

Over the last fifty years Scotland has seen a significant change in climate – to warmer and wetter weather with more extreme weather events. This trend is set to continue. The aim of Climate Ready Places is to get people thinking about Scotland becoming climate ready. What are the risks? What can we do? What do we want our future to look like?

The ideas displayed in Climate Ready Places have been collected from experts working on adaptation across Scotland in many different sectors.

We asked them to imagine what a Scotland adapting to climate change would look like. These visions for the future were then grouped under six illustrative Scottish 'places'. The posters display each of the six places – the Uplands, Lowlands, Suburbs, City, and Coastal and Industrial areas – in first their current unadapted state, then in their adapting state. Can you spot the differences? All of the changes made to make each place more climate ready are detailed on the accompanying info sheets, with more information available on our [website](#).

The innovations described are a collection of ideas – it is not a plan – but we hope that Climate Ready Places will start a conversation about the Scotland people would like to see in the future. There will be many more ways to get your area climate ready. We hope that through using these resources you'll have some ideas of your own.



Adaptation Scotland is a programme funded by the Scottish Government
and delivered by Sniffer



The Climate Ready Places Project was completed with
additional support from



Adaptation Scotland

Sniffer, Edinburgh Centre for Carbon Innovation, High School Yards, Infirmary Street, Edinburgh EH1 1LZ, Scotland UK

T: 0131 651 4675 **E:** adaptationscotland@sniffer.org.uk **W:** www.adaptationscotland.org.uk

Scottish Charity No SC022375, Company No SC149513. Registered in Edinburgh. Registered Office: 1 Exchange Crescent, Conference Square, Edinburgh, EH3 8UL

© Crown Copyright. Contains public sector information licensed under the Open Government Licence v3.0.

<http://www.gov.scot/CrownCopyright>

The 'City' represents the urban city and town centres across Scotland. The varied mix of historic and new buildings displays a distinctly Scottish character. They are a focus of commercial activity, both offices and shopping, they host important transport hubs, and are home to much of the population.

Our urban centres are already impacted by severe weather, especially flooding and storms – and increasingly from overheating. Disruption here often has consequences far beyond the local area. We can build climate resilience through increasing greenspace, improving flood management, retrofitting and maintaining our buildings, and securing our infrastructure.

Unadapted



Adapting



Maintain Buildings

Buildings are damaged by severe weather like high winds and heavy rainfall, as well as water penetration that causes damp, mould and condensation. Poor ventilation can lead to overheating. Good maintenance can improve building fabric, remove harmful vegetation, and give better protection against rain water. Recommissioning original features in traditional buildings, such as vents that have been blocked up, may provide sufficient passive ventilation.

Unadapted



Adapting



In-Street Rain Gardens

Urban streets are hard surfaces prone to localised surface water flooding and increased air temperature leading to overheating. By introducing permeable surfaces and green infrastructure, like trees and rain gardens, we can reduce local flood risk, provide natural shading, reduce overheating on streets and surrounding buildings, and improve local air quality.

Unadapted



Adapting



Local Growing

In many urban areas vacant sites can be used, even on a temporary basis, to produce food and increase greenspace, which benefits surrounding streets and buildings. These innovative projects create community spaces that have a wide range of benefits to local people and the environment. They also improve community cohesion which is critical to resilience.

Info sheet 1: The City

Unadapted



Adapting



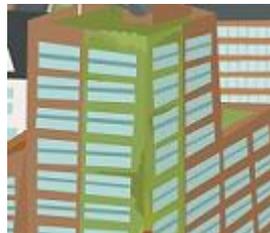
Replace Car Parking

Large areas of our urban centres are allocated to hard-standing car parking, which contributes to flooding and the urban heat island effect. By improving public transport and active travel links we can reduce demand for parking. Hard-standing surfaces can be made permeable and make room for greenspace. This will improve drainage and reduce local overheating.

Unadapted



Adapting



Retrofit Buildings

Many buildings will need to be retrofitted to perform in a warmer climate with both heavy rainfall and prolonged dry spells. They need to be well-ventilated to cope with overheating and damp, which may require alteration of the building or sometimes recommissioning original design features, like vents, that have not been in use. Nearby green infrastructure and external fitting of green-walls and roofs can improve insulation, reduce runoff and provide cooling.

Unadapted



Adapting



Healthcare Providers

Healthcare providers need to deliver critical services in a changing climate. Estate buildings need to be resilient to the risk of flooding or overheating, and emergency responders must plan ahead for change. Health issues may emerge around changing patterns of disease and lifestyle. This may change the way health care services and assets are provided and managed.

Unadapted



Adapting



Green Carparks

Car parking is provided in higher density multi-storey carparks, freeing up space for more greenspace in the urban centre. The carpark building can also incorporate green infrastructure in walls and roof, reducing local temperature, water runoff, air pollution and visual impact.

Info sheet 1: The City

Unadapted



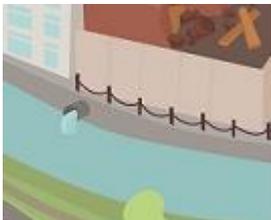
Adapting



Resilient Transport

Transport can be disrupted by severe weather with knock-on effects that interrupt the flows of people and goods throughout the network. The resilience of transport networks, including active travel, can be increased through investing in maintenance, innovative engineering solutions and capital expenditure on improvements. Smart transport networks can improve response and communication.

Unadapted



Adapting



Floodplain Park

Creating a riverside park reconnects the river to its floodplain providing room for water storage during floods. Removing stream culverts to create an open naturalised watercourse reduces the chance of blockage and lowers flood risk. The park is a major increase in urban greenspace providing health benefits and improving active travel connections within the city.

Unadapted



Adapting



Redevelop Derelict Sites

Redeveloping derelict sites can provide centrally located homes and commercial space, while ensuring heritage buildings are actively used and maintained. Redevelopments can increase climate resilience by being designed for weather resistance, ventilation and water management. It can also include green infrastructure like green walls and roofs.

Unadapted



Adapting

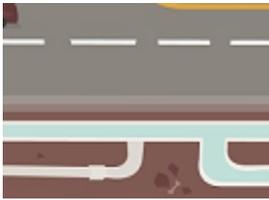


Public Space

Public spaces can integrate green infrastructure, such as pocket greenspaces and street trees, and permeable surfaces. This can provide shade and limit overheating on hot days, reduce puddles on wet days and improve air quality. Greening and pedestrianisation creates desirable public spaces, making them more attractive to residents and visitors.

Info sheet 1: The City

Unadapted



Adapting



Drainage Network

Heavy rainfall is expected more often with climate change. Draining this water through ever larger underground systems, and its subsequent treatment, is unsustainable. Surface water can be managed through widespread integration of sustainable drainage systems (SUDS) such as swales and permeable surfaces – where water is managed locally.

Unadapted



Adapting



Green Streets

Reducing city centre traffic makes space for integrating green infrastructure, including pocket greenspaces, street trees, rain gardens and swales. These make urban spaces more attractive and usable, particularly as temperatures rise and rainfall increases. They also create community spaces, support active travel (walking/cycling) and encourage local businesses like street cafés. Well-designed green infrastructure also benefits biodiversity.

Adaptation Scotland is a programme funded by the Scottish Government and delivered by Sniffer



The Climate Ready Places Project was completed with additional support from



Adaptation Scotland

Sniffer, Edinburgh Centre for Carbon Innovation, High School Yards, Infirmary Street, Edinburgh EH1 1LZ, Scotland UK

T: 0131 651 4675 **E:** adaptationscotland@sniffer.org.uk **W:** www.adaptationscotland.org.uk

Scottish Charity No SC022375, Company No SC149513. Registered in Edinburgh. Registered Office: 1 Exchange Crescent, Conference Square, Edinburgh, EH3 8UL

The 'Suburbs' represents the residential neighbourhoods of our towns and cities, home to the majority of people living in Scotland. These areas include our schools and local shopping, and our playing fields and parks.

Our neighbourhoods are already impacted by severe weather, especially flooding and storms. These risks will increase as the climate changes and some – like overheating – will become more important than they are today. We can become more climate resilient through increasing greenspace, retrofitting and maintaining our buildings, and improving flood management.

Unadapted



Adapting



Permeable Neighbourhoods

Hard-standing driveways and building extensions increase surface water runoff and cause localised flooding. Creating permeable surfaces and greenspace around homes prevents flooding and overloading of drainage systems during heavy rainfall events.

Unadapted



Adapting



All-Weather Sports

Sport fields will need to be carefully managed to deal with more frequent periods of prolonged rainfall or drought that can close grass pitches. In some cases only all-weather sports pitches can ensure year round access. The all-weather pitches must be designed and located so that they don't add to surface water management problems. They must also be usable in warmer conditions, for example by providing shade.

Unadapted



Adapting



Retrofitted School

Measures to increase climate resilience can be introduced as the school building is redeveloped over time. Better ventilation and maintenance of the building increases resilience to wind driven rain, damp conditions and overheating. A green roof improves insulation, prevents overheating and reduces runoff.

Info sheet 2: The Suburbs

Unadapted



Adapting



Quality Greenspace

Greenspace is re-designed to connect people and places, encouraging walking, cycling and enjoyment of the natural environment. Improving greenspace can contribute to surface water management in the area and help nature adapt by including a range of plant species.

Unadapted



Adapting



Retrofitted Apartments

Retrofit of water butts, downpipe disconnections, raingardens, planters and permeable surfaces can be effective for surface water management. External fitting of green-walls and roofs improve insulation, reduce runoff and provide cooling. Buildings will also need to be well-ventilated to cope with overheating and damp.

Unadapted



Adapting



Open Watercourses

Removing culverts and re-introducing open water channels slows the flow of rain water in to drains and rivers, helping to reduce the risk of flooding. This also improves water quality, provides space for vegetation and more public greenspace.

Unadapted



Adapting

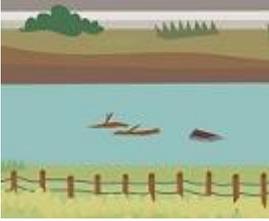


Safe Homes

Investing in flood prevention schemes can reduce local flood risk while improving greenspace and local amenities. This can ensure people stay in the area, are able to access affordable insurance, and encourage better maintenance of homes and the neighbourhood.

Info sheet 2: The Suburbs

Unadapted



Adapting



Re-naturalising Watercourse

The canalised watercourse can be restored to more natural meanders and banks. Giving space to the watercourse and allowing temporary flooding of greenspace reduces flood risk to surrounding areas. It also improves habitats and allows access for recreation and active travel.

Unadapted



Adapting



Community Hub

A community hub provides access to local services and workspace bringing people together to develop local projects and social enterprises. This helps community coordination and people will be less reliant on travel to access services.

Unadapted



Adapting



Protect Critical Services

Emergency services and their critical assets, like fire stations, need to operate during severe weather events. The sites and access routes need a high degree of flood protection to ensure it remains operational in emergencies.

Unadapted



Adapting



Permeable Surfaces

Replacing hard-standing car parks and driveways with permeable surfaces and making room for more greenspace, including street trees, can improve drainage, reduce local overheating, and improve air quality.

Info sheet 2: The Suburbs

Unadapted



Adapting



Climate Ready Homes

Homes will need to cope with rising temperatures, heavy rainfall and damp. To be low carbon and climate resilient, design will need to consider ventilation, solar gain and shading. They can be surrounded by permeable surfaces and green infrastructure for surface water management and to reduce local overheating.

Unadapted



Adapting



Climate Classroom

Schools can demonstrate best practice in the community. Replacing grey-space impermeable surfaces with an outdoor classroom that integrates green infrastructure, food growing, and natural habitat can increase the climate resilience of the school and raise awareness in the community.

Unadapted



Adapting



Community Growing

Community growing initiatives can increase greenspace, often in underused locations. As well as growing local seasonal food, they can enhance biodiversity, provide a focus for local projects, and improve community cohesion.

Unadapted



Adapting



Remove Culvert

Removing the culvert under the bridge will improve the flow of water, contribute to reducing flood risk, and stop litter and debris from being trapped. It will increase the visual appeal of the river and improve the river environment.

Adaptation Scotland is a programme funded by the Scottish Government and delivered by Sniffer

The Climate Ready Places Project was completed with additional support from



Adaptation Scotland

Sniffer, Edinburgh Centre for Carbon Innovation, High School Yards, Infirmary Street, Edinburgh EH1 1LZ, Scotland UK

T: 0131 651 4675 E: adaptationscotland@sniffer.org.uk W: www.adaptationscotland.org.uk

Scottish Charity No SC022375, Company No SC149513. Registered in Edinburgh. Registered Office: 1 Exchange Crescent, Conference Square, Edinburgh, EH3 8UL

The 'Industrial' place represents many of the industries, infrastructure and services that our urban areas are built around, and which our society relies on. These are the motorways, ports and bridges that connect us, the powerlines that provide our electricity and ICT solutions, and the treatment plants that manage our waste and water.

It is essential that infrastructure, services and networks are climate resilient and able to cope with an increase in disruptive weather events. This means securing existing assets, as well as developing new infrastructure that can service a climate ready, low carbon future.

Unadapted



Adapting



Connected Transport

Connecting different modes of transport increases travel options, making us less reliant on a single form of transport. This can increase network resilience. Here a new train station is linked to active travel routes, reducing the need to use a car to get to the business park.

Unadapted



Adapting



Replace Carparks

Improving public transport and active travel links can reduce demand for parking. Hard-standing surfaces can be made permeable and make room for more greenspace. This can make local buildings more resilient by improving surface water drainage, providing shade from trees and reducing local overheating.

Unadapted



Adapting



Redevelop Derelict Sites

Redeveloping derelict sites can provide new homes and commercial space, while protecting heritage buildings. Climate resilience can be increased by designing for ventilation, weather resistance and water management. It can also include green infrastructure like green walls and roofs.

Info sheet 3: Industrial

Unadapted



Adapting



Ferry Connections

Passenger ferries are a critical transport link, especially when they connect island communities. Harbour design is critical to secure that the port can operate in all but the most severe weather condition.

Unadapted



Adapting



Offshore Renewables

There is a growing offshore renewable energy sector that needs to be supported by resilient onshore infrastructure, including servicing at key ports.

Unadapted



Adapting



Green Bridge

A green bridge spanning the motorway reduces a barrier to active travel in the urban area – connecting the new train station and business parks. This provides more travel options and increases network resilience.

Unadapted



Adapting



Restored Ecosystems

Wasteland and disused sites can be restored to functioning ecosystems. For example wetlands can provide a range of benefits to the surrounding area, including surface water management, biodiversity, and improving water and environmental quality.

Info sheet 3: Industrial

Unadapted



Adapting



Smart Travel

Smart travel advice can be provided on route selection and travel options on-road, in-car and before leaving home. Transport disruption from severe weather can be managed through real-time information.

Unadapted



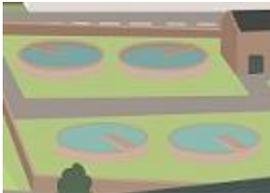
Adapting



Data Centre

A new technology industry data centre on a previously derelict site can take advantage of local energy and heat networks. It can be designed to stay cool during hot summers and to be resilient to on-site flood risk.

Unadapted



Adapting



Waste Water Treatment

Investing in waste water treatment works has given rise to bio-refineries, which recover energy, nutrients and other valuable products from our waste resources, making them available for local reuse – enhancing the resilience of nearby building and infrastructure.

Unadapted



Adapting



Coastal Defences

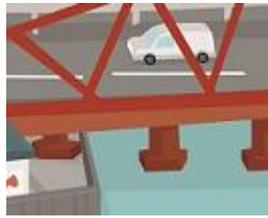
Sea level rise increases risk to critical infrastructure near the coast. Some sites may need protection with hard coastal defences, although nature-based solutions can make a significant contribution in many locations.

Info sheet 3: Industrial

Unadapted



Adapting



Strengthened Structures

Storm surges, exacerbated by sea level rise, could undermine structures such as bridges. Where necessary, we can strengthen support structures to increase resistance to damage.

Unadapted



Adapting



Resilient Harbours

Ports are critical infrastructure providing passenger and freight transport connections. They also support fishing and offshore energy industries. Designing and maintaining harbours to withstand long-term sea level rise and extreme weather means they can stay open in all but the most severe weather.

Adaptation Scotland is a programme funded by the Scottish Government and delivered by Sniffer



The Climate Ready Places Project was completed with additional support from



Adaptation Scotland

Sniffer, Edinburgh Centre for Carbon Innovation, High School Yards, Infirmary Street, Edinburgh EH1 1LZ, Scotland UK

T: 0131 651 4675 E: adaptationscotland@sniffer.org.uk W: www.adaptationscotland.org.uk

Scottish Charity No SC022375, Company No SC149513. Registered in Edinburgh. Registered Office: 1 Exchange Crescent, Conference Square, Edinburgh, EH3 8UL

The 'Coast' represents Scotland's extensive and varied coastline. This includes communities from the islands of the Hebrides and Northern Isles, to the dunes and golf courses of the East coast and Ayrshire.

Sea level rise will increase flooding and accelerate erosion at our coasts. Warming seas and acidification will impact on marine ecosystems. This will have significant impact on coastal communities, infrastructure and industries. Long-term planning will need to take account of a changing coast.

Unadapted



Adapting



Coastal Change

Sea level rise will accelerate coastal erosion and change the coast. Erosion can be limited through managing coastal systems, for example by protecting dunes with planting and preventing access by livestock. Long term planning for inevitable change can limit the impacts on people and ecosystems, in some cases this may be managed realignment of the coast.

Unadapted



Adapting



Relocate Infrastructure

Sea level rise will increase coastal flooding and accelerate coastal erosion, damaging coastal defences and infrastructure. It may be a better long-term option to relocate infrastructure, such as road and rail networks, away from particularly vulnerable coastal locations.

Unadapted



Adapting



Community Hubs

Remote communities, and the services that support them, can be vulnerable. Community hubs can support community groups, demonstrate good practice and co-ordinate emergency response to severe weather.

Info sheet 4: The Coast

Unadapted



Adapting



Agricultural Productivity

A warming climate may benefit agricultural productivity and allow more diverse crop types, although weather will remain variable and at times damaging. Managing potential waterlogging of fields, improving soil quality and maintaining protective shelterbelts can increase resilience.

Unadapted



Adapting



Buildings at the Coast

Sea level rise will increase coastal flooding and erosion. Managing coastal systems carefully can limit erosion but at some locations buildings cannot be protected. Careful planning for change can ensure suitable use of coastal sites.

Unadapted



Adapting



Managed Re-alignment

Flood protection banks can lead to coastal squeeze, limiting natural processes and movement of habitats. Removing or relocating the protection inland can allow the coastline to re-align and develop mudflat and saltmarsh habitats.

Unadapted



Adapting



Coastal Heritage

Coastal erosion can damage heritage sites but it also exposes new archaeological features. Options to defend sites are limited and not always desirable. The focus can be on new discoveries and visitor information rather than preservation.

Info sheet 4: The Coast

Unadapted



Adapting



Slope Stability

Increased rainfall can lead to slope instability and more frequent disruption of key transport links. Geotechnical engineering or the planting of appropriate vegetation can improve slope stability, although in some circumstances it may be necessary to relocate roads.

Unadapted



Adapting



Waterfront Buildings

Coastal flooding will increase due to rising sea level. Buildings that are considered vulnerable to flood risk, like homes, should be set back from coast. Existing at-risk buildings can be converted to less vulnerable uses, like shops and offices, taking flood resilience measures.

Unadapted



Adapting



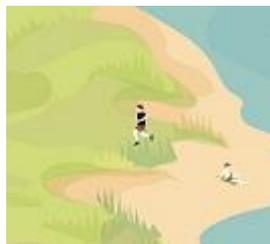
Re-establishing Coastal Processes

Sea level rise is driving change at the coast, putting pressure on coastal systems. Land use in some locations, like plantation forestry, may need to make room for coastal processes of sand redistribution and dune formation.

Unadapted



Adapting



Dune Systems

Removing hard coastal defences where they are not essential allows the natural process of dune formation in response to sea level rise. This maintains the dune system's capacity to benefit nearby settlement. A small part of the golf course can be redesigned to accommodate this change.

Info sheet 4: The Coast

Unadapted



Adapting



Resilient Harbour

Sea level rise will increase exposure to storm surge flooding, as well as undermining coastal defences. Harbour infrastructure and buildings will need strengthened defences. Response and recovery operations will need to be planned. A new harbour wall provides a possible renewable energy innovation opportunity.

Unadapted



Adapting



Aquaculture

Increasing water temperature and ocean acidification will affect growth rates of farmed finfish and shellfish, increase the presence of parasites and pathogens, and change species suitability. Aquaculture will need to consider choice of species, manage threats, and innovate in design and technology.

Unadapted



Adapting



Fisheries

Warming seas will change species distributions as warm water species, like red mullet and sea bass, begin to replace cold water species, like cod. Fisheries will need to travel further or change target species. This may alter the equipment needed or how the fish is supplied to consumers.

Adaptation Scotland is a programme funded by the Scottish Government and delivered by Sniffer



The Climate Ready Places Project was completed with additional support from



Adaptation Scotland

Sniffer, Edinburgh Centre for Carbon Innovation, High School Yards, Infirmary Street, Edinburgh EH1 1LZ, Scotland UK

T: 0131 651 4675 E: adaptationscotland@sniffer.org.uk W: www.adaptationscotland.org.uk

Scottish Charity No SC022375, Company No SC149513. Registered in Edinburgh. Registered Office: 1 Exchange Crescent, Conference Square, Edinburgh, EH3 8UL

The 'Lowlands' represents areas of productive agriculture and smaller towns and villages, many with a heritage of mining and industry. This place captures the rolling hills and plains of eastern Scotland and the central lowlands.

A warming climate could improve growing conditions and agricultural productivity. Making the most of this opportunity will depend on carefully managing changes to water, soils, pests and disease. As extreme storms become more frequent, flood management measures will become even more important to help protect people and assets locally, as well as settlements downstream.

Unadapted



Adapting



Soil Management

Soil and crop management will need to respond to changes in growing seasons, rainfall patterns and water availability. For example increased heavy rainfall may increase soil erosion, run-off, compaction and crop damage. This could be countered by improving soil quality, using cover crops to reduce soil exposure, strengthening hedging, field trees and other field boundaries, and ploughing along slope contours.

Unadapted



Adapting



Crops

A warming climate could benefit agricultural productivity and allow new crops, although weather will remain variable and at times damaging. Changes to farming practice could take opportunities and minimise threats, for example through establishing tree shelter-belts and making use of poly tunnels (perhaps with smart materials).

Unadapted



Adapting



Re-naturalising Watercourses

Re-naturalising watercourses (by de-canalising and restoring meanders) is a natural flood management measure that can reduce flood risk downstream. This improves water quality, provides riparian habitats for wildlife and reduces maintenance costs.

Info sheet 5: Lowlands

Unadapted



Adapting



Archaeological Sites

Heavy rainfall and changing patterns of land use can increase soil erosion and disturbance to archaeological sites, especially if damaging cultivation, grazing or burrowing animals are present. Controlling rabbits, limiting to light grazing and preventing invasive vegetation can protect the Iron Age hill fort.

Unadapted



Adapting



Changing Crops

Increased heavy rainfall can lead to soil erosion, crop damage and impact on water quality due to runoff from fields. It may be appropriate to change to a different crop, for example small-scale short rotation coppice willow that provides energy for biomass and supports community resilience.

Unadapted



Adapting



Reconnecting Floodplain

Heavy rainfall can increase flooding in the catchment. Natural flood management can reduce flood risk, for example by removing the flood bank to reconnect the river with the floodplain, which provides storage of flood water.

Unadapted



Adapting



Livestock Management

Waterlogged ground is vulnerable to poaching by cattle, causing erosion and pollution. In summer, cattle may be vulnerable to heat exposure during heatwaves. Farming practices can adapt, for example by building sheds, fencing land by rivers, and providing trees for shade.

Info sheet 5: Lowlands

Unadapted



Adapting



Creating Habitat

Nature and biodiversity is vulnerable to climate change. Creating a pond from former gravel working can provide new habitats for wildlife, woodland for birds including new arrivals like nuthatch, and opportunities for recreation, including angling.

Unadapted



Adapting



Lowland Raised Bog

Lowland raised bog is vulnerable to drying out in summer. The restoration of bogs by blocking ditches and managing agricultural runoff can improve ecosystem function and increase resilience. It can also slow deterioration of archaeological remains.

Unadapted



Adapting



Protect Infrastructure

With an increase in flooding, key infrastructure such as water and wastewater facilities may need increased flood protection. A variety of methods can be used to adapt sites to flood risk, for example, constructing hard defences, creating upstream storage for flood waters, and raising control equipment above flood level to maintain services during floods.

Unadapted



Adapting



Improved Livestock Buildings

Hotter summers can lead to overheating for livestock kept indoors. Improving ventilation in buildings will reduce this risk. There is also potential to capture biomass for local energy production.

Info sheet 5: Lowlands

Unadapted



Adapting



Surface Water

Localised surface water flooding in the village during heavy rainfall events can be reduced by increasing permeable surfaces and green infrastructure like green roofs and swales.

Unadapted



Adapting



Flood Protection

New flood protection measures can protect the village. The river can be given space on the floodplain that includes planned flooding of the play area, which is designed to recover quickly after an event.

Unadapted



Adapting



Historic Sites

Historic structures can be consolidated or restored to reduce vulnerability to changing weather. Adaptive and proactive conservation of exposed features, for example turf roofs and soft capping of walls, can limit the damage. Some buildings may be restored for use.

Unadapted



Adapting



Active Travel

The longer season for outdoor activities is an opportunity to encourage more cycling and walking for recreation and active travel, reducing car use and providing health benefits. New safe cycle routes can be provided into and through the countryside.

Adaptation Scotland is a programme funded by the Scottish Government and delivered by Sniffer

The Climate Ready Places Project was completed with additional support from



Adaptation Scotland

Sniffer, Edinburgh Centre for Carbon Innovation, High School Yards, Infirmary Street, Edinburgh EH1 1LZ, Scotland UK

T: 0131 651 4675 E: adaptationscotland@sniffer.org.uk W: www.adaptationscotland.org.uk

Scottish Charity No SC022375, Company No SC149513. Registered in Edinburgh. Registered Office: 1 Exchange Crescent, Conference Square, Edinburgh, EH3 8UL

The 'Uplands' represents largely rural areas with forests, open moorlands, and hills rising to our towering mountains. These are iconic Scottish landscapes of both the Highlands and Southern Uplands.

The impacts of climate change will be widely felt here – with warmer temperatures and increasingly seasonal rainfall affecting habitats and wildlife. By improving the quality and connectivity of habitats we can build resilience, helping to build a vibrant and sustainable rural economy in the future.

Unadapted



Adapting



Connected Habitats

Some species will need to move to remain in their preferred climate space. Fragmented habitat can make this difficult. Expanding woodlands and building a green bridge over the carriageway can improve connections between habitats.

Unadapted



Adapting



Mixed-Species Forest

Single-species, even-aged forests are more vulnerable to changes in climate and the spread of pests and disease. Introducing a mix of species and making use of systems like continuous cover forestry can increase forest resilience. This will also benefit biodiversity, improve the landscape and reduce catchment flood risk.

Unadapted



Adapting

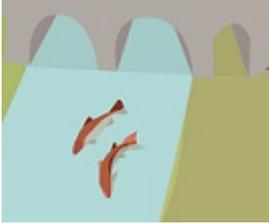


Deer

Deer health can be impacted by wet conditions, the spread of disease and inappropriate numbers - which can also reduce plant diversity. Red deer are naturally a forest-edge species, so expanding forest habitat could benefit their health, where grazing, trampling and browsing effects are managed to allow forest regeneration.

Info sheet 6: Uplands

Unadapted



Adapting



Fish

Increasing water temperature and low water levels in rivers will have a detrimental impact on fish health. Expanding riparian vegetation on river banks can provide shade and restore watercourses in degraded areas, creating pool-riffle river beds, with deeper water and areas suitable for spawning.

Unadapted



Adapting



Resilient Buildings

Buildings and their surroundings can be damaged by severe weather like high winds and heavy rainfall, as well as water penetration during prolonged wet intervals causing damp, mould and condensation. Maintenance is important to ensure weather resistance and ventilation. Green roofs and permeable surfaces can reduce localised flooding.

Unadapted



Adapting



Distillery

Distilleries will need to plan for less reliable water supply, overheating in summer and increased flood risk. This can be achieved through increasing ventilation and water efficiency – as well as implementing a strategy to minimise environmental impact.

Unadapted



Adapting



Farming

Warmer conditions can make marginal land more viable for farming, although heavy rainfall increasing soil erosion and unpredictable weather will be challenging. Farming can diversify with low density cattle grazing on the hills and fodder crops on better land. Lowering sheep numbers can reduce erosion on slopes and benefit wildlife.

Info sheet 6: Uplands

Unadapted



Adapting



Shelter

An increase in tree cover and shelterbelts can provide better shelter for livestock during extreme weather conditions, connect woodland networks, host biodiversity and provide a source of fuel for the farm.

Unadapted



Adapting



Reservoir Management

Reservoirs will need to be managed for more variable and seasonal rainfall – wetter winters and drier summers – increased intensity of rainfall affecting water quality, and potential for less snow cover reducing spring peak river flows. Maintenance of impoundments and catchment land use can regulate water supply, reduce flood risk, and ensure water quality.

Unadapted



Adapting



Local Energy

Severe weather can disrupt energy supply to local communities and business. Developing local community energy and heat generation, like a biomass boiler using distillery and forestry bi-products, can diversify supply and increase local resilience.

Unadapted



Adapting



Roadside Swales

Heavy rainfall is expected to increase. Roadside swales and other features can manage surface water on roads and runoff onto adjacent land. This can reduce disruption from flooding and improve the quality of water entering the surrounding environment.

Info sheet 6: Uplands

Unadapted



Adapting



Restore Peat Bogs

Blanket peat bog is at risk of drying out and wildfires due to rising temperatures and reduced summer rainfall. Restoring blanket peat bog – for example by blocking ditches to raise the water table – can help the bog function by retaining water. This also reduces downstream flood risk during wet periods and can improve water quality.

Unadapted



Adapting



Breeding Habitats

The water's edge nests of species like red- and black-throated divers can be vulnerable to flooding and fluctuating water levels, as well as predators. Floating rafts have been successful in providing less vulnerable nesting sites. Bird hides also provide tourism opportunities.

Unadapted



Adapting



Sustainable Tourism

There is an opportunity to build on tourism that is sustainable and works to enhance the natural environment. This encourages visitors and locals alike to enjoy outdoor activities. Derelict buildings can be repurposed for economic purposes like hospitality, bike hire and accommodation.

Unadapted



Adapting



Diversify Grouse Moors

Intensive grouse moor management leaves land vulnerable to increased risk from wildfire and erosion. Red grouse are more susceptible to ticks and diseases. Diversifying moors to promote a mosaic of habitats may reduce these risks, increase habitat diversity, while still providing for sport shooting.

Info sheet 6: Uplands

Unadapted



Adapting



Seasonal Tourism

Warmer and drier conditions could lengthen and improve the summer tourist season, although weather will remain unpredictable. There is an opportunity to diversify tourism, taking advantage of outdoor activities like mountain biking. However, less reliable winter snow season could be challenging for year-round tourism in some locations with snow sports.

Unadapted



Adapting



Landslides

An increase in prolonged periods of heavy rainfall can lead to more landslides that disrupt transport routes and other infrastructure. Slope management and reinforcement, through engineered works or tree planting, can protect important infrastructure, minimising damage and disruption.

Unadapted



Adapting



Restore Wet Woodlands

Wet deciduous woodlands are important habitats that need to be encouraged to expand on poorly-drained floodplains. Active management can contribute to flood water storage and provide shade during hot conditions.

Adaptation Scotland is a programme funded by the Scottish Government and delivered by Sniffer



The Climate Ready Places Project was completed with additional support from



Adaptation Scotland

Sniffer, Edinburgh Centre for Carbon Innovation, High School Yards, Infirmary Street, Edinburgh EH1 1LZ, Scotland UK

T: 0131 651 4675 E: adaptationscotland@sniffer.org.uk W: www.adaptationscotland.org.uk

Scottish Charity No SC022375, Company No SC149513. Registered in Edinburgh. Registered Office: 1 Exchange Crescent, Conference Square, Edinburgh, EH3 8UL