Maintaining historic buildings	Maintain and repair historic buildings in Edinburgh to ensure that they are adapted to current and future climate change impacts	Edinburgh World Heritage, Historic Environment Scotland	Ongoing
HS4	Historic Buildings – easy-read guidance	Collation and simplification of existing built heritage guidance to produce an easy-read source of adaptation guidance for owners of historic residential and commercial buildings.	Edinburgh World Heritage, Historic Environment Scotland	2016 onwards
HS5	Edinburgh specific historic building maintenance guide	Draw on existing Historic Environment Scotland and Edinburgh World Heritage materials to produce a suite of guidance on building maintenance/adaptation tailored to promote to Edinburgh's commercial/tourism businesses.	Edinburgh World Heritage, Historic Environment Scotland, VisitScotland	Ongoing
HS6	Historic Environment Scotland's Climate Change Action Plan 2012-17	Undertake a pilot risk assessment of Historic Environment Scotland's own Estate to inform decision-making for prioritising the ongoing conservation and maintenance programme. Intention is to deliver a methodology that can be applied elsewhere by others	Historic Environment Scotland (HES)	2016-December 2016

Flood Prevention

Flooding has a huge impact on all sectors of society. Climate change is likely to exacerbate river and coastal flooding and greater frequency and intensity of extreme rainfall will increase surface water flooding.

The Flood Risk Management (Scotland) Act 2009 sets out Scotland's approach to flood risk management. The Act aims to reduce the adverse consequences of flooding on communities, the environment, transport, cultural heritage and economic activity. More thought is to be given to alternative means of reducing flood risk by avoiding the likelihood of flooding through effective land use planning, maintenance and better control and management of run-off.

Scotland is separated into 14 Local Plan Districts for flood risk management purposes. The Scottish Environment Protection Agency (SEPA), working with others, has produced a Flood Risk Management Strategy for each Local Plan District. These coordinate efforts to tackle flooding in Scotland, set the national direction of future flood risk management, helping to target investment and coordinate actions across public bodies. The strategies explain what causes flooding in high risk areas as well as the impacts when flooding does occur. This information is used as a basis for better decision-making across flood risk management organisations.

The City of Edinburgh Council was the Lead Authority for the area around the Forth Estuary. As lead authority the Council produced a Local Flood Risk Management Plan. The Plan provides further information on funding and the timetable for delivering the actions identified in the strategy between 2016 and 2022. Another of the local authorities in this area will now take on the role of lead authority for the next 6 years.

Edinburgh has two flood prevention schemes – on the Water of Leith and the Braid Burn. Studies are being undertaken into other at risk areas. A Surface Water Management Plan is being developed to identify the most sustainable range of actions to manage and reduce flood risk for this type of flooding. SEPA is developing flood mapping to improve understanding of coastal flooding risk.

SEPA and other responsible authorities have a duty to raise public awareness of flood risk. Improved awareness and actions that prepare people, homes and businesses from flooding can reduce the overall impact. SEPA engages with the community through local participation in national initiatives and in addition will engage with local authorities and community resilience groups where possible. Local authorities will be undertaking additional awareness raising activities. Daily national flood guidance statements are issued to Category 1 and 2 responders. SEPA issues flood warnings, giving people a better chance of reducing the impact of flooding on their home or business.

The below actions show what Edinburgh is doing to tackle and reduce flood risk for communities, homes and business, as well as other sectors of the city.

Flood Prevention Actions

Action Ref	Action Title	Action	Partners	Timescale
FL1	Water of Leith (Phase 2) Flood Protection Works	The Water of Leith (Phase 2) Flood Protection Scheme is currently under construction, scheduled to be completed by 2018. The scheme will protect Murrayfield and Roseburn from flooding from the Water of Leith.	The City of Edinburgh Council Flood Prevention Team , The City of Edinburgh Council Water of Leith (Phase 2) Team	2015-2018
FL2	Water of Leith Flood Protection Works Future Phases	Flood protection works have been proposed for Edinburgh to further reduce flooding from the Water of Leith. An updated economic appraisal has been undertaken on this watercourse and the proposed works will likely include Coltbridge, Gorgie and Saughton, subject to the availability of funding.	CEC Flood Prevention Team	TBA (Funding is not yet identified for this project)
FL3	Forth Estuary Flood Risk Management Strategy	The purpose of the Strategy is to identify flooding from various sources, its impacts, and outline action to address this flood risk. The Strategy is in three sections and provides: 1) background on the approach to flood risk management; 2) the causes and consequences of flooding, the agreed objectives, and the actions that will be taken in areas considered to be potentially vulnerable to flooding; and 3) shares the information on the sources of flooding, including surface water	Scottish Environment Protection Agency (SEPA), The City of Edinburgh Council, local authorities, Scottish Water, Scottish Natural Heritage	2016-2022
FL4	Forth Estuary Local Flood Risk Management Plan 2016-2025	Delivery plan to address actions to reduce flood risk detailed in the Forth Estuary Flood Risk Management Strategy	Scottish Environment Protection Agency, Scottish Water, The City of Edinburgh Council and 12 neighbouring Local Authorities, Scottish Natural Heritage	June 2016-2021

Flood Prevention Actions

Action Ref	Action Title	Action	Partners	Timescale
FL5	Edinburgh and the Lothians Integrated Catchment Study (linked with below)	To model the interaction between above and below ground water assets to establish where partnership working is, and will be, required.	Scottish Water	July 2013-2016
FL6	Surface Water Management Plan (SWMP) (linked with the above)	To ascertain the risk of flooding when surface water, watercourses and sewers interact and to develop a strategy to reduce the risk resulting from the interaction between sewers and other sources of flooding	The City of Edinburgh Council, Scottish Water	2021-2022
FL7	Water of Leith Siltation Study	The study will establish flood risk in this area of the Water of Leith and make recommendations regarding dredging. The study will also identify various environmental constraints and regulatory approvals which will inform future coordination arrangements.	The City of Edinburgh Council, Forth Ports and consultant	May 2016-November 2016
FL8	Niddrie Burn Flood Prevention Study	A flood protection study has been recommended for Niddrie Burn in Edinburgh to assess whether flood storage, modification of conveyance, installation/modification of fluvial control structures, flood defences and sediment management could reduce flood risk. The study will also consider the viability of property level protection. The study should take a catchment approach and consider the potential benefits and disbenefits and interaction between actions upstream and downstream. It should also aim to improve gauging on the Niddrie/Burdiehouse Burn catchment in partnership with SEPA and the City of Edinburgh Council.	The City of Edinburgh Council, Scottish Environment Protection Agency (SEPA) and consultant	2017-2022

Flood Prevention Actions

Action Ref	Action Title	Action	Partners	Timescale
FL9	Gogar Burn Flood Prevention Study	A flood prevention study has been recommended for Gogar Burn in Edinburgh to assess whether direct flood defences and sediment management could reduce flood risk. The study should take a catchment approach and consider the potential benefits and disbenefits and interaction between actions upstream and downstream. This study should also aim to improve the accuracy of the flood mapping in the Gyle/Gogar Burn area.	The City of Edinburgh Council, Scottish Environment Protection Agency and consultant	2020-2022
FL10	Water of Leith Flood Protection Scheme	Continue to maintain the existing flood protection scheme	The City of Edinburgh Council	Ongoing
FL11	Maintain the Water of Leith (Phase 2) Flood Protection Scheme in Murrayburn and Roseburn when completed in 2018	Reduce risk to community facilities and economic damages to properties in Edinburgh at Murrayfield and Roseburn	The City of Edinburgh Council	2018 onwards
FL12	Braid Burn Flood Protection Scheme	Continue to maintain the existing flood protection scheme, reducing the risk of flooding to homes and businesses along the Braid Burn between Redford Road and Portobello	The City of Edinburgh Council, Scottish Water, Network Rail, Scottish Environment Protection Agency, Scottish Natural Heritage, and private landowners	Ongoing
FL13	Greendykes and Nether Craigour	Continue to maintain the existing flood control structure, flood storage area and flood defences	The City of Edinburgh Council	Ongoing

Flood Prevention Actions

Action Ref	Action Title	Action	Partners	Timescale
FL14	Coastal flood defences	Continue to maintain existing flood defences along the coast.	The City of Edinburgh Council, Scottish Water, Network Rail, Marine Scotland, Scottish Environment Protection Agency, Scottish Natural Heritage, and private landowners	Ongoing
FL15	Reservoir maintenance	Continue to maintain the reservoirs in the upper catchment of the Water of Leith to reduce peak flows and lower river levels downstream.	The City of Edinburgh Council	Ongoing
FL16	Assessment and Inspection, Clearance and Repair	Local authorities have a duty to assess watercourses and coastlines and carry out repair works where such works would substantially reduce flood risk.	The City of Edinburgh Council, asset/land managers	Ongoing
FL17	Emergency Response	CEC responsibilities may include activating flood defence systems, provision of sandbags and other flood prevention controls, road traffic management, closures and diversions, assisting with warning and alerting arrangements, contributing to media and public information strategies, establishing emergency rest centres for the care and welfare of persons evacuated or affected, coordinating the longer term recovery measures for rehabilitation of the community and restoration of the environment	During severe flooding, the City of Edinburgh Council will work in partnership with the Emergency and Health Services, SEPA, Met Office, Scottish Water, Voluntary Organisations and other agencies to coordinate the response to the incident.	As and when required
FL18	Strategic Mapping and Modelling – sewer catchments	Scottish Water will review the assessment of flood risk within the highest risk sewer catchments to improve knowledge and understanding of surface water risk	Scottish Water	2016-2021

Flood Prevention Actions

Action Ref	Action Title	Action	Partners	Timescale
FL19	Awareness raising	SEPA and the responsible authorities have a duty to raise public awareness of flood risk. Improved awareness of flood risk and actions that prepare individuals, homes and business for flooding can reduce the overall impact. From 2016 SEPA will engage with the community through local participation in national initiatives, including partnership working with Neighbourhood Watch Scotland. In addition, SEPA will engage with local authorities and community resilience groups where possible. Local authorities will be undertaking additional awareness raising activities. The City of Edinburgh Council will engage at project level when required.	Scottish Environment Protection Agency (SEPA), Scottish Flood Forum, community flood action groups and local authorities	Ongoing
FL20	Site Protection Plans	Site protection plans are developed to identify whether normal operation of a facility can be maintained during a flood. This may be due to existing protection or resilience of the facility or the network. Edinburgh Airport operates a site protection plan.	Edinburgh Airport, other organisations	Ongoing
FL21	Natural Flood Management	Identify opportunities for natural flood management or other enhancement projects arising from the flood risk plans.	The City of Edinburgh Council Planning and Transport, SEPA, Scottish Natural Heritage	2016-2020
FL22	Reach agreement on SUDS between Scottish Water and CEC	The system for adoption of SUDS by Scottish Water requires review. Once rectified this will allow faster adoption of SUDS schemes, improving efficiency and maintenance.	The City of Edinburgh Council, Scottish Water	Ongoing

Society & Economy

Communities across the city are vulnerable to a whole range of impacts from climate change, including flooding, damage to property and temperature fluctuations.

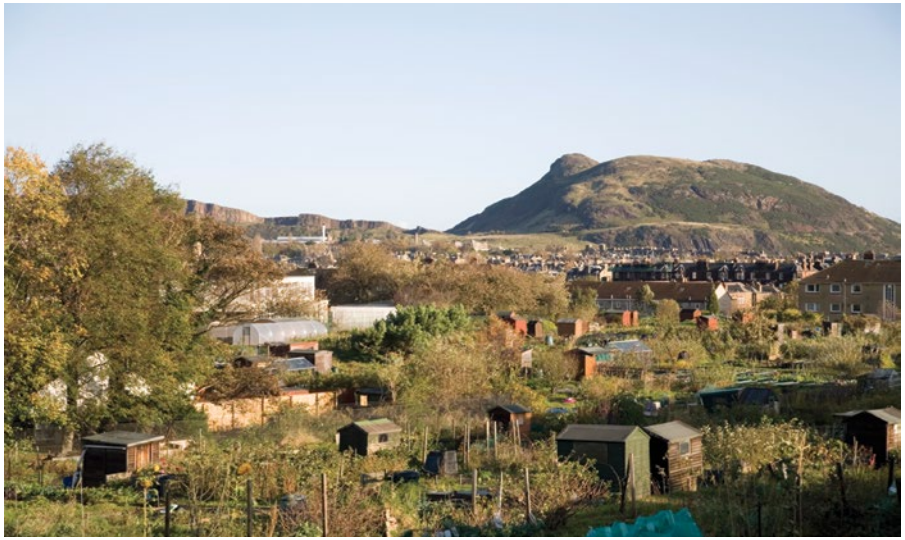
The National Flood Risk Assessment for Scotland estimated that the average annual damage to homes, businesses and agriculture from all sources of flooding is between £720m and £850m. In addition to the personal distress and health impacts of flooding, this represents a significant impact on Scotland's economy. In 2015, Edinburgh's estimated population was 498,810, and predicted to grow by 8.8 per cent by 2037. As Edinburgh's population grows, so does its vulnerability to these impacts.

Certain groups of people can be more vulnerable than others. This includes people living in areas at risk of, for example, flooding or excessive heat due to environmental conditions or poor building quality, and people who are already deprived by health, level of income, quality of their homes and mobility, the elderly and the very young. Extreme weather-related events are likely to increase mental as well as physical health problems.

There are around 2,000 heat-related deaths per year across the UK. The risk to health is projected to increase in the future as temperatures rise. Although the current level of risk is small, the future risk is unknown for homes, hospitals, care homes, schools, offices and prisons in Scotland. Policies do not exist at present to adapt homes or other buildings to higher temperatures projected for the future.

Indirect climate impacts, such as price fluctuations and the availability of certain foods and goods, will also impact on individuals, communities, and the economy.

This Action Plan aims to raise awareness of these impacts and ways to increase service and community resilience to them through partnership, neighbourhood and locality working. The Edinburgh Community Resilience Project aims to help neighbourhood areas enhance their capacity to



respond to and recover from resilience incidents. The 'Are we ready' toolkit developed by the Scottish Communities Climate Action Network and Adaptation Scotland aims to support community groups to start conversations about becoming more climate resilient. The Royal Botanic Garden Edinburgh host events and talks to raise awareness of the social and environmental impacts of climate change in Edinburgh and possible ways to adapt to these.

Climate change poses threats to the future prosperity of Edinburgh. A vibrant economy is vital to the continued success of the city and the well-being of its communities. Appropriate adaptation is required to maintain a city that remains attractive to investors and businesses. Informing and encouraging local business is of crucial importance to achieving this goal. Taking early action now will ensure businesses are best prepared for the impacts of climate change and able to take full advantage of the business opportunities offered by a changing local and global climate.

Business, tourism, the arts and service sectors are raising awareness and taking measures to adapt to a changing climate. The Green Arts initiative (GAI) raises awareness of the impacts and potential actions that arts organisations, venues, bodies and individuals can take. Edinburgh is a festival city, so it is vital that all its festivals are fully adapted to any future impacts.

Tourism is a vital part of Edinburgh's economy. The Insight Department at Visit Scotland published a paper on 'Extreme Weather Impact on Tourism and Events' (March 2013) which looks at trends in extreme weather events and how tourism businesses and events can become more resilient.

Engagement with communities and business will continue as this Action Plan progresses.

"The University of Edinburgh has 35,000 enrolled students, 13,000 staff and 550 buildings, making us a large community and a significant part of the city of Edinburgh. We are pleased to endorse the Edinburgh Adapts Action Plan and aim to contribute fully to its implementation and to continued development of adaptation measures for the city through partnership working."

Society & Economy Actions

Action Ref	Action Title	Action	Partners	Timescale
SE1	Edinburgh Community Resilience Project (Pilot)	To help neighbourhood areas enhance their capacity to respond to and recover from resilience incidents. Specific aims are to: 1) help community groups to develop a stronger facilitating role for mitigating resilience risks 2) provide advice on the risk of resilience incidents occurring in or affecting their locality or constituency 3) suggest mitigating actions to enhance preparedness 4) provide support to develop appropriate resilience arrangements to enable response and recovery Two Neighbourhood Partnership areas will be selected to take part in the pilot Project. Those who choose to do so will be given the opportunity to, using templates developed as part of the project, develop local resilience plans.	Corporate Resilience Unit, Category 1 Responders, other relevant agencies, Neighbourhood Partnerships, community-based groups	18-month pilot
SE2	Partnership & locality working	Through partnership, neighbourhood and locality working, raise awareness of the impacts of climate change and ways to increase service and community resilience to these.	City of Edinburgh Council Strategy & Insight, Edinburgh Partnership, Neighbourhood Partnerships, Locality Leadership Teams, Community Planning partners	2016-2020
SE3	Public Sector Sustainable Food Procurement	Improve food resilience by developing more sustainable food procurement practices by the city's public sector organisations	Edinburgh Food for Life Partnership	2012-2019

Society & Economy Actions

Action Ref	Action Title	Action	Partners	Timescale
SE4	Food Hubs – development proposals	Consider potential for local community food hubs to 1) Alleviate poverty 2) Support the local food economy and shorten supply chains, and 3) Build local resilience	Edible Edinburgh, Glasgow Food Policy Partnership, City of Edinburgh Council, Glasgow City Council, Nourish Scotland, key Edinburgh and Glasgow food groups	2015 onwards
SE5	Measure Edinburgh's progress as a 'Sustainable Food City'	1) Undertake a study of sustainability of Edinburgh's current food system to establish a baseline for – i. monitoring change. ii. Identifying priority issues for action 2) Development of a framework for regularly measuring progress	Edinburgh Centre for Carbon Innovation, Edinburgh's universities	2016
SE6	Local Sustainable Food Growing Strategy	To foster and support the development of resilience in local food systems and communities. Edible Edinburgh will engage and consult on the development of a local food growing strategy.	Edinburgh Local Food Network, Federation of City Farms and Community Gardens, Community Land Advisory Service, local growing groups, CEC Planning and Environment, Edinburgh & Lothian Greenspace Trust, Scottish Wildlife Trust, Development Trust Association Scotland	2016-2020
SE7	MSc Participation in Policy and Planning Food project	MSc student project to engage with key stakeholders on methods to take forward community food hubs, develop a baseline for measuring of Edinburgh's progress as a Sustainable Food City and a local sustainable food growing strategy, and for access to vacant or derelict land for food growing or temporary greening.	University of Edinburgh MSc Participation in Policy and Planning course, Edible Edinburgh	January – March 2017
SE8	Adaptation advice, support, awareness raising and research	Promote adaptation through providing advice and support to local businesses and organisations on adaptation, and undertaking research into tackling the challenges of the impacts of climate change	Edinburgh Centre for Carbon Innovation, ClimateXChange, Sniffer	Ongoing

Society & Economy Actions

Action Ref	Action Title	Action	Partners	Timescale
SE9	The Green Arts Initiative (GAI)	Through the Green Arts initiative (a community of practice for arts organisation), raise awareness of the impacts of climate change and any potential actions that arts organisations, venues, bodies and individuals can take.	Creative Carbon Scotland, Festivals Edinburgh, Green Arts Initiative members	2013 onwards
SE10	PAS Training Programme – Engagement & Awareness	Training programme to raise awareness of climate change impacts and resilience to these through supporting built environment professionals and community organisations to engage with adaptation	Adaptation Scotland, PAS, partners	Ongoing
SE11	PAS planning advice helpline	A free and impartial advice service on planning and related matters for individuals and community groups, to enable people to understand and engage with the planning system	PAS Advice Service	Ongoing
SE12	Community Raingardens	Work with community groups to promote and develop community green roofs and raingardens	Grow Wild Scotland	2016-17
SE13	Community Mentoring	Fund and support Grow Wild Volunteer Mentors as advisors providing community groups with advice and support on a range of plant and wild flowers related areas.	Grow Wild Scotland	2016-17
SE14	Living Wall	Create a living wall as part of the Edinburgh Festival	Lymbus	Subject to funding
SE15	VisitScotland Quality Assurance Scheme [Scotland wide]	This scheme already undertakes a basic assessment of sustainability actions within quality assured tourism businesses in the City. From 2016 onwards some basic advice around adaptation and signposting to further advice from Adaptation Scotland will be provided where relevant. A 'Better Business Guide' providing an introduction and basic advice and signposting is available to all businesses on visitscotland.org website.	VisitScotland	Ongoing

Society & Economy Actions

Action Ref	Action Title	Action	Partners	Timescale
SE16	VisitScotland Taste Our Best [Scotland wide]	A VisitScotland business accreditation aimed at promoting the use of local and Scottish produce in the catering and hospitality sectors.	VisitScotland	Ongoing
SE17	Adaptation showcase and information hub	A demonstration site/network which can be used to both showcase successes and best practice, and provide information and support to those looking to take independent adaptation action.	RSPB, Schools, community groups, Edinburgh Living Landscapes, Community Councils, Friends Groups (i.e. Friends of the Meadows), tenant/ housing groups.	Early stages
SE18	RBGE awareness raising	Through RGBE events and talks, raise awareness of the social and environmental impacts of climate change in Edinburgh, and possible ways to adapt to these	Royal Botanic Garden Edinburgh	Ongoing
SE19	Are we ready toolkit and workshops	Package of resources to support community groups to start conversations about becoming more climate resilient. Consists of a short film, workshop guide and information sheets. Workshops can be run with different community groups and aim to raise awareness of the need to adapt to local impacts and reduce emissions as a first stage in preparing a community resilience action plan.	Scottish Communities Climate Action Network (SCCAN), Adaptation Scotland	Ongoing
SE20	Community Adaptation Network	Work with the Community Adaptation Network to increase community resilience to climate change in Edinburgh	Edinburgh Adapts Steering Group, Adaptation Scotland, Community Adaptation Network	Early stages
SE21	2050 Climate Group	The 2050 Climate Group will empower young people to be part of the decision making process across all aspects of society to push for strong actions to support climate change mitigation to reduce as far as possible the need for adaptation. This will be achieved through the 2050 Young Leaders Development Programme and other work of the Group.	2050 Climate Group	Ongoing

Additional Actions

As part of the Edinburgh Adapts engagement exercise, we asked stakeholders if there were any other actions they would like included in the Plan if appropriate resources and funding were available. These additional or aspirational actions are shown below:

Action Ref	Action Title	Action	Partners	Timescale
ASP1	Citywide risk registers	Encourage the incorporation of climate-related risks into Risk Registers citywide	All sectors of the city	2016-2020
ASP2	Socio-economic analysis of status quo vs well adapted city	Undertake a study to compare the costs and co-benefits of 'business as usual' and 'well adapted' scenarios. This would be a holistic research project looking at the benefits, risks and constraints acting on the city. It would focus on the multiple, cross-sector benefits that can come with adaptation actions (including those to health, community cohesion etc.)	To be decided	To be decided
ASP3	Forward planning to ensure adaptation is embedded into infrastructure and maintenance/ upgrading projects and work	Develop mechanisms and communications channels to ensure adaptation and green infrastructure are promoted and embedded in future development and maintenance works through planned intervention and piggybacking measures.	The City of Edinburgh Council Environment, Transport and Planning, Scottish Natural Heritage, Scottish Water, Scottish Power, Scottish and Southern Energy, land-owners and developers, other road and transport stakeholders, etc	Ongoing
ASP4	Permeability Retrofitting	Create a plan and budget to retrofit permeability into existing urban surfaces	The City of Edinburgh Council, Scottish Natural Heritage, Scottish Water, Scottish energy providers, land-owners and developers, other road and transport stakeholders, etc	Ongoing

Additional Actions

Action Ref	Action Title	Action	Partners	Timescale
ASP5	Expand the use of park-lets	Essential Edinburgh partnered with Dobbies to create park-lets on George Street to improve the look of the street. This scheme could be expanded throughout appropriate spaces in the city, with businesses adopting their own parklets. This would extend habitats and help to green the urban environment.	Essential Edinburgh, other stakeholders	2016 onwards
ASP6	Edinburgh Indoor Market	Create a permanent indoor market place in Edinburgh to give local producers a way to connect with local customers. This would build on the success of the current farmers market. King Stables Road is a possible location.	Edible Edinburgh, Essential Edinburgh	
ASP7	Adaptation Champions	Recruit high profile Edinburgh leaders and citizens to be champions for adaptation and sustainable living.	All sectors of the city	2017 onwards
ASP8	Retain brownfield sites as areas to develop greenspaces	Develop certain brownfield sites as greenspaces and/or parks as city is regenerated. Sites could include community growing spaces. Recognise biodiversity value of brownfield sites – rare plants and invertebrates	CSGN Buglife Study & RBGE work Scottish Natural Heritage advisory role	2016-2020
ASP9	Sea level rise and Edinburgh's coast line	'The Edinburgh Shoreline Exhibition' RBGE, 2018. Hope to raise awareness of climate impacts such as sea level change, together with climate adapted future land use	Royal Botanic Garden Edinburgh, Edinburgh Living Landscape, Scottish Natural Heritage	to 2018
ASP10	Street trees	Increase the number of street trees in the city, raise awareness of the amount of trees currently being lost and the need for trees in the city, and promote heritage trees.	The City of Edinburgh Council Environment, Edinburgh World Heritage Trust, RBGE	2017 ongoing

Monitoring and Indicators

Annual progress reports will be produced over the life of this action plan. These reports will be submitted to the Edinburgh Sustainable Development Partnership and shared with partners.

The remit of the Edinburgh Adapts Steering Group is to oversee the development and implementation of the Action Plan. This includes monitoring adaptation projects and reporting on their progress.

The City of Edinburgh Council's Strategy and Insight Division will assist the Steering Group in monitoring the action plan.

Measuring adaptation is a complex policy issue and we will continue to monitor EU, UK and Scottish Government, and academic research to inform our practice, and work with our partners to improve our approach. An annual report on progress will be produced.

Indicators

A number of indicators are being developed to show active progress towards achieving the actions in this action plan.

Progress on some of these actions will be reported on in the annual reports of the organisations who have contributed actions. For public sector organisations, progress on some of the actions will be reported as part of their mandatory reporting duties under the Climate Change (Scotland) Act. Indicators will be developed for the remaining actions.

The City of Edinburgh Council's Strategy and Insight Division will collate this information and provide assistance in developing indicators for the remaining actions.

A RAG assessment will be provided for each action in the Action Plan. In addition, the indicators could be categorised as structural or community measures. Possible structured measures could include measuring by pre-designated spatial planning area, including volume of green structures (e.g. greenspace, living roofs and walls) water systems (e.g. retention, flowing and flooding), energy (efficiency and renewables) and urban structure (urban design and texture). Possible community measures could include awareness campaign, consultation exercise and co-production project impacts.

Version control

This document will be reviewed annually to ensure it is accurate and up to date.

No.	Version	Date	Initials	Description
1	V1.01	August 2016	FM	Initial year of Edinburgh Adapts Action Plan

THE EDINBURGH PARTNERSHIP

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for a resilient Scotland

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